

Cellphone-Mate, Inc.

REVISED TEST REPORT TO 100827-13

**5 Band Consumer Booster, Model: Fusion5s 2.0
and
DC Power Supply, Model: GME36A-12300FDS**

Tested to The Following Standard:

FCC Part 20.21 / 22 / 24 / 27

Report No.: 100827-13A

Date of issue: March 23, 2018



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	4
Test Report Information	4
Revision History	4
Report Authorization	4
Test Facility Information	5
Software Versions	5
Site Registration & Accreditation Information	5
Summary of Results	6
Modifications During Testing	7
Conditions During Testing	7
Equipment Under Test	8
General Product Information	8
FCC Part 20.21/22/24/27	9
General Test Setup	9
7.1 Authorized Frequency Band Verification	10
Summary of Results	11
7.2 Maximum Power / 7.3 Maximum Gain	17
Summary of Results	18
7.4 Intermodulation Product	41
Summary of Results	42
7.5 Out of Band Emissions	48
Summary of Results	49
7.6 Conducted Spurious Emissions	81
Summary of Results	82
7.7 Noise limit	107
Summary of Results	108
7.7.1 Maximum Transmitter Noise Power Level	112
7.7.2 Variable UL Noise Timing	117
7.8 Uplink Inactivity	120
Summary of Results	121

7.9 Booster Gain Limit	124
Summary of Results	125
7.9.1 Maximum Gain	128
7.9.2 Variable uplink Gain Timing	129
7.10 Occupied Band Width	132
Summary of Results	133
7.11 Oscillation Detection	184
Summary of Results	186
7.11.2 Oscillation Restart Tests	188
7.12 Radiated Spurious Emissions	198
Summary of Results	200
Exhibit A: Test Setup Photos	202
Supplemental Information.....	207
Measurement Uncertainty	207
Emissions Test Details.....	207

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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REPORT PREPARED BY:

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REPRESENTATIVE: Dennis Findley
Customer Reference Number: CKC02052018

Project Number: 100827

DATE OF EQUIPMENT RECEIPT:

February 11, 2018

DATE(S) OF TESTING:

February 11-26, 2018

Revision History

Original: Testing of the 5 Band Consumer Booster Model: Fusion5s 2.0 and DC Power Supply Model: GME36A-12300FDS to FCC 20.21 / 22 / 24 / 27

Revision A: Sections 7.2-7.3 and 7.9 have been updated due to the change of antenna kitting and MSCL numbers provided by the manufacturer.

Report Authorization

The test data contained in this report documents the observed testing parameters pertaining to and are relevant for only the equipment provided by the client, 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.

A handwritten signature in black ink that reads "Steve Behm".

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	5.03.11
EMITest Immunity	5.03.10

Site Registration & Accreditation Information

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

SUMMARY OF RESULTS

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

**Wideband Consumer Signal Booster Measurement Guidance: KDB #935210 DO3 v04r01,
October 27, 2017**

Correlation Matrix & Results					
Guidance Section	Guidance Description	FCC Section	FCC Rule Description	Mods	Results
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 20.21/22/24/27 - continued

Correlation Matrix & Results					
Guidance Section	Guidance Description	FCC Section	FCC Rule Description	Mods	Results
7.9.1 a) - l)	Variable Booster Gain	20.21(e)(8)(i)(C) (1), (2)(i)	Booster Gain	NA	Pass
7.9.2 a) - f)	Variable Uplink Gain Timing	20.21(e)(8)(i)(H)	Transmit Power Off Mode		
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	NA	NA	NA	NA1

NA = Not applicable

NA1 = Not applicable because the EUT does not have spectrum blocking.

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
DC Power Supply	SureCall	GME36A-12300FDS	None
5 Band Consumer Booster	Cellphone-Mate, Inc.	Fusion5s 2.0	01

Support Equipment:

Device	Manufacturer	Model #	S/N
None			

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Equipment	Zone Enhancer
Operating Frequency Range:	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
OBW and Emissions Type(s):	GXW (GSM) G7W (EDGE) F9W(CDMA) F9W(WCDMA) W7D (LTE)
Modulation Type(s):	0.3 GMSK (GSM) 3p/8 8-PSK (EDGE) QPSK (CDMA) BPSK/QPSK (WCDMA) OFDM (LTE)
Number of TX Chains:	1
Antenna Type(s) and Gain:	Dedicated, See antenna kitting information
Beamforming Type:	NA
Antenna Connection Type:	UL: 50 Ohm/ N Type DL: 50 Ohm/ N Type
Nominal Input Voltage:	120VAC,60Hz
Firmware / Software used for Test:	SC_S1_Fusion5s_V3_4.hex version 3.4

FCC PART 20.21/22/24/27

General Test Setup

Summary of Conditions

General setup

The equipment under test (EUT) is a Fixed Wideband Consumer Booster.

The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.

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.

All switches are in the on position

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

Firmware: SC_S1_Fusion5s_V3_4.hex version 3.4

Test environment conditions: As noted in individual section

Test Procedure: 935210 D03 Signal Booster Measurements v04r01, October 27, 2017

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 #: **100827** Date 02/11/18
 Test Type: **Conducted Emissions**
 Tested By: **Hieu Song Nguyenpham**
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
 Temperature: 20.3°C
 Relative Humidity: 46%
 Pressure: 101.9 kPa

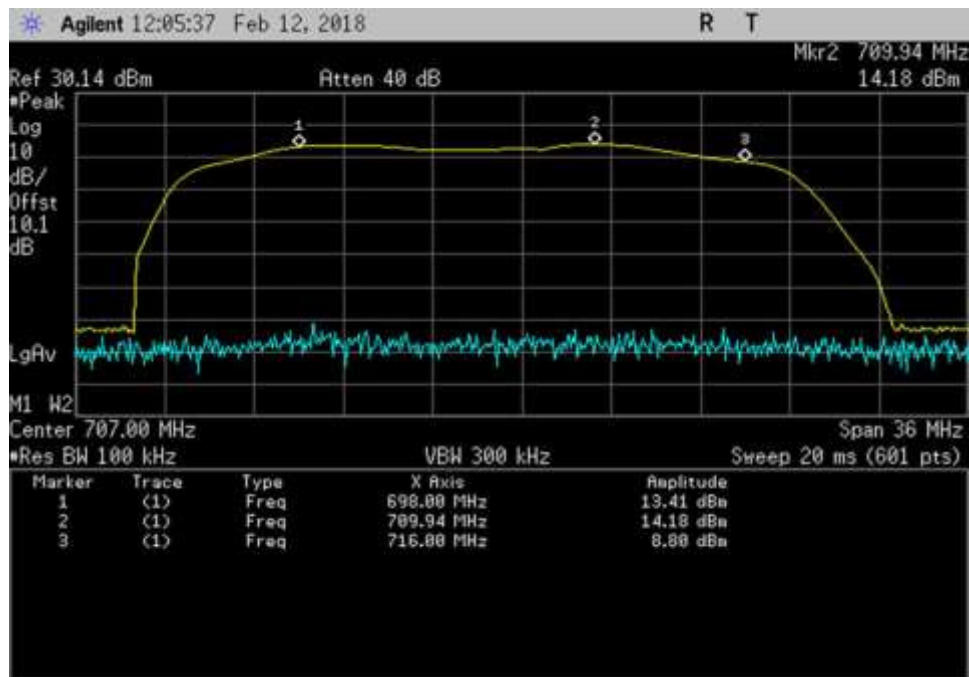
Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020

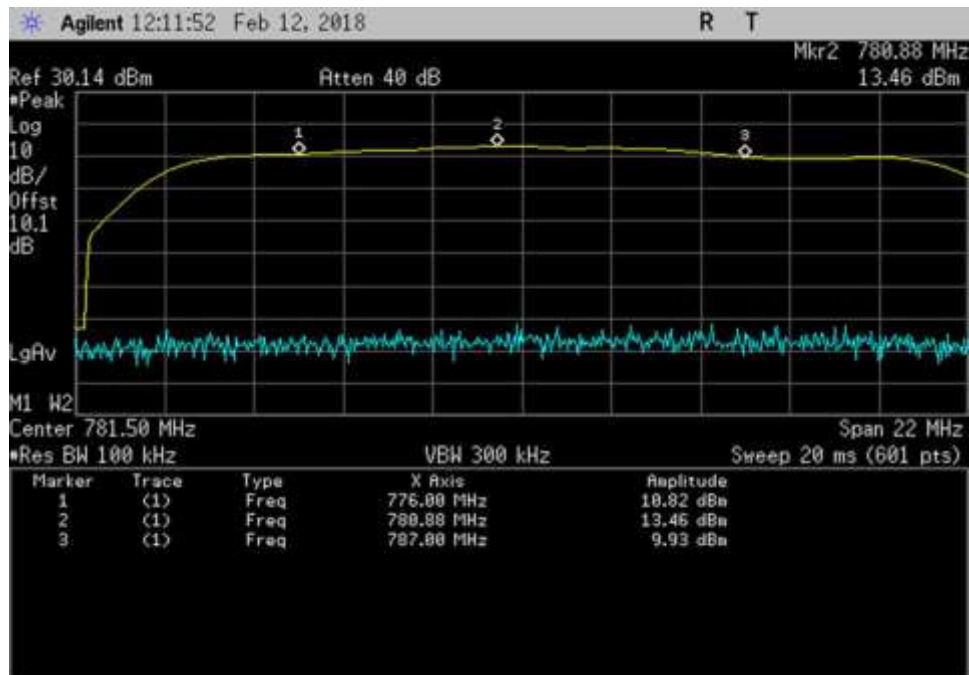
Summary of Results

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

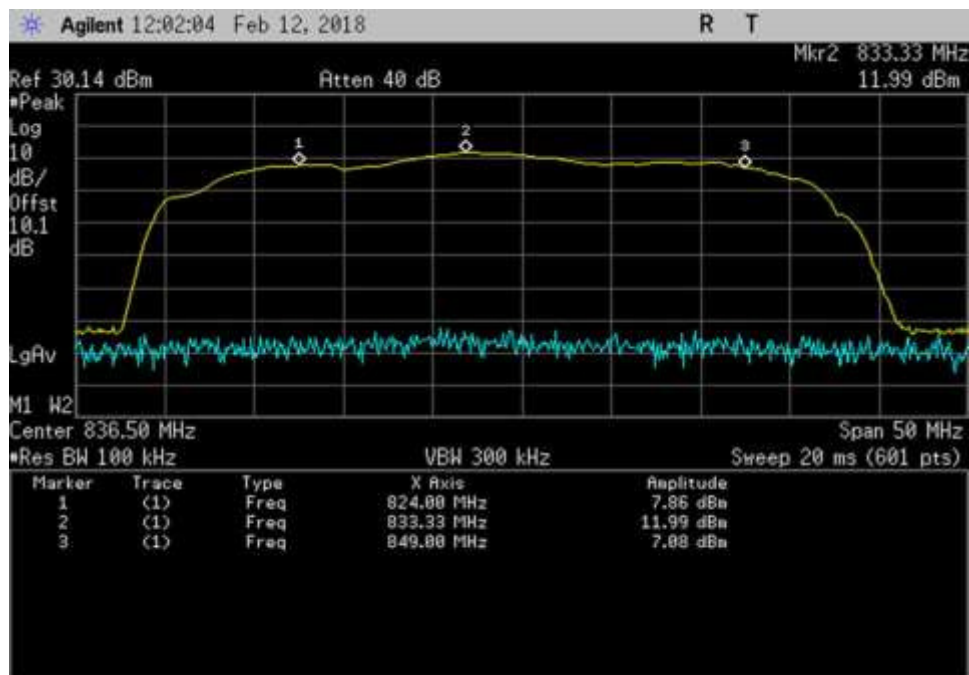
Plots



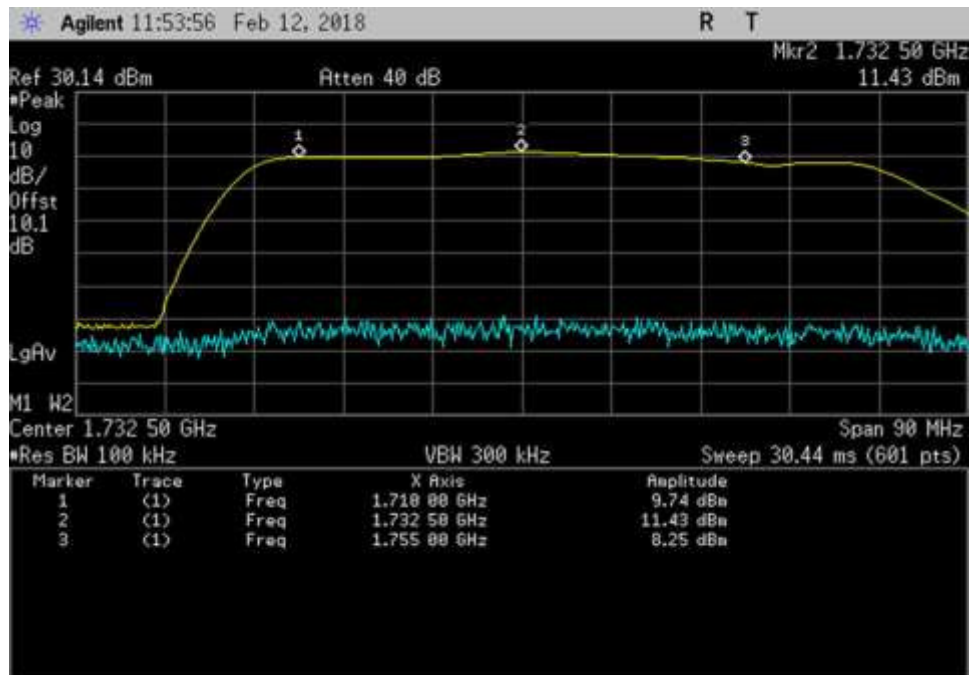
UL_698-716_ 698- 709.94MHz



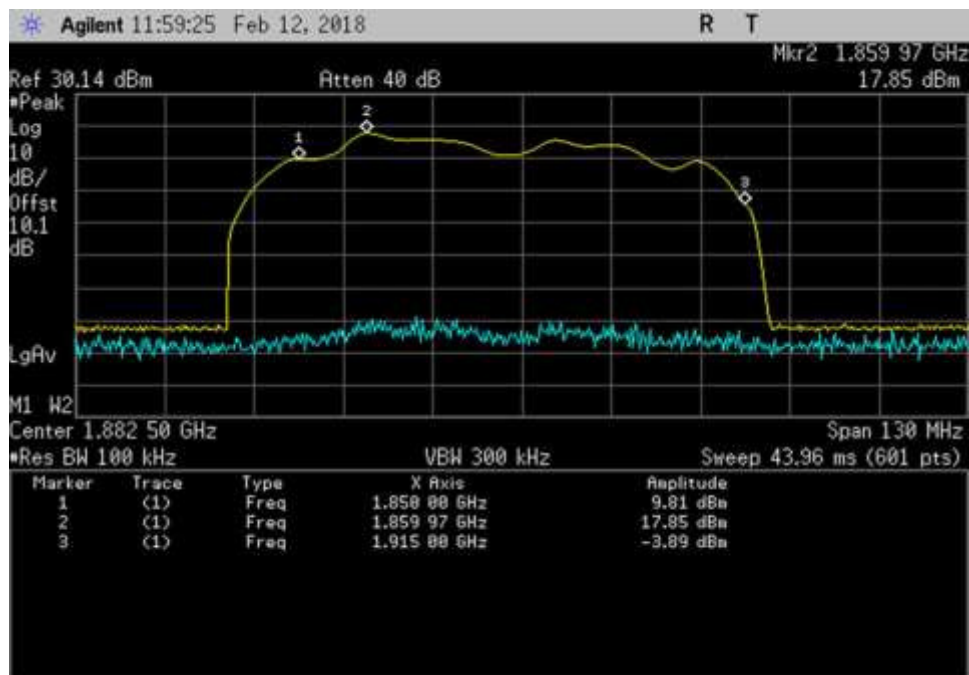
UL_776-787_ 776- 780.88MHz



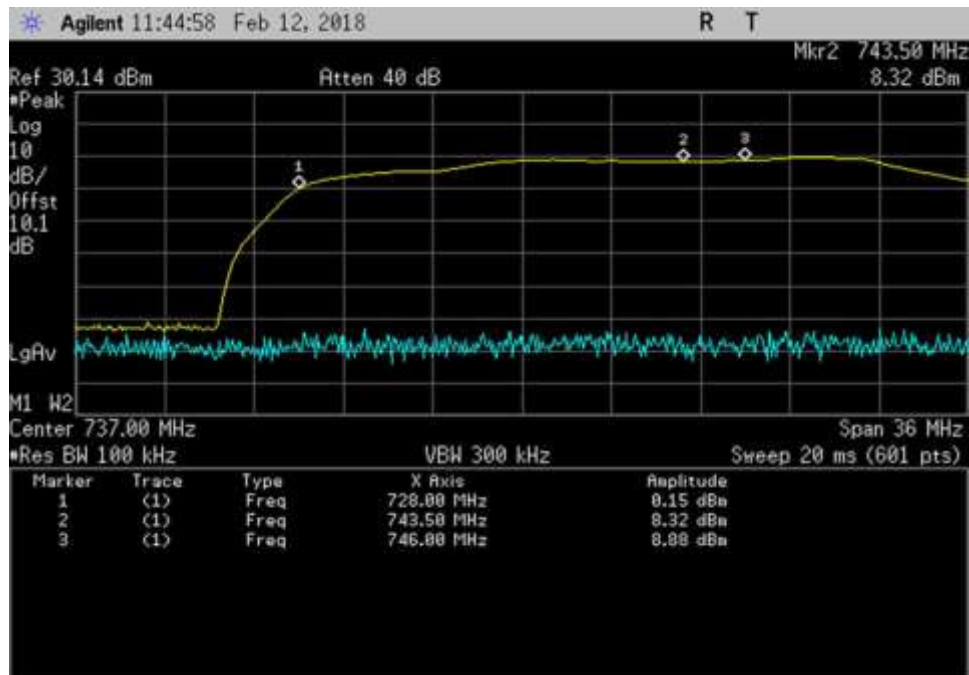
UL_824-849_ 824- 833.33MHz



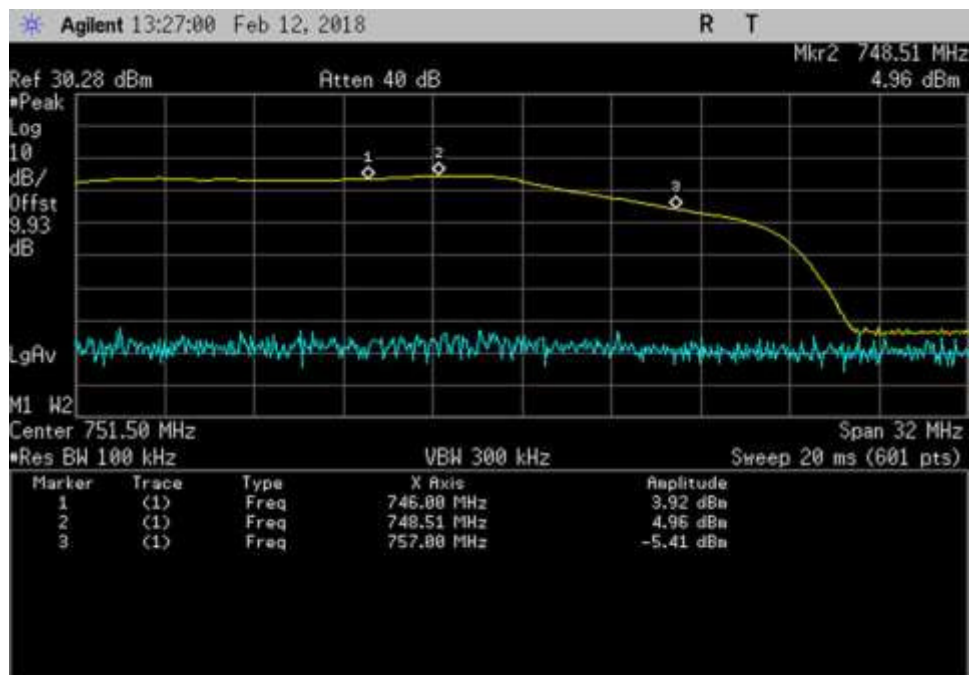
UL_1710-1755_ 1710- 1732.5MHz



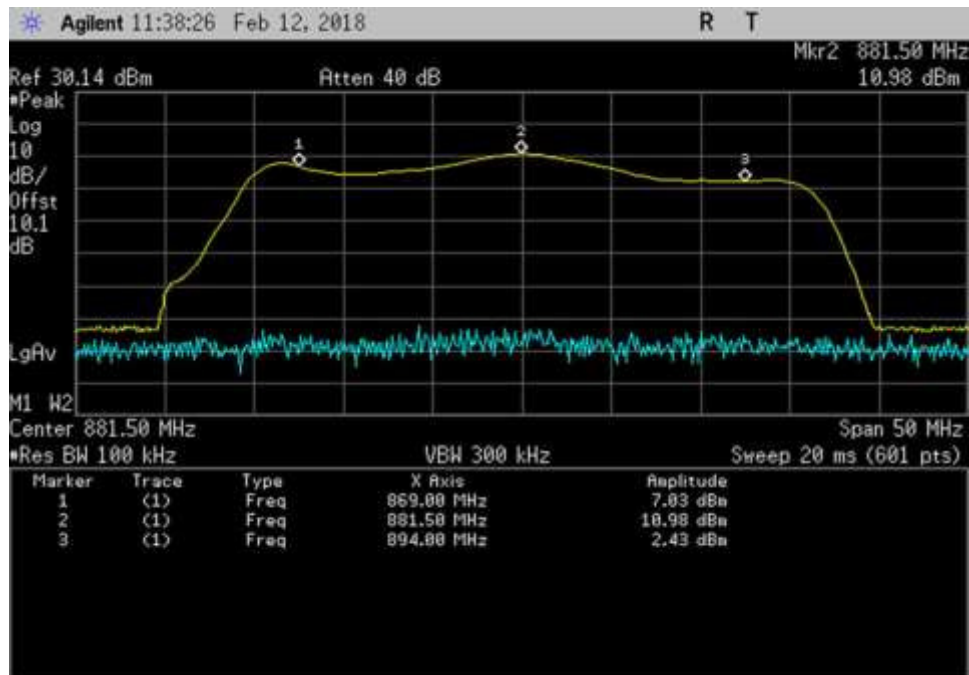
UL_1850-1915_ 1850- 1859.97MHz



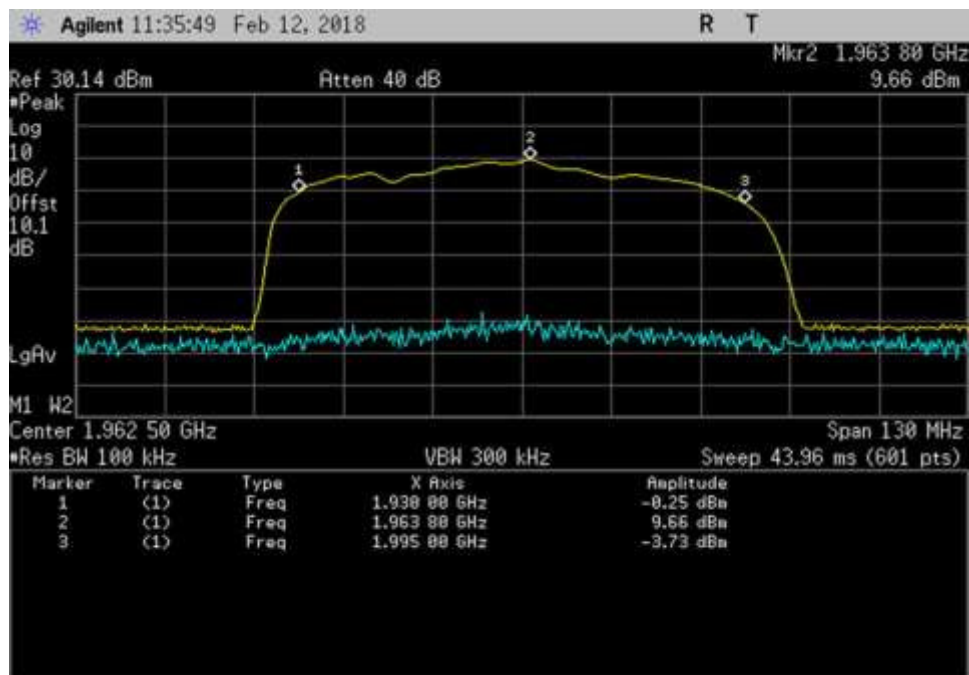
DL_728-746_ 728- 743.5MHz



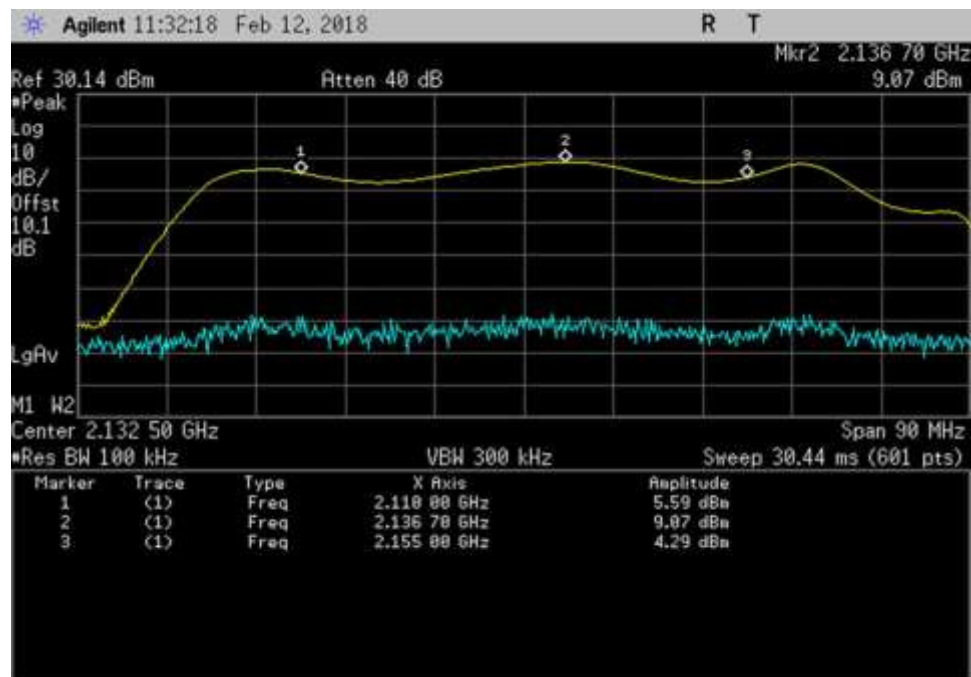
DL_746-757_ 746- 748.51MHz



DL_869-894_ 869- 881.5MHz



DL_1930-1995_ 1930- 1963.8MHz



DL_2110-2155_ 2110- 2136.7MHz

7.2 Maximum Power / 7.3 Maximum Gain

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 #: **100827** Date 02/16/18 and 02/19/18
 Test Type: **Conducted Emissions**
 Tested By: **Hieu Song Nguyenpham**
 Software: **EMITest 5.03.11**

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

02/16/18: Test environment conditions:

Temperature: 23.5°C

Relative Humidity: 46%

Pressure: 102.5 kPa

02/19/18: Test environment conditions:

Temperature: 19.8°C

Relative Humidity: 50%

Pressure: 101.5kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019

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	-45.9	23.1	69.0	-48.5	20.3	68.8
UL1850-1915	-45.9	23.2	69.1	-46.9	21.7	68.6
UL824-894	-39.6	20.5	60.1	-40.3	19.4	59.7
UL 698-716	-37.7	23.3	61.0	-38.7	21.7	60.5
UL776-787	-41.1	20.5	61.6	-40.7	20.9	61.6
DL2110-2155	-54.0	14.4	68.4	-54.3	15.4	69.7
DL1930-1995	-54.1	15.0	69.1	-54.7	16.4	71.1
DL869-894	-44.8	15.7	60.5	-45.2	16.4	61.6
DL728-746	-43.2	14.6	57.8	-42.6	15.8	58.4
DL746-757	-43.2	14.8	58.0	-42.3	16.1	58.4

Pulse GSM					Conducted	Conducted and EIRP
Frequency (MHz)	Output Power (dBm)	*Ant Gain (dBi)	Cable/Four Splitter loss (dB)	EIRP (dBm)	Limit Min (dBm)	Limit Max (dBm)
UL1710-1755	23.1	10.0	6.1	27.0	17	30
UL1850-1915	23.2	10.0	6.5	26.7	17	30
UL824-894	20.5	10.0	4.4	26.1	17	30
UL 698-716	23.3	10.0	4.2	29.1	17	30
UL776-787	20.5	10.0	4.2	26.3	17	30
DL2110-2155	14.4	10.0	10.2	14.2	NA	17
DL1930-1995	15.0	10.0	9.9	15.1	NA	17
DL869-894	15.7	7.0	8.3	14.4	NA	17
DL728-746	14.6	7.0	8.1	13.5	NA	17
DL746-757	14.8	7.0	8.1	13.7	NA	17

4.1MHz AWGN					Conducted	Conducted and EIRP
Frequency (MHz)	Output Power (dBm)	*Ant Gain (dBi)	Cable/Four Splitter loss (dB)	EIRP (dBm)	Limit Min (dBm)	Limit Max (dBm)
UL1710-1755	20.3	10.0	6.1	24.2	17	30
UL1850-1915	21.7	10.0	6.5	25.2	17	30
UL824-894	19.4	10.0	4.4	25.0	17	30
UL 698-716	21.7	10.0	4.2	27.5	17	30
UL776-787	20.9	10.0	4.2	26.7	17	30
DL2110-2155	15.4	10.0	10.2	15.2	NA	17
DL1930-1995	16.4	10.0	9.9	16.5	NA	17
DL869-894	16.4	7.0	8.3	15.1	NA	17
DL728-746	15.8	7.0	8.1	14.7	NA	17
DL746-756	16.1	7.0	8.1	15.0	NA	17

* Antenna gain and cable losses indicated from the antenna kitting Fusion5s 2.1 kit

UL SC230W, SC240-40FN

DL SC248W, SC400-50NN, SC-WS-2 and SC400-20NN

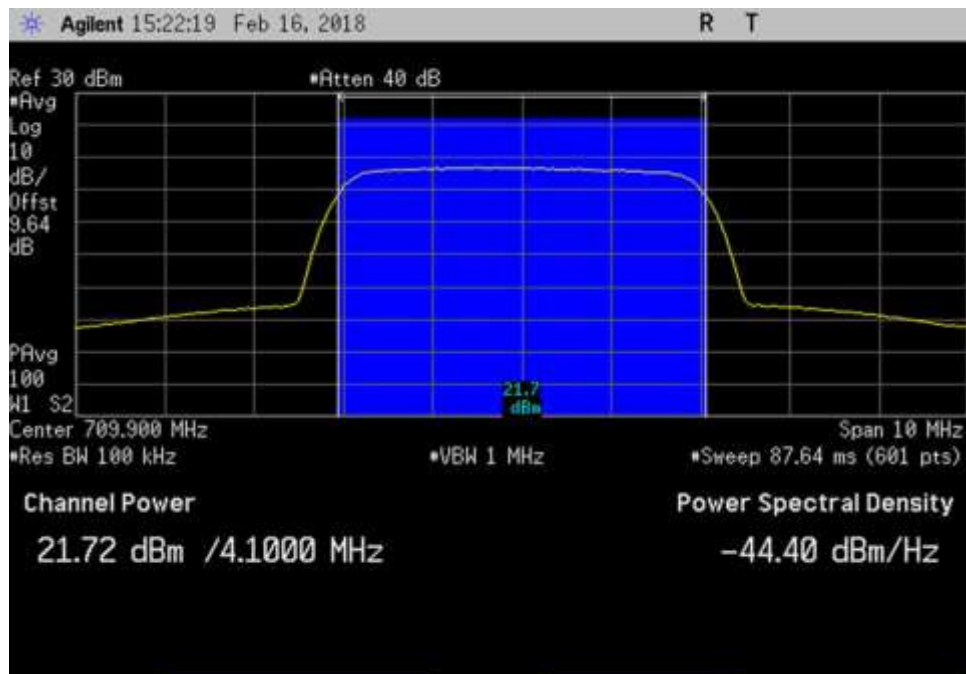
Section 5.5 power						
Frequency (MHz)	Pulse GSM			4.1 MHz AWGN		
	Input (dBm)	Output (dBm)	Gain (dB)	Input (dBm)	Output (dBm)	Gain (dB)
UL1710-1755	-0.7	22.6	23.3	-0.7	20.4	21.0
UL1850-1915	-0.7	23.0	23.7	-0.7	21.4	22.1
UL824-894	-0.3	20.0	20.3	-0.3	19.0	19.3
UL 698-716	-0.3	22.5	22.8	-0.3	21.0	21.4
UL776-787	-0.3	20.5	20.8	-0.3	20.3	20.6
DL2110-2155	-20.7	14.5	35.2	-20.7	15.0	35.7
DL1930-1995	-20.7	14.3	35.0	-20.7	16.0	36.7
DL869-894	-20.4	15.1	35.5	-20.4	16.0	36.4
DL728-746	-20.4	14.3	34.7	-20.4	15.1	35.5
DL746-756	-20.4	14.2	34.6	-20.4	15.7	36.1

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.

UL gain vs DL gain	Pulse GSM (dB)	4.1MHz AWGN (dB)	Limit (dB)
UL gain vs DL gain 1710/2110	0.6	-0.9	9.0
UL gain vs DL gain 1850/1930	0.0	-2.5	9.0
UL gain vs DL gain 824/869	-0.4	-1.9	9.0
UL gain vs DL gain 776/728	3.2	2.0	9.0
UL gain vs DL gain 776/746	3.6	3.2	9.0

