Huaptec

TEST REPORT FOR

Quint Band Signal Booster
Model: Pro25-5S-LCD

Tested To The Following Standards:

FCC Part 20.21 / 22 / 24 / 27

Report No.: 99881-9

Date of issue: June 9, 2017

A2LA ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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.

TABLE OF CONTENTS

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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Bao'an Shenzhen 518102, China

REPRESENTATIVE: April

REPORT PREPARED BY:

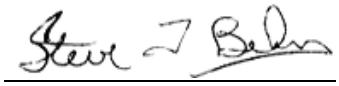
Terri Rayle
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 99881

DATE OF EQUIPMENT RECEIPT: May 10, 2017
DATE(S) OF TESTING: May 10 to June 1, 2017

Report Authorization

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



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

Test Facility Information

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

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

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02
EMITest Immunity	5.03.02

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A, CA	US0060	SL2-IN-E-1146R	3082D-1	US1025	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 20.21 / 22 / 24 / 27

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	NA[1]

NA = Not Applicable

NA[1] = Not applicable because the EUT does not employ a spectrum block filter.

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 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Quint Band Signal Booster	Huaptec	Pro25-5S-LCD	NA
Power Supply	Generic	GM50-120300-F	NA

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

FCC PART 20.21

7.1 Authorized Frequency Band Verification

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	7.1 Band verification		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1° C
Relative Humidity: 40%
Pressure:100.8 kPa

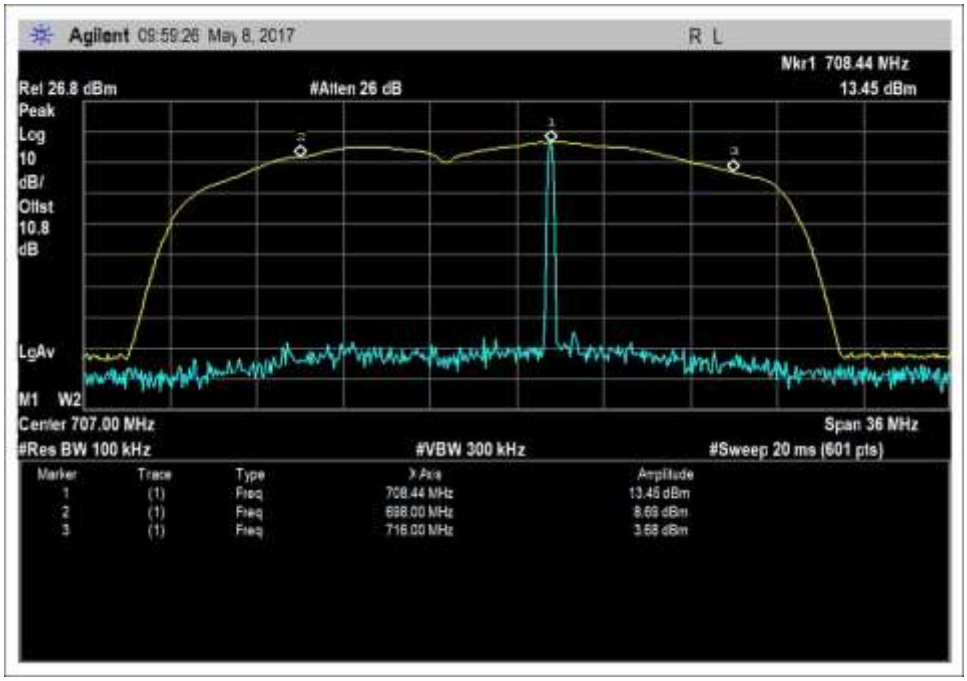
Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
AN3420	Agilent	E4438C	7/8/2015	7/8/2017

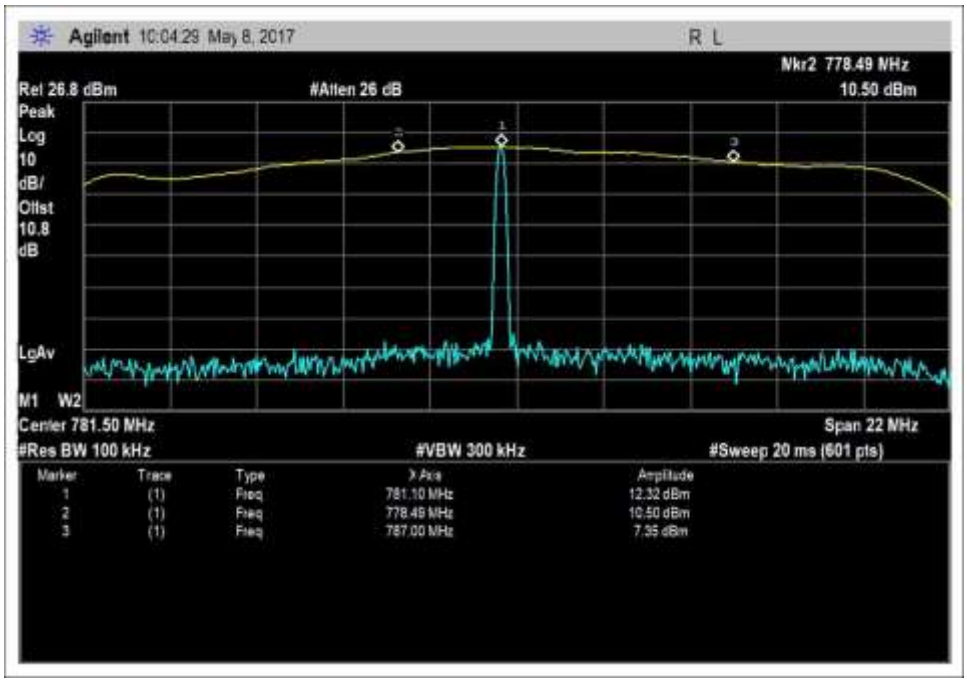
Summary of Results

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

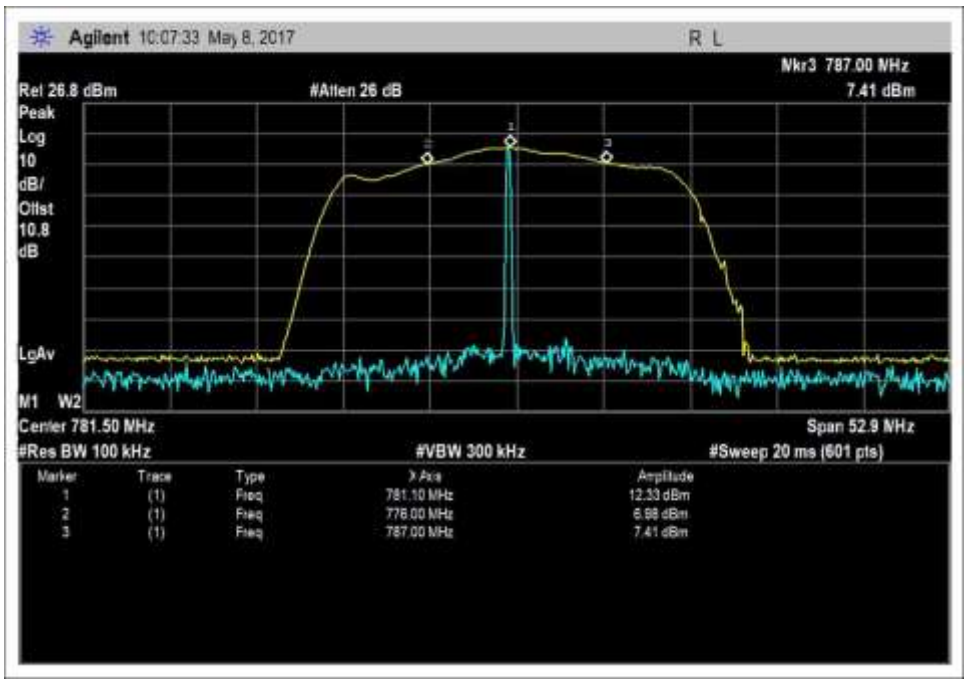
Plots



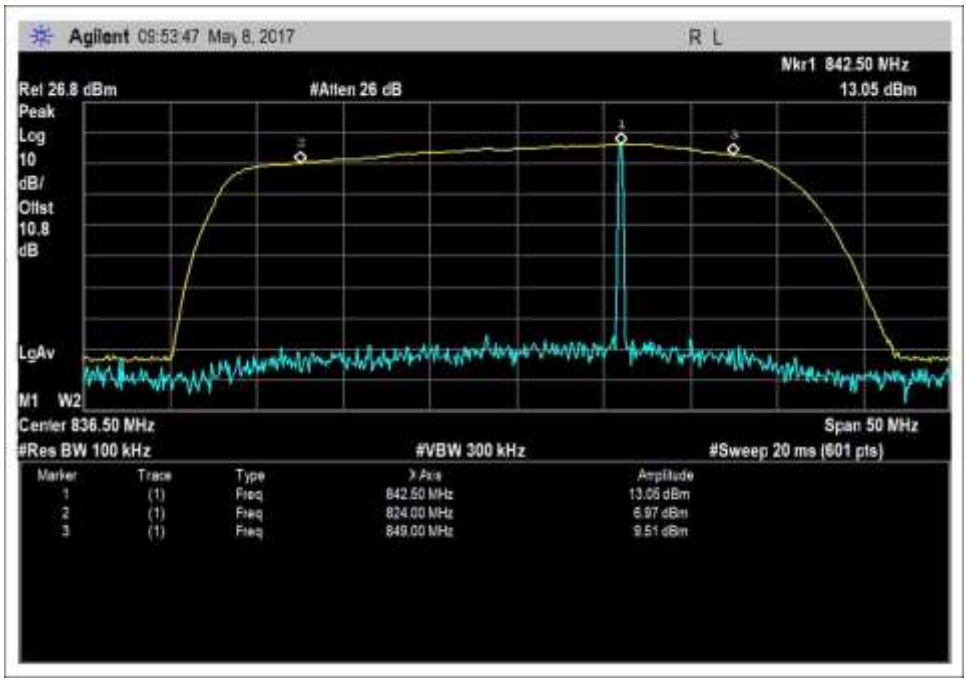
UL_698-716MHz



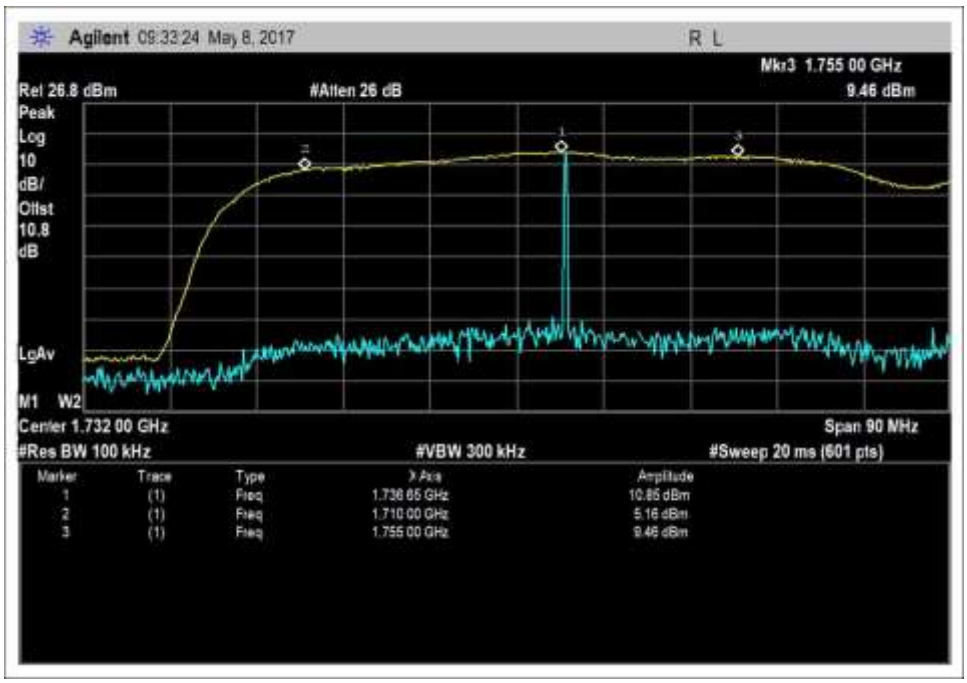
UL_776-787MHz



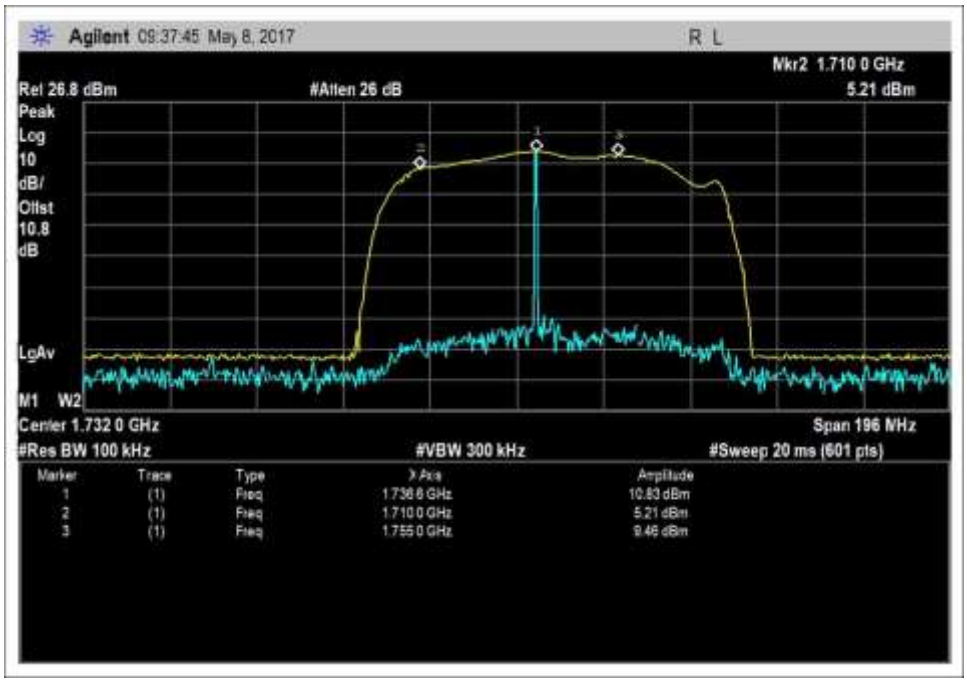
UL_776-787MHz_zoom



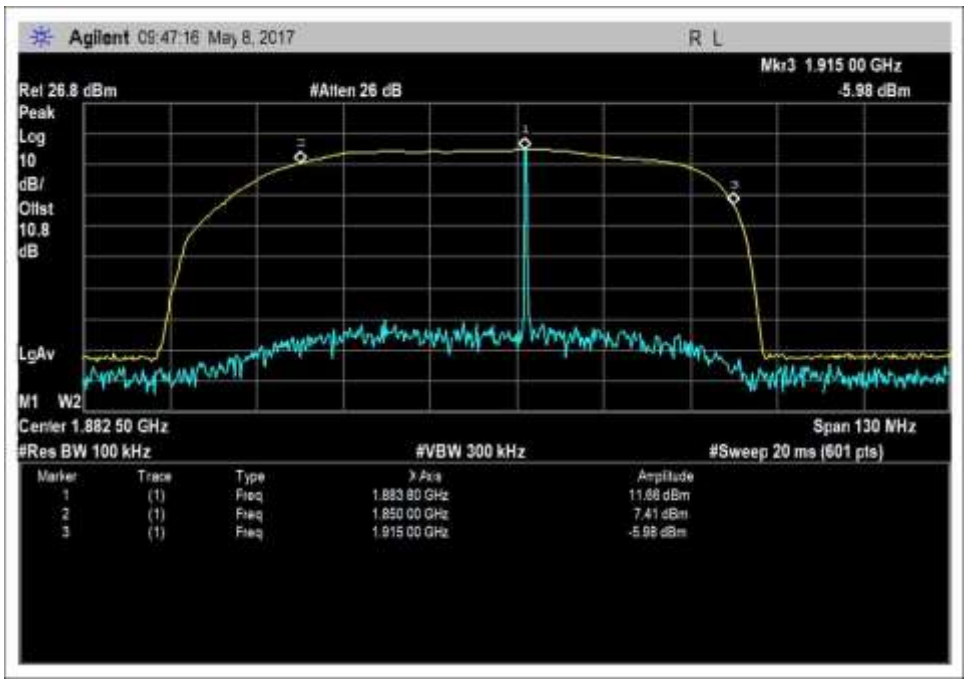
UL_820-849MHz



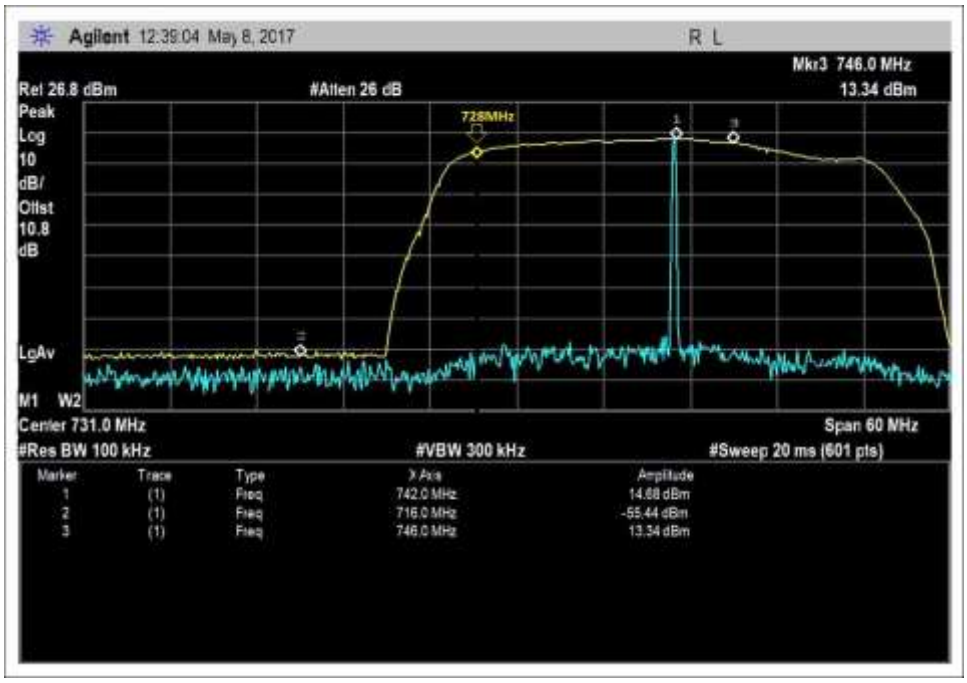
UL_1710-1755MHz



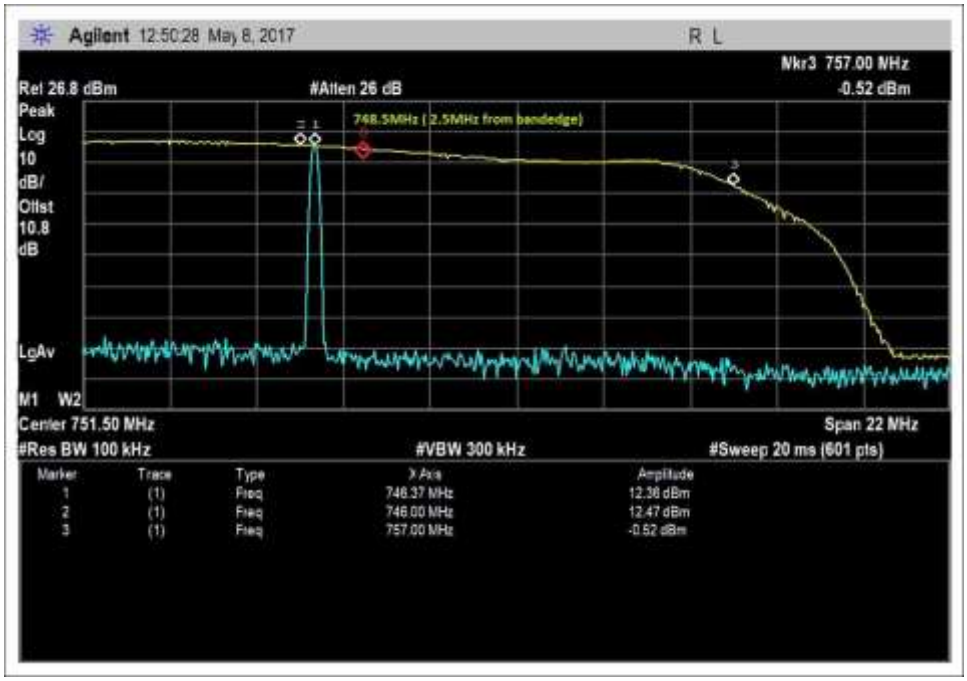
UL_1710-1755MHz_zoom



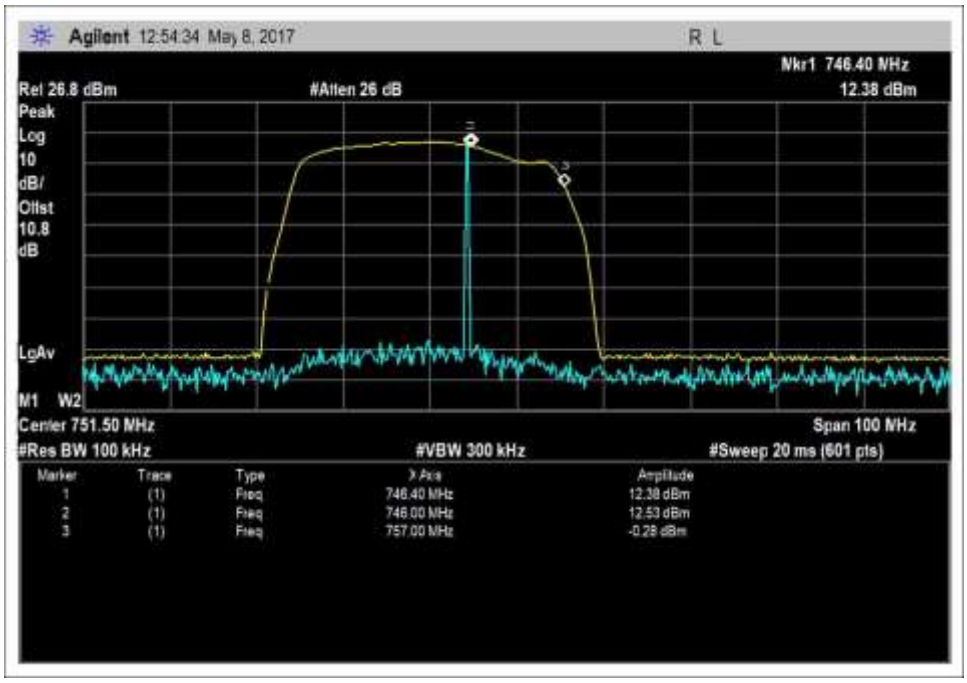
UL_1850-1915MHz



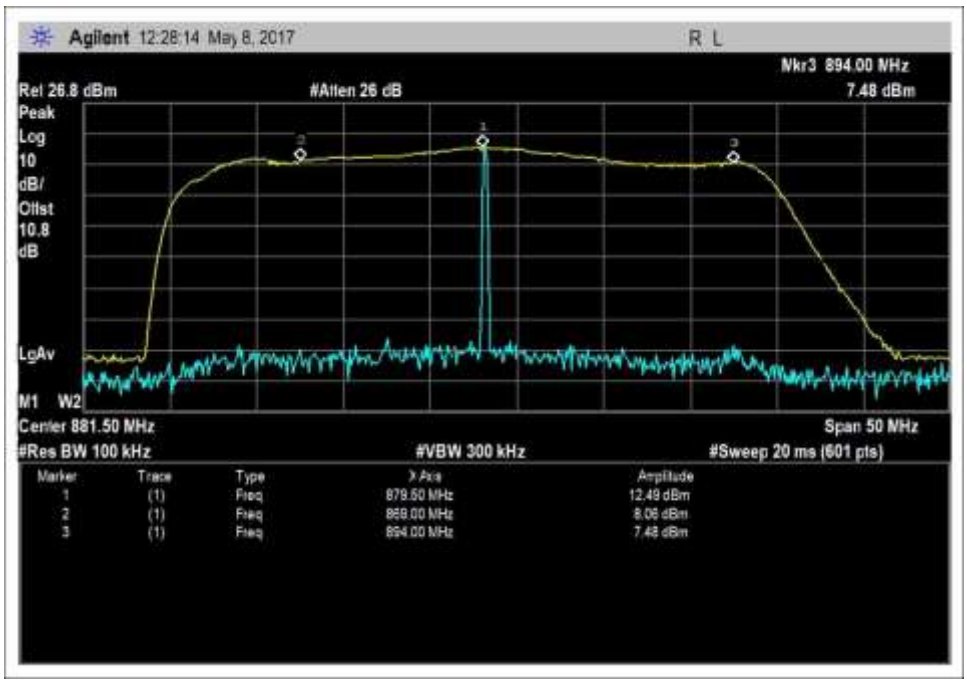
DL_728-746MHz



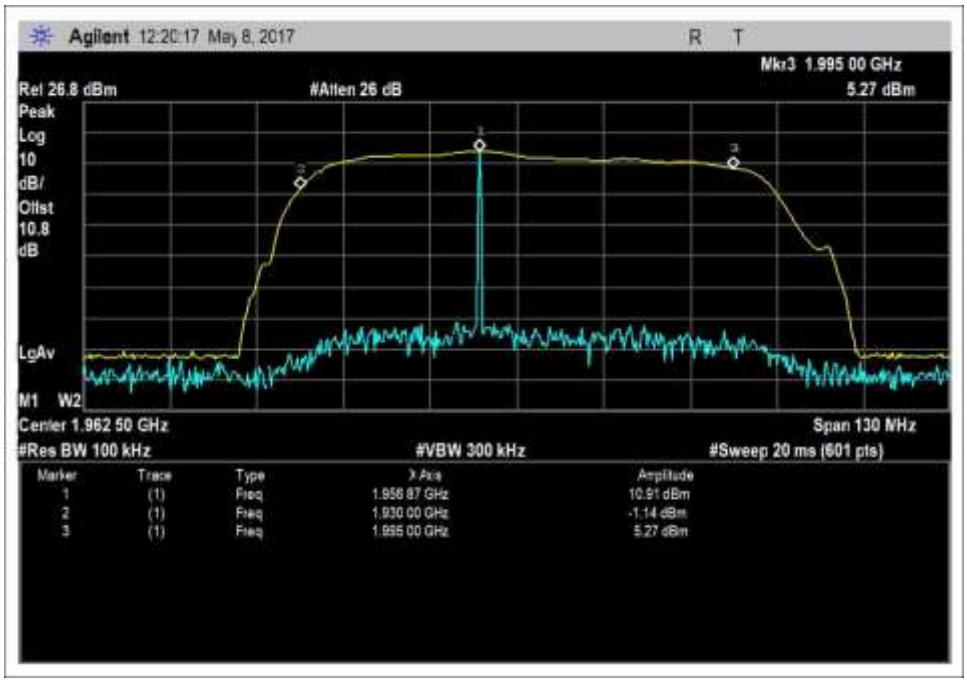
DL_746-757MHz



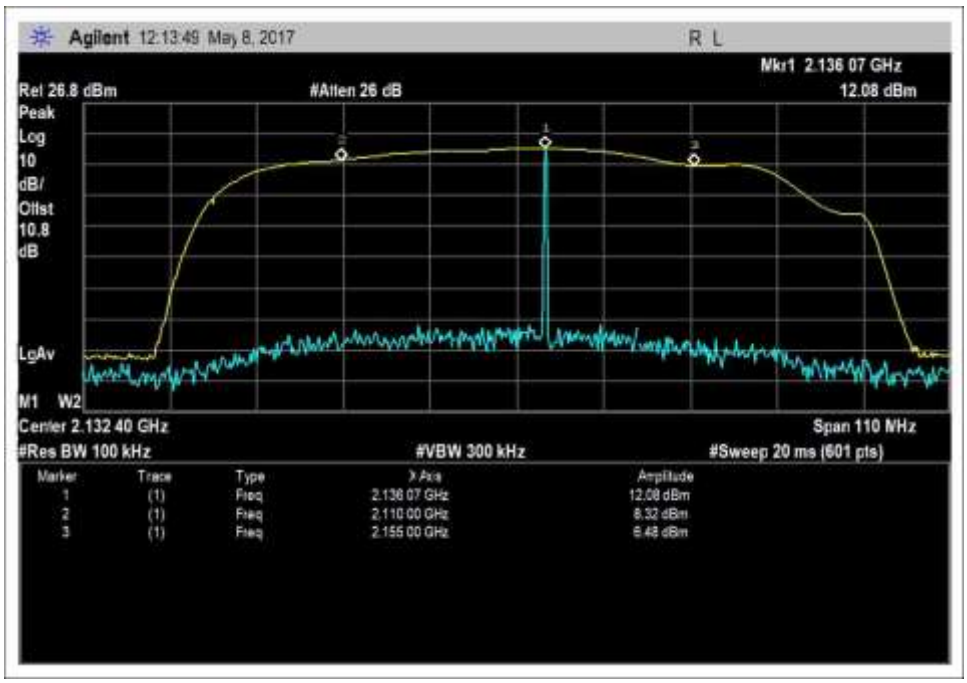
DL_746-757MHz_zoom



DL_869-894MHz



DL_1930-1995MHz



DL_2110-2155MHz

7.2 and 7.3 Maximum Power

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	**7.2 Maximum Power Measurement** **7.3 Maximum Booster Gain**		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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, 7.3 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 kPa

Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
ANP06554	Cable	32022-29094K-29094K-24TC	12/30/2015	12/30/2017
P07037	Agilent	E4438C	10/06/2016	10/06/2018
AN03420	Agilent	E4438C	7/8/2015	7/8/2017

Summary of Results

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

Frequency	Pre AGC			Pre AGC		
	Pulse GSM			4.1 MHz AWGN		
	Input(dBm)	Output (dBm)	Gain (dB)	Input(dBm)	Output (dBm)	Gain(dB)
UL1710-1755	-46.7	19.5	66.2	-46.9	17.4	64.3
UL1850-1915	-46.2	19.5	65.7	-48.1	17.1	65.2
UL824-894	-37.9	20.6	58.5	-40.6	17.6	58.2
UL 698-716	-38.8	19.2	58.0	-39.7	17.4	57.1
UL776-787	-36.8	20.0	56.8	-38.7	17.6	56.3
DL2110-2155	-51.4	14.0	65.4	-51.0	14.1	65.1
DL1930-1995	-51.8	14.5	66.3	-52.4	14.2	66.6
DL869-894	-44.6	14.8	59.4	-44.7	14.2	58.9
DL:728-746	-42.4	14.8	57.2	-41.7	15.2	56.9
DL 746-757	-41.1	11.8	52.9	-41.3	12.1	53.4

*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

Pulsed GSM					Conducted	Conducted and EIRP
Frequency	Conducted Output Power	Ant Gain	Cable Loss	EIRP(dBm)	Limit Min(dBm)	Limit Max(dBm)
UL1710-1755	19.5	11	1.8	28.7	17	30
UL1850-1915	19.5	11	1.8	28.7	17	30
UL824-894	20.6	10	1.2	**29.4**	17	30
UL 698-716	19.2	10	1.2	28.0	17	30
UL776-787	20.0	10	1.2	28.8	17	30
DL2110-2155	14.0	9.4	7.3	16.1	NA	17
DL1930-1995	14.5	9.4	7.3	16.6	NA	17
DL869-894	14.8	3	2	15.8	NA	17
DL:728-746	14.8	3	2	15.8	NA	17
DL 746-757	11.8	3	2	12.8	NA	17

Antenna Kitting: UL: 11-30400, DL: 3-50400-50 (728-894MHz), 103-30400-50 (1930-2155MHz)

4.1MHz AWGN					Conducted	Conducted and EIRP
Frequency	Output Power	Ant Gain	Cable Loss	EIRP(dBm)	Limit Min(dBm)	Limit Max (dBm)
UL1710-1755	17.4	11	1.8	26.6	17	30
UL1850-1915	17.1	11	1.8	26.3	17	30
UL824-894	17.6	10	1.2	26.4	17	30
UL 698-716	17.4	10	1.2	26.2	17	30
UL776-787	17.6	10	1.2	26.4	17	30
DL2110-2155	14.1	9.4	7.3	16.2	NA	17
DL1930-1995	14.2	9.4	7.3	16.3	NA	17
DL869-894	14.2	3	2	15.2	NA	17
DL:728-746	15.2	3	2	16.2	NA	17
DL 746-757	12.1	3	2	13.1	NA	17

Antenna Kitting: UL: 11-30400, DL: 3-50400-50 (728-894MHz), 103-30400-50 (1930-2155MHz)

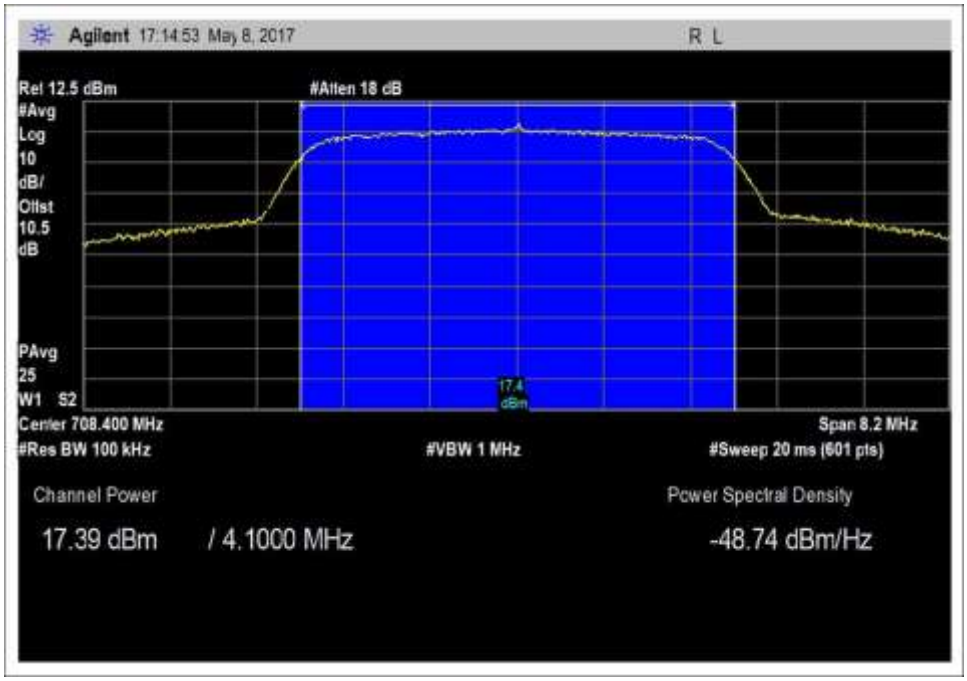
Section 5.5 Power						
	Pulse GSM			4.1 MHz AWGN		
Frequency	Input(dBm)	Output (dBm)	Gain (dB)	Input(dBm)	Output (dBm)	Gain(dB)
UL1710-1755	-40.0	19.0	59.0	-40.0	17.6	57.6
UL1850-1915	-40.0	19.0	59.0	-40.0	17.5	57.5
UL824-894	-27.0	19.1	46.1	-25.0	18.0	43.0
UL 698-716	-26.0	18.1	44.1	-24.0	17.9	41.9
UL776-787	-22.0	20.0	42.0	-24.0	18.0	42.0
DL2110-2155	-40.0	13.2	53.2	-40.0	14.0	54.0
DL1930-1995	-40.0	13.1	53.1	-40.0	14.0	54.0
DL869-894	-40.0	12.4	52.4	-30.0	14.4	44.4
DL:728-746	-30.0	13.2	43.2	-25.0	14.2	39.2
DL 746-757	-30.0	-10.4	19.6	-40.0	**12.0**	52.0

Note: The booster went into Transmitter off mode at Max input power in accordance with section 5.5.
Results presented on the above table are at 1 dB below the Transmit off RF input level.

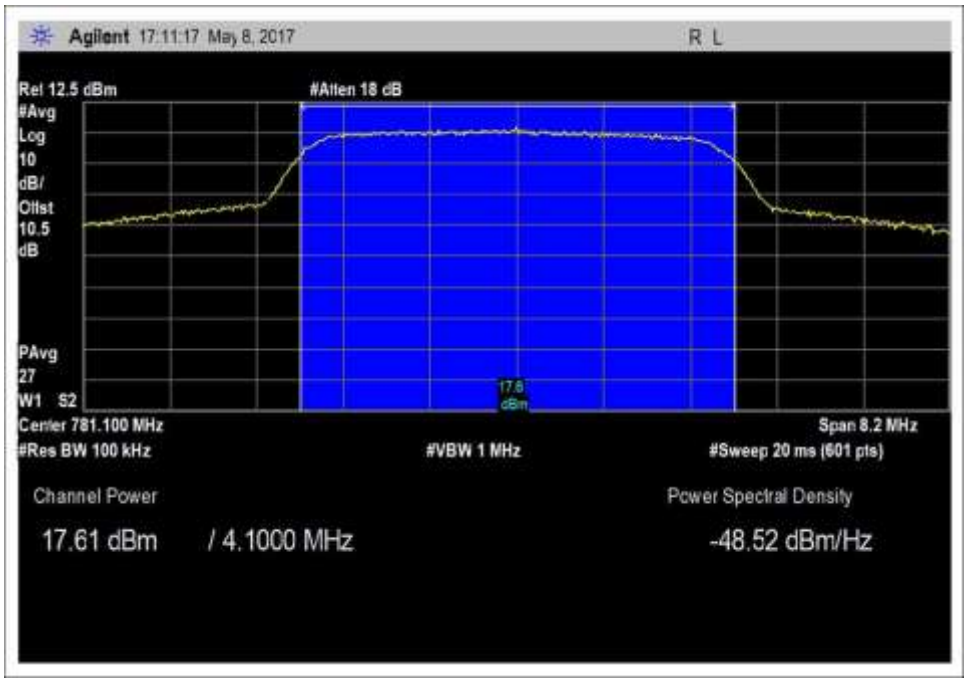
	Pulse GSM	4.1MHz AWGN	Limit (dB)
UL gain vs DL gain 1710/2110	0.8	-0.8	9.0
UL gain vs DL gain 1850/1930	-0.6	-1.4	9.0
UL gain vs DL gain 824/869	-0.9	-0.7	9.0
UL gain vs DL gain 776/728	0.8	0.2	9.0
UL gain vs DL gain 776/746	3.9	2.9	9.0