Plots

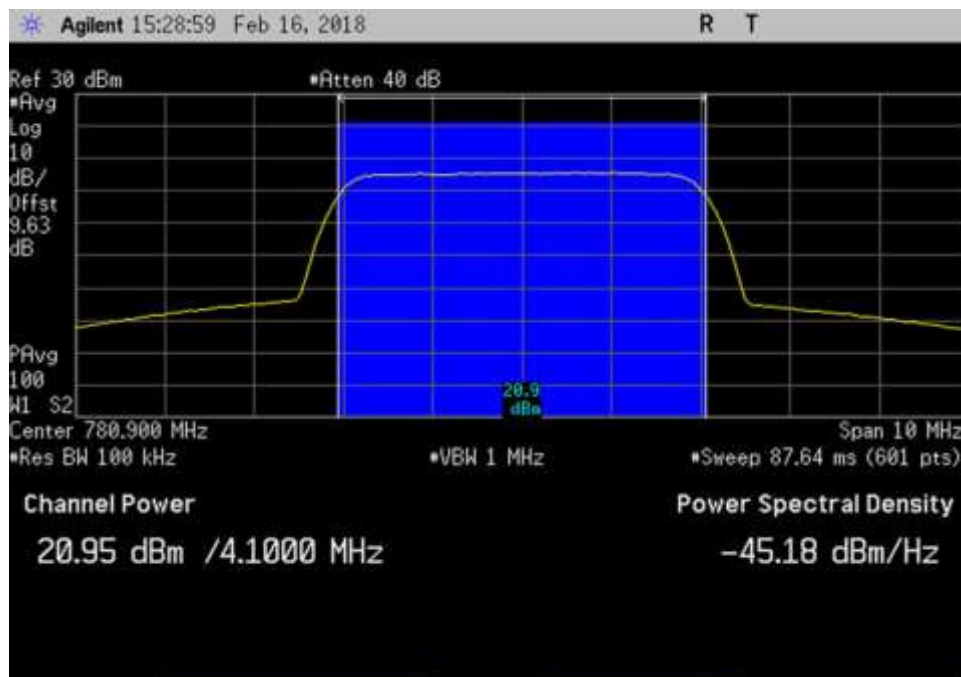
AWGN



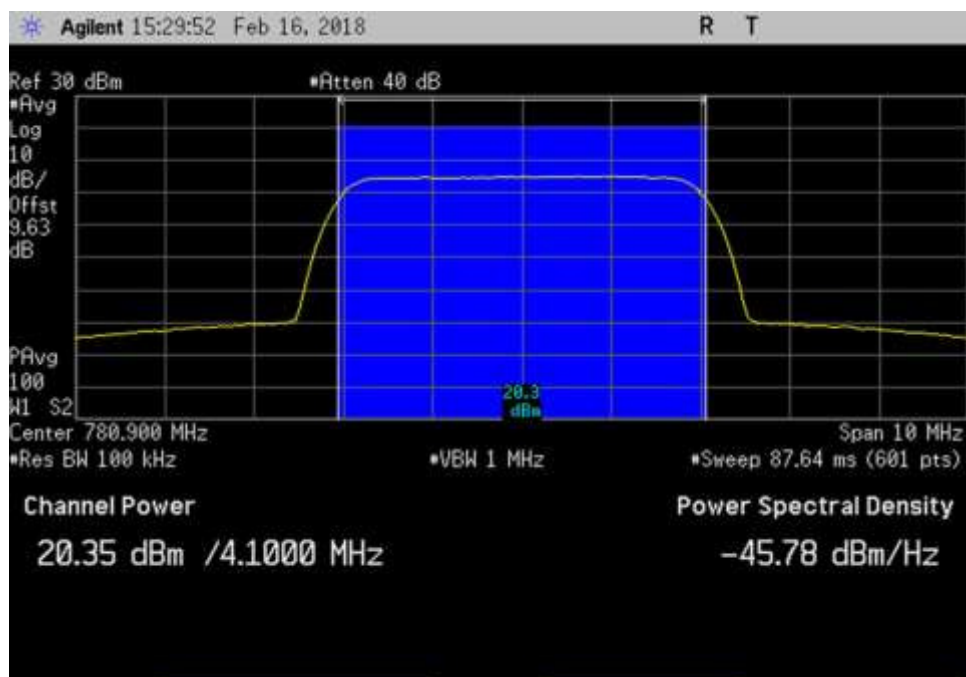
UL_698-716_AWGN_709.9MHz



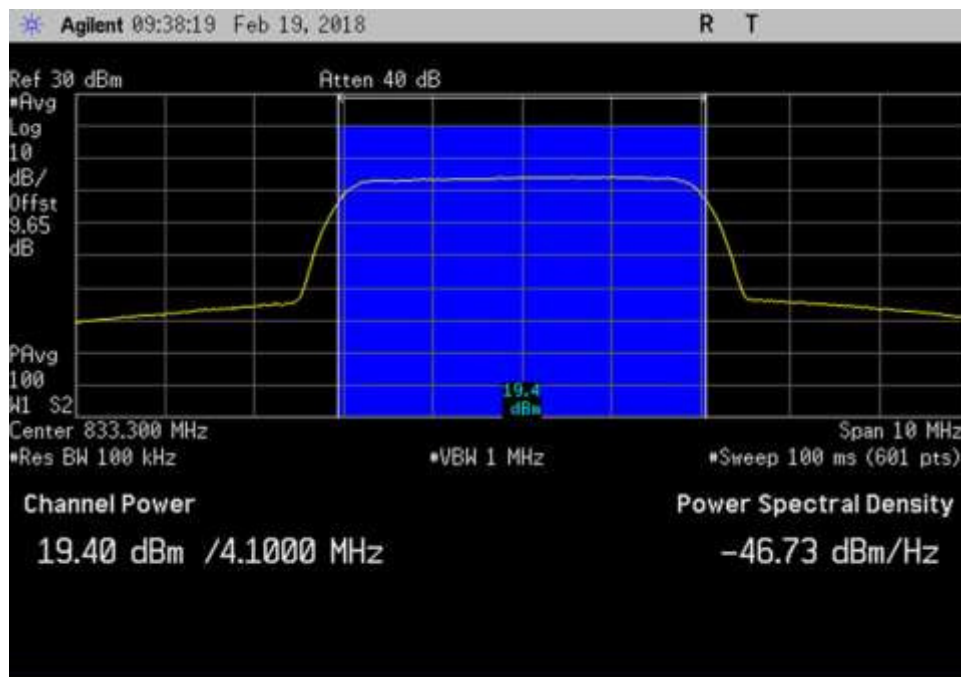
UL_698-716_AWGN_Max_709.9MHz



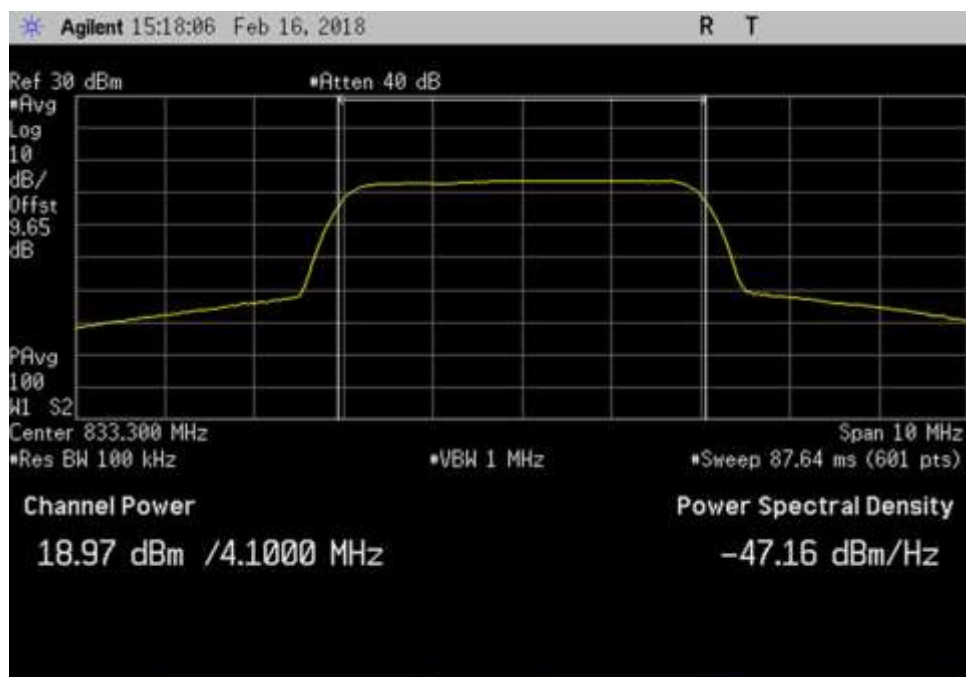
UL_776-787_AWGN_780.9MHz



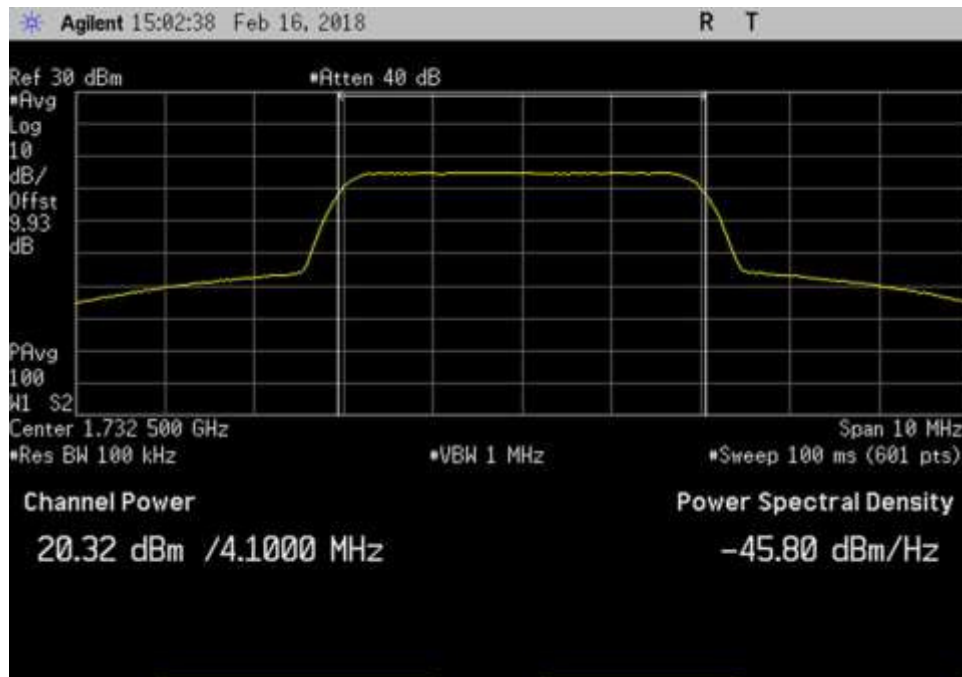
UL_776-787_AWGN_Max_780.9MHz



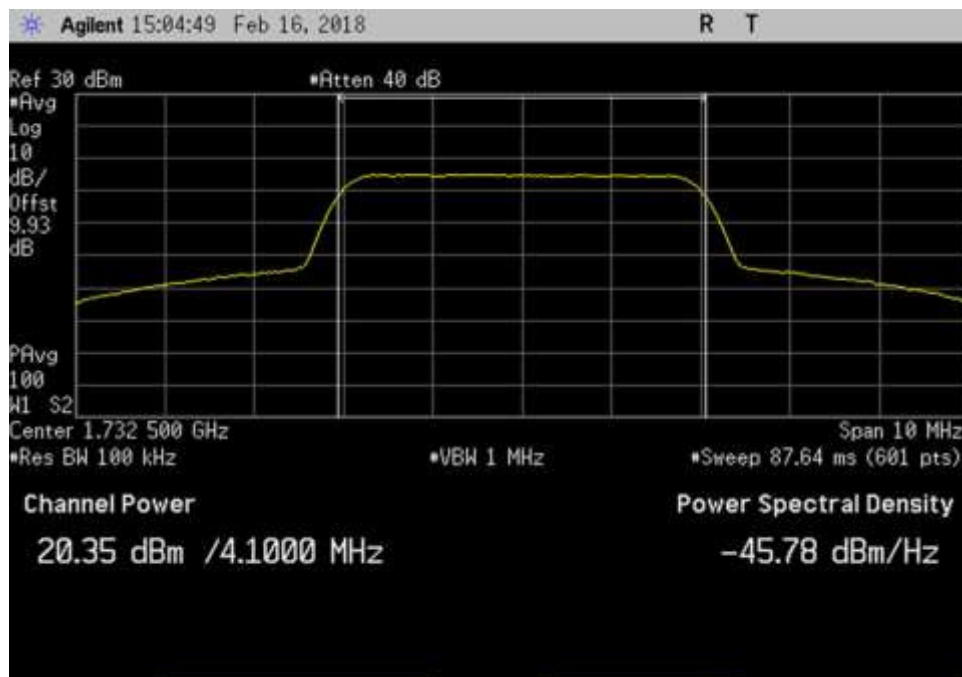
UL_824-849_AWGN_ 833.3MHz



UL_824-849_AWGN_Max_ 833.3MHz



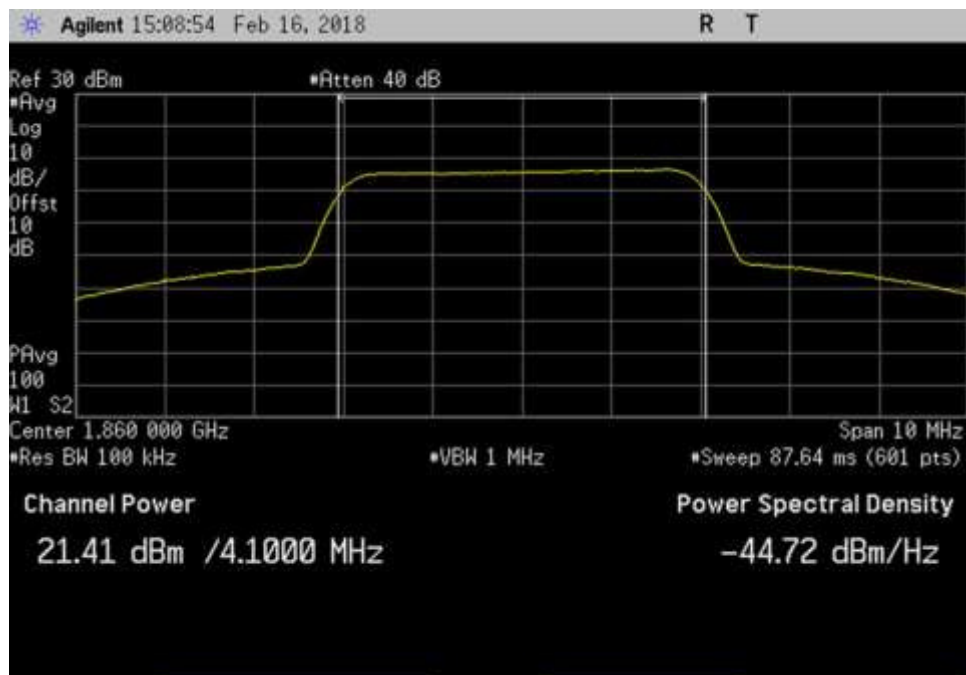
UL_1710-1755_AWGN_ 1732.5MHz



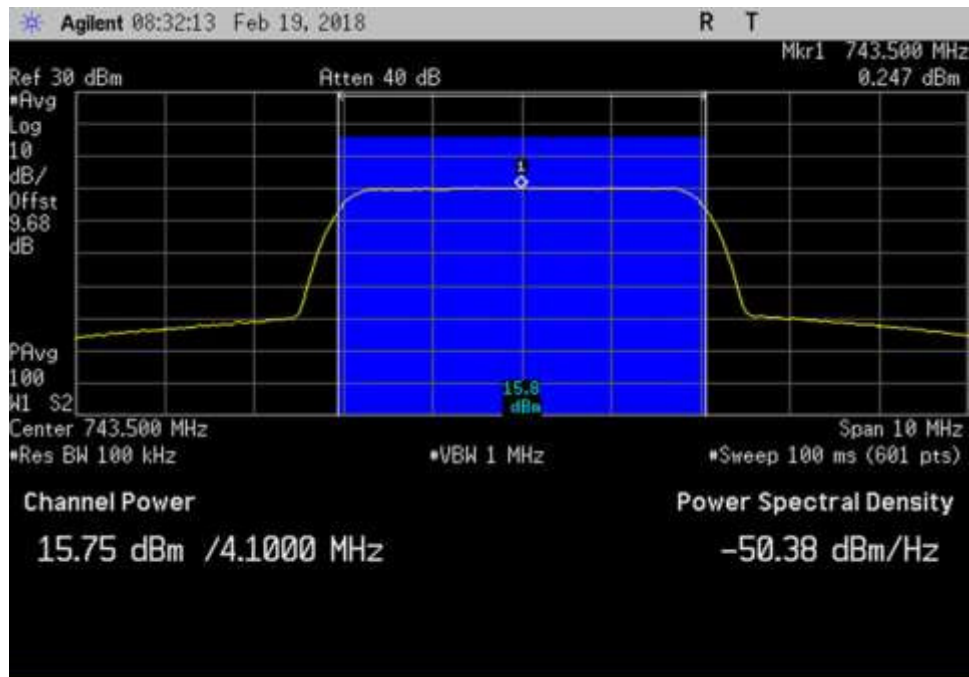
UL_1710-1755_AWGN_Max_ 1732.5MHz



UL_1850-1915_AWGN_ 1860MHz



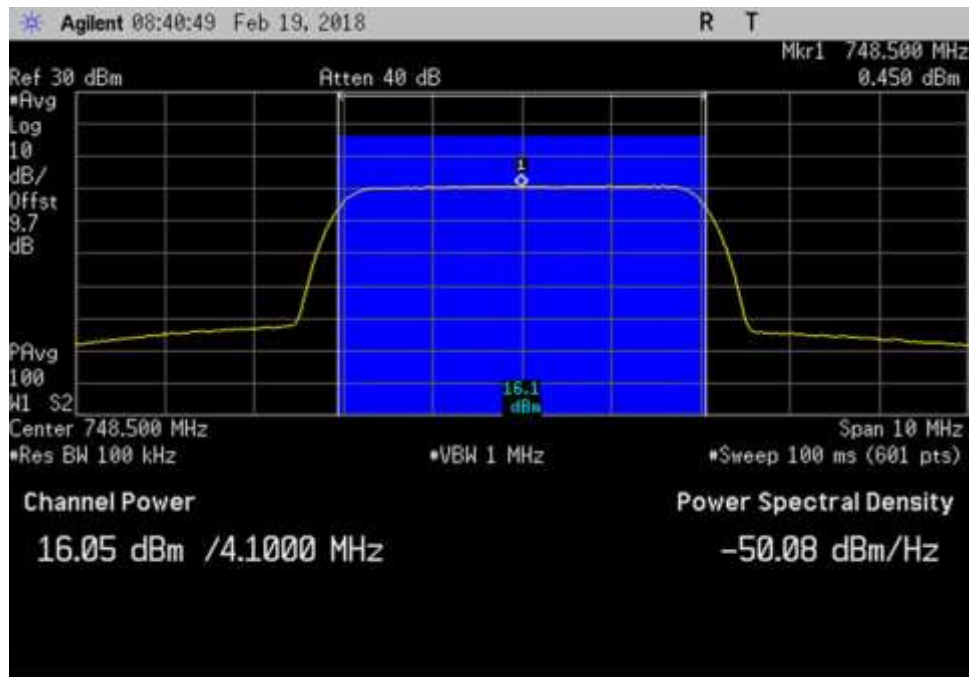
UL_1850-1915_AWGN_Max_ 1860MHz



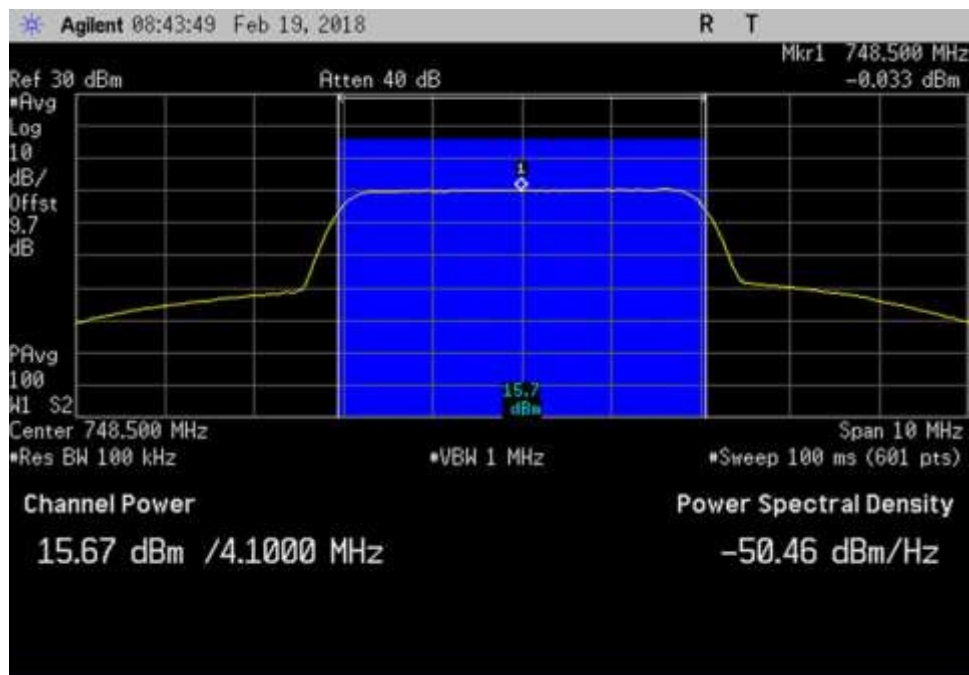
DL_728-746_AWGN_743.5MHz



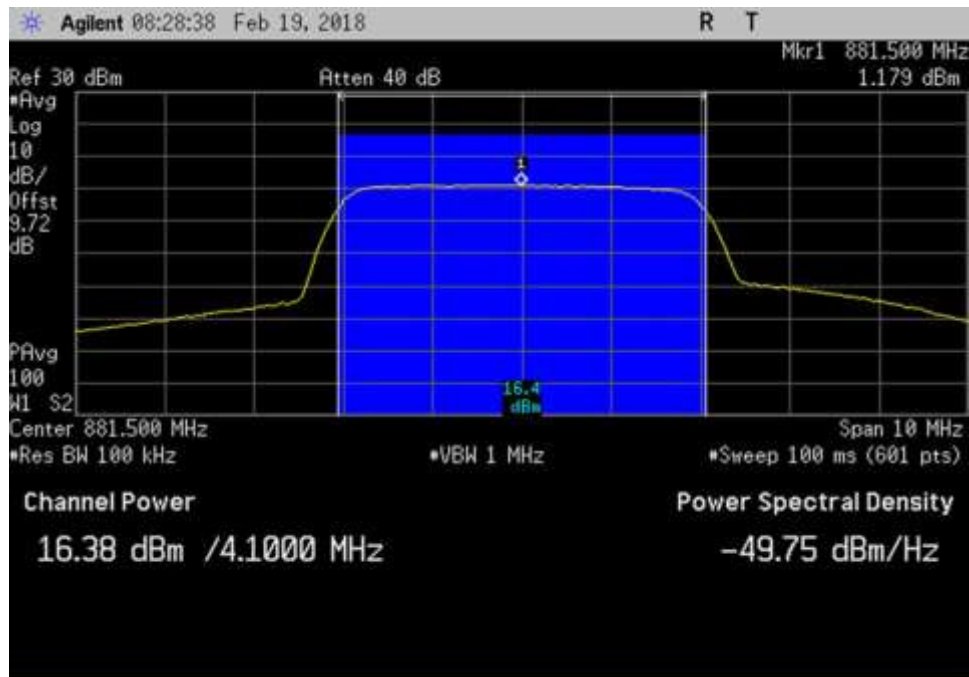
DL_728-746_AWGN_Max_743.5MHz



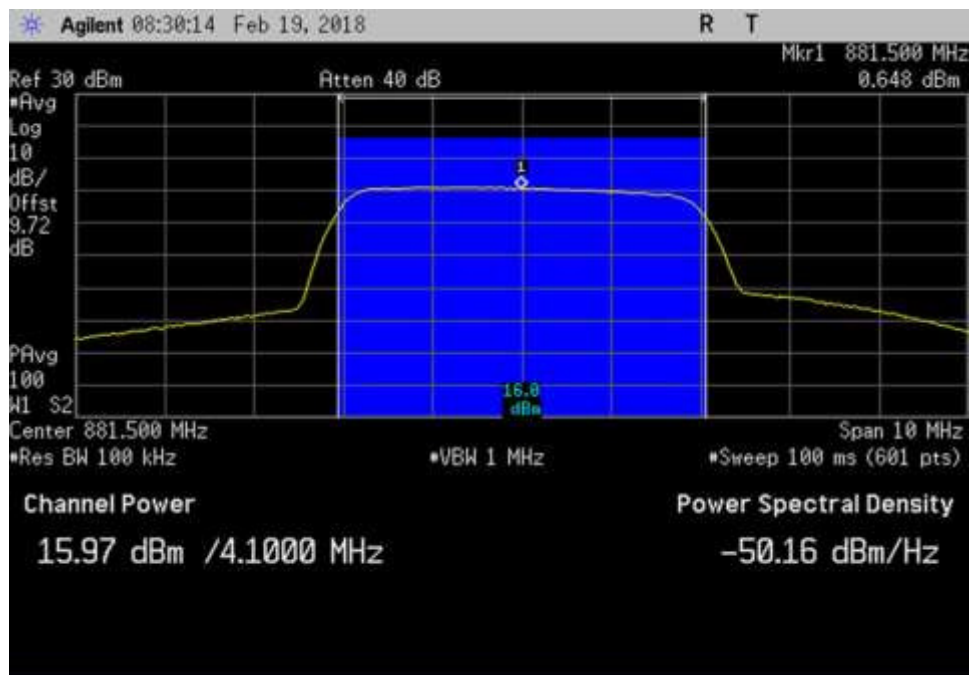
DL_746-757_AWGN_748.5MHz



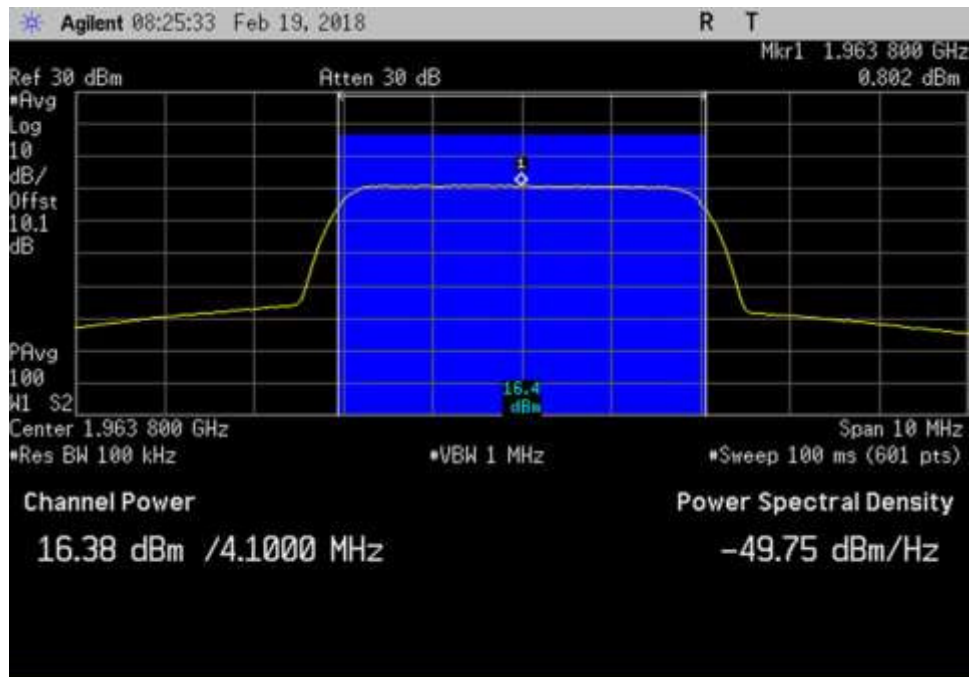
DL_746-757_AWGN_Max_748.5MHz



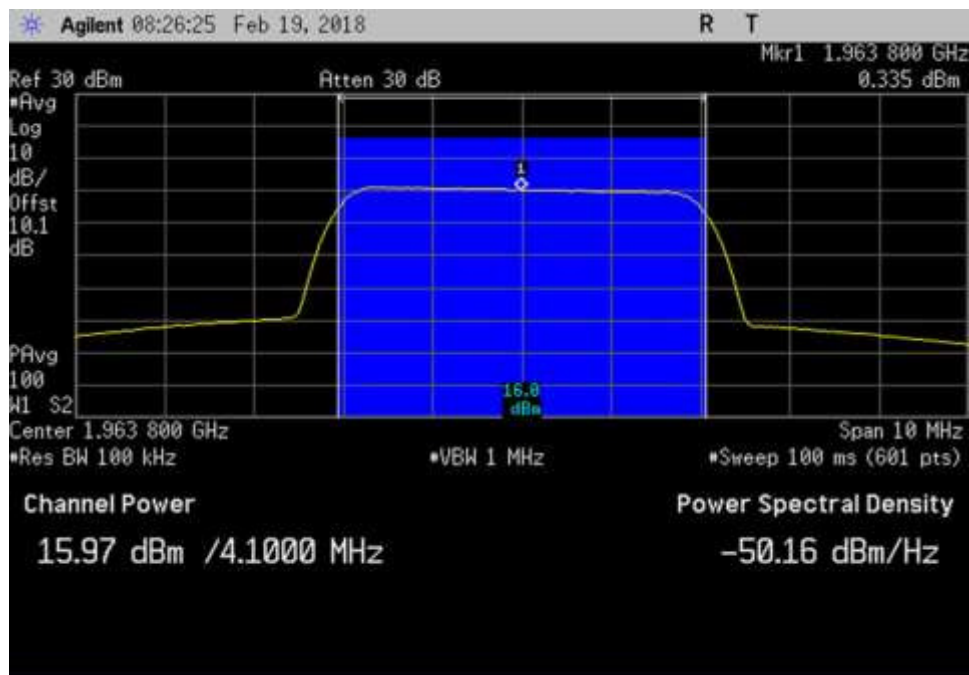
DL_869-894_AWGN_ 881.5MHz



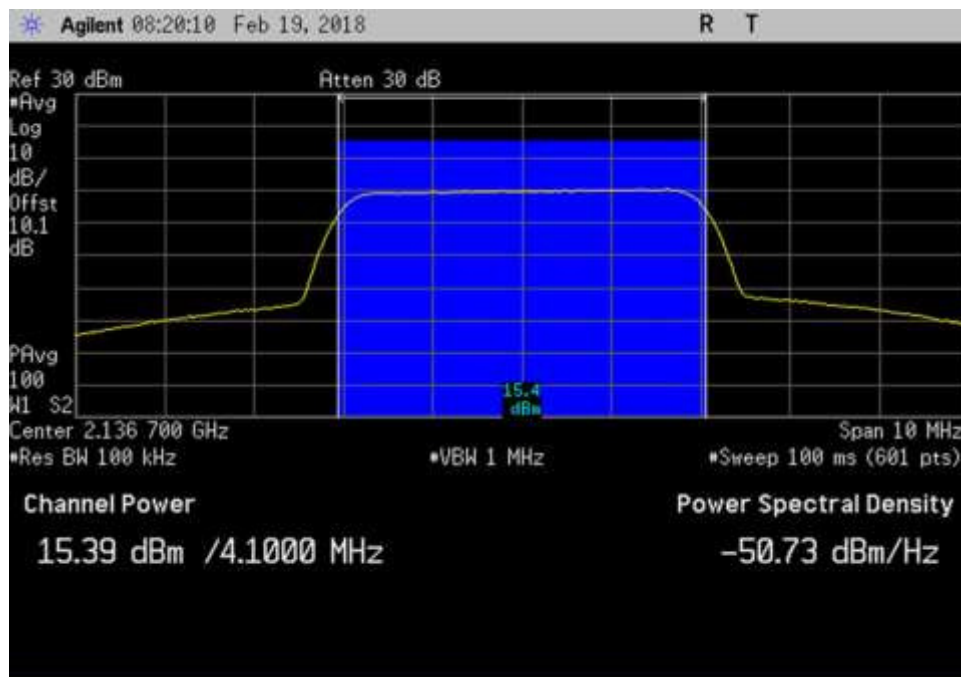
DL_869-894_AWGN_Max_ 881.5MHz



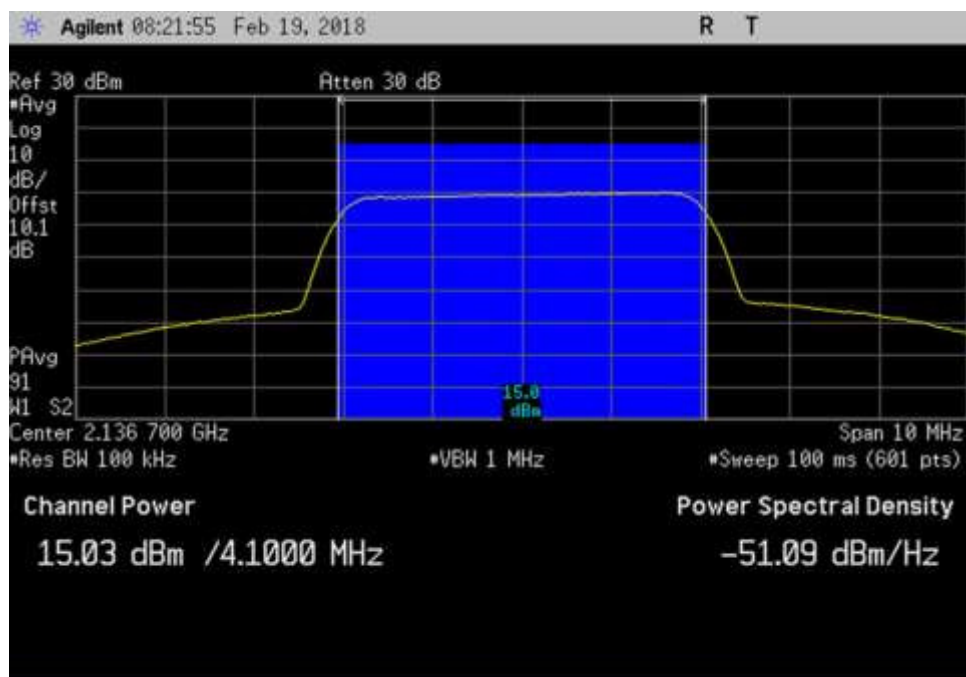
DL_1930-1995_AWGN_1963.8MHz



DL_1930-1995_AWGN_Max_1963.8MHz

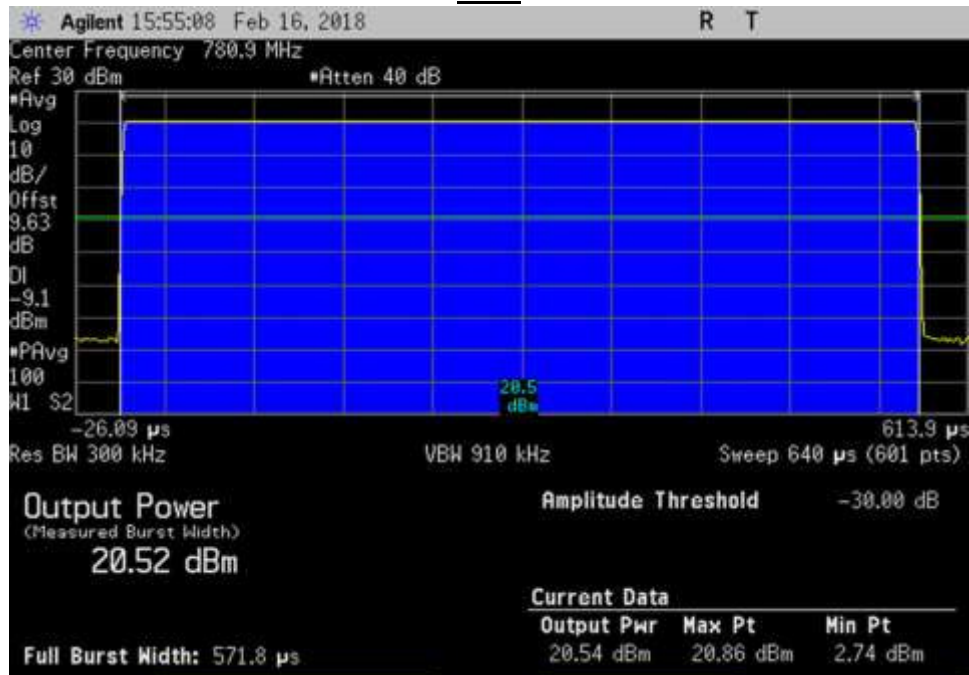


DL_2110-2155_AWGN_ 2136.7MHz

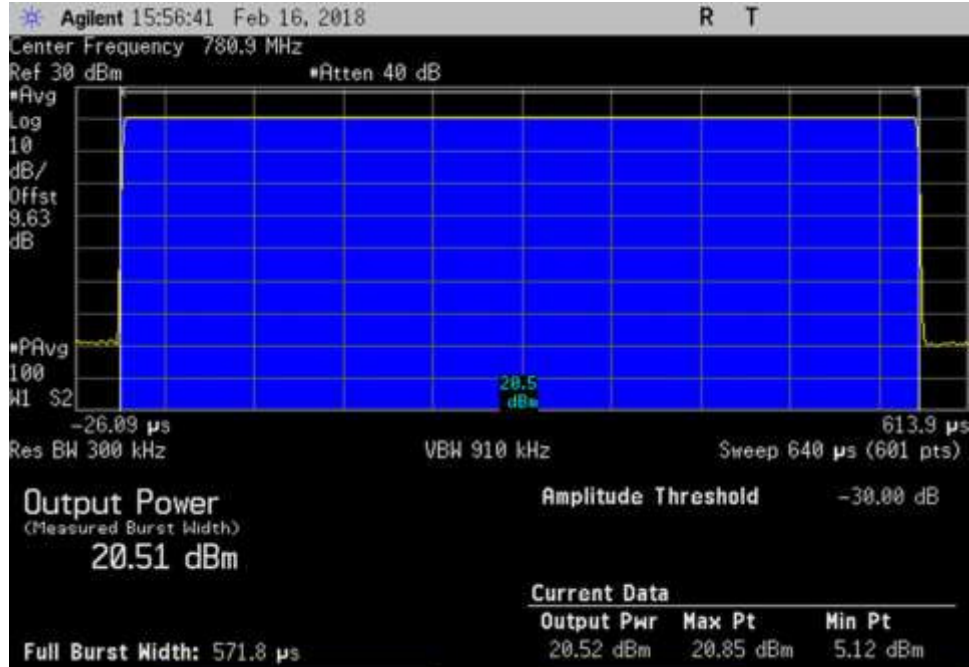


DL_2110-2155_AWGN_Max_ 2136.7MHz

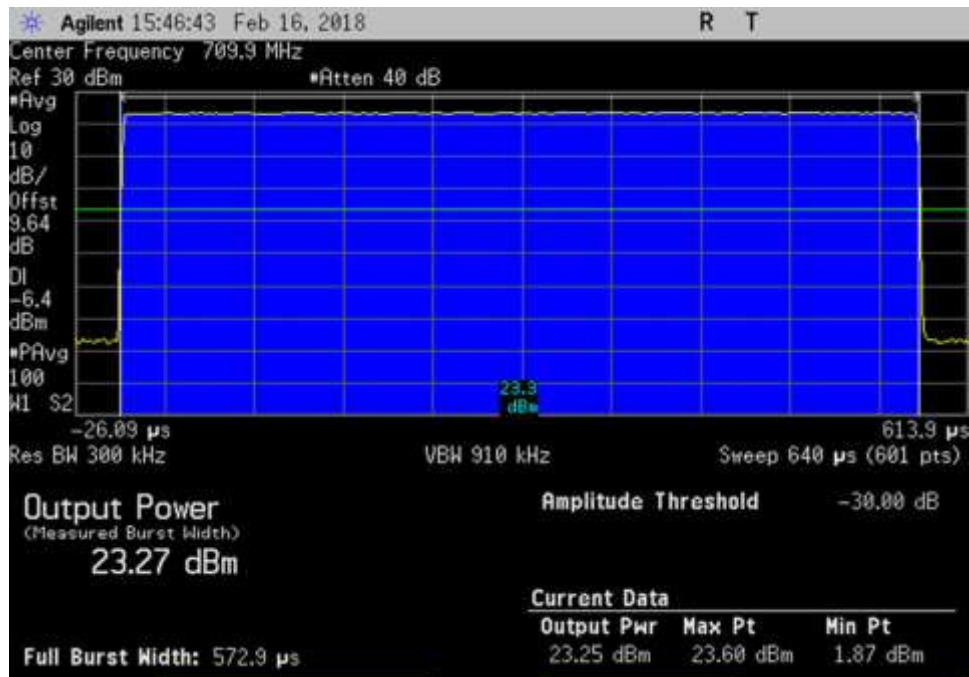
GSM



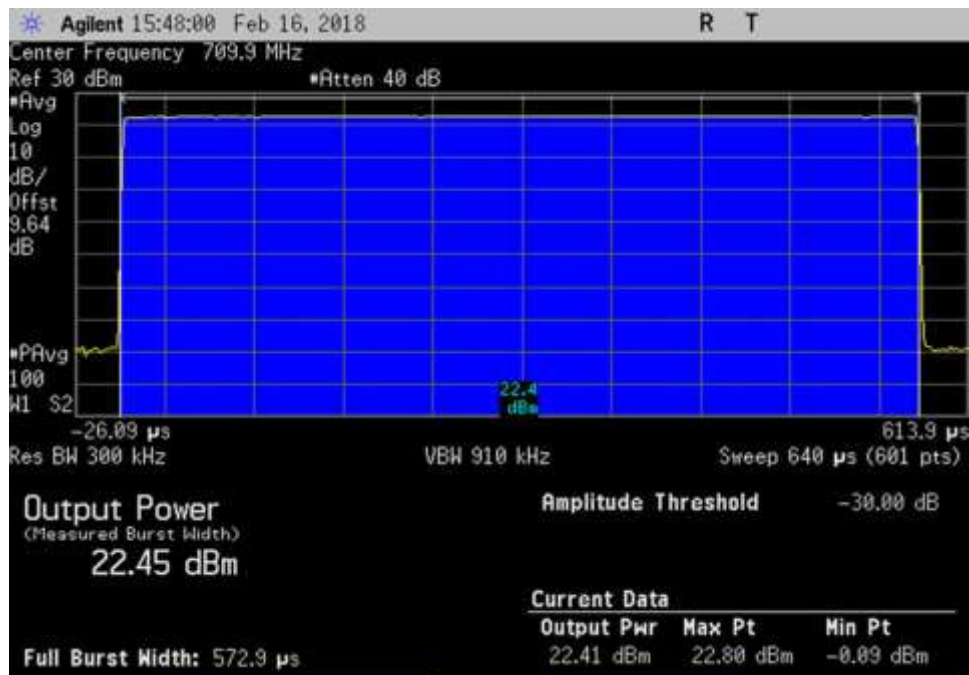
UL_698-716_GSM_ 709.9MHz



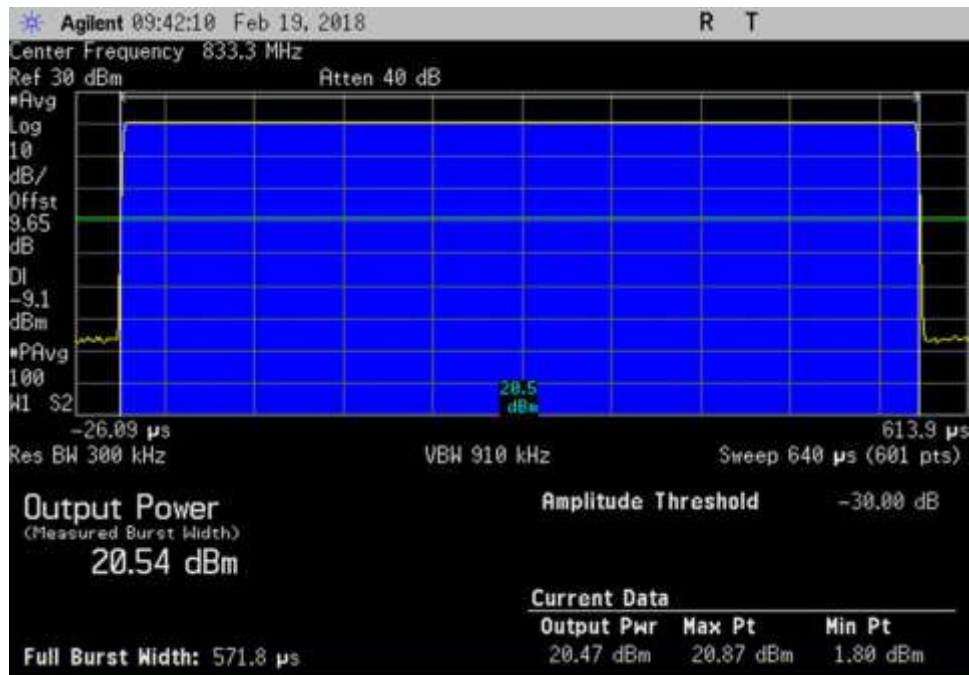
UL_698-716_GSM_Max_ 709.9MHz



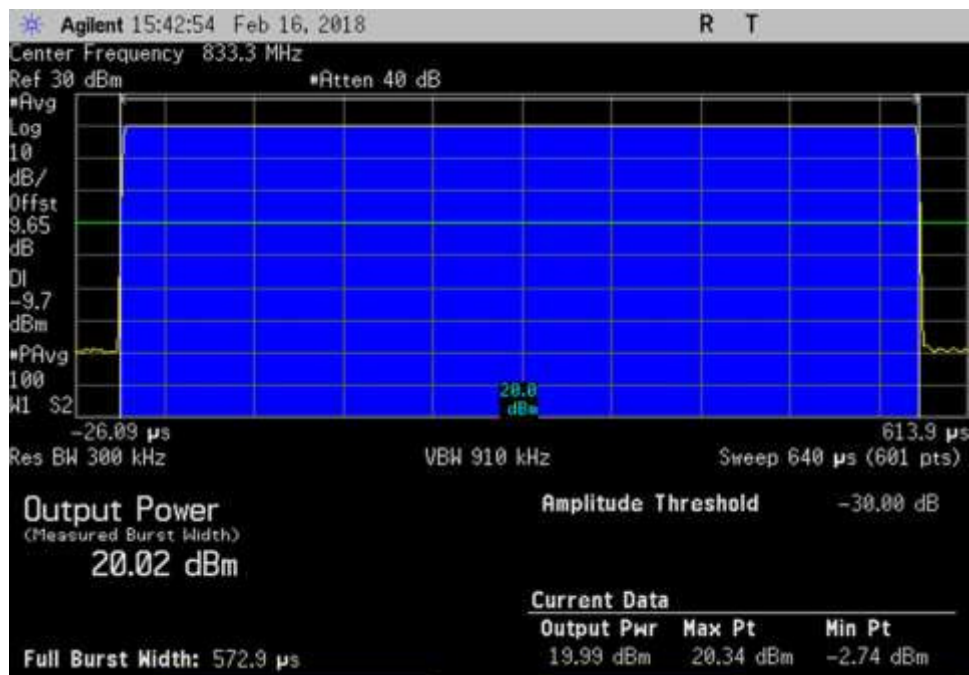
UL_776-787_GSM_ 780.9MHz



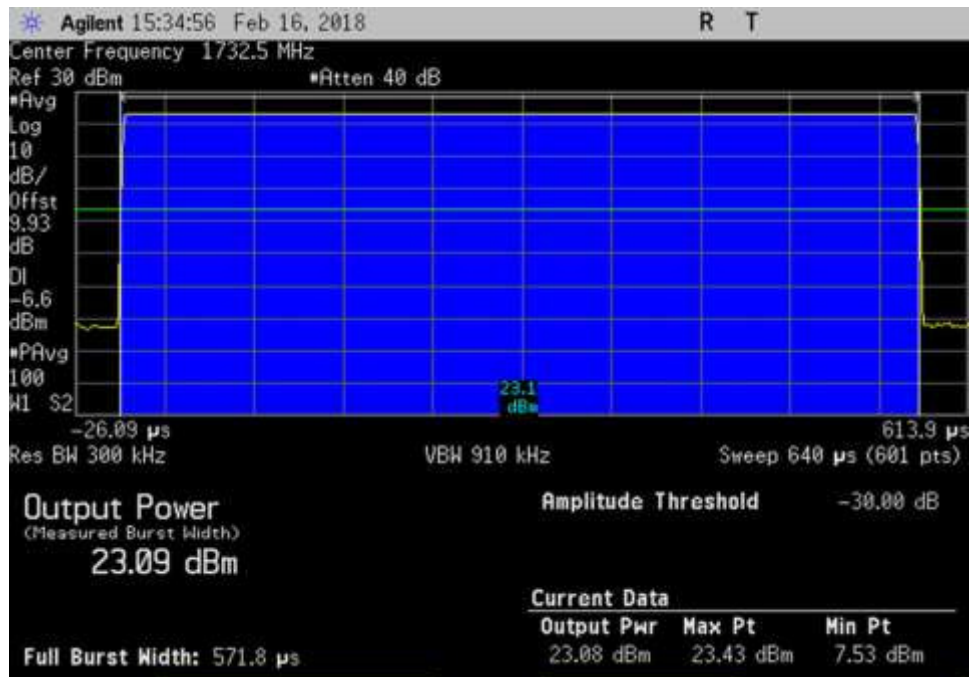
UL_776-787_GSM_Max_ 780.9MHz



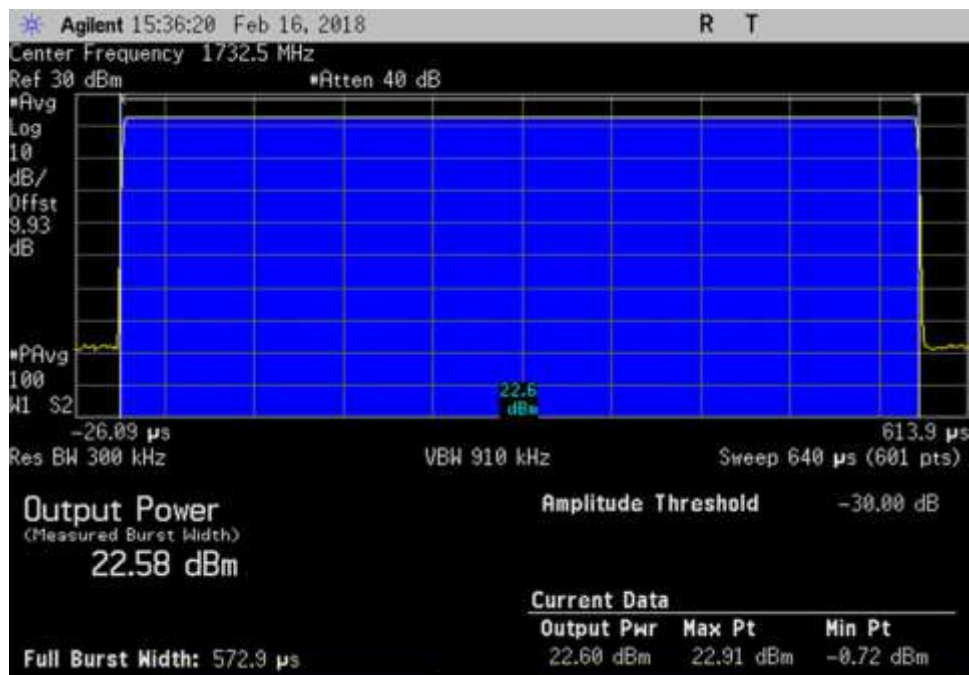
UL_824-849_GSM_ 833.3MHz



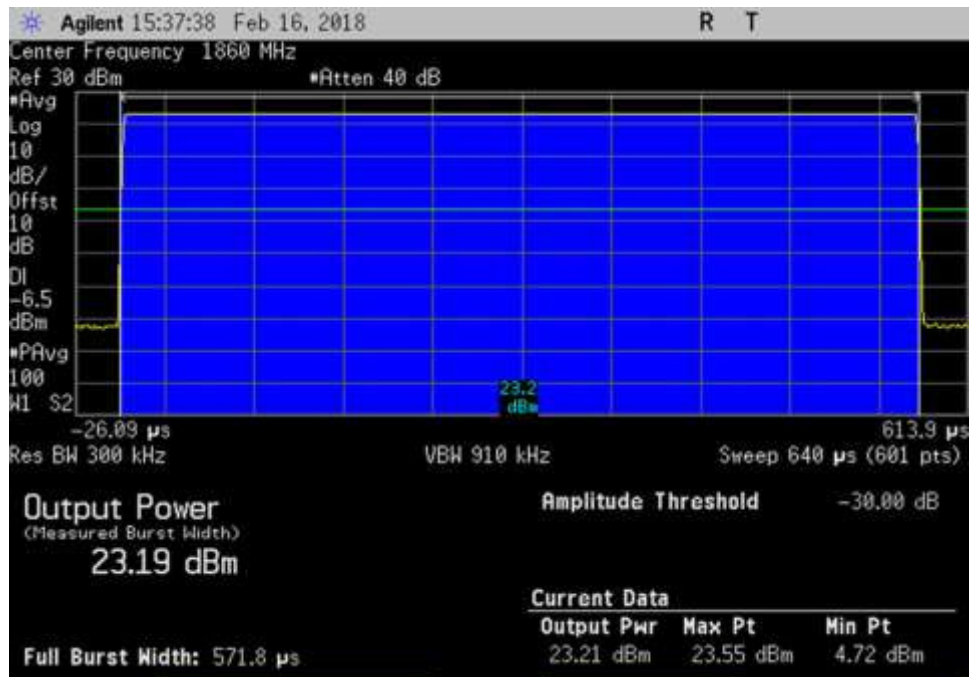
UL_824-849_GSM_Max_ 833.3MHz



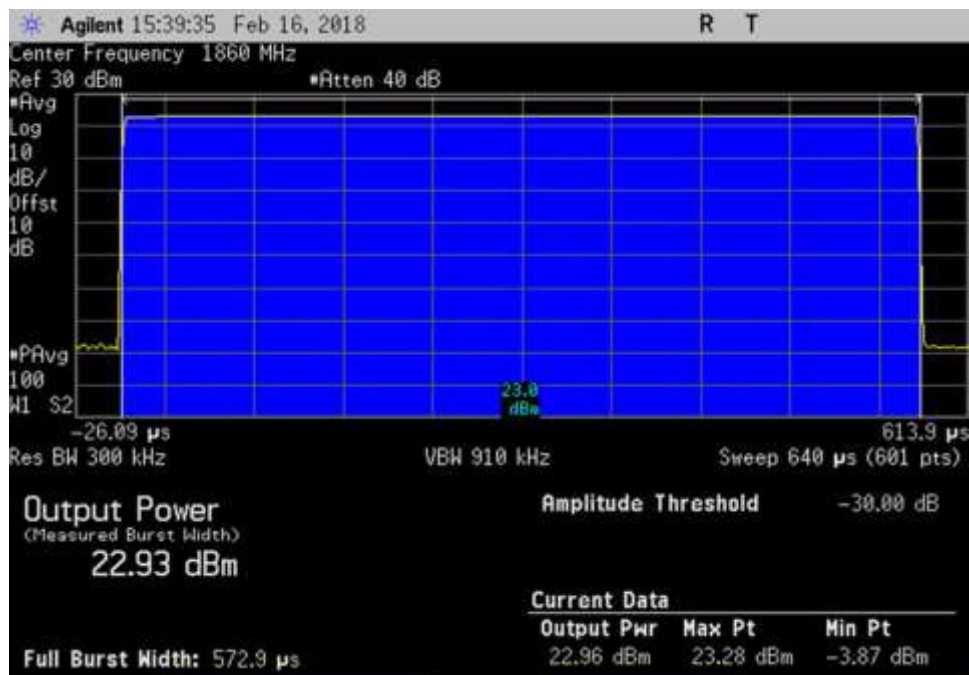
UL_1710-1755_GSM_ 1732.5MHz



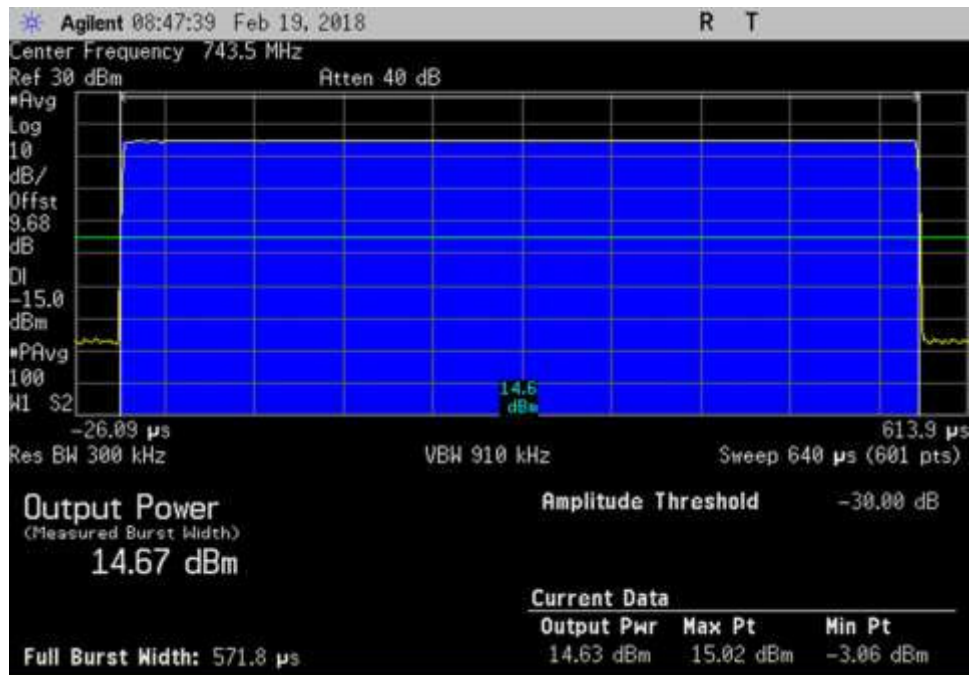
UL_1710-1755_GSM_Max_ 1732.5MHz



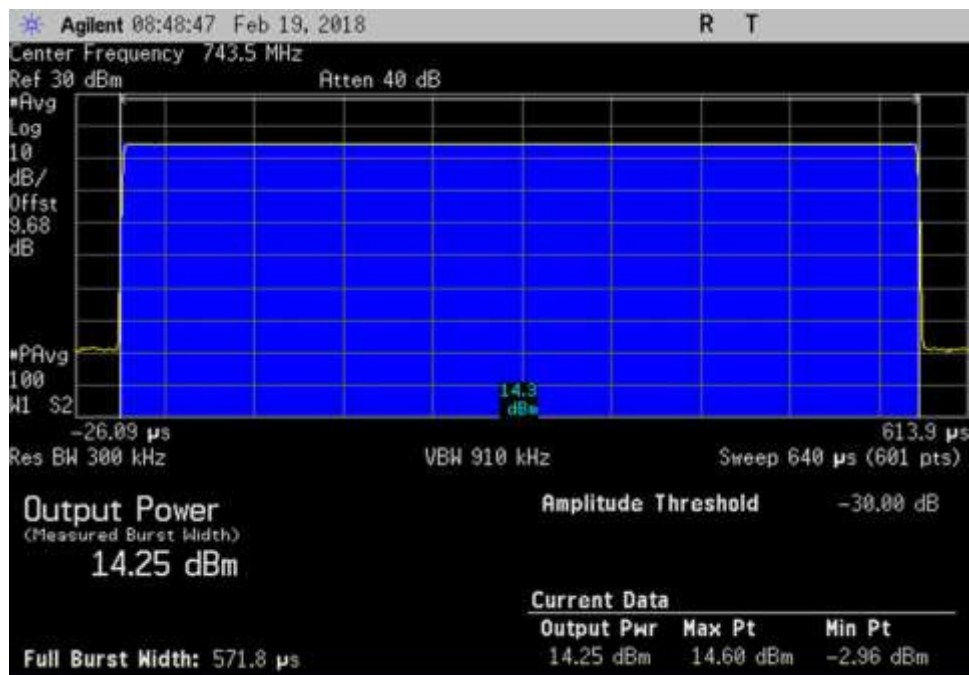
UL_1850-1915_GSM_1860MHz



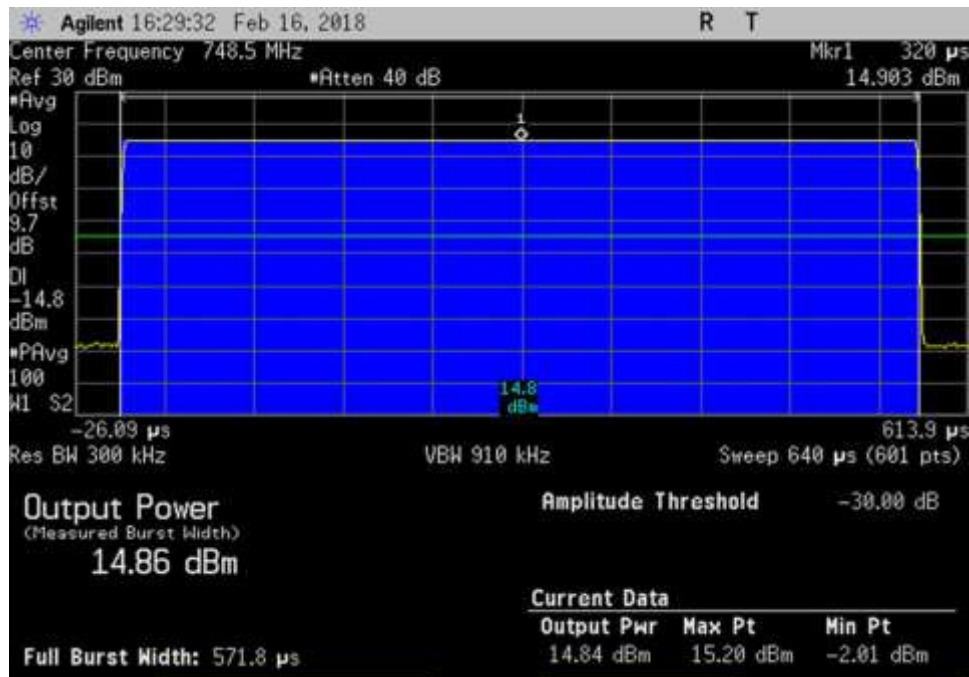
UL_1850-1915_GSM_Max_1860MHz



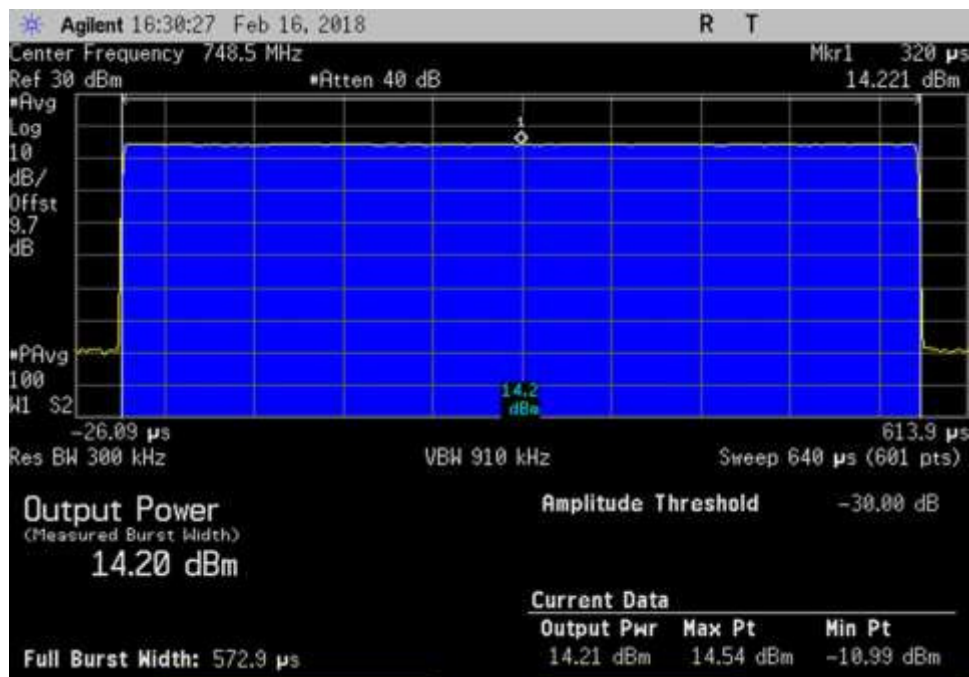
DL_728-746_GSM_ 743.5MHz



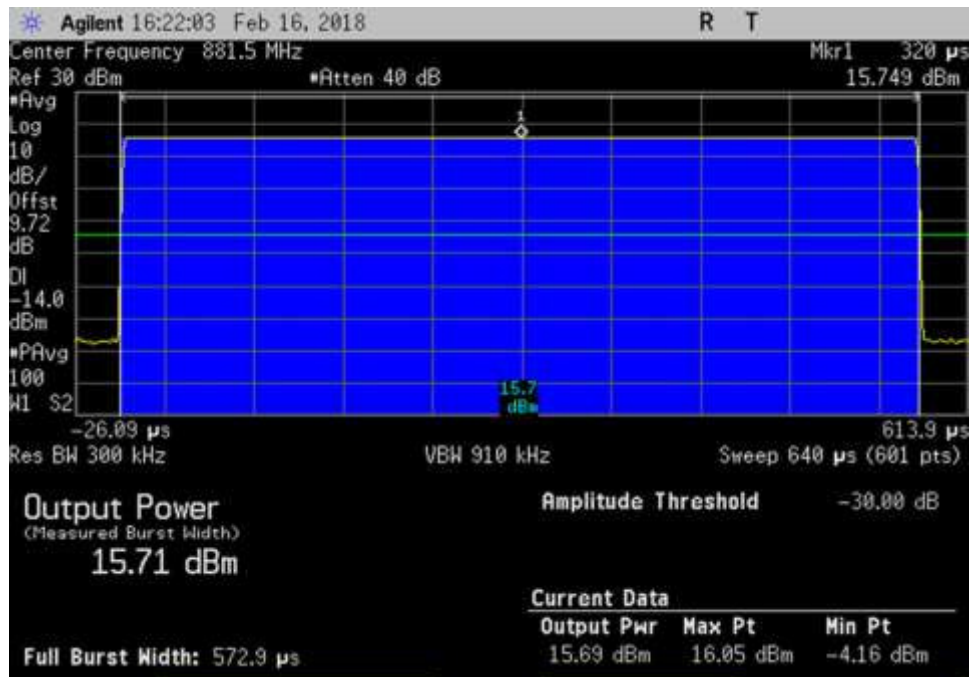
DL_728-746_GSM_Max_ 743.5MHz



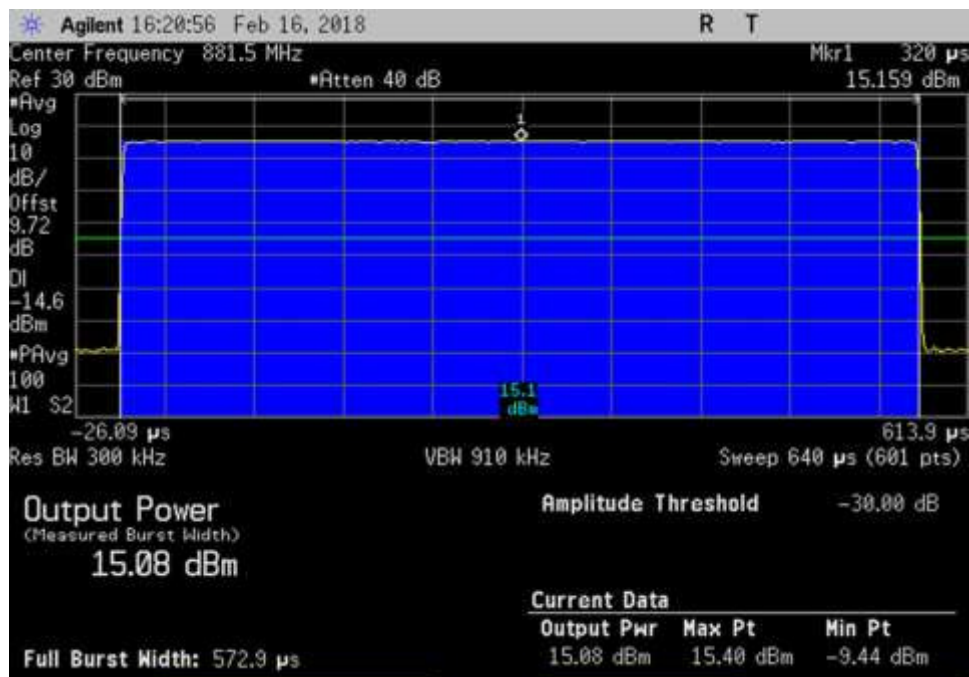
DL_746-757_GSM_ 748.5MHz



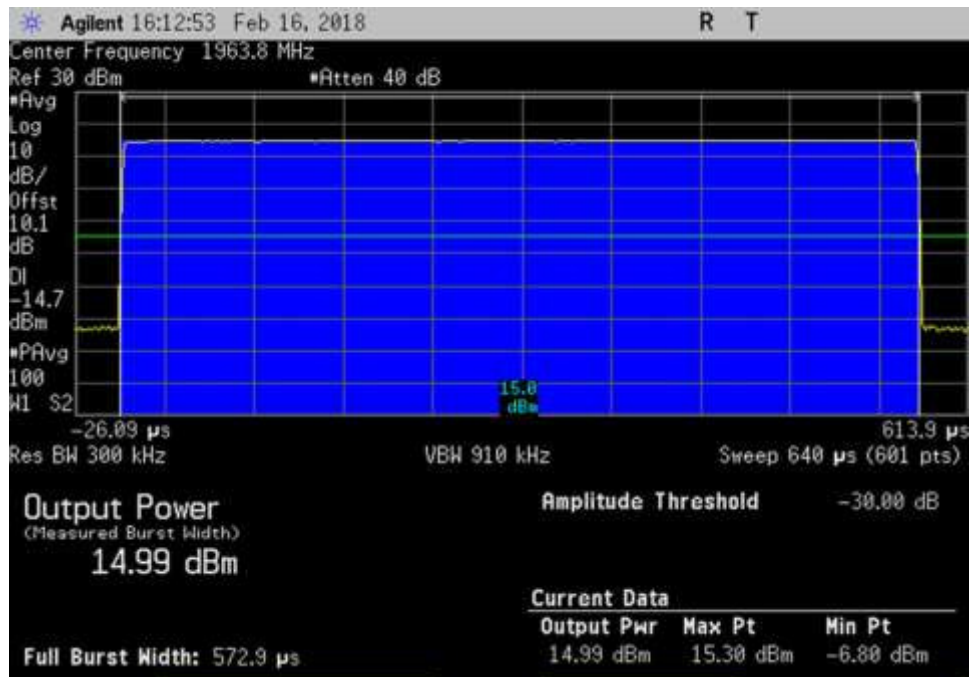
DL_746-757_GSM_Max_ 748.5MHz



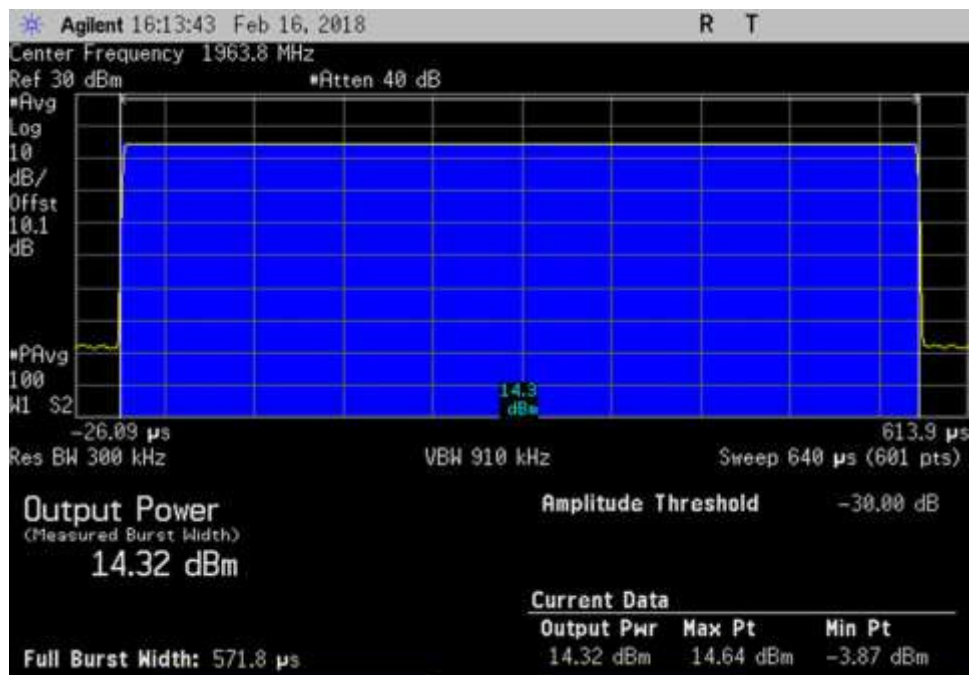
DL_869-894_GSM_ 881.5MHz



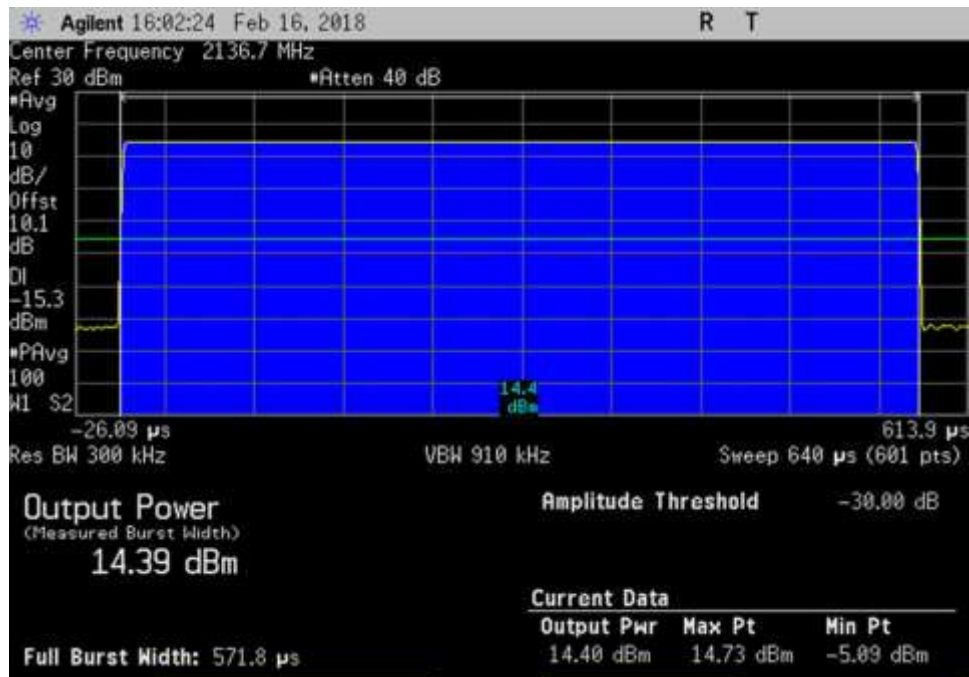
DL_869-894_GSM_Max_ 881.5MHz



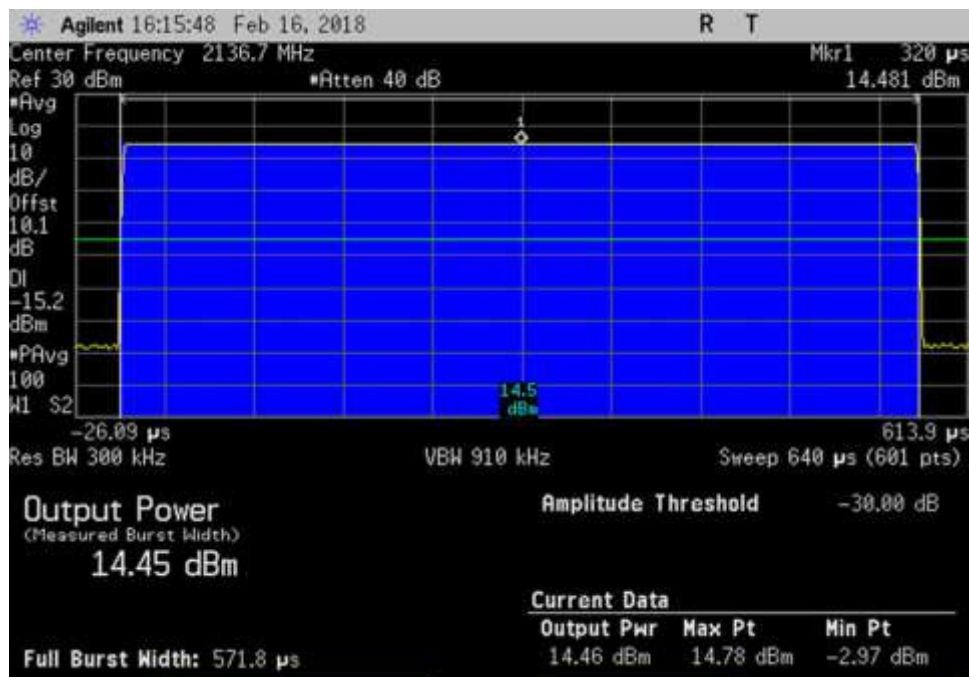
DL_1930-1995_GSM_1963.8MHz



DL_1930-1995_GSM_Max_1963.8MHz



DL_2110-2155_GSM_ 2136.7MHz



DL_2110-2155_GSM_Max_ 2136.7MHz

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 #: **100827** Date 02/14/18
 Test Type: **Conducted Emissions**
 Tested By: **Hieu S. Nguyenpham**
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
 Temperature: 19.3°C
 Relative Humidity: 44%
 Pressure: 101.5 kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019

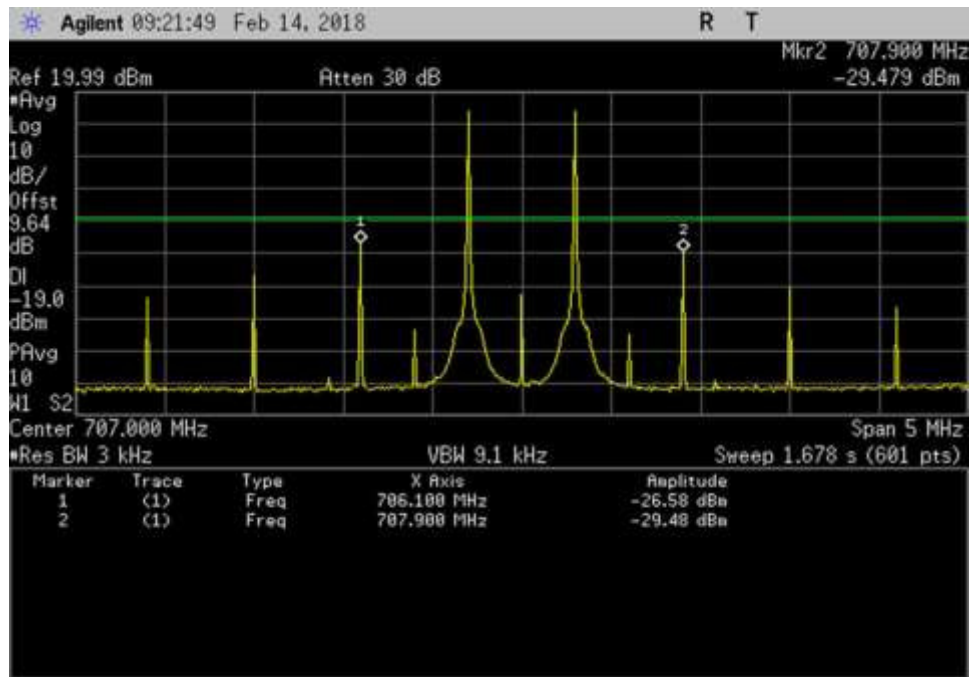
Summary of Results

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

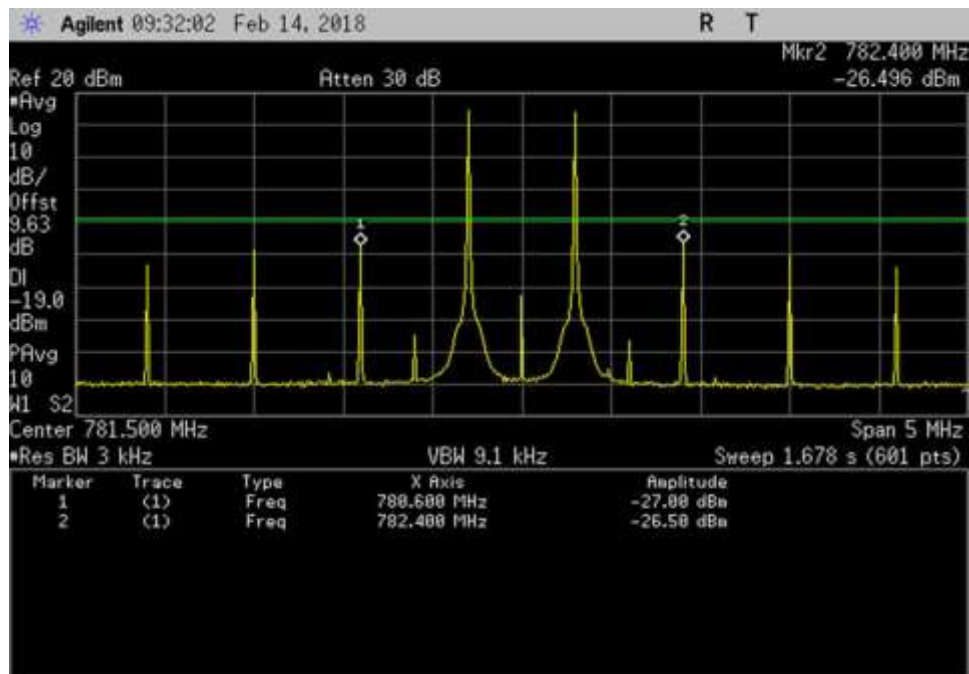
Inter Modulation Product			
Frequency (MHz)	Pre AGC (dBm)	Limit (dBm)	Results
UL 1710-1755	-31.9	-19	Pass
UL 1850-1915	-26.5	-19	Pass
UL 824-894	-24.2	-19	Pass
UL 698-716	-26.6	-19	Pass
UL 776-787	-26.5	-19	Pass
DL 2110-2155	-30.2	-19	Pass
DL 1930-1995	-28.9	-19	Pass
DL 869-894	-26.1	-19	Pass
DL 728-746	-33.7	-19	Pass
DL 746-757	-30.7	-19	Pass

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

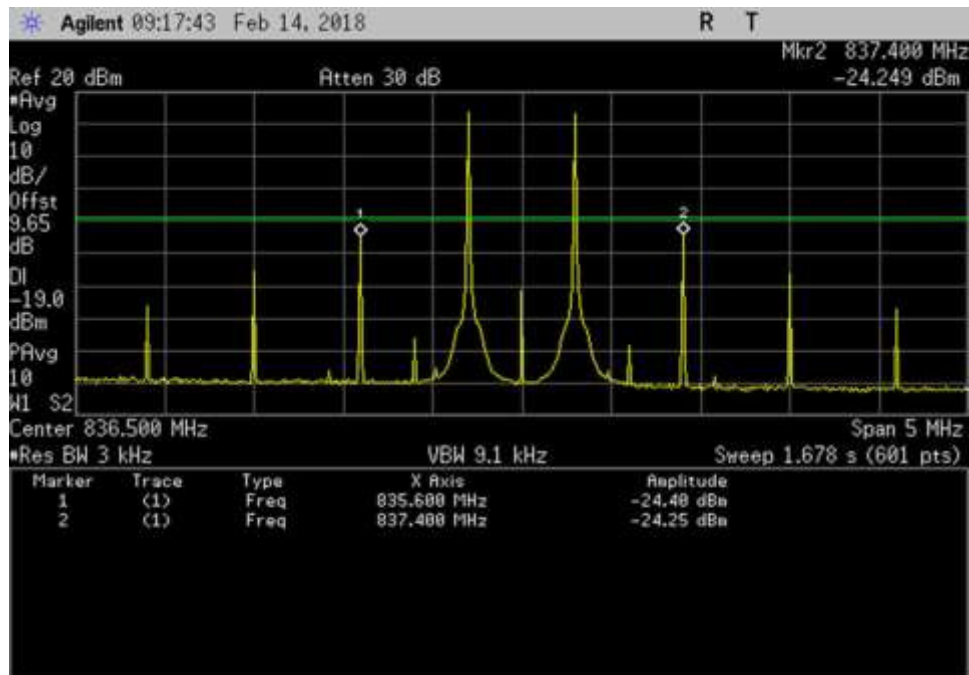
Plots



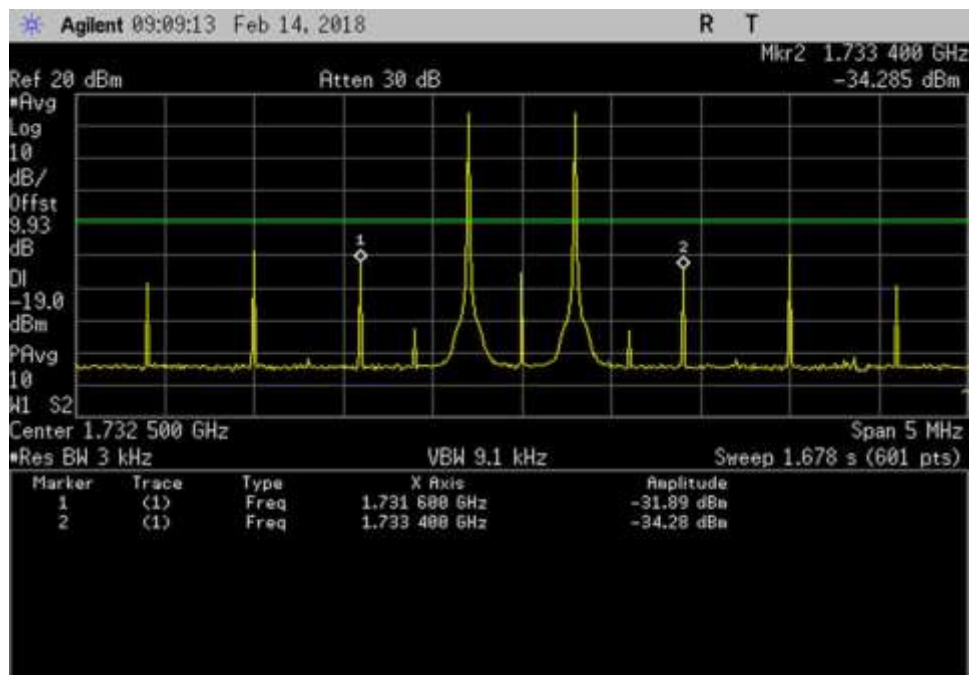
UL_698-716_707MHz



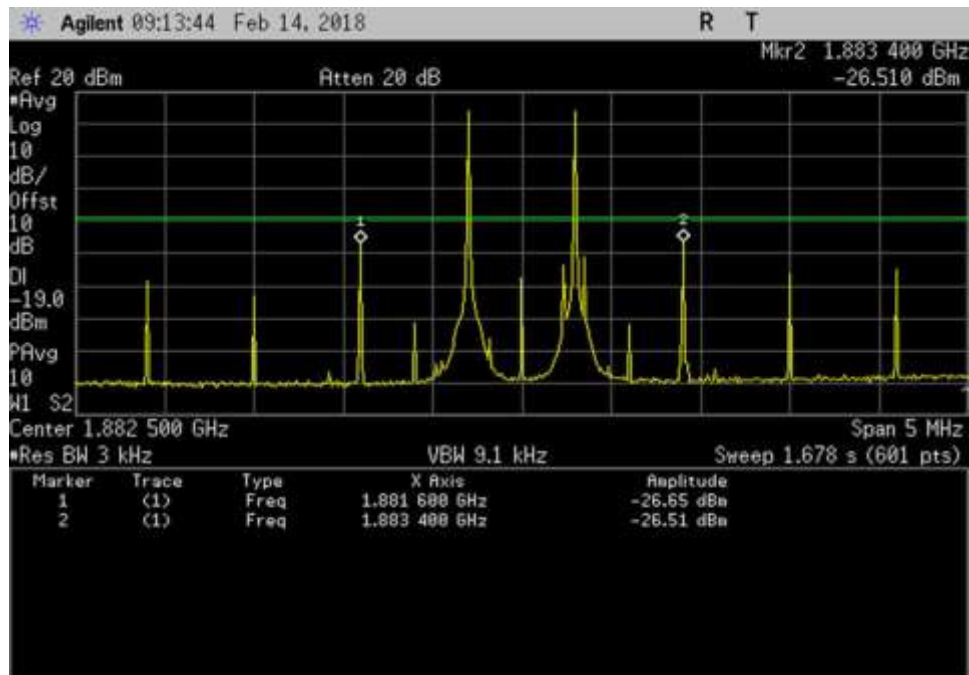
UL_776-787_781.5MHz



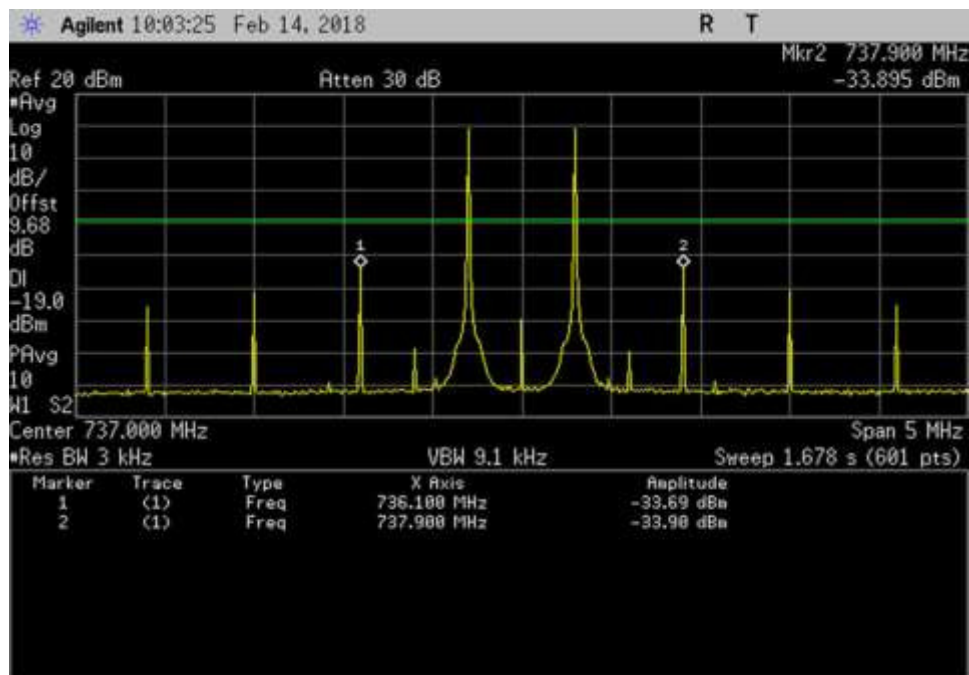
UL_824-849_ 836.5MHz



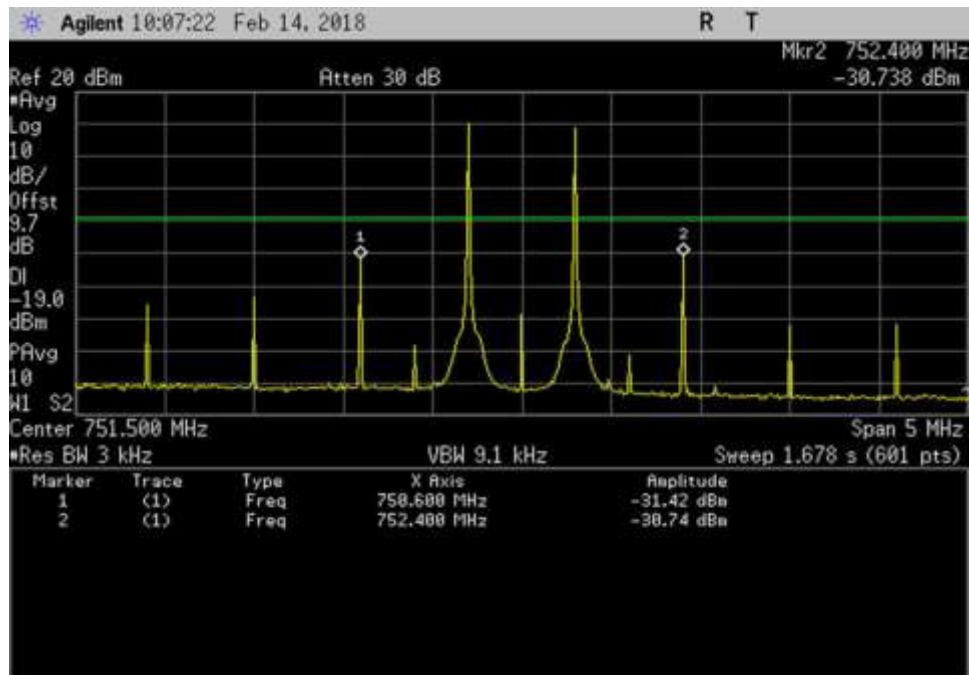
UL_1710-1755_ 1732.5MHz



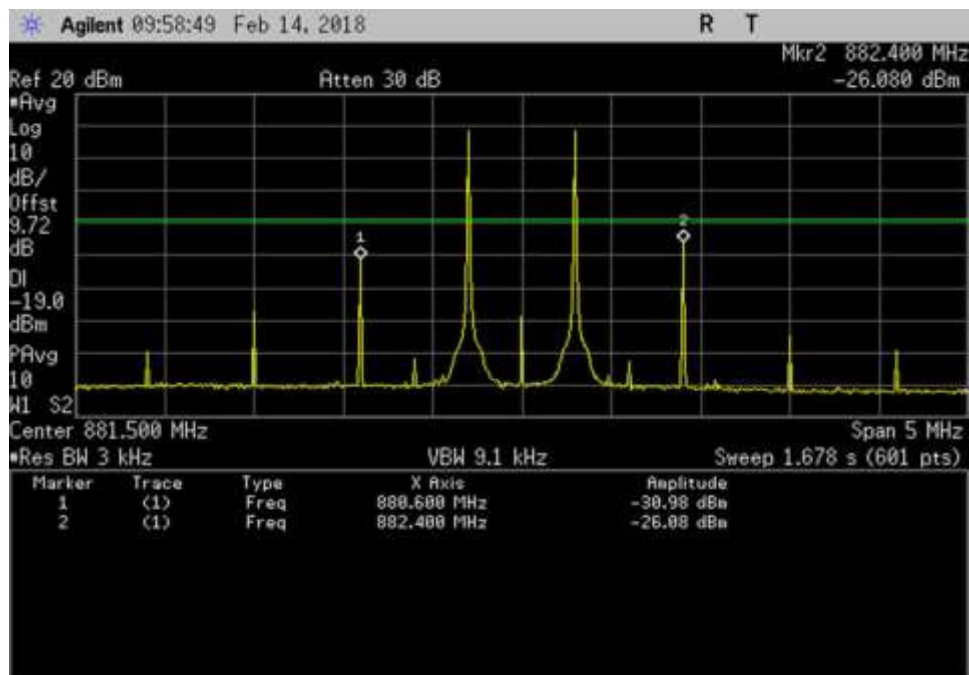
UL_1850-1915_1882.5MHz



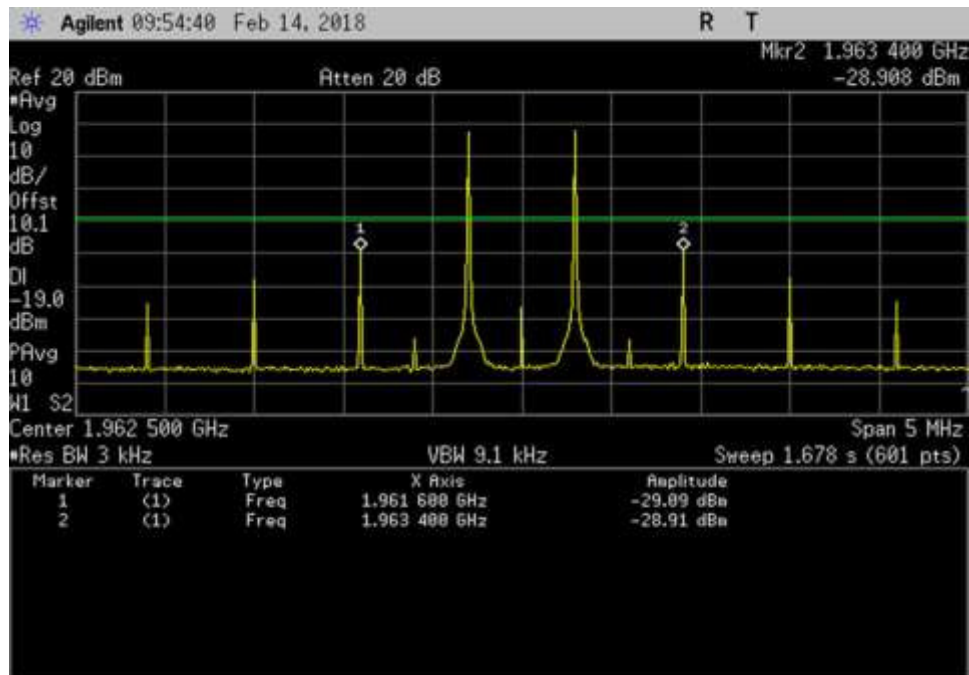
DL_728-746_737MHz



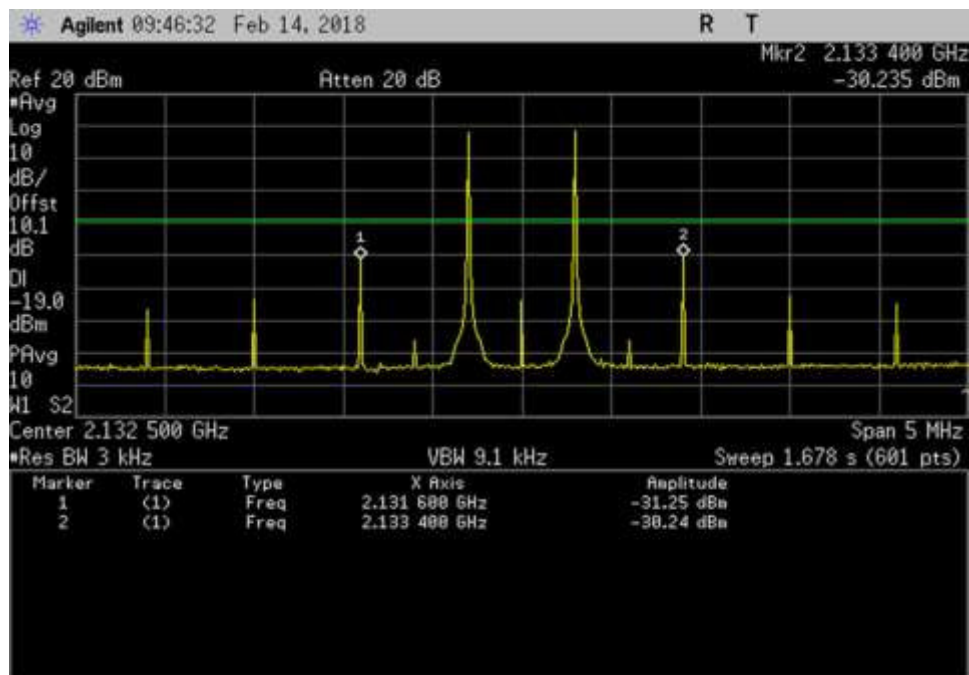
DL_746-757_ 751.5MHz



DL_869-894_ 881.5MHz



DL_1930-1995_ 1962.5MHz



DL_2110-2155_ 2132.5MHz

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 #: **100827** Date 02/14/18 and 02/15/18
 Test Type: **Conducted Emissions**
 Tested By: **Hieu Song Nguyenpham**
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

02/14/18: Test environment conditions:
 Temperature: 19.3°C
 Relative Humidity: 44%
 Pressure: 101.5 kPa

02/15/18: Test environment conditions:
 Temperature: 19.6°C
 Relative Humidity: 43%
 Pressure: 101.6 kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020

Summary of Results

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

GSM

Low				High			
Out of Band Emission				Out of Band Emission			
Frequency (MHz)	Pre AGC	Limit (dBm)	Results	Frequency (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-21.8	-19	Pass	UL1710-1755	-24.5	-19	Pass
UL1850-1915	-21.5	-19	Pass	UL1850-1915	-26.3	-19	Pass
UL824-849	-24.3	-19	Pass	UL824-849	-22.9	-19	Pass
UL 698-716	-25.9	-19	Pass	UL 698-716	-23.9	-19	Pass
UL776-787	-22.6	-19	Pass	UL776-787	-22.1	-19	Pass
DL2110-2155	-26.5	-19	Pass	DL2110-2155	-29.3	-19	Pass
DL1930-1995	-30.0	-19	Pass	DL1930-1995	-33.6	-19	Pass
DL869-894	-28.9	-19	Pass	DL869-894	-31.0	-19	Pass
DL:728-746	-31.9	-19	Pass	DL:728-746	-30.2	-19	Pass
DL 746-757	-30.7	-19	Pass	DL 746-757	-32.4	-19	Pass

CDMA (alternative 1.25 MHz AWGN)

Low				High			
Out of Band Emission				Out of Band Emission			
Frequency (MHz)	Pre AGC	Limit (dBm)	Results	Frequency (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-22.1	-19	Pass	UL1710-1755	-29.3	-19	Pass
UL1850-1915	-23.1	-19	Pass	UL1850-1915	-32.3	-19	Pass
UL824-849	-30.7	-19	Pass	UL824-849	-32.0	-19	Pass
UL 698-716	-27.9	-19	Pass	UL 698-716	-31.7	-19	Pass
UL776-787	-33.3	-19	Pass	UL776-787	-34.8	-19	Pass
DL2110-2155	-37.1	-19	Pass	DL2110-2155	-38.2	-19	Pass
DL1930-1995	-37.0	-19	Pass	DL1930-1995	-37.0	-19	Pass
DL869-894	-27.9	-19	Pass	DL869-894	-40.1	-19	Pass
DL:728-746	-52.1	-19	Pass	DL:728-746	-49.5	-19	Pass
DL 746-757	-50.8	-19	Pass	DL 746-757	-39.6	-19	Pass

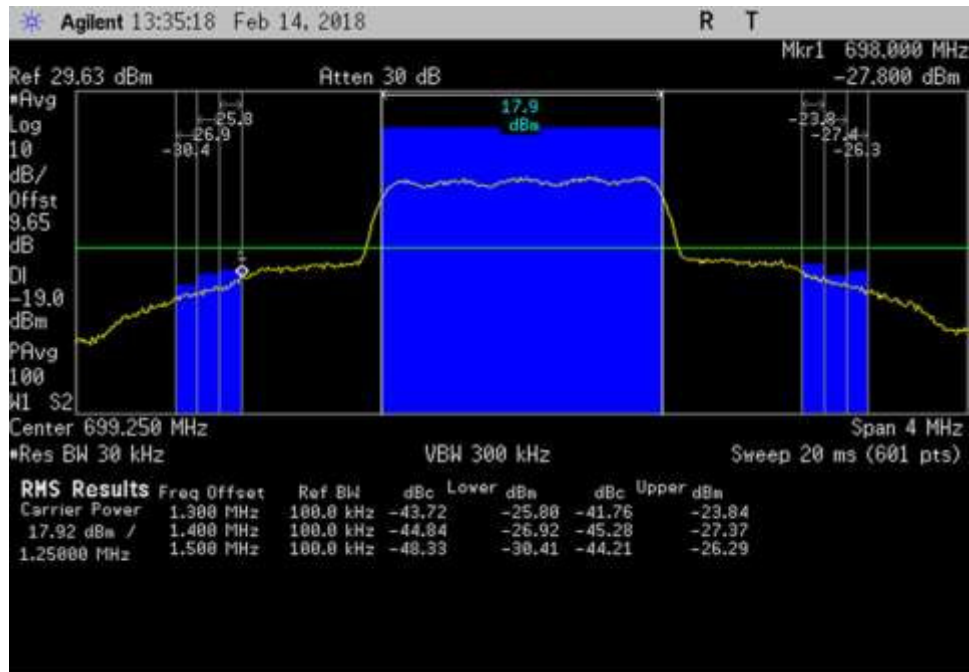
LTE (alternative 4.1MHz AWGN)

Low				High			
Out of Band Emission				Out of Band Emission			
Frequency (MHz)	Pre AGC	Limit (dBm)	Results	Frequency (MHz)	Pre AGC	Limit (dBm)	Results
UL1710-1755	-26.0	-19	Pass	UL1710-1755	-31.3	-19	Pass
UL1850-1915	-26.6	-19	Pass	UL1850-1915	-37.8	-19	Pass
UL824-849	-30.4	-19	Pass	UL824-849	-32.0	-19	Pass
UL 698-716	-27.6	-19	Pass	UL 698-716	-30.6	-19	Pass
UL776-787	-31.1	-19	Pass	UL776-787	-33.5	-19	Pass
DL2110-2155	-33.2	-19	Pass	DL2110-2155	-35.2	-19	Pass
DL1930-1995	-36.5	-19	Pass	DL1930-1995	-37.8	-19	Pass
DL869-894	-32.8	-19	Pass	DL869-894	-35.2	-19	Pass
DL:728-746	-41.9	-19	Pass	DL:728-746	-37.7	-19	Pass
DL 746-757	-38.0	-19	Pass	DL 746-757	-41.8	-19	Pass

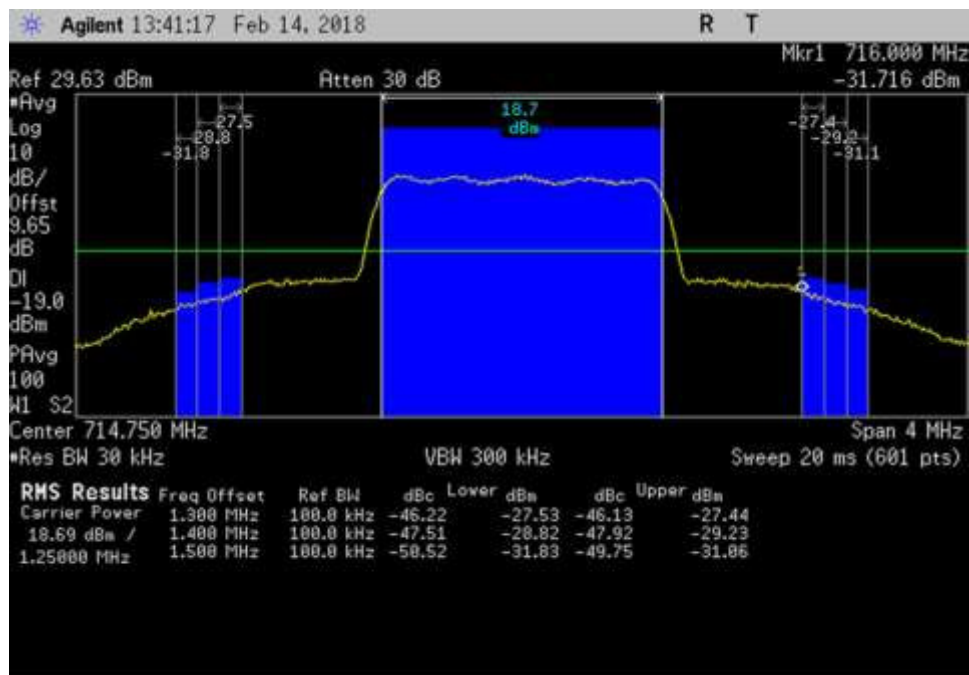
Note: The EUT also maintains compliance with the out-of-band emissions limit at input power indicated in section 5.5.