Plots

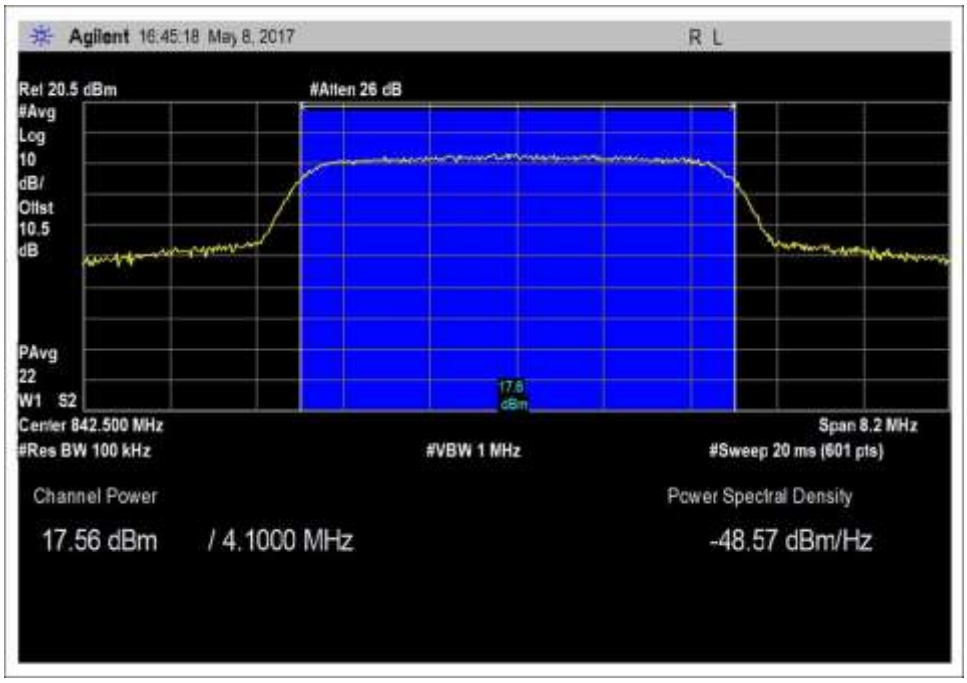
AWGN



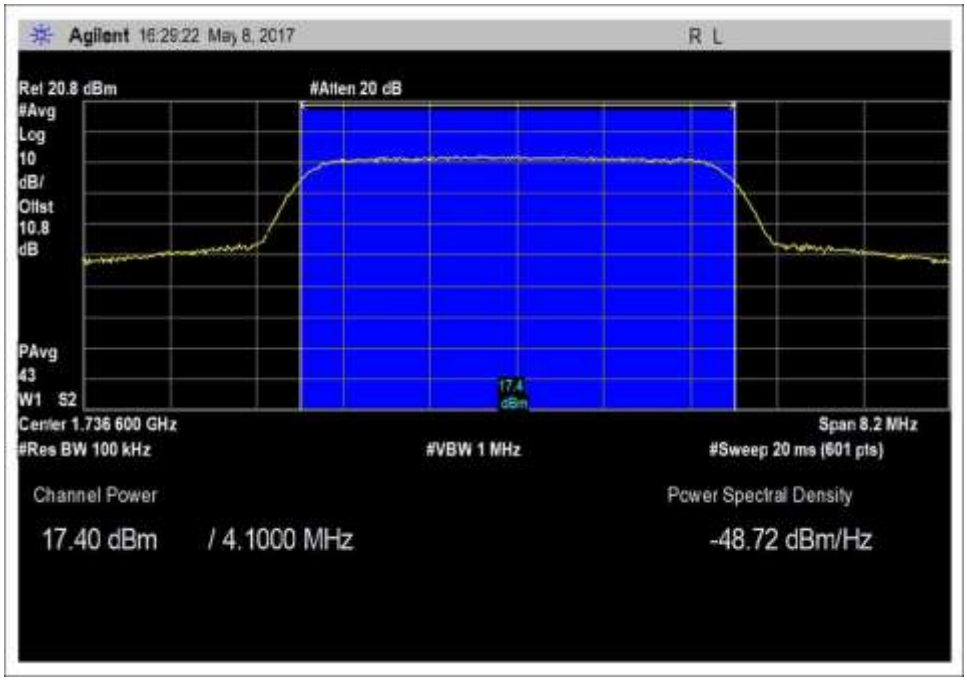
UL_698-716MHz



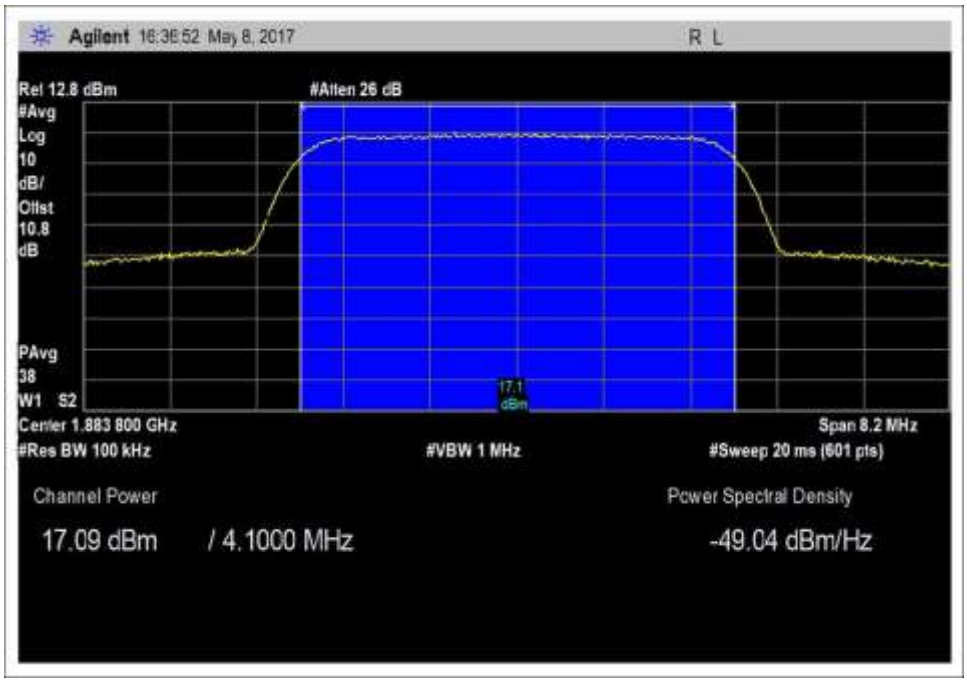
UL_776-787MHz



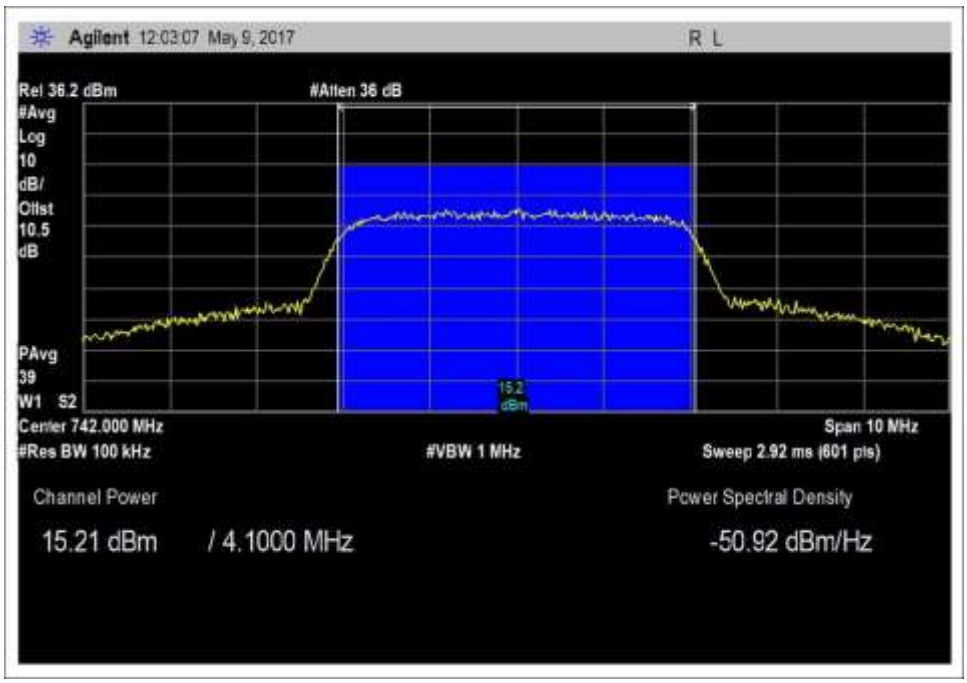
UL_824-894MHz



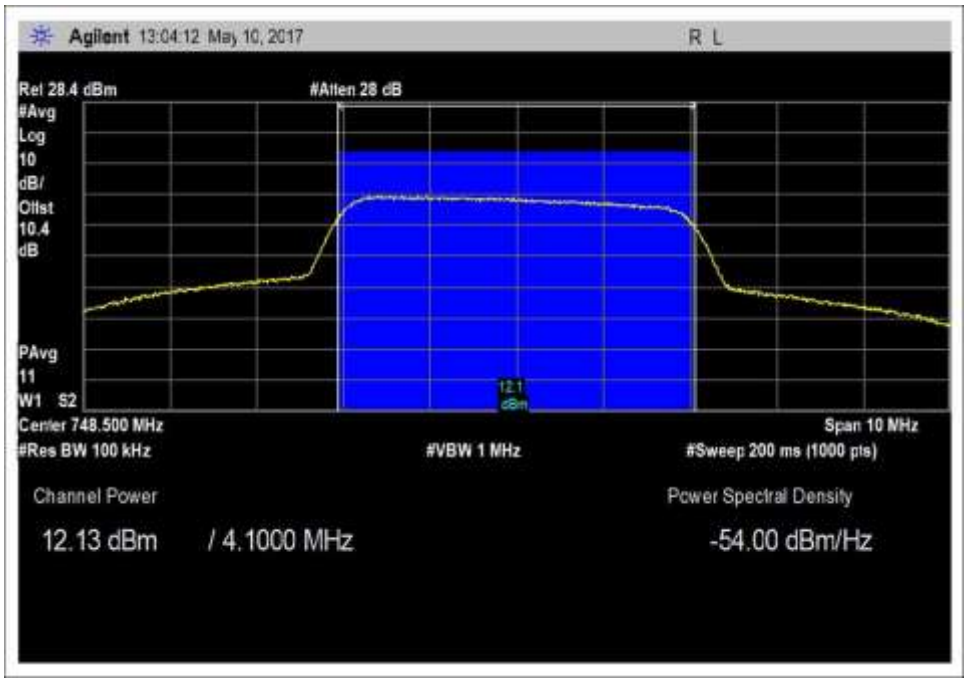
UL_1710-1755MHz



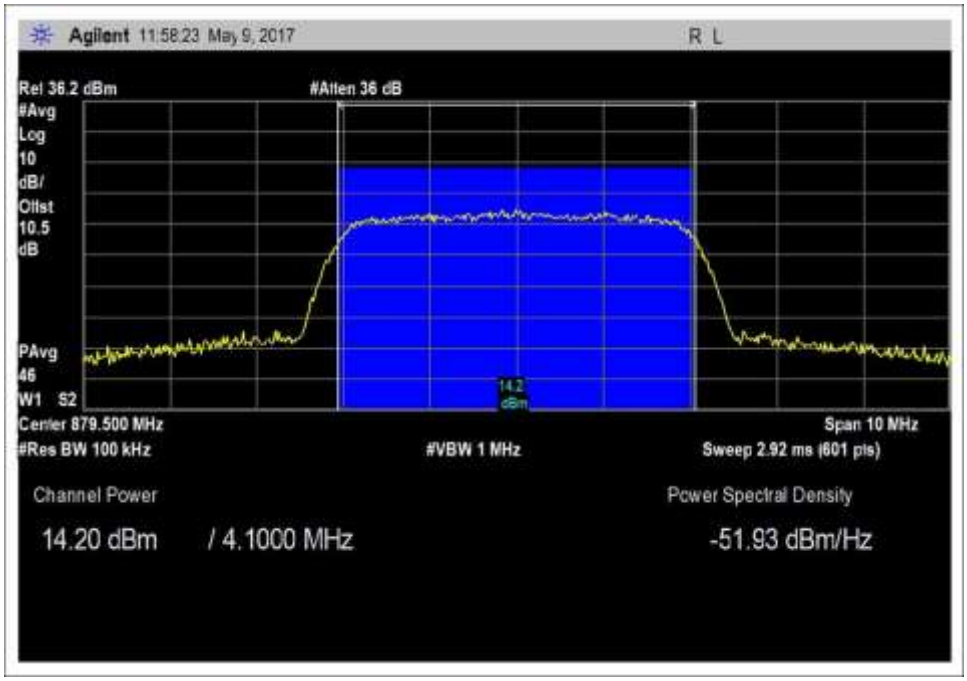
UL_1850-1915MHz



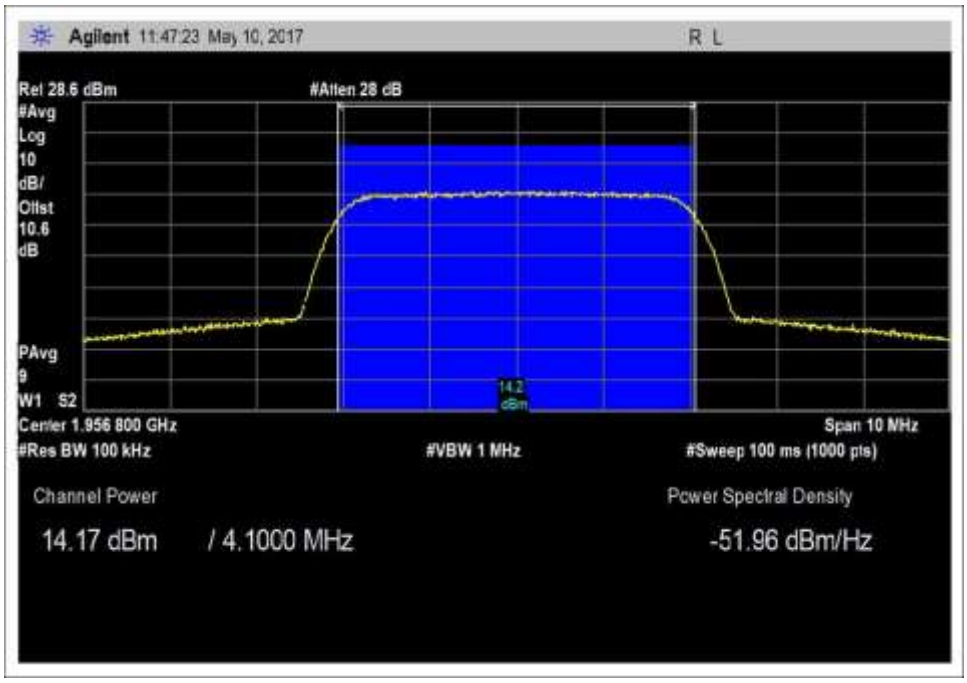
DL_728-746MHz



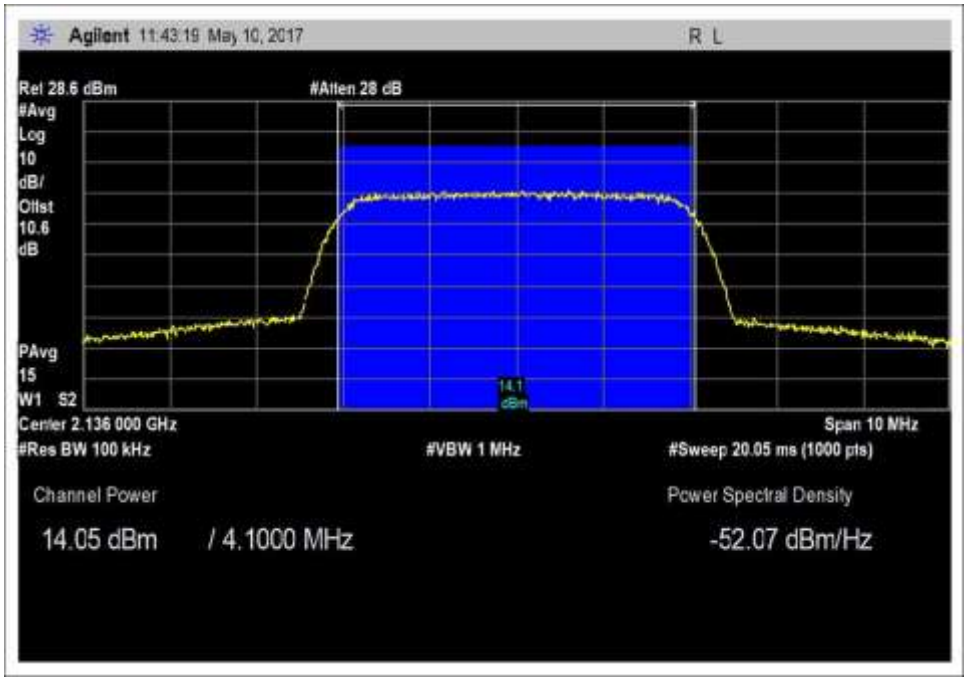
DL_746-757MHz



DL_869-894MHz

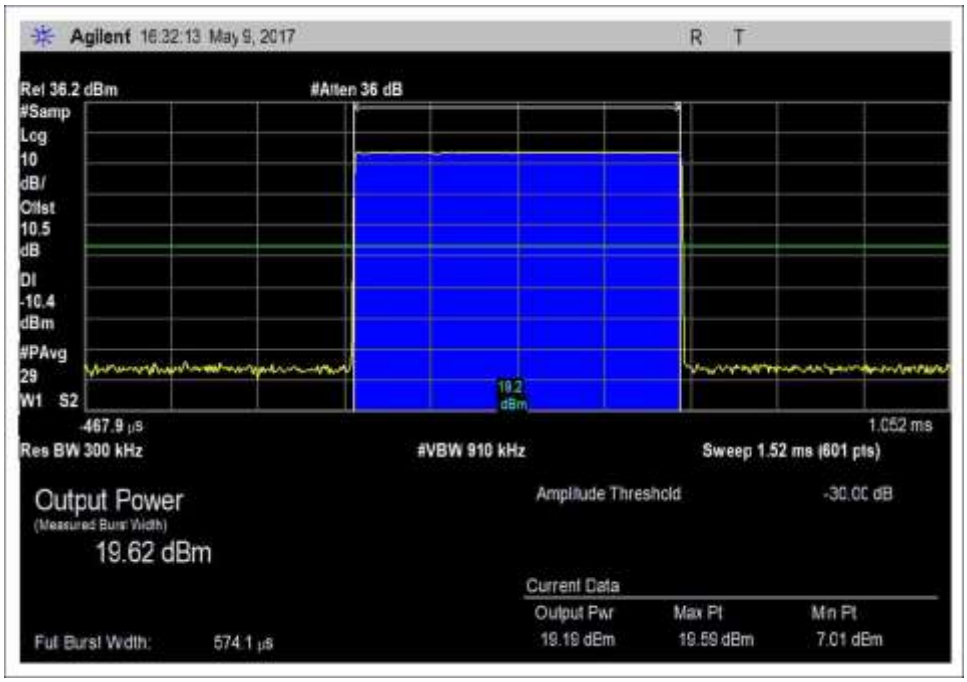


DL_1930-1995MHz

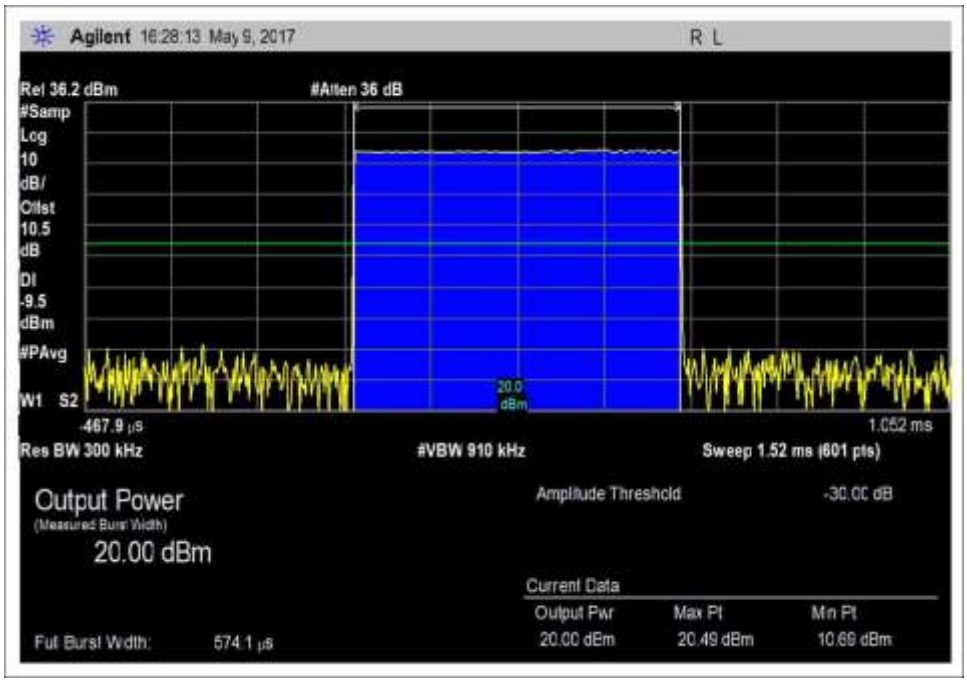


DL_2110-2155MHz

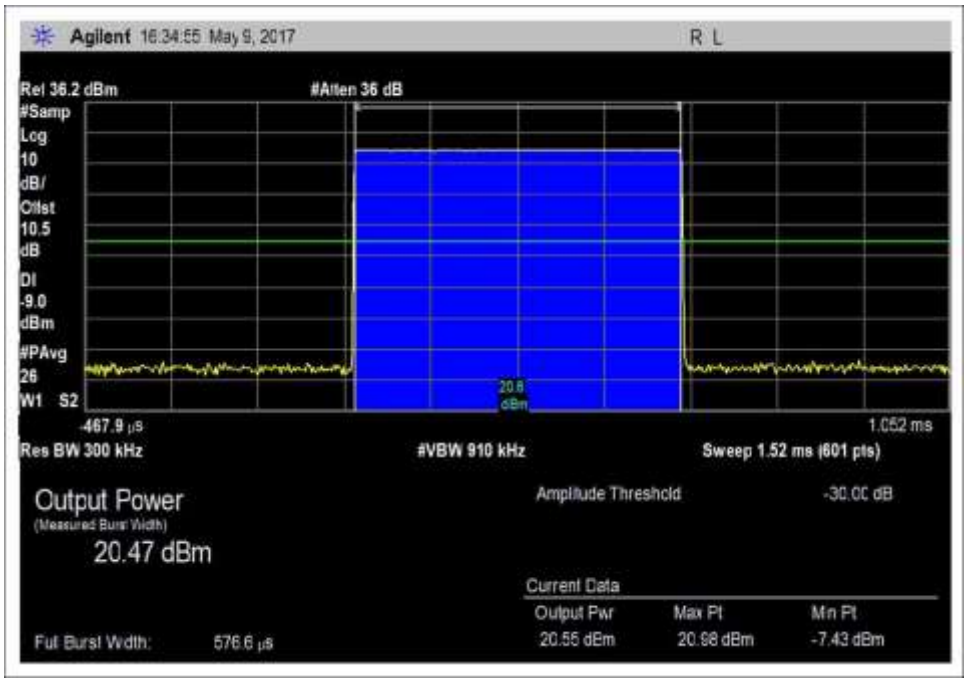
GSM



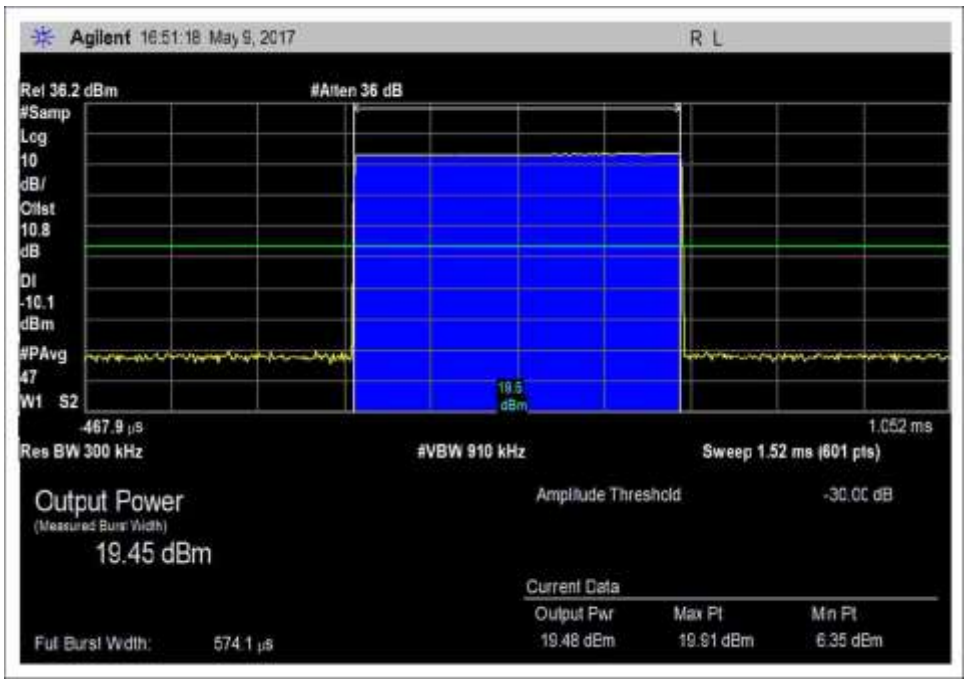
UL_698-716MHz



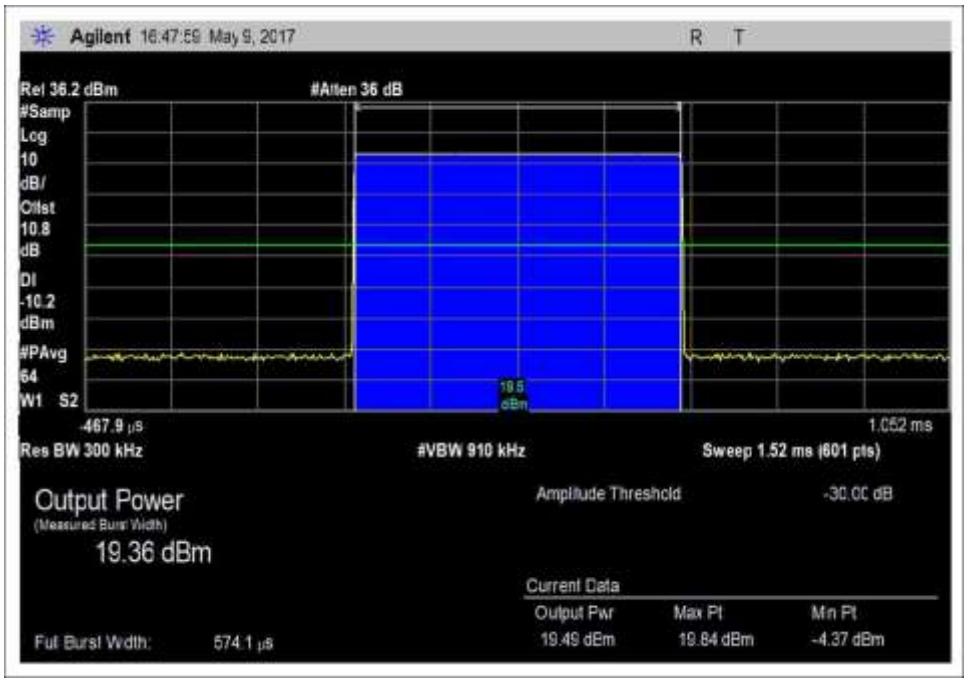
UL_776-787MHz



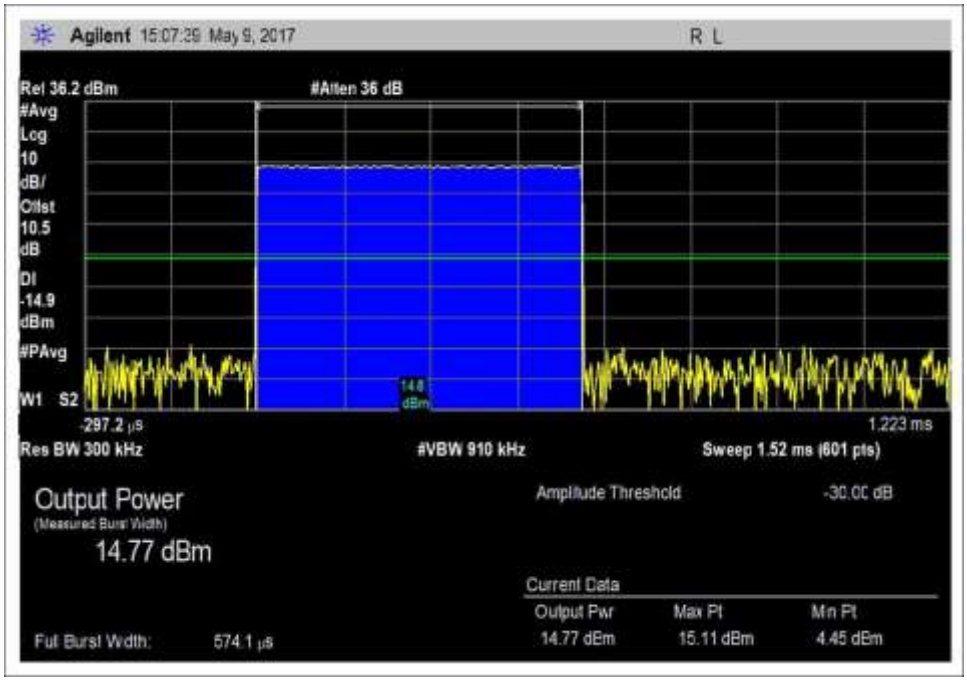
UL_824-849MHz



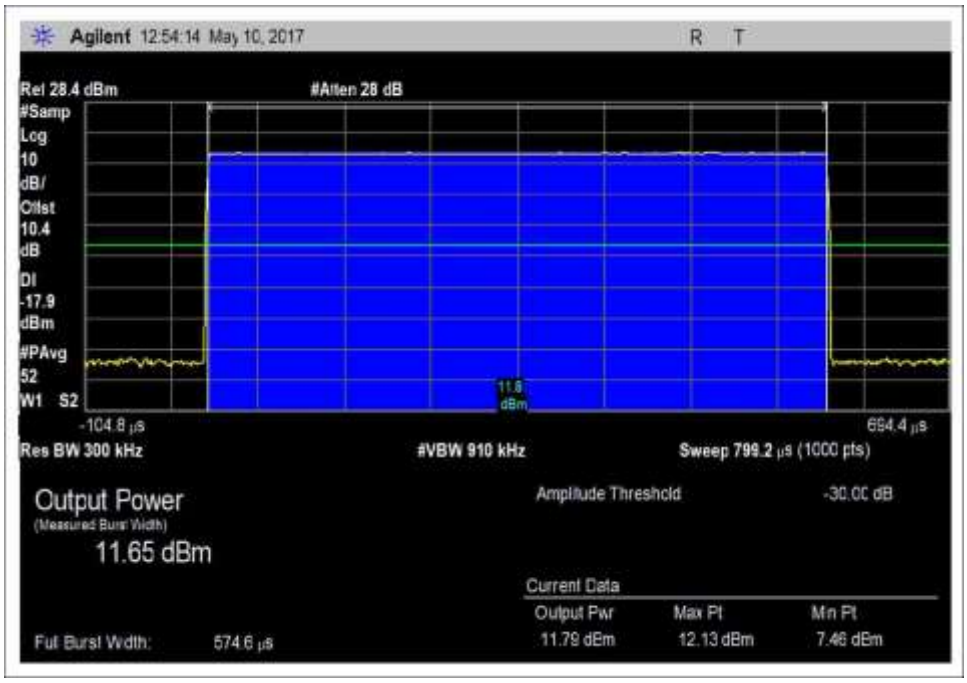
UL_1710-1755MHz



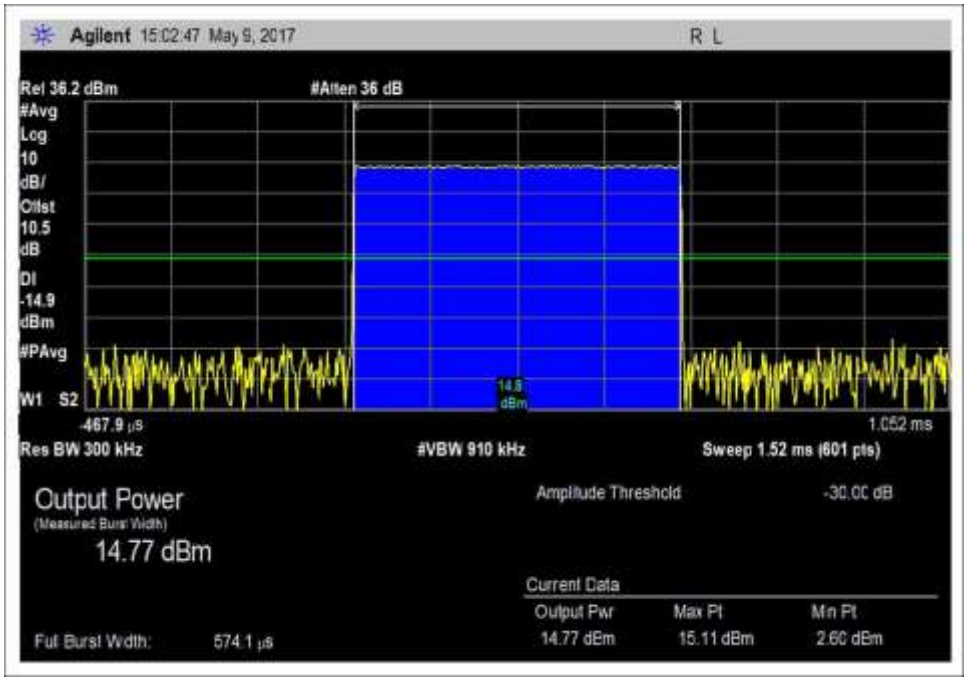
UL_1850-1915MHz



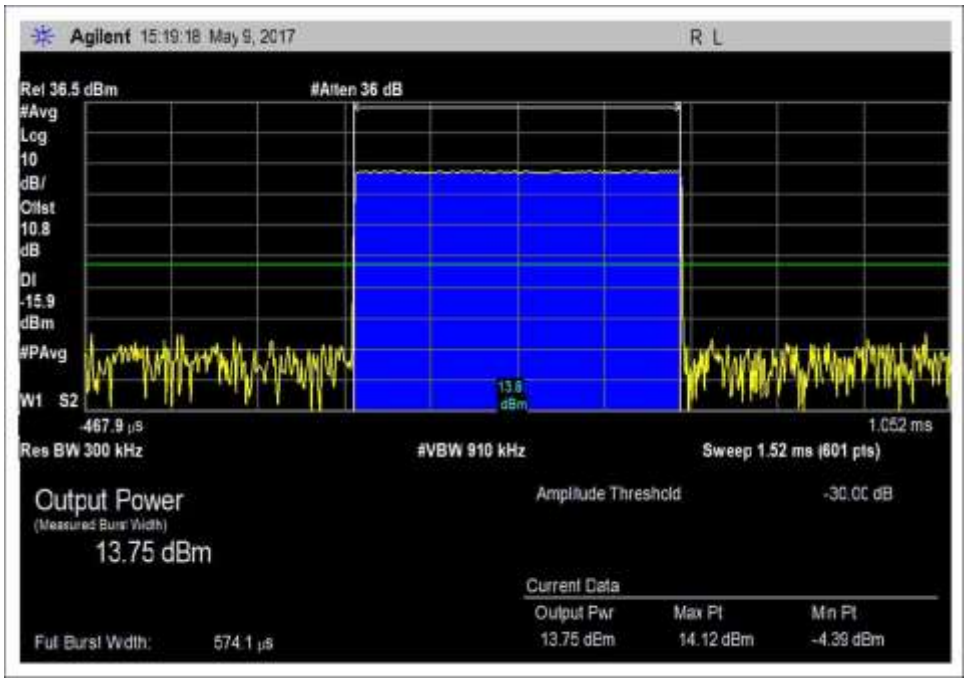
DL_728-746MHz



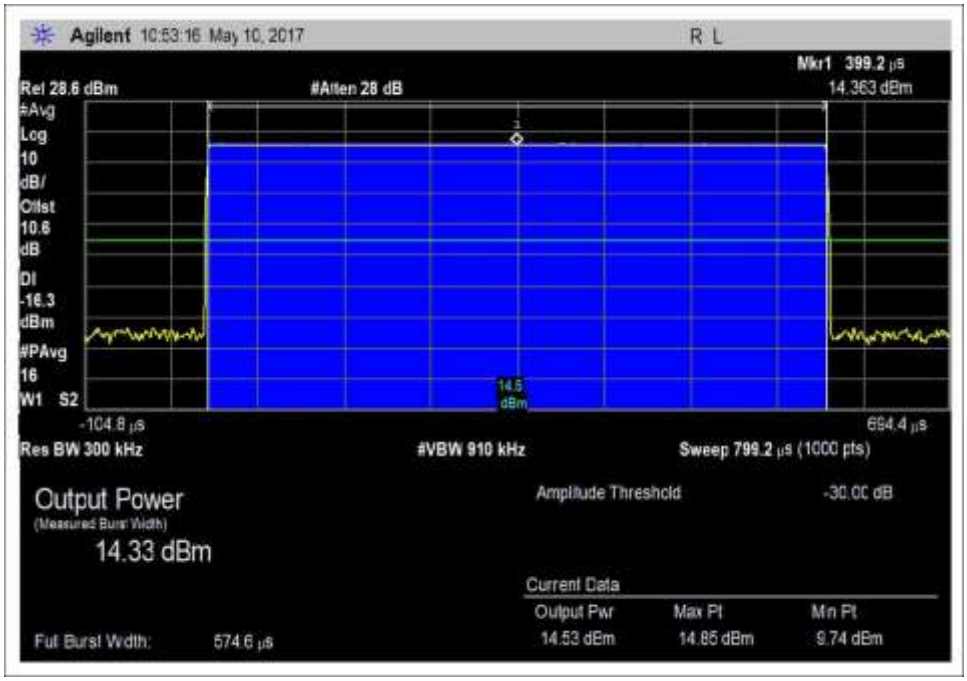
DL_746-757 MHz



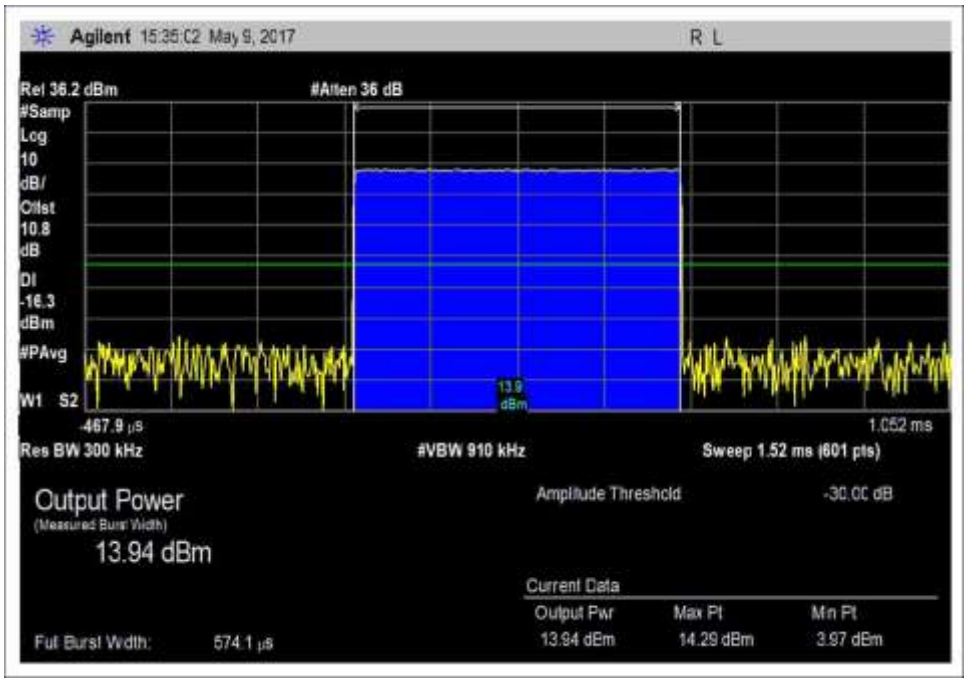
DL_869-894MHz



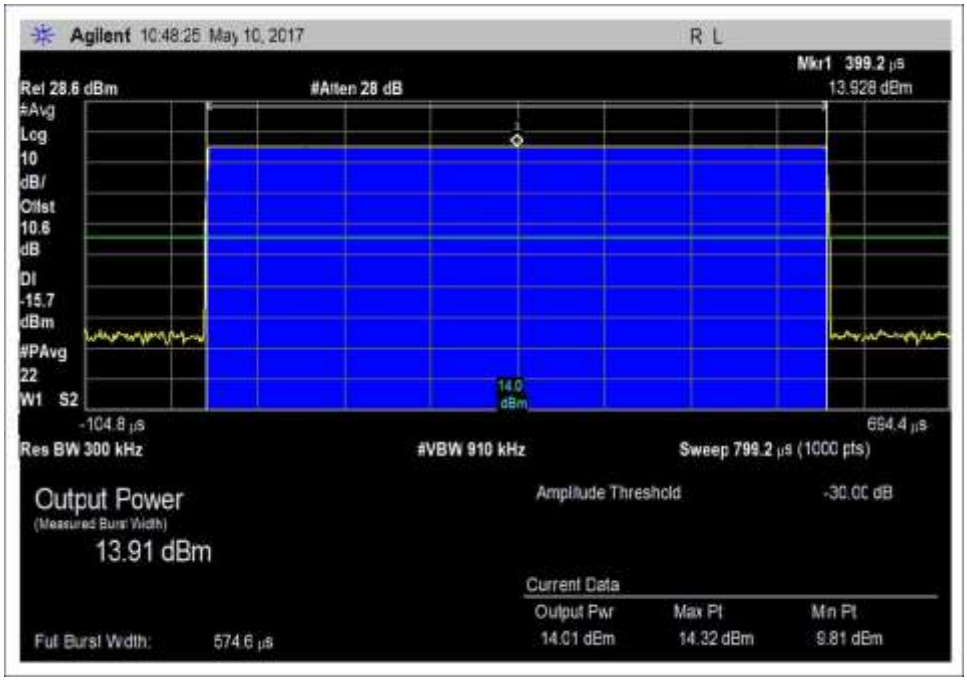
DL_1930-1915MHz



DL_1930-1915MHz



DL_2110-2155MHz



DL_2110-2155MHz

7.4 Intermodulation Product

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	**7.4 Maximum Power Measurement**		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 kPa

Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
ANP06554	Cable	32022-29094K-29094K-24TC	12/30/2015	12/30/2017
P07037	Agilent	E4438C	10/06/2016	10/06/2018
AN03420	Agilent	E4438C	7/8/2015	7/8/2017

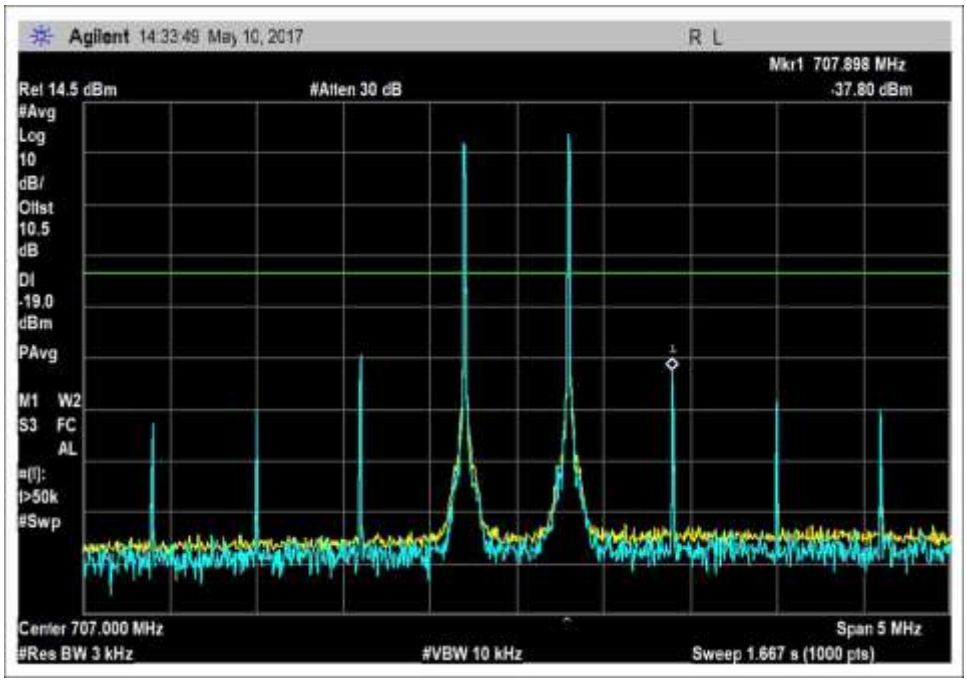
Summary of Results

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

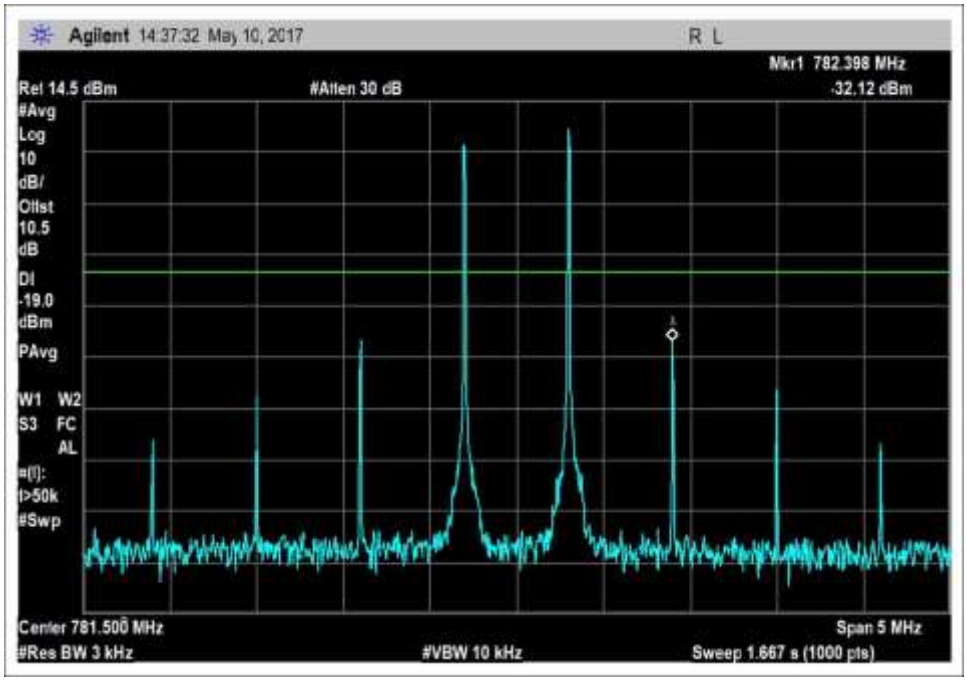
Inter Modulation Product			
Frequency	**Pre AGC**	**Limit**	**Results**
(MHz)	(dBm)	(dBm)	
UL 1710-1755	-32.8	-19	Pass
UL 1850-1915	-33.6	-19	Pass
UL 824-894	-30.7	-19	Pass
UL 698-716	-37.8	-19	Pass
UL 776-787	-32.12	-19	Pass
DL 2110-2155	-29.3	-19	Pass
DL 1930-1995	-32.2	-19	Pass
DL 869-894	-30.1	-19	Pass
DL 728-746	-23.7	-19	Pass
DL 746-757	-30.3	-19	Pass

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

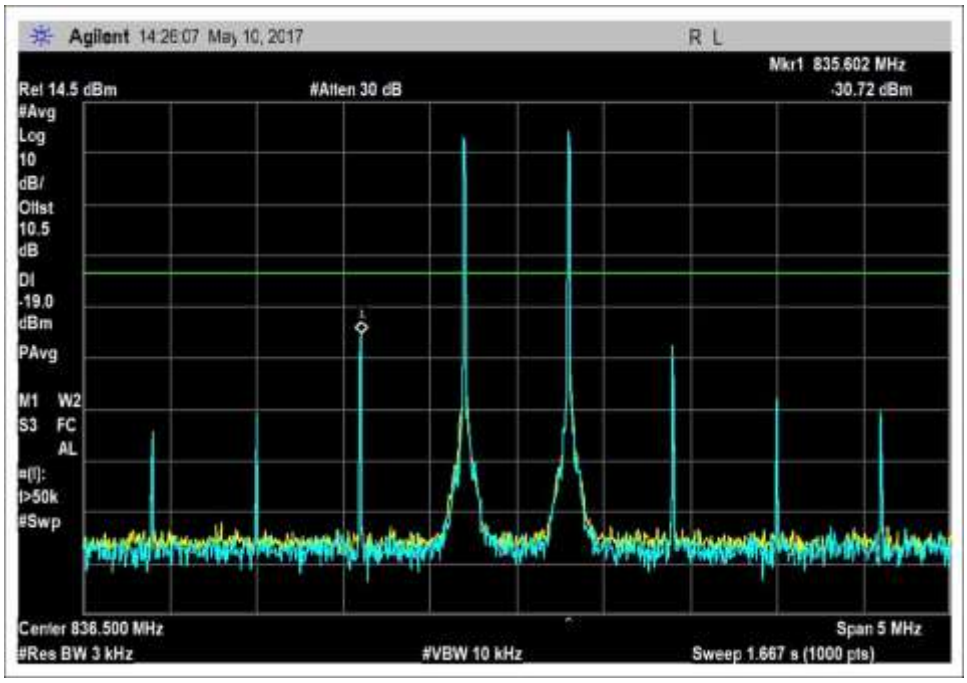
Plots



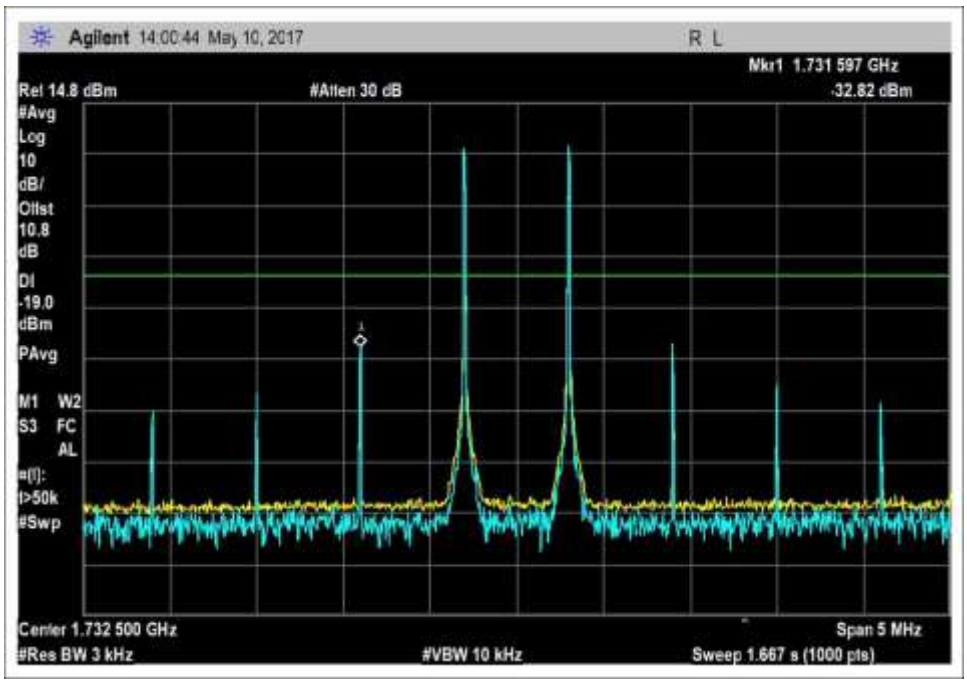
UL_698-716MHz



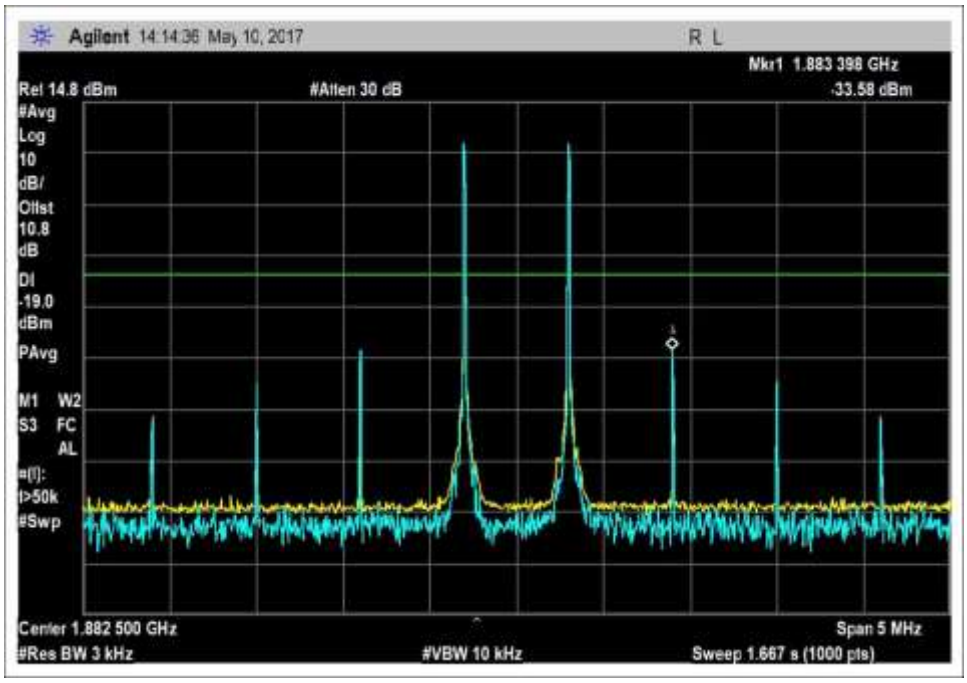
UL_776-787MHz



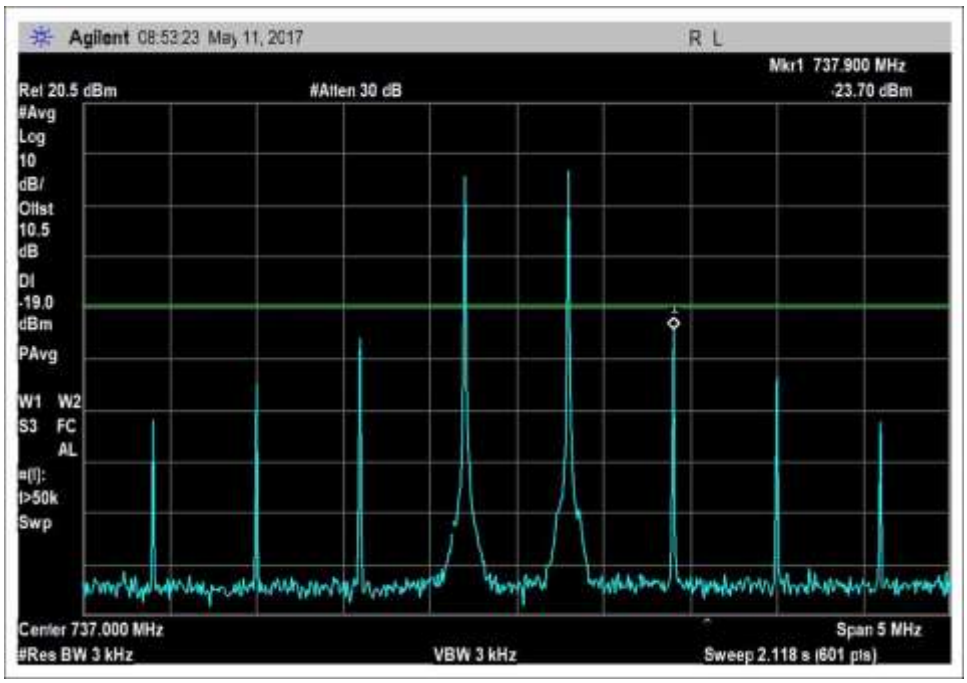
UL_824-849MHz



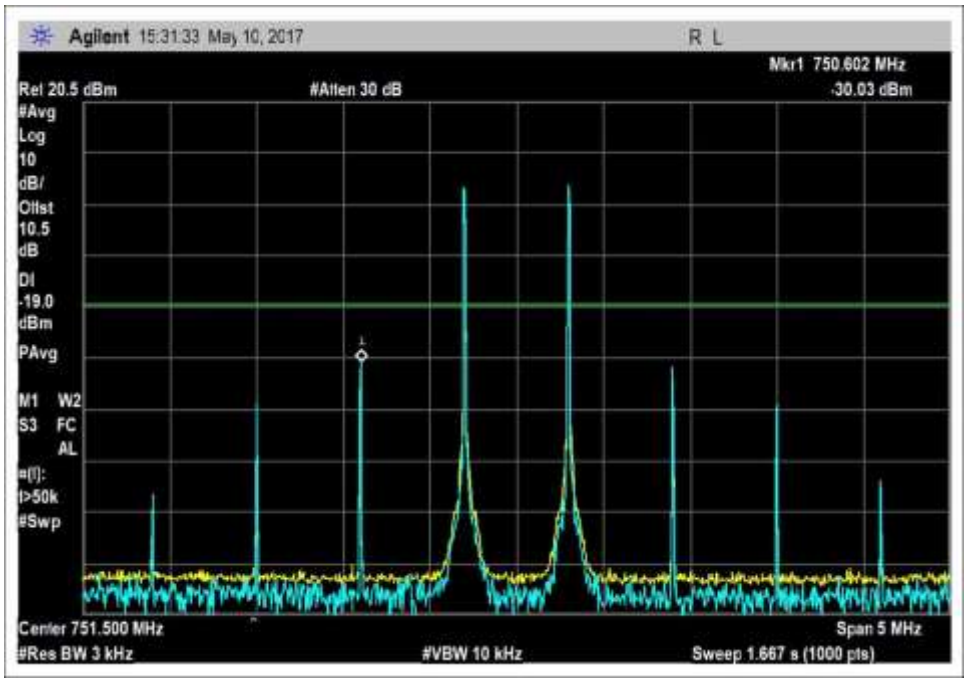
UL_1710-1755MHz



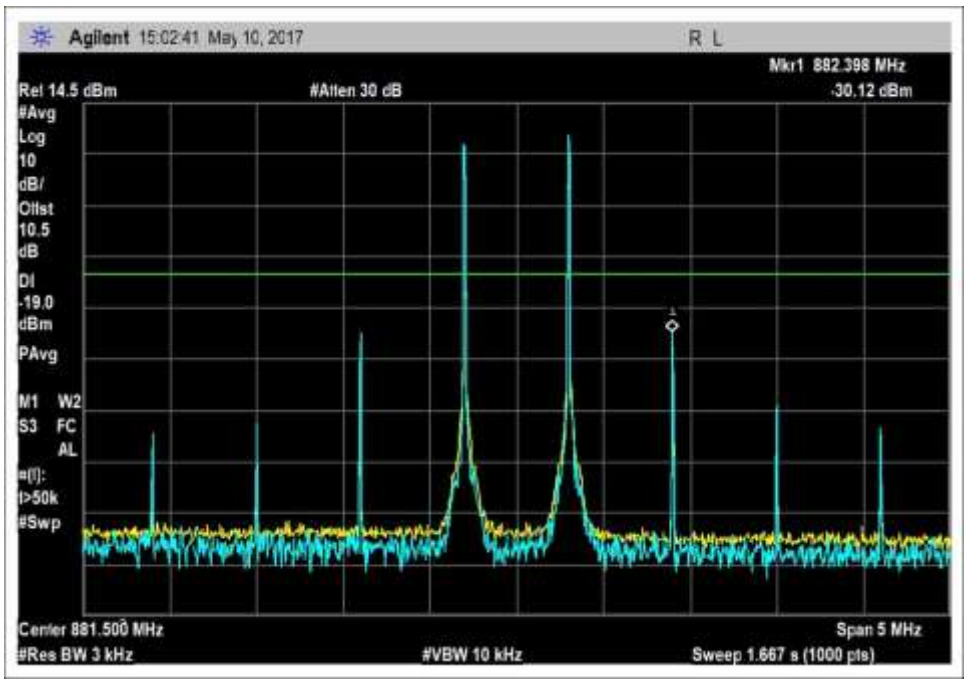
UL_1850-1915MHz



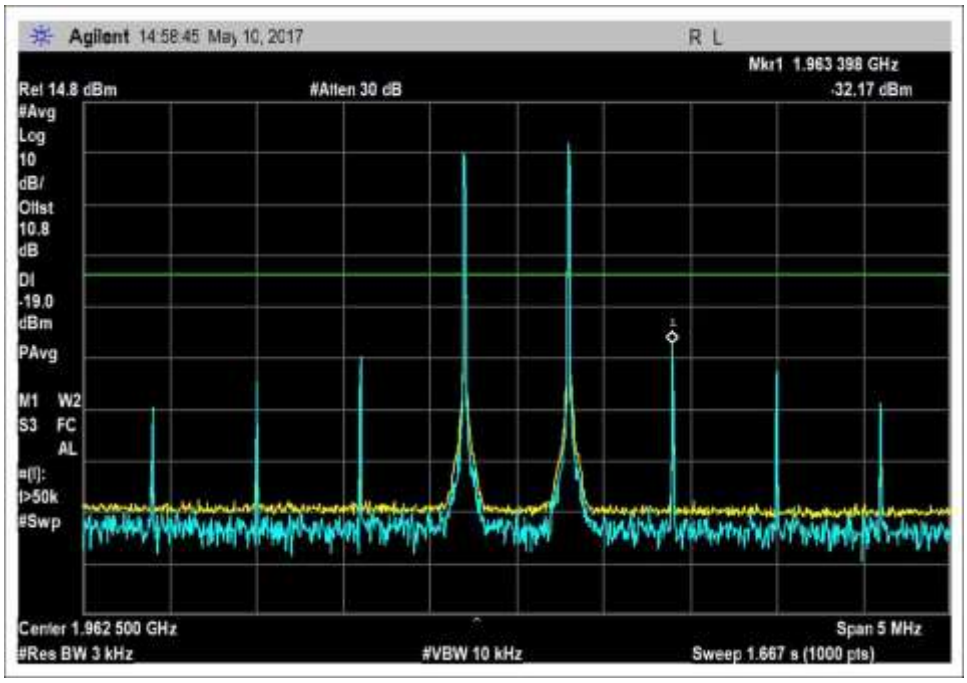
DL_728-746MHz



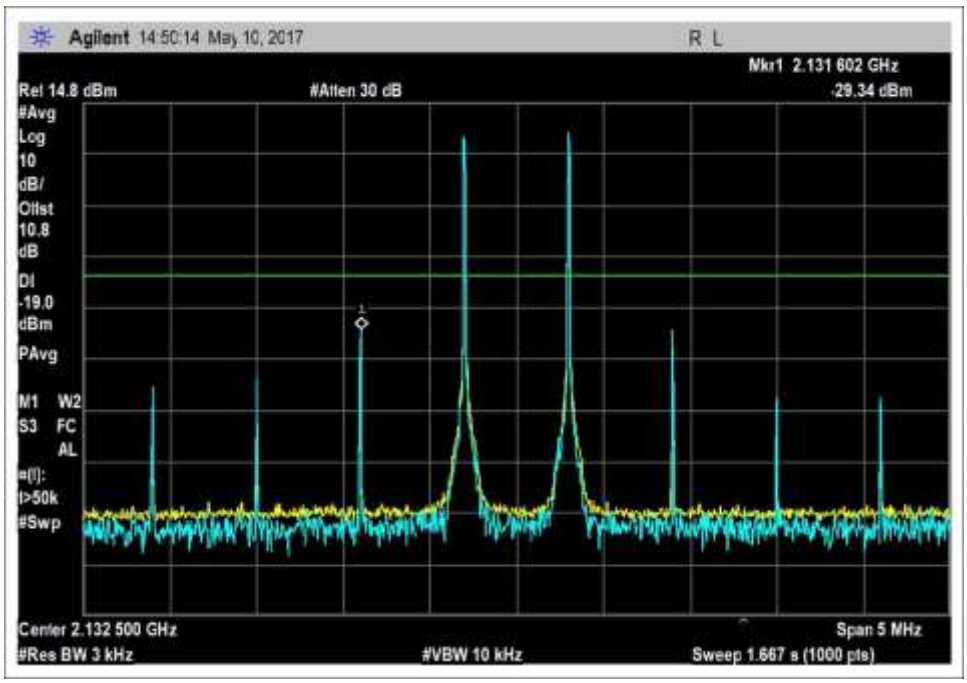
DL_746-757MHz



DL_869-894MHz



DL_1930-1995MHz



DL_2110-2155MHz

7.5 Out of Band Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	**7.5 Out of Band Emission**		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 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:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
P07037	Agilent	E4438C	10/06/2016	10/06/2018
AN03420	Agilent	E4438C	7/8/2015	7/8/2017

Summary of Results

PASS: as indicated in plots above, all OBE are under the limit of -19dBm.