Plots

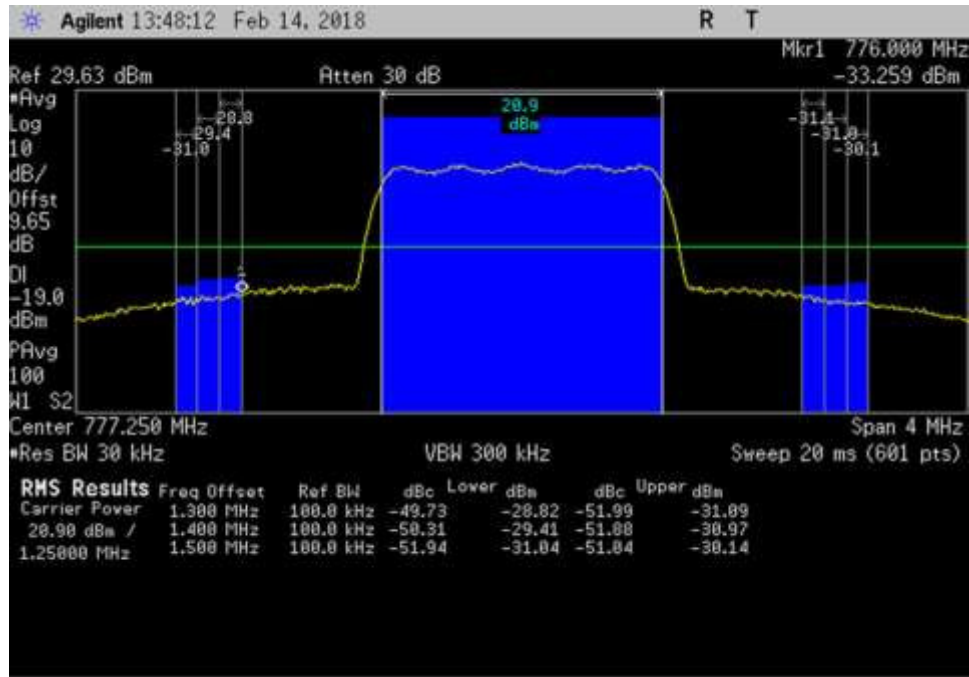
CDMA



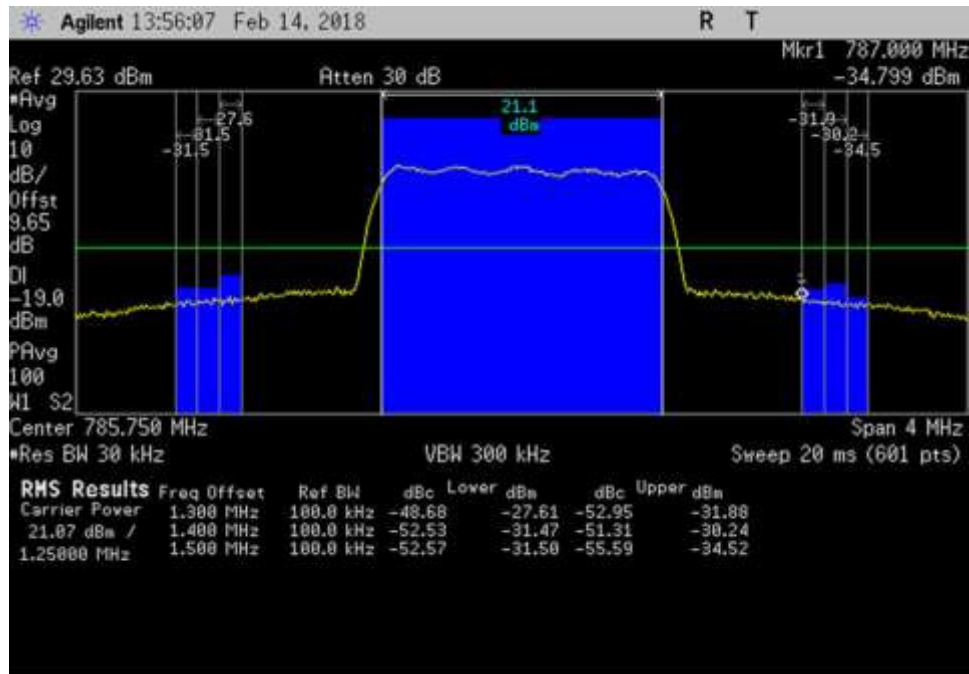
UL_698-716_CDMA_697.25- 701.25MHz



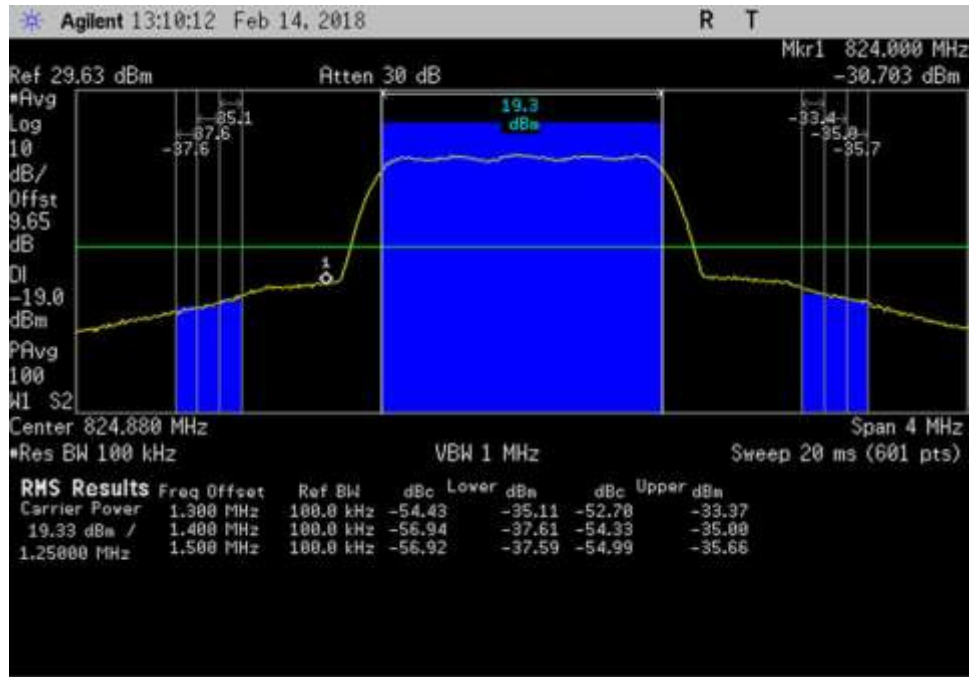
UL_698-716_CDMA_712.75- 716.75MHz



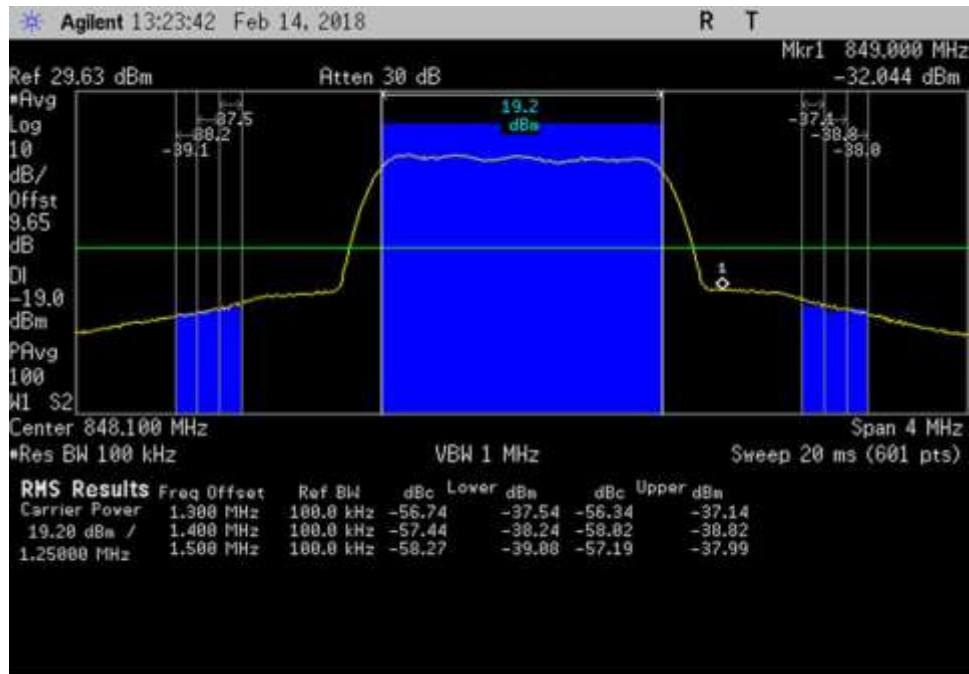
UL_776-787_CDMA_775.25-779.25MHz



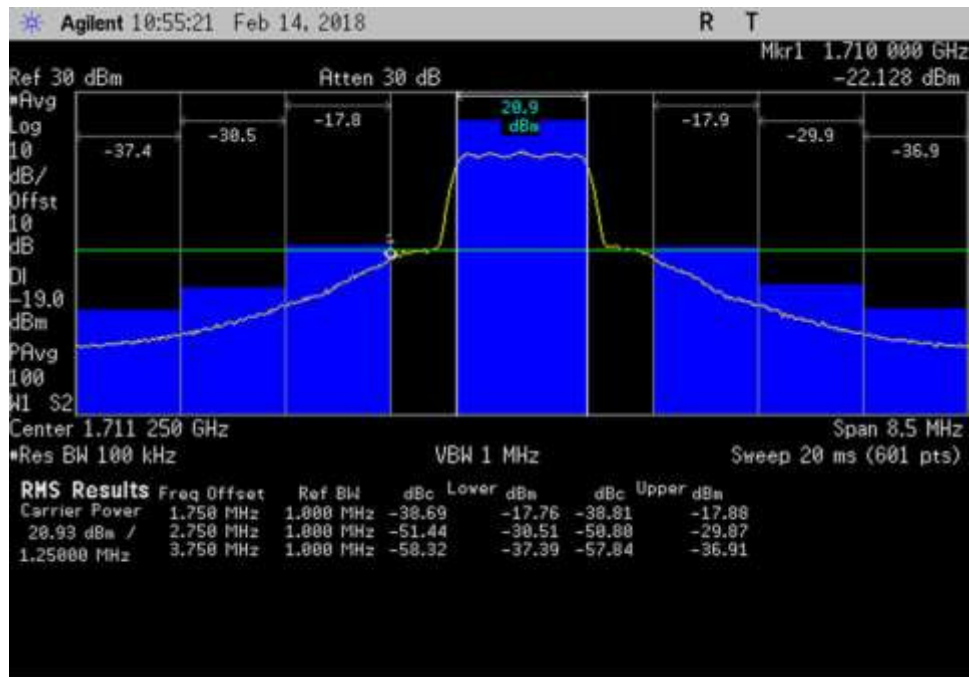
UL_776-787_CDMA_783.75-787.75MHz



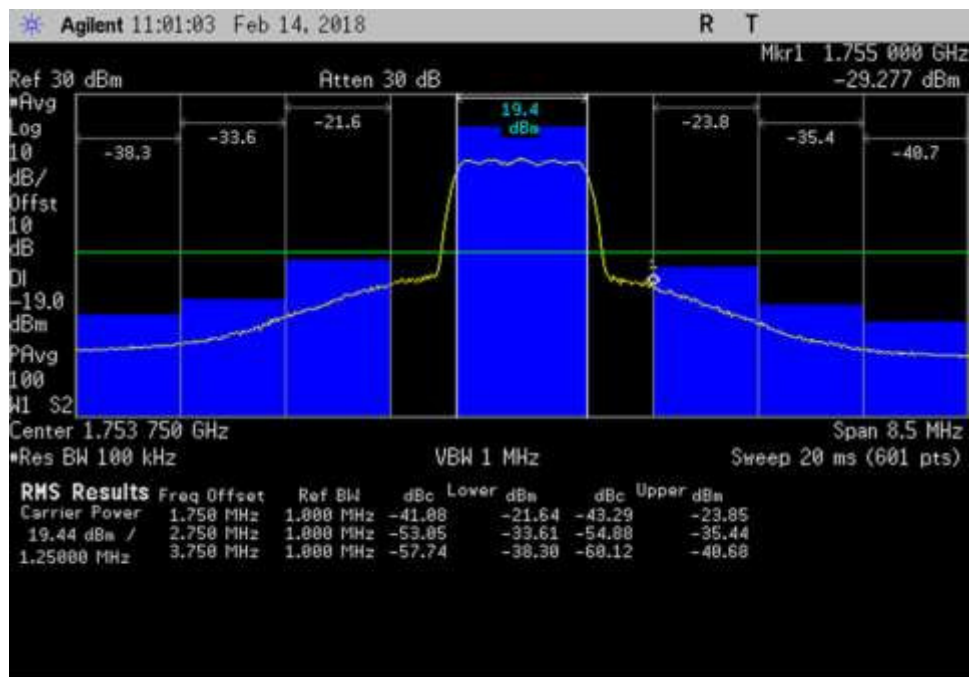
UL_824-849_CDMA_ 822.88- 826.88MHz



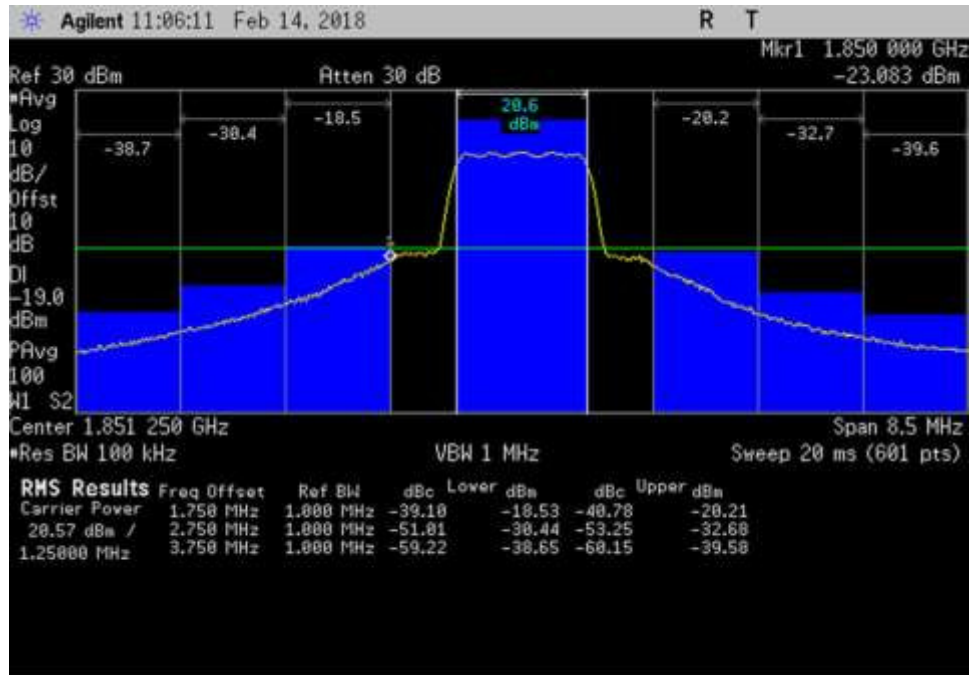
UL_824-849_CDMA_ 846.1- 850.1MHz



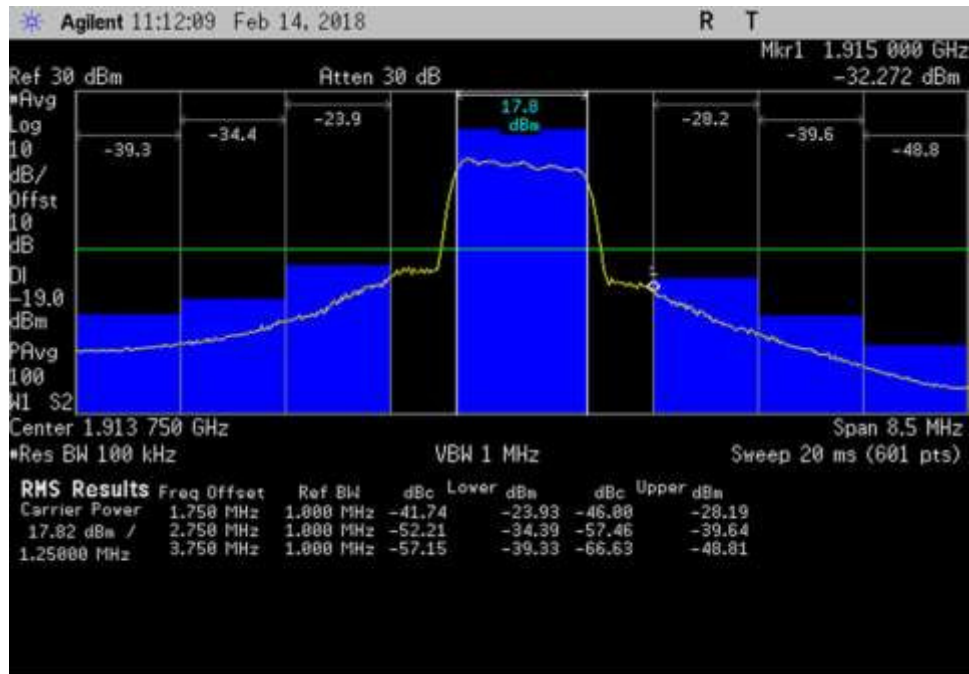
UL_1710-1755_CDMA_1707-1715.5MHz



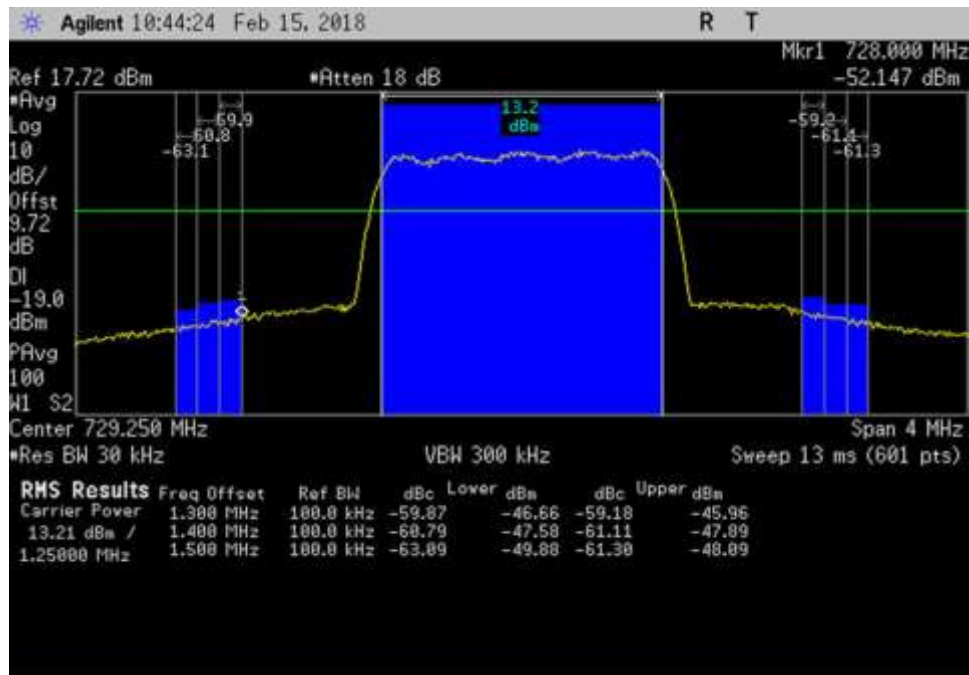
UL_1710-1755_CDMA_1749.5-1758MHz



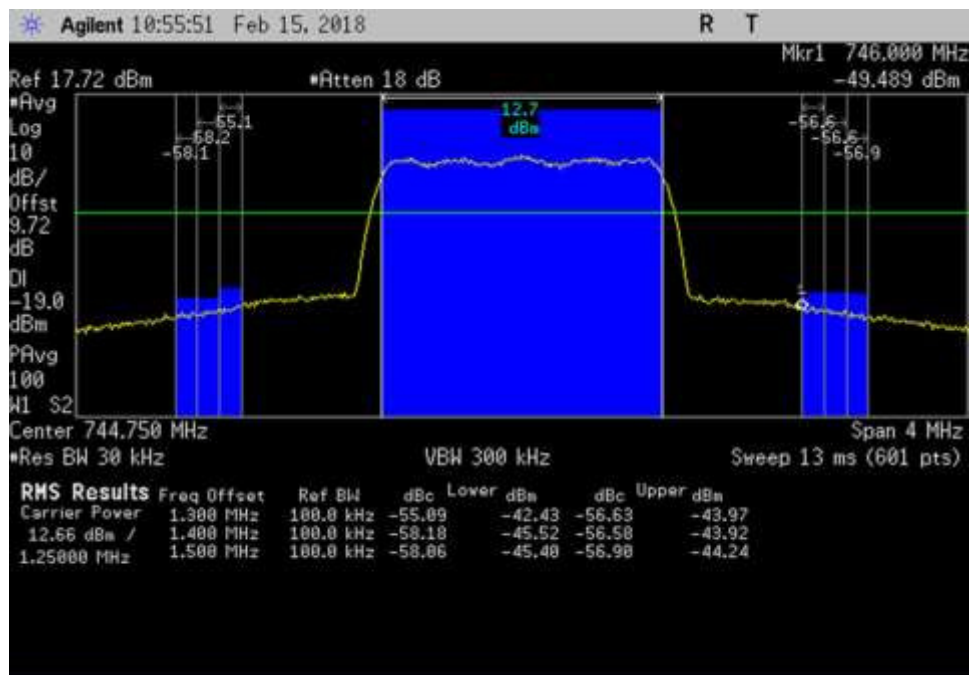
UL_1850-1915_CDMA_1847-1855.5MHz



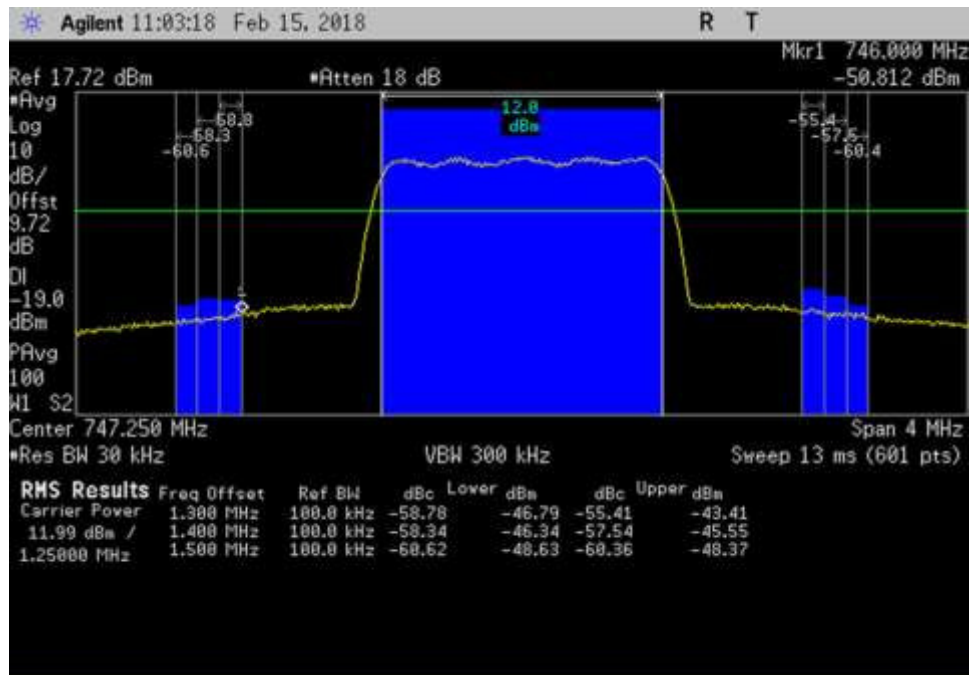
UL_1850-1915_CDMA_1909.5-1918MHz



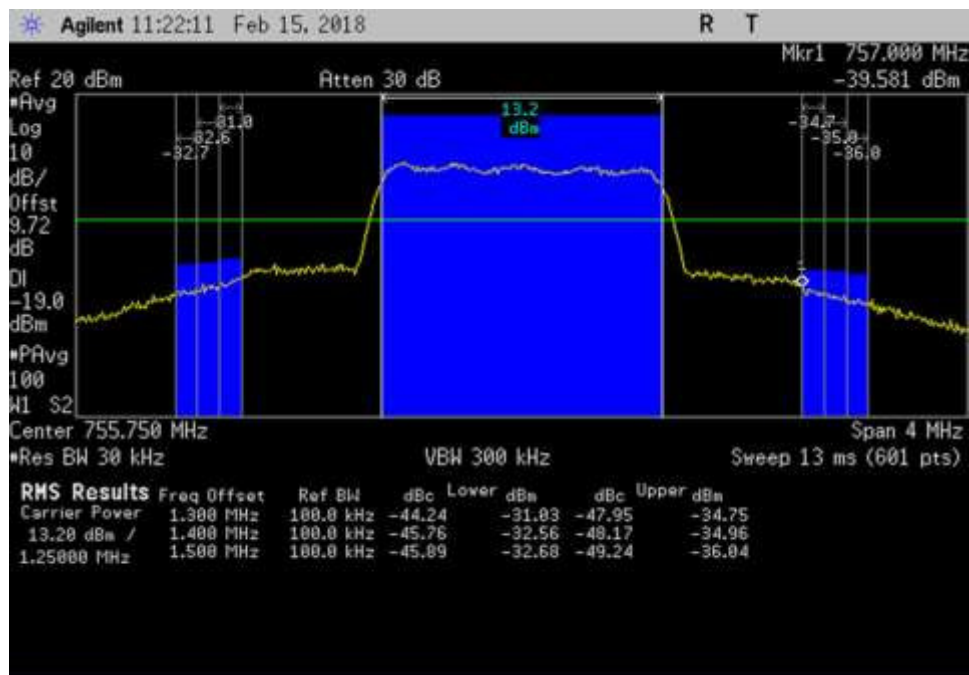
DL_728-746_CDMA_727.25-731.25MHz



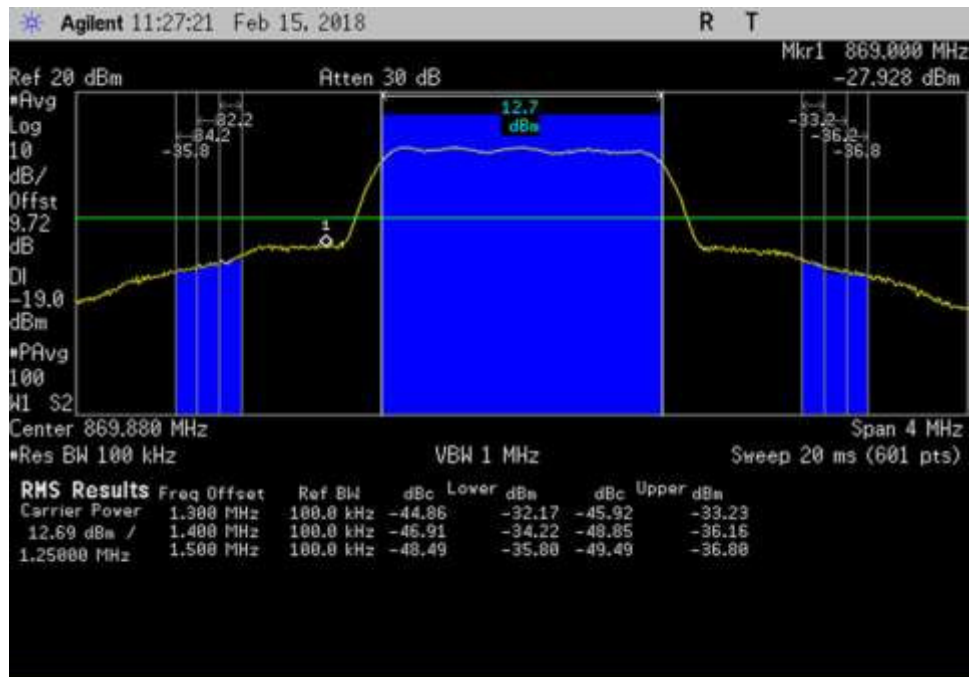
DL_728-746_CDMA_742.75-746.75MHz



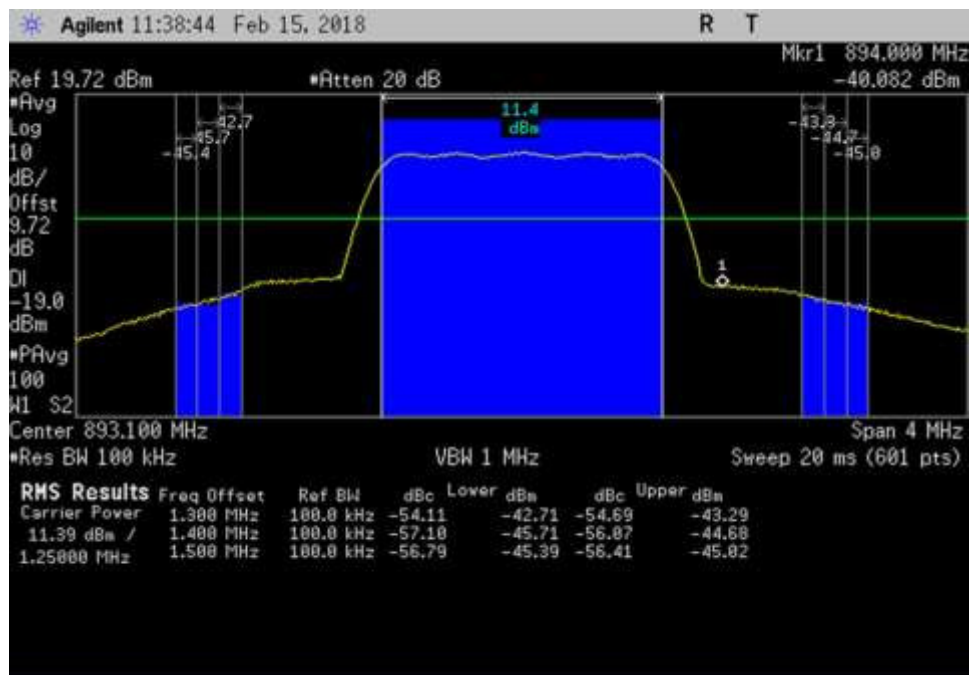
DL_746-757_CDMA_745.25-749.25MHz



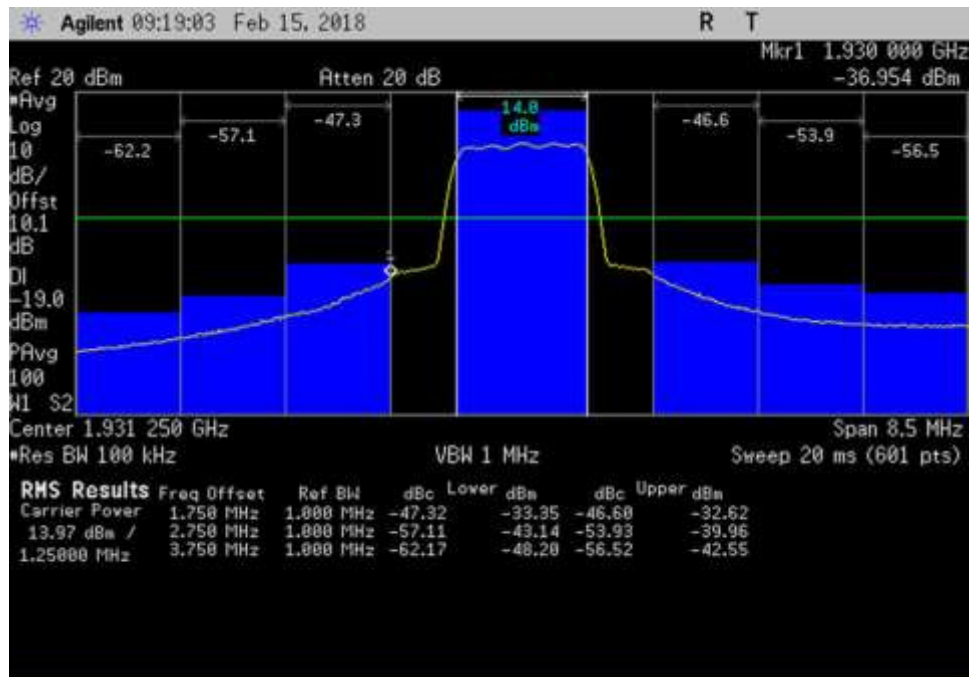
DL_746-757_CDMA_753.75-757.75MHz



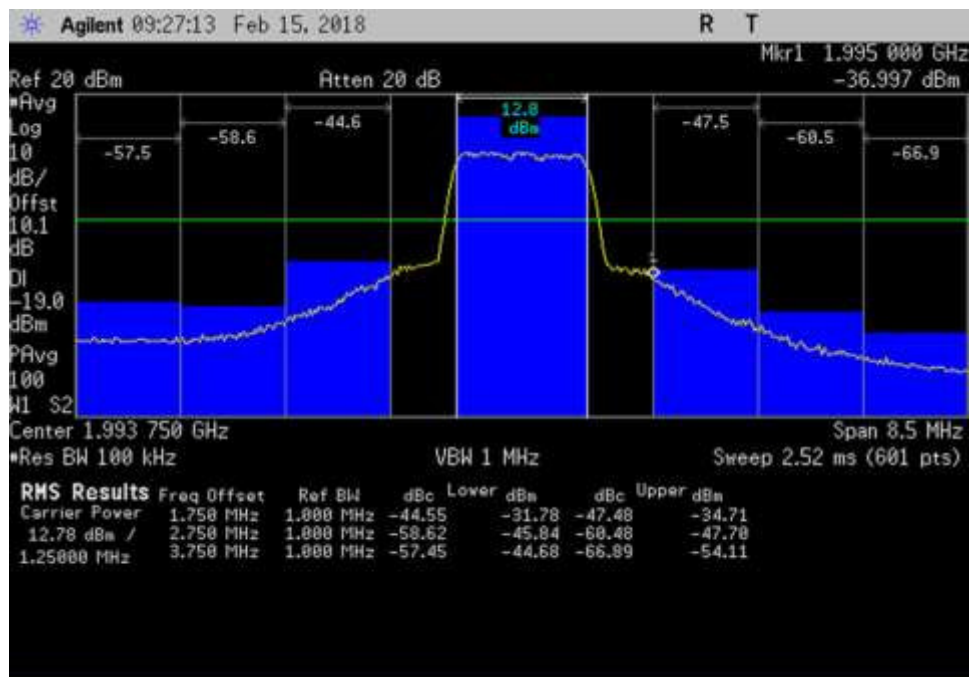
DL_869-894_CDMA_867.88-871.88MHz



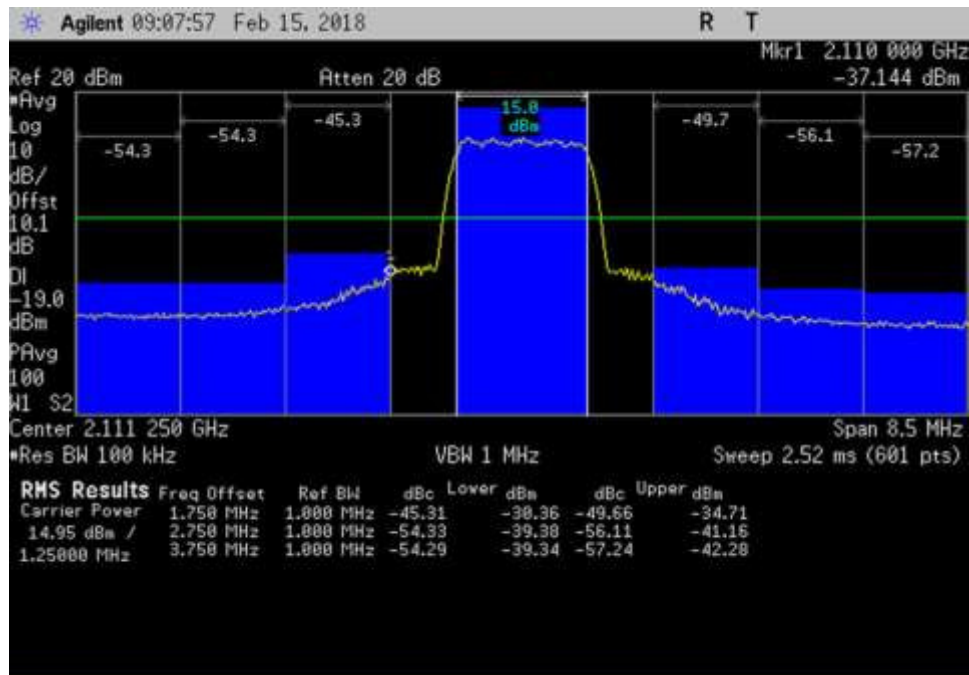
DL_869-894_CDMA_891.1-895.1MHz



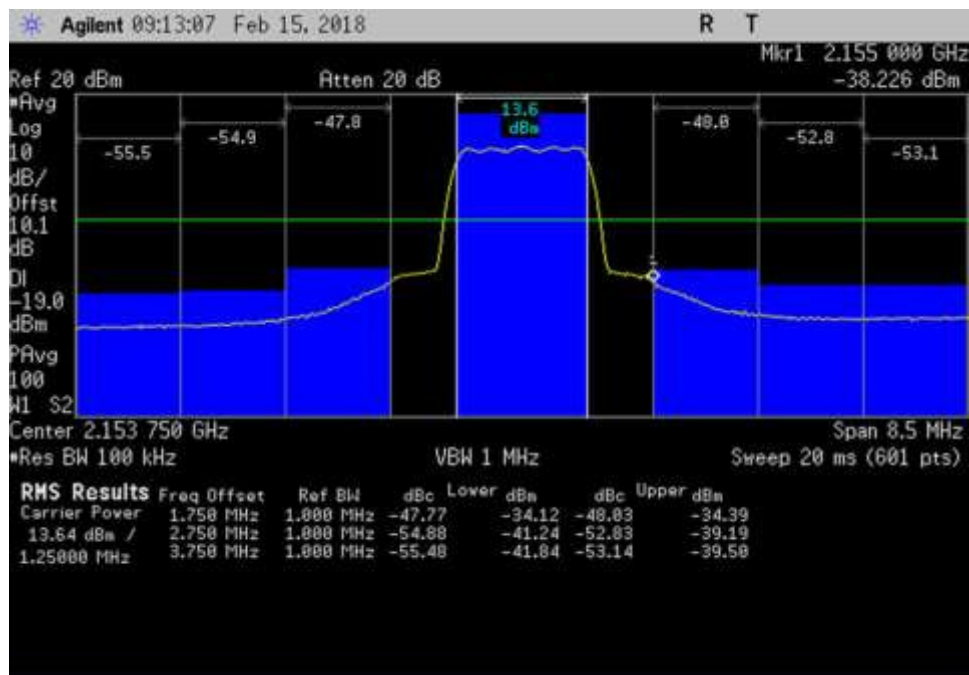
DL_1930-1995_CDMA_ 1927- 1935.5MHz



DL_1930-1995_CDMA_ 1989.5- 1998MHz

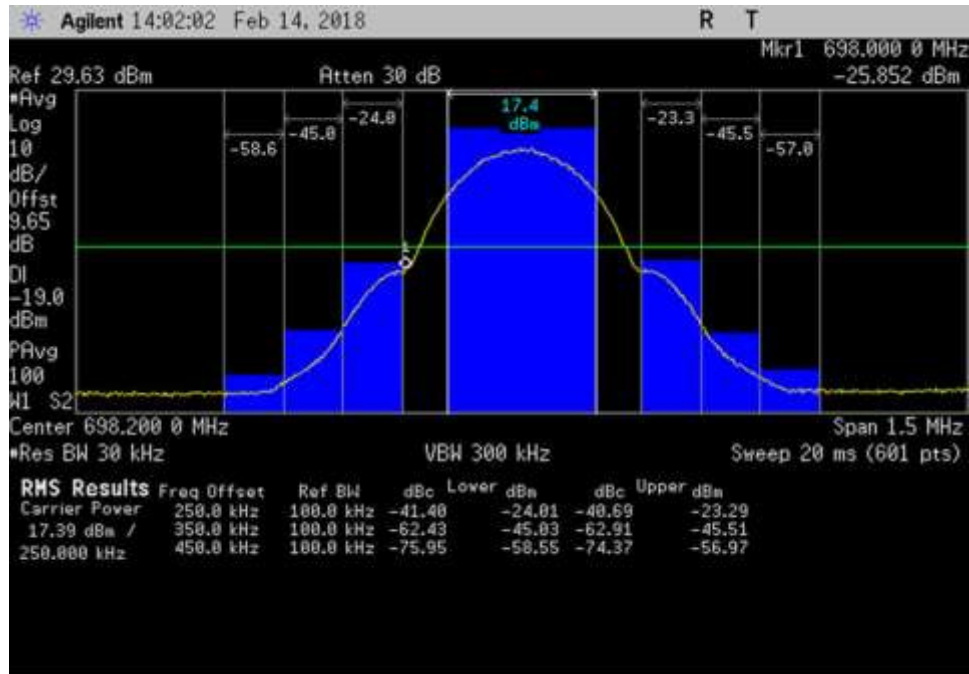


DL_2110-2155_CDMA_ 2107- 2115.5MHz

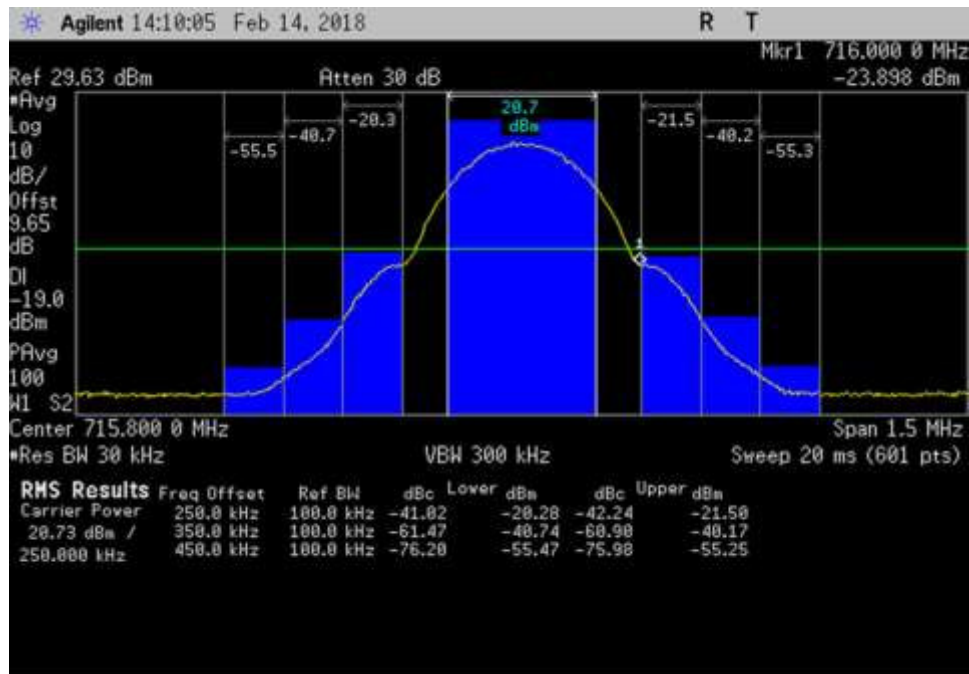


DL_2110-2155_CDMA_ 2149.5- 2158MHz

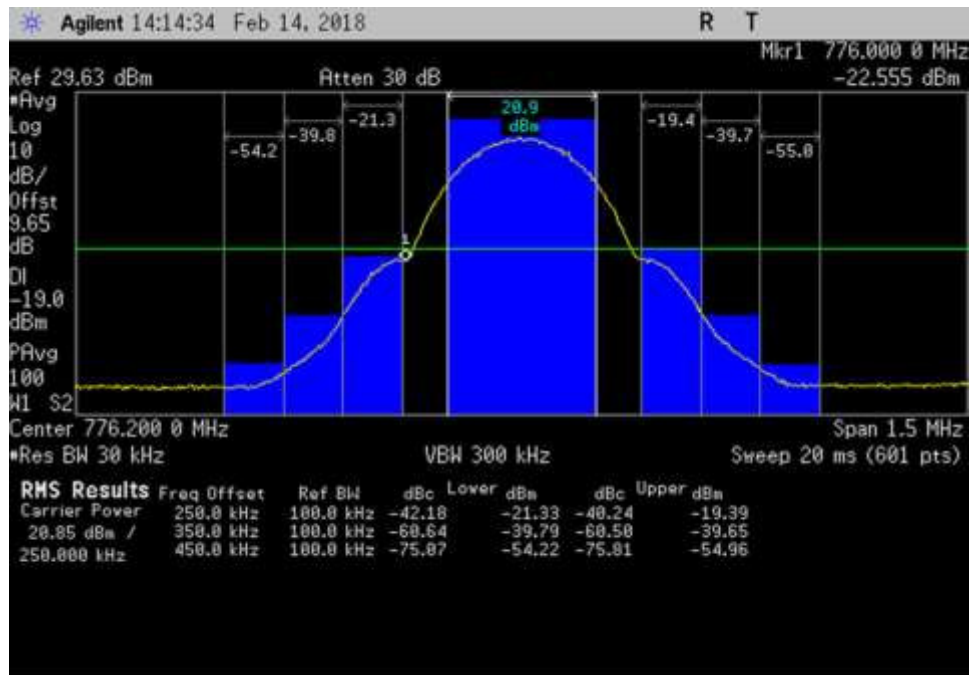
GSM



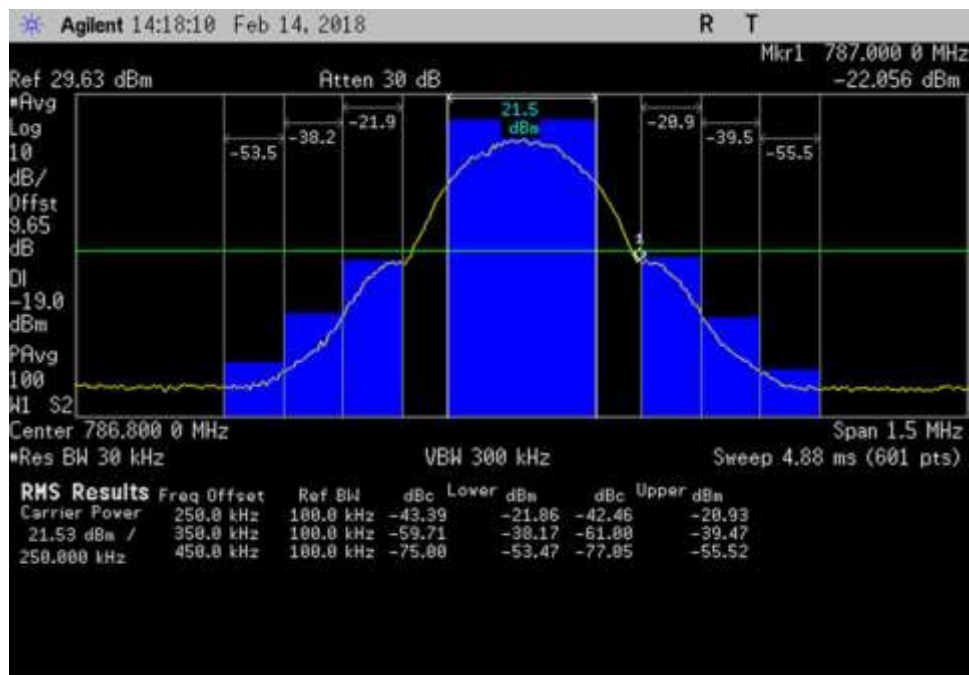
UL_698-716_GSM_697.45- 698.95MHz



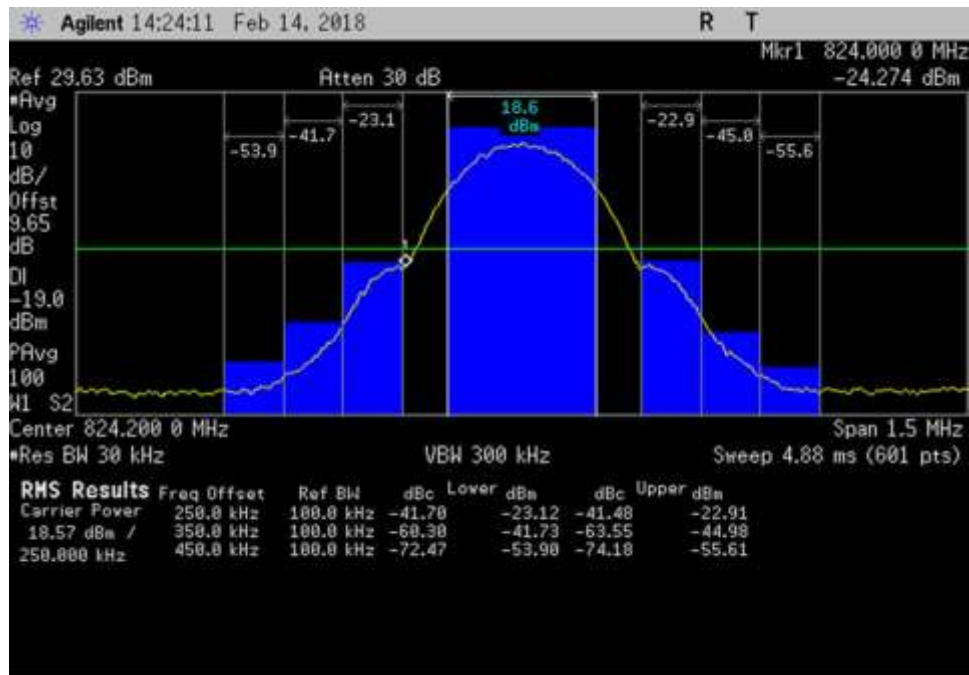
UL_698-716_GSM_715.05- 716.55MHz



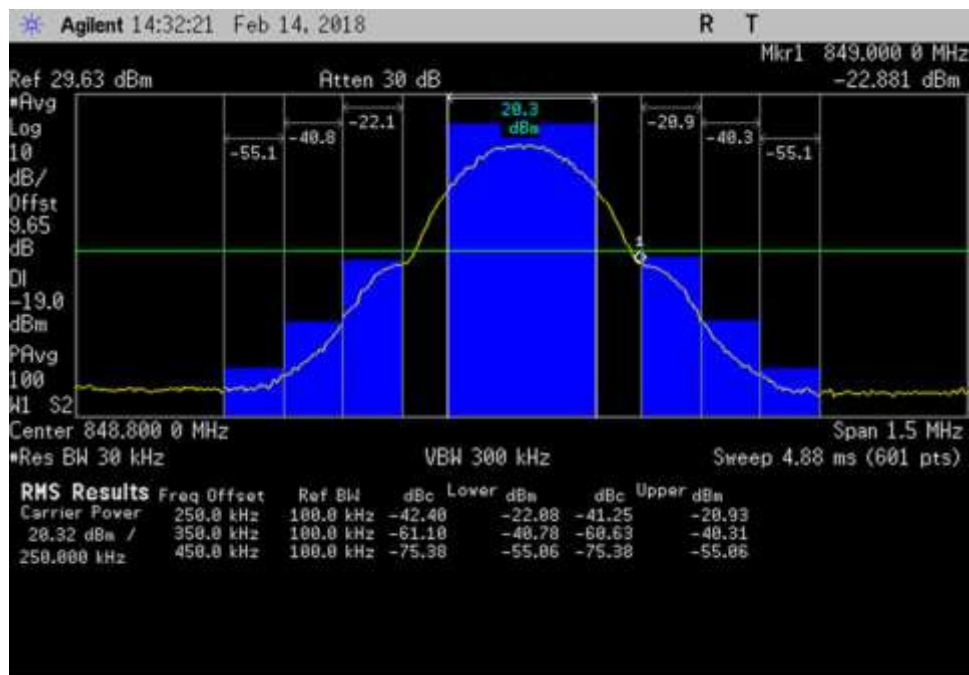
UL_776-787_GSM_ 775.45- 776.95MHz



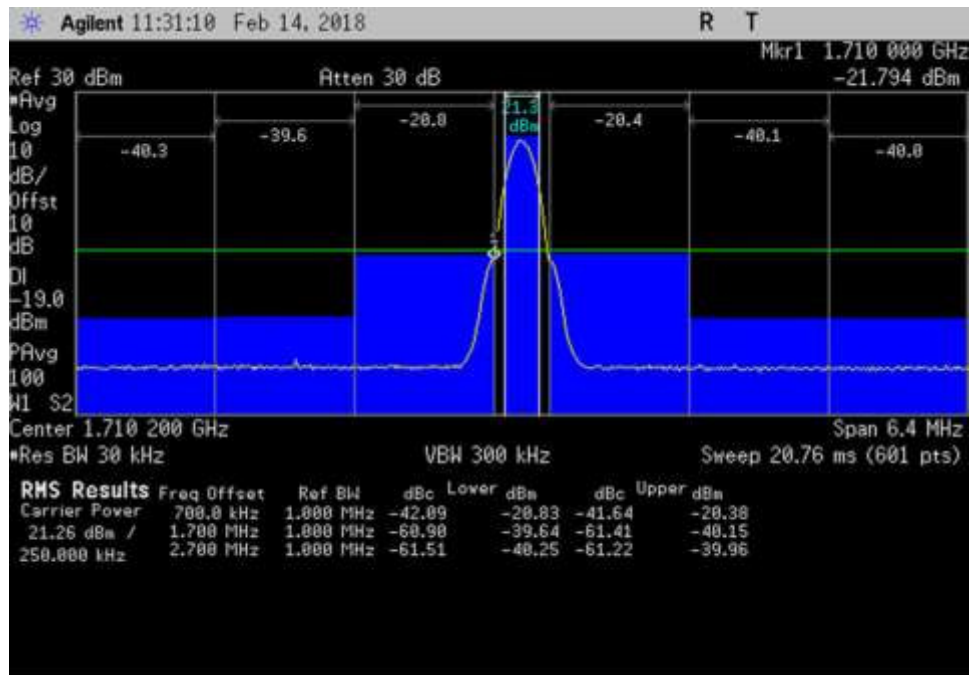
UL_776-787_GSM_ 786.05- 787.55MHz



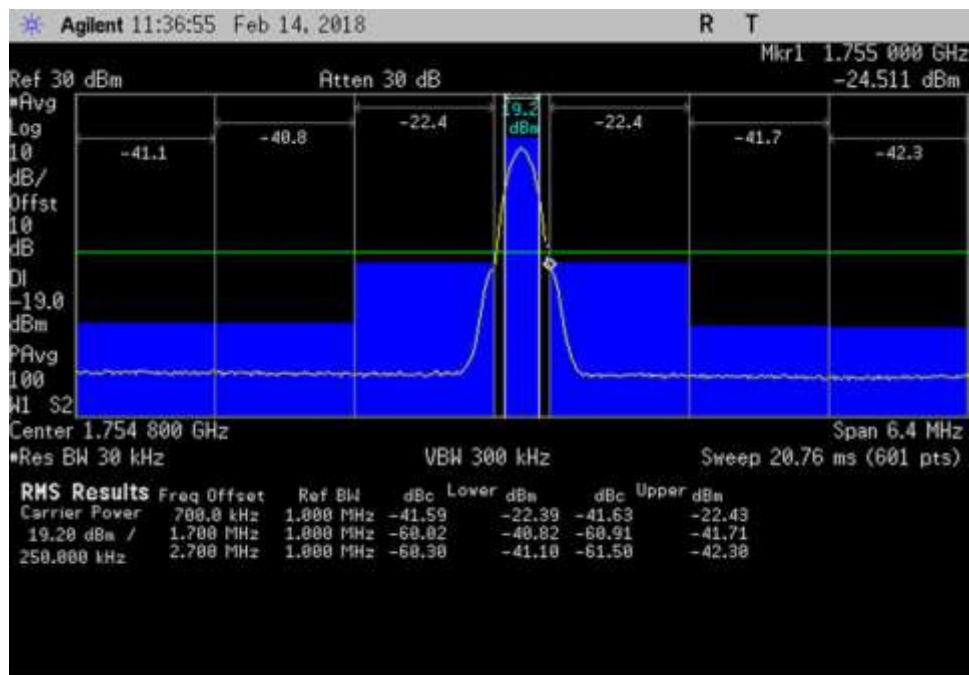
UL_824-849_GSM_ 823.45- 824.95MHz



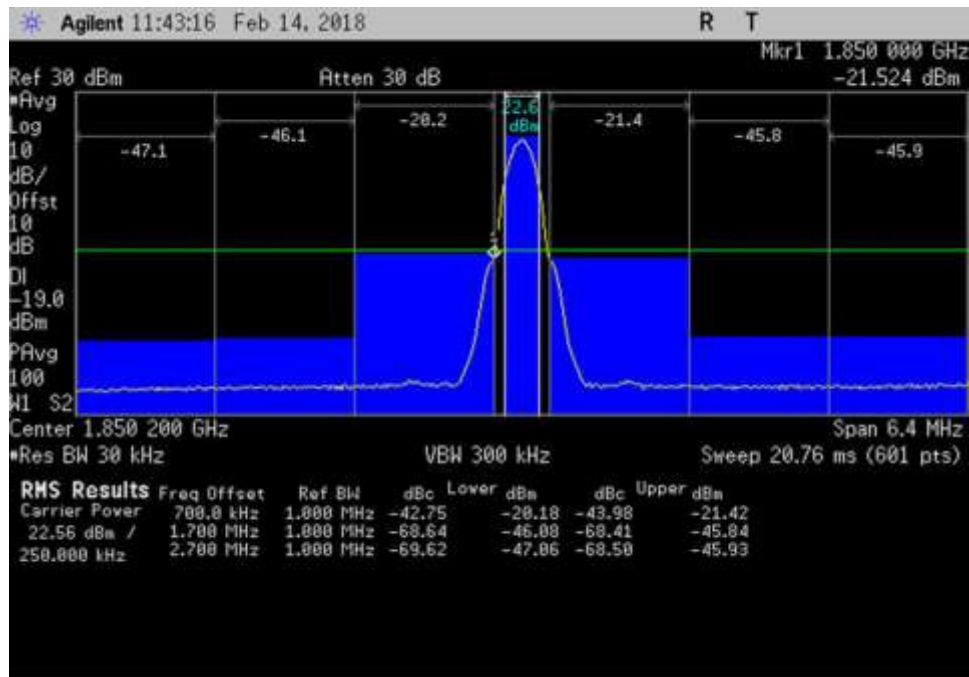
UL_824-849_GSM_ 848.05- 849.55MHz



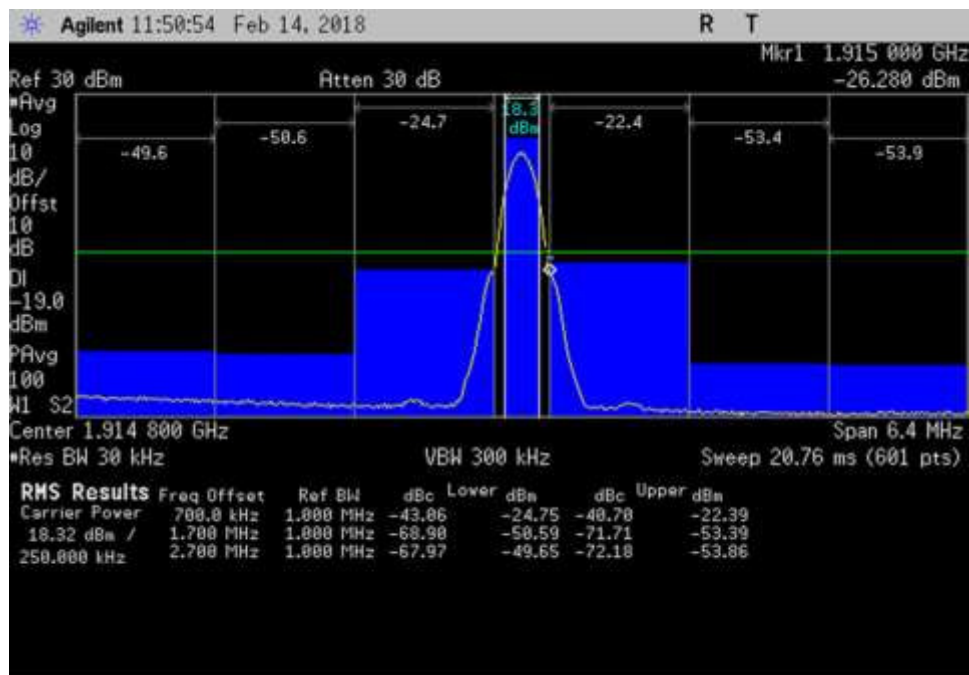
UL_1710-1755_GSM_1707-1713.4MHz



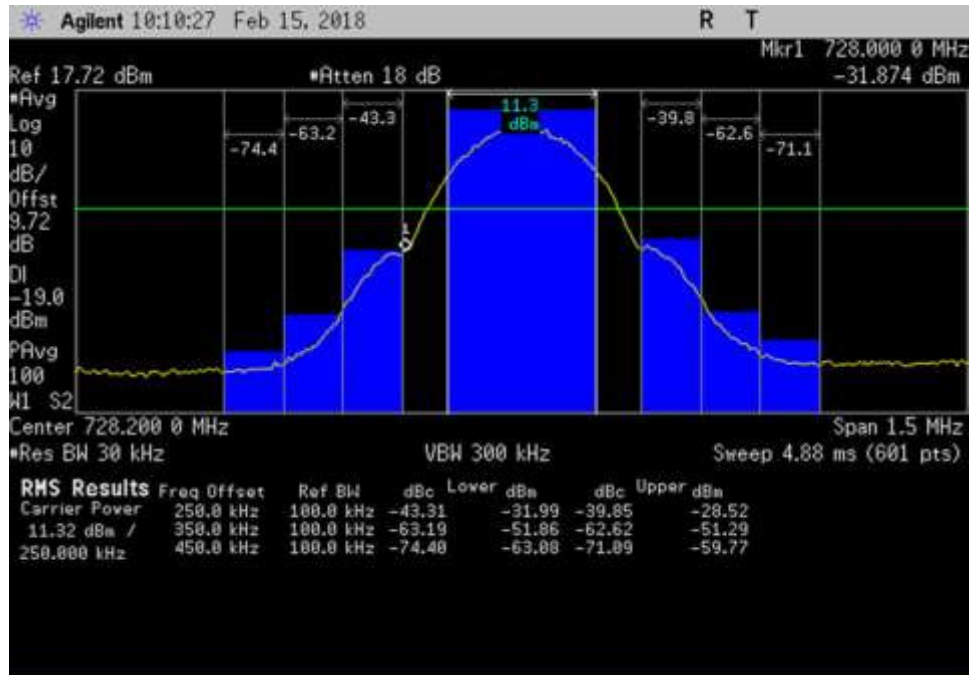
UL_1710-1755_GSM_1751.6-1758MHz



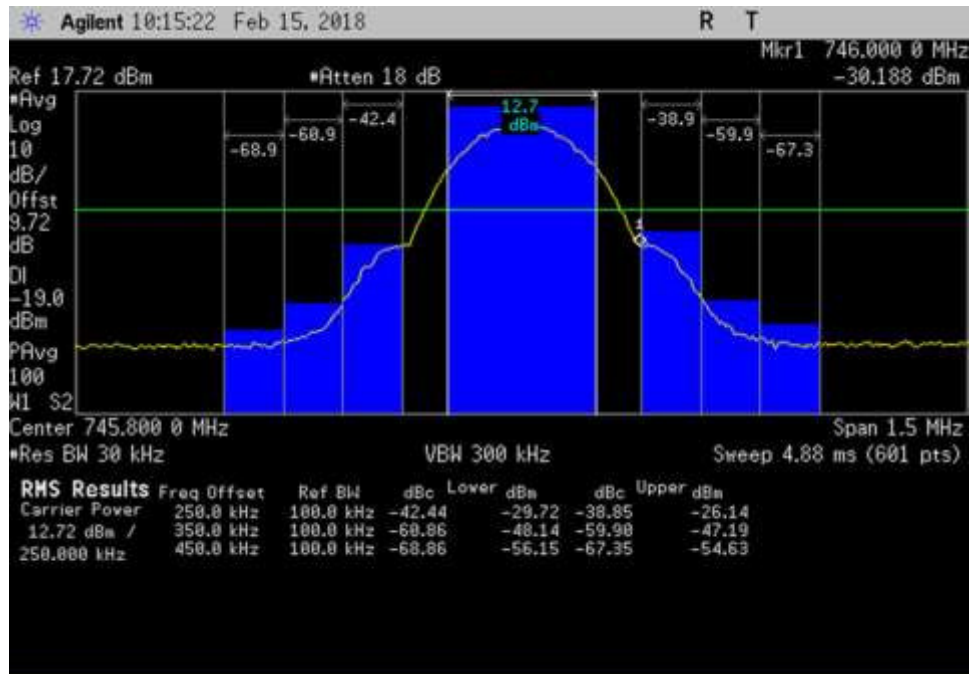
UL_1850-1915_GSM_1847-1853.4MHz



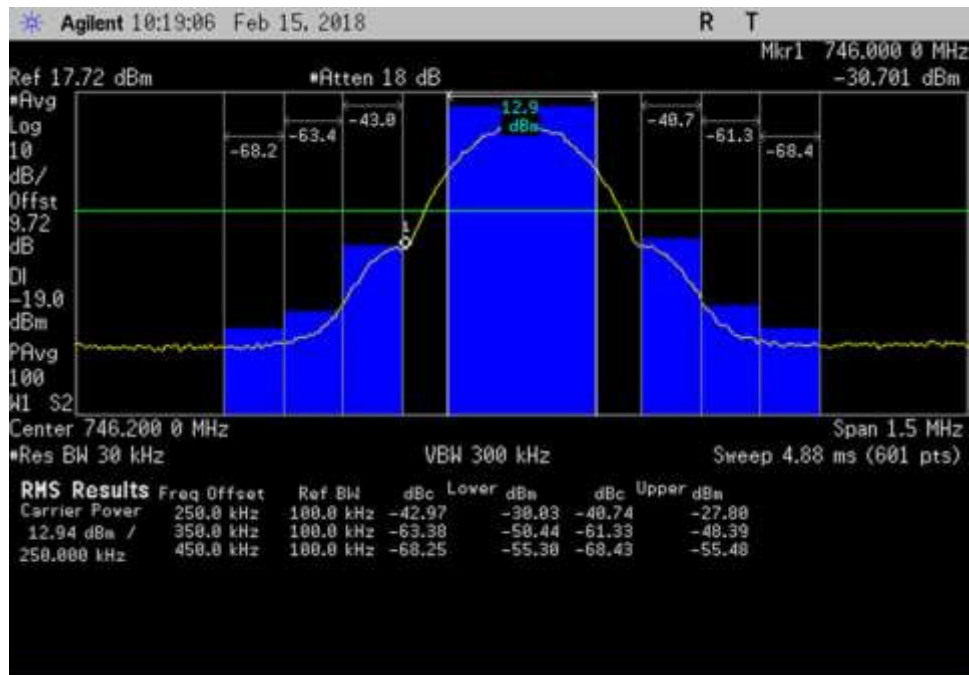
UL_1850-1915_GSM_1911.6-1918MHz



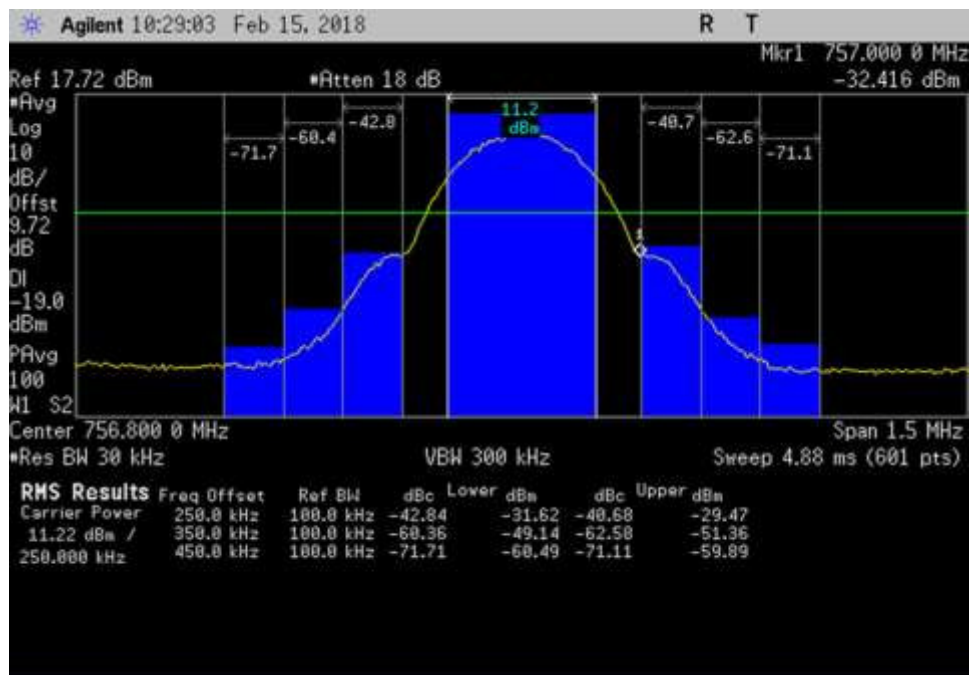
DL_728-746_GSM_ 727.45- 728.95MHz



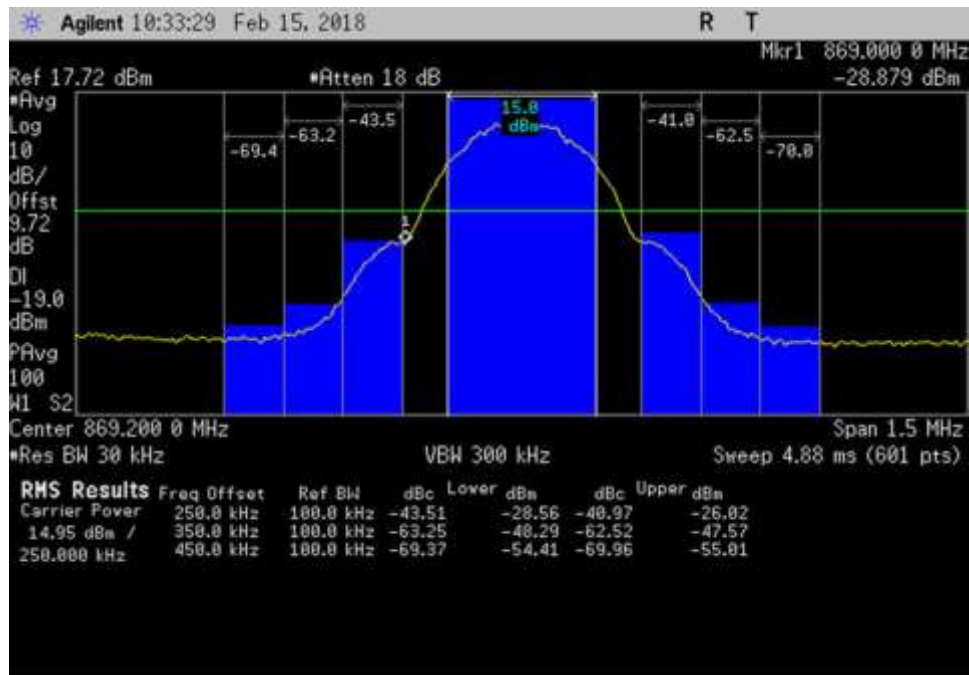
DL_728-746_GSM_ 745.05- 746.55MHz



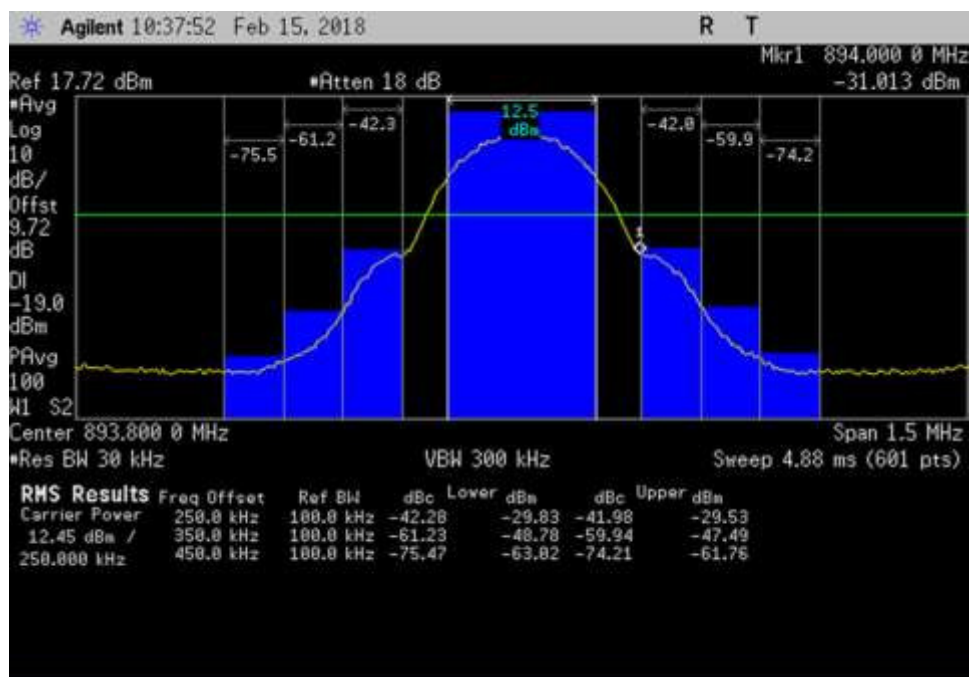
DL_746-757_GSM_745.45-746.95MHz



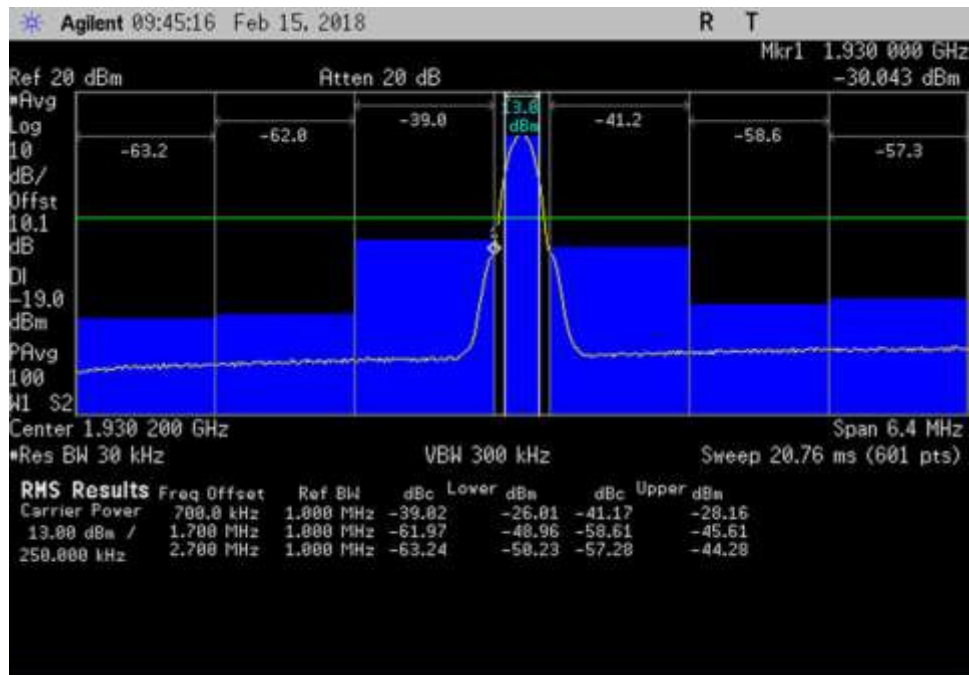
DL_746-757_GSM_756.05-757.55MHz



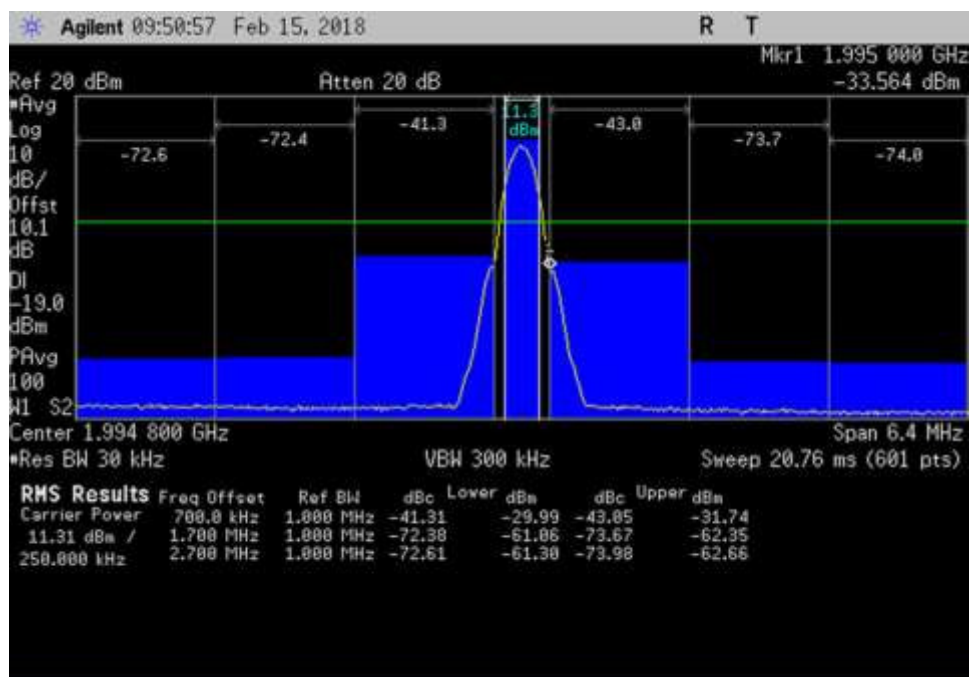
DL_869-894_GSM_868.45-869.95MHz



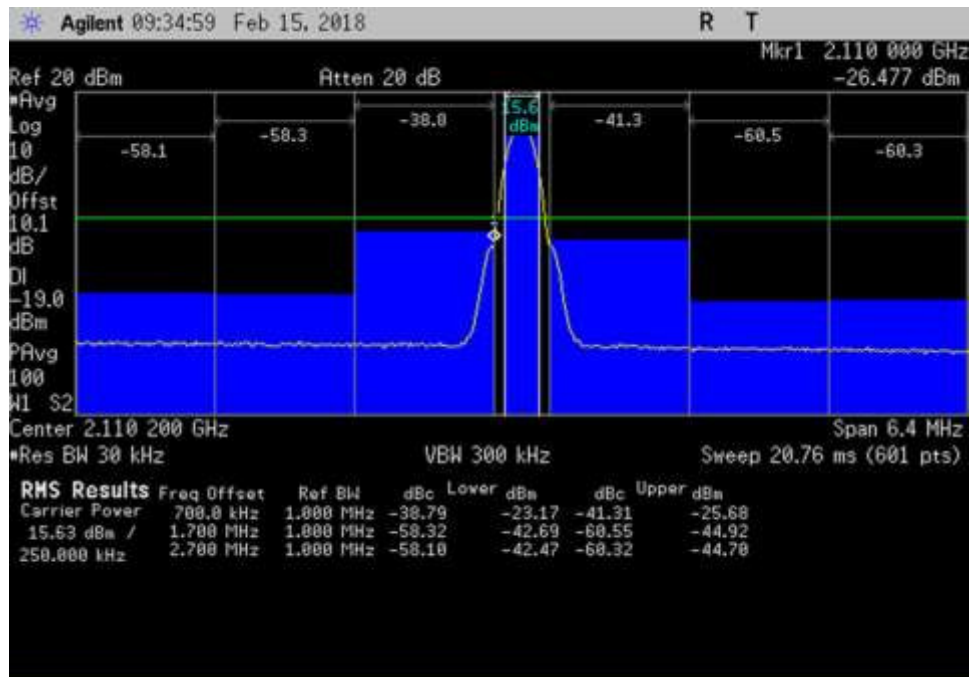
DL_869-894_GSM_893.05-894.55MHz



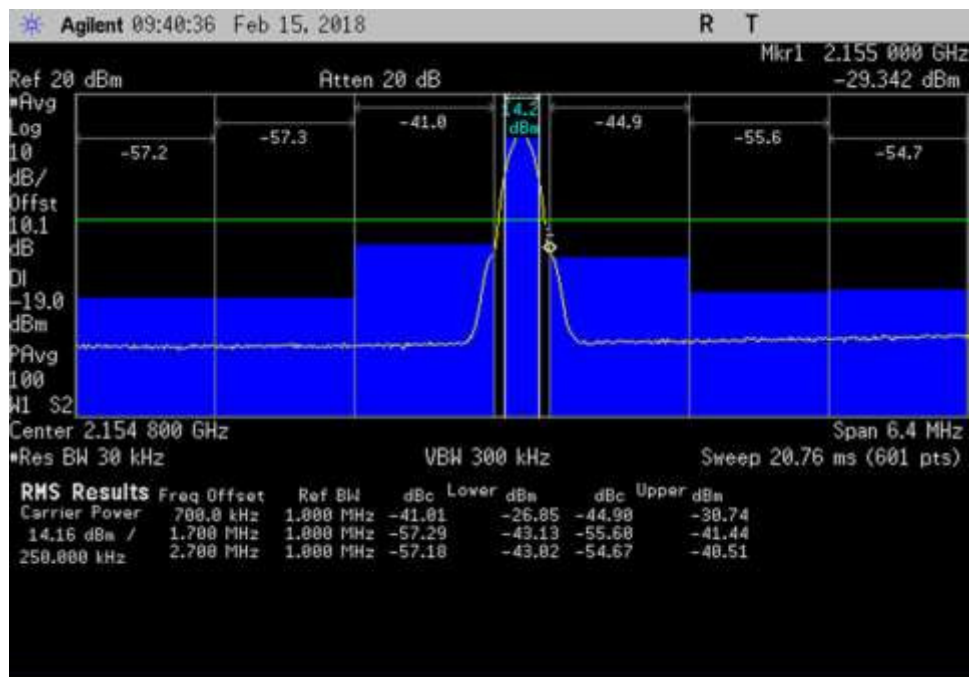
DL_1930-1995_GSM_ 1927- 1933.4MHz



DL_1930-1995_GSM_ 1991.6- 1998MHz

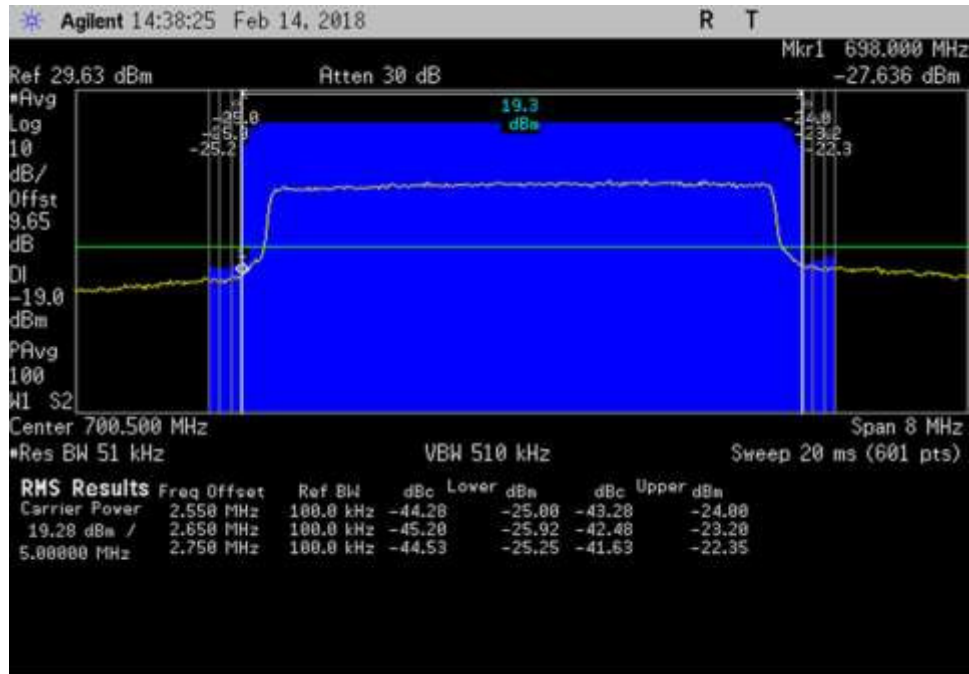


DL_2110-2155_GSM_ 2107- 2113.4MHz

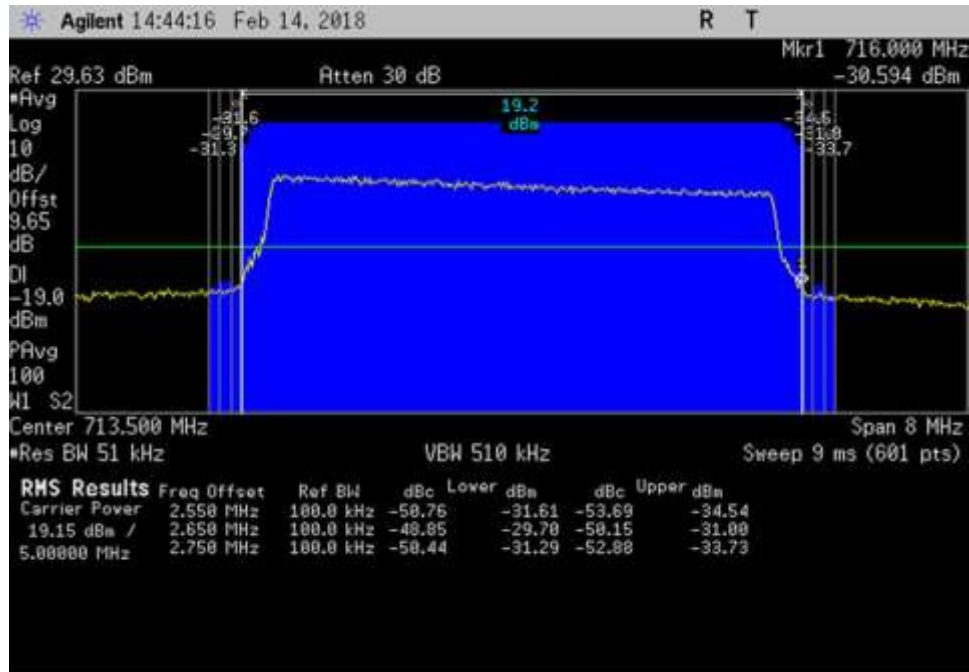