GSM

Low

Out of Band Emission			
Frequency (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-30.1	-19	Pass
UL1850-1915	-28.5	-19	Pass
UL824-849	-32.4	-19	Pass
UL 698-716	-30.3	-19	Pass
UL776-787	-32.6	-19	Pass
DL2110-2155	-29.3	-19	Pass
DL1930-1995	-35.4	-19	Pass
DL869-894	-31.4	-19	Pass
DL:728-746	-30.5	-19	Pass
DL 746-757	-29.4	-19	Pass

High

Out of Band Emission			
Frequency (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-27.5	-19	Pass
UL1850-1915	-30.3	-19	Pass
UL824-849	-29.1	-19	Pass
UL 698-716	-29.5	-19	Pass
UL776-787	-30.5	-19	Pass
DL2110-2155	-29.8	-19	Pass
DL1930-1995	-32.9	-19	Pass
DL869-894	-33.4	-19	Pass
DL:728-746	-29.4	-19	Pass
DL 746-757	-37.3	-19	Pass

CDMA

Low

Out of Band Emission			
Frequency (MHz)	**Pre AGC**	**Limit (dBm)**	**Results**
UL1710-1755	-37.1	-19	Pass
UL1850-1915	-34.7	-19	Pass
UL824-849	-34.7	-19	Pass
UL 698-716	-44.9	-19	Pass
UL776-787	-51.9	-19	Pass
DL2110-2155	-38.6	-19	Pass
DL1930-1995	-38.8	-19	Pass
DL869-894	-37.9	-19	Pass
DL:728-746	-27.6	-19	Pass
DL 746-757	-28.8	-19	Pass

High

Out of Band Emission			
Frequency (MHz)	**Pre AGC**	**Limit (dBm)**	**Results**
UL1710-1755	-36.3	-19	Pass
UL1850-1915	-38.2	-19	Pass
UL824-849	-31.3	-19	Pass
UL 698-716	-50.8	-19	Pass
UL776-787	-36.9	-19	Pass
DL2110-2155	-40.4	-19	Pass
DL1930-1995	-38.9	-19	Pass
DL869-894	-46.8	-19	Pass
DL:728-746	-31.3	-19	Pass
DL 746-757	-38.6	-19	Pass

LTE (4.1MHz AWGN alternative)

Low

Out of Band Emission			
Frequency (MHz)	**Pre AGC**	**Limit (dBm)**	**Results**
UL1710-1755	-32.0	-19	Pass
UL1850-1915	-29.0	-19	Pass
UL824-849	-32.2	-19	Pass
UL 698-716	-30.0	-19	Pass
UL776-787	-27.6	-19	Pass
DL2110-2155	-34.4	-19	Pass
DL1930-1995	-34.1	-19	Pass
DL869-894	-35.1	-19	Pass
DL:728-746	-30.8	-19	Pass
DL 746-757	-25.0	-19	Pass

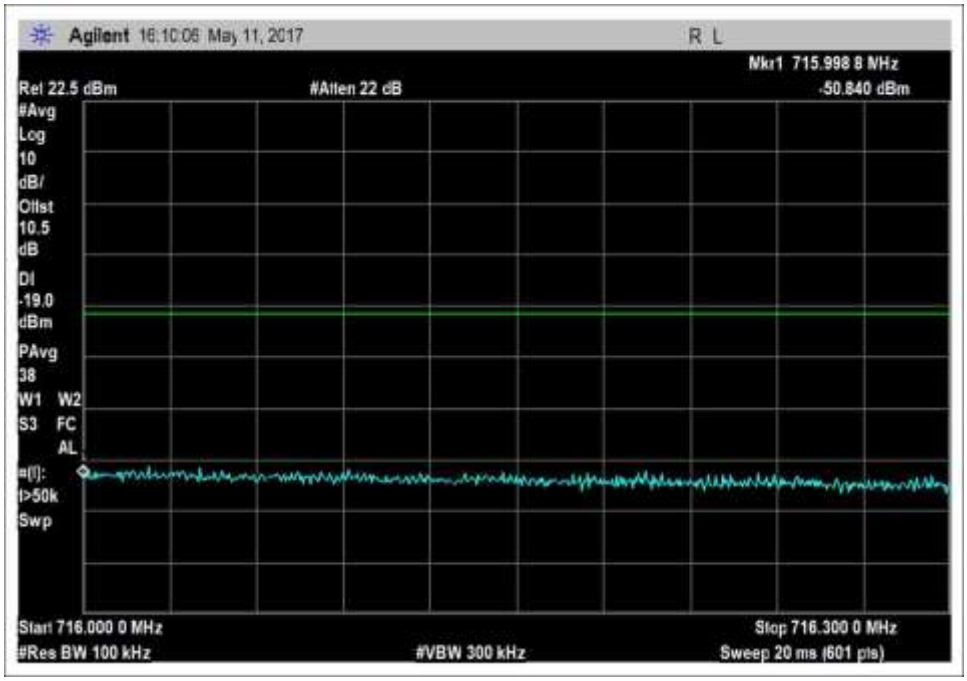
High

Out of Band Emission			
Frequency (MHz)	**Pre AGC**	**Limit (dBm)**	**Results**
UL1710-1755	-29.2	-19	Pass
UL1850-1915	-24.9	-19	Pass
UL824-849	-29.5	-19	Pass
UL 698-716	-36.5	-19	Pass
UL776-787	-31.2	-19	Pass
DL2110-2155	-34.5	-19	Pass
DL1930-1995	-32.6	-19	Pass
DL869-894	-33.4	-19	Pass
DL:728-746	-27.4	-19	Pass
DL 746-757	-33.4	-19	Pass

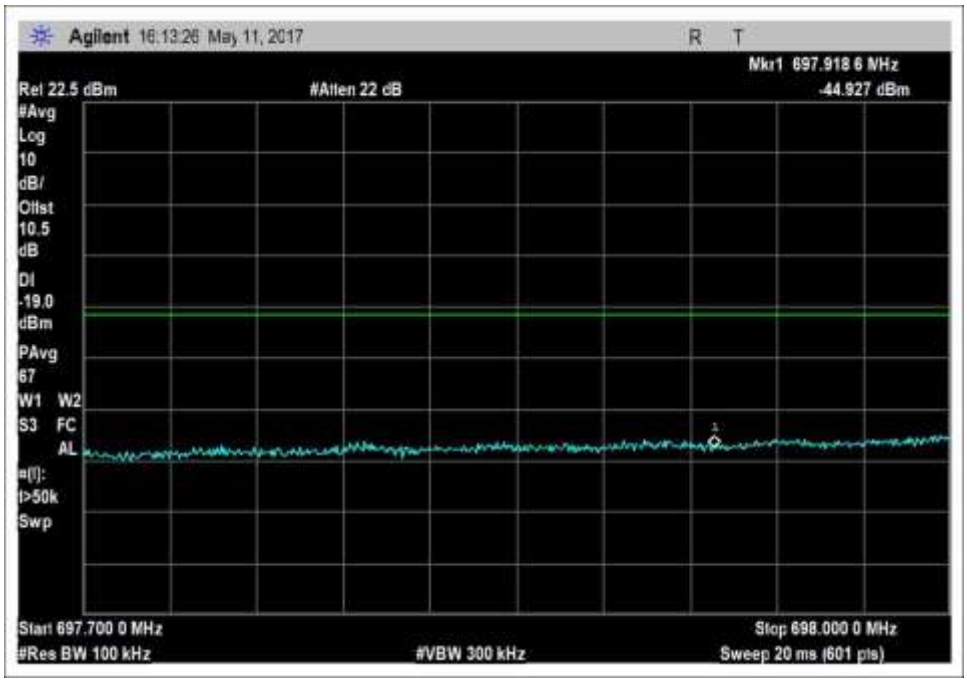
Note: The EUT also maintains compliance with the out-of-band emissions limit at input power indicated in section 5.5.

Plots

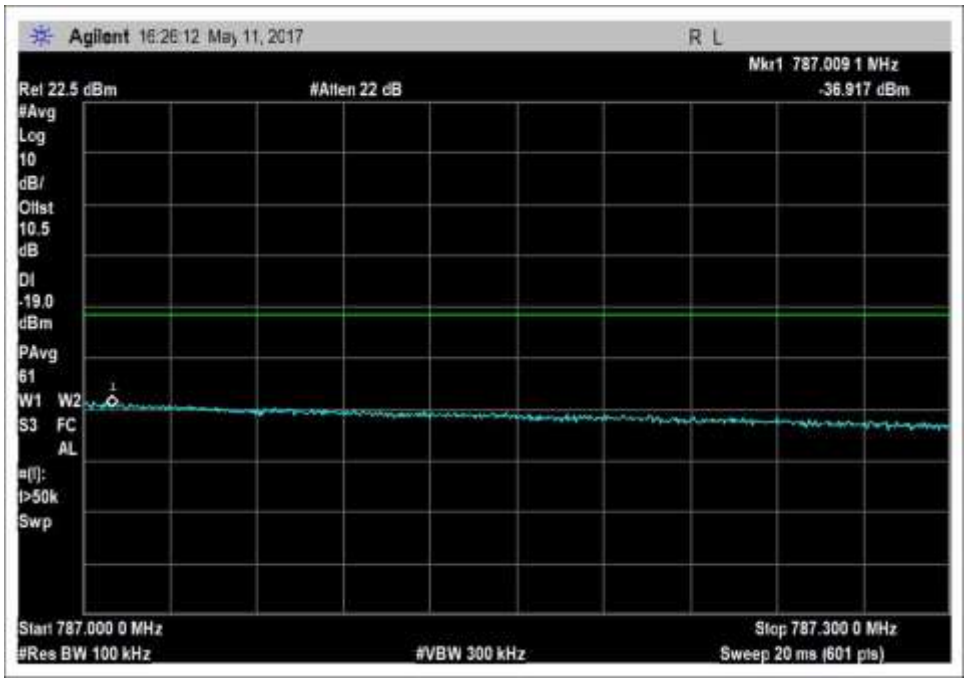
CDMA



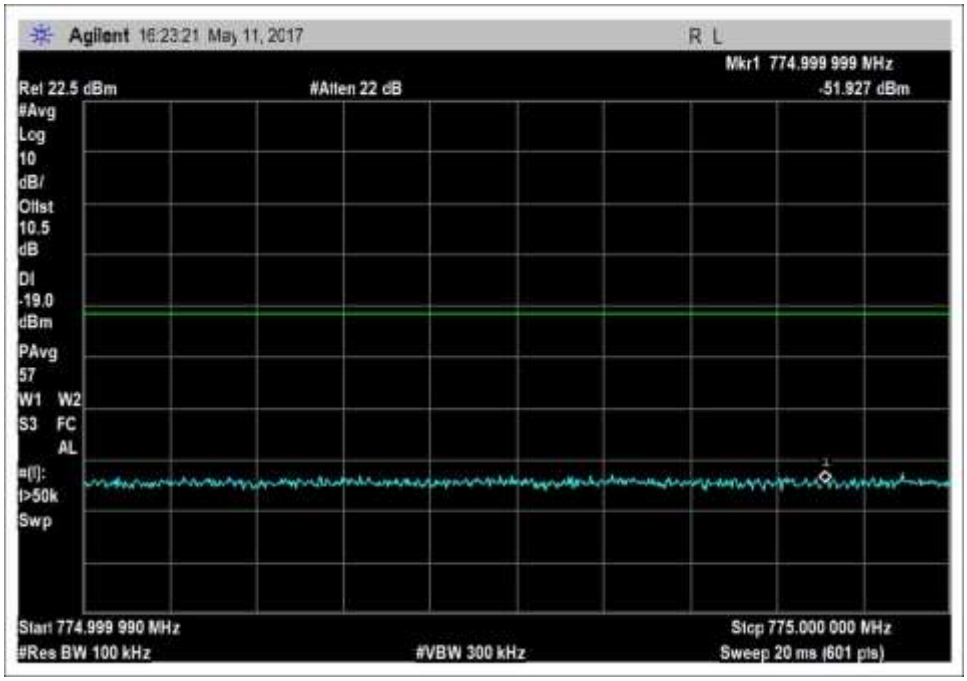
UL_698-716MHz_H_PreAGC_CDMA



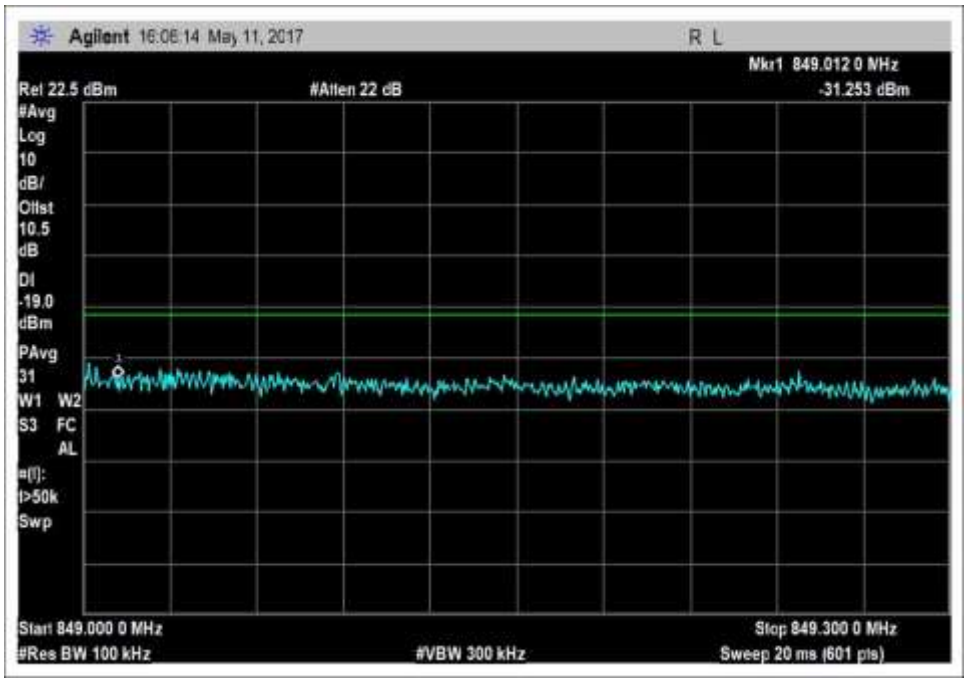
UL_698-716MHz_L_PreAGC_CDMA



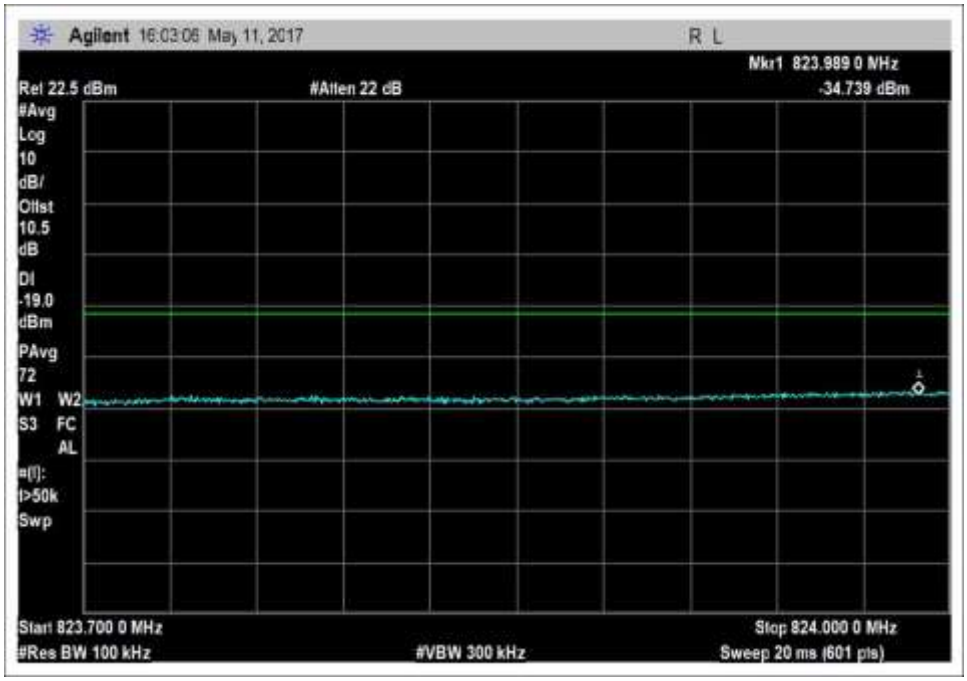
UL_776-787MHz_H_PreAGC_CDMA



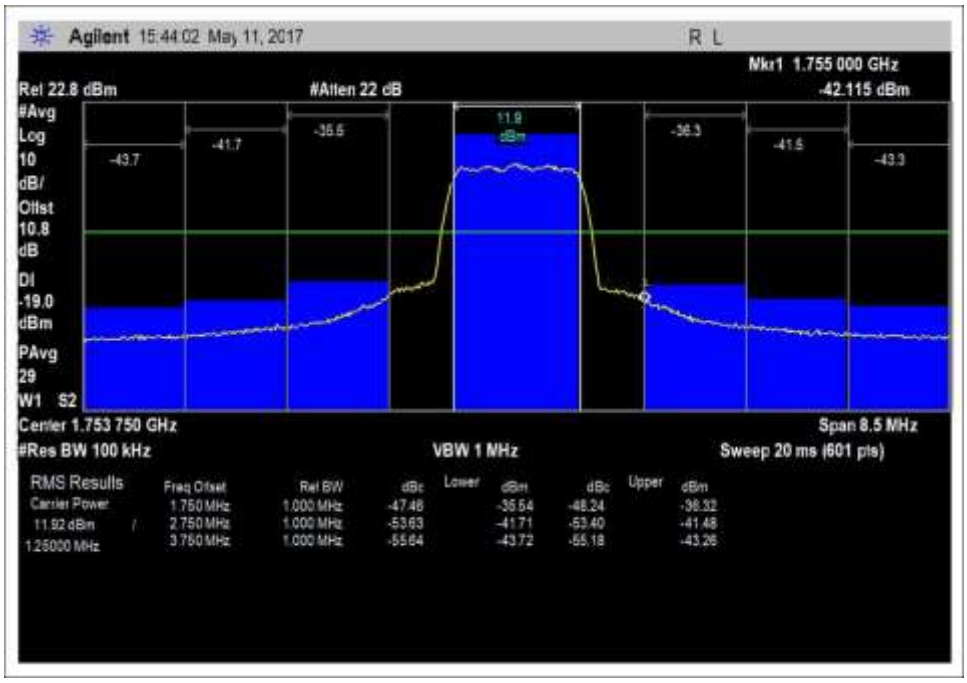
UL_776-787MHz_L_PreAGC_CDMA



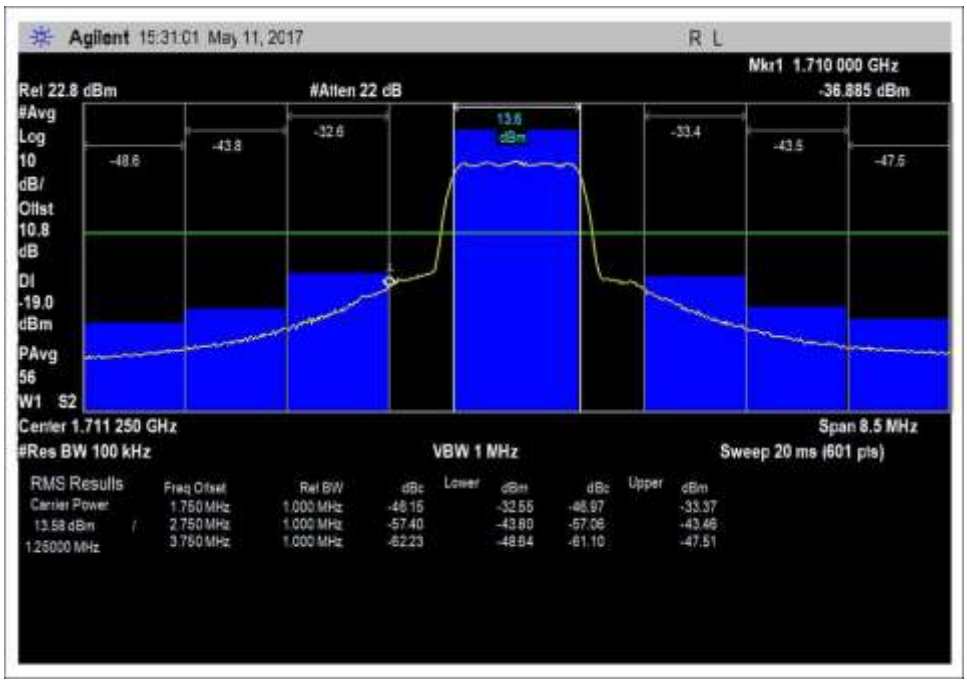
UL_824-849MHzMHz_H_PreAGC_CDMA



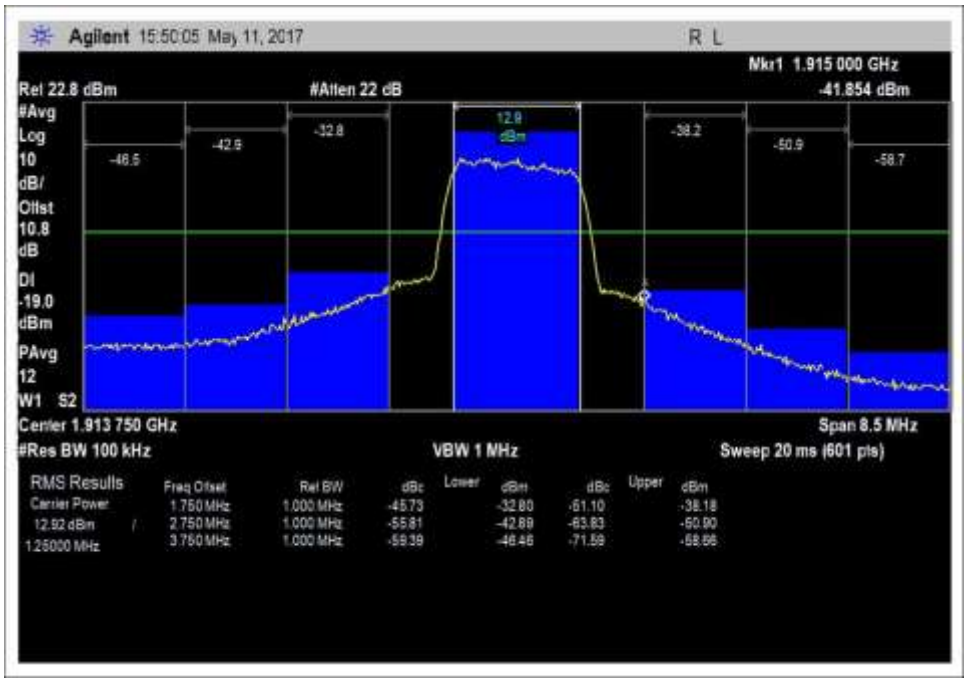
UL_824-849MHzz_L_PreAGC_CDMA



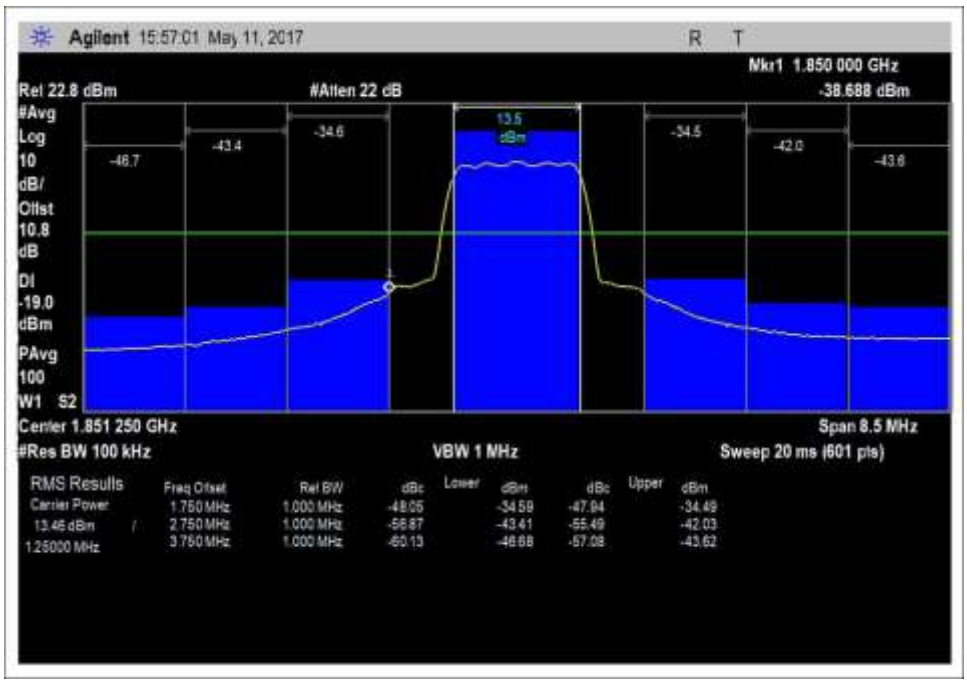
UL_1710-1755MHz_H_PreAGC_CDMA



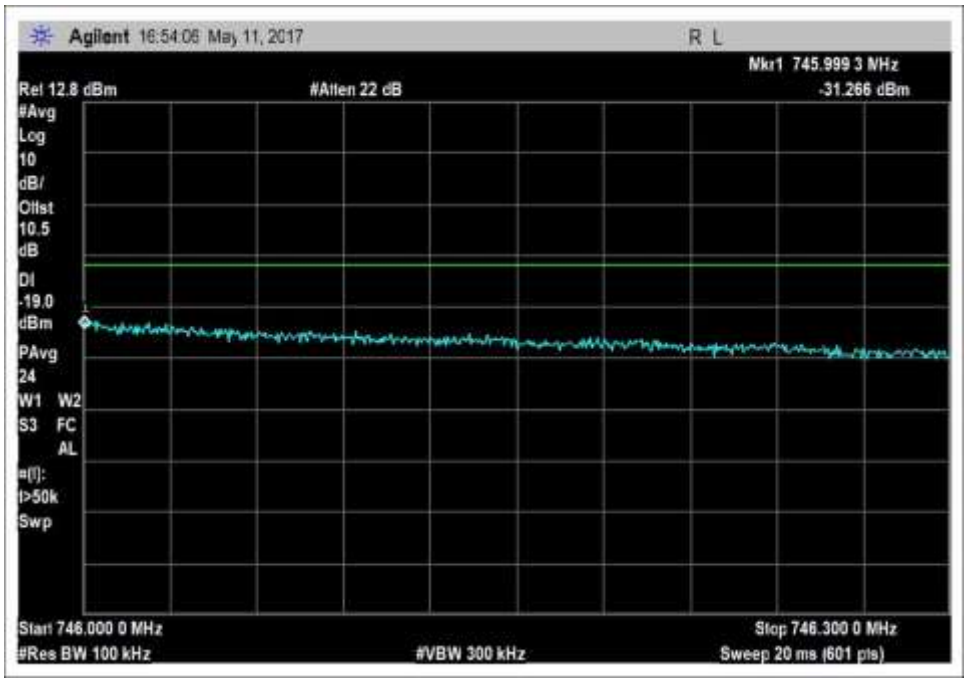
UL_1710-1755MHz_L_PreAGC_CDMA



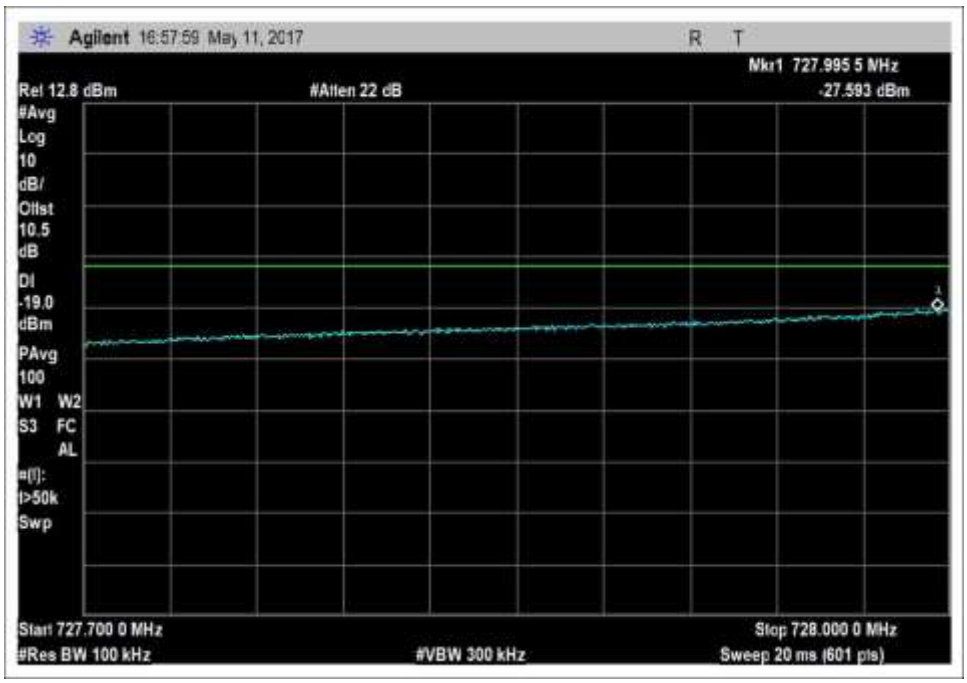
UL_1850-1915MHz_H_PreAGC_CDMA



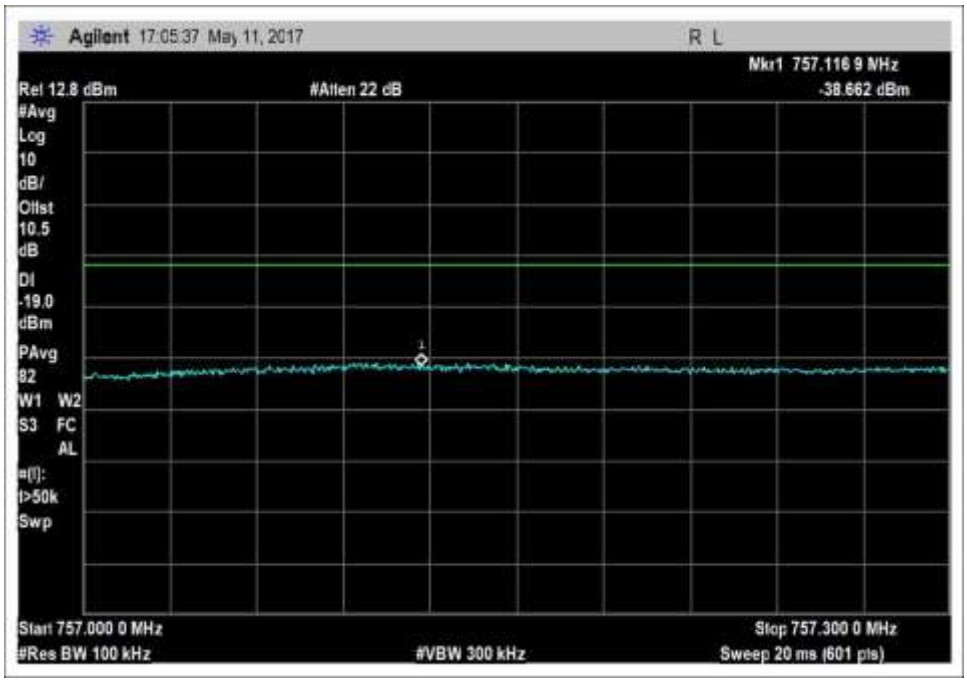
UL_1850-1915MHz_L_PreAGC_CDMA



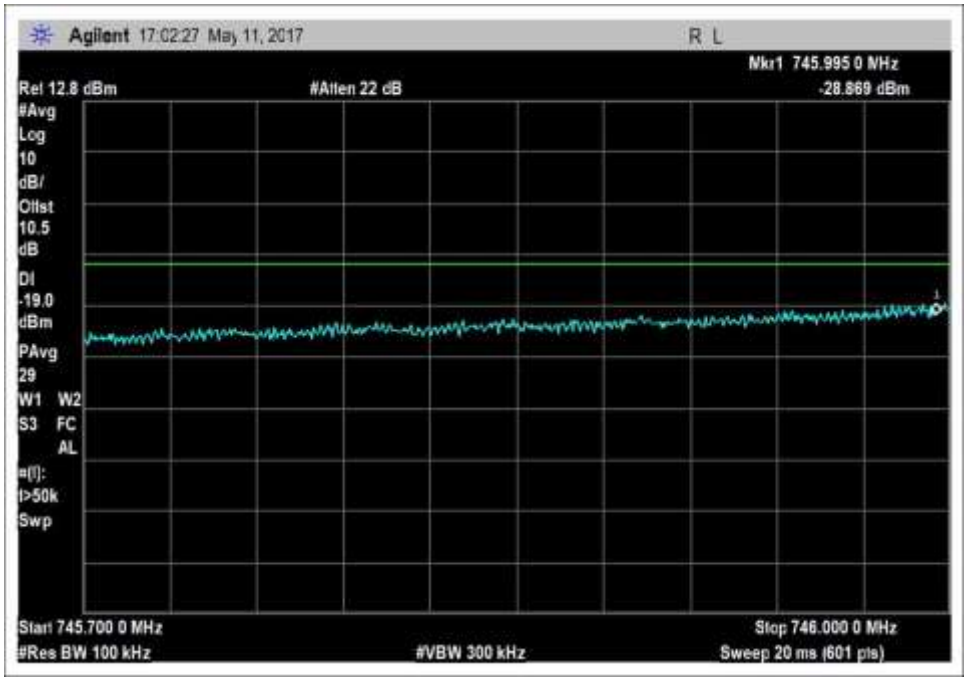
DL_728-746MHz_H_PreAGC_CDMA



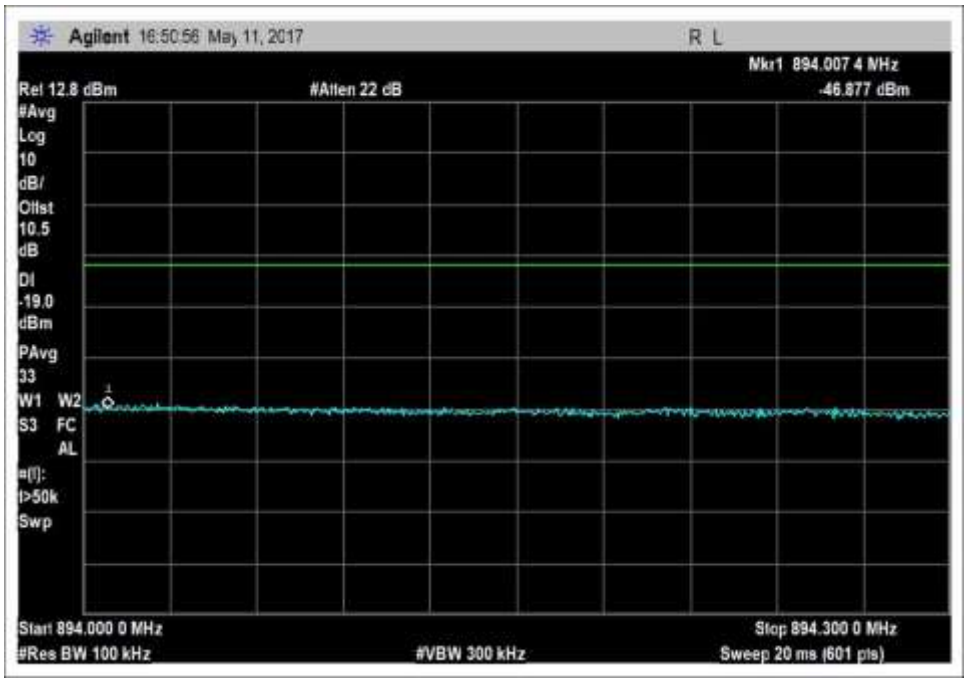
DL_728-746MHz_L_PreAGC_CDMA



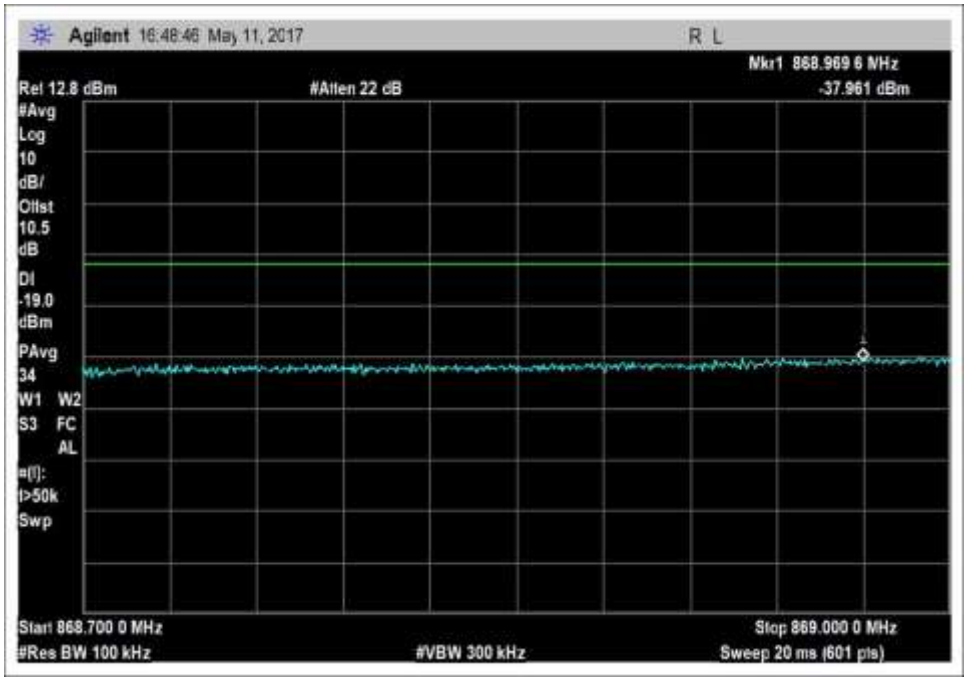
DL_746-757MHz_H_PreAGC_CDMA



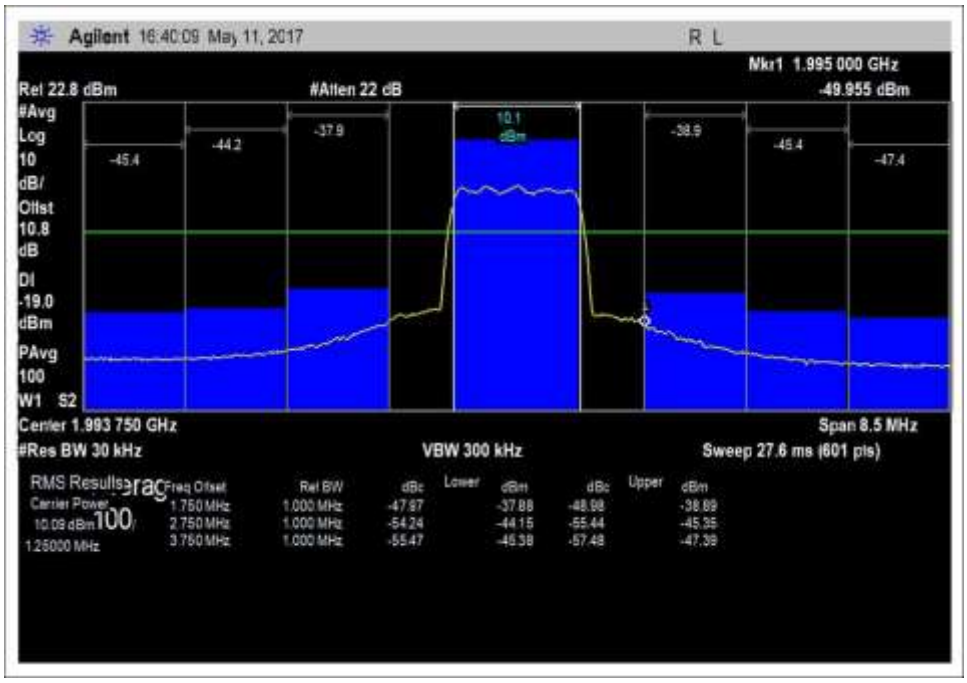
DL_746-757MHz_L_PreAGC_CDMA



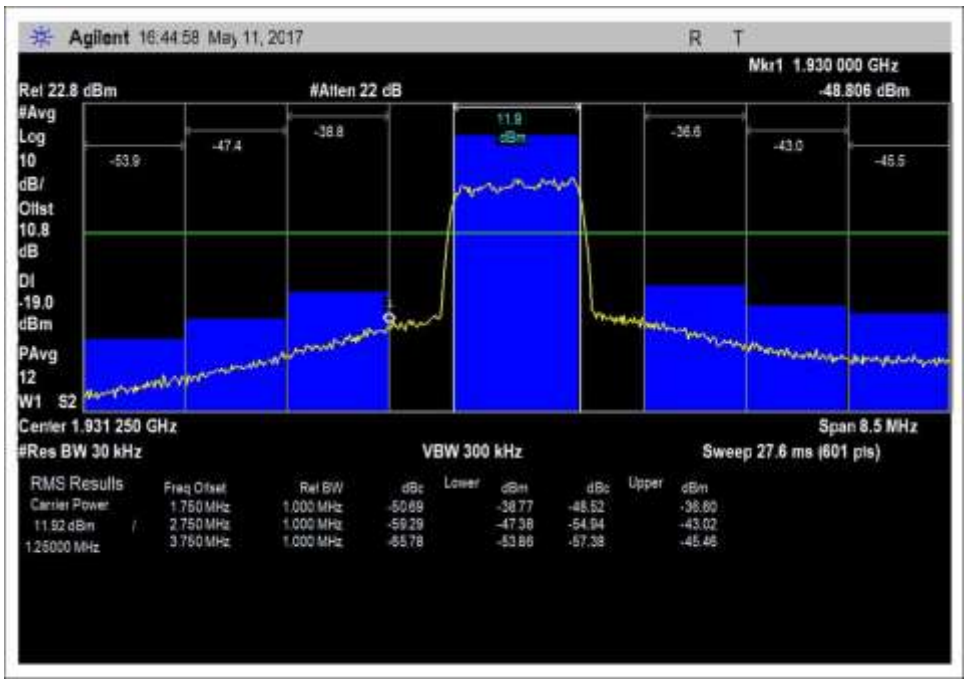
DL_869-894MHz_H_PreAGC_CDMA



DL_869-894MHz_L_PreAGC_CDMA



DL_1930-1995MHz_H_PreAGC_CDMA



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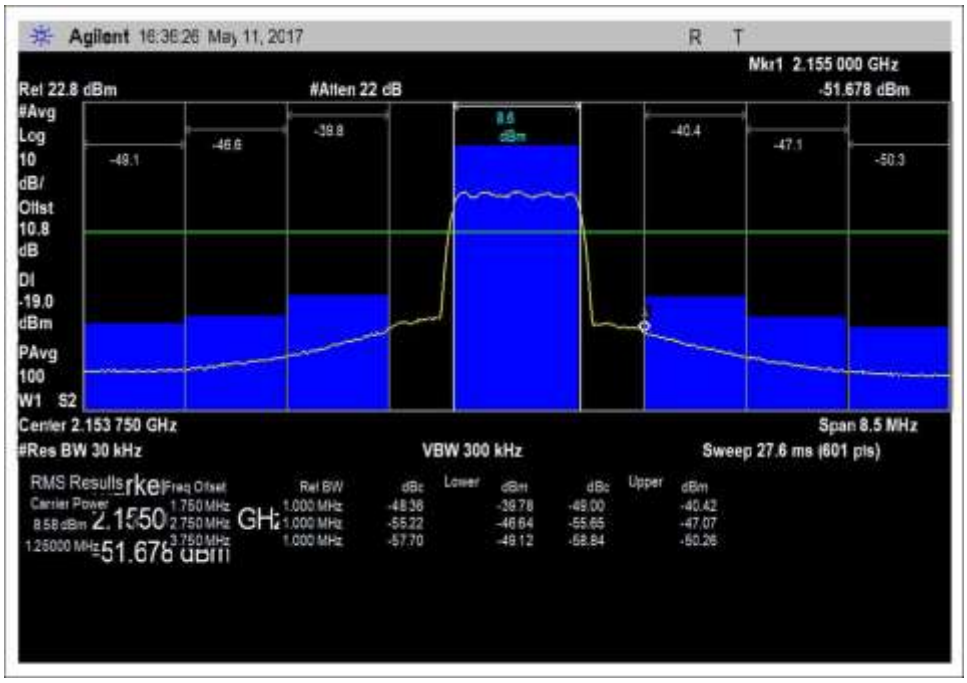
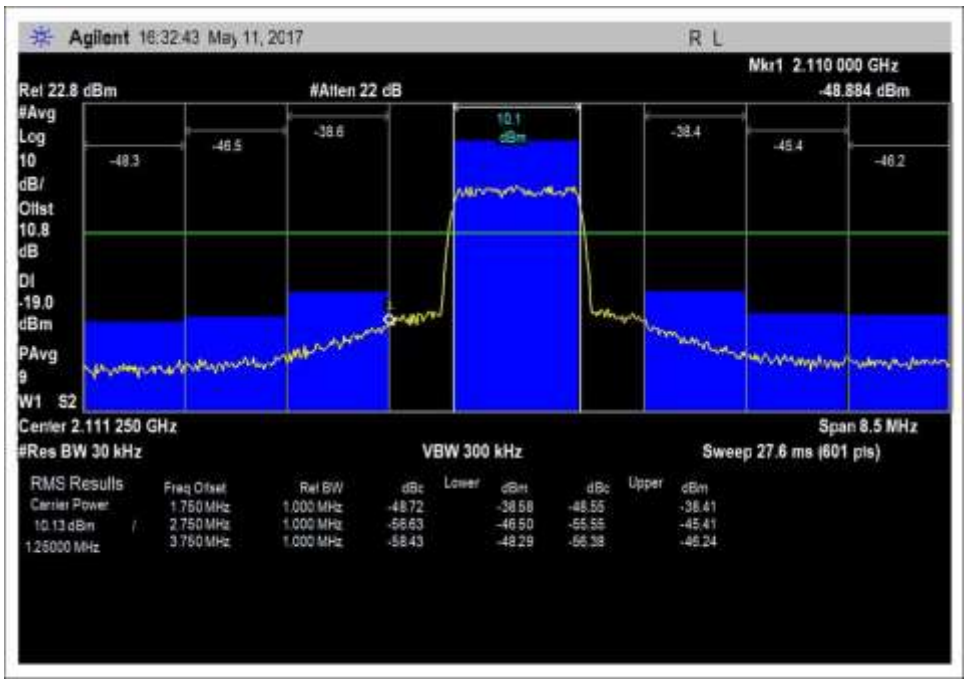
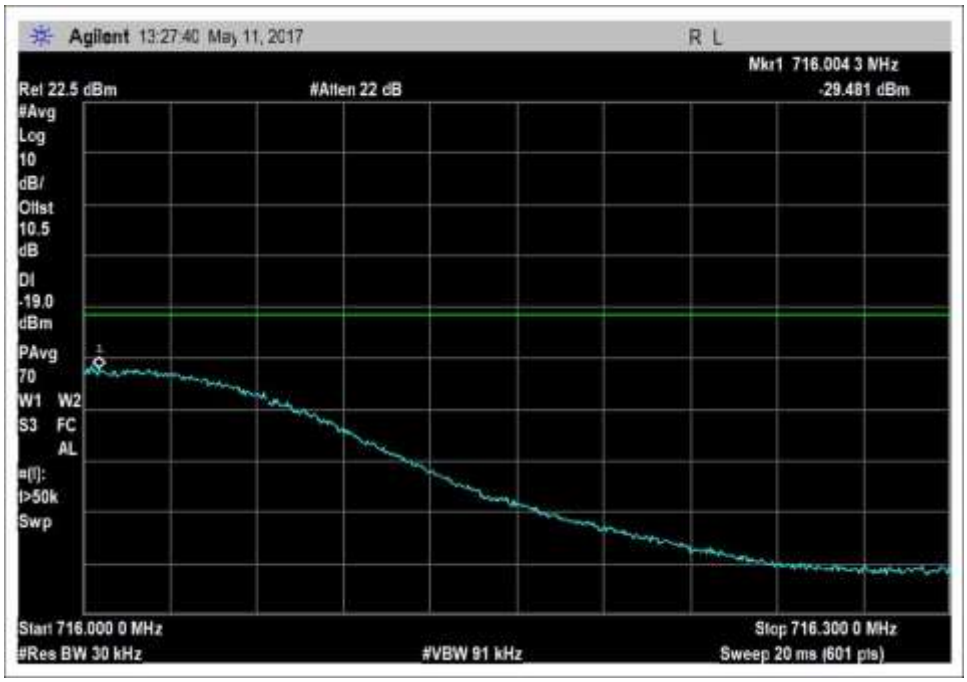


DL_2110-2155MHz_H_PreAGC_CDMA

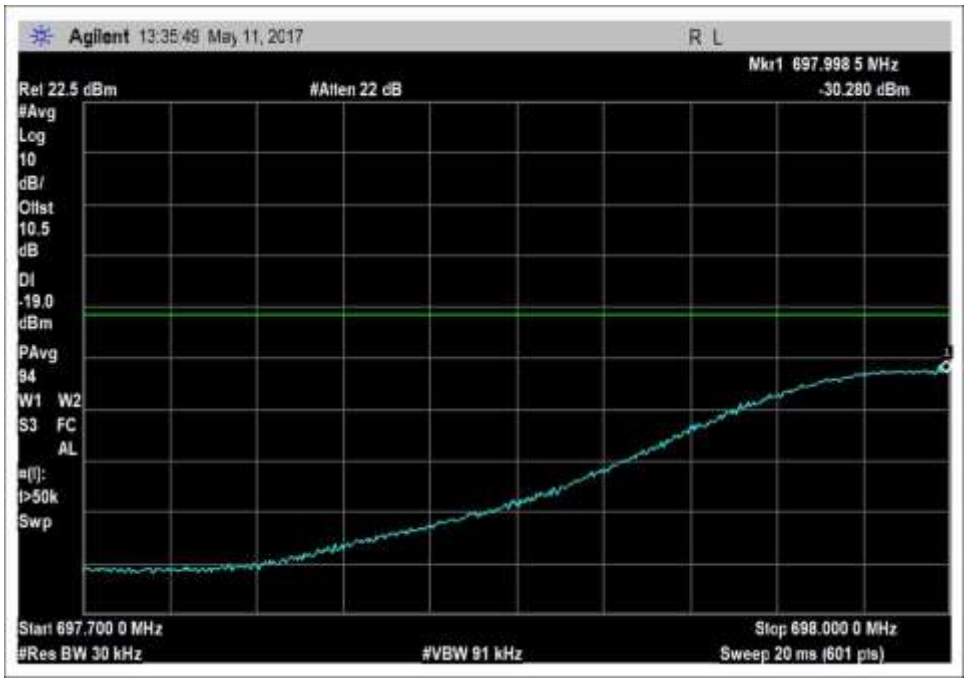


DL_2110-2155MHz_L_PreAGC_CDMA

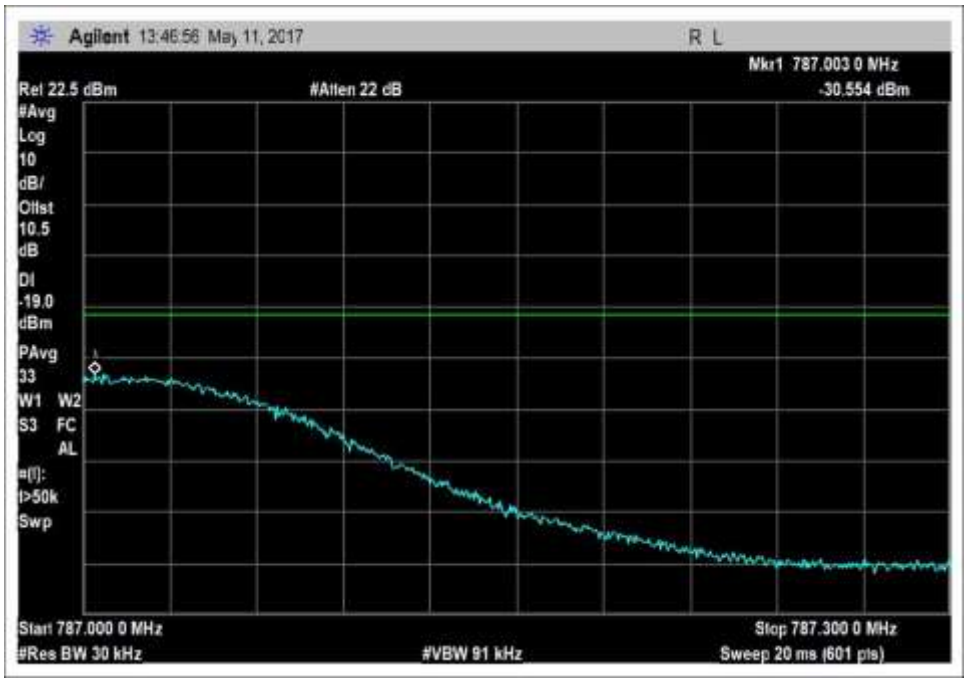
GSM



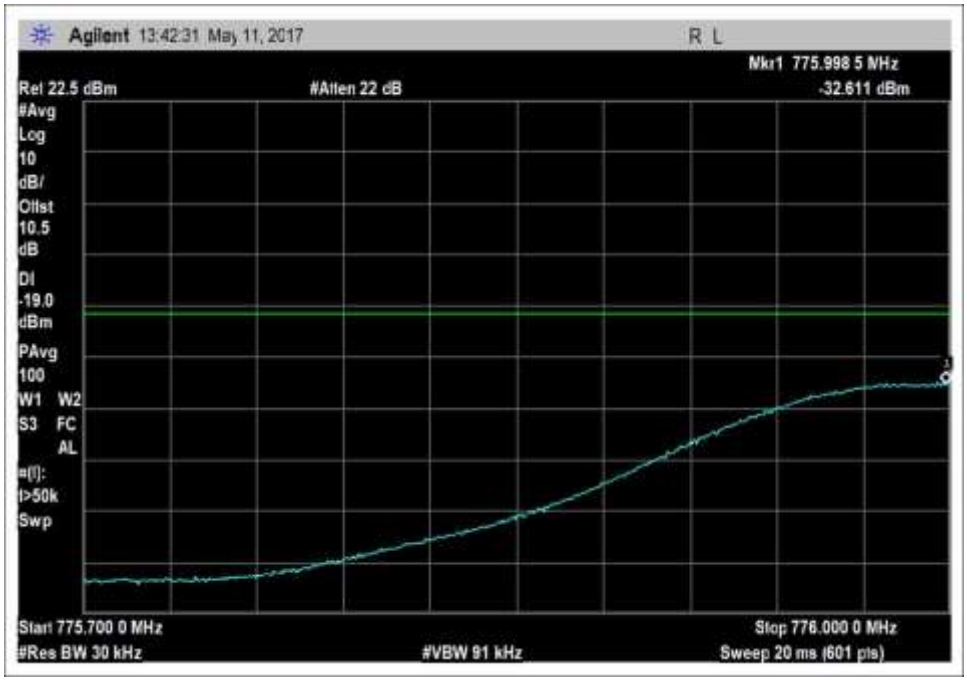
UL_698-716MHz _H_PreAGC_GSM



UL_698-716MHz _L_PreAGC_GSM

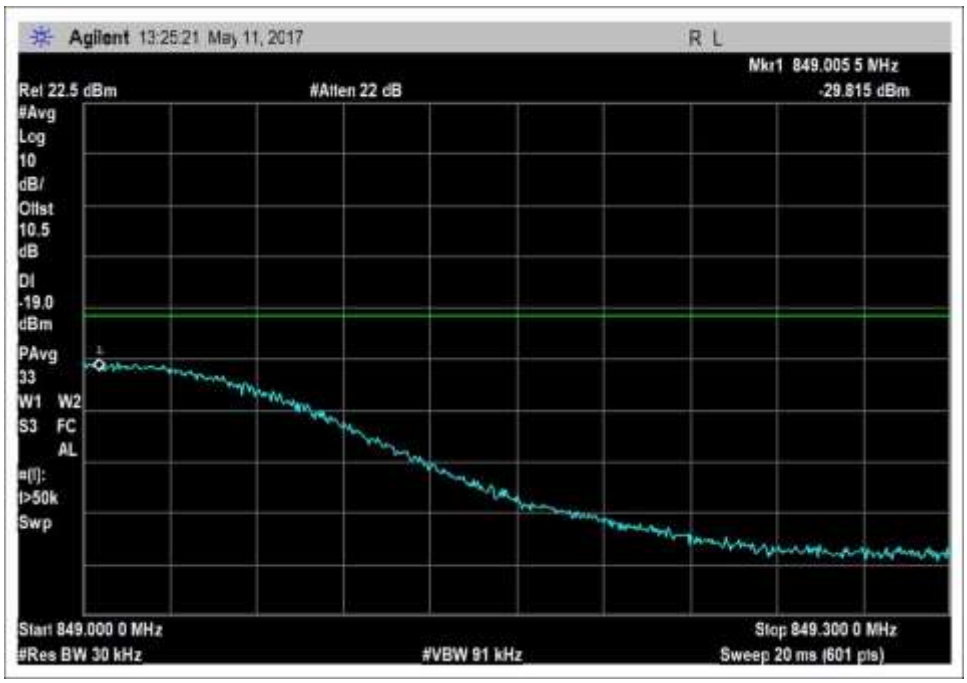


UL_776-787MHz _H_PreAGC_GSM

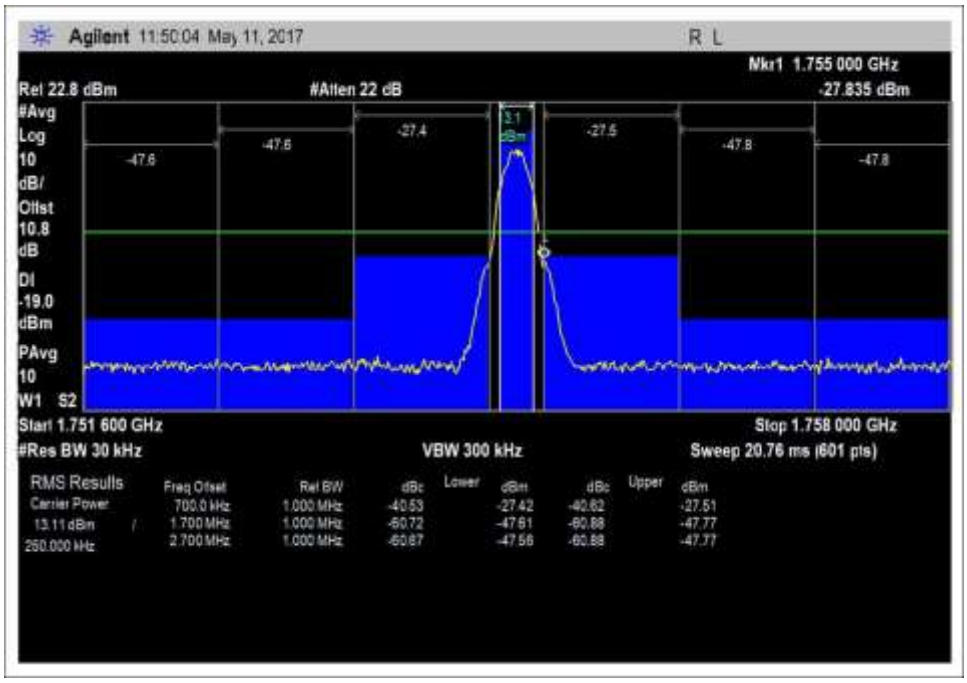


UL_776-787MHz _L_PreAGC_GSM

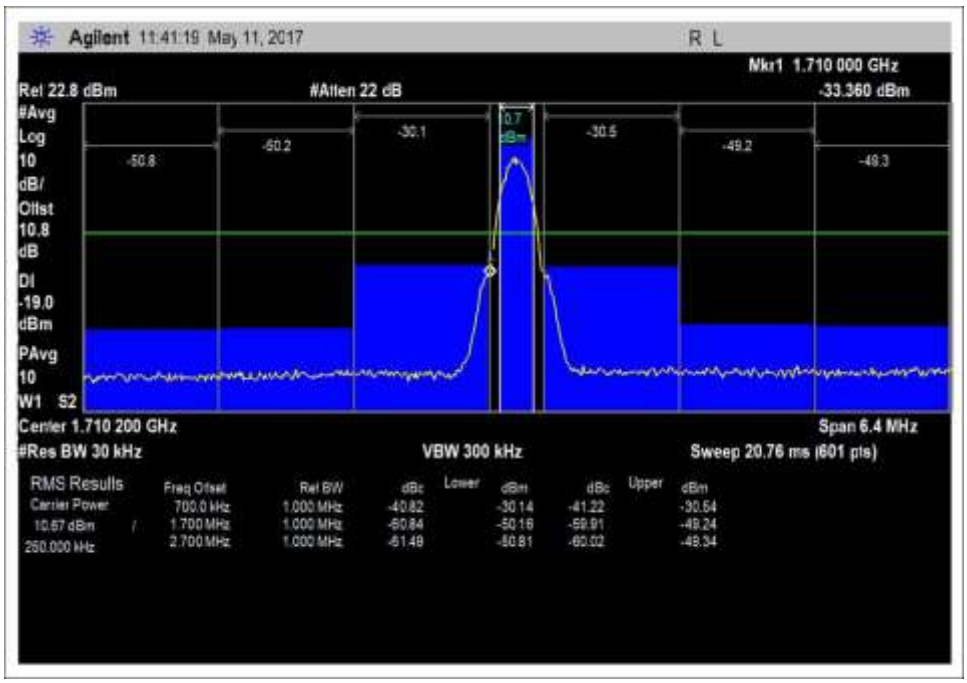
UL_824-849MHz _L_PreAGC_GSM



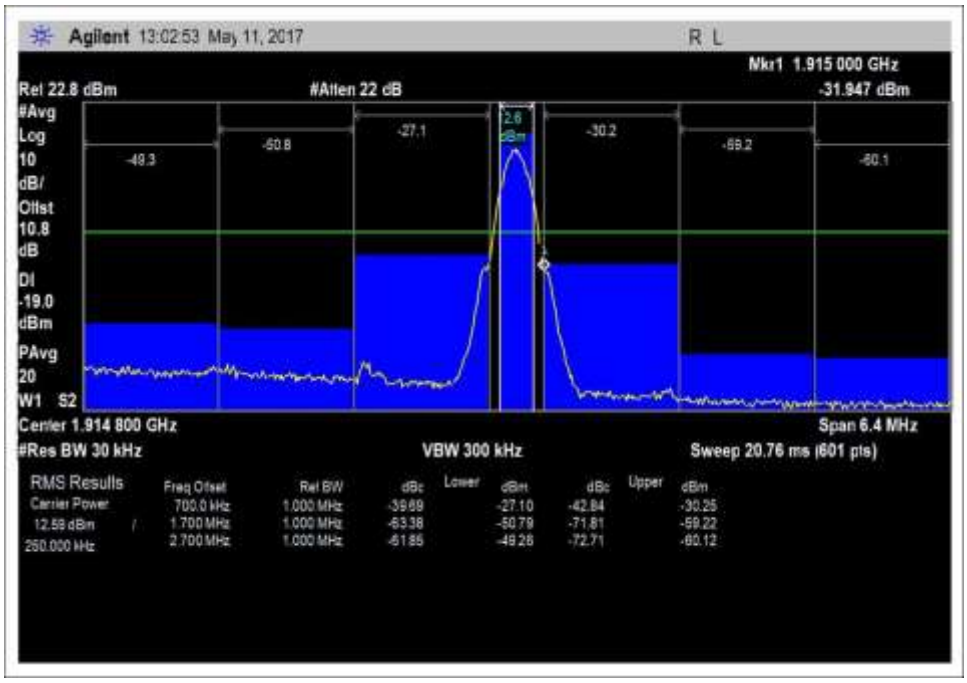
UL_824-849MHz_H_PreAGC_GSM



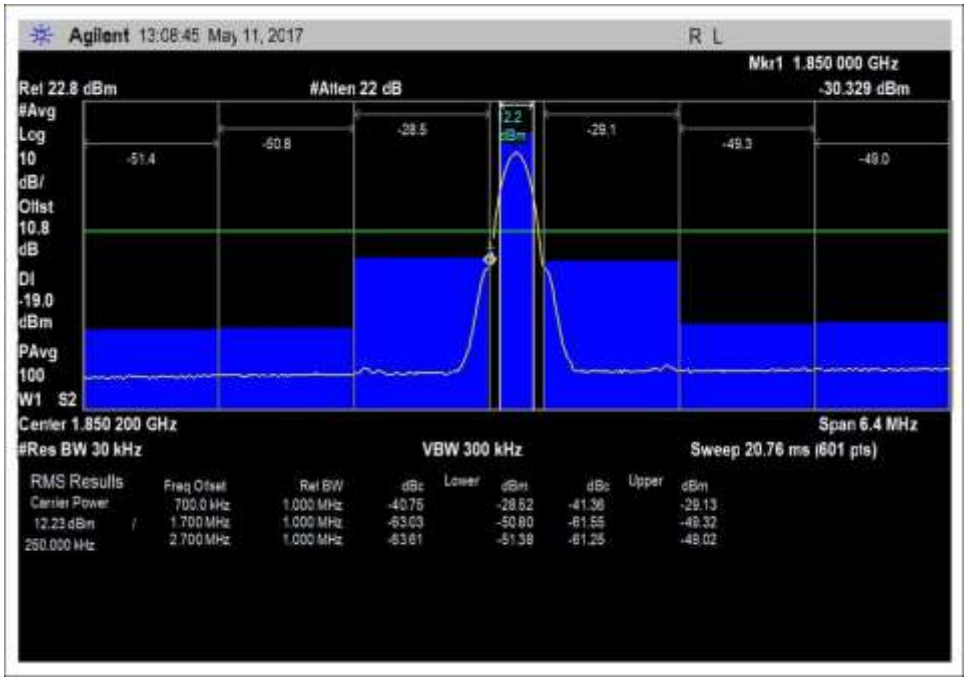
UL_1710-1755MHz_H_PreAGC_GSM



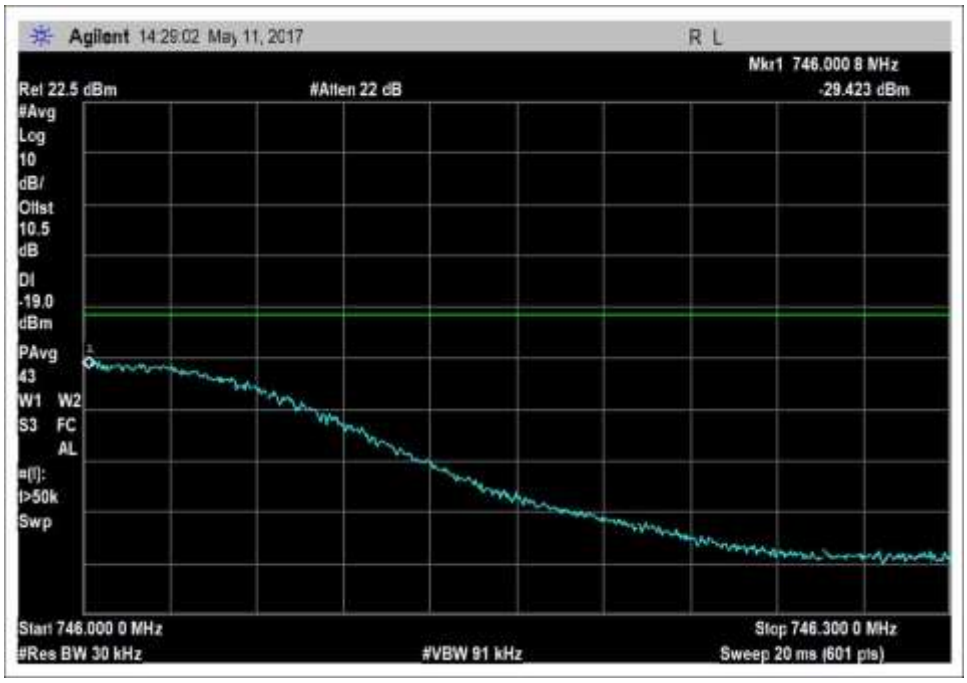
UL_1710-1755MHz_L_PreAGC_GSM



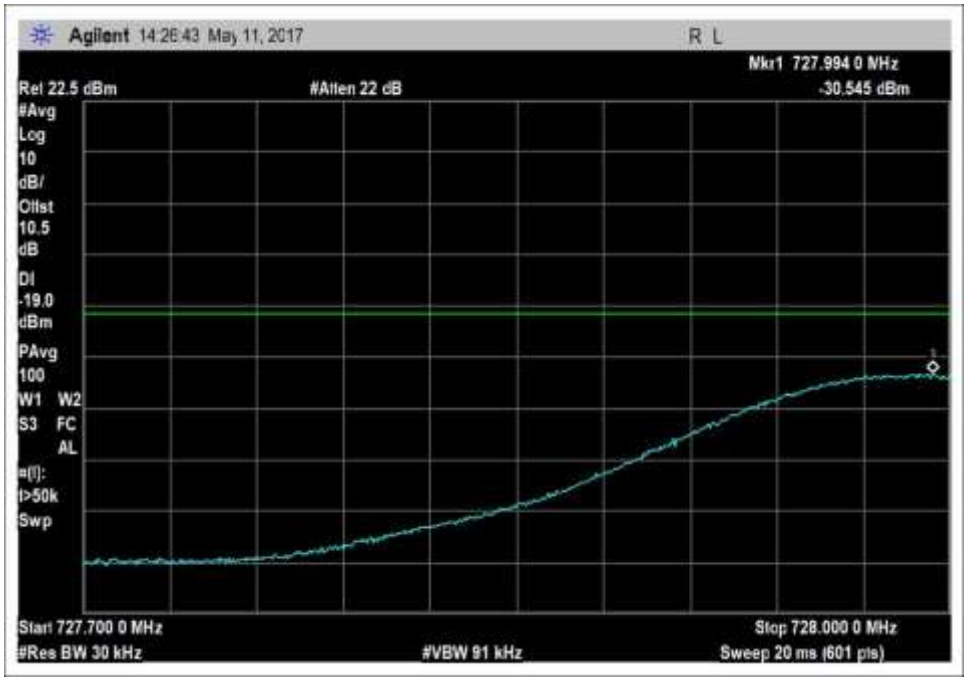
UL_1850-1915MHz _H_PreAGC_GSM



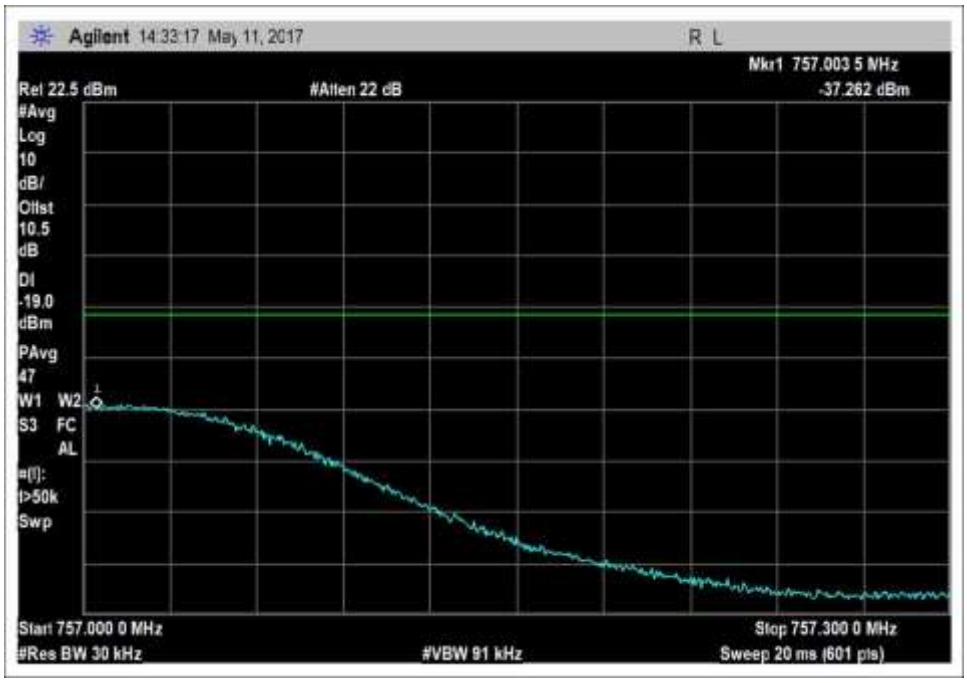
UL_1850-1915MHz _L_PreAGC_GSM



DL_ 728-746MHz _H_PreAGC_GSM

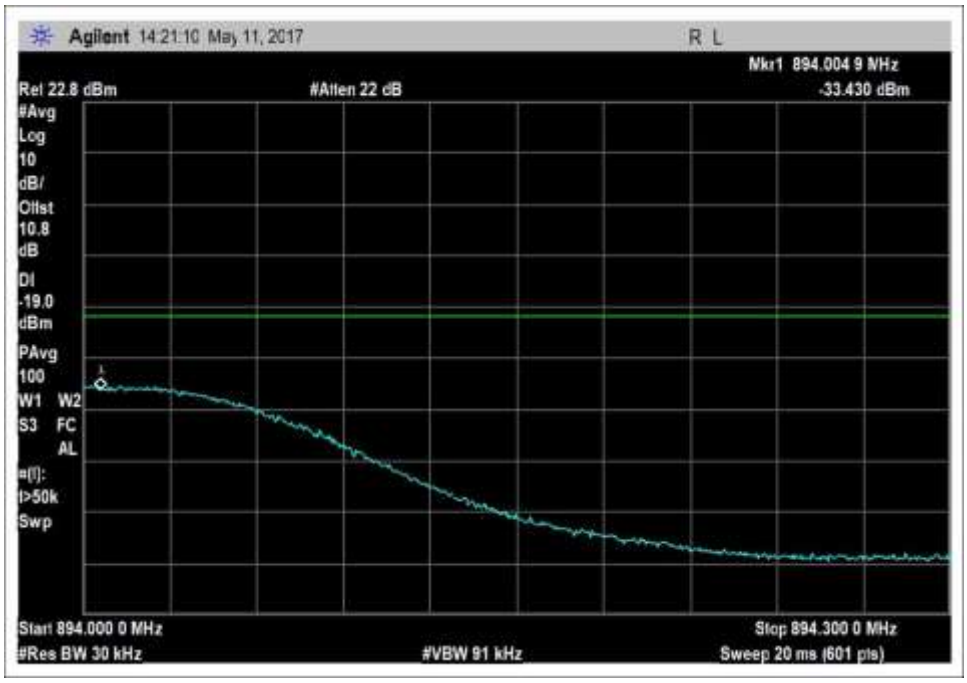


DL_ 728-746MHz _L_PreAGC_GSM

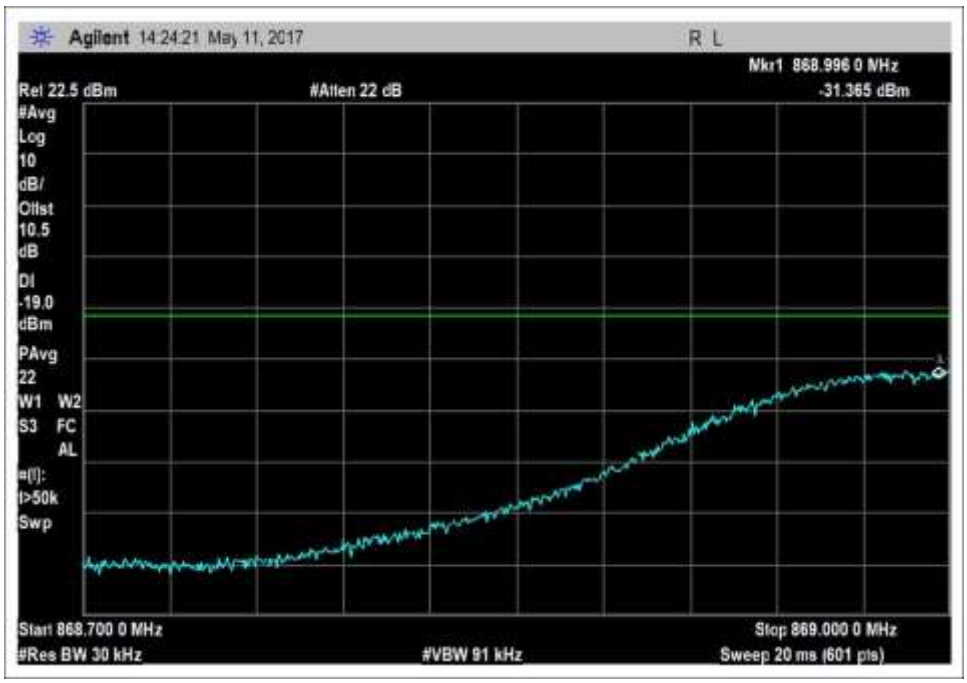


DL_746-757MHz _H_PreAGC_GSM

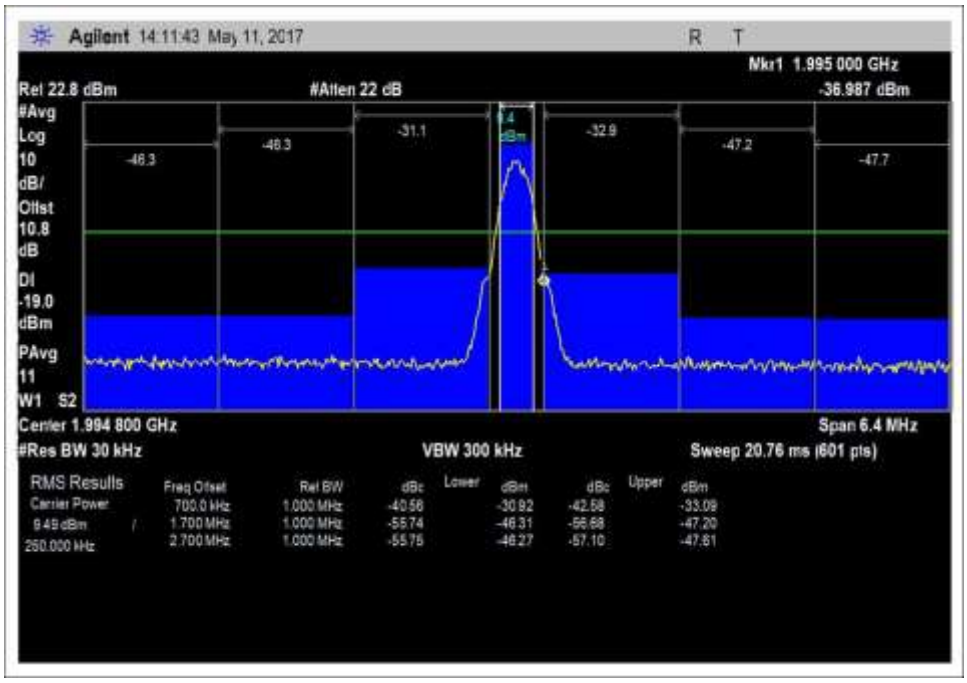
DL_746-757MHz _L_PreAGC_GSM



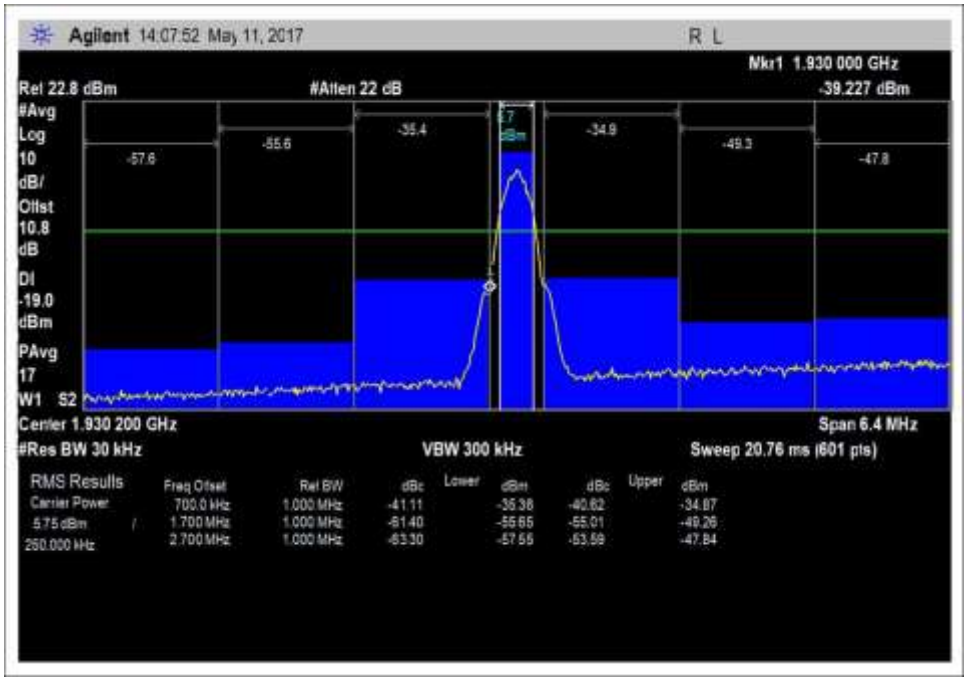
DL_869-894MHz _H_PreAGC_GSM



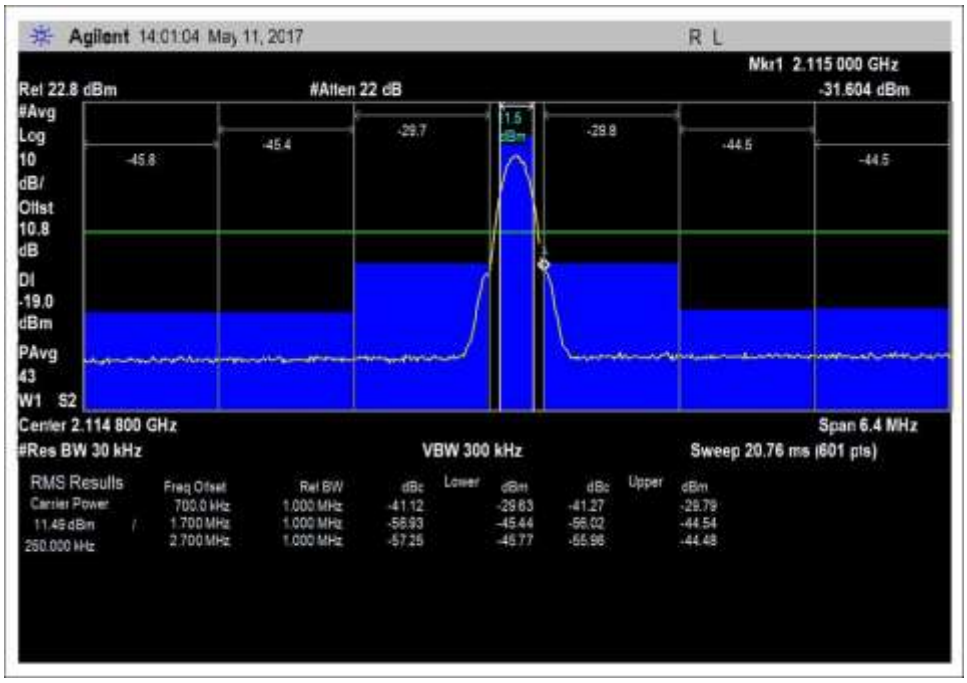
DL_869-894MHz _L_PreAGC_GSM



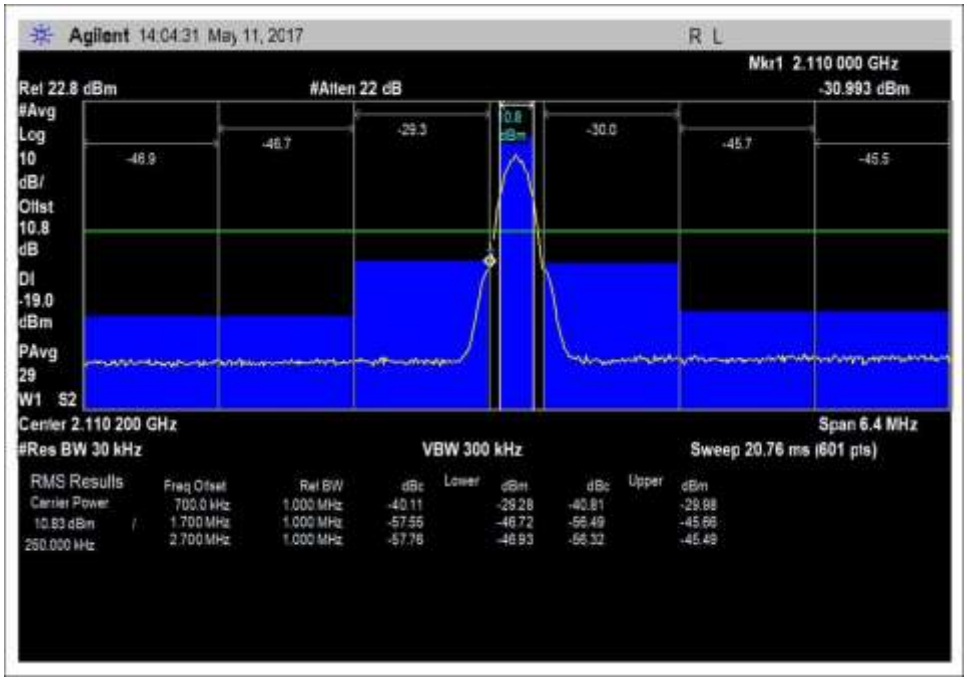
DL_1930-1995MHz _H_PreAGC_GSM



DL_1930-1995MHz _L_PreAGC_GSM

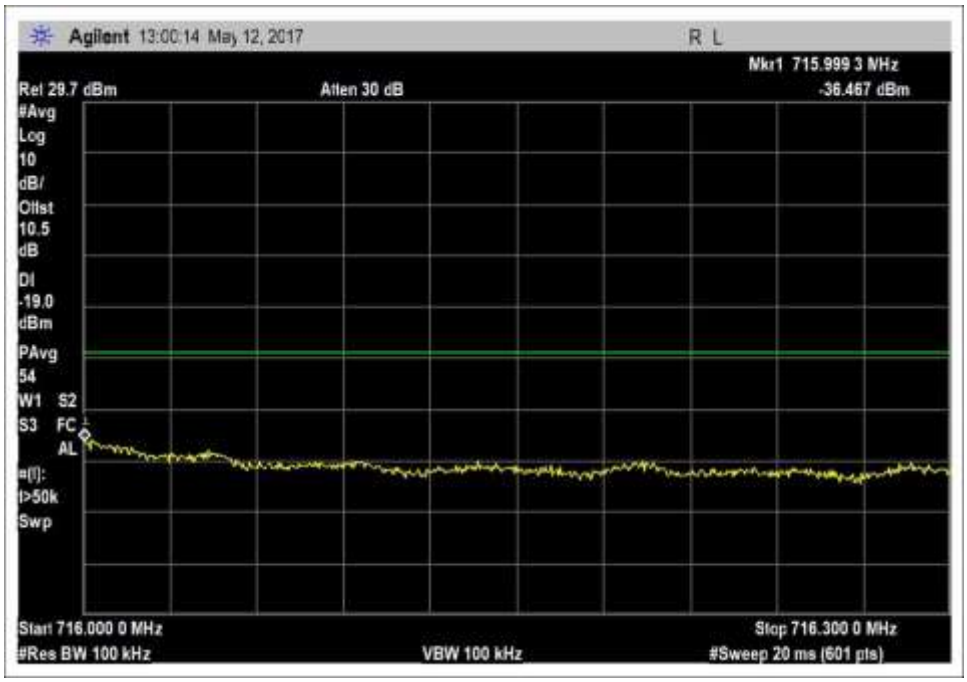


DL_2110-2155MHz _H_PreAGC_GSM

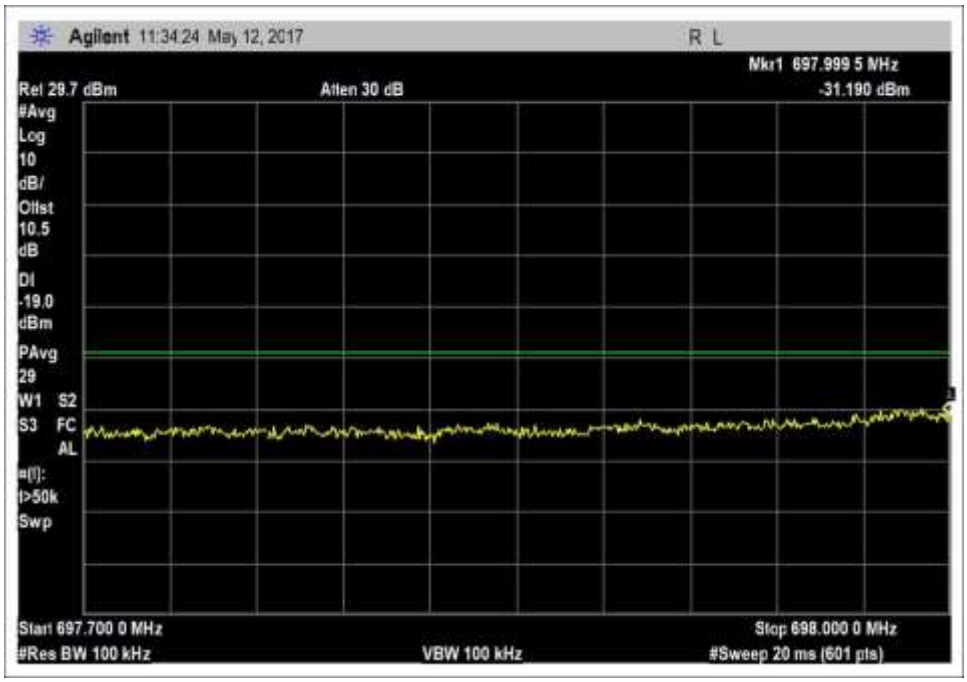


DL_2110-2155MHz _L_PreAGC_GSM

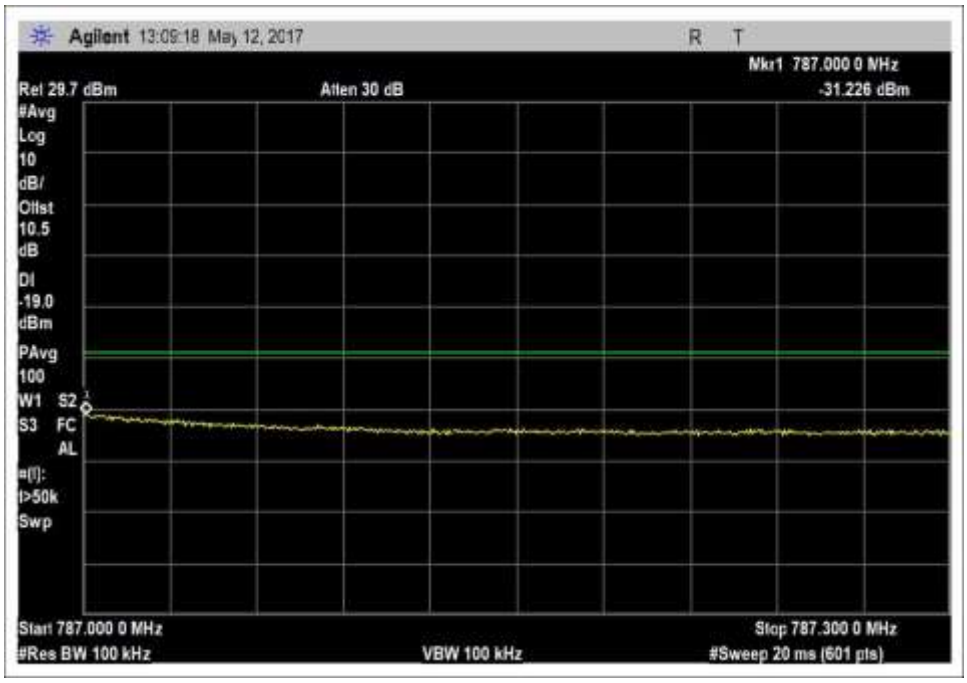
LTE



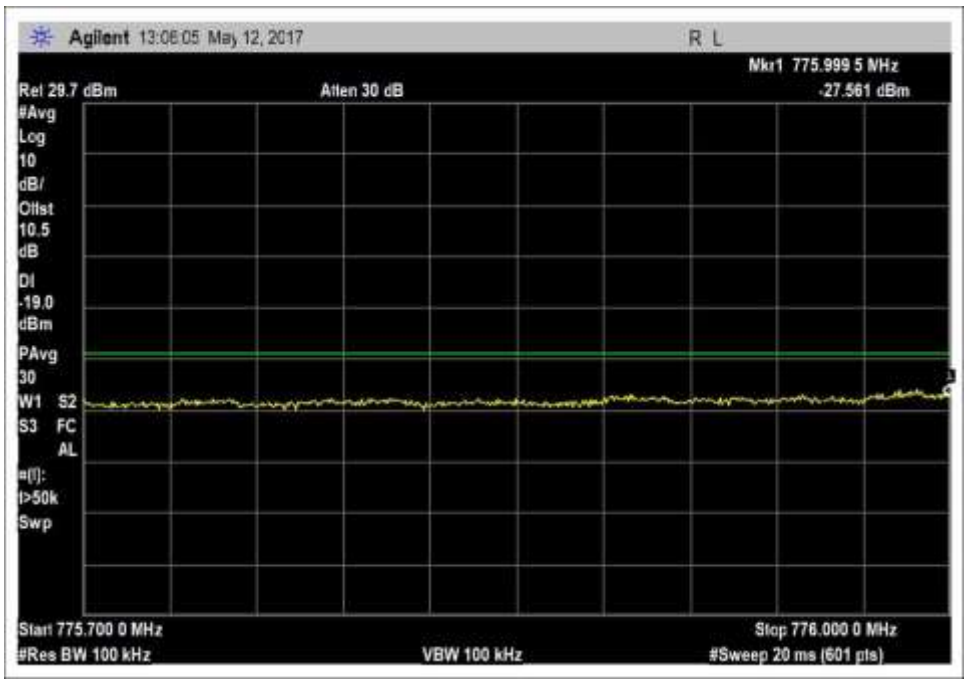
UL_698-716MHz _H_PreAGC_LTE



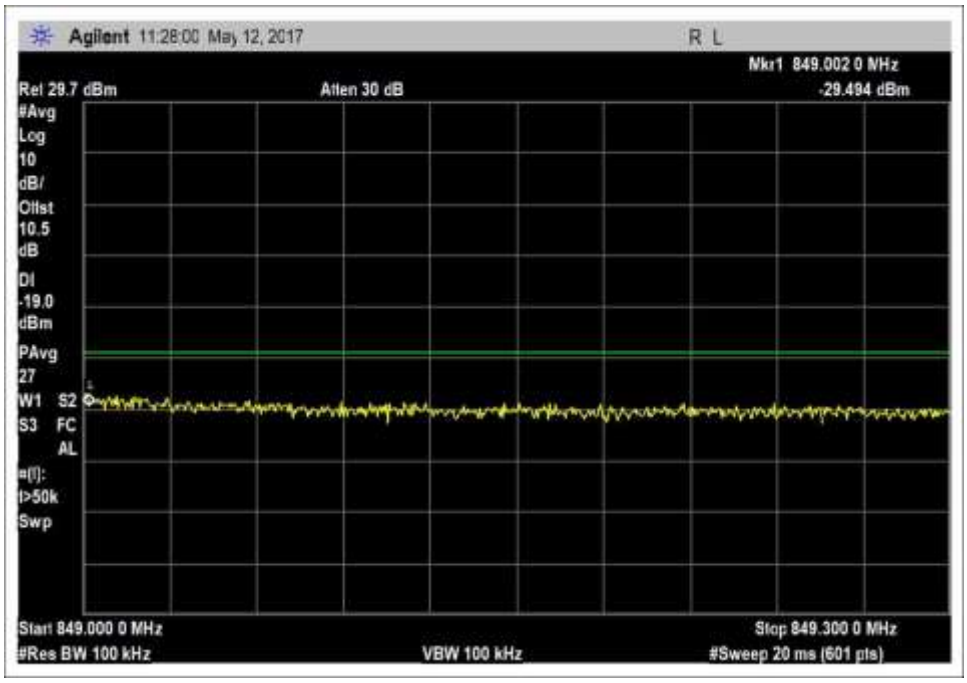
UL_698-716MHz _L_PreAGC_LTE



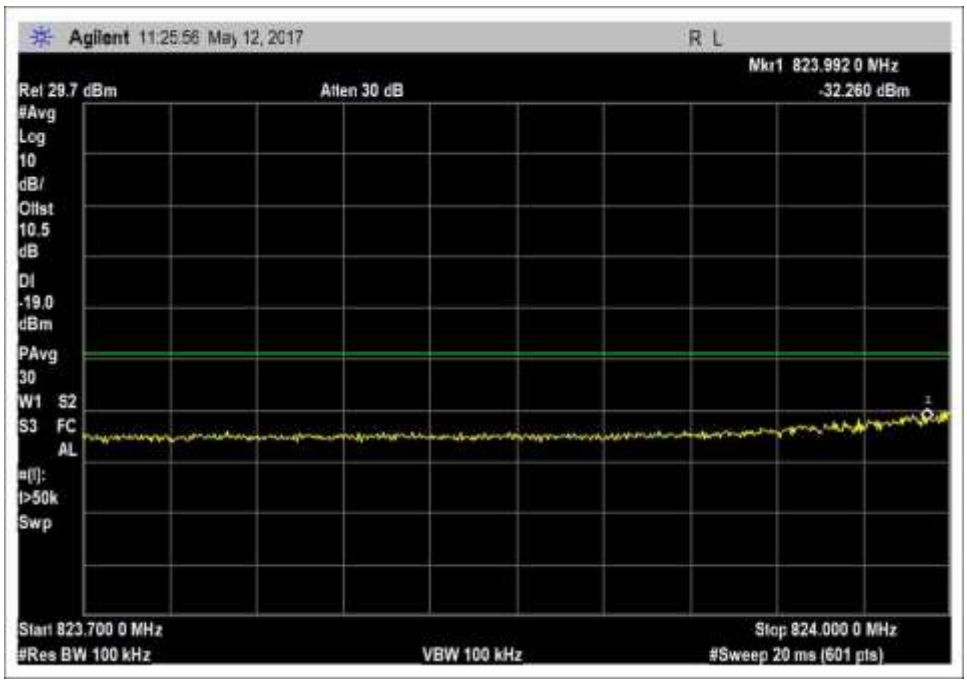
UL_776-787MHz_H_PreAGC_LTE



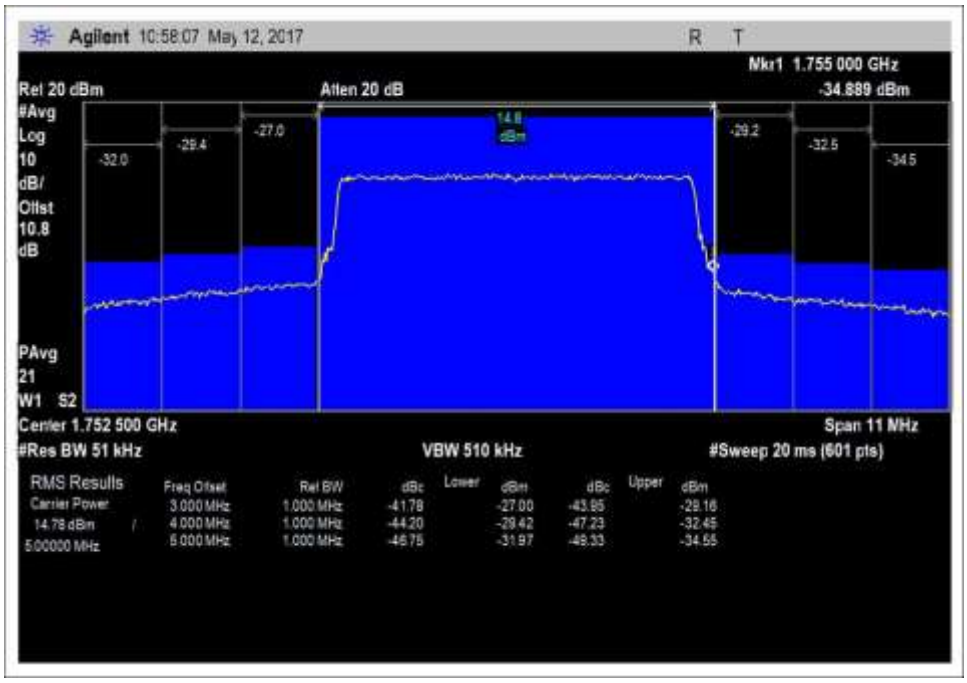
UL_776-787MHz_L_PreAGC_LTE



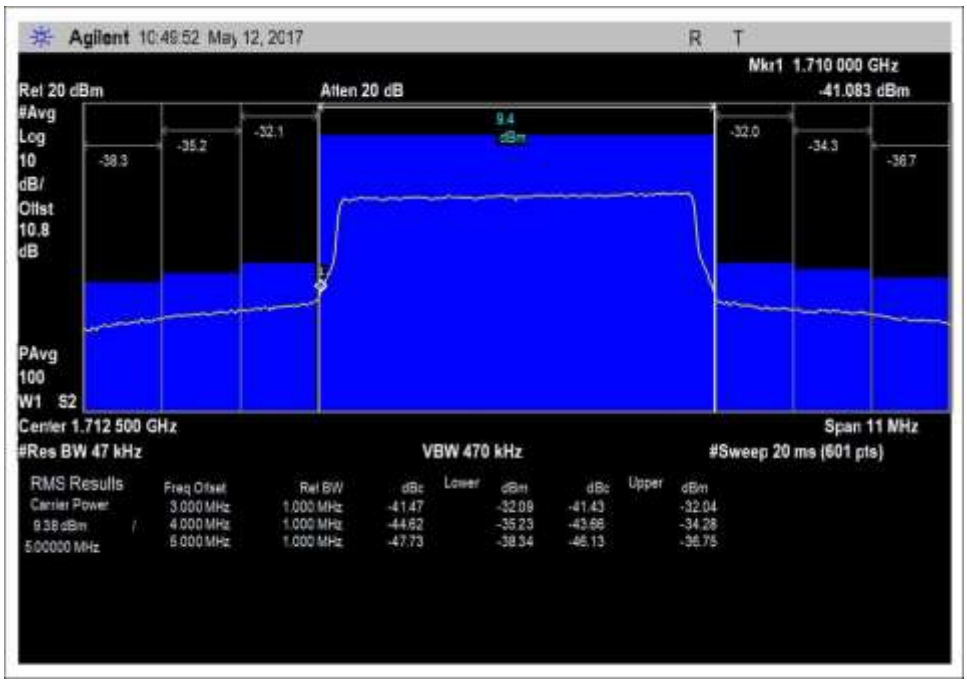
UL_824-849MHz _H_PreAGC_LTE



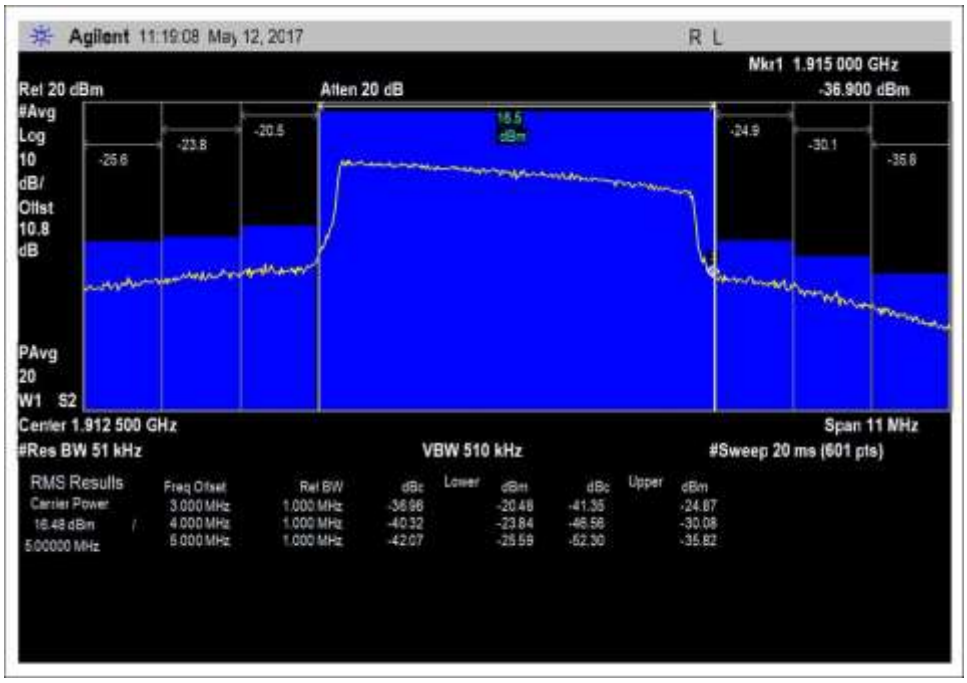
UL_824-849MHz _L_PreAGC_LTE



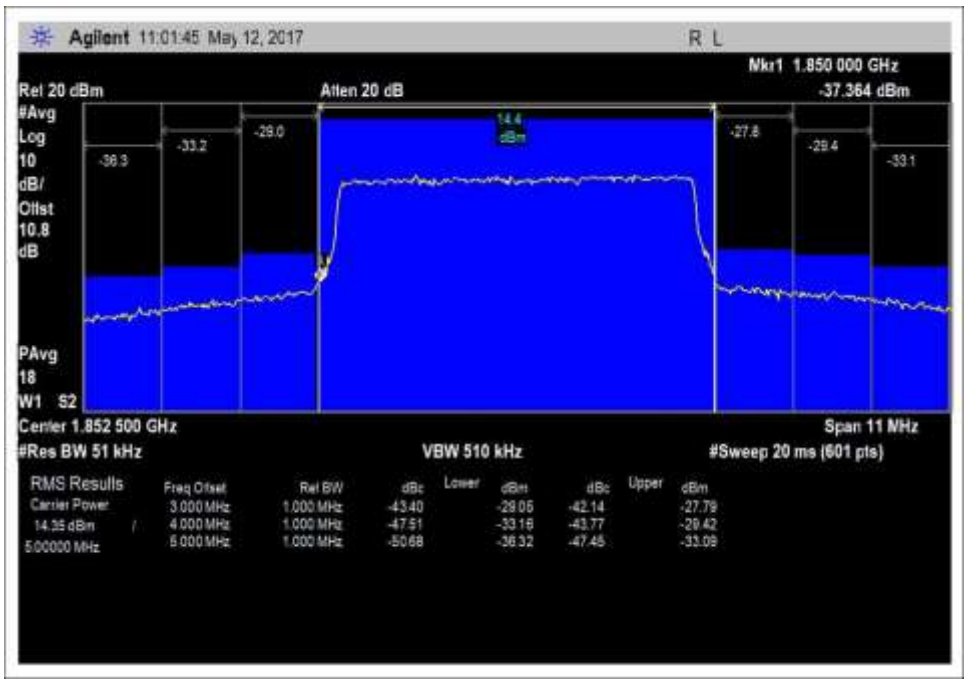
UL_1710-1755MHz_H_PreAGC_LTE



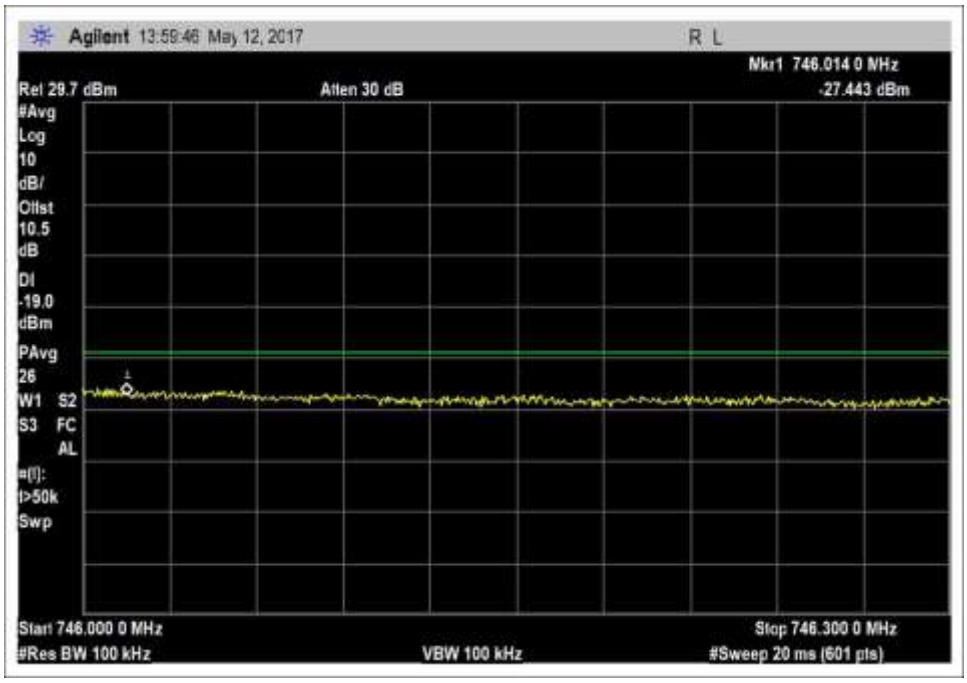
UL_1710-1755MHz_L_PreAGC_LTE



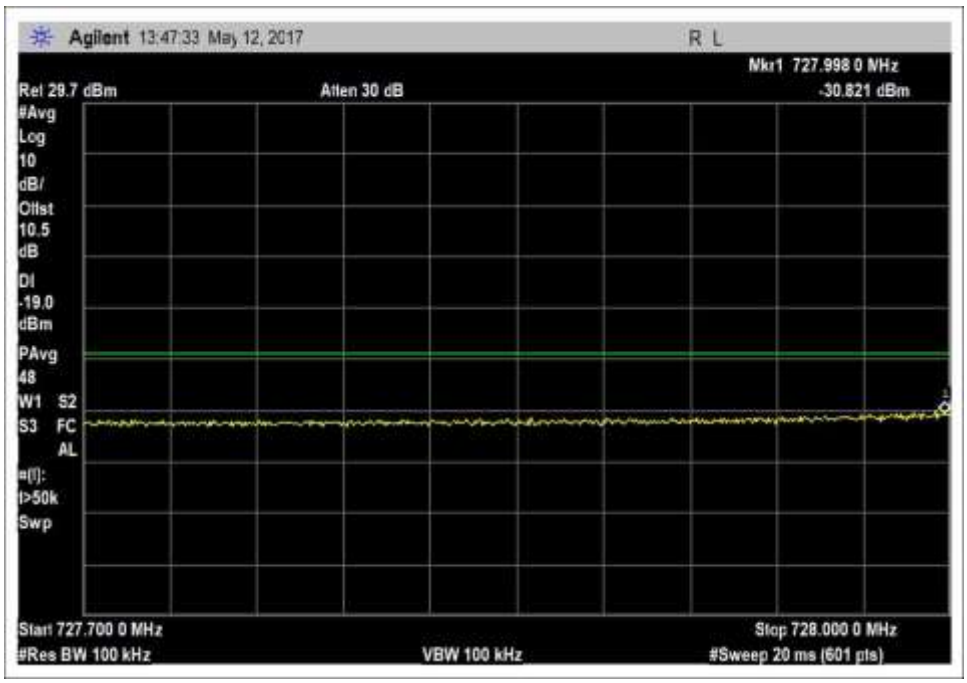
UL_1850-1915MHz _H_PreAGC_LTE



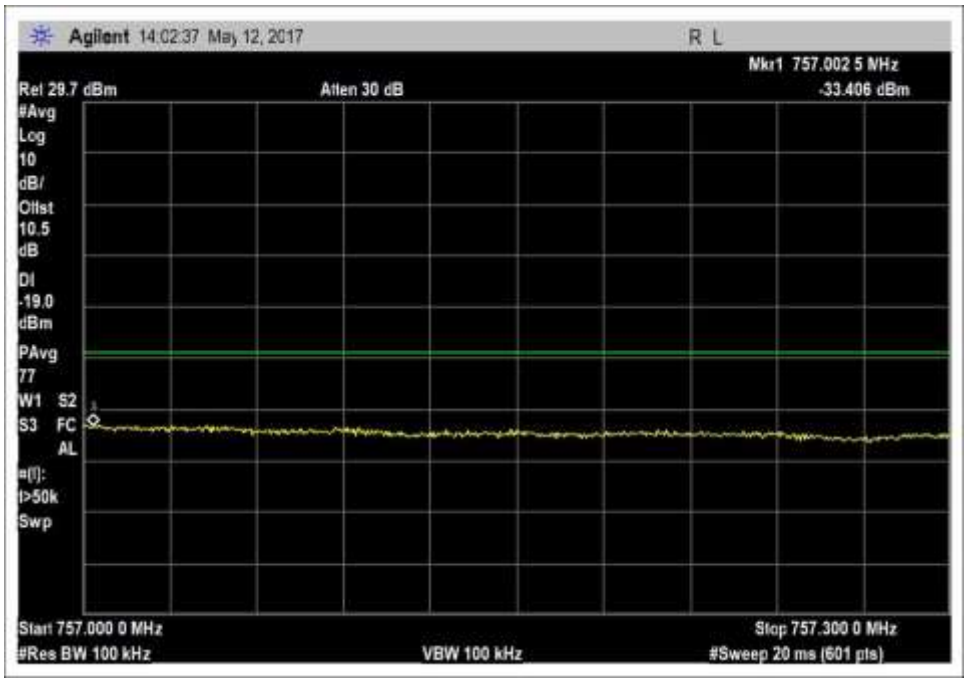
UL_1850-1915MHz _L_PreAGC_LTE



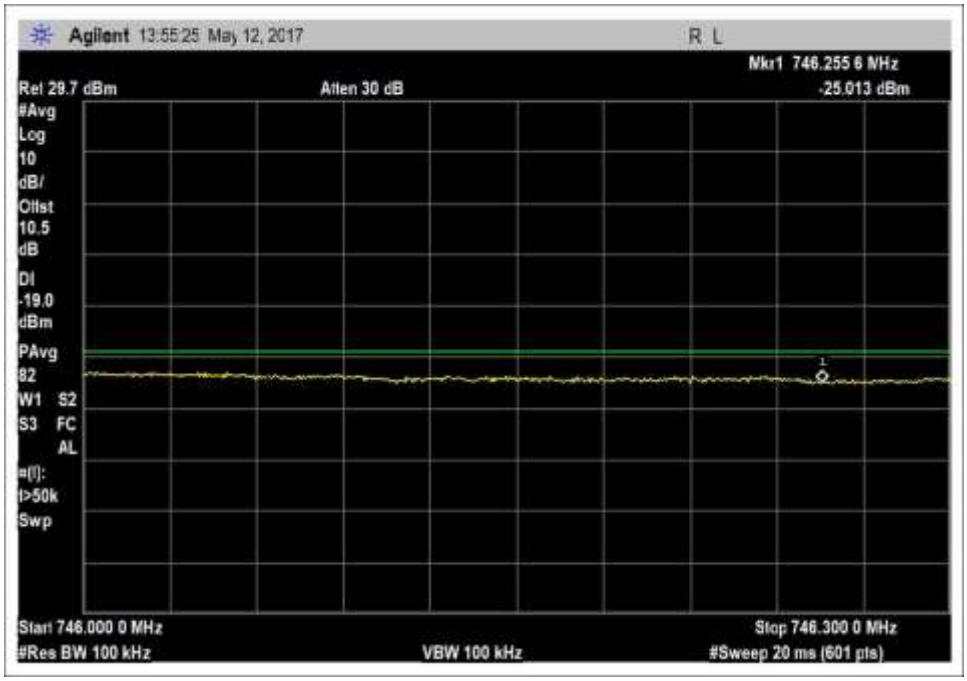
DL_728-746MHz_H_PreAGC_LTE



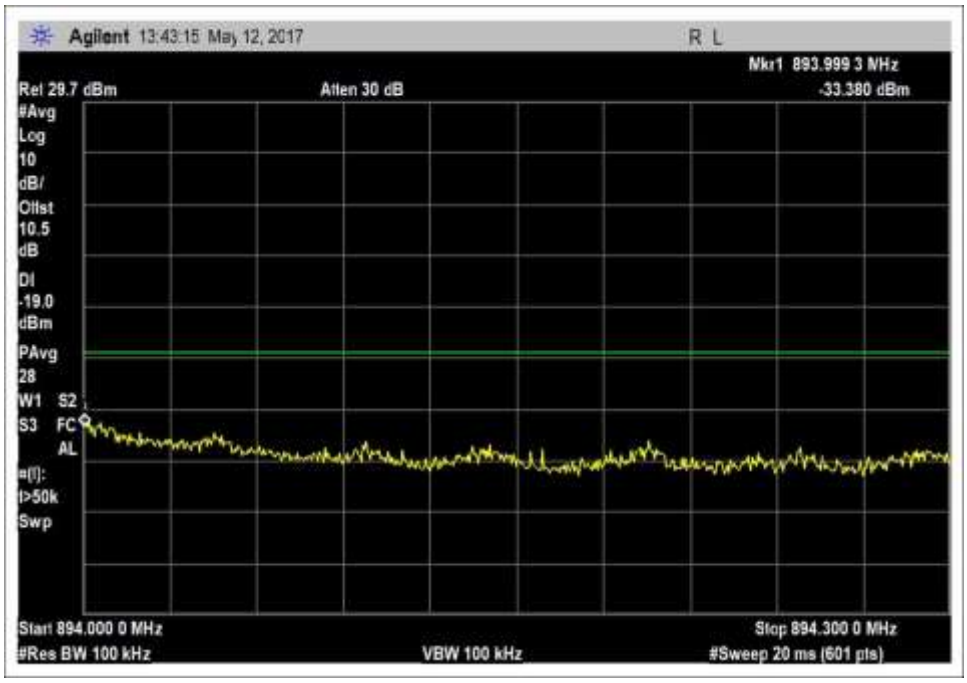