DL_2110-2155_GSM_ 2151.6- 2158MHz

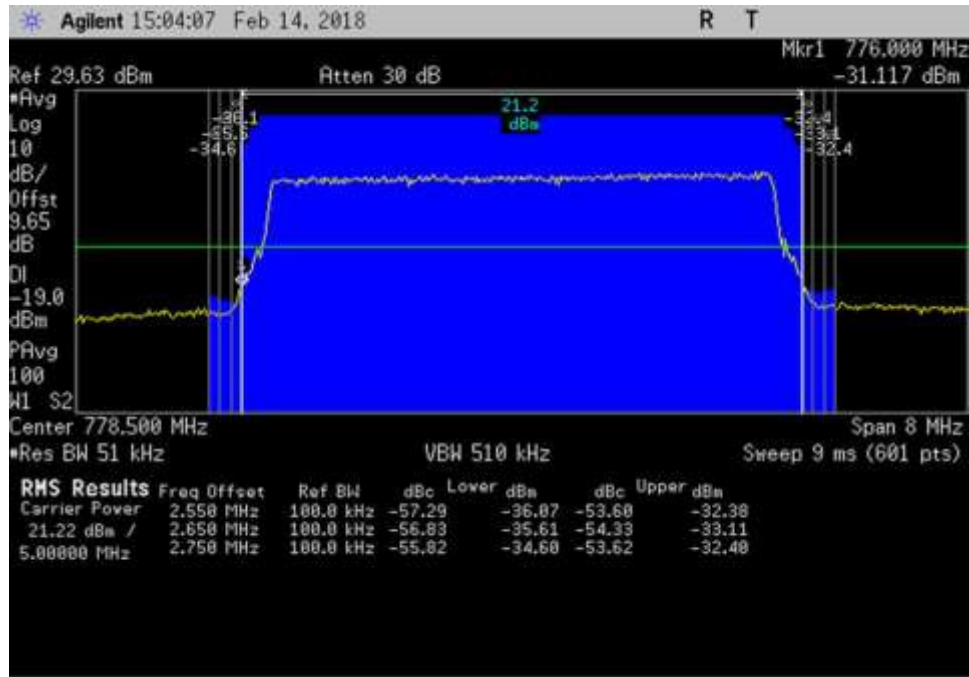
LTE



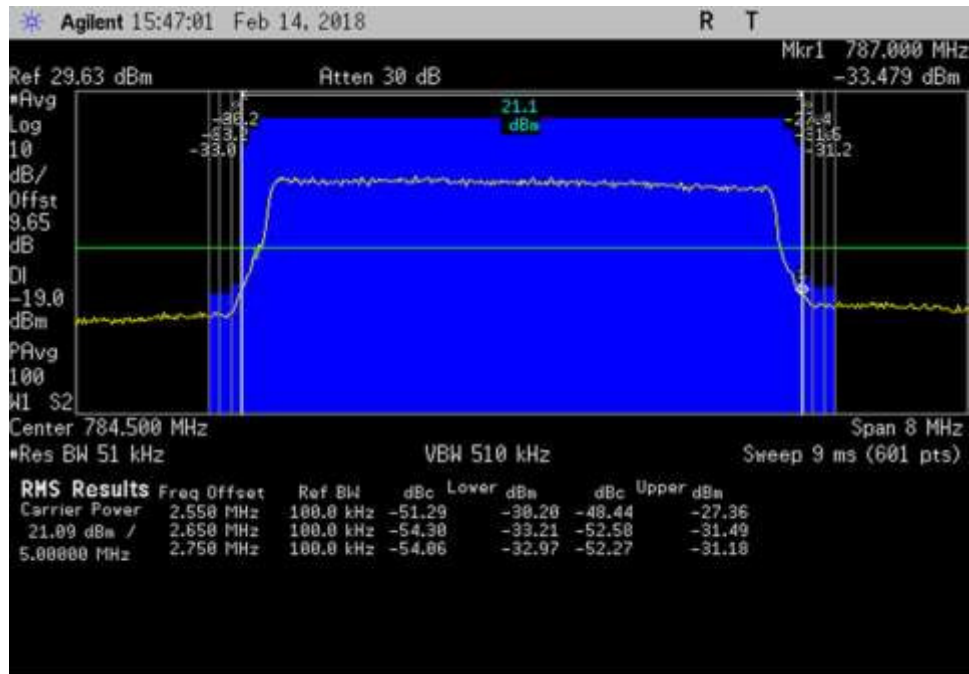
UL_698-716_LTE_696.5- 704.5MHz



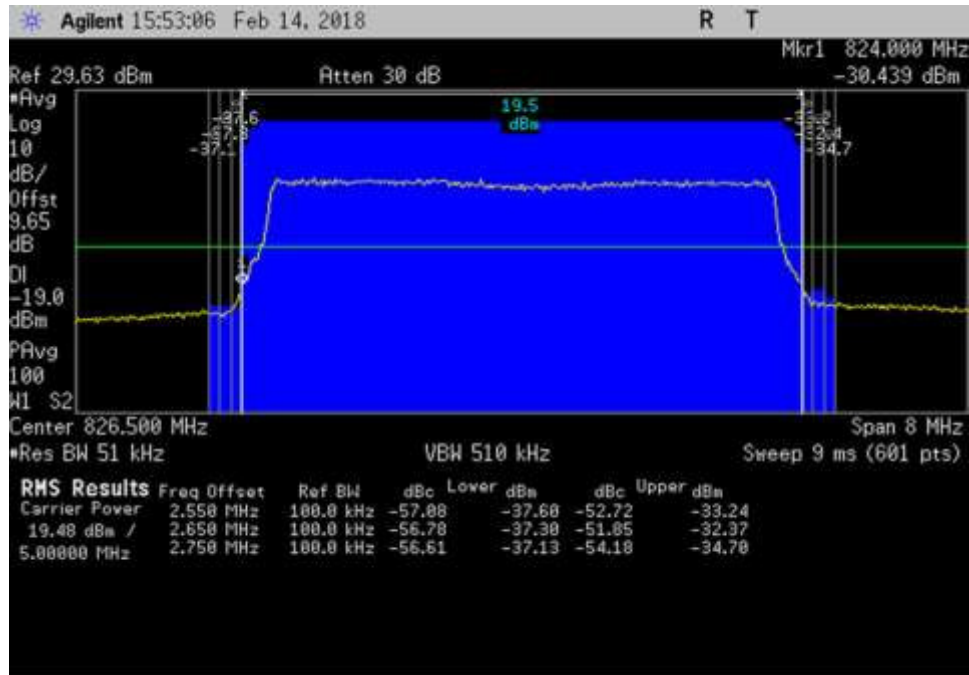
UL_698-716_LTE_709.5- 717.5MHz



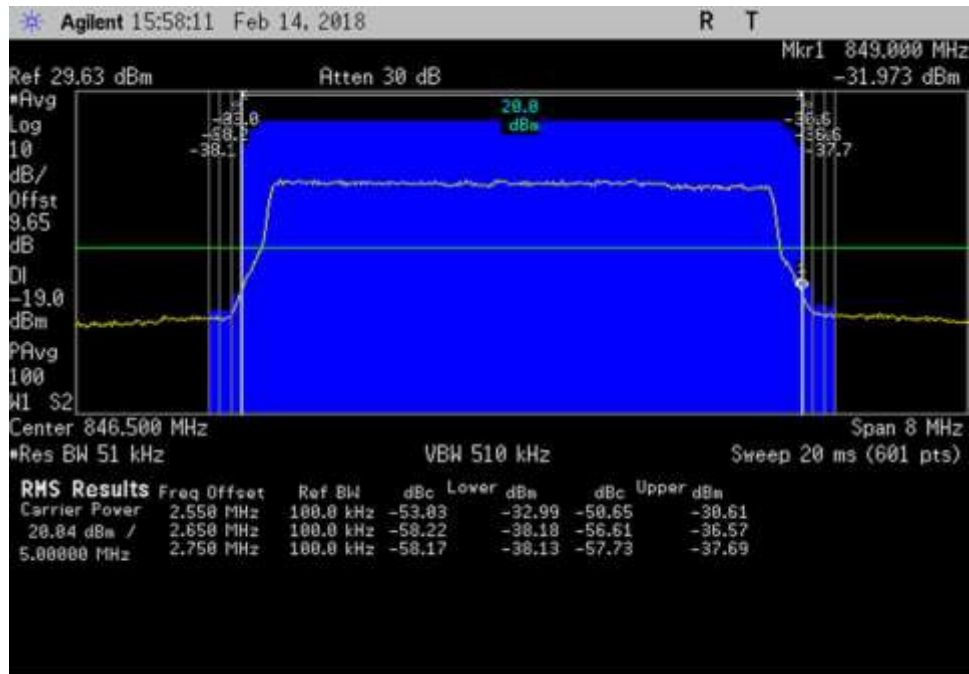
UL_776-787_LTE_774.5-782.5MHz



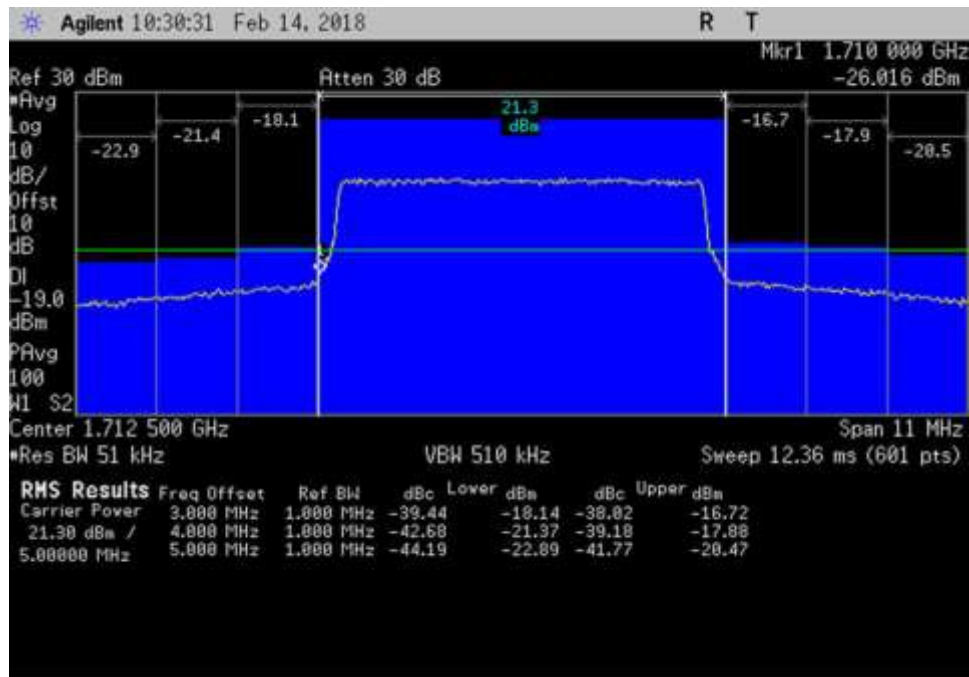
UL_776-787_LTE_780.5-788.5MHz



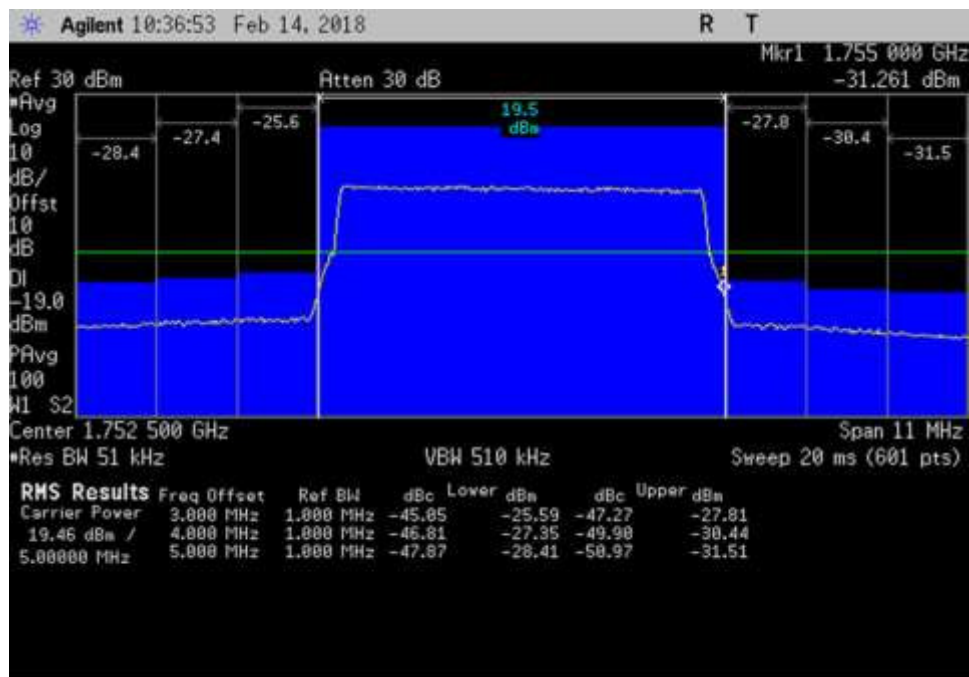
UL_824-849_LTE_ 822.5- 830.5MHz



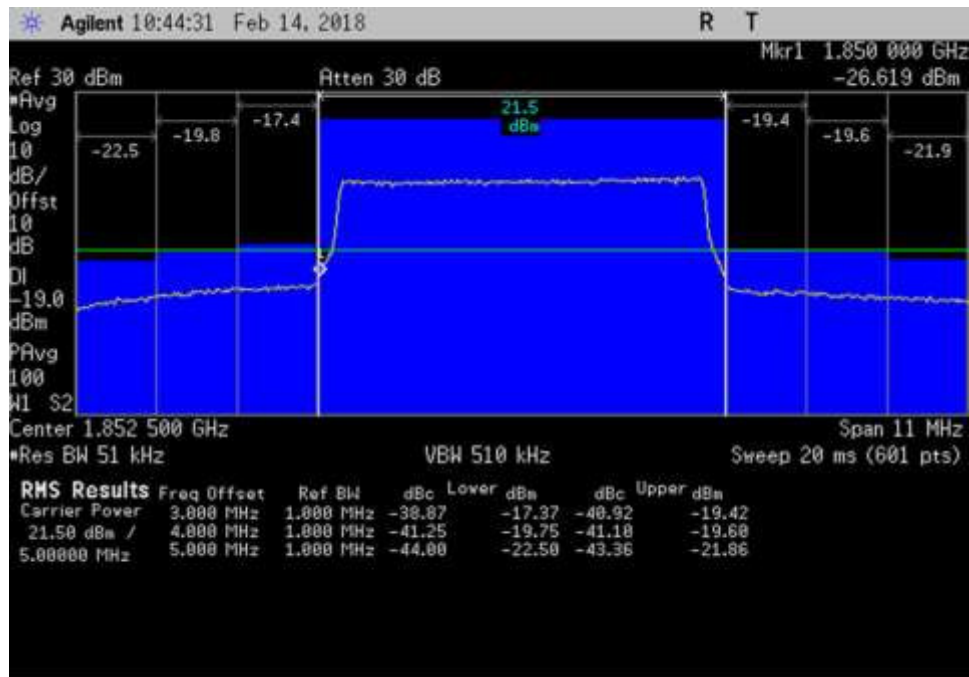
UL_824-849_LTE_ 842.5- 850.5MHz



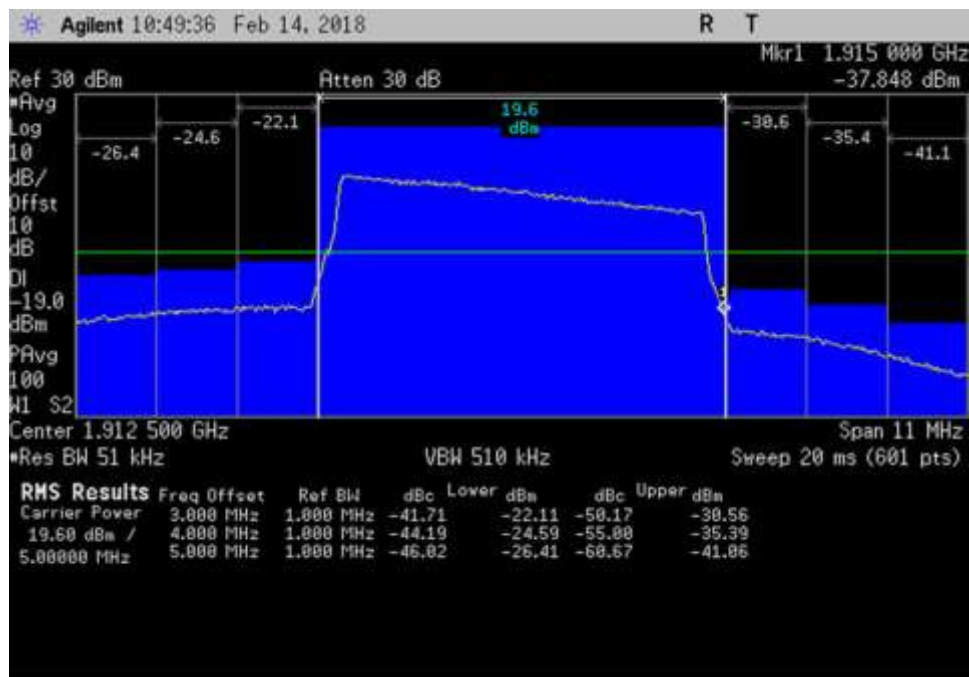
UL_1710-1755_LTE_1707-1718MHz



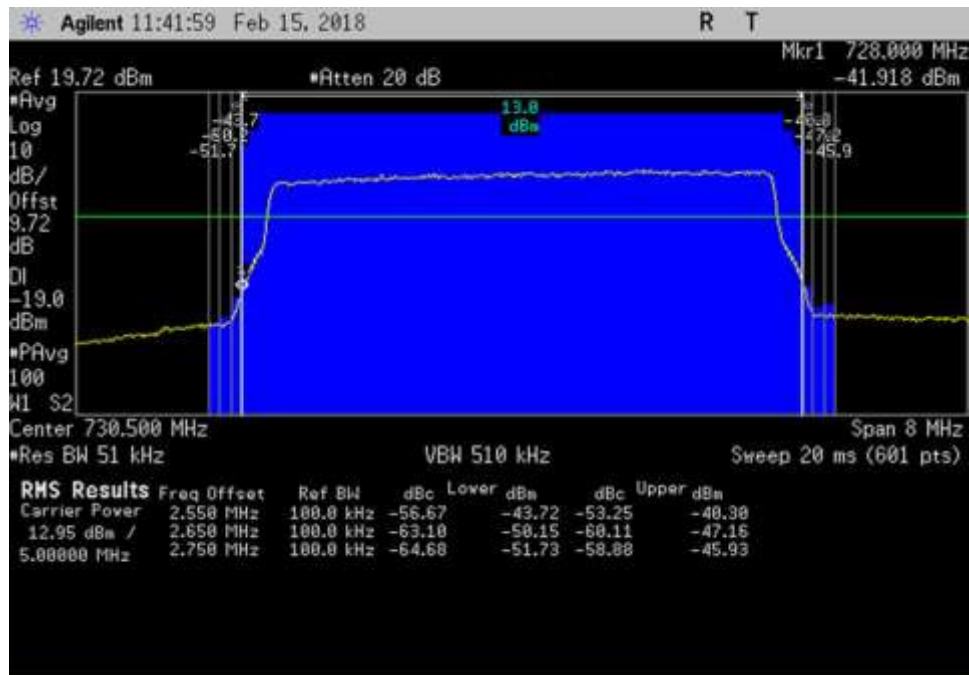
UL_1710-1755_LTE_1747-1758MHz



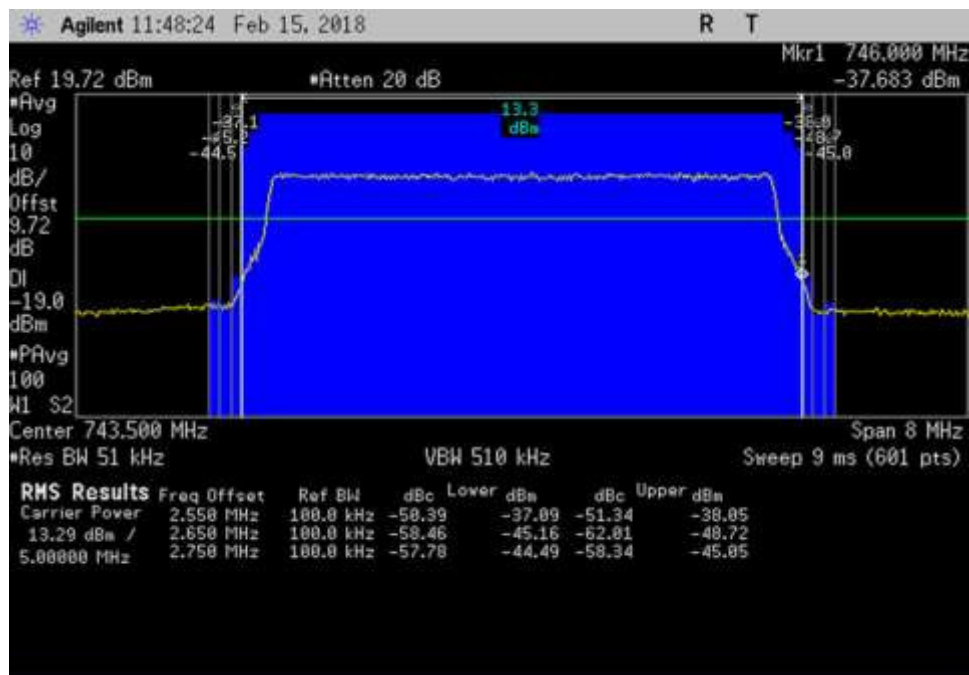
UL_1850-1915_LTE_1847-1858MHz



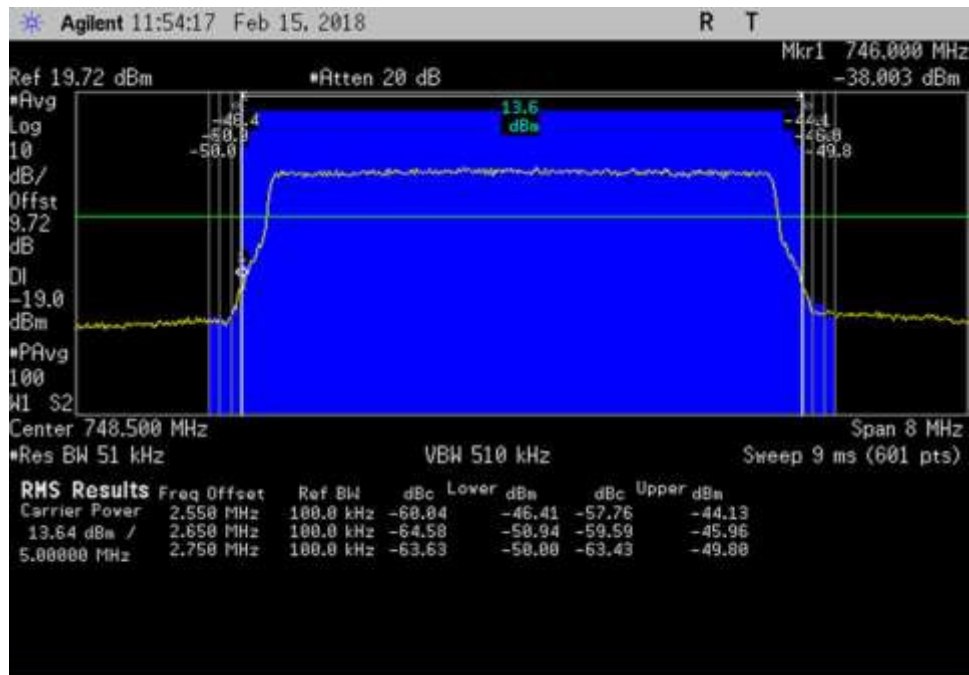
UL_1850-1915_LTE_1907-1918MHz



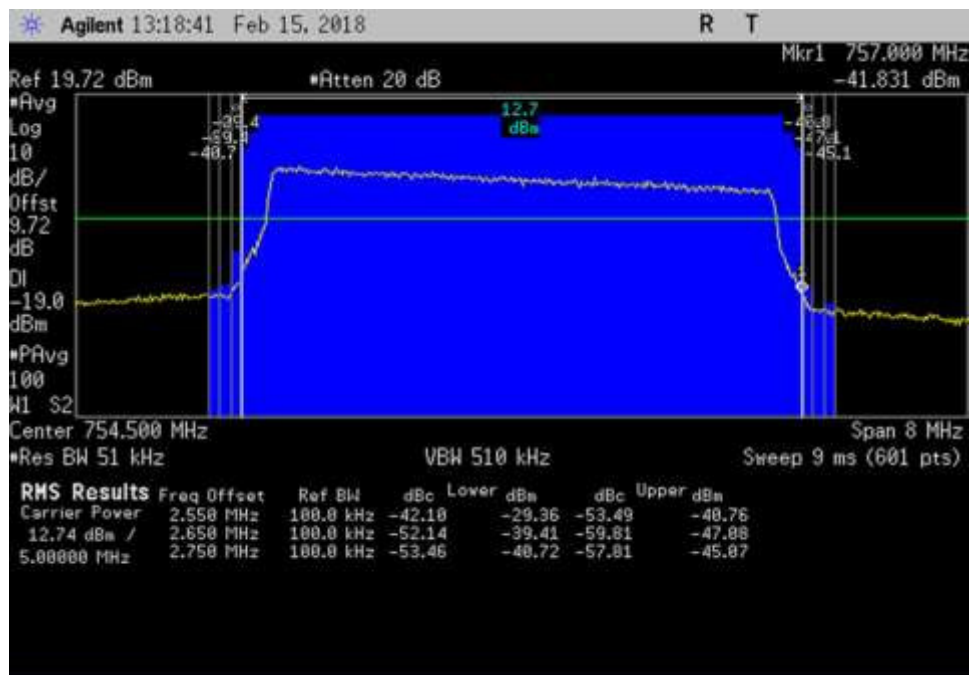
DL_728-746_LTE_ 726.5- 734.5MHz



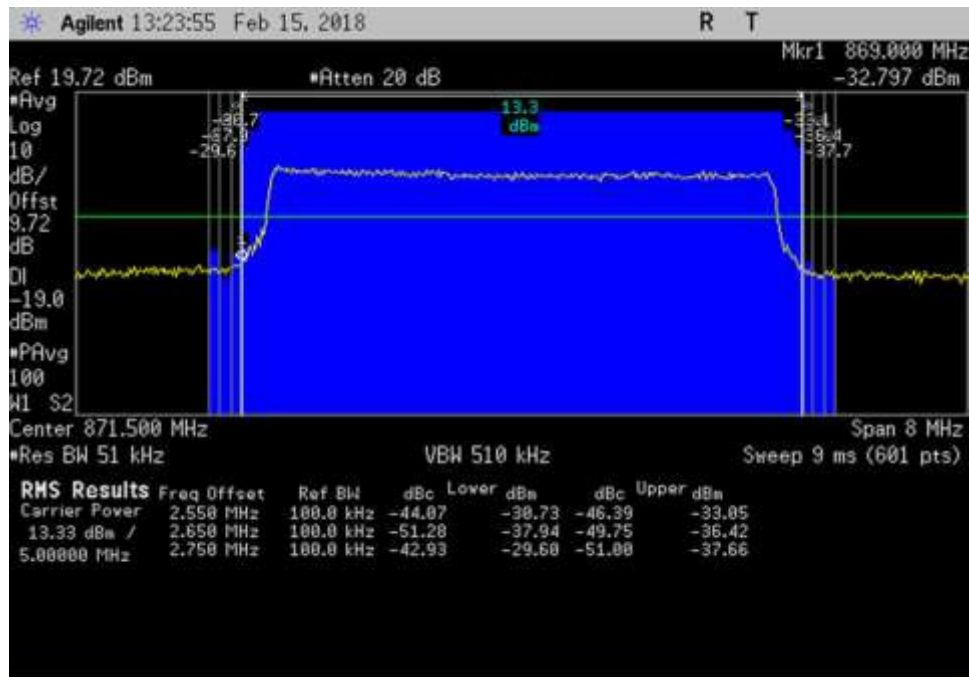
DL_728-746_LTE_ 739.5- 747.5MHz



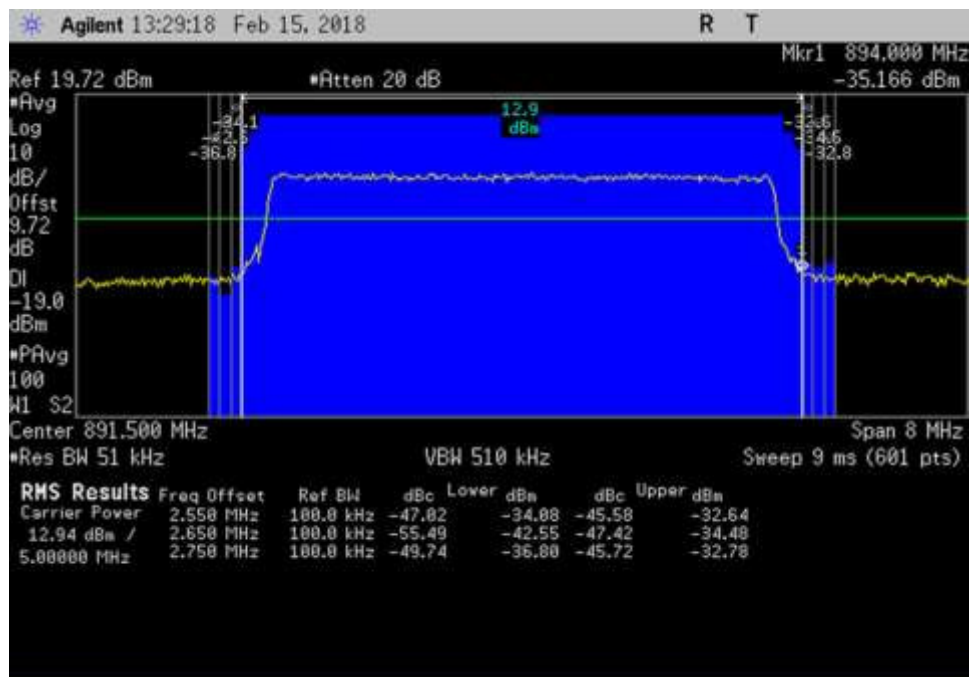
DL_746-757_LTE_ 744.5- 752.5MHz



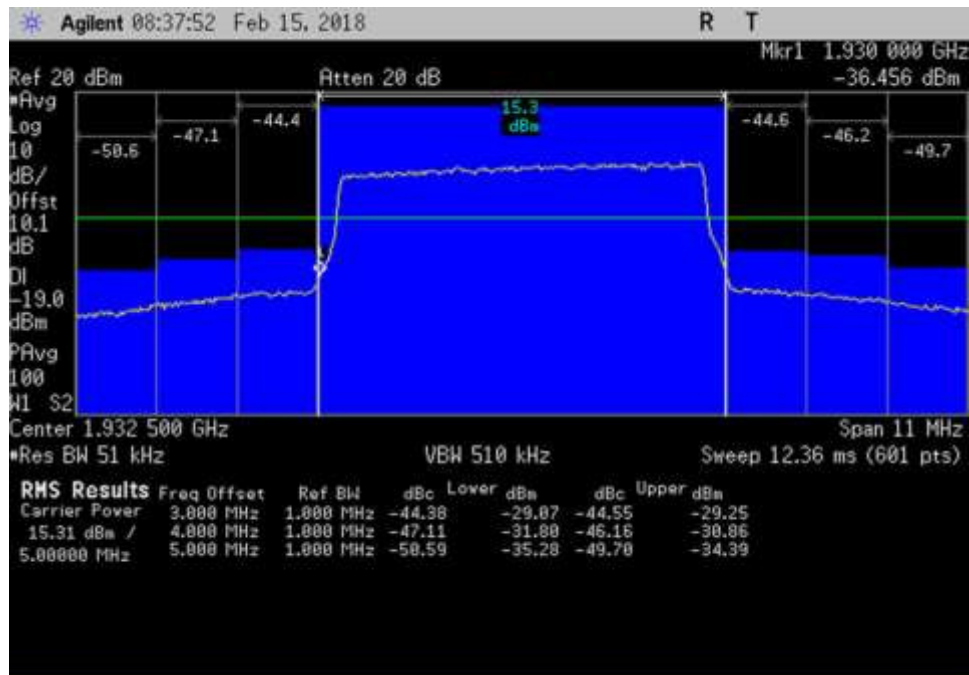
DL_746-757_LTE_ 750.5- 758.5MHz



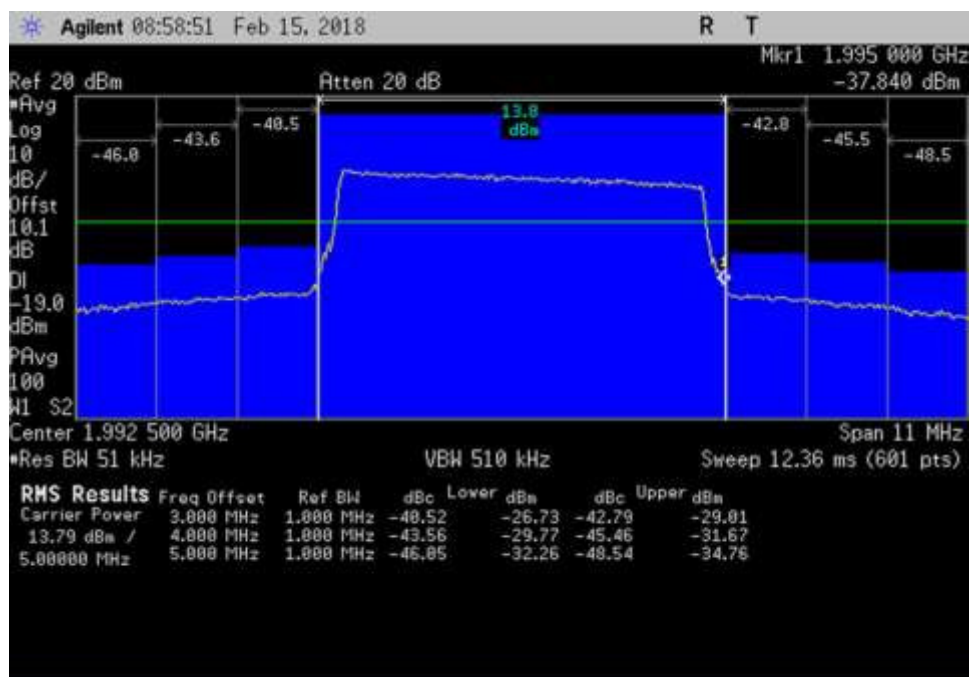
DL_869-894_LTE_ 867.5- 875.5MHz



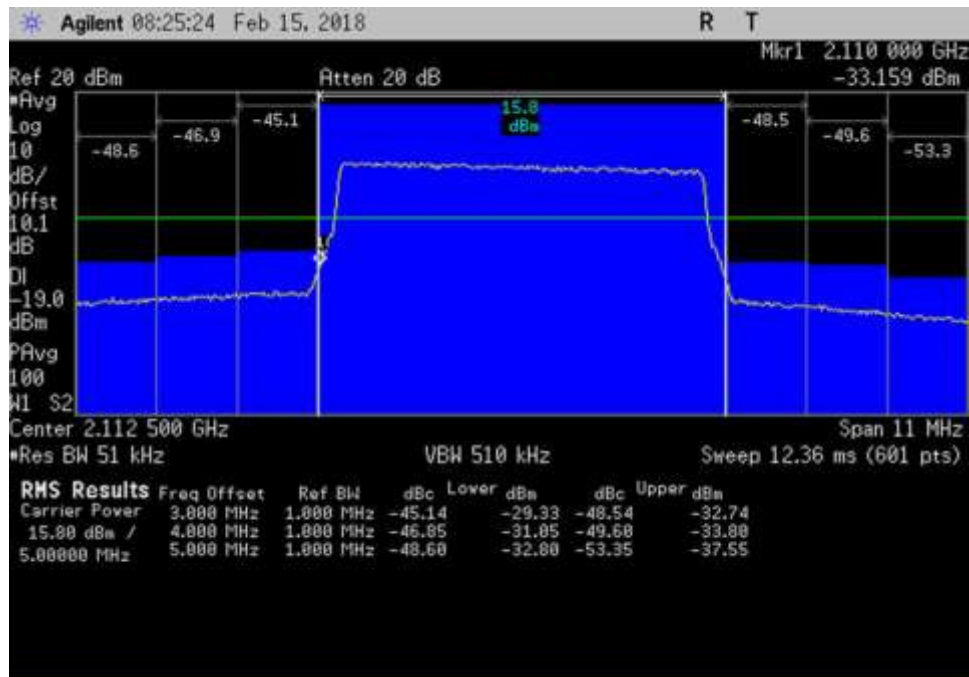
DL_869-894_LTE_ 887.5- 895.5MHz



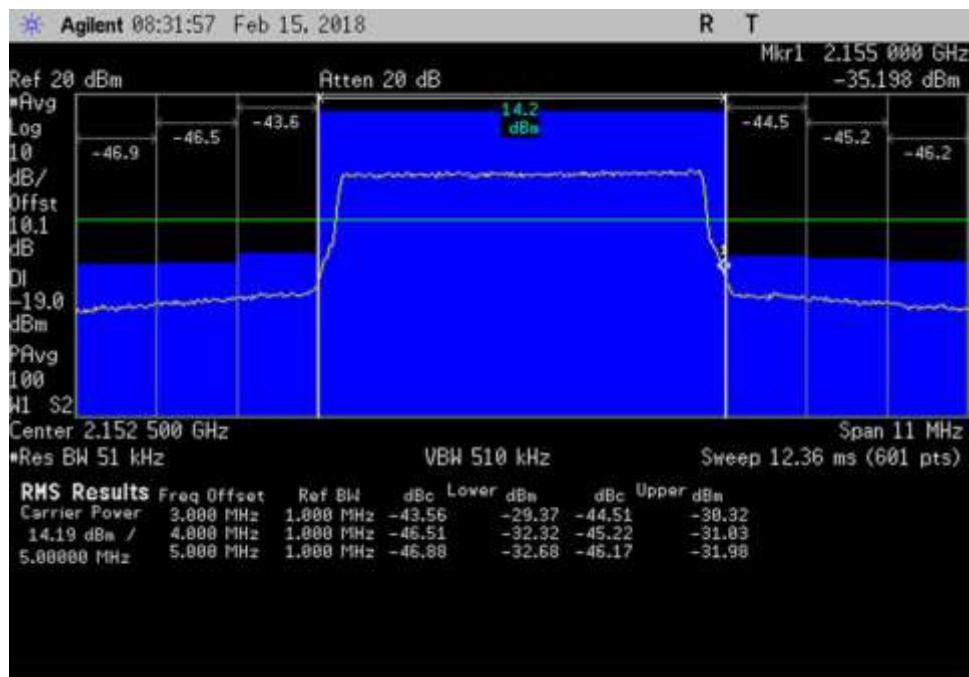
DL_1930-1995_LTE_1927-1938MHz



DL_1930-1995_LTE_1987-1998MHz



DL_2110-2155_LTE_ 2107- 2118MHz



DL_2110-2155_LTE_ 2147- 2158MHz

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 #: **100827** Date 02/15/18
 Test Type: **Conducted Emissions**
 Tested By: **Hieu S Nguyenpham**
 Software: **EMITest 5.03.11**

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:

Temperature: 19.6°C

Relative Humidity: 43%

Pressure: 101.6 kPa

Frequency range of measurement = 30MHz- 22GHz.

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 v04r01, 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:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020

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)		(dBW/MHz)	(dBm)	(dBm)
UL 776-787	-0.52		-70.0	-40	-40.52

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

$$\text{REQUIRED ATTENUATION} = 43 + 10 \log P \text{ DB}$$

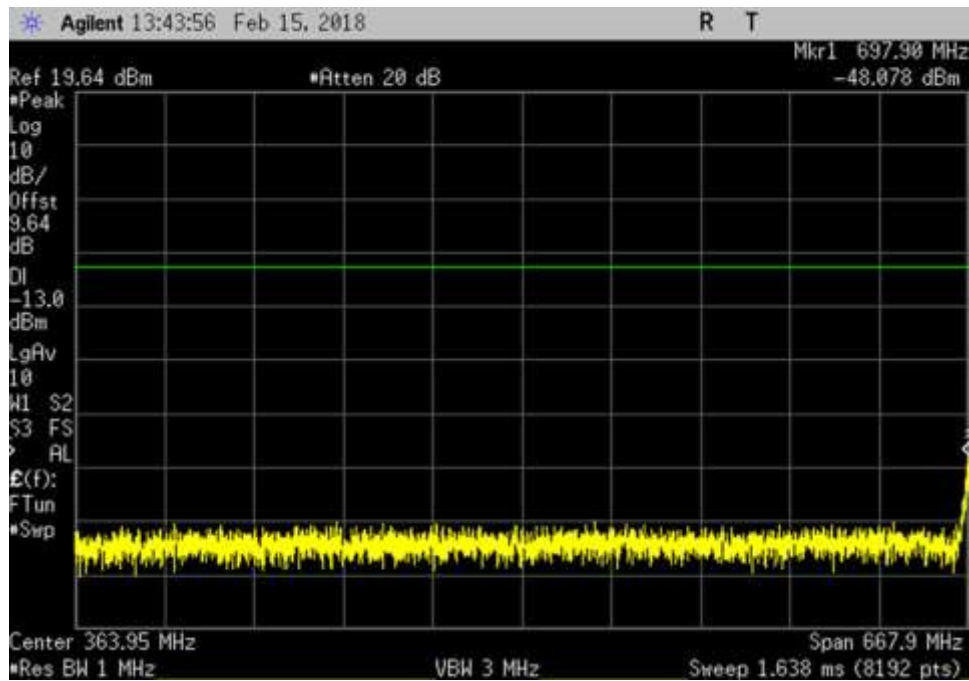
$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

$$\begin{aligned} V_{\text{dBuV}} &= 20 \log \frac{V}{1 \times 10^{-6}} \\ &= 20 (\log V - \log 1 \times 10^{-6}) \\ &= 20 \log V - 20 \log 1 \times 10^{-6} \\ &= 20 \log V - 20(-6) \\ &= 20 \log V + 120 \end{aligned}$$

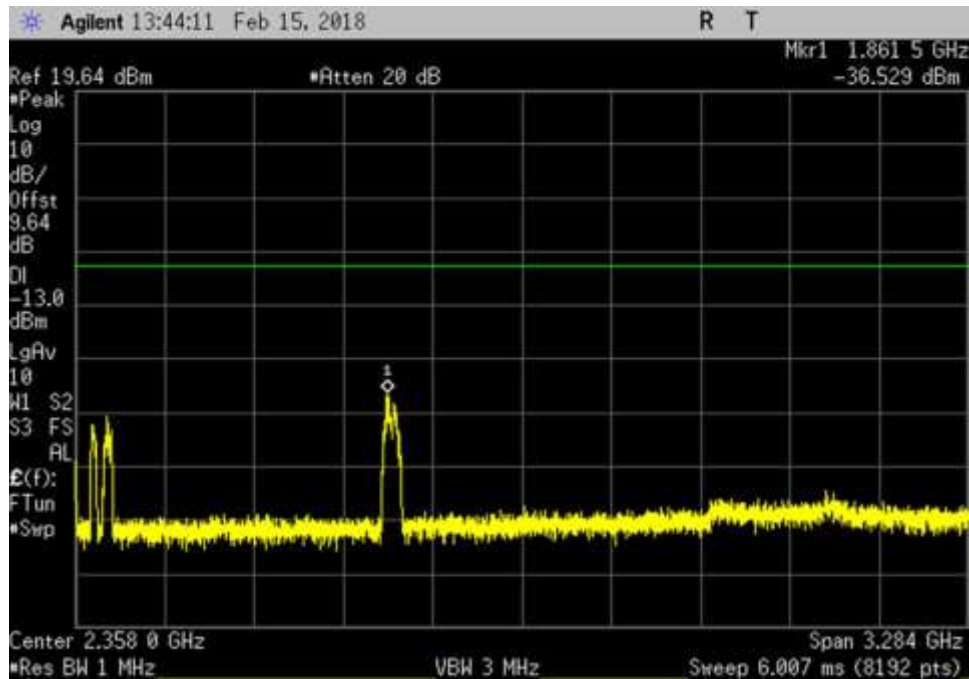
$$\begin{aligned} \text{Attenuation} &= 43 + 10 \log P \\ &= 43 + 10 \log \frac{V^2}{R} \\ &= 43 + 10 (\log V^2 - \log R) \\ &= 43 + 10 (2 \log V - \log R) \\ &= 43 + 20 \log V - 10 \log R \end{aligned}$$

$$\begin{aligned} \text{Limit line} &= V_{\text{dBuV}} - \text{Attenuation} \\ &= 20 \log V + 120 - (43 + 20 \log V - 10 \log R) \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 120 - 43 + 10 \log 50 \quad \text{Note : } R = 50 \Omega \\ &= 120 - 43 + 16.897 \\ &= 94 \text{ dBuV at any power level} \end{aligned}$$