DL_728-746MHz_L_PreAGC_LTE



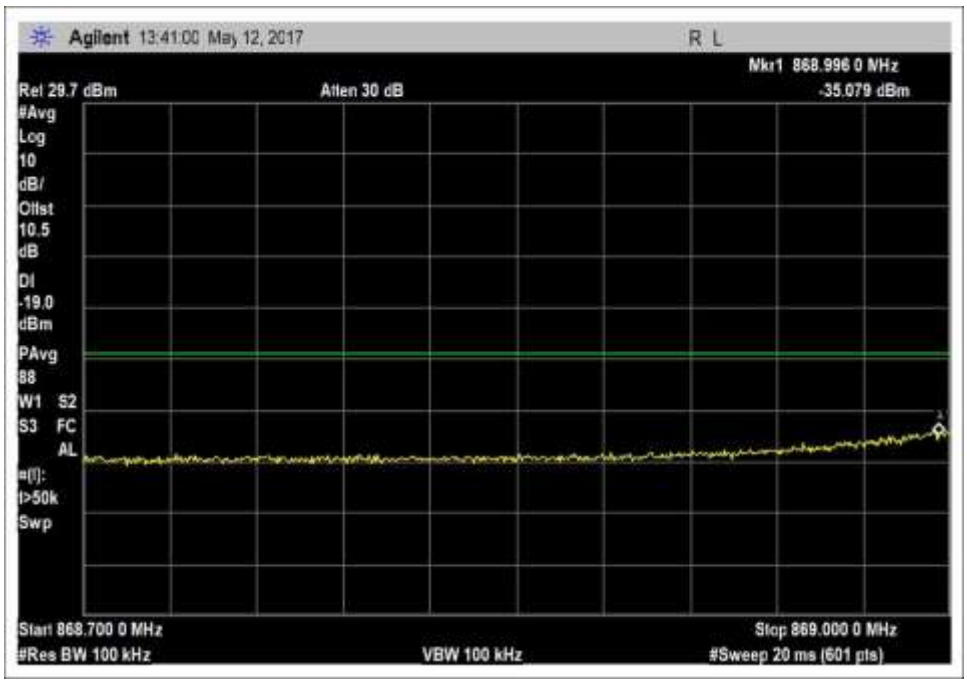
DL_746-757MHz_H_PreAGC_LTE



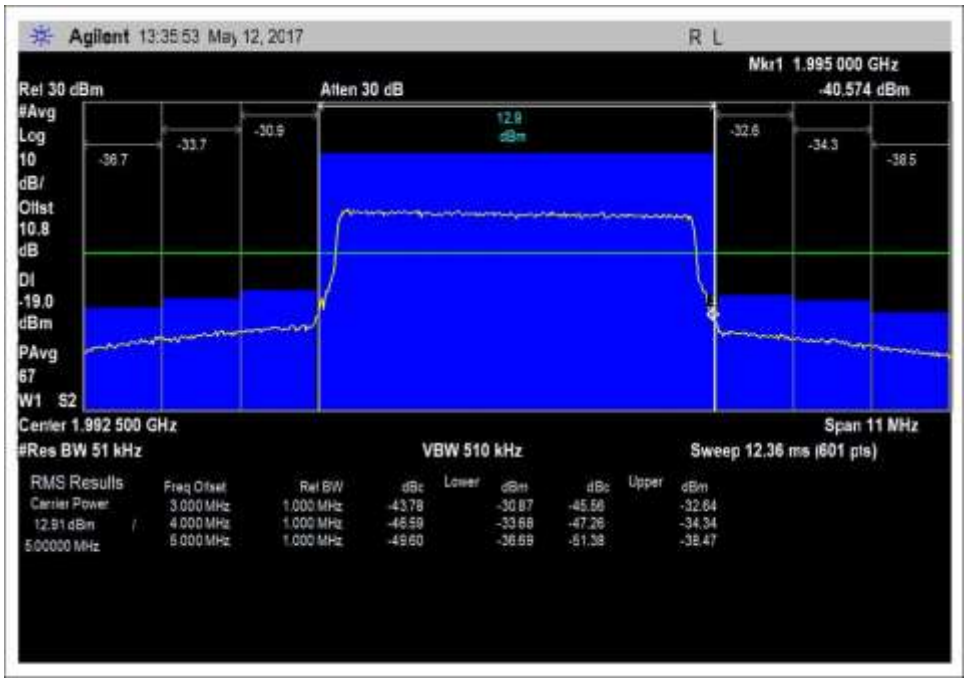
DL_746-757MHz_L_PreAGC_LTE



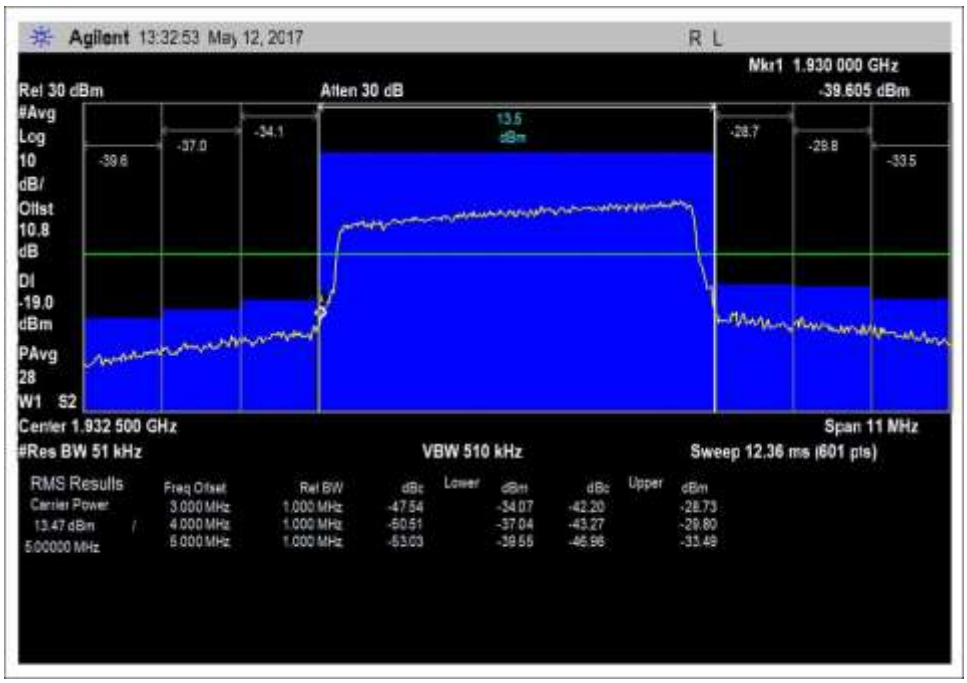
DL_869-894MHz_H_PreAGC_LTE



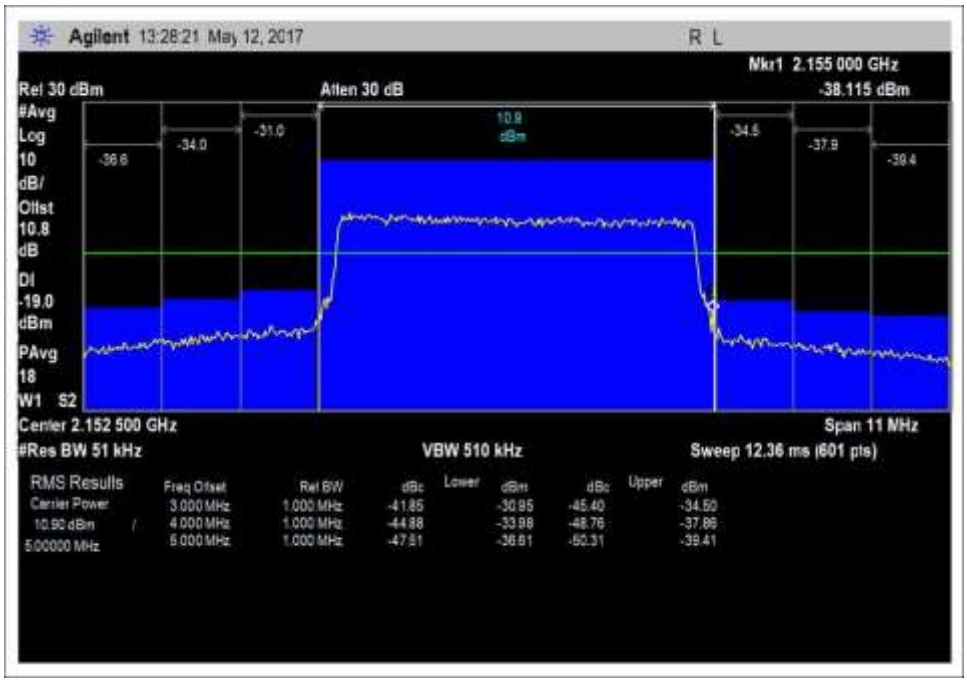
DL_869-894MHz_L_PreAGC_LTE



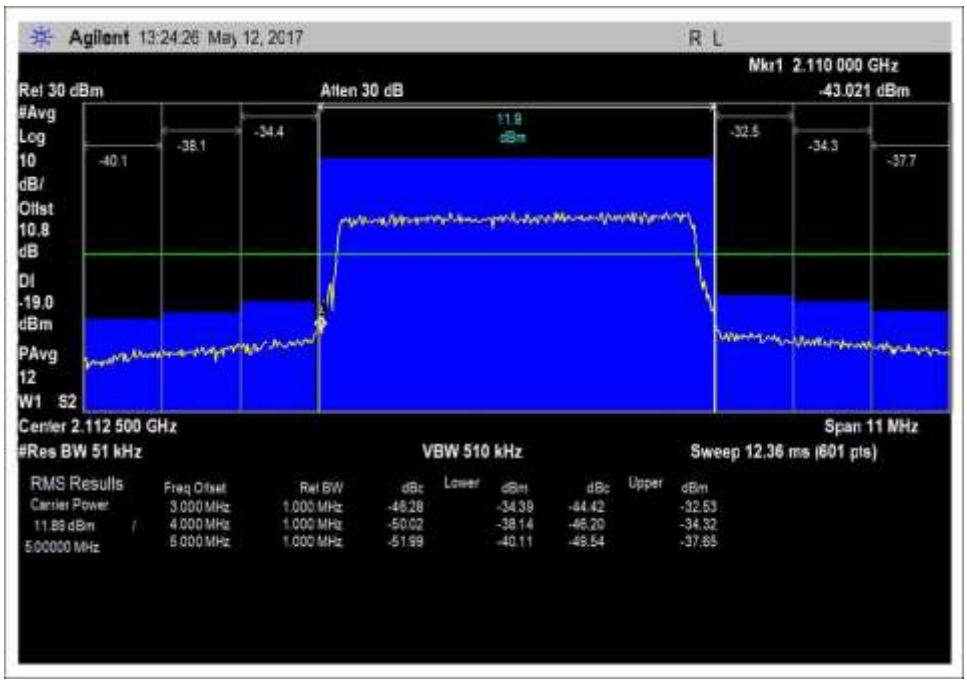
DL_1930-1995MHz_H_PreAGC_LTE



DL_1930-1995MHz_L_PreAGC_LTE



DL_2110-2155MHz_H_PreAGC_LTE



DL_2110-2155MHz_L_PreAGC_LTE

7.6 Conducted Spurious Emissions

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112
Customer:	**Huaptec**
Specification:	**7.6 Conducted Spurious Emissions / 47 CFR §2.1051 Spurious Emissions at Antenna Terminals** **47 CFR §22.917(a) Conducted Spurious Emissions** **47 CFR §24.238(a) Conducted Spurious Emissions** **47 CFR §27.53(c), (f), (g) and (h) Conducted Spurious Emissions**

Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 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.*AWGN test signal, the bandwidth was measured 99% occupied bandwidth.

Additional zoom in plots showing additional emission detail at reduced span.

Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
P07037	Agilent	E4438C	10/06/2016	10/06/2018
AN03420	Agilent	E4438C	7/8/2015	7/8/2017

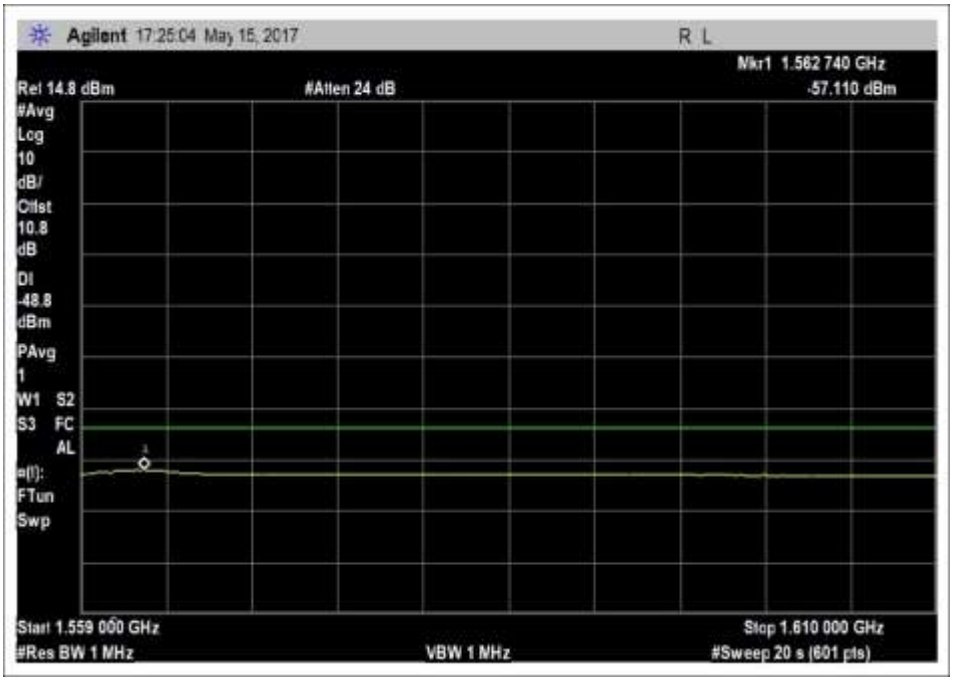
Summary of Results

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 (MHz)	Antenna Gain (dBi)	Cable Loss (dB)	Limit line EIRP (dBW/MHz)	Limit line EIRP (dBm)	Limit line EIRP corrected (dBm)
UL 776-787	10	1.2	-70.0	-40	-48

*Used Kit number 11-30400

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

REQUIRED ATTENUATION = 43+10 LOG P DB

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

$$V_{dBuV} = 20\,\text{Log}\,\frac{V}{1\,x\,10^{-6}}$$

$$= 20\left(\text{Log}\,V - \text{Log}\,1\,x\,10^{-6}\right)$$

$$= 20\,\text{Log}\,V - 20\,\text{Log}1\,x\,10^{-6}$$

$$= 20\,\text{Log}\,V - 20\left(-6\right)$$

$$= 20\,\text{Log}\,V + 120$$

$$\text{Attenuation} = 43 + 10\,\text{Log}\,P$$

$$= 43 + 10\,\text{Log}\,\frac{V^2}{R}$$

$$= 43 + 10\left(\text{Log}\,V^2 - \text{Log}\,R\right)$$

$$= 43 + 10\left(2\,\text{Log}\,V - \text{Log}\,R\right)$$

$$= 43 + 20\,\text{Log}\,V - 10\,\text{Log}\,R$$

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

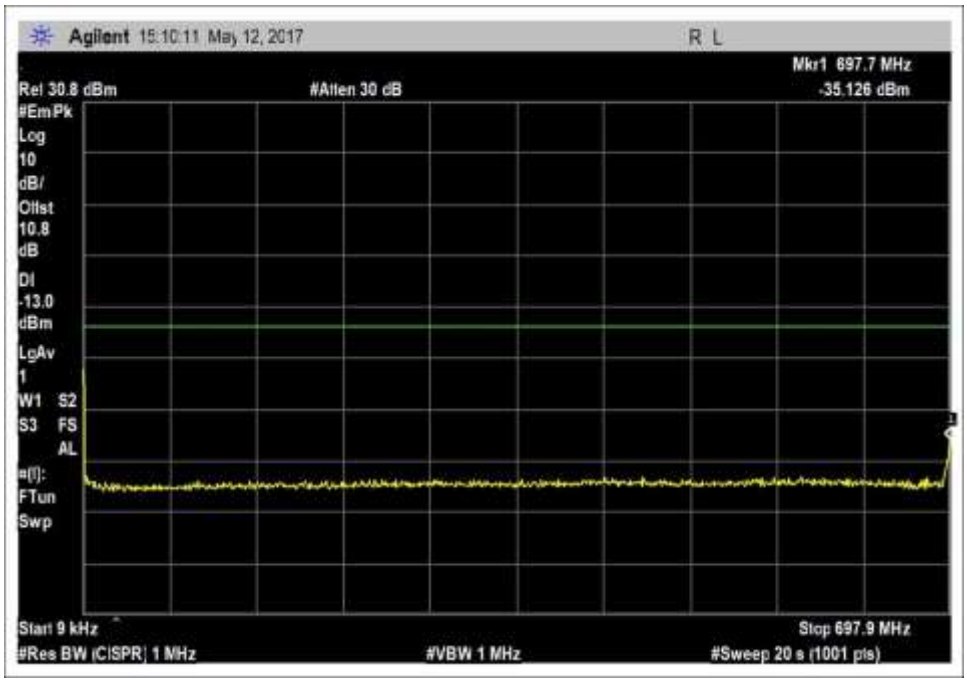
= 20 Log V + 120 – 43 – 20 Log V + 10Log R

= 120 – 43 + 10 Log 50 Note : R = 50 Ω

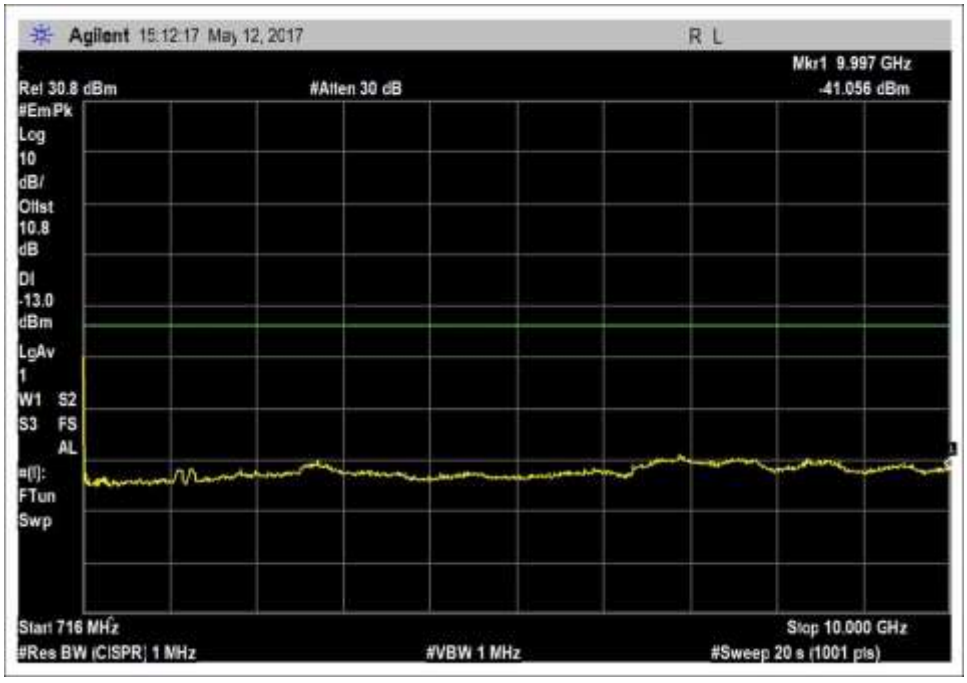
= 120 –43 + 16.897

= 94 dBuV at any power level

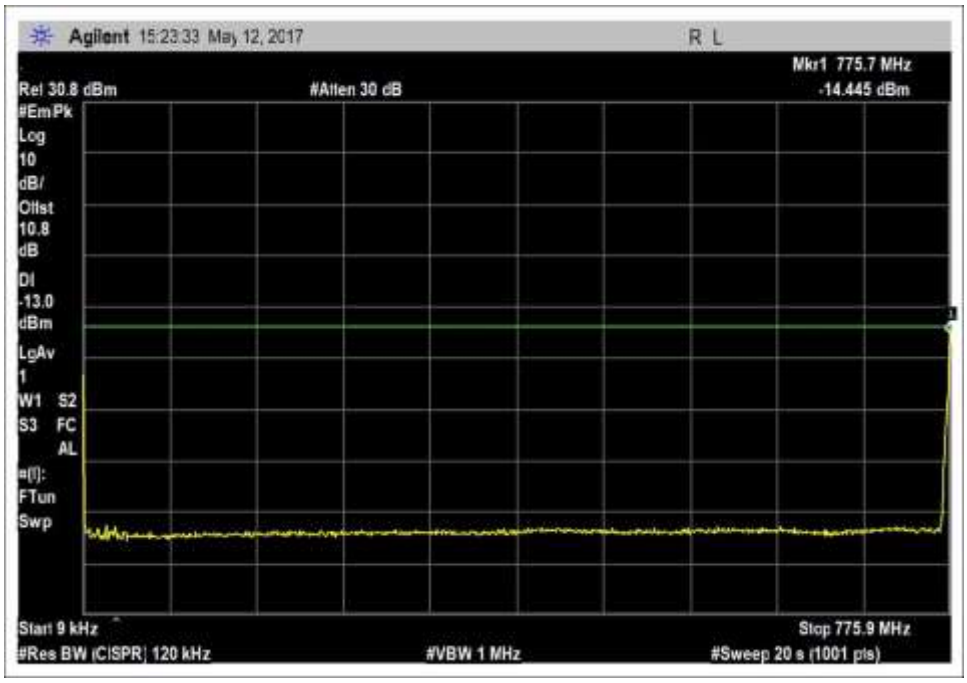
Plots



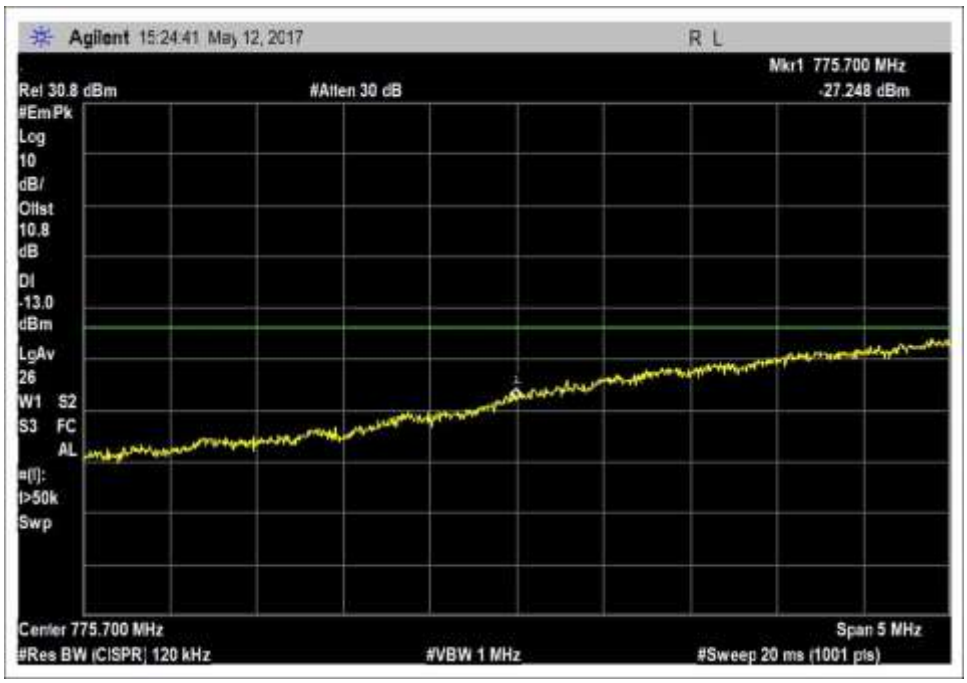
UL_698-716MHz



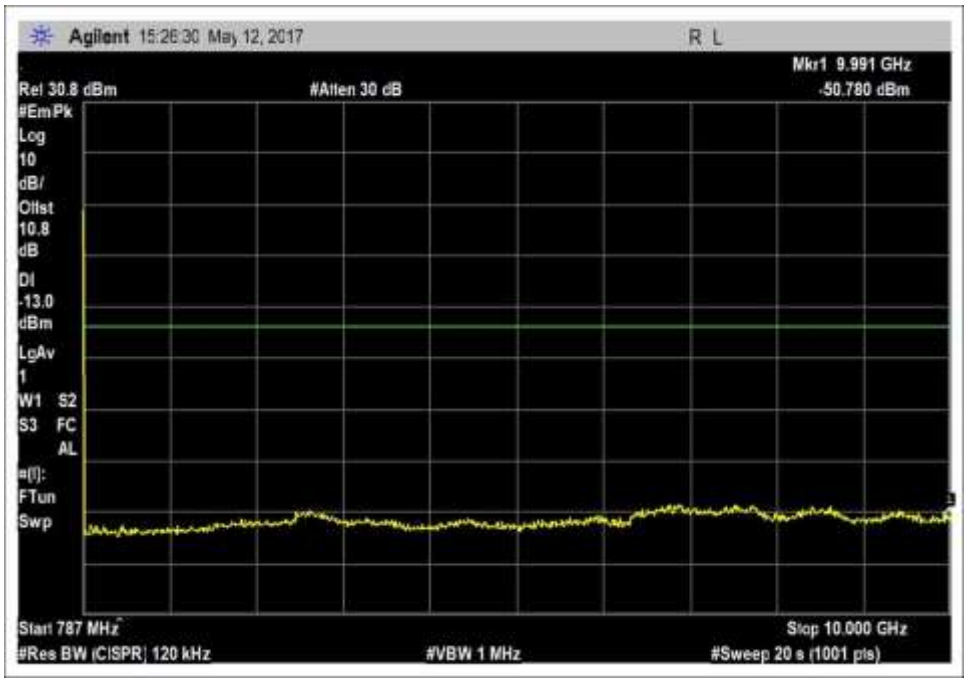
UL_698-716MHz



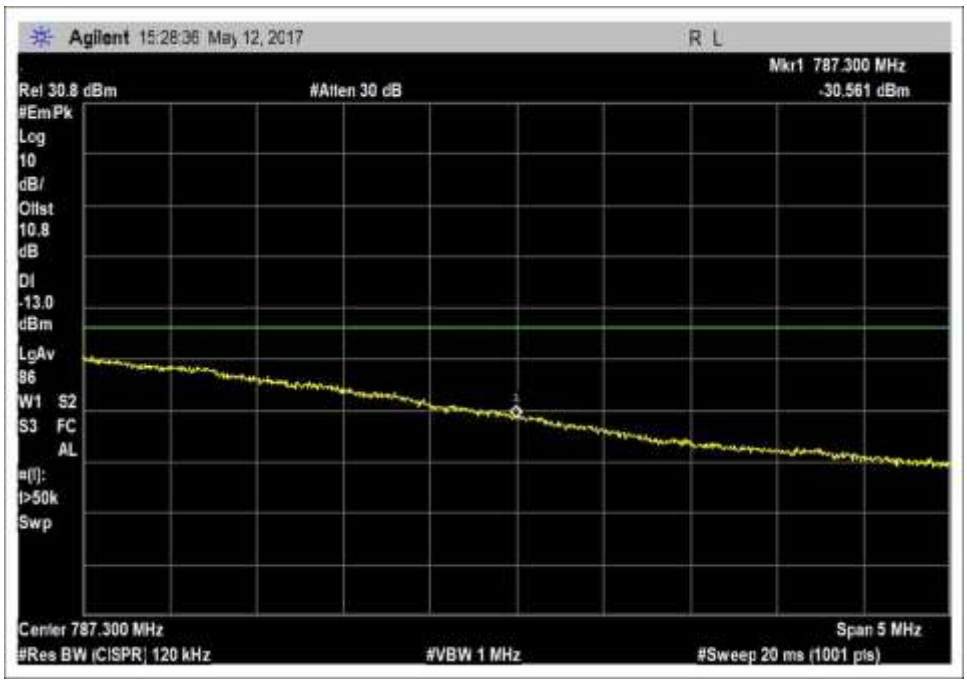
UL_776-787MHz



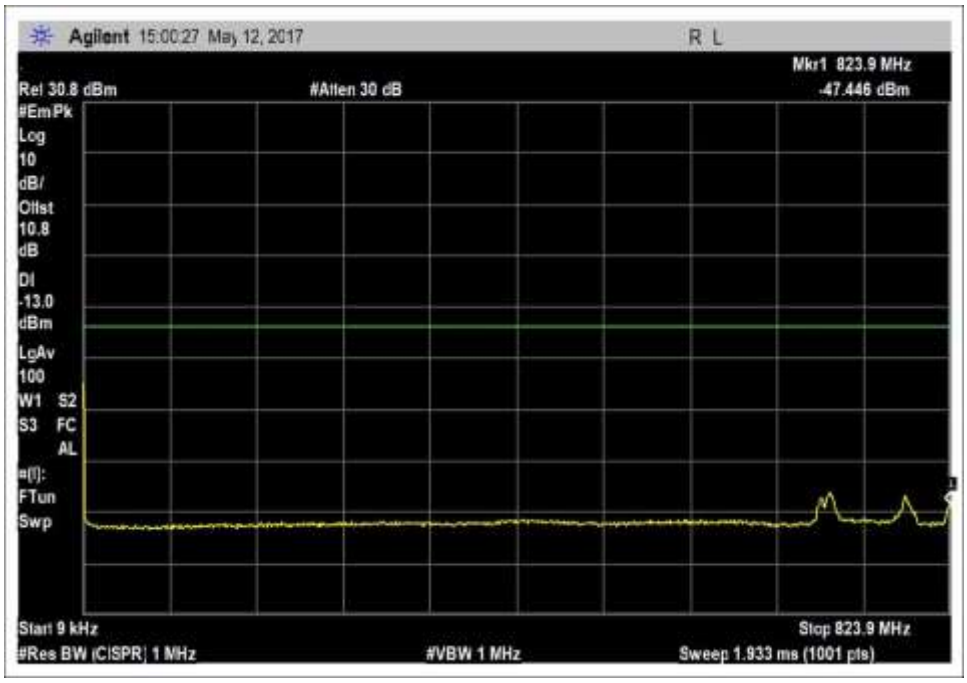
UL_776-787MHz



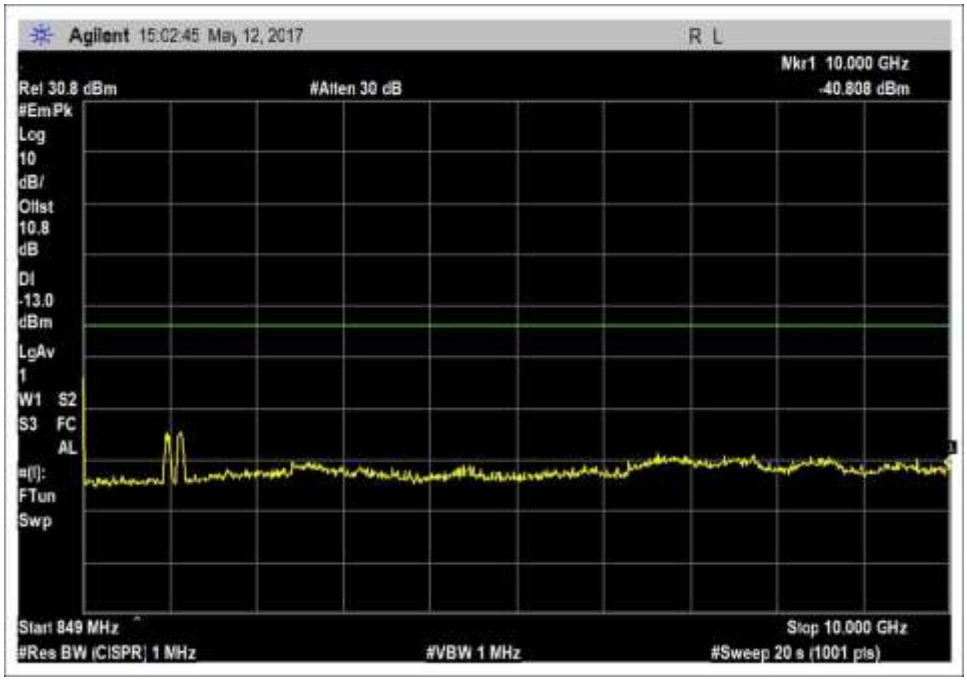
UL_776-787MHz



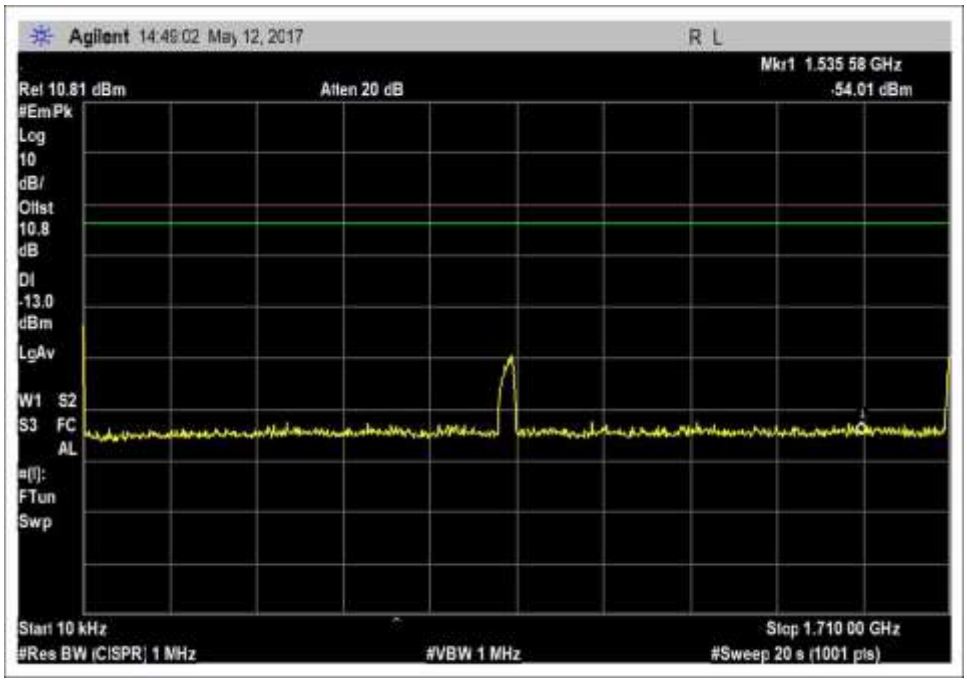
UL_776-787MHz



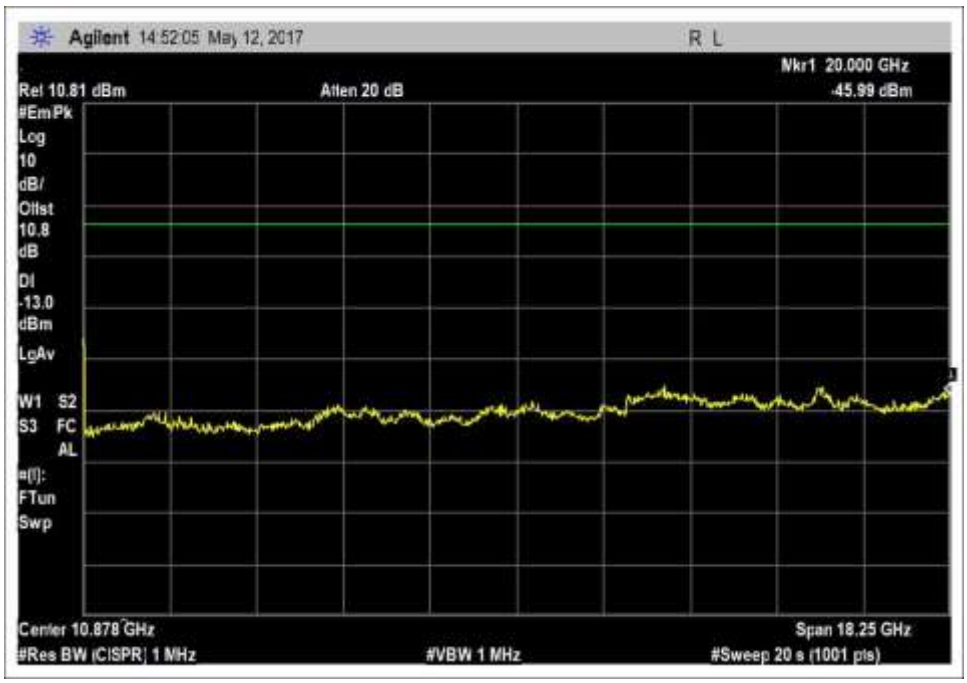
UL_824-849MHz



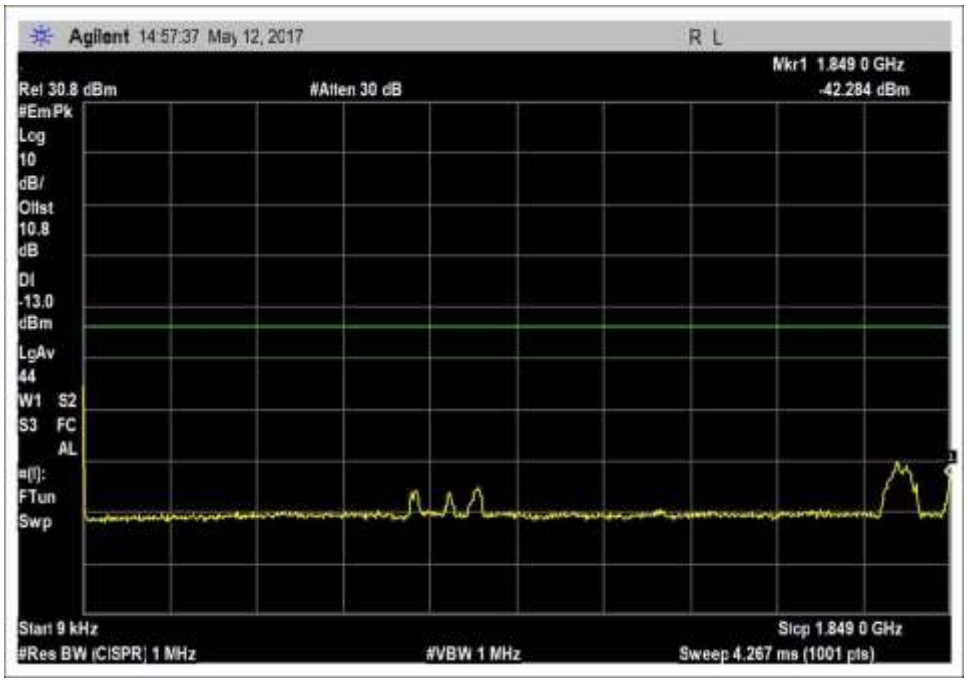
UL_824-849MHz



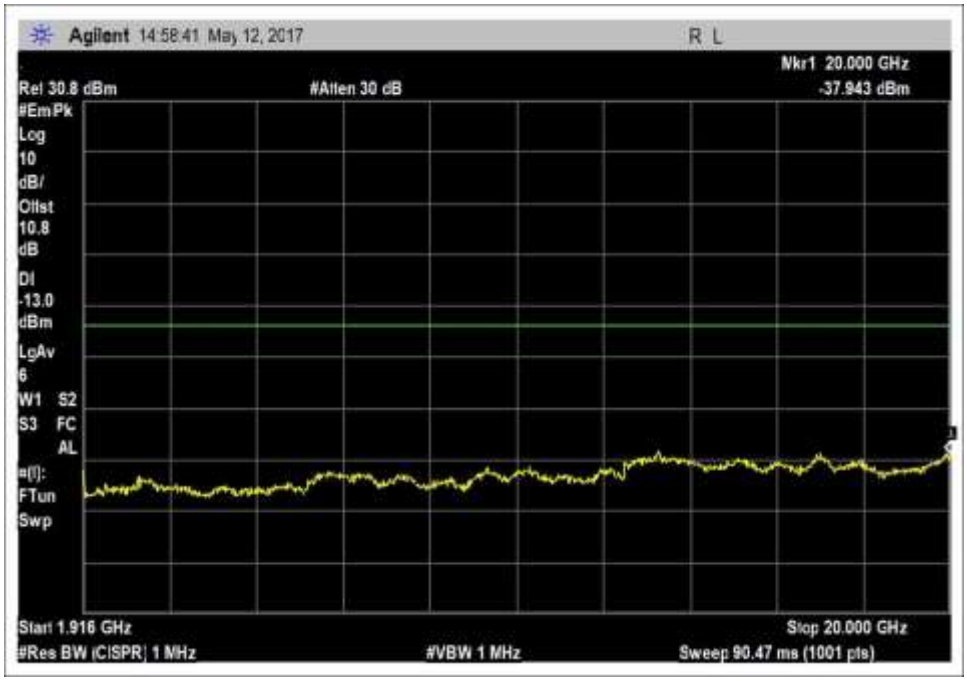
UL_1710-1755MHz



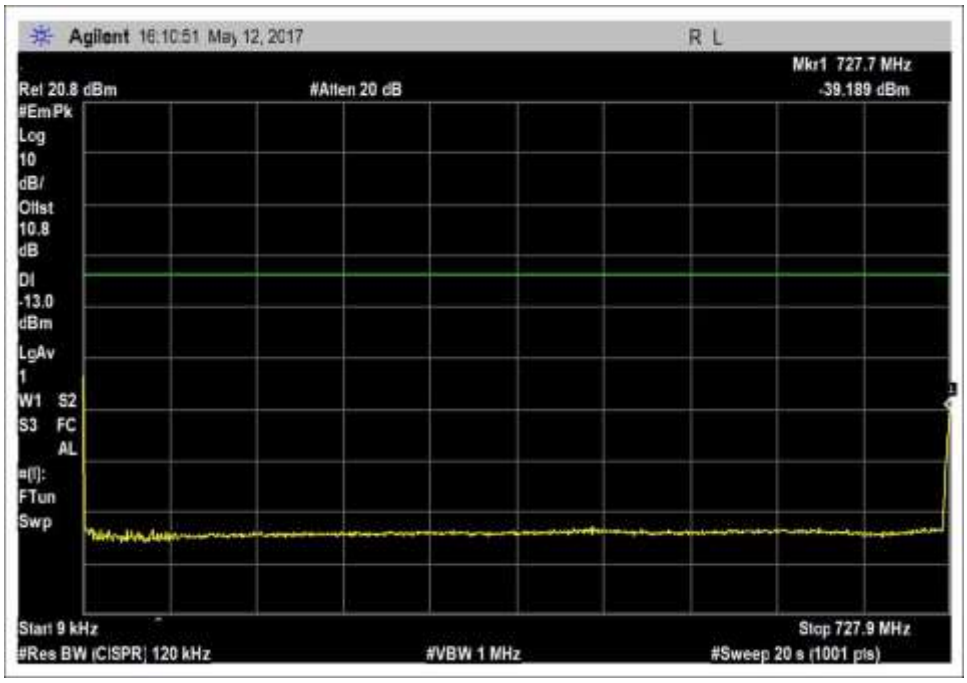
UL_1710-1755MHz



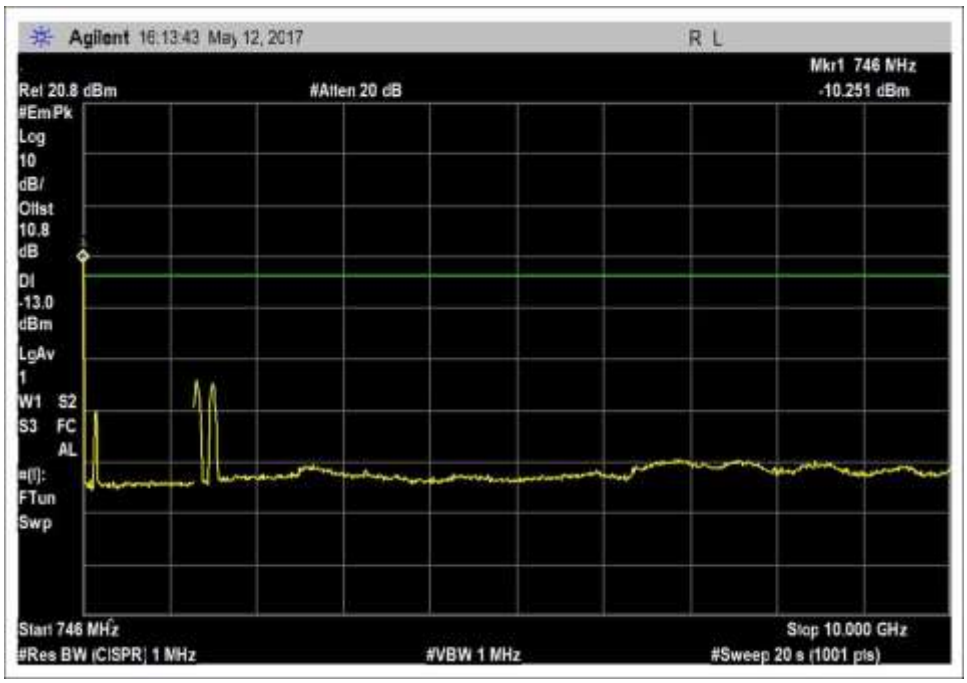
UL_1850-1915MHz



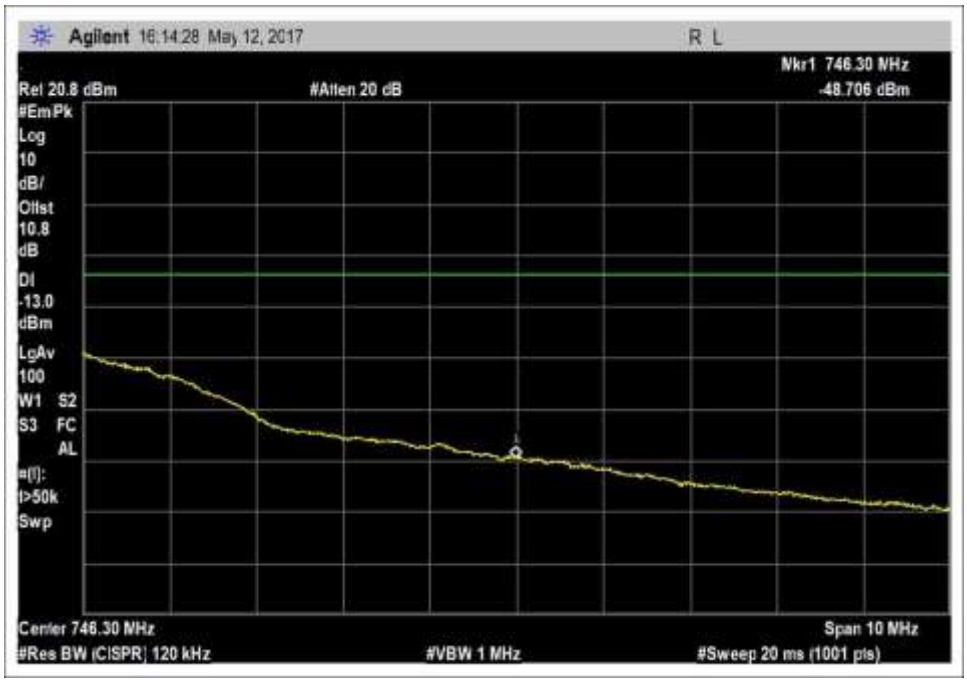
UL_1850-1915MHz



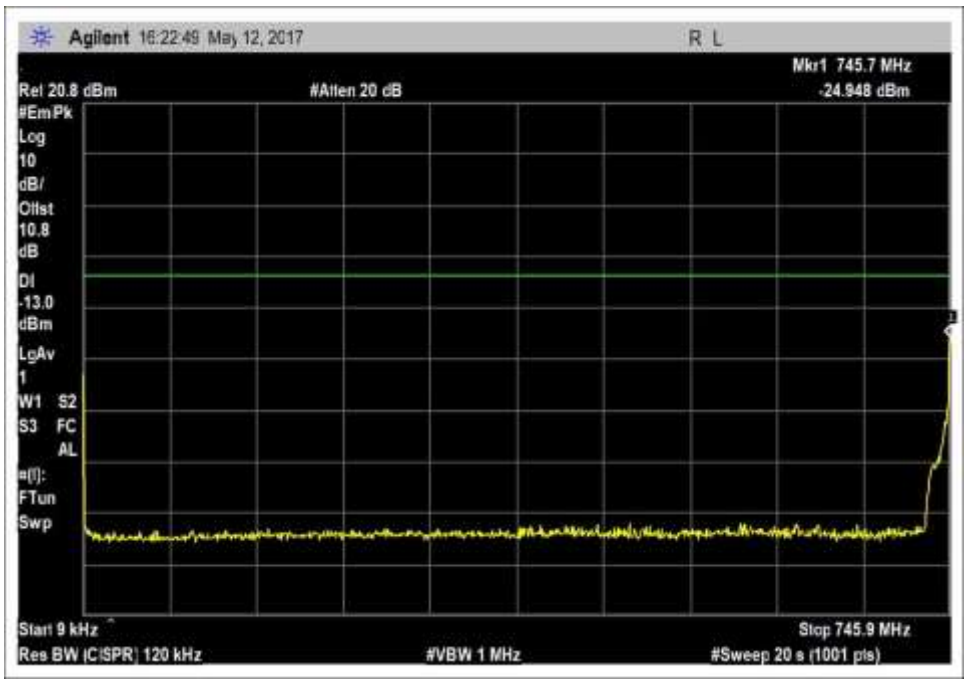
DL_728-746MHz



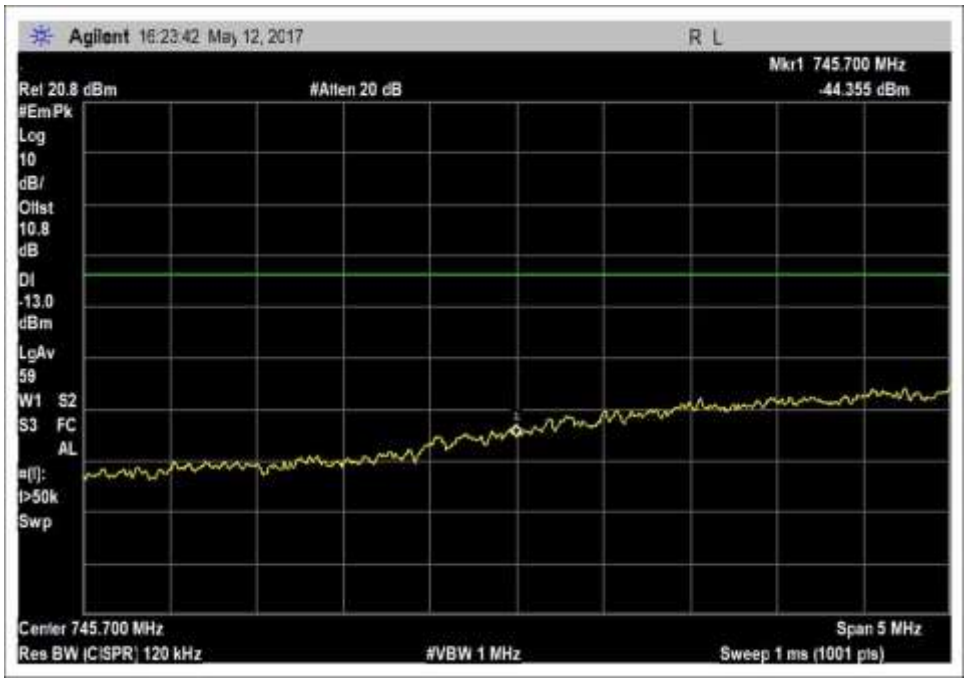
DL_728-746MHz



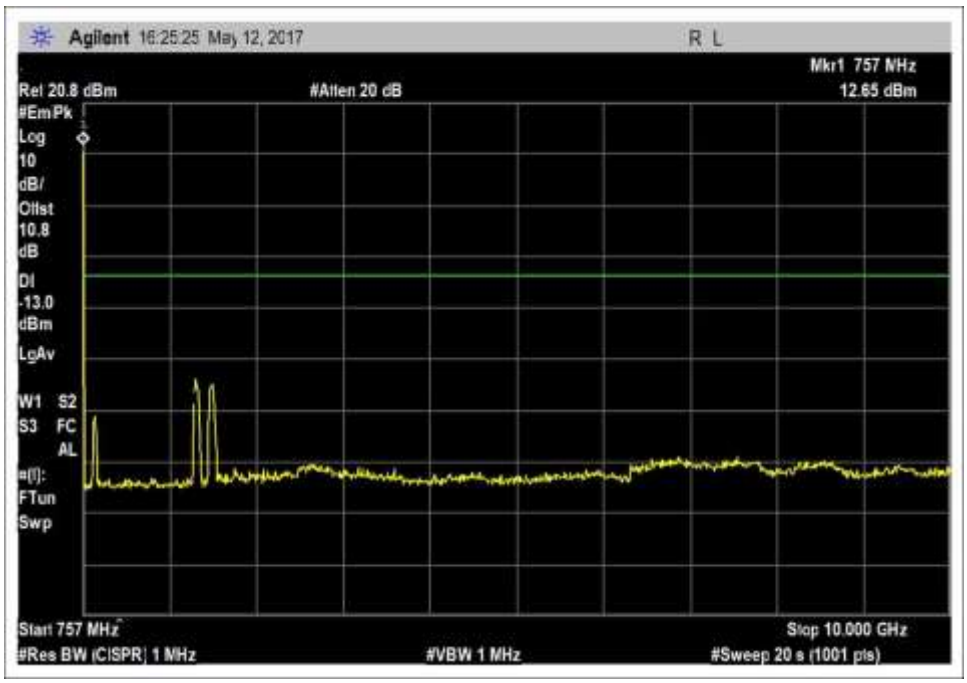
DL_728-746MHz_zoom



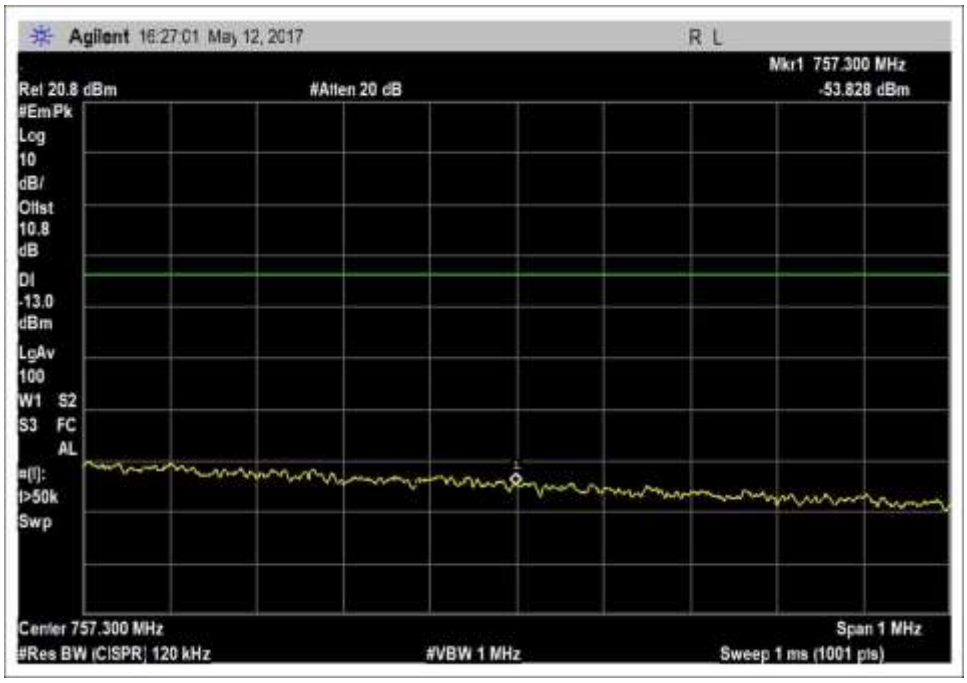
DL_746-757MHz



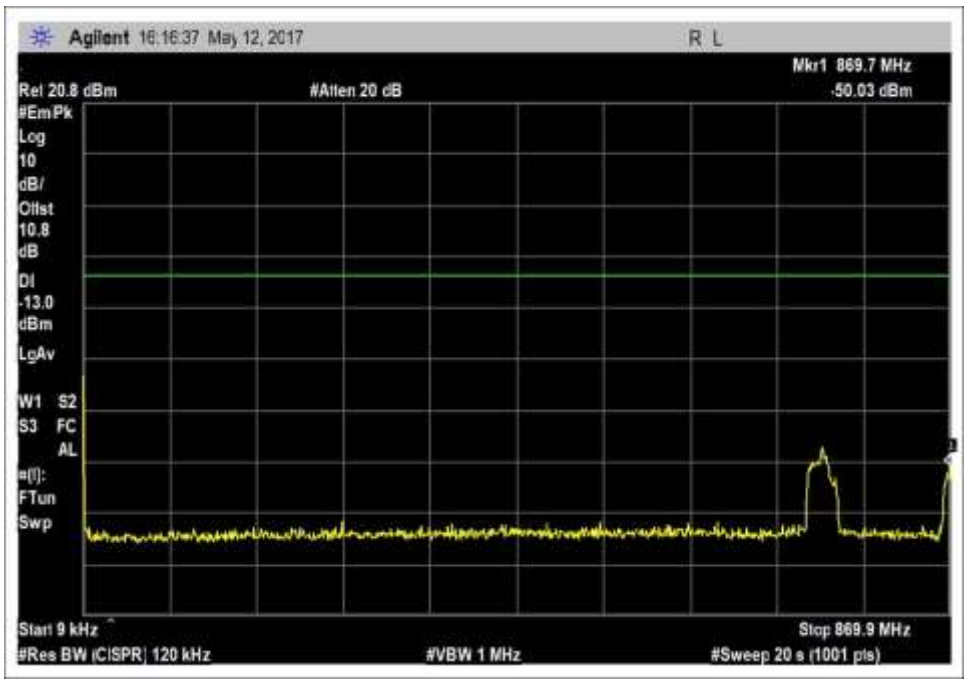
DL_746-757MHz_zoom



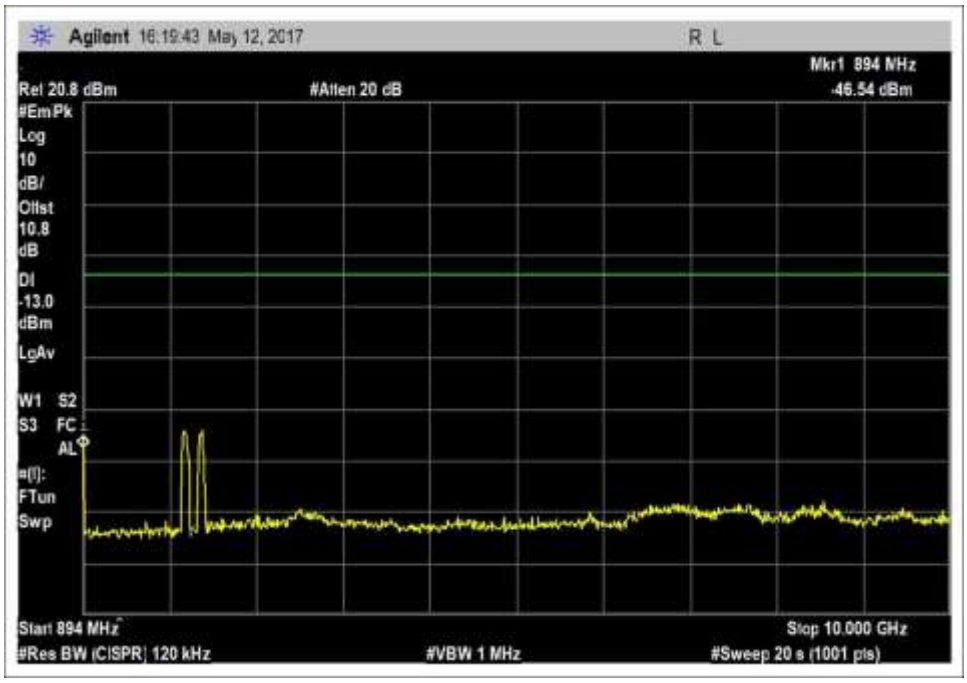
DL_746-757MHz



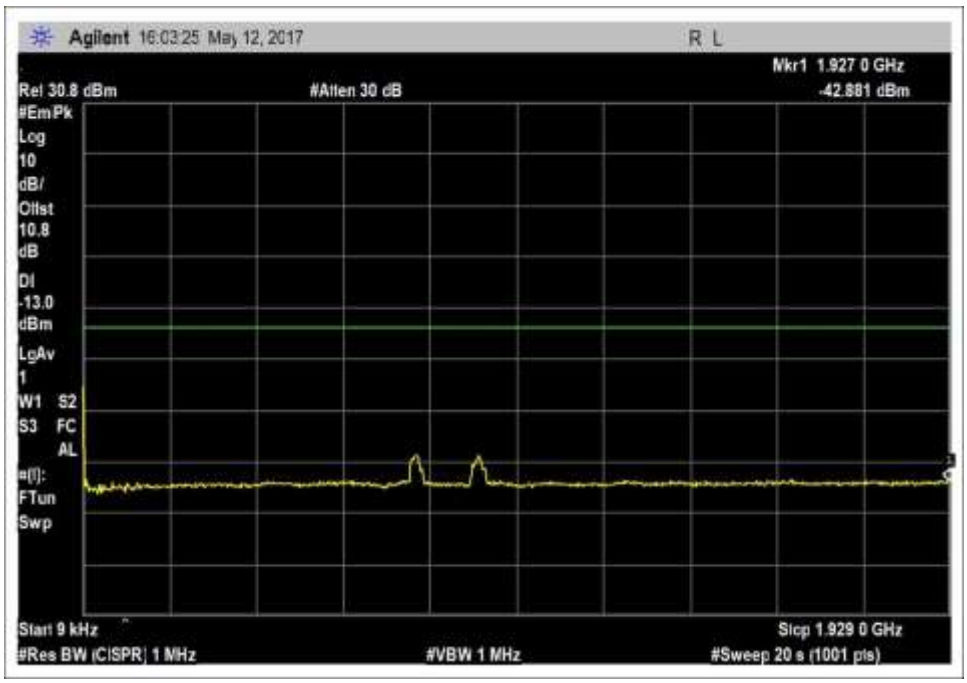
DL_746-757MHz_zoom



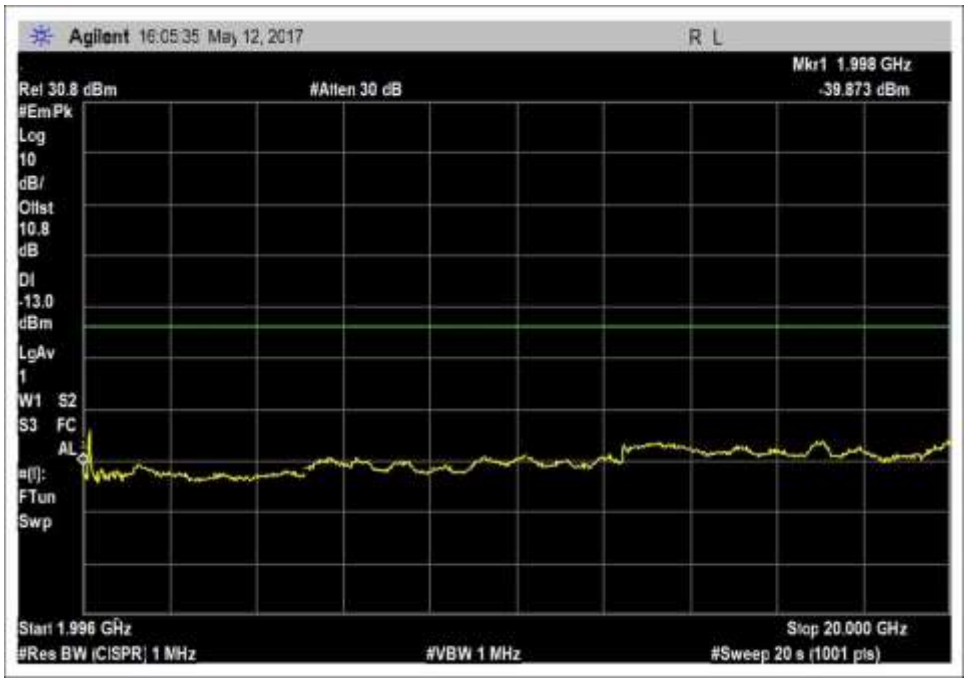
DL_869-894MHz



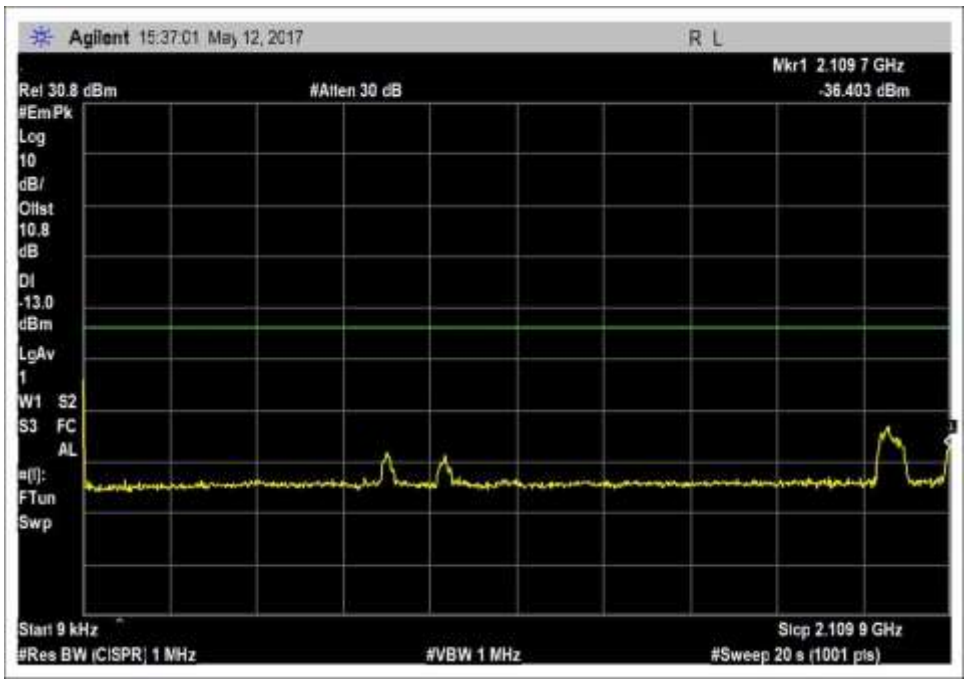
DL_869-894MHz



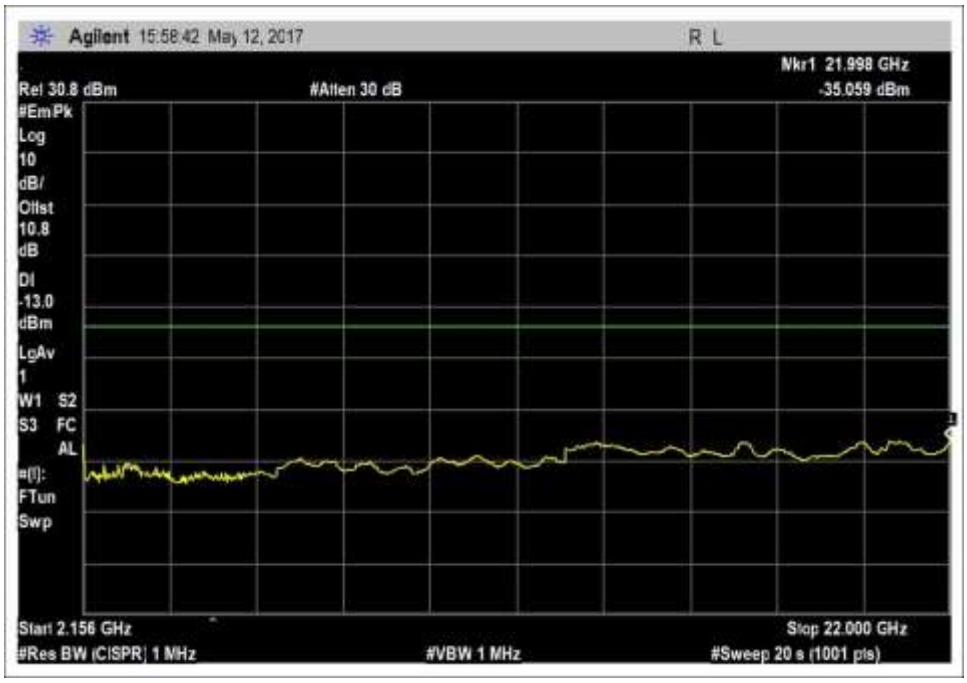
DL_1930-1995MHz



DL_1930-1995MHz



DL_2110-2155MHz



DL_2110-2155MHz

7.7 Noise limit

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	**7.7 Noise Limit (Maximum Transmitter Noise Power Level / Variable UL Noise Timing)**		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 kPa

Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
P07037	Agilent	E4438C	10/06/2016	10/06/2018
AN03420	Agilent	E4438C	7/8/2015	7/8/2017

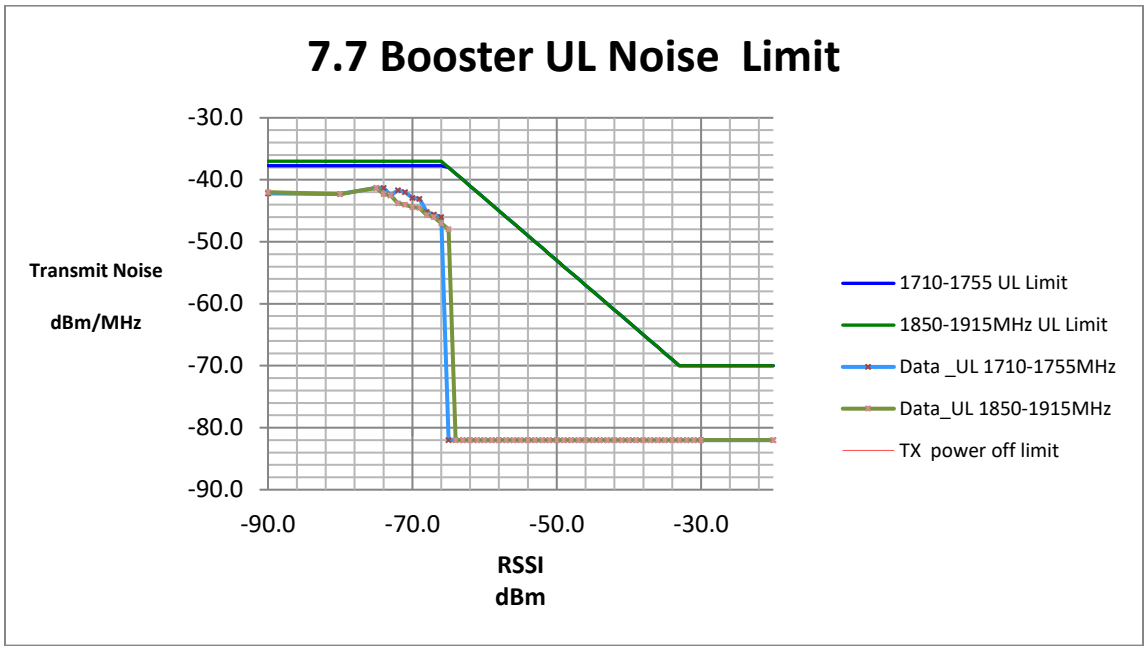
Summary of Results

7.7.1 Maximum transmitter noise power level

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

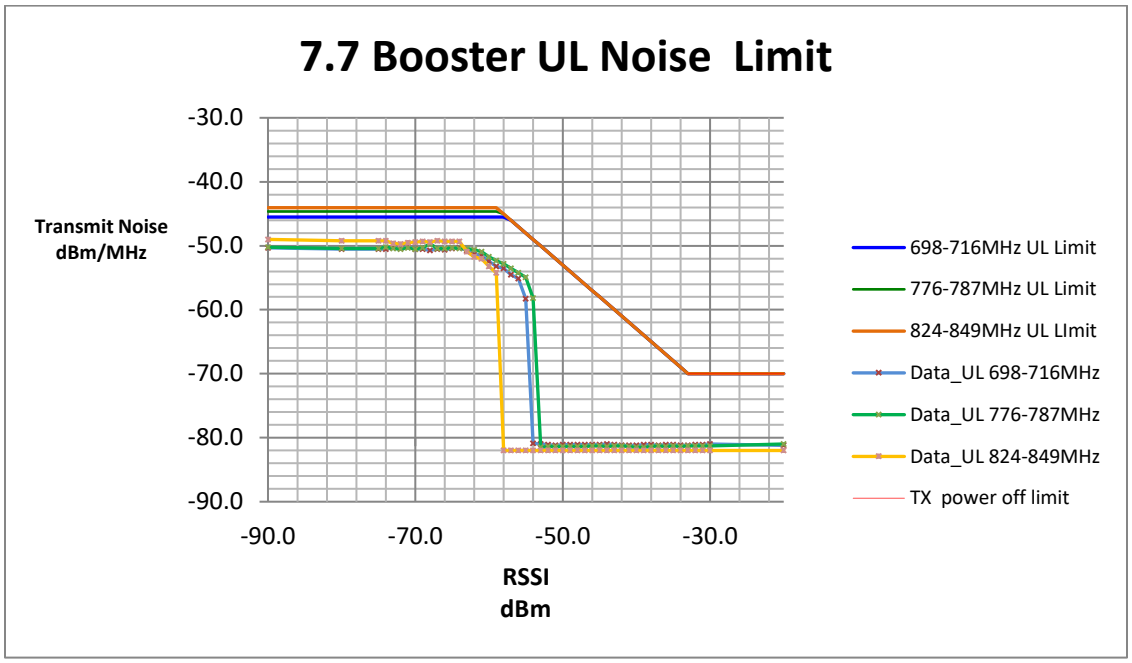
Maximum Noise Power			
Frequency	**Measured**	**Limit**	**Margin**
MHz	**dBm./MHz**	**dBm/MHz**	
UL 1710-1755	-42.2	-37.7	-4.5
UL 1850-1915	-42.3	-37.0	-5.3
UL 824-849	-48.2	-44.1	-4.1
UL 698-716	-48.9	-45.5	-3.4
UL 776-787	-49.5	-44.6	-4.9
DL 2110-2155	-42.5	-37.7	-4.8
DL 1930-1995	-41.5	-37.0	-4.5
DL 869-894	-48.4	-44.1	-4.3
DL 728-746	-47.8	-45.5	-2.3
DL 746-757	-49.6	-44.6	-5.0

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	Measured	RSSI dependent	Frequency dependent	TX off	Column2
-90.0	-39.9	-	-37.7	-	-2.2
-74.0	-39.9	-	-37.7	-	-2.2
-59.0	-52.6	-44.0	-	-	-8.6
-56.0	-55.6	-47.0	-	-	-8.6
-54.0	-57.2	-49.0	-	-	-8.2
-51.0	-60.5	-52.0	-	-	-8.5
-32.0	-81.3	-	-	-70	-11.3

1850.0 - -1915.0 MHz					
		Limit			Margin
RSSI	Measured	RSSI dependent	Frequency dependent	TX off	Column2
-90.0	-39.0	-	-37.0	-	-2.0
-75.0	-39.6	-	-37.0	-	-2.6
-62.0	-48.2	-41.0		-	-7.2
-60.0	-50.1	-43.0	--	-	-7.1
-56.0	-54.1	-47.0	-	-	-7.1
-52.0	-58.1	-51.0	-	-	-7.1
-32.0	-81.5	-	-	-70	-11.5



824.0 - 849.0MHz					
		Limit			Margin
RSSI	Measured	RSSI dependent	Frequency dependent	TX off	Column2
-71.0	-44.8	-	-44.1	-	-0.7
-70.0	-44.7	-	-44.1	-	-0.6
-49.0	-59.4	-54.0	-	-	-5.4
-48.0	-59.5	-55.0	-	-	-4.5
-47.0	-59.9	-56.0	-	-	-3.9
-46.0	-60.2	-57.0	-	-	-3.2
-32.0	-80.7	-	-	-70	-10.7

698.0 - 716.0 MHz					
		Limit			Margin
RSSI	Measured	RSSI dependent	Frequency dependent	TX off	Column2
-75.0	-47.2		-45.5		-1.7
-71.0	-47.1		-45.5		-1.6
-49.0	-61.3	-54.0			-7.3
-48.0	-62.0	-55.0			-7.0
-47.0	-62.0	-56.0			-6.0
-46.0	-62.9	-57.0			-5.9
-32.0	-80.3			-70	-10.3