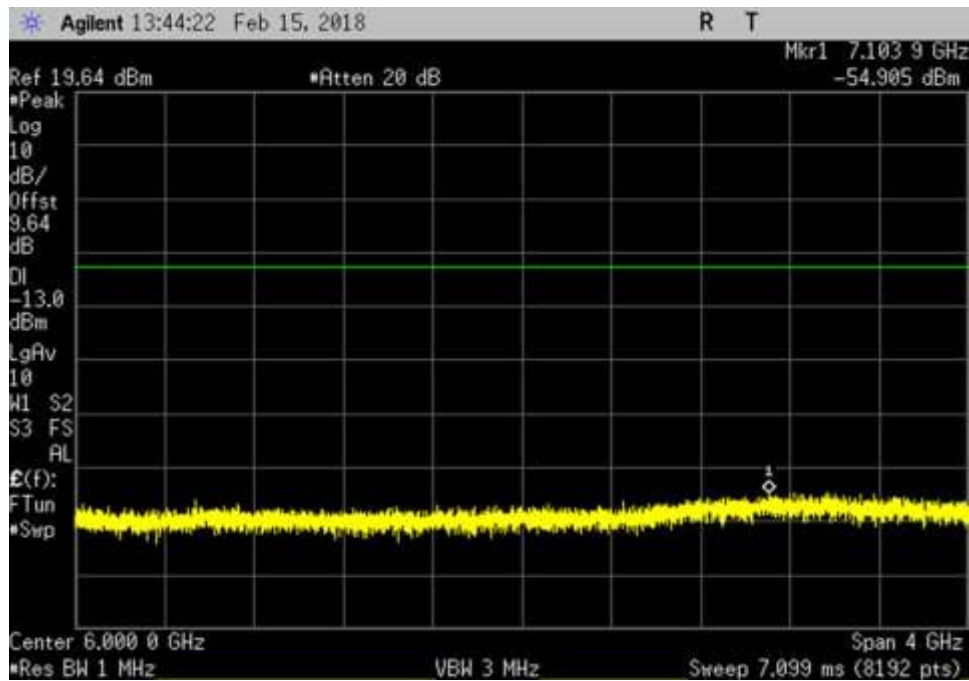
Plots



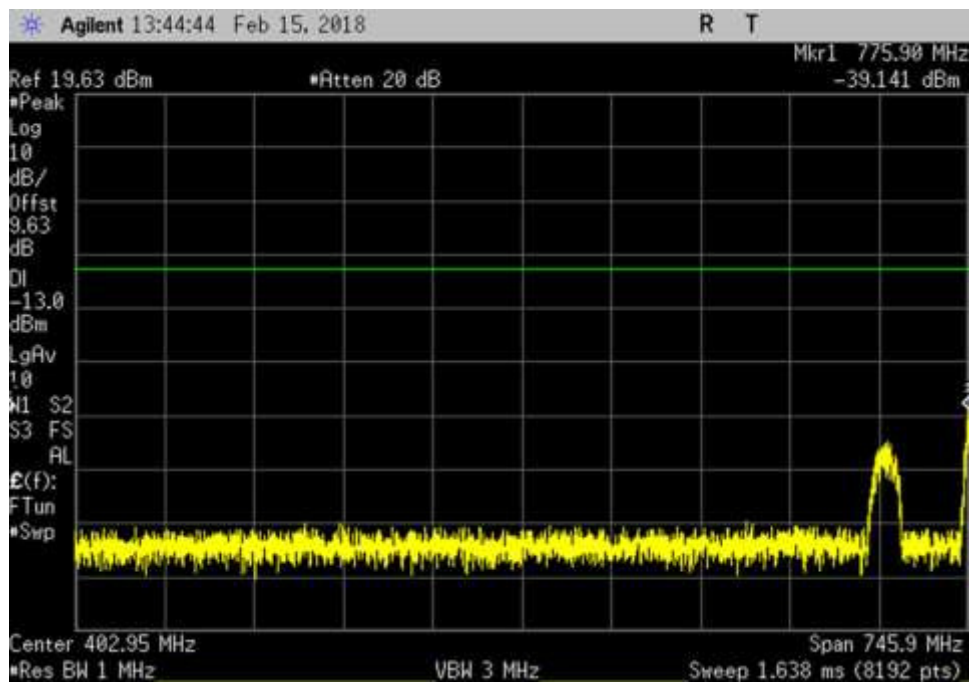
UL_698-716_30- 697.9MHz



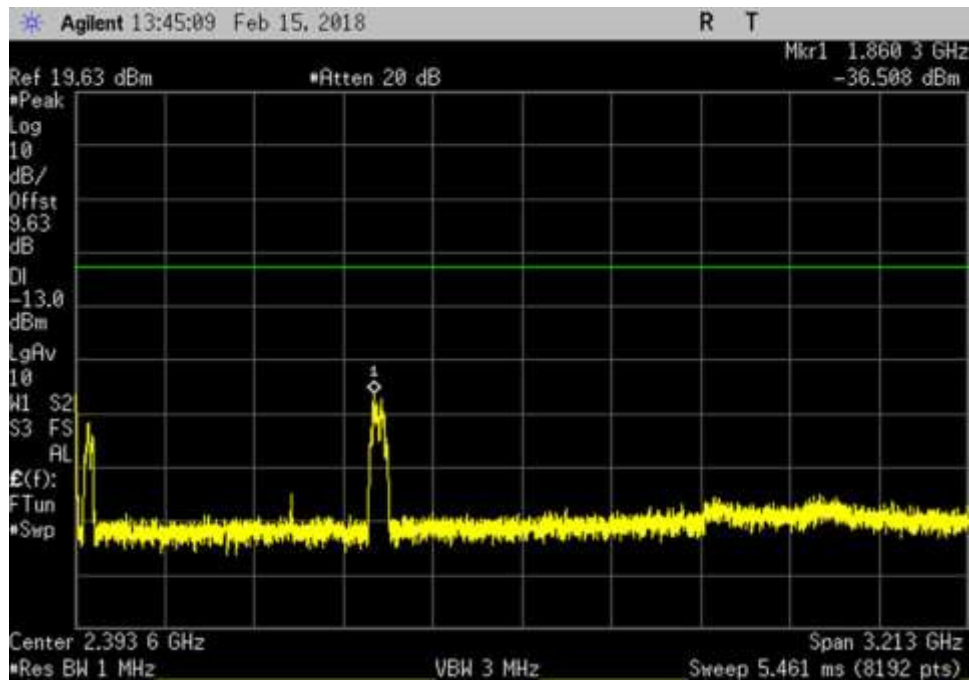
UL_698-716_716.1- 4000MHz



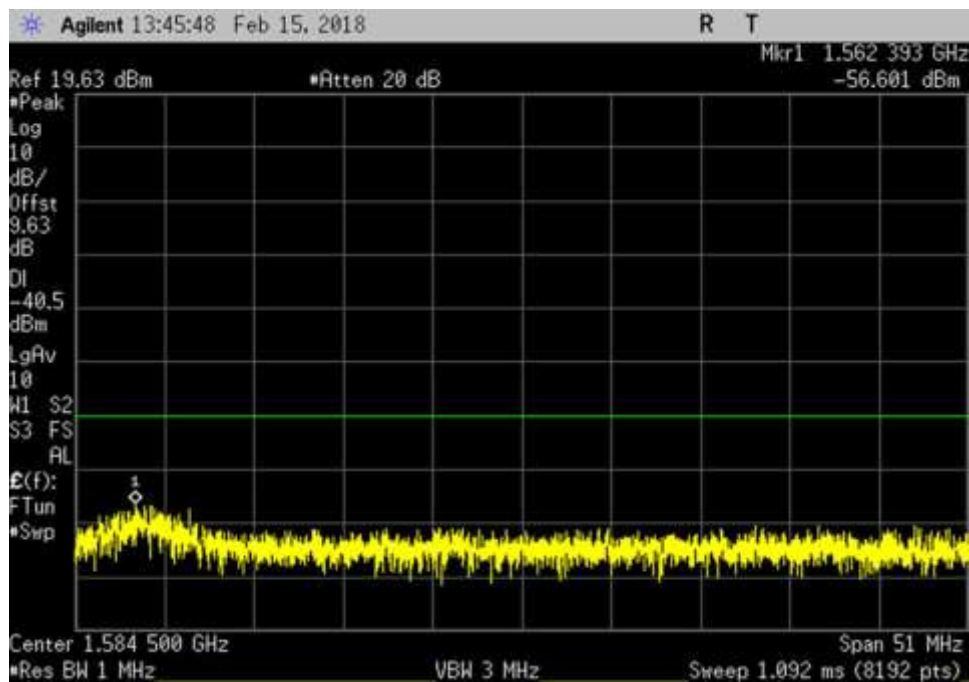
UL_698-716_ 4000- 8000MHz



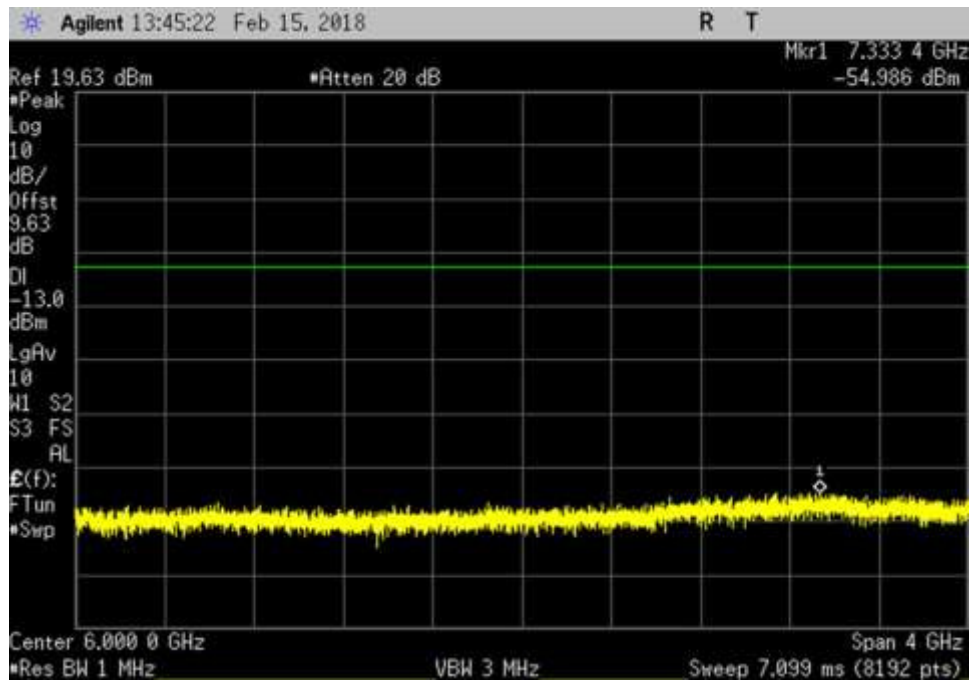
UL_776-787_ 30- 775.9MHz



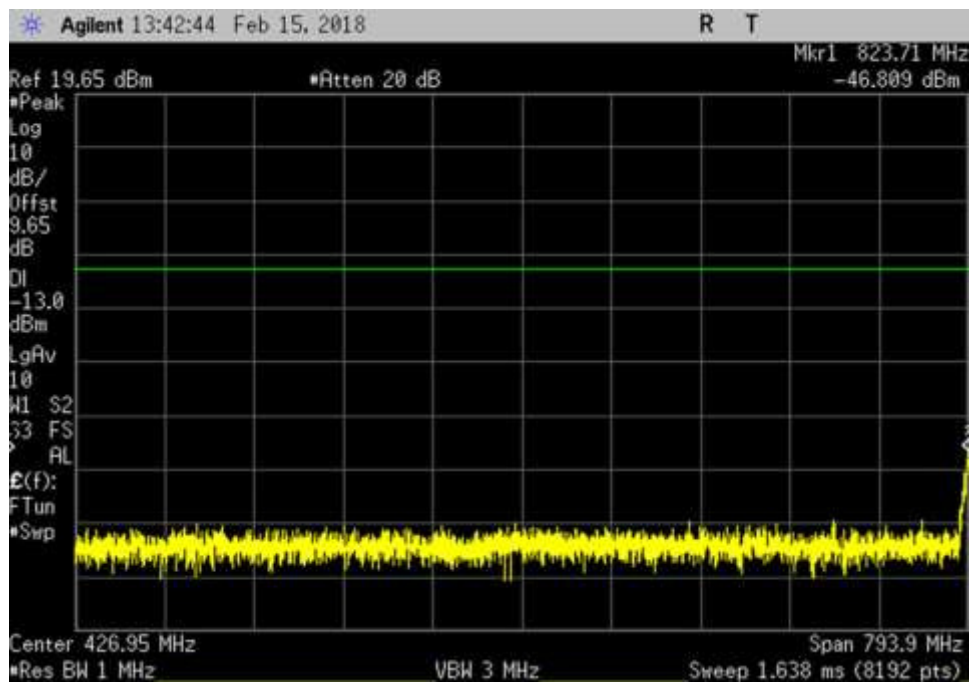
UL_776-787_ 787.1- 4000MHz



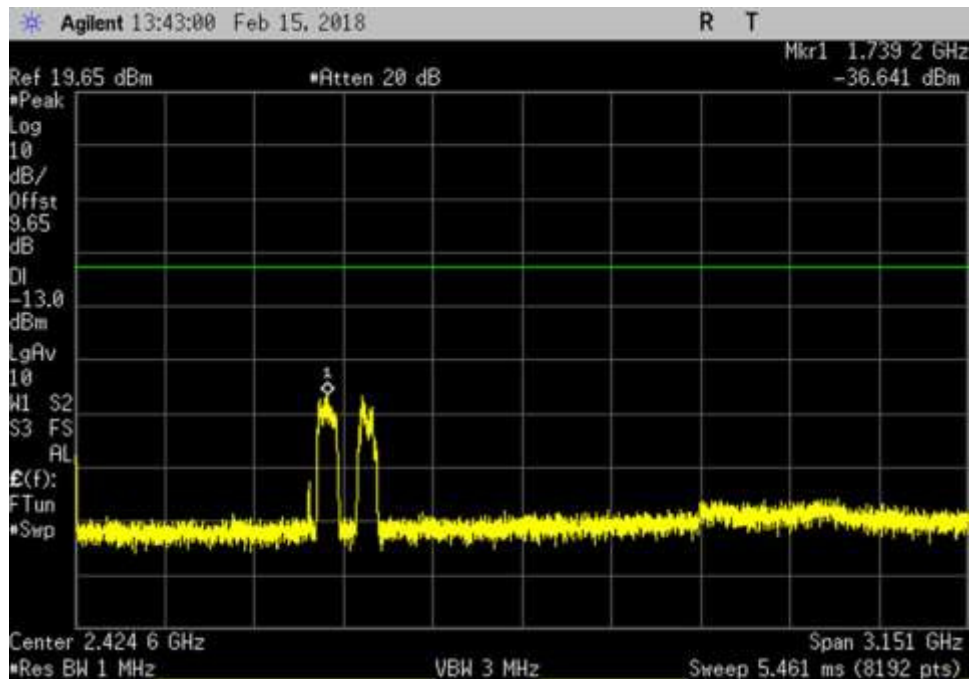
UL_776-787_ 1559- 1610MHz



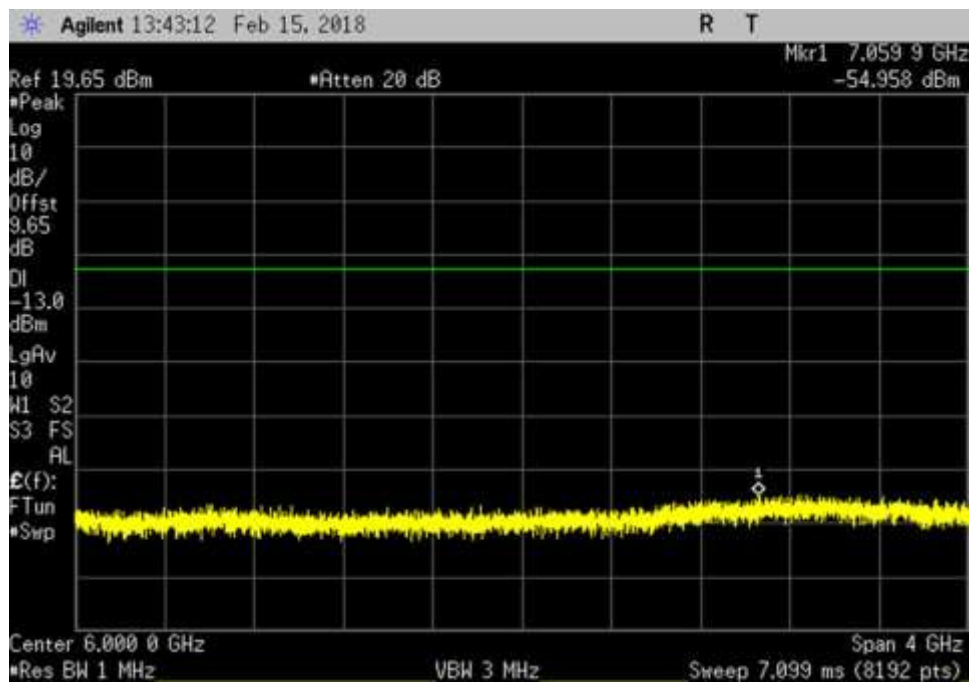
UL_776-787_ 4000- 8000MHz



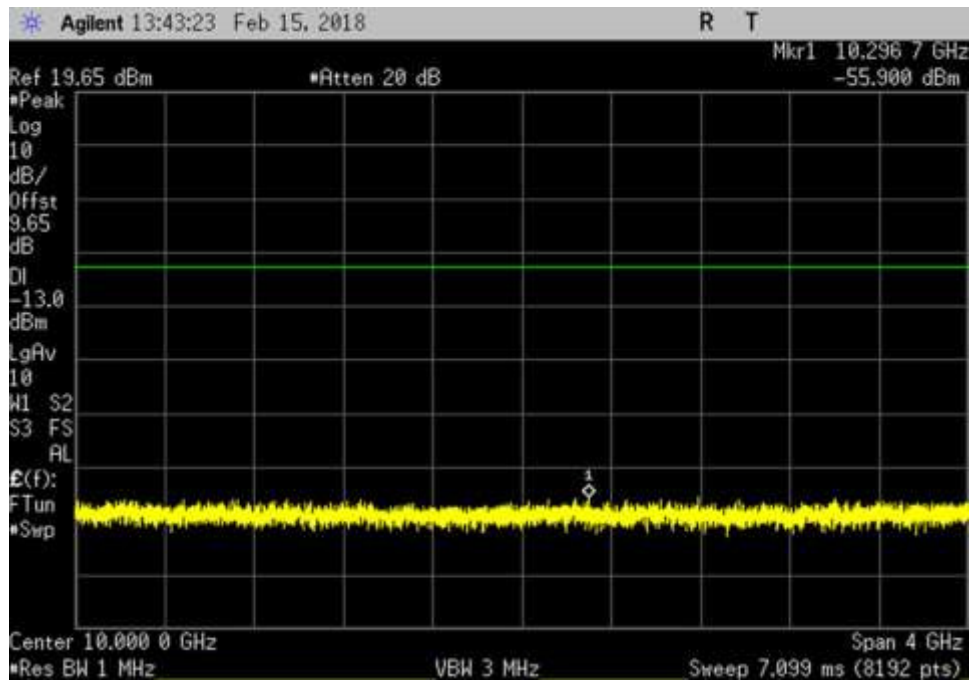
UL_824-849_ 30- 823.9MHz



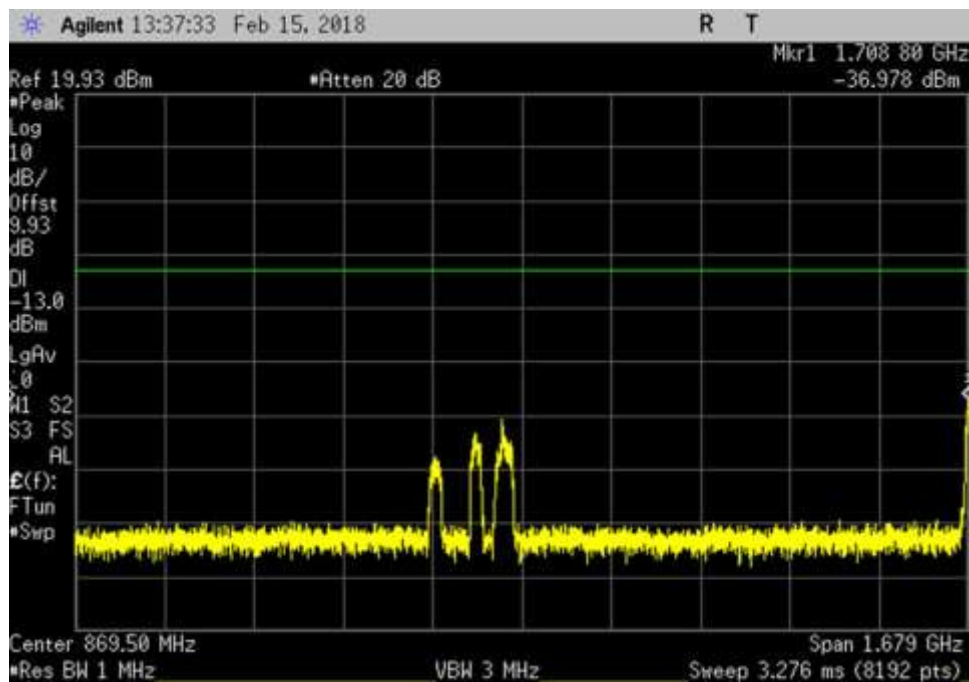
UL_824-849_ 849.1- 4000MHz



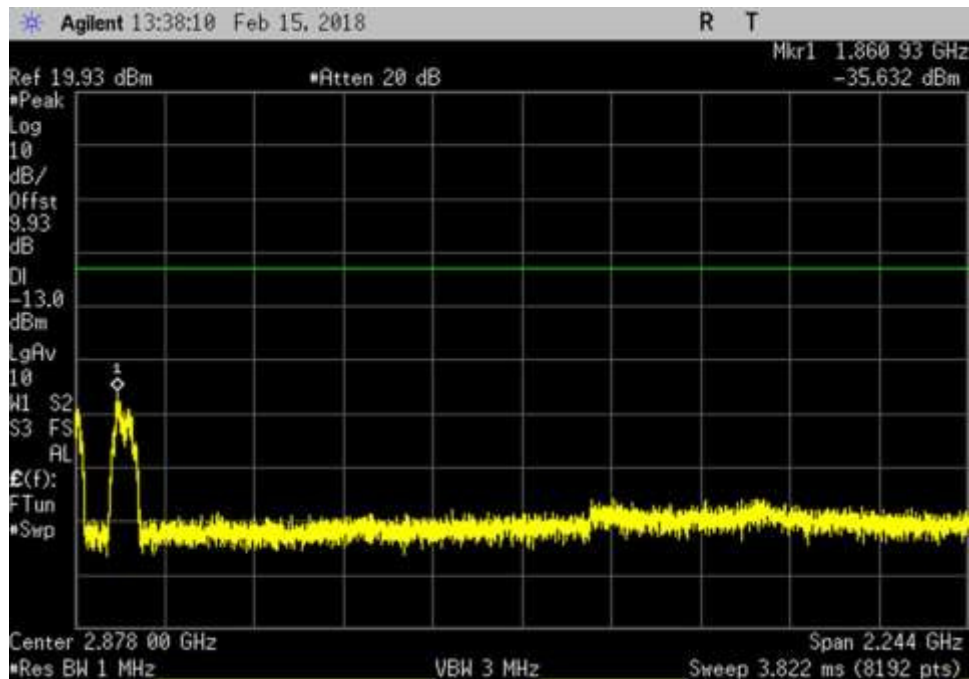
UL_824-849_ 4000- 8000MHz



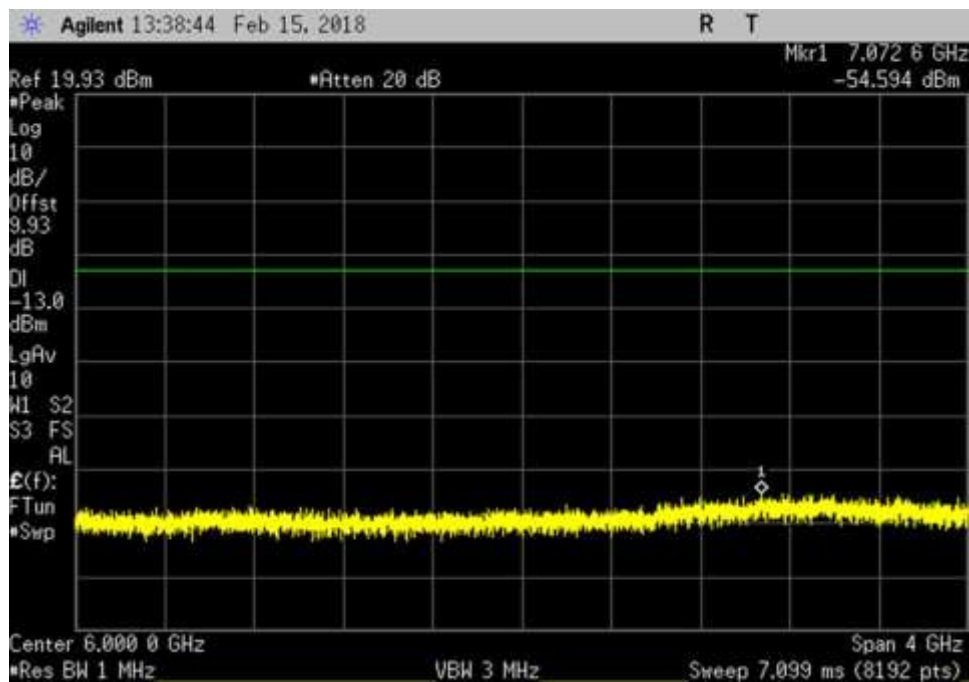
UL_824-849_ 8000- 12000MHz



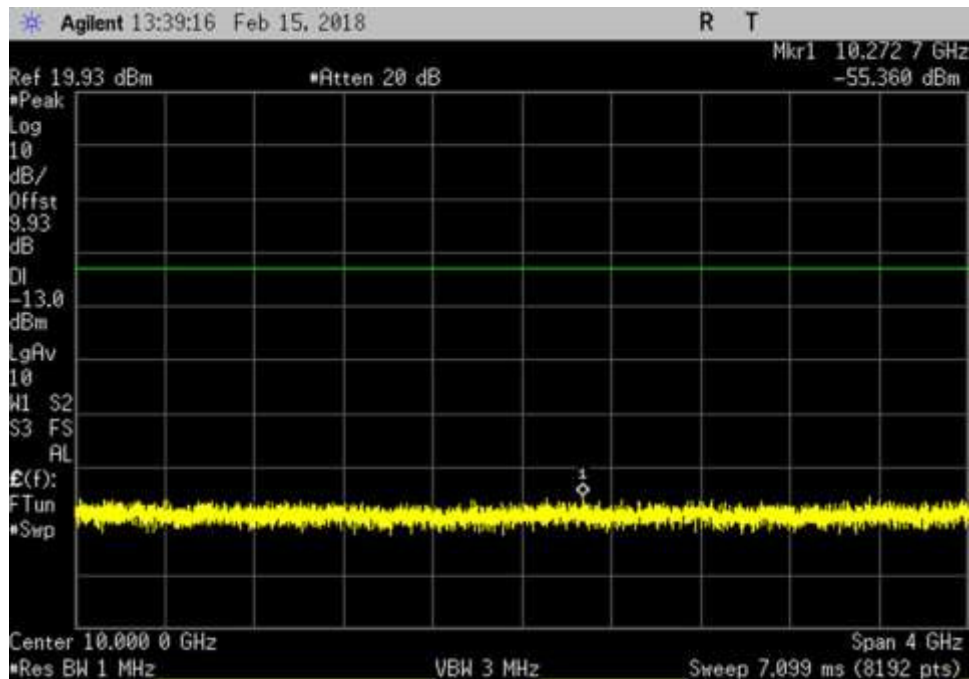
UL_1710-1755_ 30- 1709MHz



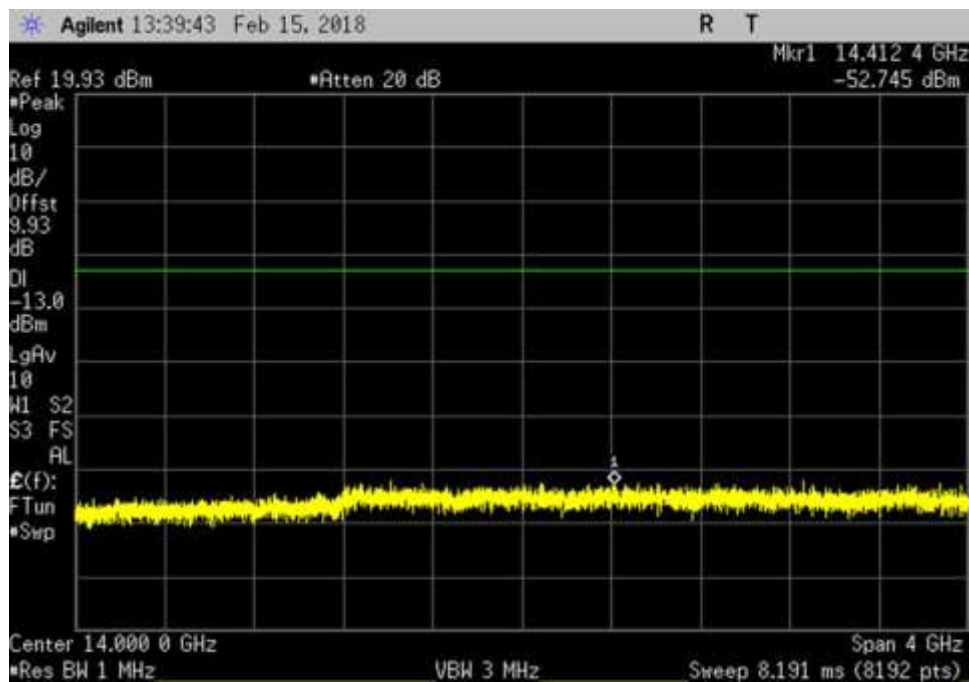
UL_1710-1755_ 1756- 4000MHz



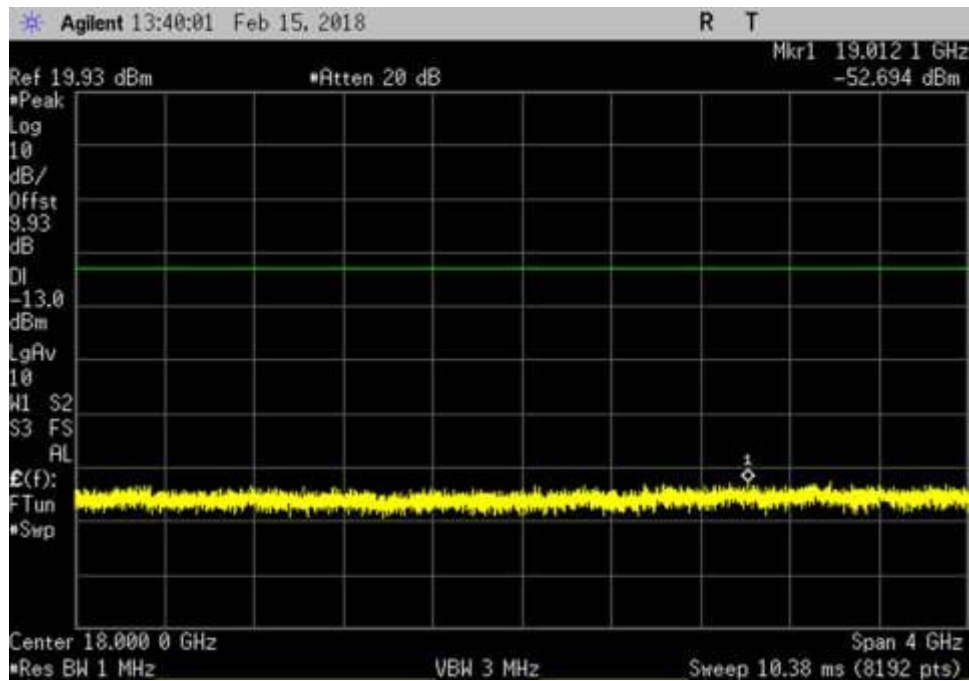
UL_1710-1755_ 4000- 8000MHz



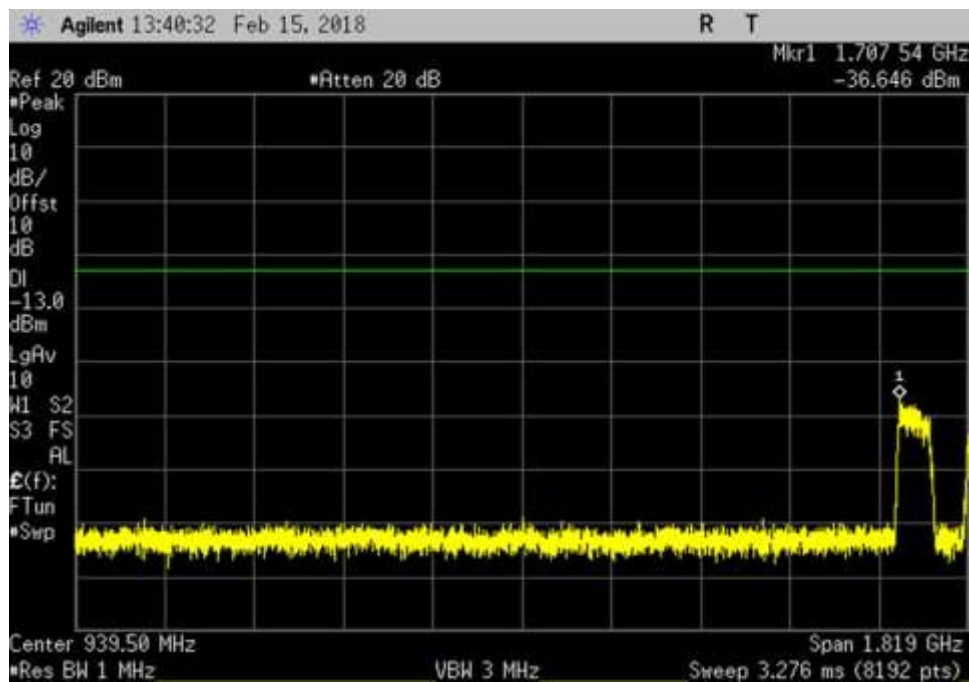
UL_1710-1755_ 8000- 12000MHz



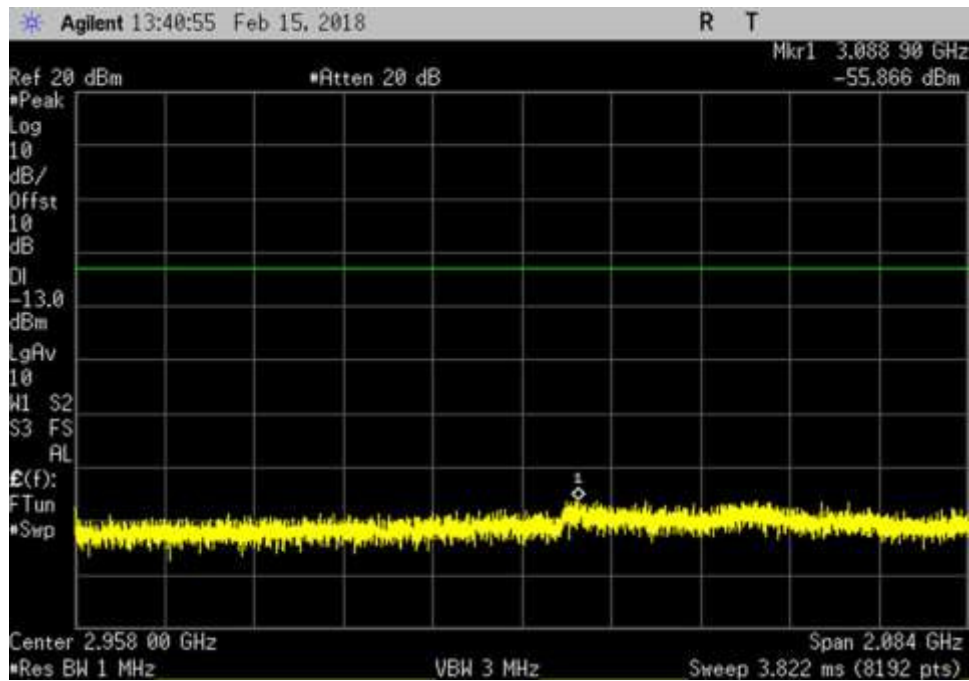
UL_1710-1755_ 12000- 16000MHz



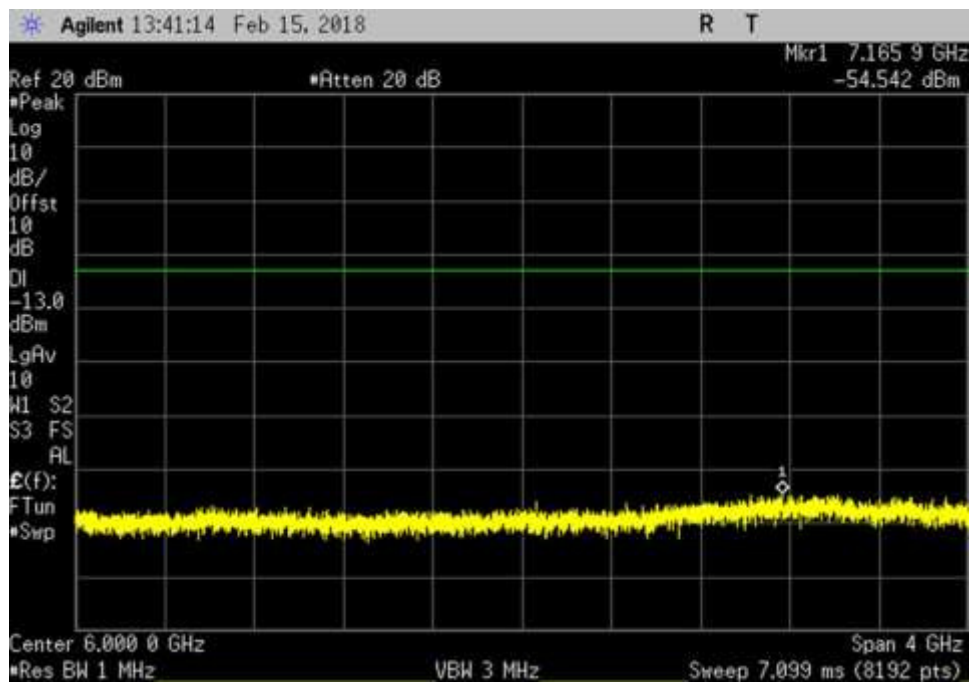
UL_1710-1755_ 16000- 20000MHz



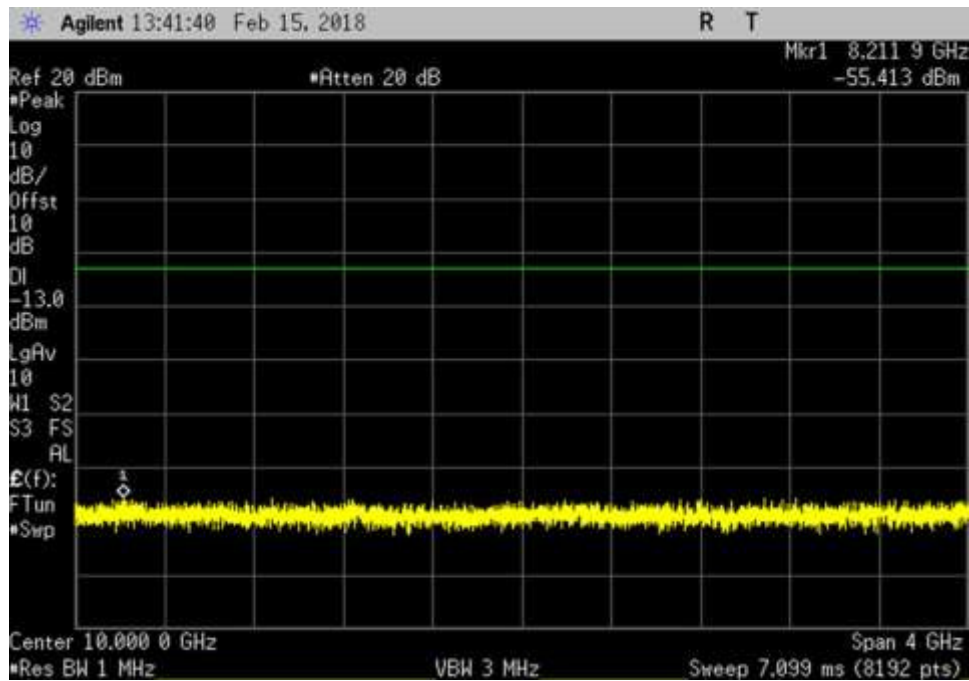
UL_1850-1915_ 30- 1849MHz



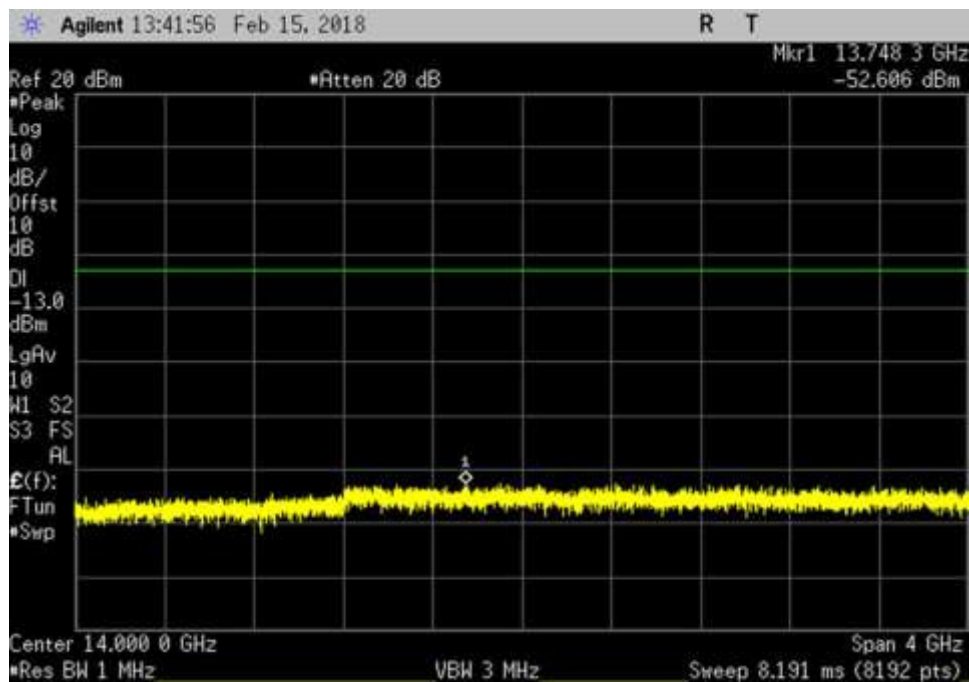
UL_1850-1915_ 1916- 4000MHz



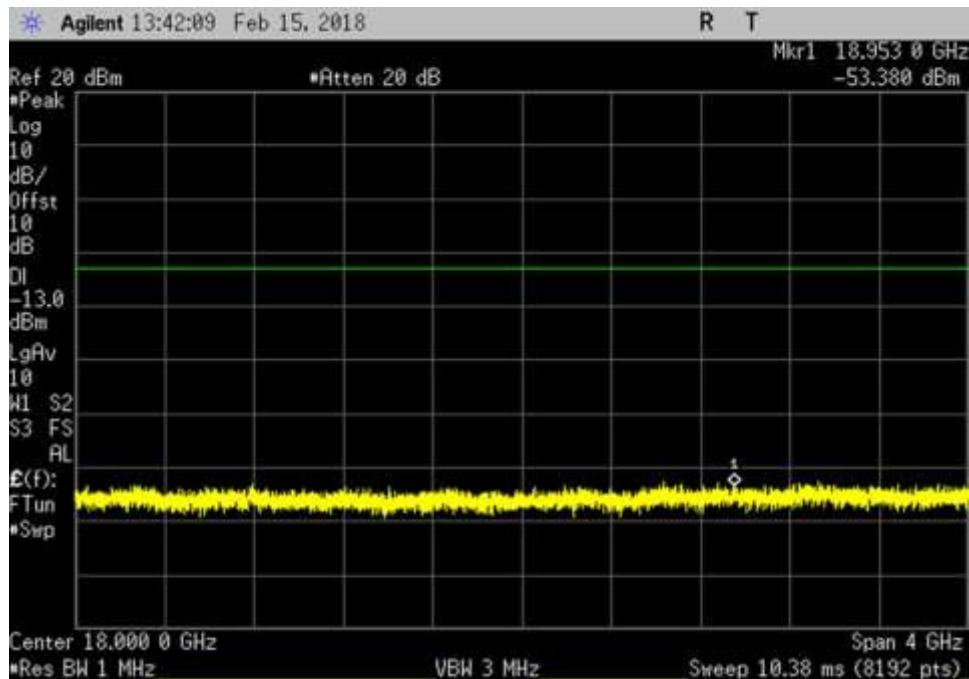
UL_1850-1915_ 4000- 8000MHz



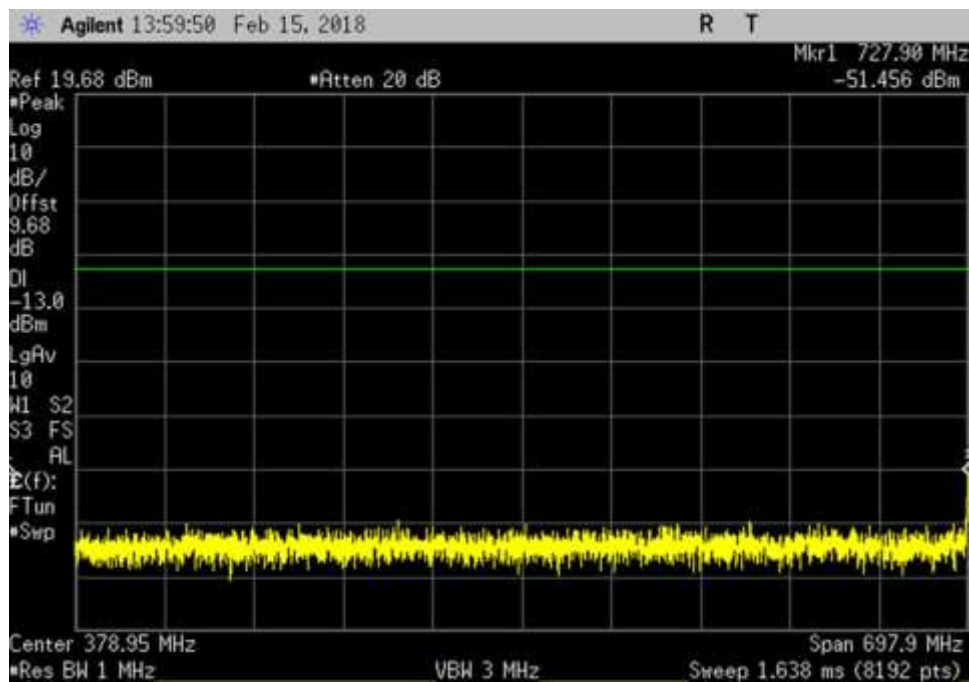
UL_1850-1915_ 8000- 12000MHz



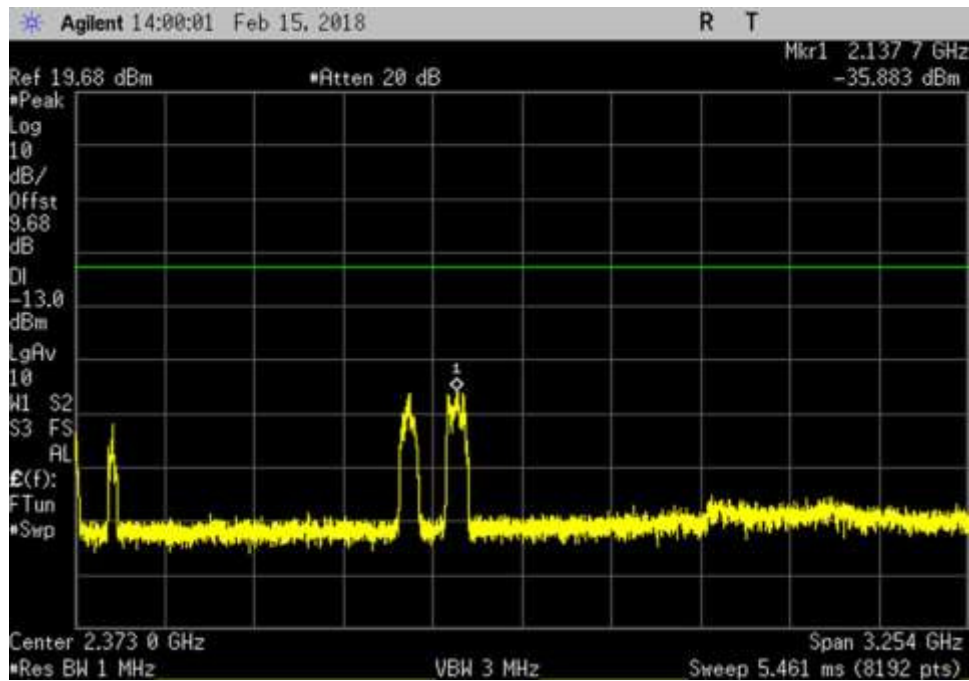
UL_1850-1915_ 12000- 16000MHz



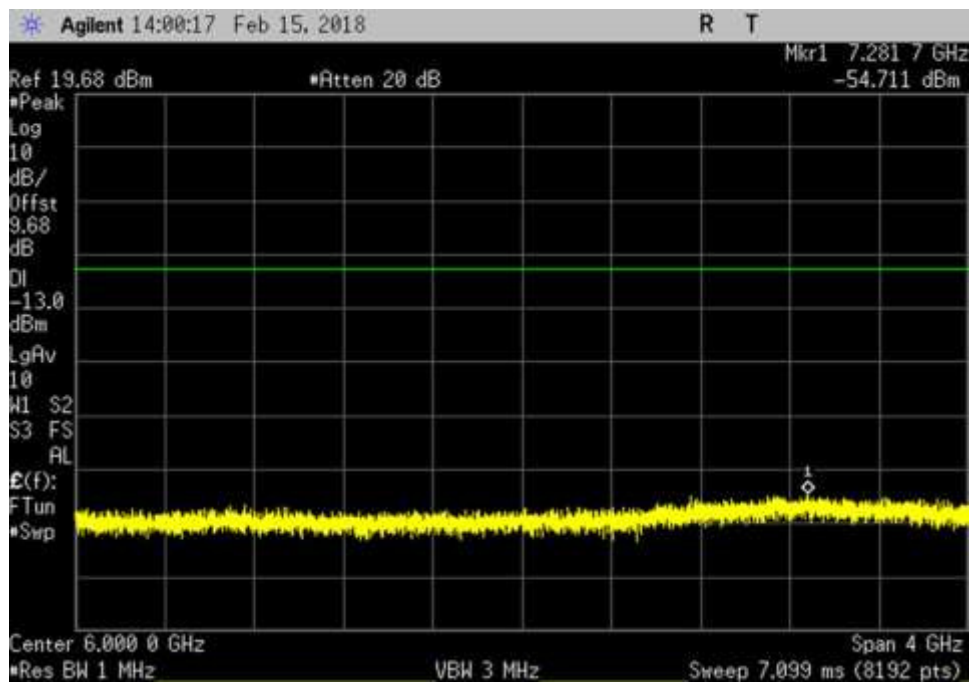
UL_1850-1915_ 16000- 20000MHz



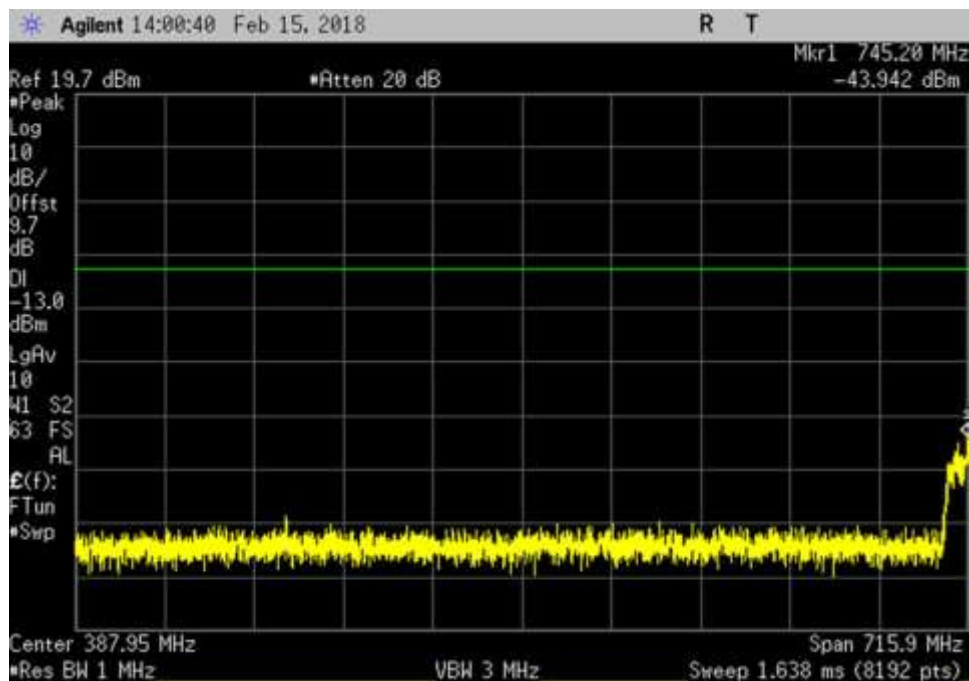
DL_728-746_ 30- 727.9MHz



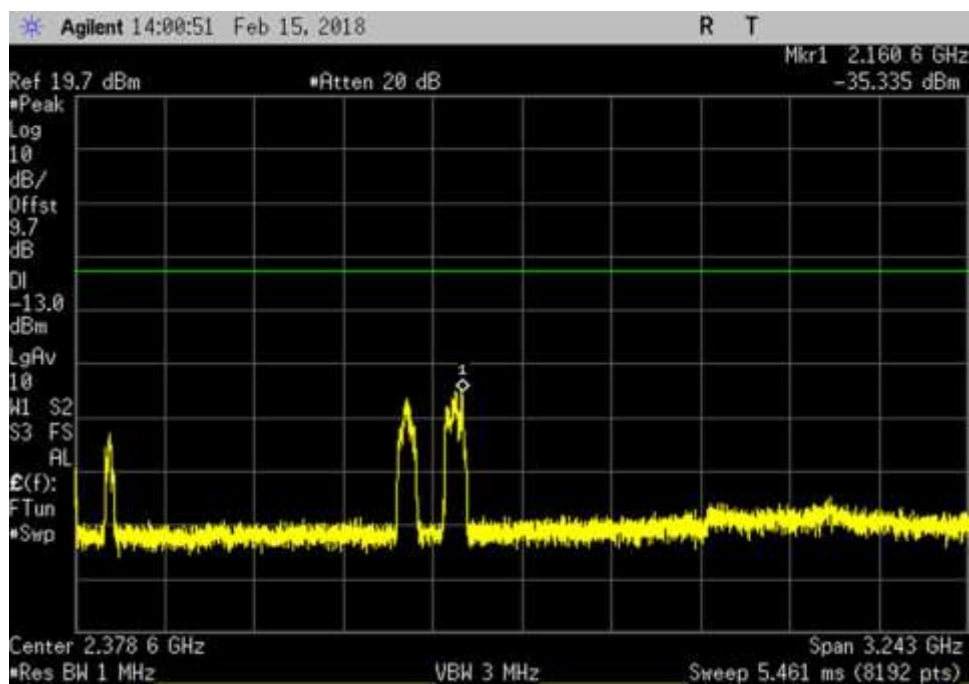
DL_728-746_ 746.1- 4000MHz



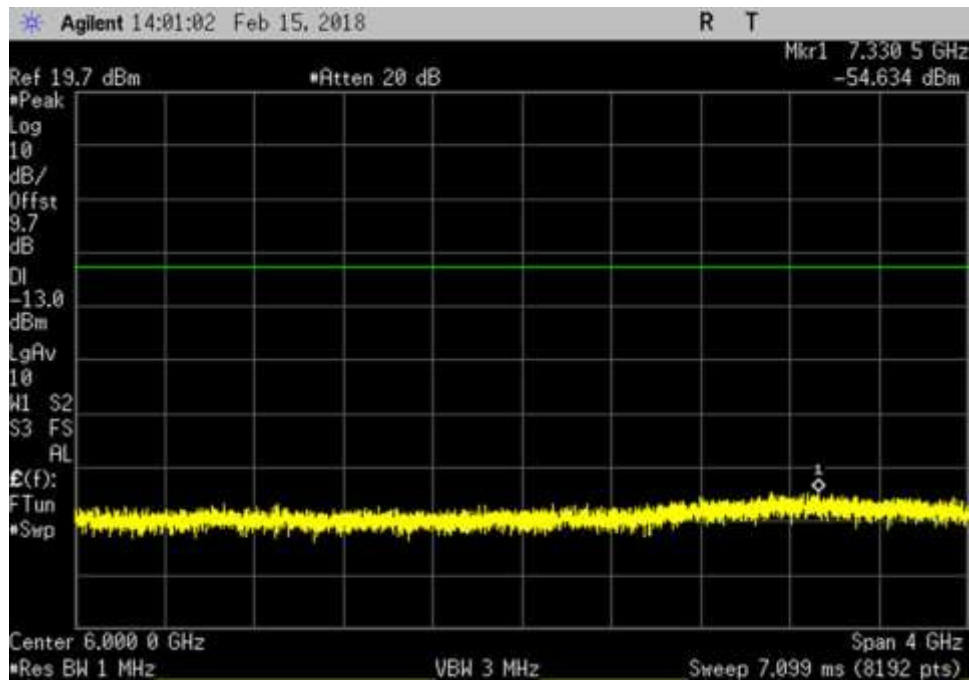
DL_728-746_ 4000- 8000MHz



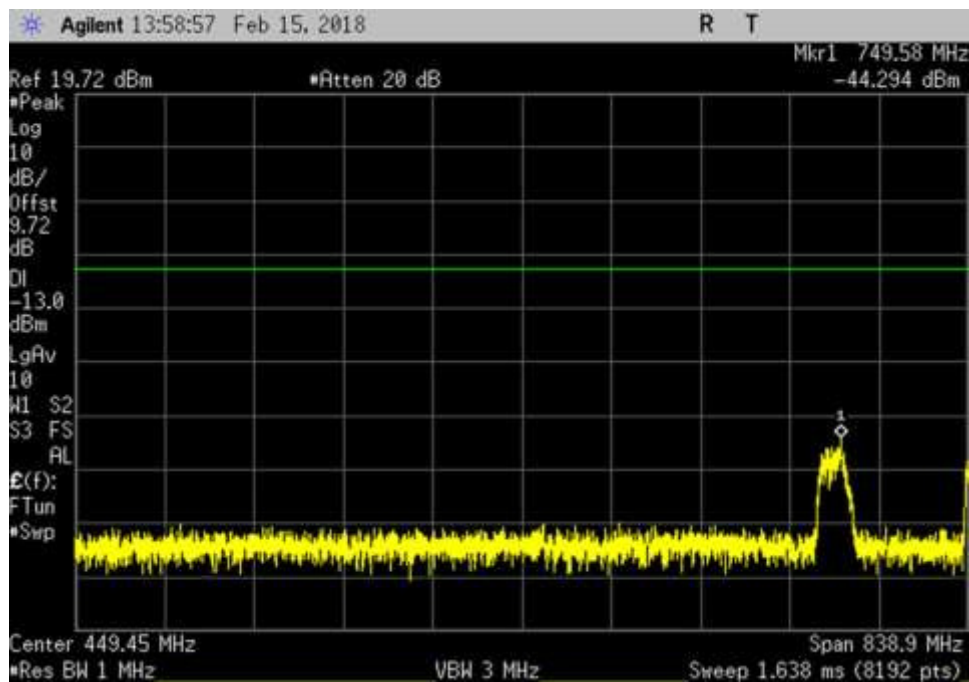
DL_746-757_30- 745.9MHz



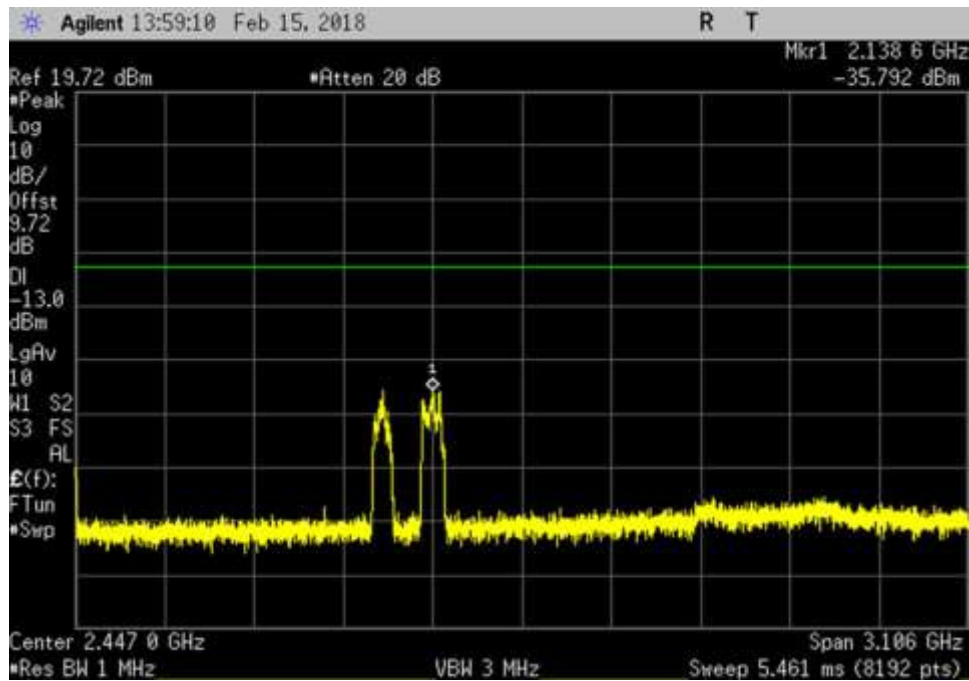
DL_746-757_757.1- 4000MHz



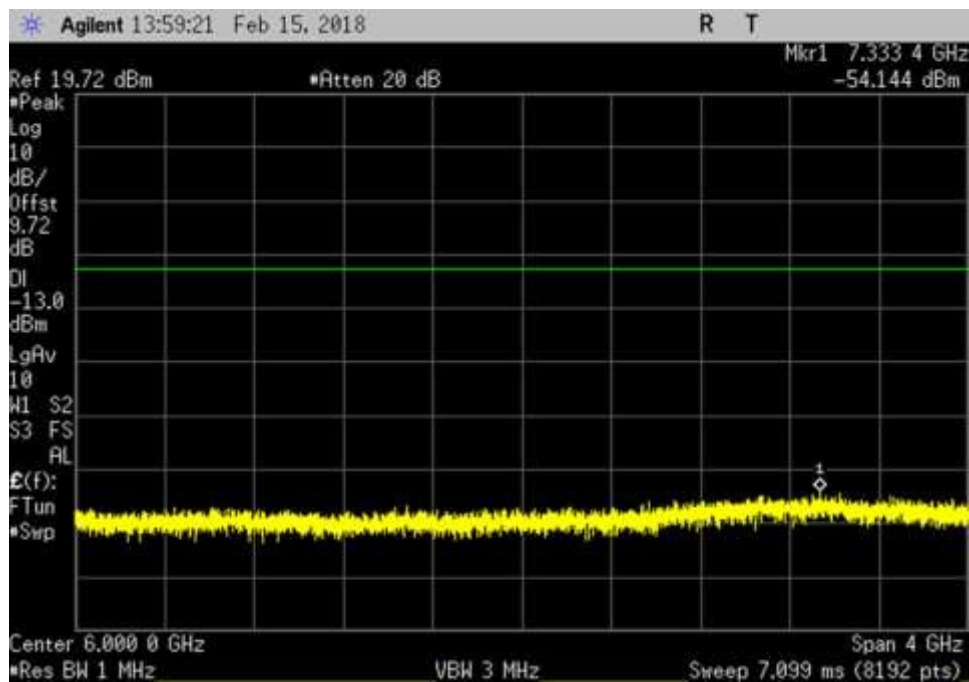
DL_746-757_ 4000- 8000MHz



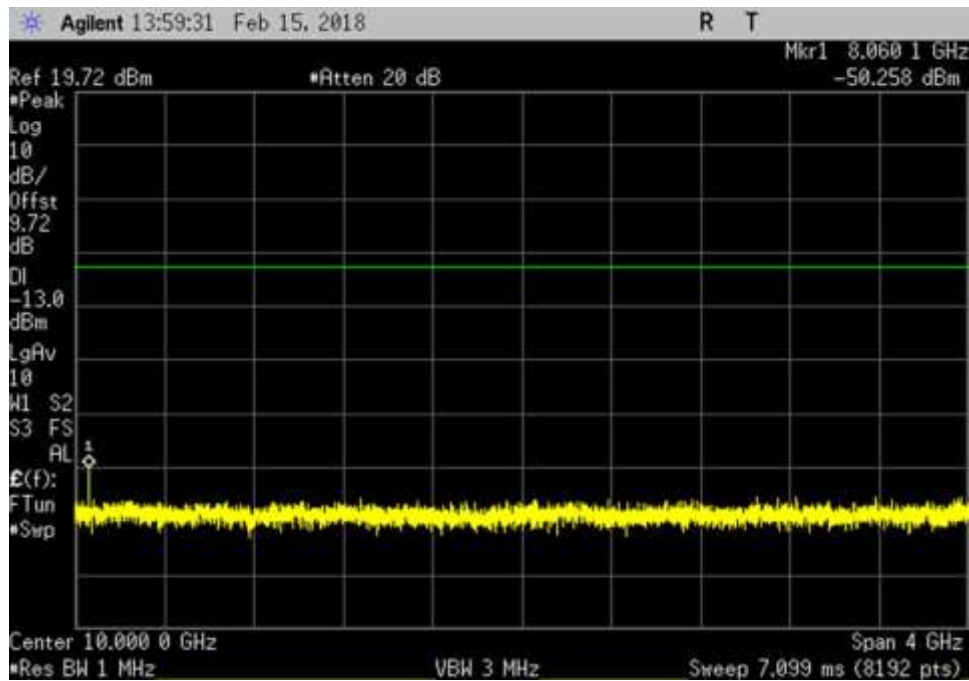
DL_869-894_ 30- 868.9MHz



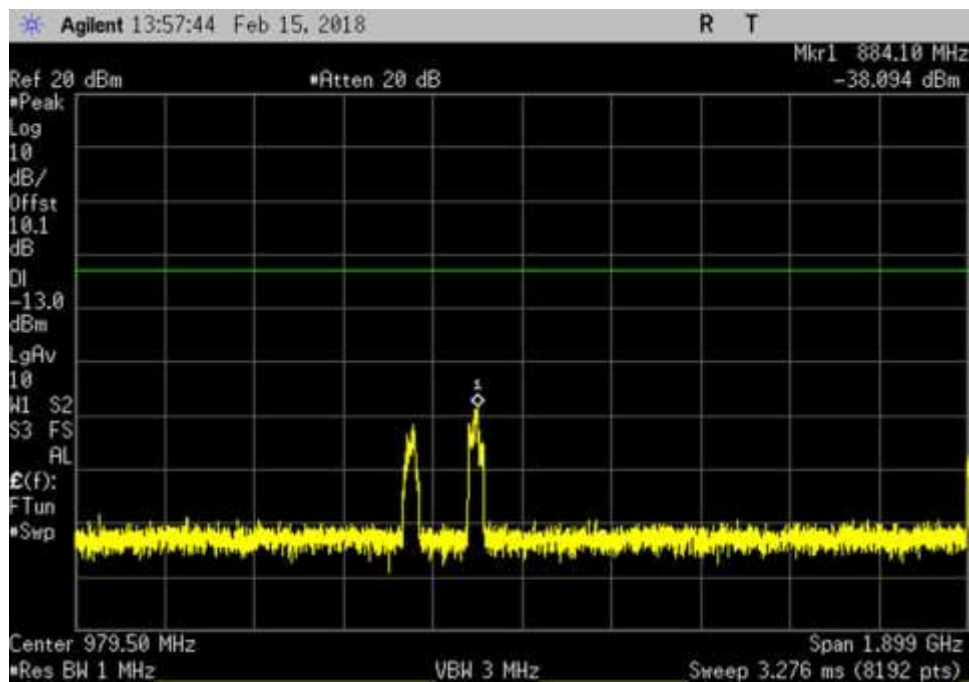
DL_869-894_ 894.1- 4000MHz



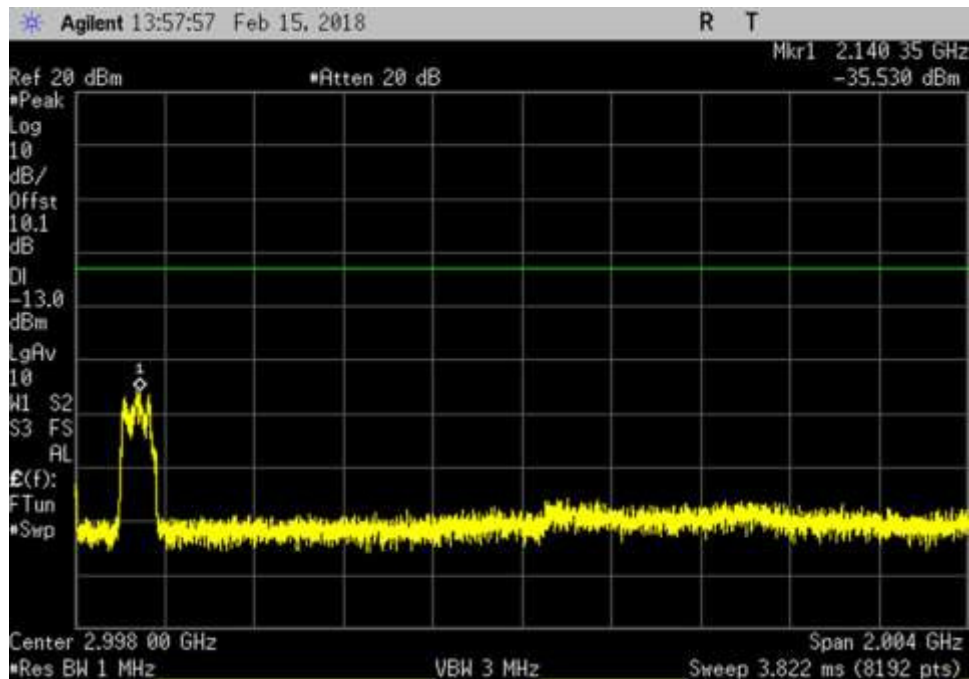
DL_869-894_ 4000- 8000MHz



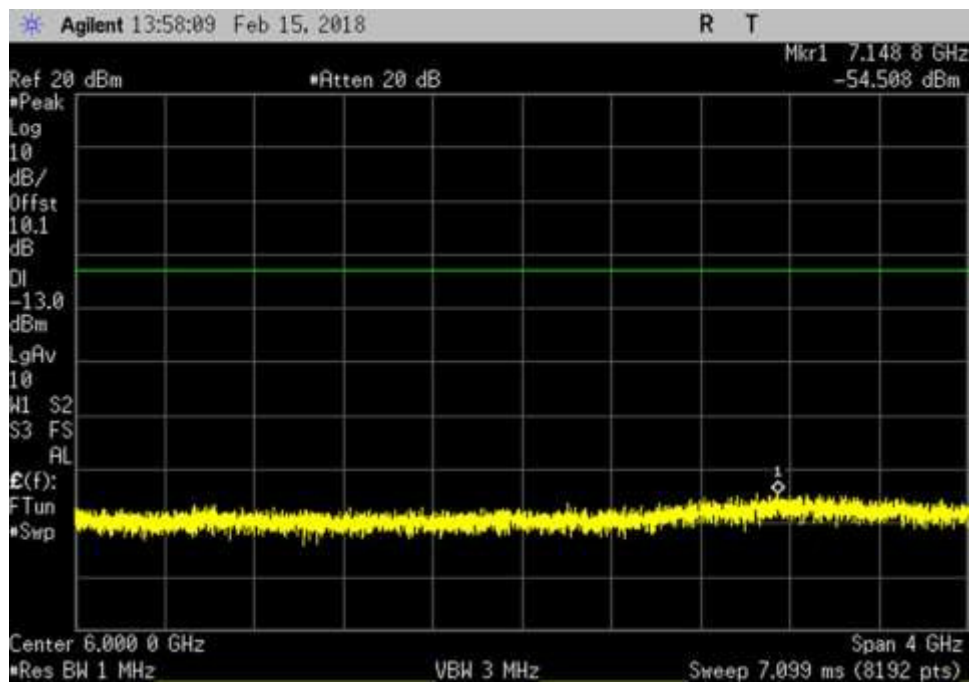
DL_869-894_ 8000- 12000MHz



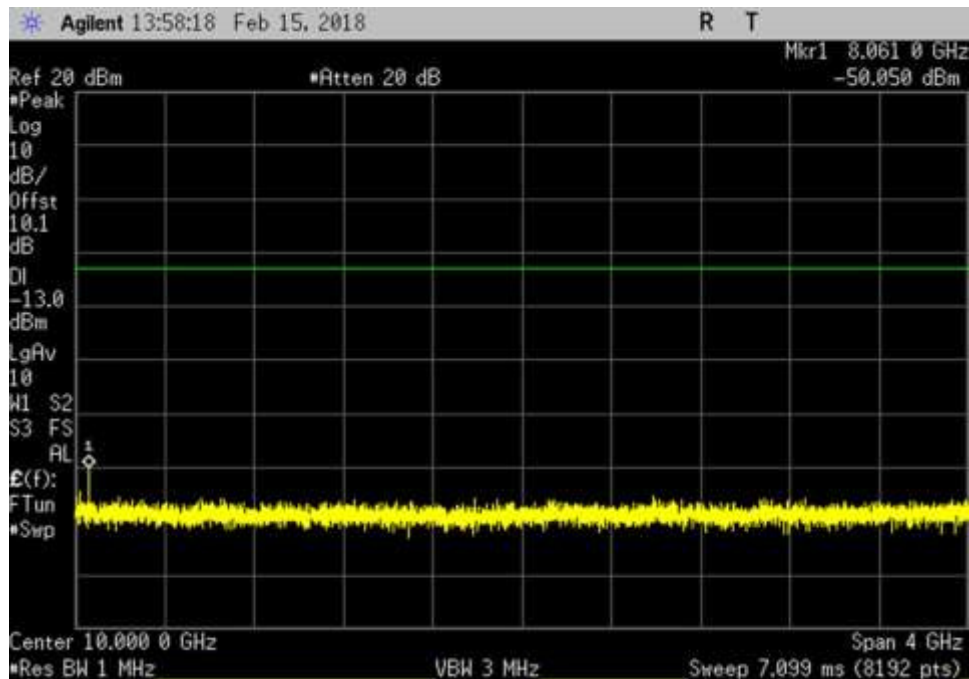
DL_1930-1995_ 30- 1929MHz



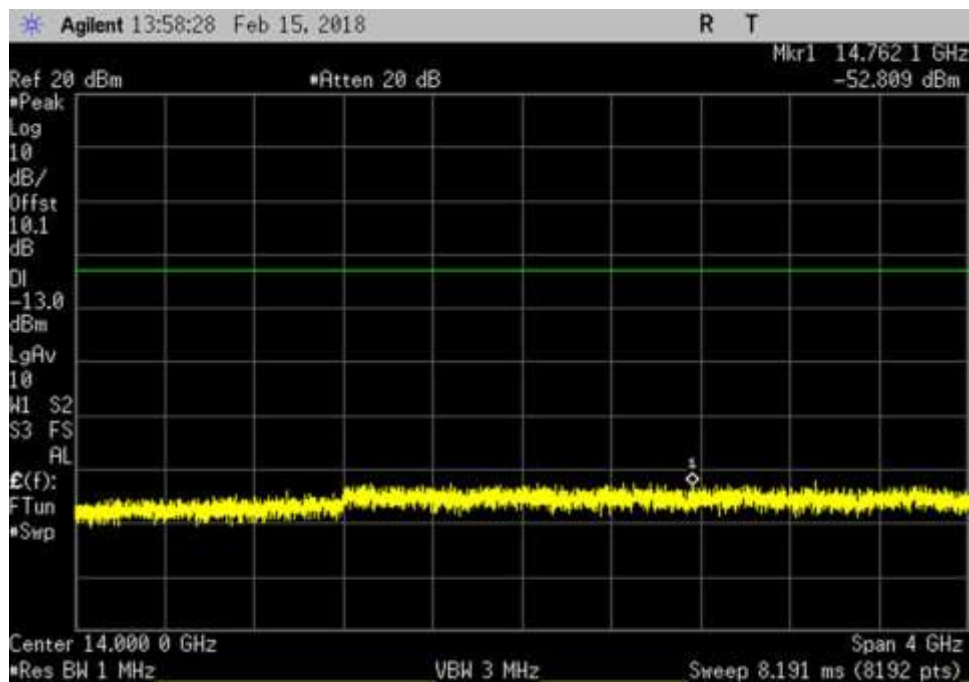
DL_1930-1995_ 1996- 4000MHz



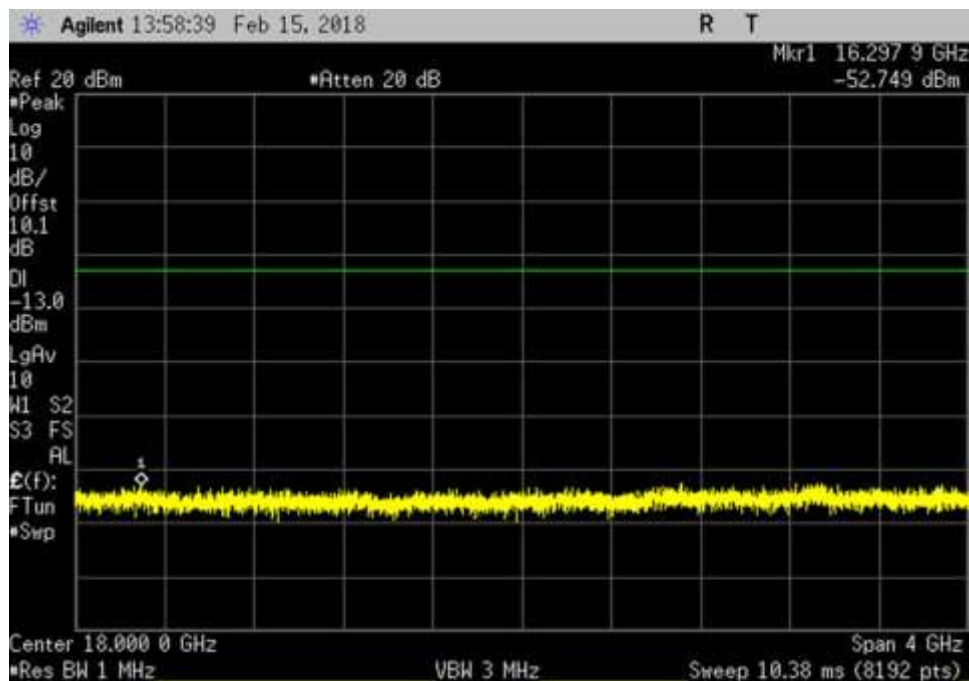
DL_1930-1995_ 4000- 8000MHz



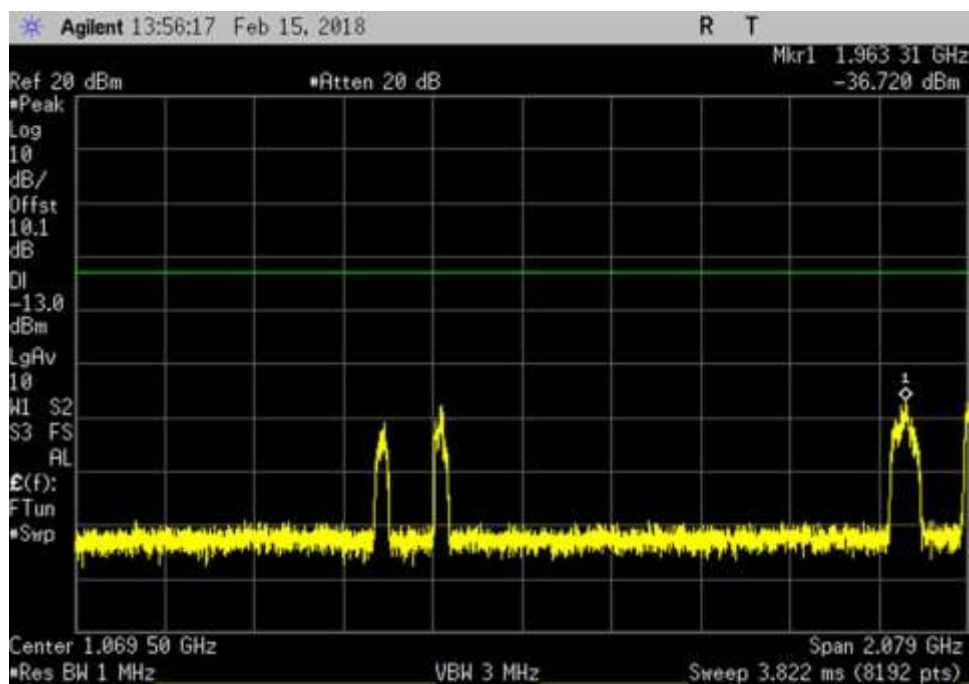
DL_1930-1995_ 8000- 12000MHz



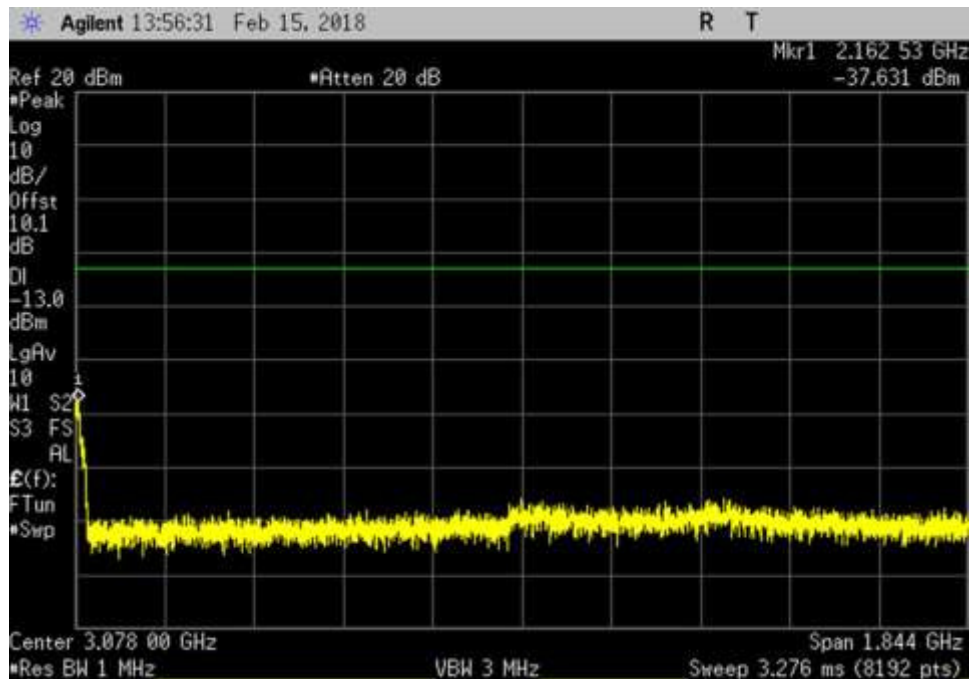
DL_1930-1995_ 12000- 16000MHz



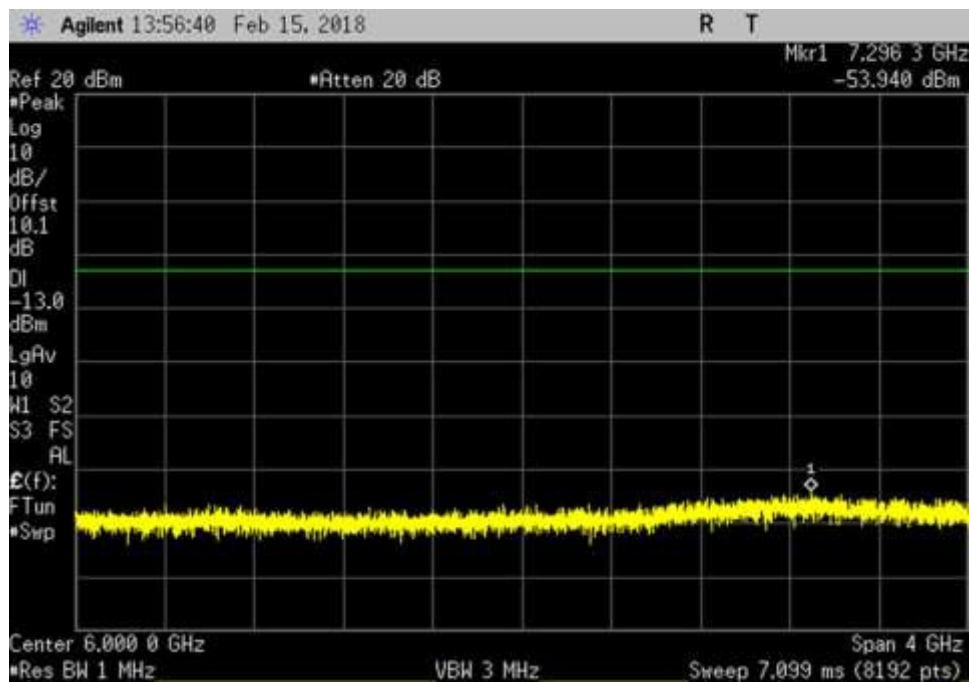
DL_1930-1995_ 16000- 20000MHz



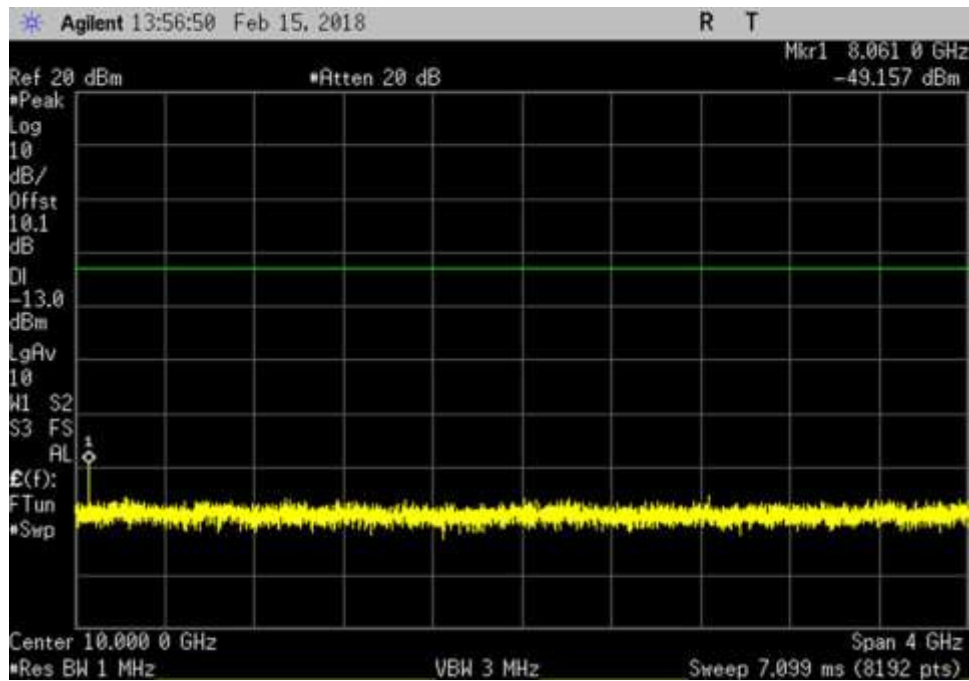
DL_2110-2155_ 30- 2109MHz



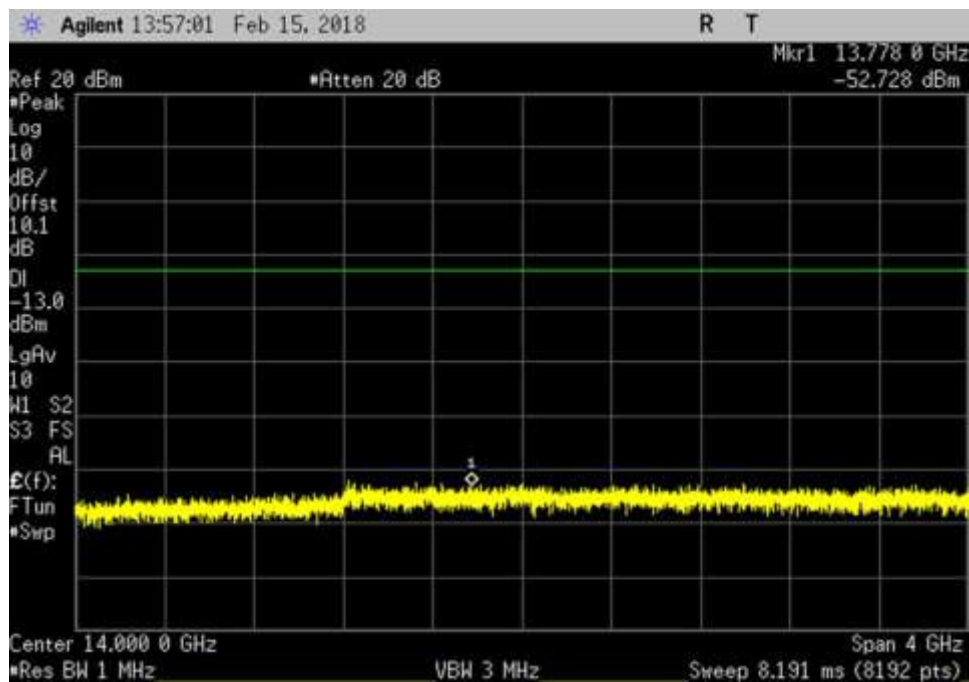
DL_2110-2155_ 2156- 4000MHz



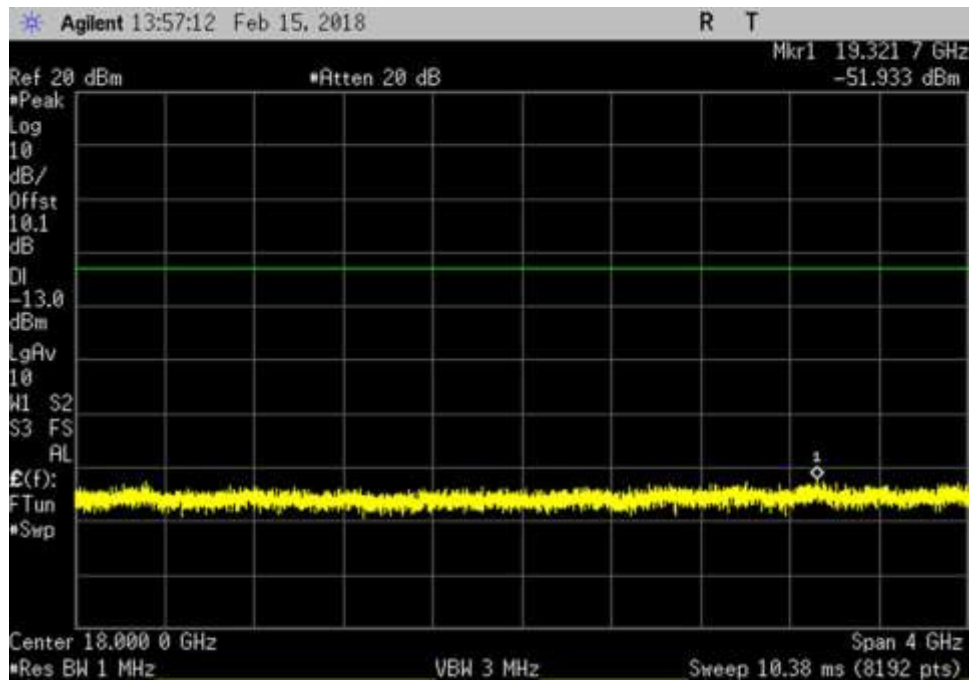
DL_2110-2155_ 4000- 8000MHz



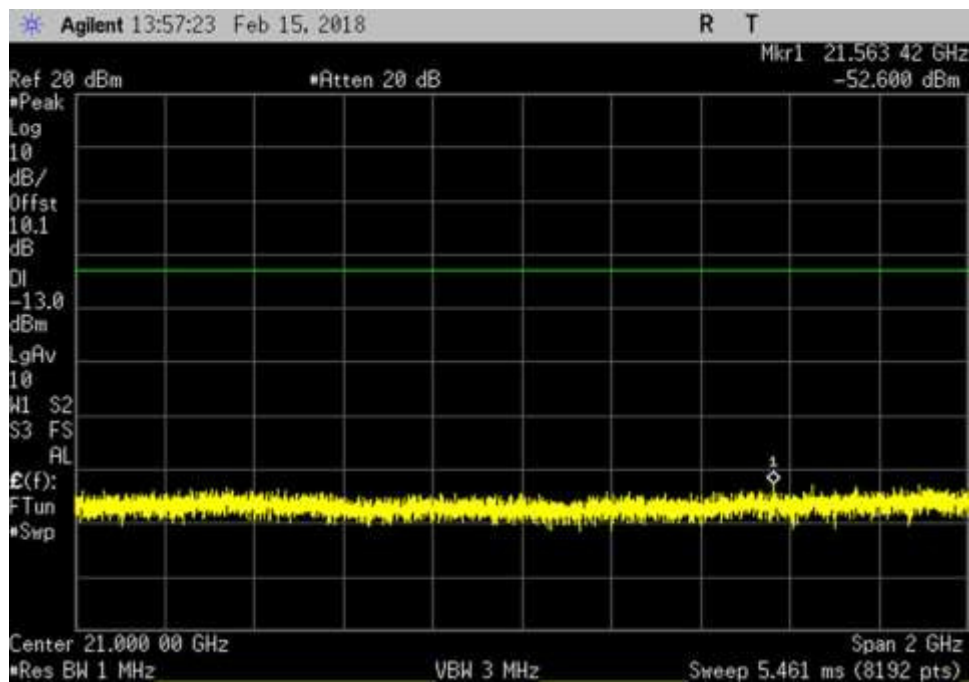
DL_2110-2155_ 8000- 12000MHz



DL_2110-2155_ 12000- 16000MHz



DL_2110-2155_ 16000- 20000MHz



DL_2110-2155_ 20000- 22000MHz

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 #: **100827** Date: 02/16/18 and 02/19/18
 Test Type: **Conducted Emissions**
 Tested By: **Hieu Song Nguyenpham**
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

02/16/18 Test environment conditions:

Temperature: 23.1°C

Relative Humidity: 61%

Pressure: 100.2kPa

02/19/18 Test environment conditions:

Temperature: 19.8°C

Relative Humidity: 50%

Pressure: 101.5kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019

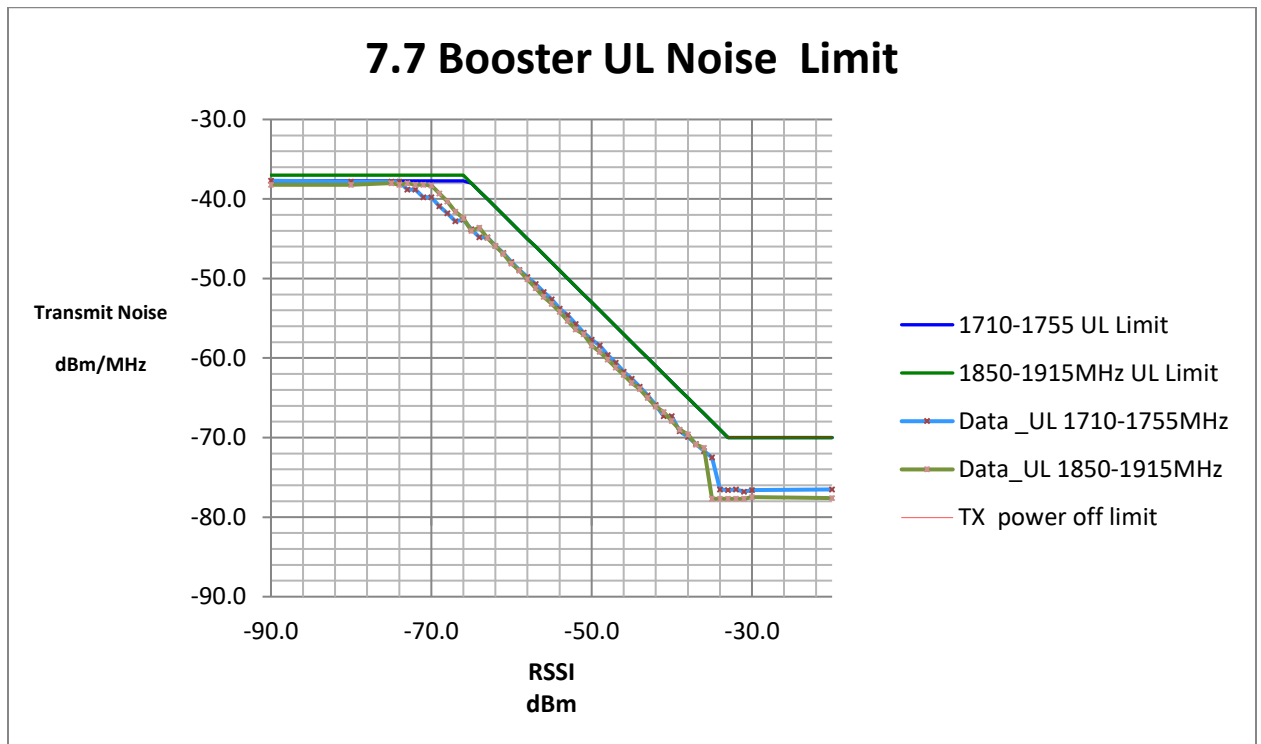
Summary of Results

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	-38.3	-37.7	-0.6
UL 1850-1915	-37.6	-37.0	-0.6
UL 824-849	-45.1	-44.1	-1.0
UL 698-716	-45.5	-45.5	0.0
UL 776-787	-45.2	-44.6	-0.6
DL 2110-2155	-38.58	-37.70	-0.88
DL 1930-1995	-38.82	-37.00	-1.82
DL 869-894	-44.17	-44.10	-0.07
DL 728-746	-46.12	-45.50	-0.62
DL 746-757	-48.25	-44.60	-3.65

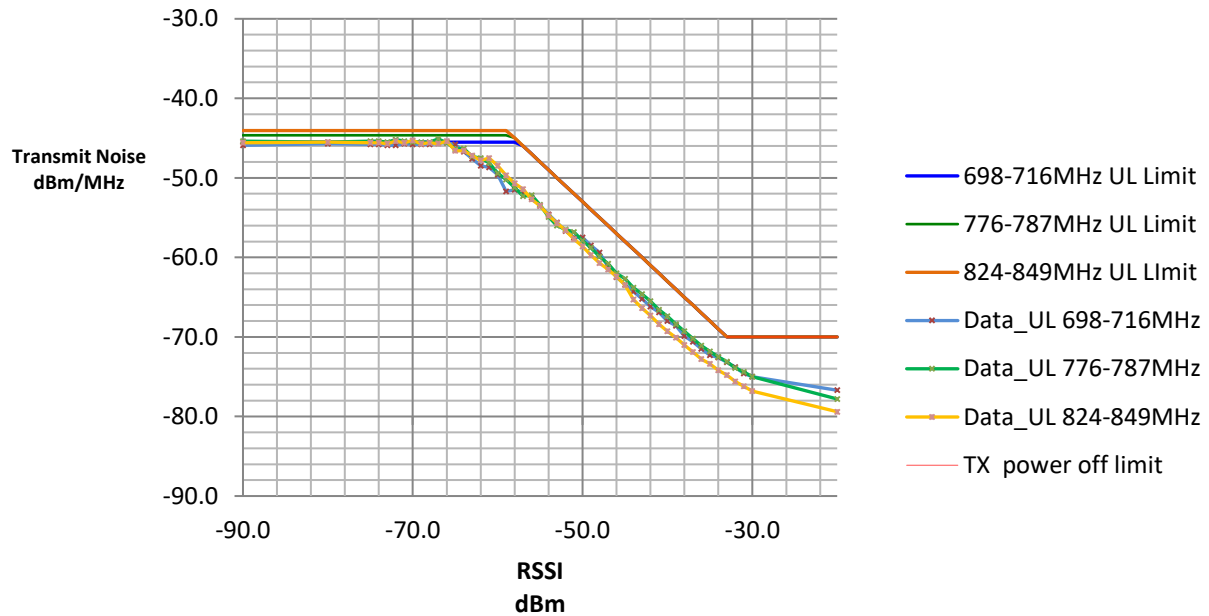
- 7.7.1 h-n: Maximum transmitter noise when varying the DL signal generator output level with a 4.1MHz AWGN signal



1710.0 - 1755.0 MHz					
		Limit			Margin
RSSI	Measured	RSSI Dependent	Fixed Booster	TX off	
(dBm)	Noise (dBm/MHz)				
-90.0	-37.7	-	-37.7	-	0.0
-80.0	-37.8	-	-37.7	-	-0.1
-49.0	-58.4	-54.0	-	-	-4.4
-40.0	-67.3	-63.0	-	-	-4.3
-30.0	-76.6	-	-	-70	-6.6
-20.0	-76.5	-	-	-70	-6.5

1850.0 - 1915.0MHz					
		Limit			Margin
RSSI	Measured	RSSI Dependent	Fixed Booster	TX off	
(dBm)	Noise (dBm/MHz)				
-90.0	-38.2	-	-37.0	-	-1.2
-73.0	-38.0	-	-37.0	-	-1.0
-38.0	-69.6	-65.0	-	-	-4.6
-36.0	-71.3	-67.0	-	-	-4.3
-30.0	-77.5	-	-	-70	-7.5
-20.0	-77.6	-	-	-70	-7.6

7.7 Booster UL Noise Limit



824.0 - 849.0MHz					