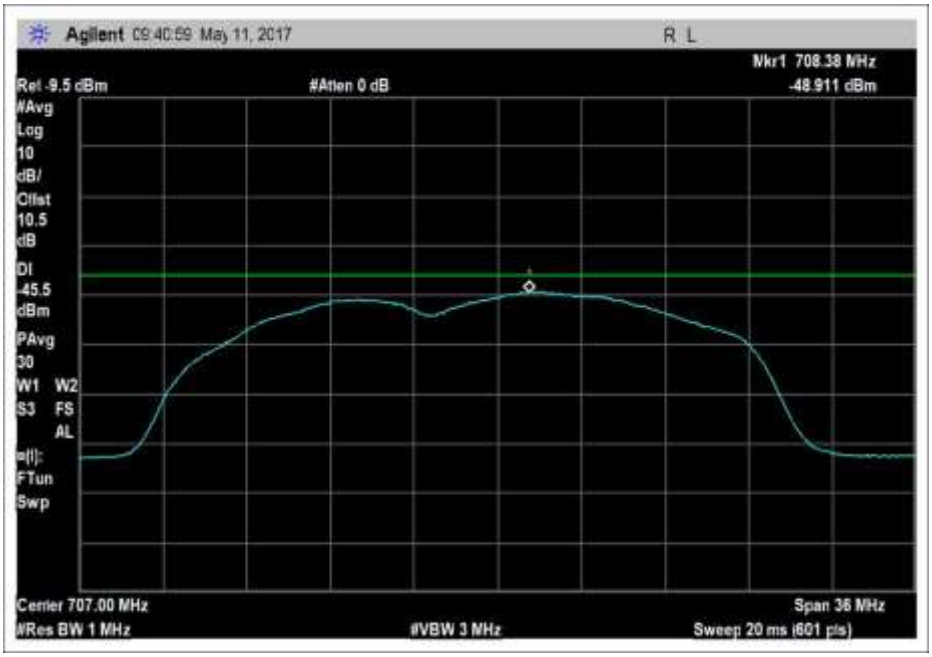
776.0 - 787.0 MHz					
		Limit			Margin
RSSI	Measured	RSSI dependent	Frequency dependent	TX off	Column2
-80.0	-47.0	-	-44.6	-	-2.4
-67.0	-47.2	-	-44.6	-	-2.6
-41.0	-64.0	-62.0	-	-	-2.0
-40.0	-64.8	-63.0	-	-	-1.8
-39.0	-65.6	-64.0	-	-	-1.6
-38.0	-66.0	-65.0	-	-	-1.0
-32.0	-80.4	-	-	-70	-10.4

7.7.2 Variable uplink noise timing

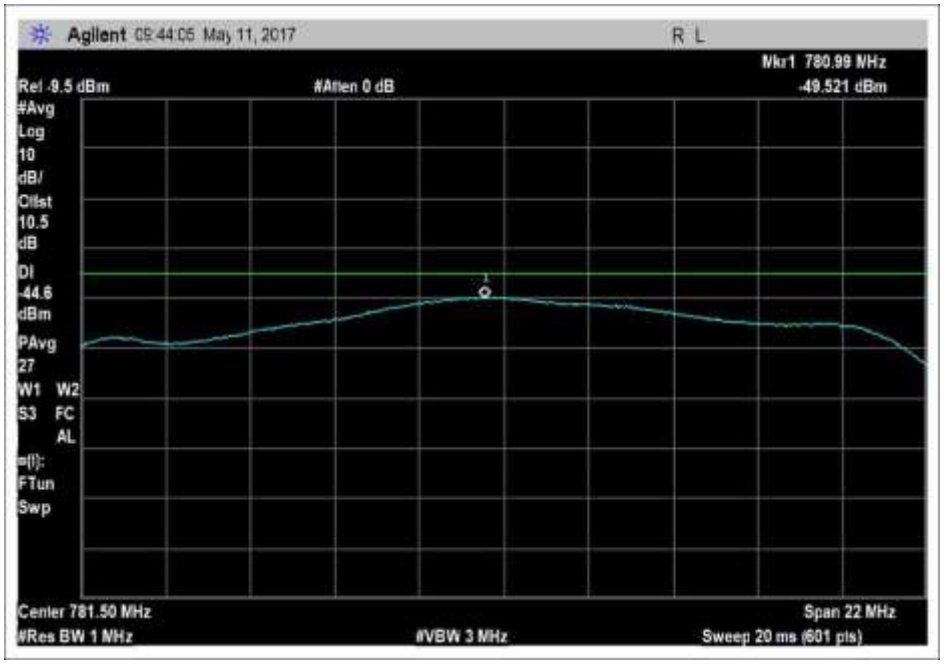
Uplink Noise timing		
Frequency	Measured	Limit
MHz	Sec	sec
UL1710-1755	0.1	3
UL1850-1915	0.3	3
UL824-849	0.3	3
UL 698-716	0.2	3
UL776-787	0.3	3

7.7.1 Maximum Transmitter Noise Power Level

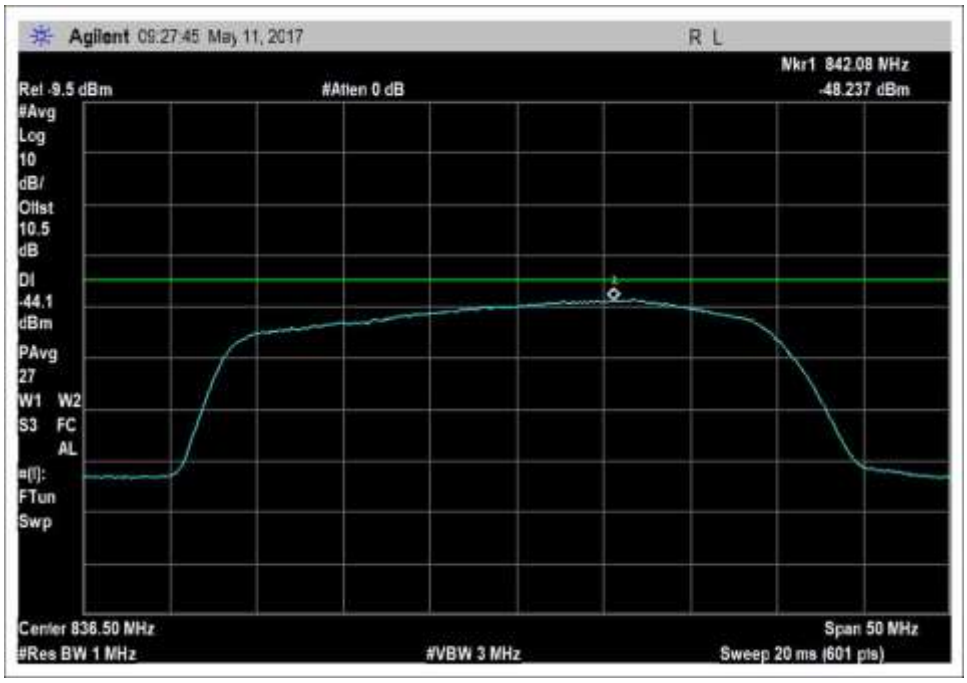
Plots



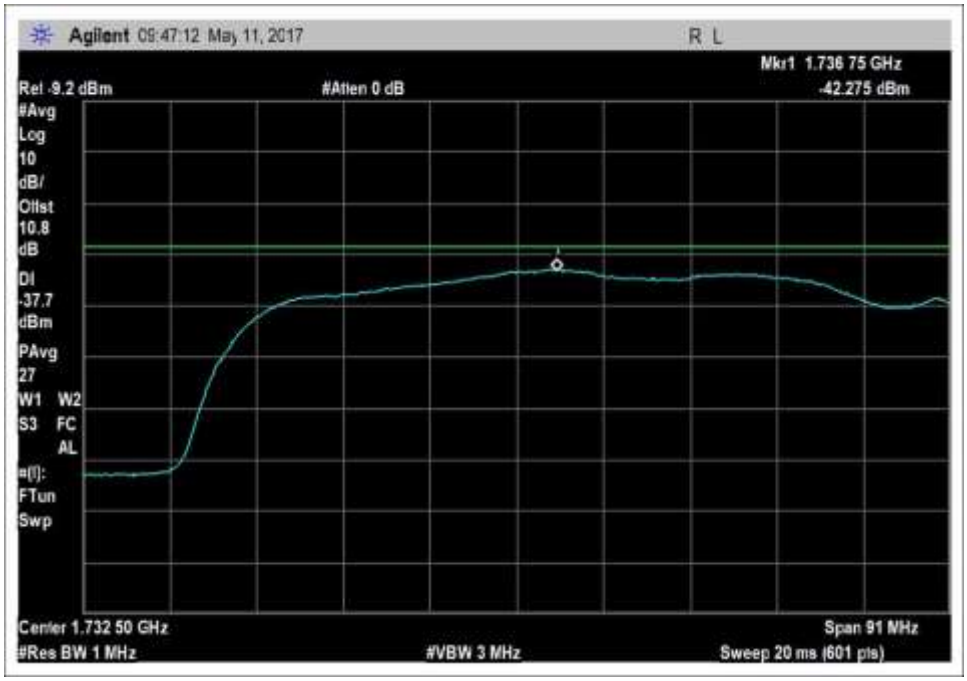
UL_698-716MHz



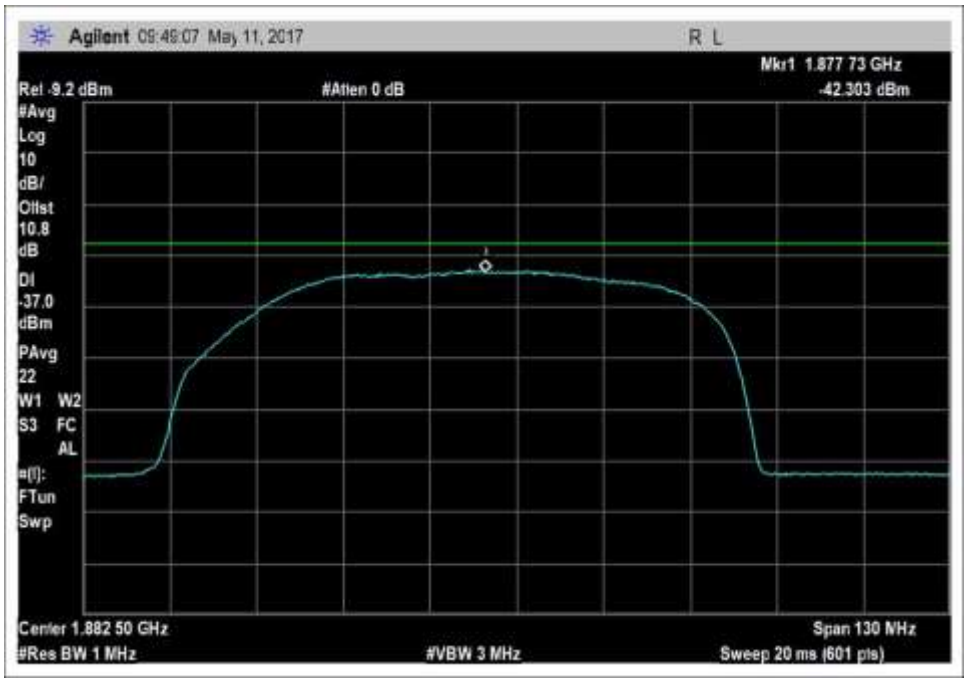
UL_776-787MHz



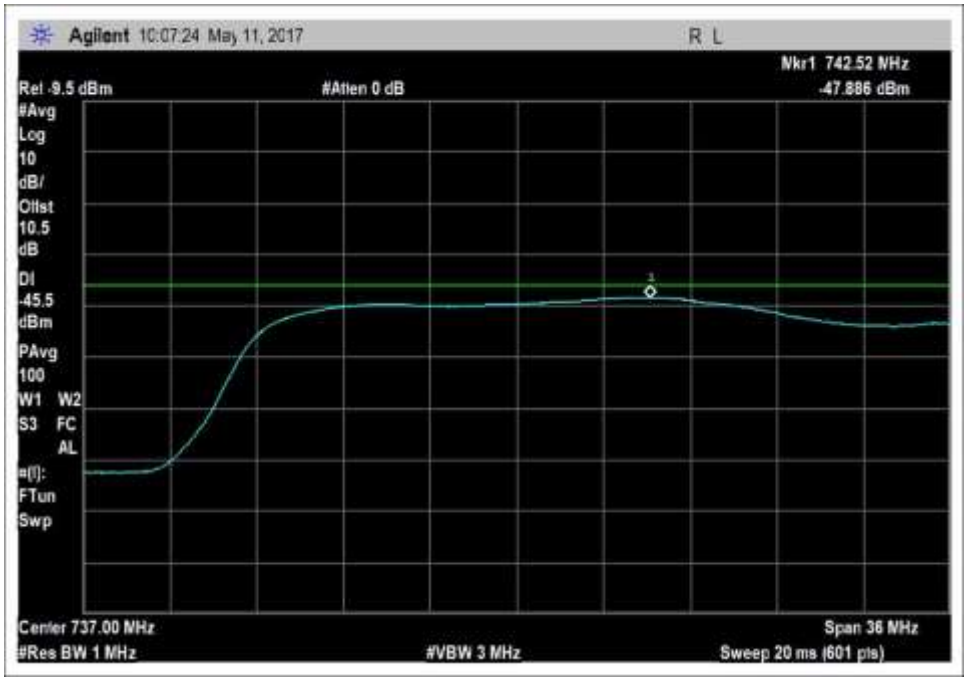
UL_824-849MHz



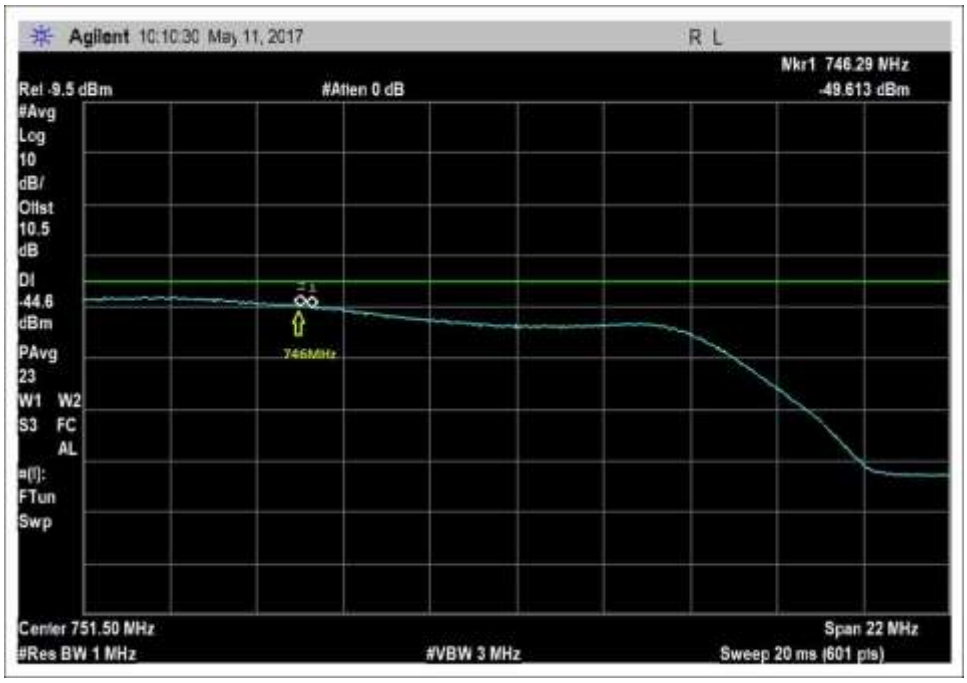
UL_1710-1755MHz



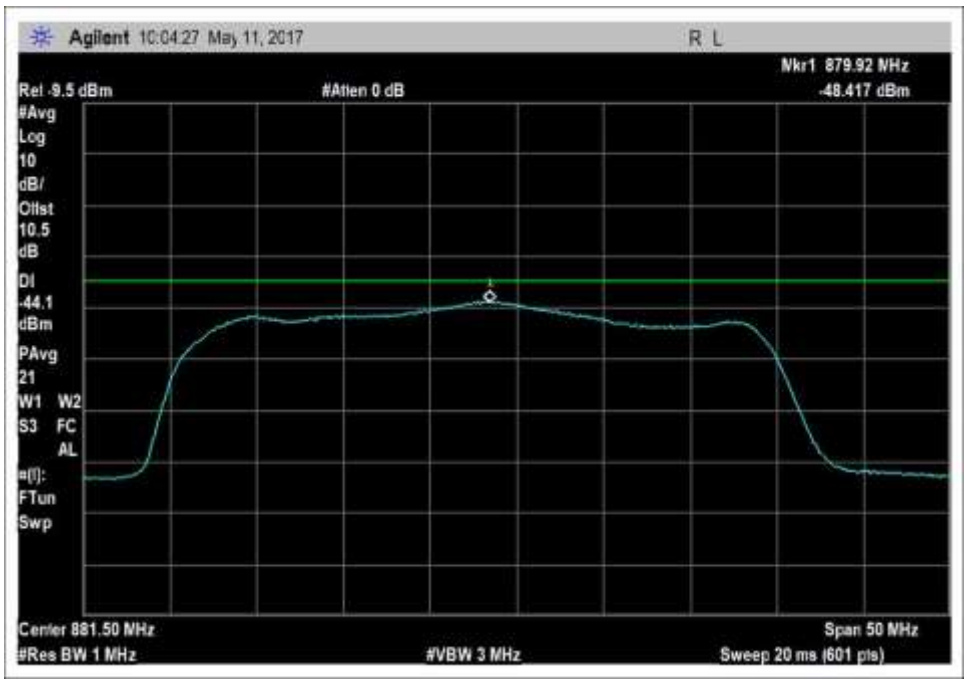
UL_1850-1915MHz



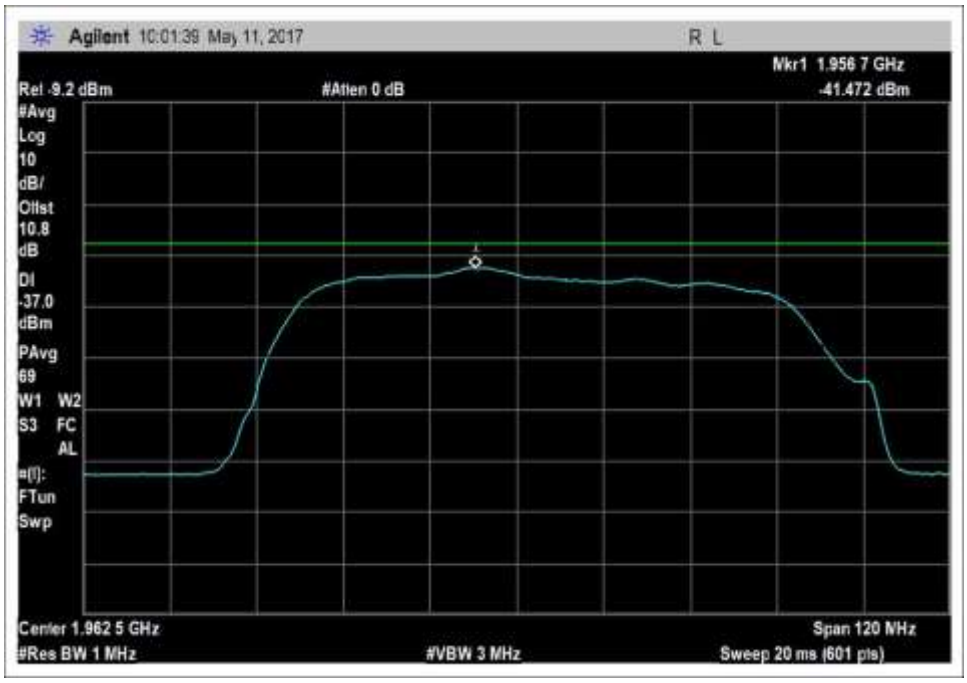
DL_728-746MHz



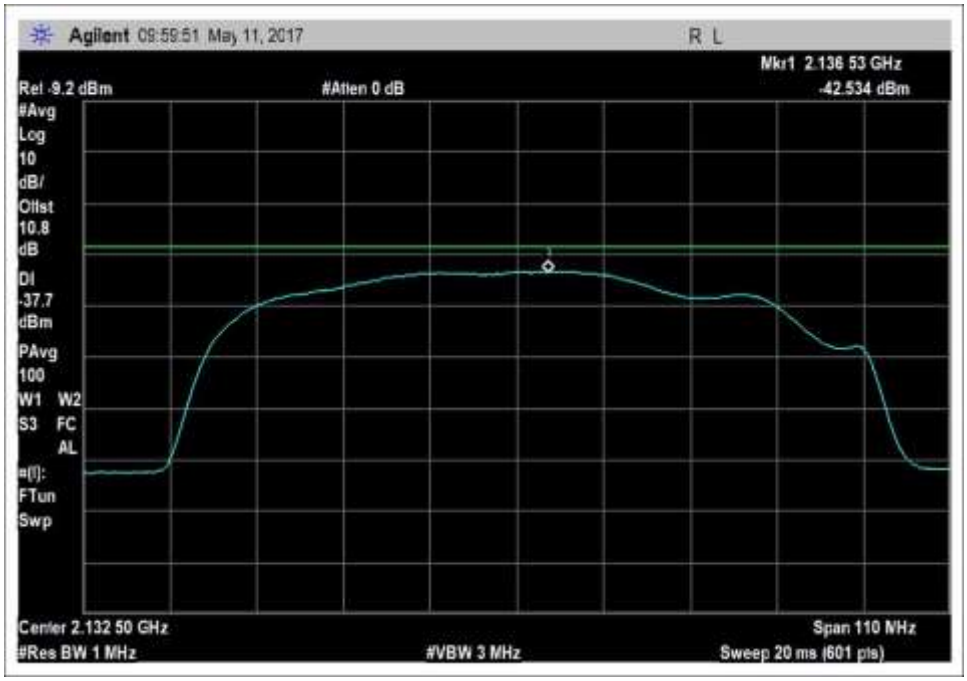
DL_746-757MHz



DL_869-894MHz



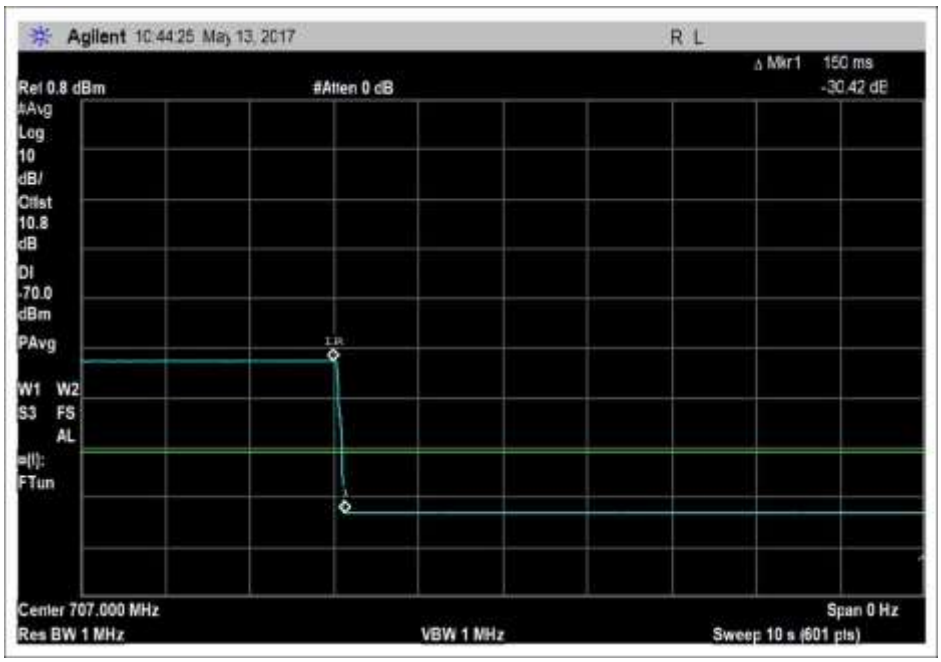
DL_1930-1995MHz



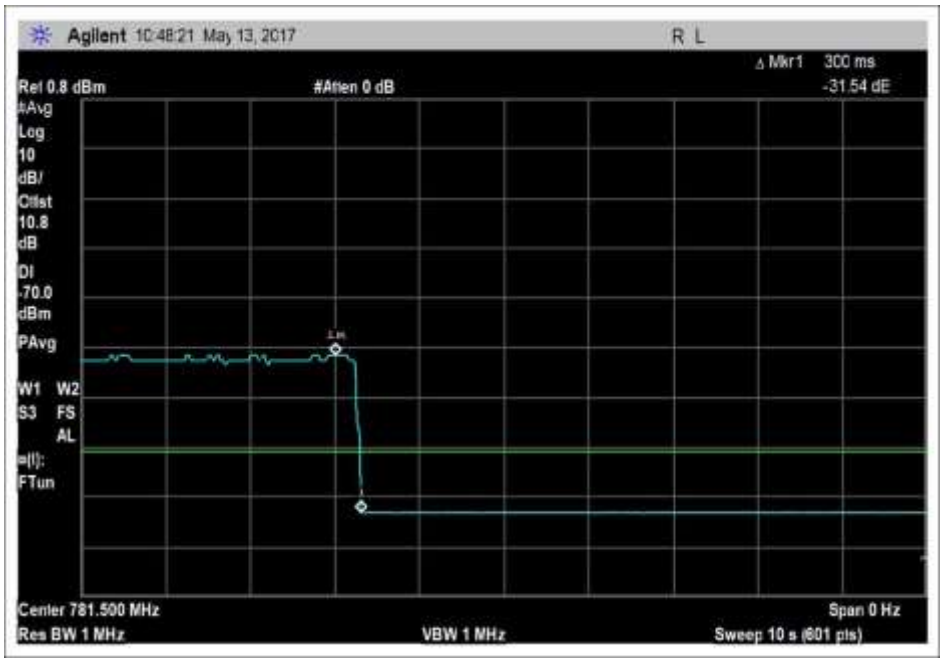
DL_2110-2155MHz

7.7.2 Variable UL Noise Timing

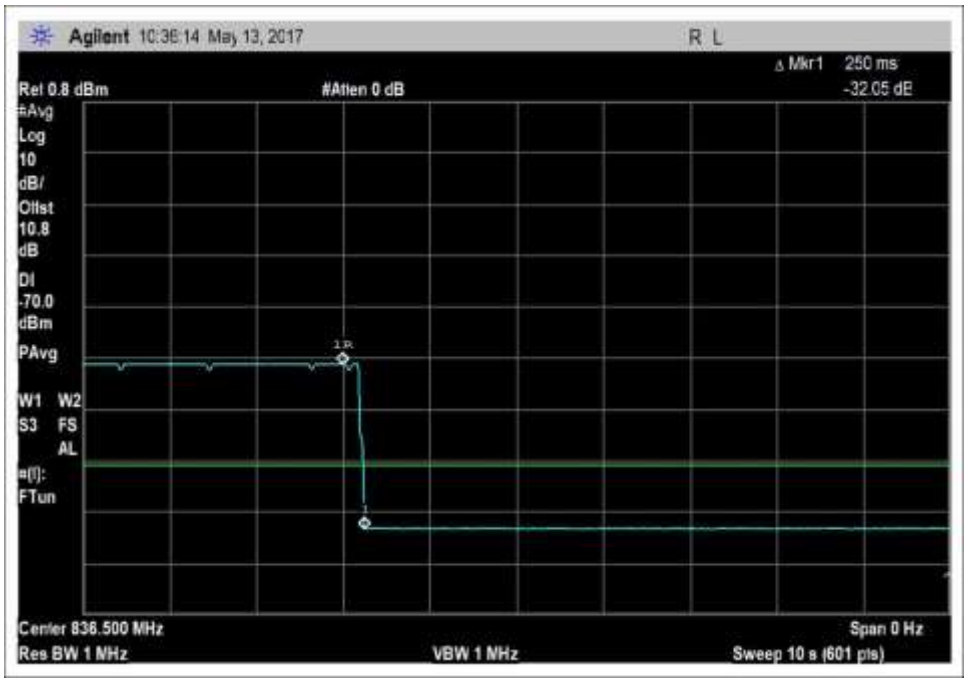
Plots



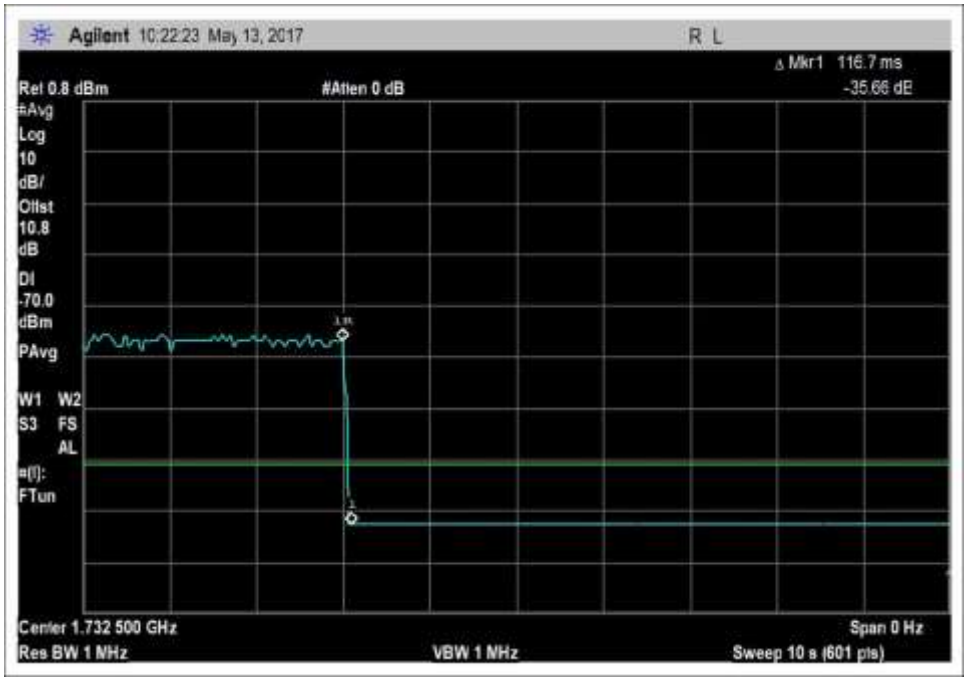
UL_698-716MHz



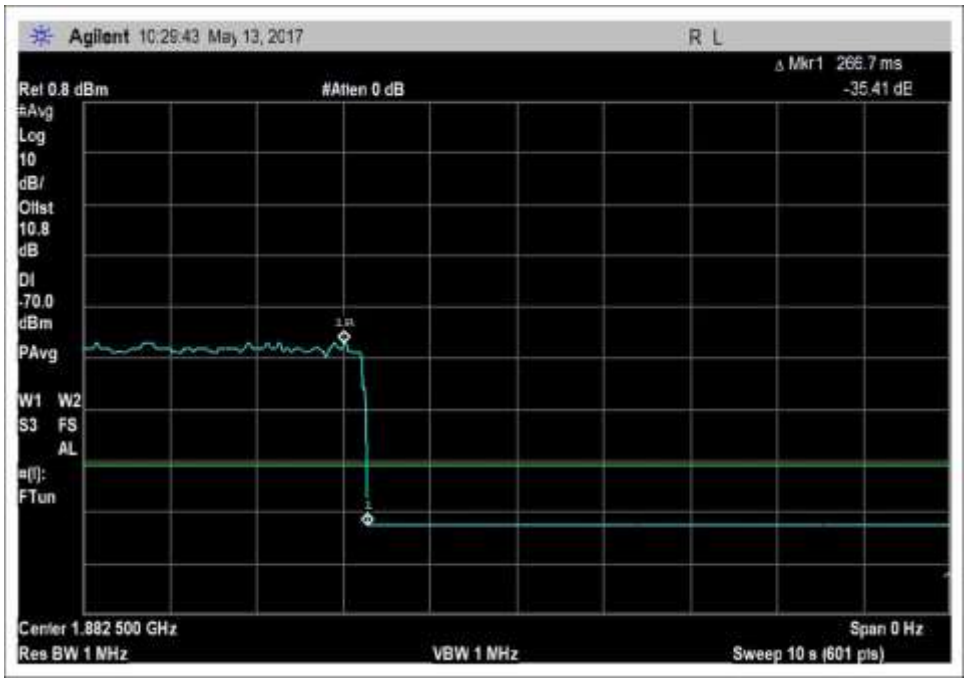
UL_776-787MHz



UL_824-849MHz



UL_1710-1755MHz



UL_1850-1915MHz

7.8 Uplink Inactivity

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	**7.8 Uplink Inactivity**		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 kPa

Test Equipment:

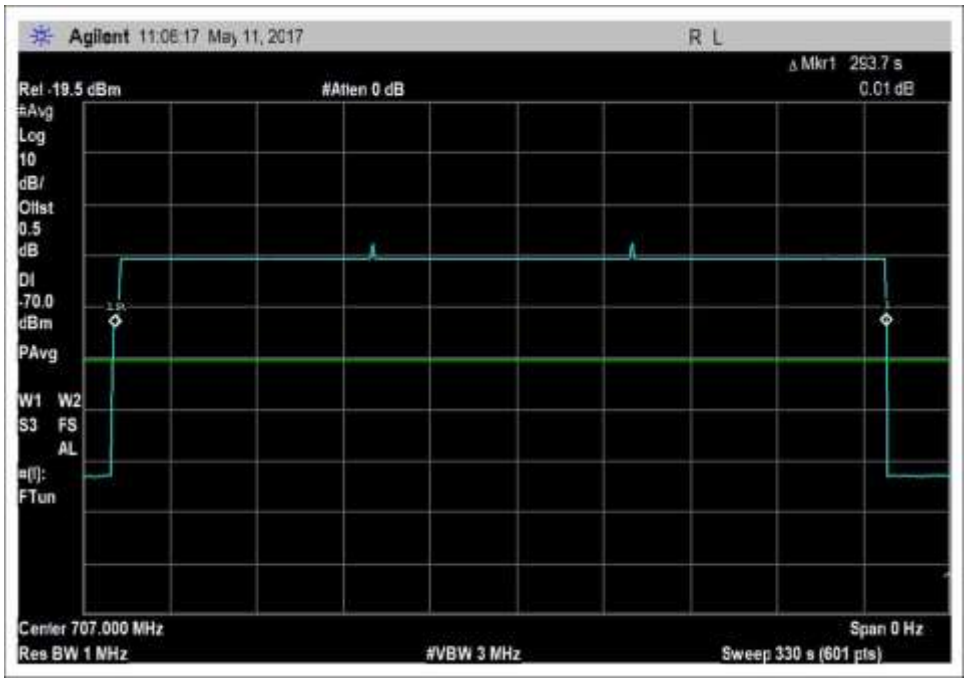
Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017

Summary of Results

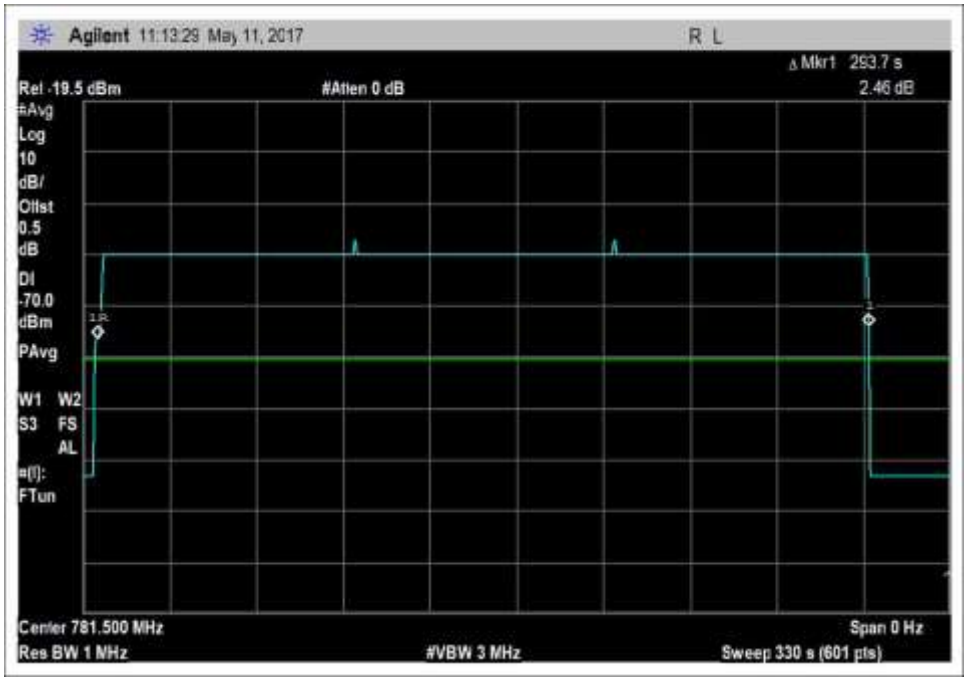
Pass: As demonstrated, when the booster is not serving an active device connection after 5 minutes the uplink noise power does not exceed -70dBm/MHz

Uplink Inactivity		
Frequency	**Measured**	**Limit**
MHz	**Min**	**Min**
UL1710-1755	4.8	5
UL1850-1915	4.9	5
UL824-849	4.9	5
UL 698-716	4.9	5
UL776-787	4.9	5

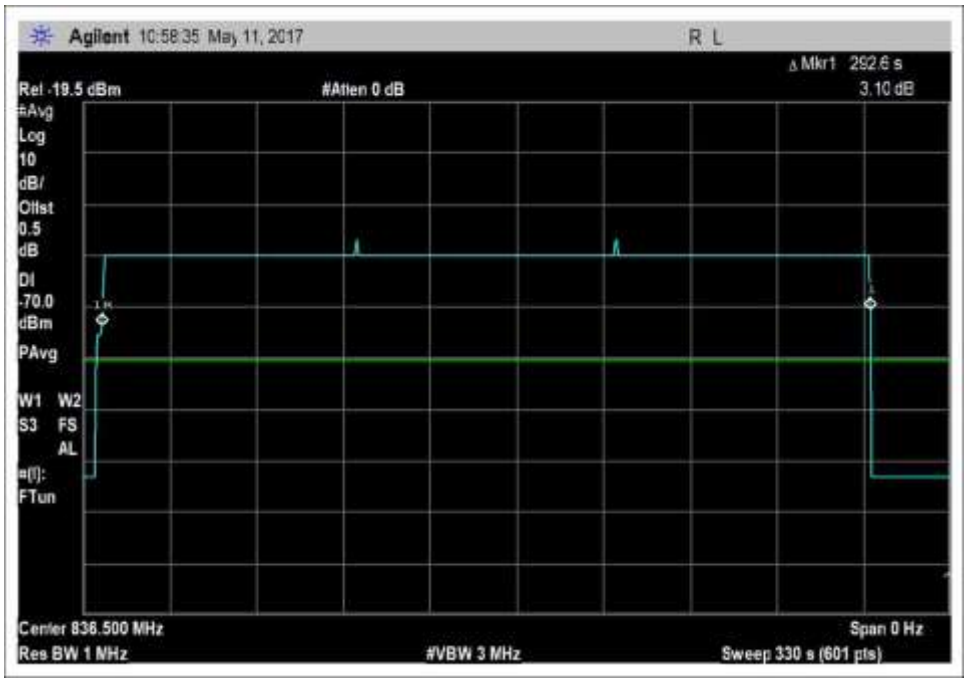
Plots



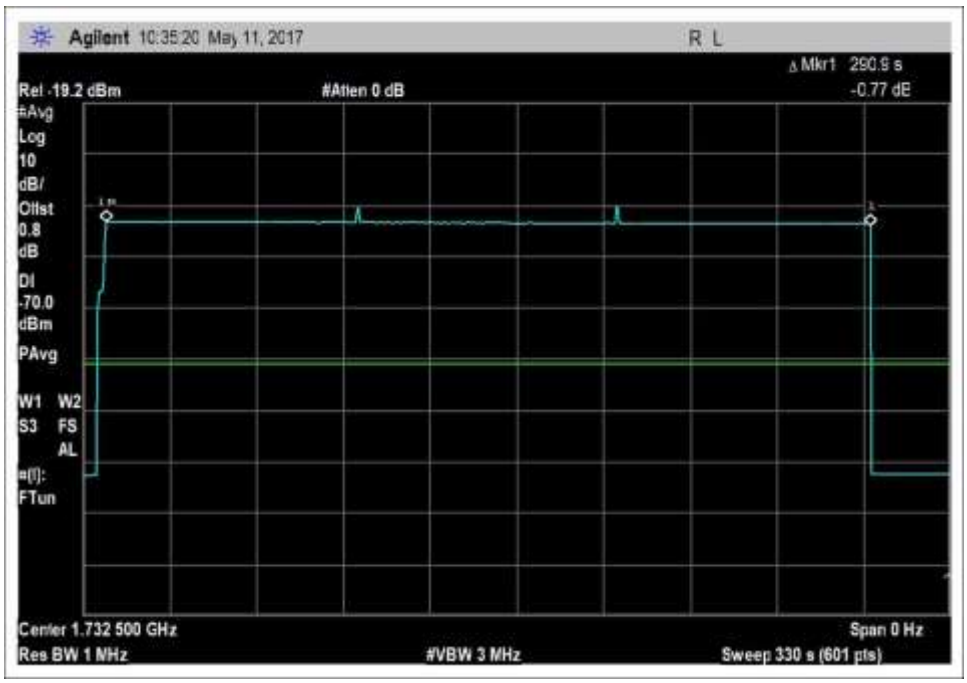
UL_698-716MHz



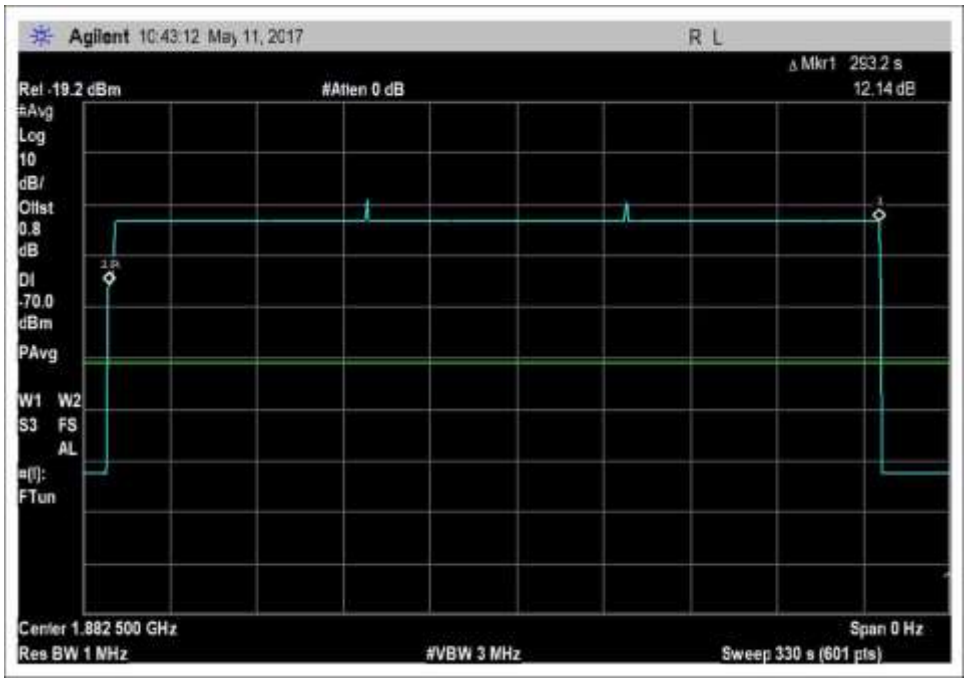
UL_776-787MHz



UL_869-894MHz



UL_1710-1755MHz



UL_1850-1915MHz

7.9 Booster Gain Limit

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	**7.9 Variable Booster gain(Max Gain / Variable Uplink Gain Timing)**		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 kPa

Used MSCL provided by the manufacture'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 = 1.8 meters.

Frequency (MHz)	MSCL (dB)
1850-1915	43.7
824-849	37.7
698-716	36.2
779-787	37.1
1710-1755	43.0

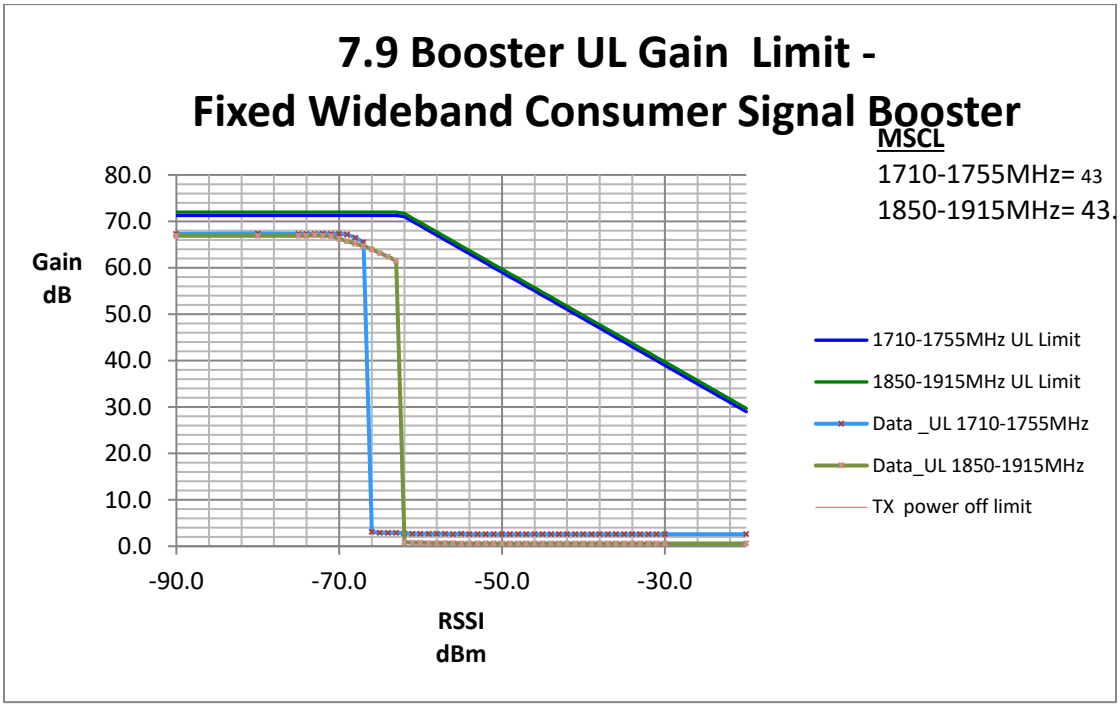
Test Equipment:

Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
ANP06554	Cable	32022-29094K-29094K-24TC	12/30/2015	12/30/2017
P07037	Agilent	E4438C	10/06/2016	10/06/2018
AN03420	Agilent	E4438C	7/8/2015	7/8/2017

Summary of Results

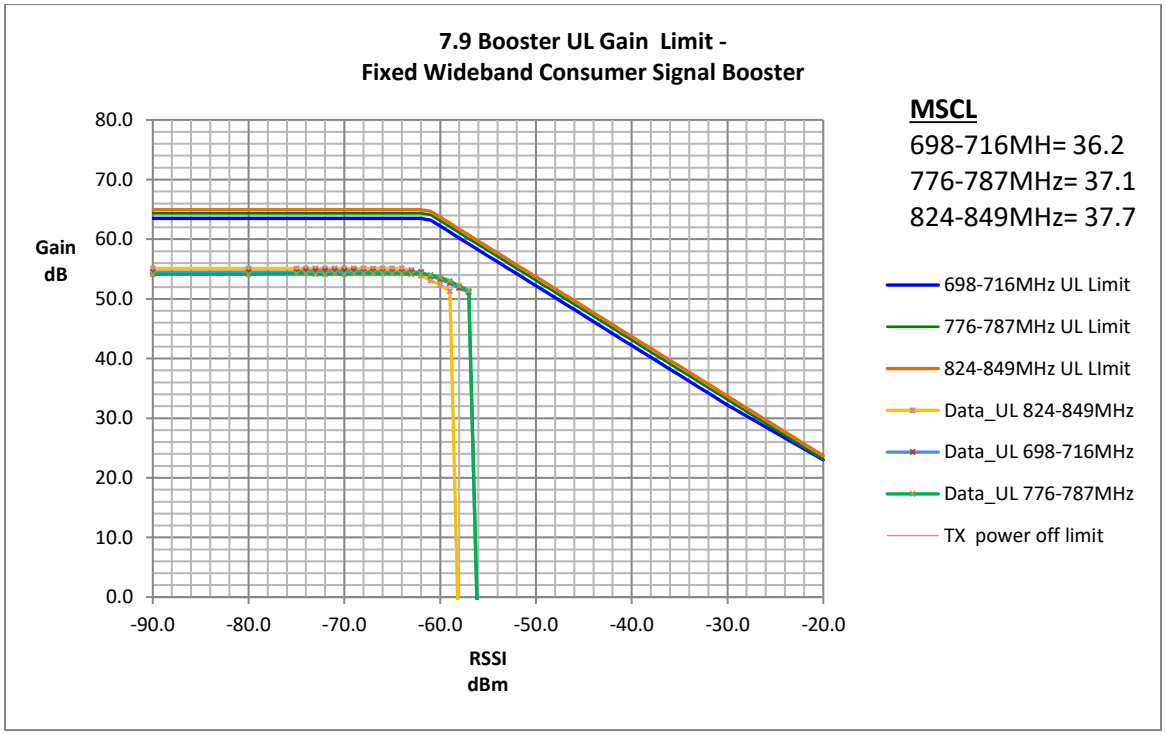
PASS: As demonstrated, computed gains are within the gain limit. All maximum variable uplink gain timings are within 3 second limit**.**

7.9.1 Maximum gain



1710.0 – 1755.0 MHz							
Limit							Margin
RSSI (dBm)	Input dBm	Measured Output (dBm)	Measured Gain (dB)	RSSI Dependent	Frequency Dependent	TX off	
-71.0	-47.5	13	60.5	-	71.3		-10.8
-66.0	-47.5	13	60.5	-	71.3		-10.8
-62.0	-47.5	12.6	60.1	71.0	-		-10.9
-61.0	-47.5	11.1	58.6	70.0	-		-11.4
-60.0	-47.5	10	57.5	69.0	-		-11.5
-59.0	-47.5	9.1	56.6	68.0	-		-11.4

1850.0 - 1915.0 MHz							
Limit							Margin
RSSI (dBm)	Input dBm	Measured Output (dBm)	Measured Gain (dB)	RSSI Dependent	Frequency Dependent	TX off	
-73.0	-46	13	59.0	-	72.0		-13.0
-67.0	-46	13	59.0	-	72.0		-13.0
-62.0	-46	11.1	57.1	71.7	-		-14.6
-61.0	-46	10.1	56.1	70.7	-		-14.6
-60.0	-46	8.9	54.9	69.7	-		-14.8
-58.0	-46	6.9	52.9	67.7	-		-14.8



824.0 - 849.0 MHz							
Limit							Margin
RSSI (dBm)	Input dBm	Measured Output (dBm)	Measured Gain (dB)	RSSI Dependent	Freq Dependent	TX off	
-72.0	-43.0	13.0	56.0	-	64.9		-8.9
-67.0	-43.0	13.0	56.0	-	64.9		-8.9
-61.0	-43.0	12.2	55.2	64.7	-		-9.5
-60.0	-43.0	11.5	54.5	63.7	-		-9.2
-59.0	-43.0	10.4	53.4	62.7	-		-9.3
-58.0	-43.0	9.2	52.2	61.7	-		-9.5

698.0 716.0 MHz							
Limit							Margin
RSSI (dBm)	Input dBm	Measured Output (dBm)	Measured Gain (dB)	RSSI Dependent	Frequency Dependent	TX off	
-74.0	-43.5	12.8	56.3	-	63.5		-7.2
-68.0	-43.5	12.8	56.3	-	63.5		-7.2
-53.0	-43.5	3.6	47.1	55.2	-		-8.1
-51.0	-43.5	1.9	45.4	53.2	-		-7.8
-50.0	-43.5	1.3	44.8	52.2	-		-7.4
-49.0	-43.5	0.4	43.9	51.2	-		-7.3

776.0 - 787.0 MHz							
Limit							Margin
RSSI (dBm)	Input dBm	Measured Output (dBm)	Measured Gain (dB)	RSSI Dependent	Frequency Dependent	TX off	
-71.0	-42.5	13.2	55.7	-	64.4		-8.7
-64.0	-42.5	13.2	55.7	-	64.4		-8.7
-51.0	-42.5	2.9	45.4	54.1	-		-8.7
-50.0	-42.5	2.4	44.9	53.1	-		-8.2
-49.0	-42.5	1.8	44.3	52.1	-		-7.8
-48.0	-42.5	0.8	43.3	51.1	-		-7.8

7.9.2 Variable uplink gain timing

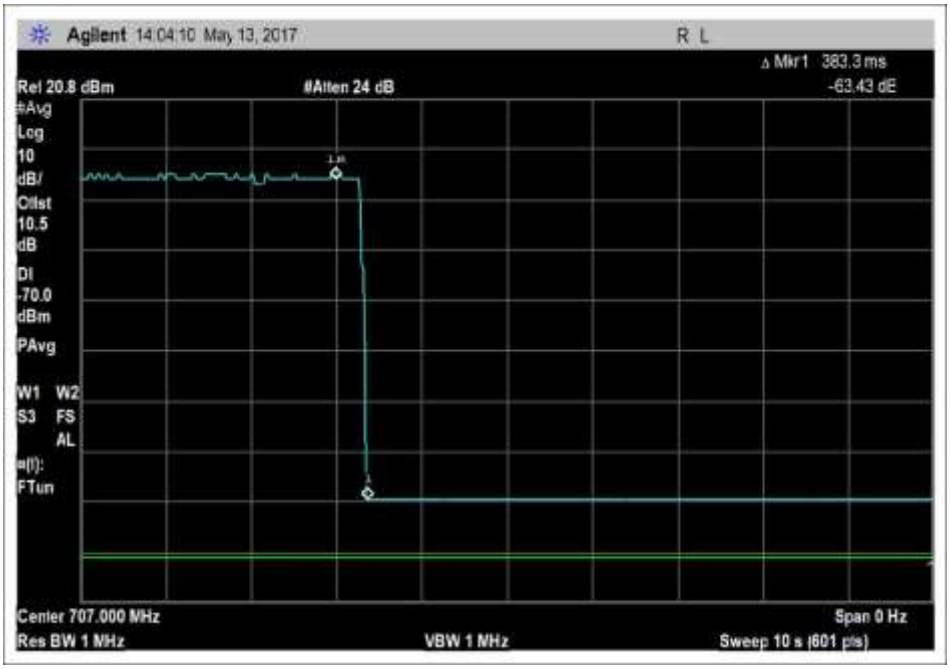
Uplink Gain Timing		
Frequency	**Measured**	**Limit**
(MHz)	**(Sec)**	**(Sec)**
UL 1710-1755	0.4	3
UL 1850-1915	0.2	3
UL 824-849	0.4	3
UL 698-716	0.4	3
UL 776-787	0.3	3

7.9.1 Maximum Gain

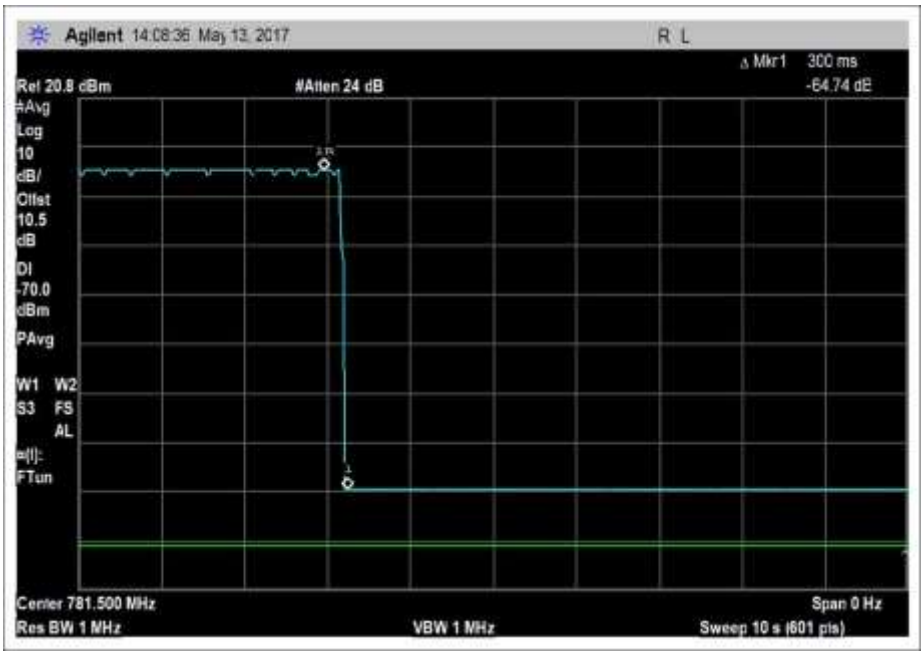
For this subsection, see summary of results of 7.9
7.9.1 Maximum gain

7.9.2 Variable uplink Gain Timing

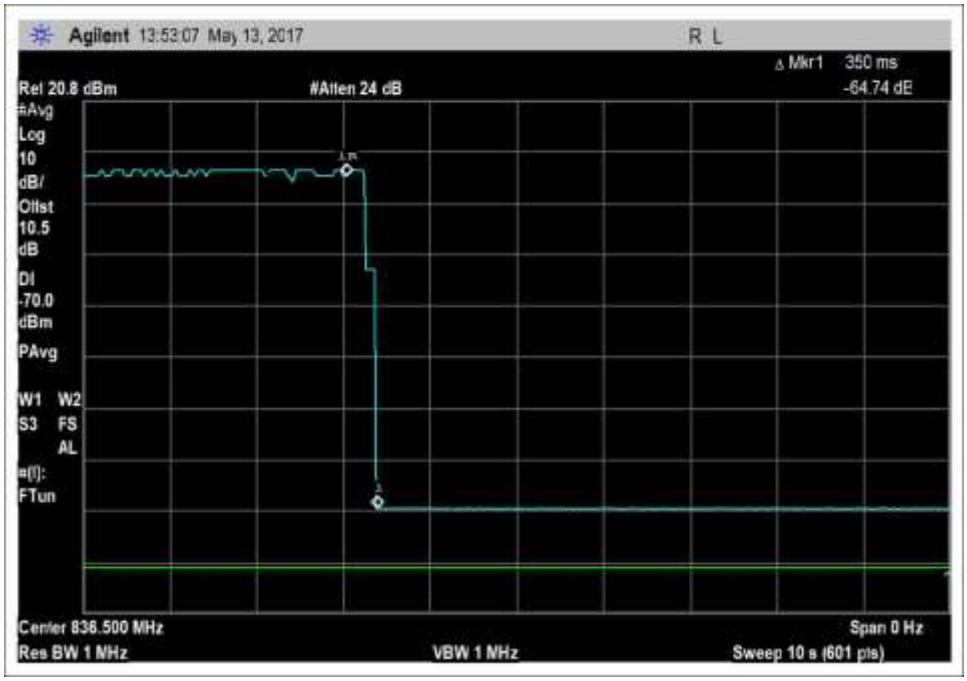
Plots



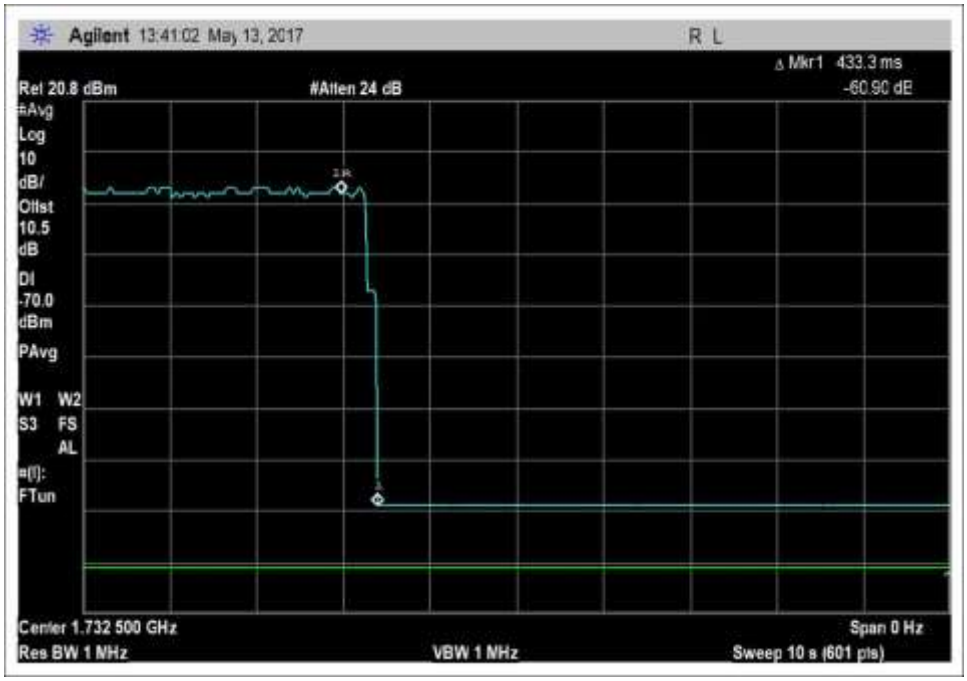
UL_698-716MHz



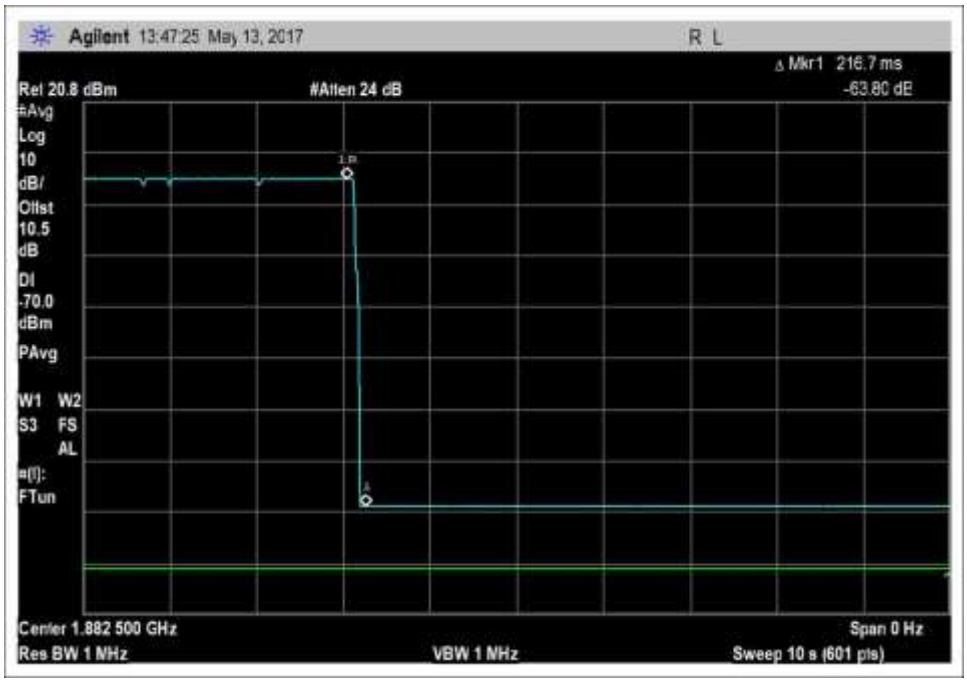
UL_776-787MHz



UL_824-849MHz



UL_1710-1755MHz



UL_1850-1915MHz

7.10 Occupied Band Width

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 110 N. Olinda Place • Brea, CA 92821 • 714 993-6112		
Customer:	**Huaptec**		
Specification:	**7.10 Occupied Band Width / 47 CFR §2.1049 Occupied Band Width**		
Work Order #:	**99881**	Date:	5/10/2017
Test Type:	**Conducted Emissions**	Time:	11:02:39
Tested By:	E. Wong	Sequence#:	1
Software:	EMITest 5.03.02		110V 60Hz

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster
The EUT is placed on the test bench.
The EUT Server port is a type N connector and 50-ohm impedance.
The EUT Donor port is type N connector and 50-ohm impedance.
RS232 service port is left unpopulated

UL: 824-849MHz
DL: 869-894MHz

UL: 1850-1915MHz
DL: 1930-1995MHz

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.

Firmware: V1.6.

Test environment conditions:
Temperature: 21.1°C
Relative Humidity: 40%
Pressure: 100.8 kPa

Test Equipment:

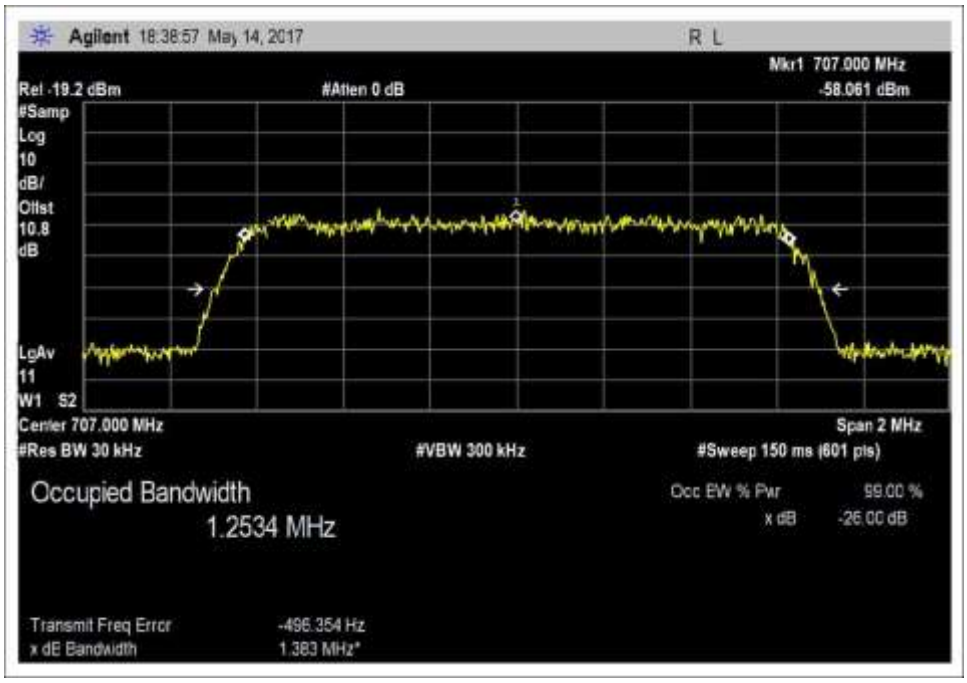
Asset #	Description	Model	Calibration Date	Cal Due Date
AN02672	Spectrum Analyzer	E4446A	3/2/2017	3/2/2019
AN03430	Attenuator	75A-10-12	11/2/2015	11/2/2017
AN02946	Cable	32022-2-2909K-36TC	11/2/2015	11/2/2017
ANP06554	Cable	32022-29094K-29094K-24TC	12/30/2015	12/30/2017
P07037	Agilent	E4438C	10/06/2016	10/06/2018
AN03420	Agilent	E4438C	7/8/2015	7/8/2017

Summary of Results

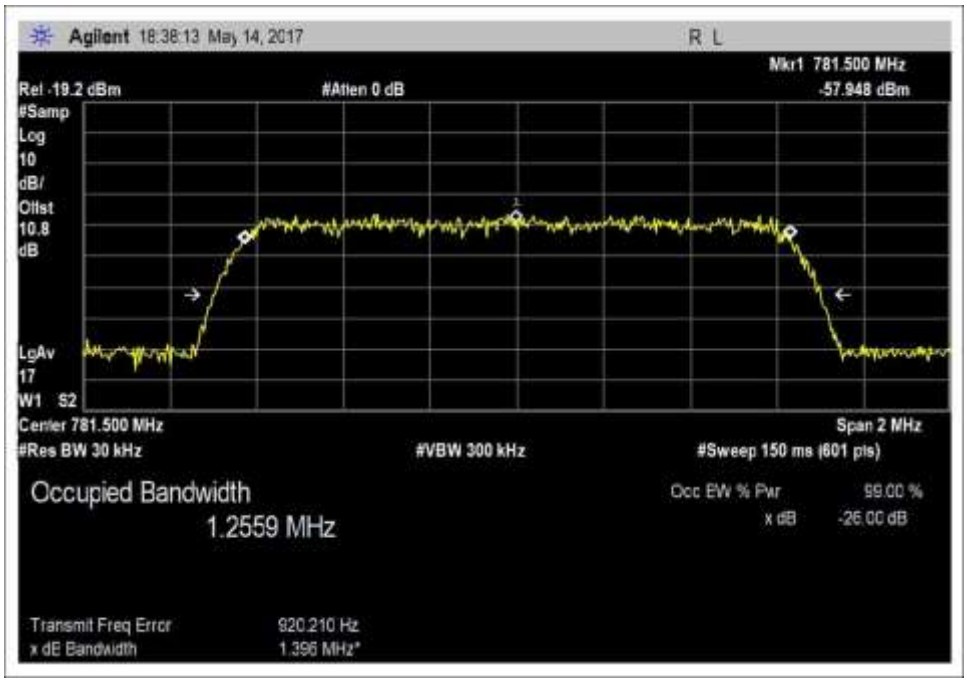
Pass: As summarized in plots below, the uniformity of the output signal relative to the input signal are practically identical. Therefore, the comparison is within limits.

Plots

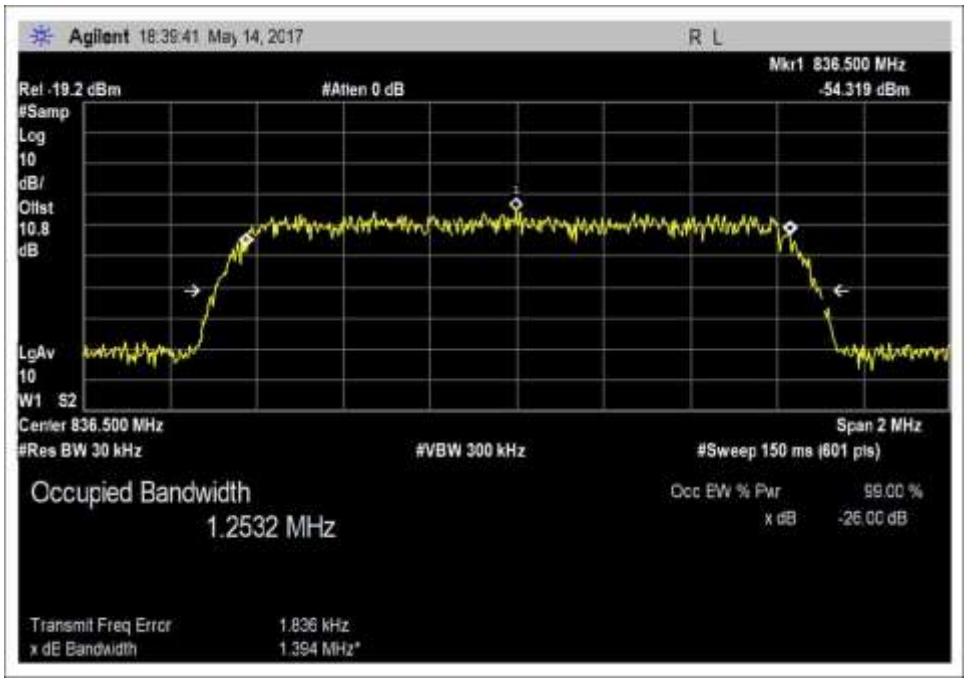
CDMA



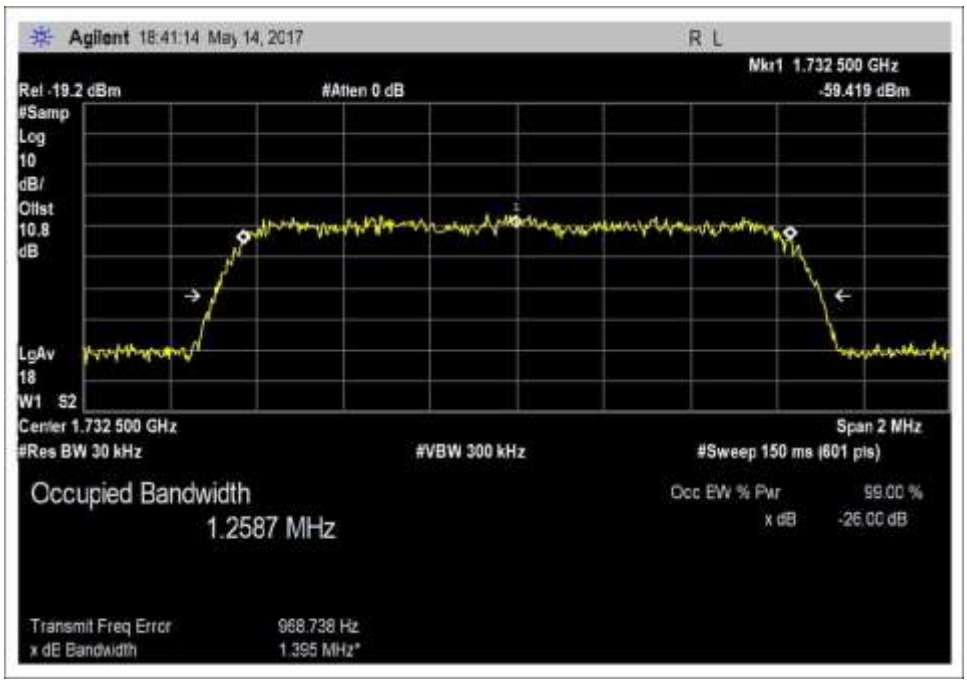
Input_OBW_UL_698-716MHz_CDMA



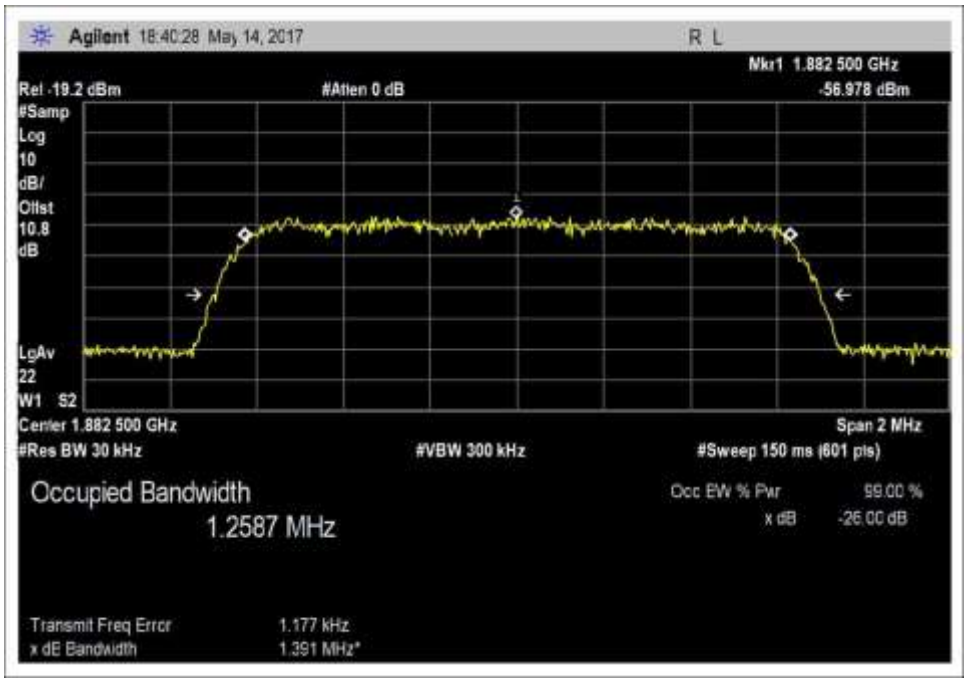
Input_OBW_UL_776-787MHz_CDMA



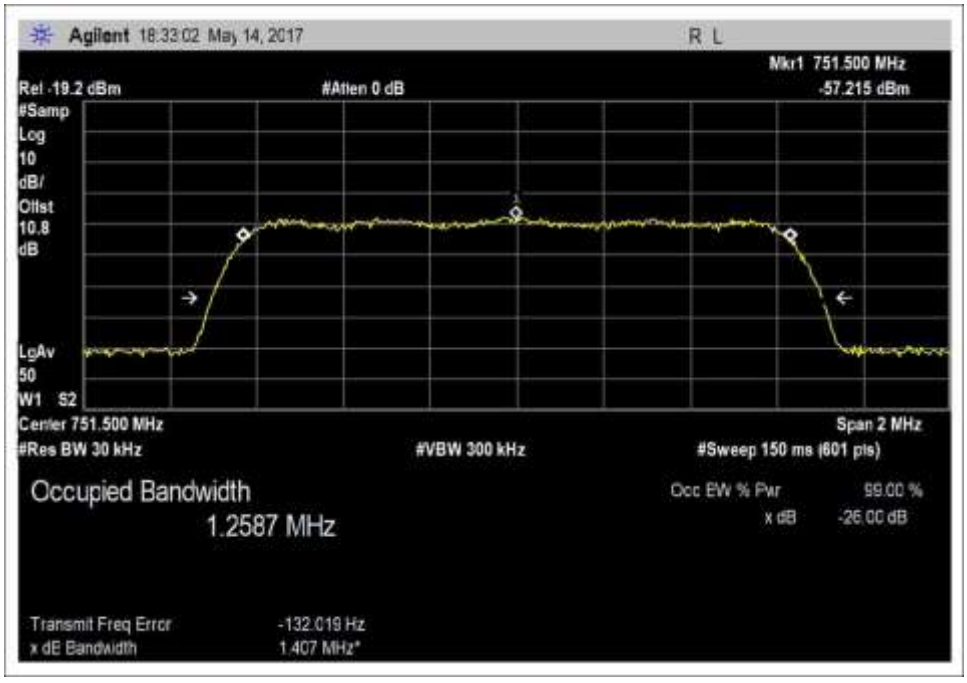
Input_OBW_UL_824-849MHz_CDMA



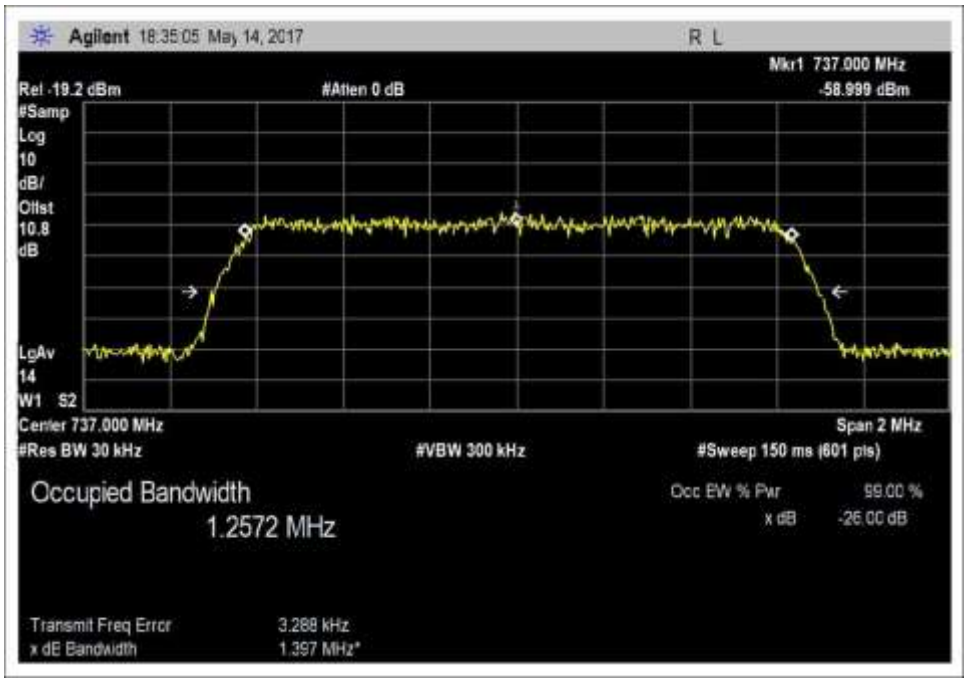
Input_OBW_UL_1710-1755MHz_CDMA



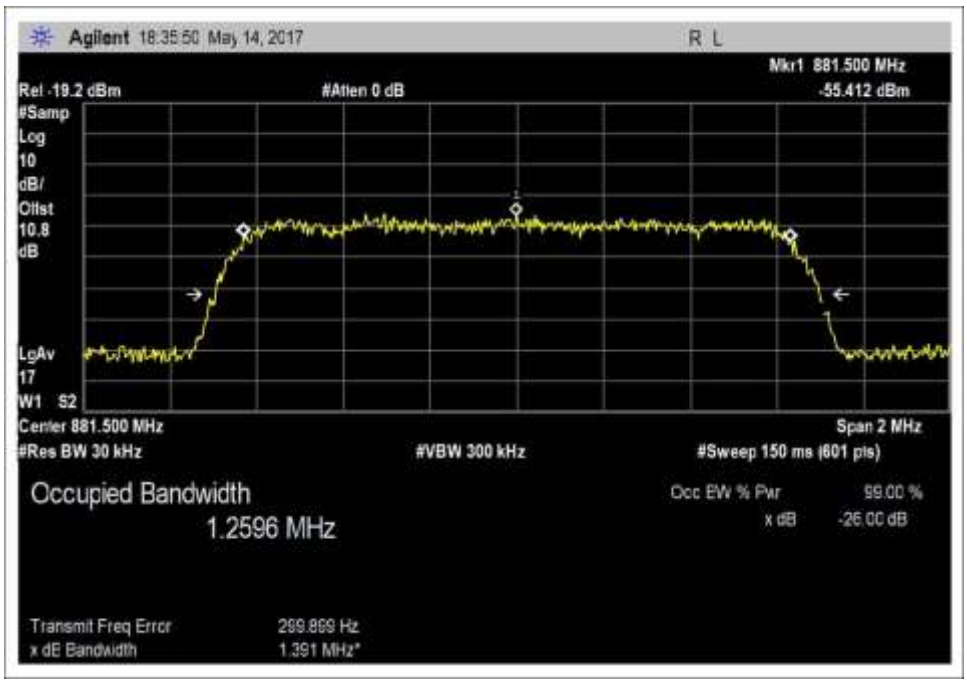
Input_OBW_UL_1850-1915MHz _CDMA



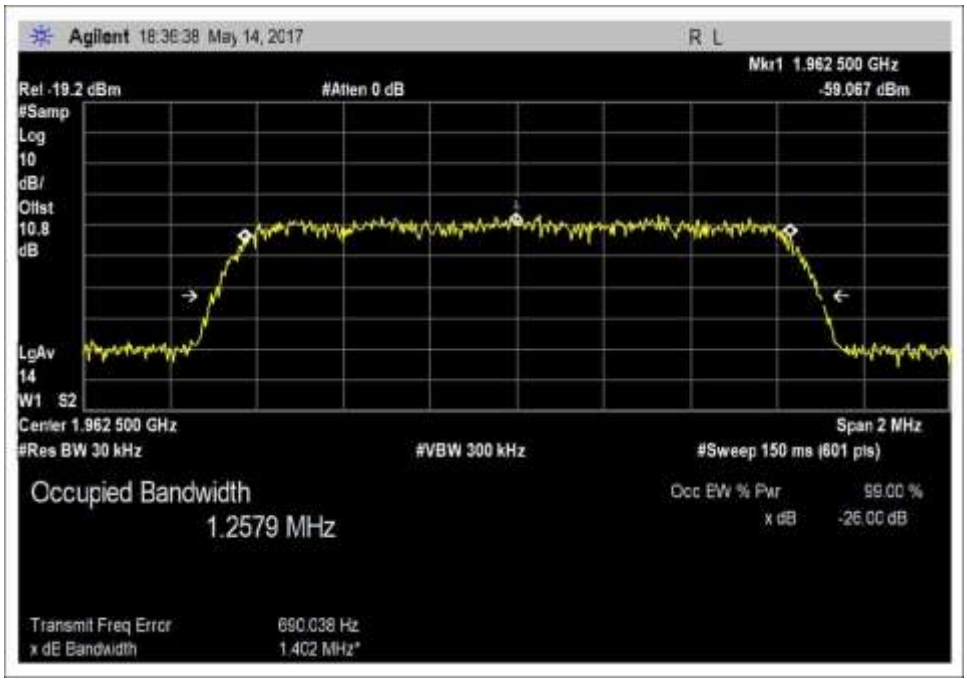
Input_OBW_DL_746-757MHz_CDMA



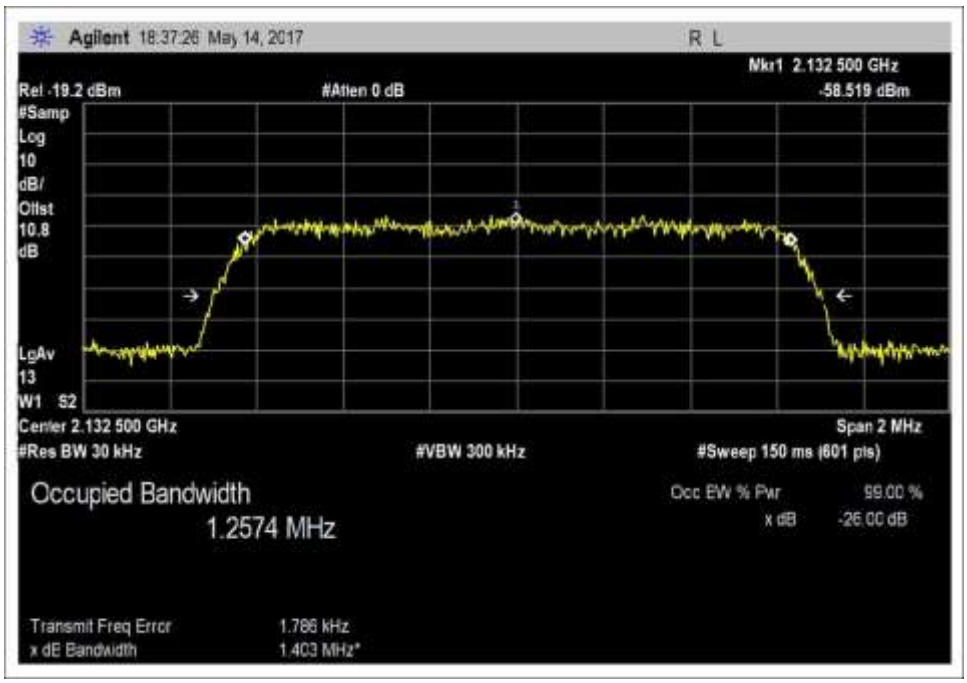
Input_OBW_DL_728-746MHz_CDMA



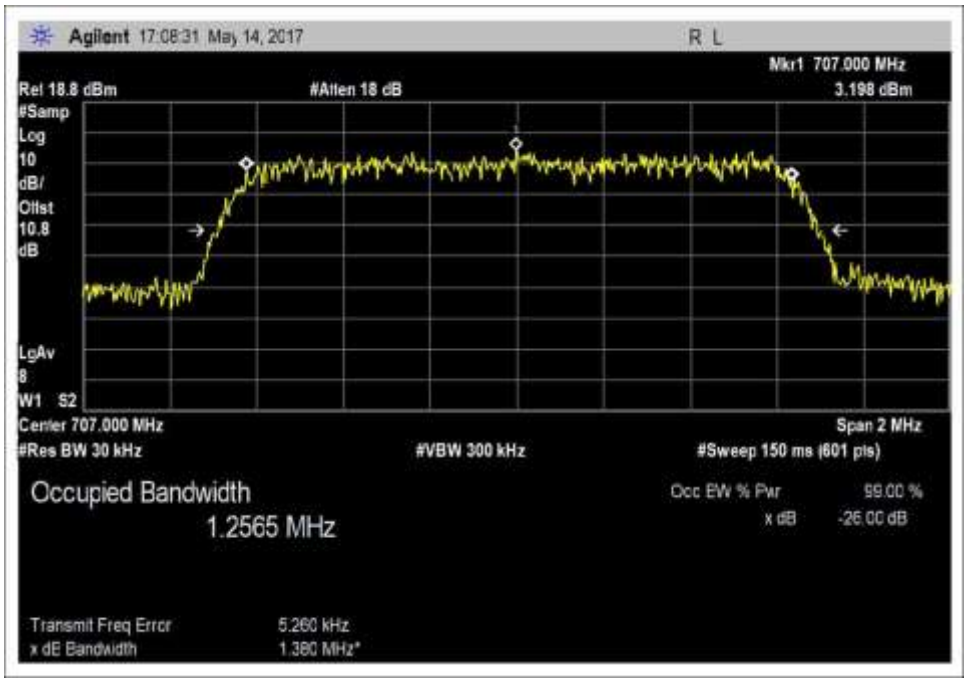
Input_OBW_DL_869-894MHz_CDMA



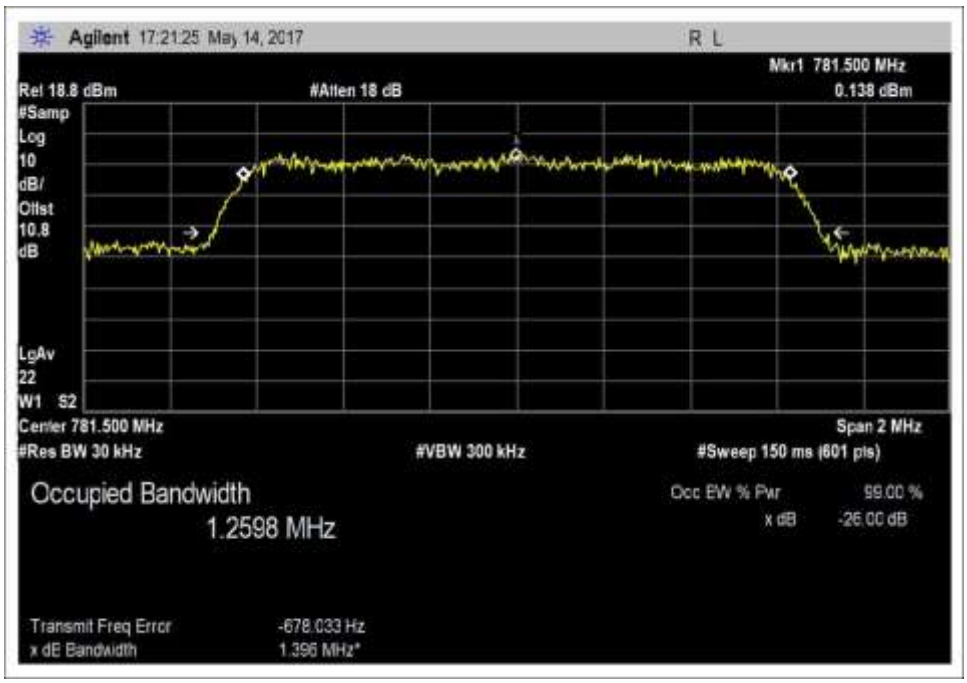
Input_OBW_DL_1930-1995MHz_CDMA



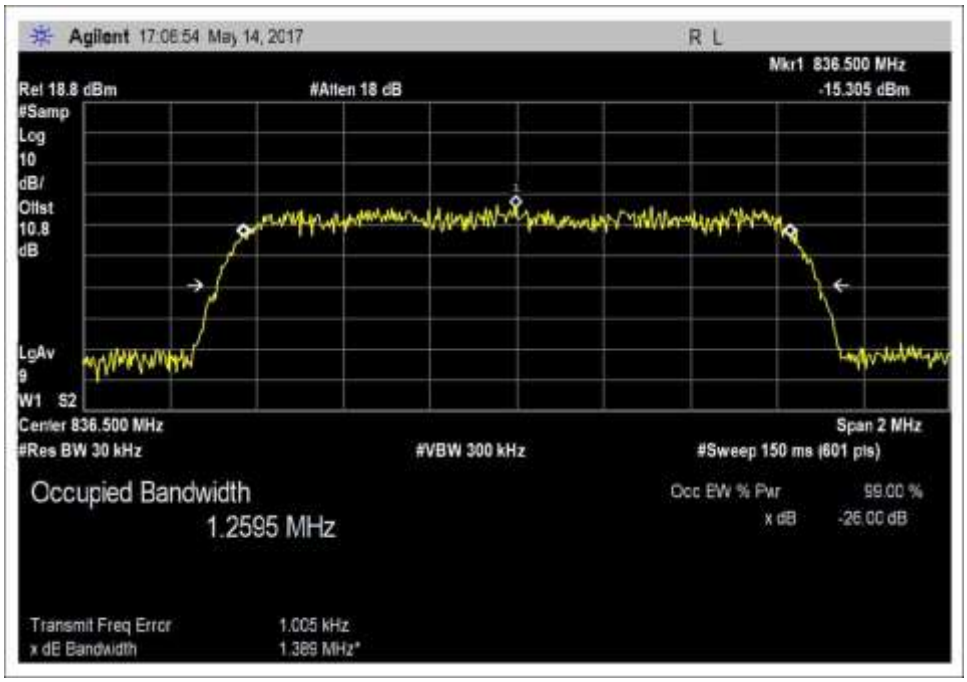
Input_OBW_DL_2110-2155MHz_CDMA



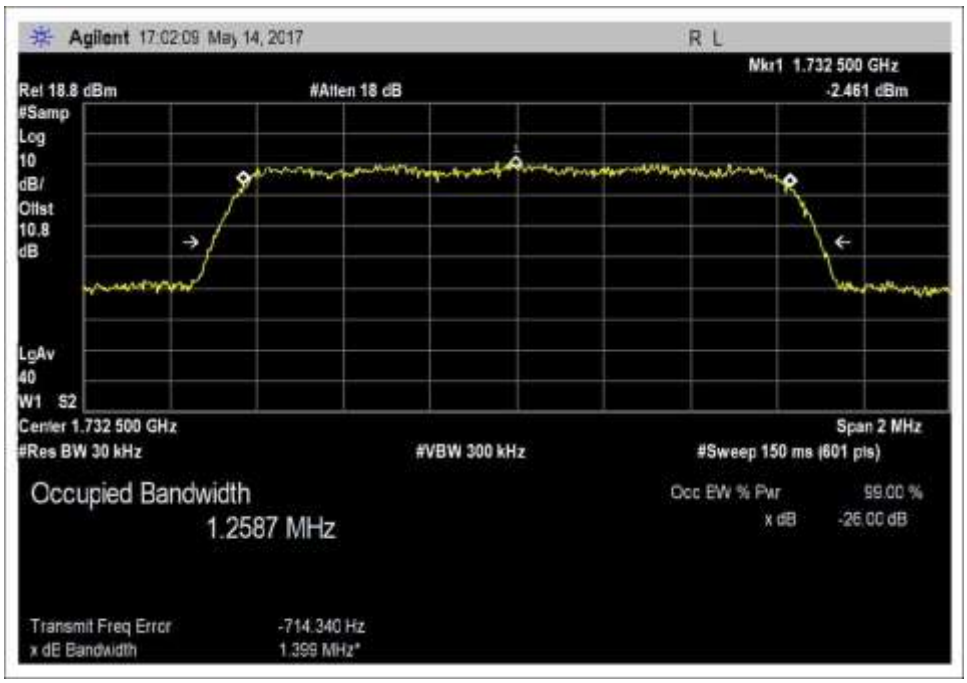
Output_OBW_UL_698-716MHz _CDMA



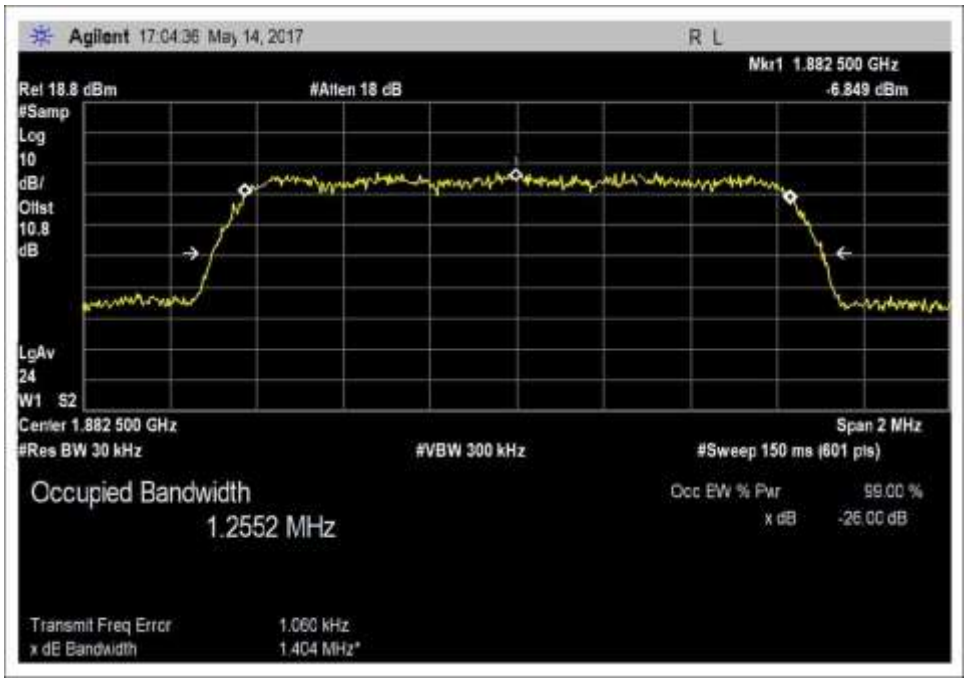
Output_OBW_UL_776-787MHz _CDMA



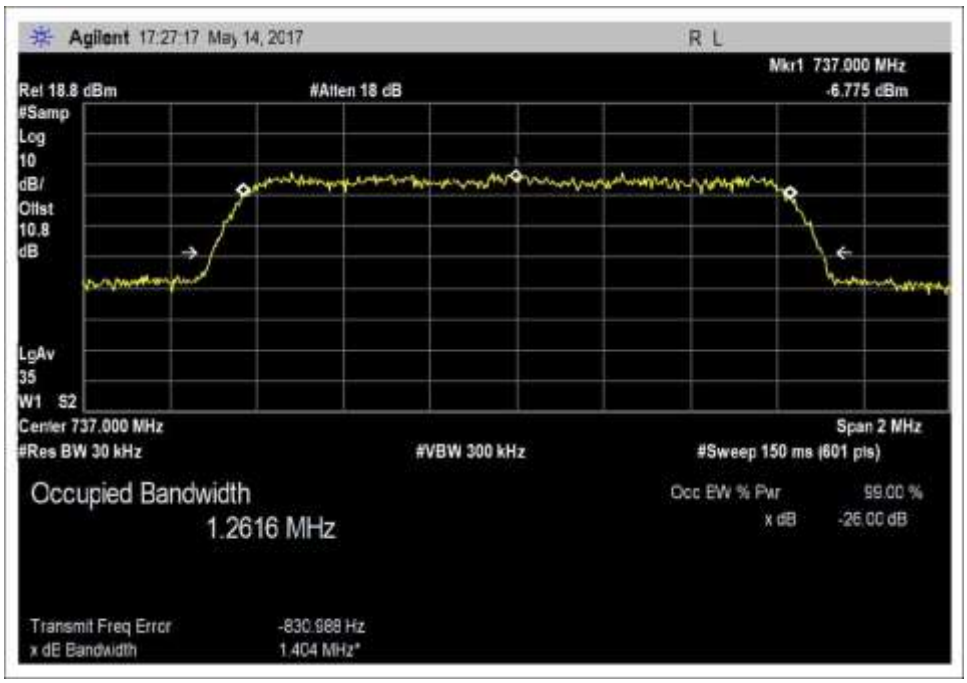
Output_OBW_UL_824-849MHz _CDMA



Output_OBW_UL_1710-1755MHz _CDMA



Output_OBW_UL_1850-1915MHz _CDMA



Output_OBW_DL_728-746MHz _CDMA