RSSI (dBm)	Measured Noise (dBm/MHz)	Limit			Margin
		RSSI Dependent	Fixed Booster	TX off	
-72.0	-45.4	-	-44.1	-	-1.3
-70.0	-45.3	-	-44.1	-	-1.2
-34.0	-74.2	-69.0	-	-	-5.2
-33.0	-74.8	-70.0	-	-	-4.8
-32.0	-75.6	-	-	-70	-5.6
-31.0	-76.2	-	-	-70	-6.2

698.0 - 716.0MHz					
		Limit			Margin
RSSI	Measured	RSSI Dependent	Fixed Booster	TX off	
(dBm)	Noise (dBm/MHz)				
-67.0	-45.6	-	-45.5	-	-0.1
-66.0	-45.6	-	-45.5	-	-0.1
-34.0	-72.6	-69.0	-	-	-3.6
-33.0	-73.2	-70.0	-	-	-3.2
-32.0	-73.8	-	-	-70	-3.8
-31.0	-74.6	-	-	-70	-4.6

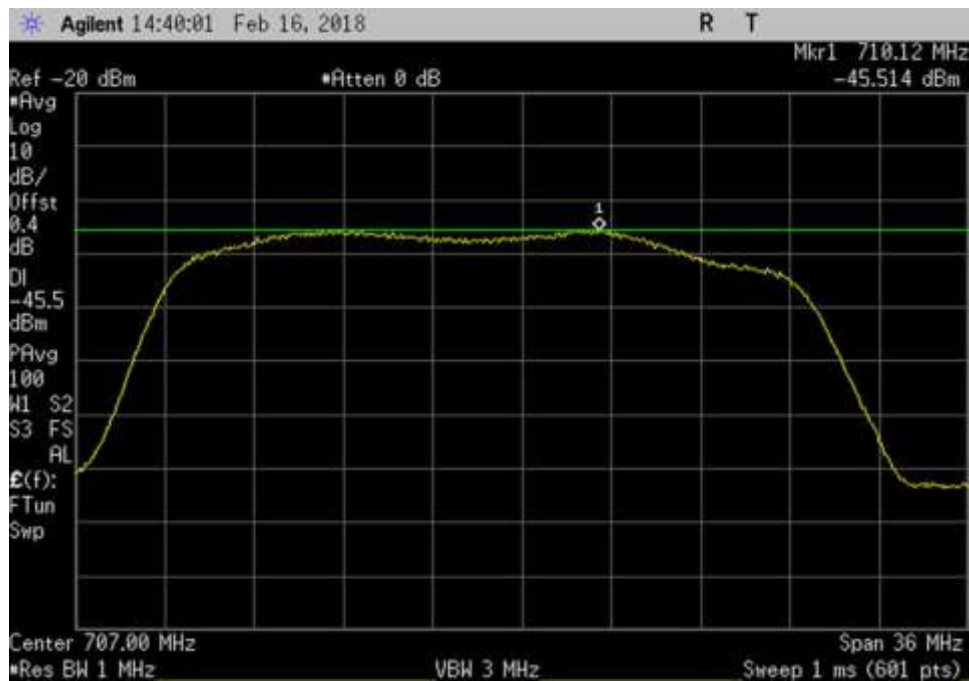
776.0 - 787.0MHz					
		Limit			Margin
RSSI	Measured	RSSI Dependent	Fixed Booster	TX off	
(dBm)	Noise (dBm/MHz)				
-90.0	-45.4	-	-44.6	-	-0.8
-67.0	-45.1	-	-44.6	-	-0.5
-34.0	-72.5	-69.0	-	-	-3.5
-33.0	-73.1	-70.0	-	-	-3.1
-32.0	-73.9	-	-	-70	-3.9
-31.0	-74.4	-	-	-70	-4.4

7.7.2 Variable uplink noise timing

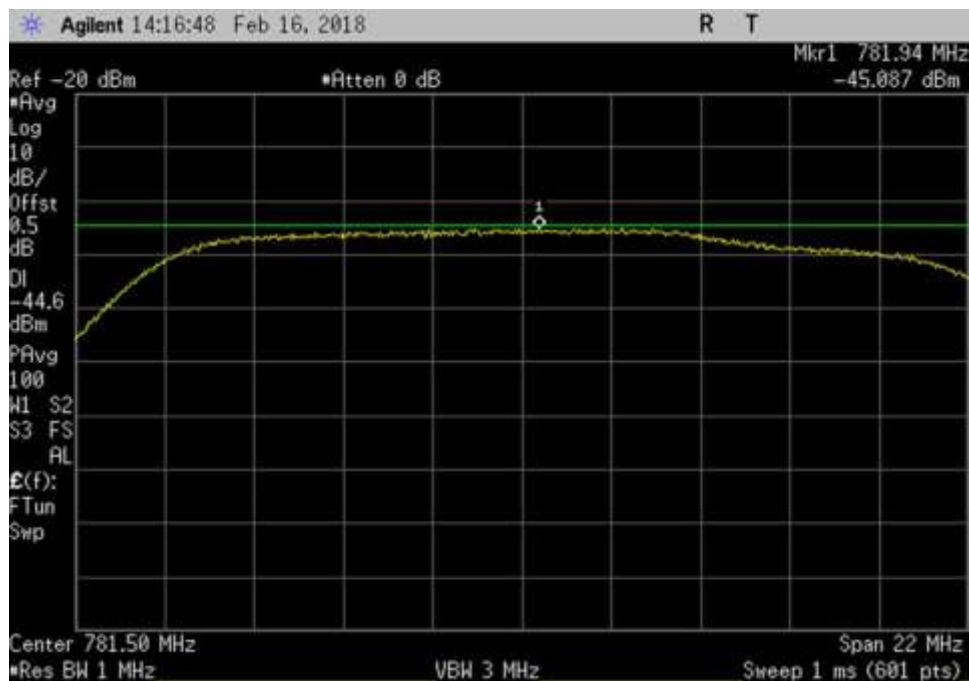
Uplink Noise timing		
Frequency	Measured	Limit
MHz	Sec	sec
UL1710-1755	0.40	3.00
UL1850-1915	0.30	3.00
UL824-849	0.07	3.00
UL 698-716	0.10	3.00
UL776-787	0.07	3.00

7.7.1 Maximum Transmitter Noise Power Level

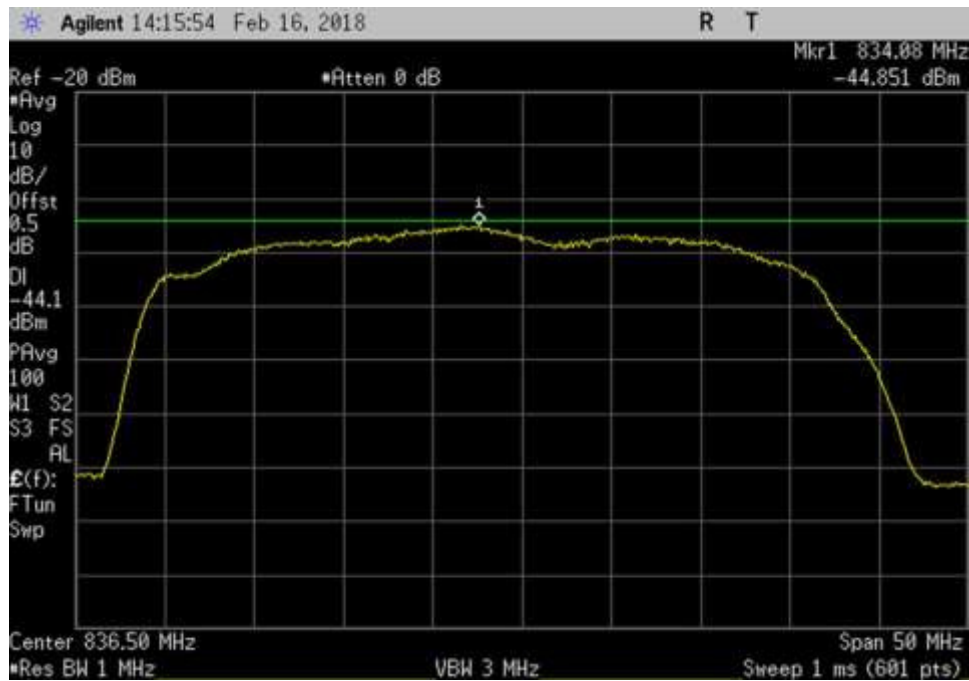
Plots



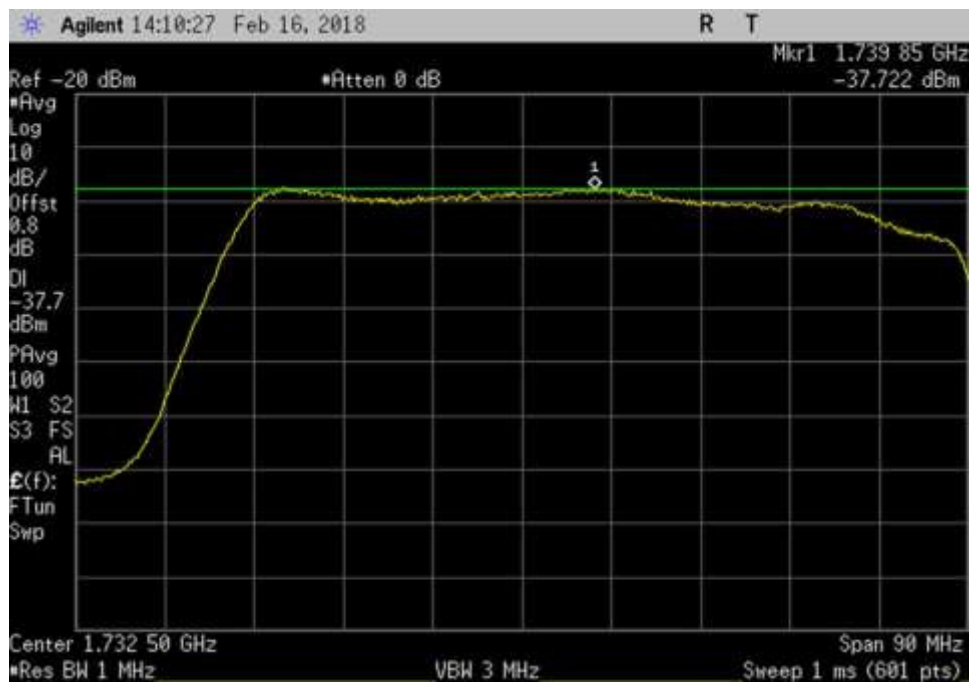
UL_698-716_707MHz



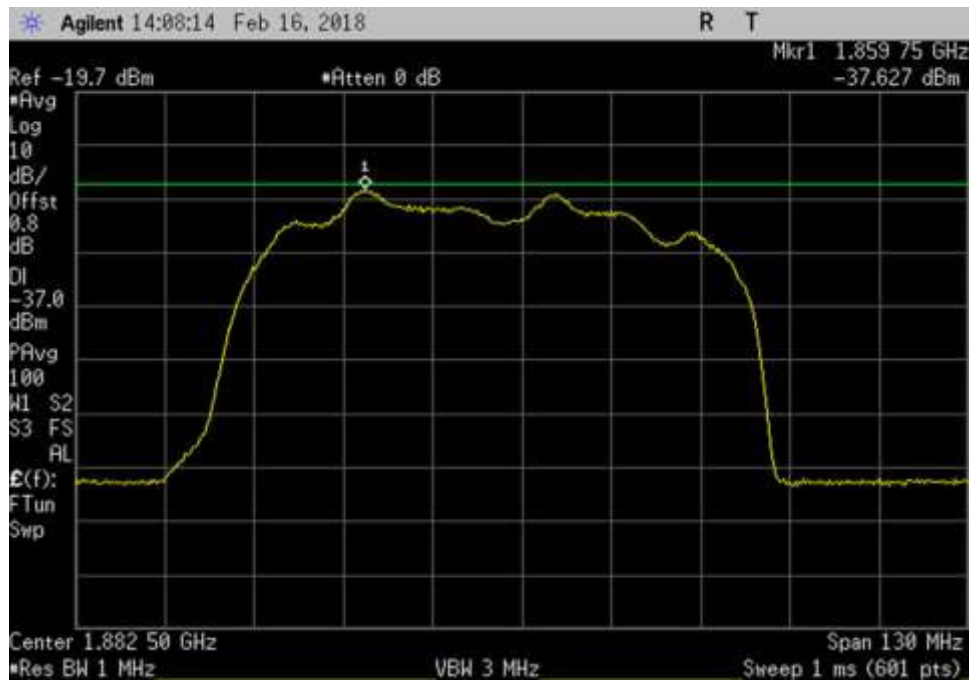
UL_776-787_781.5MHz



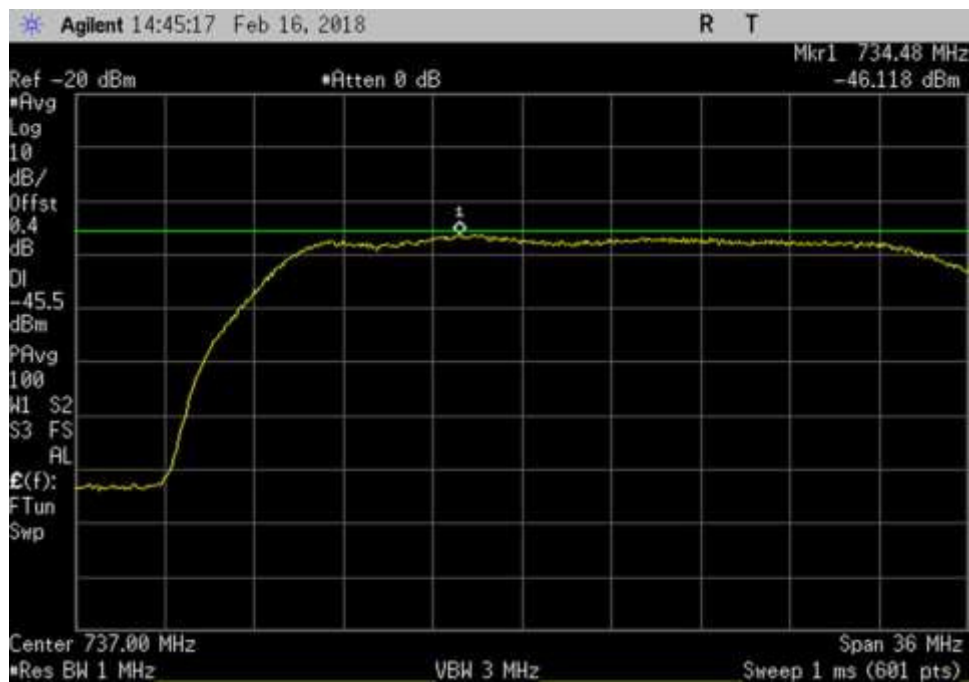
UL_824-849_ 836.5MHz



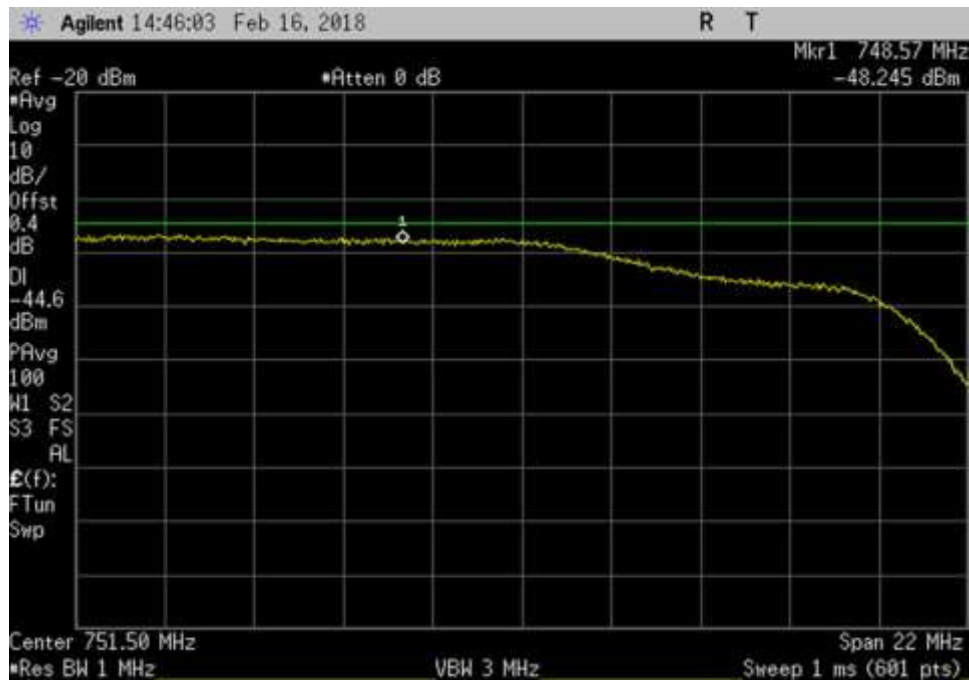
UL_1710-1755_ 1732.5MHz



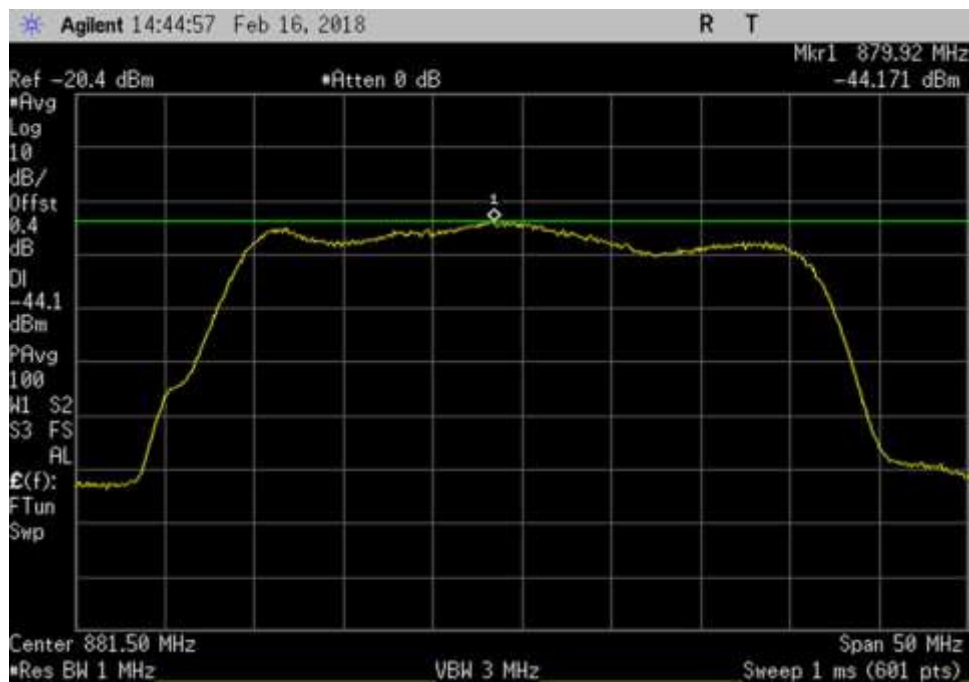
UL_1850-1915_1882.5MHz



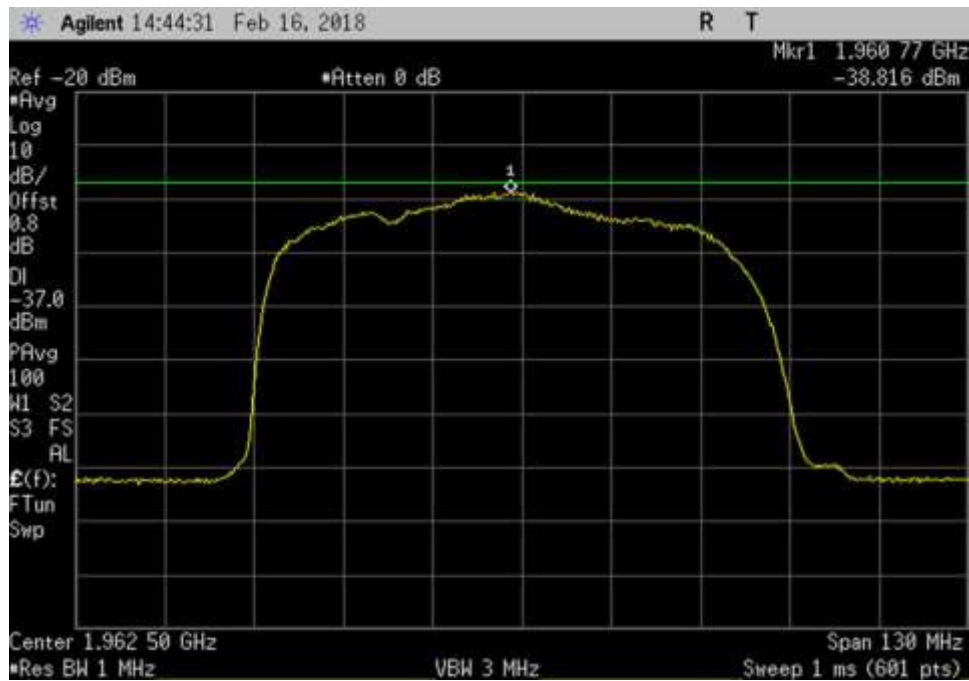
DL_728-746_737MHz



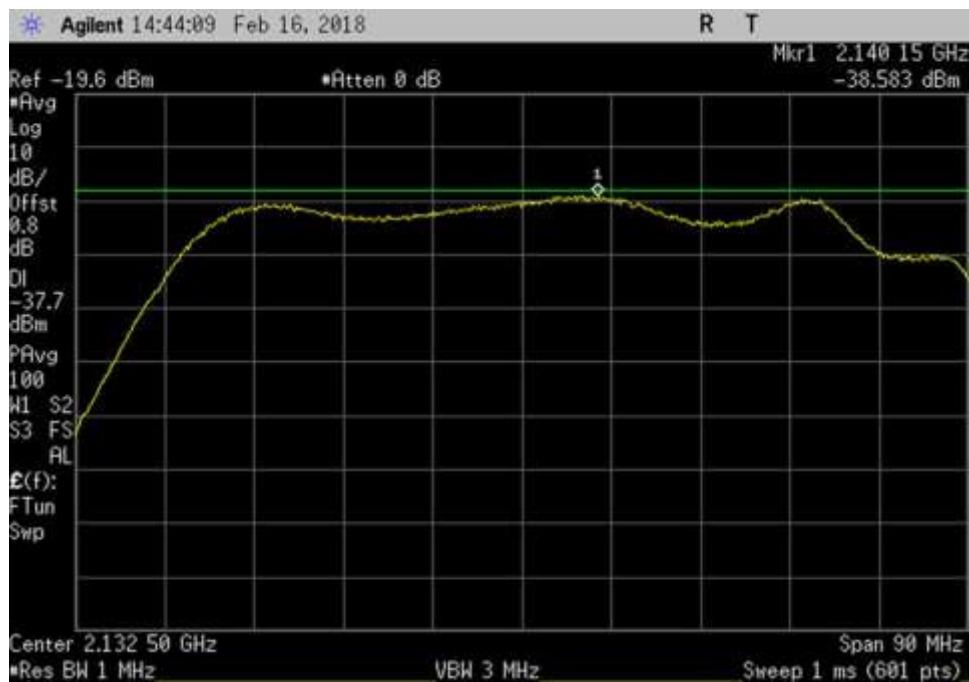
DL_746-757_ 751.5MHz



DL_869-894_ 881.5MHz



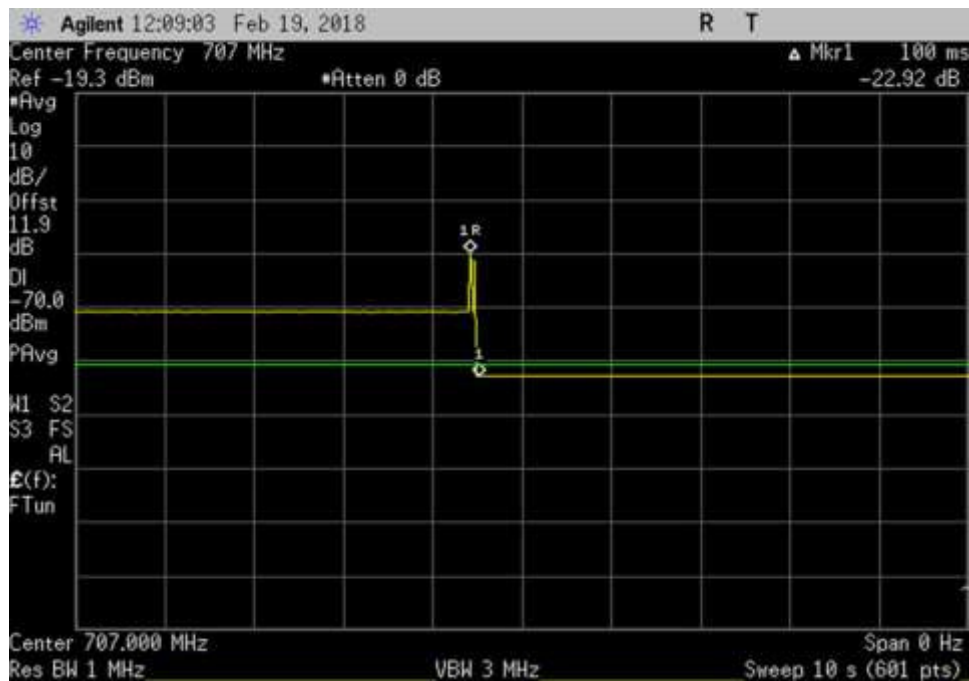
DL_1930-1995_ 1962.5MHz



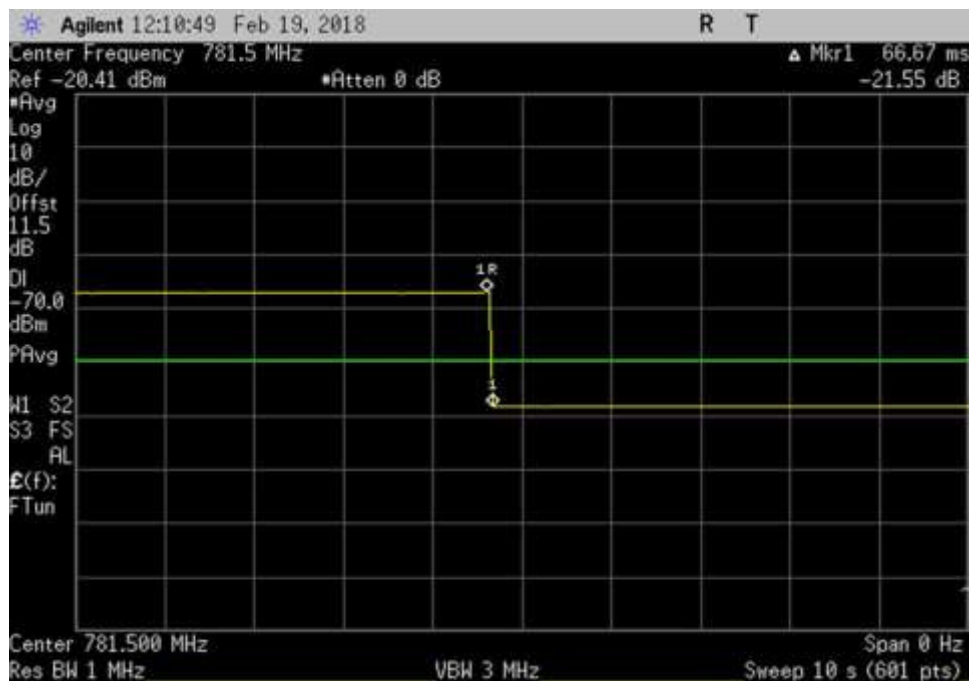
DL_2110-2155_ 2132.5MHz

7.7.2 Variable UL Noise Timing

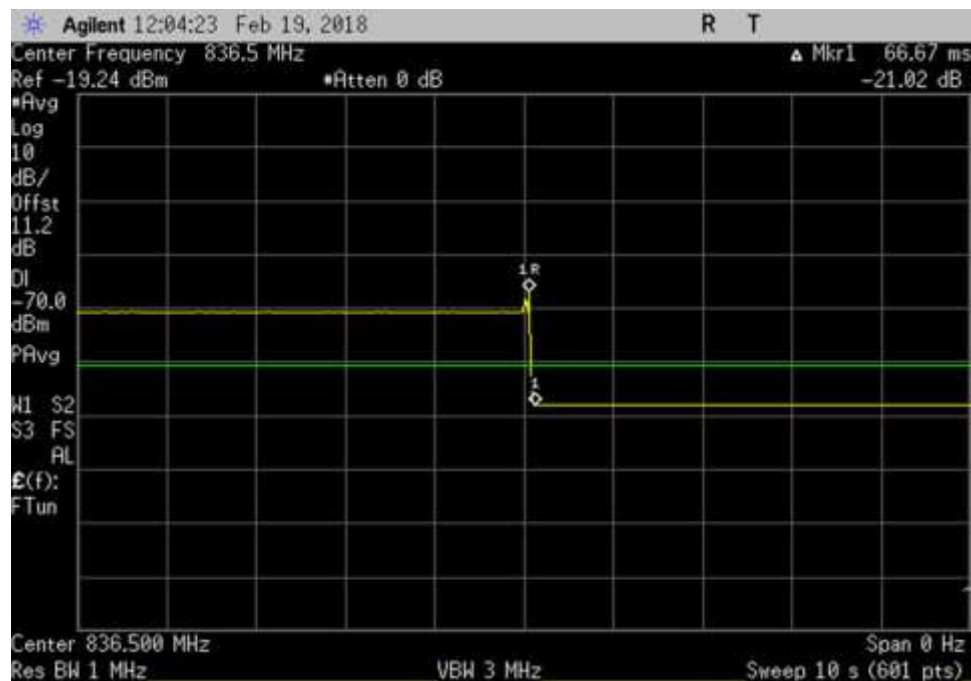
Plots



UL_698-716_707MHz_Var



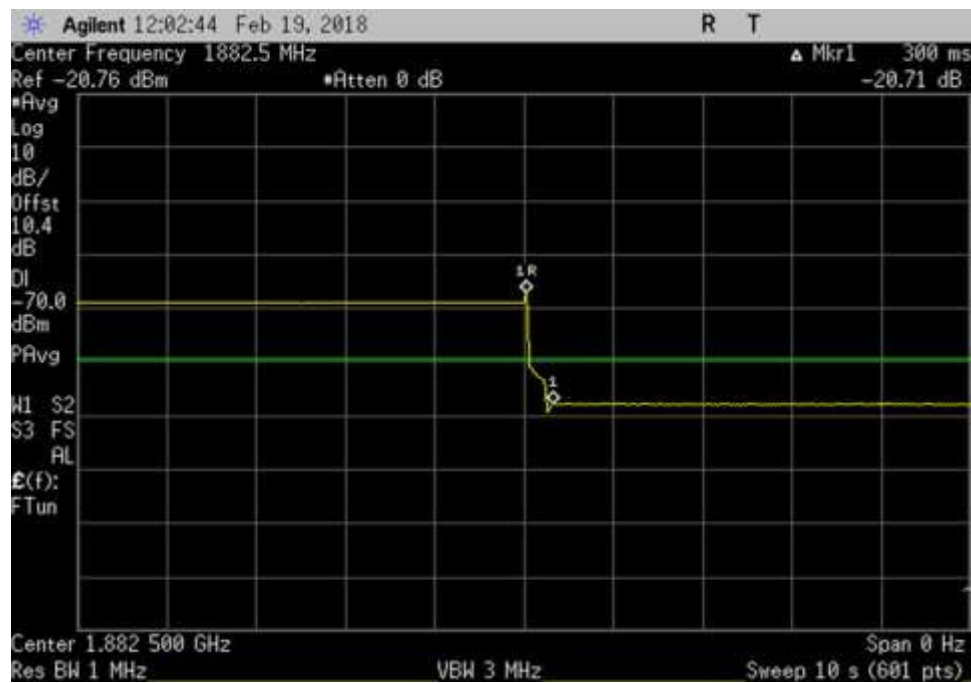
UL_776-787_781.5MHz_Var



UL_824-849_836.5MHz_Var



UL_1710-1755_1732.5MHz_Var



UL_1850-1915_1882.5MHz_Var

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 #: **100827** Date: 02/15/18
 Test Type: **Conducted Emissions**
 Tested By: **Hieu Song Nguyenpham**
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
 Temperature: 19.6°C
 Relative Humidity: 43%
 Pressure: 101.6 kPa

Test Equipment:

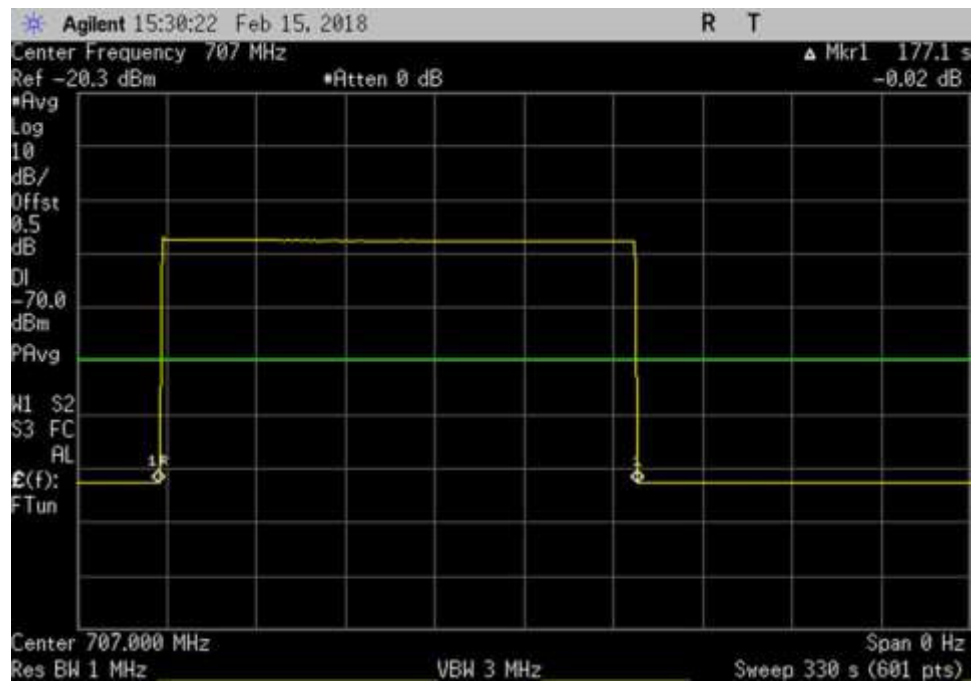
Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019

Summary of Results

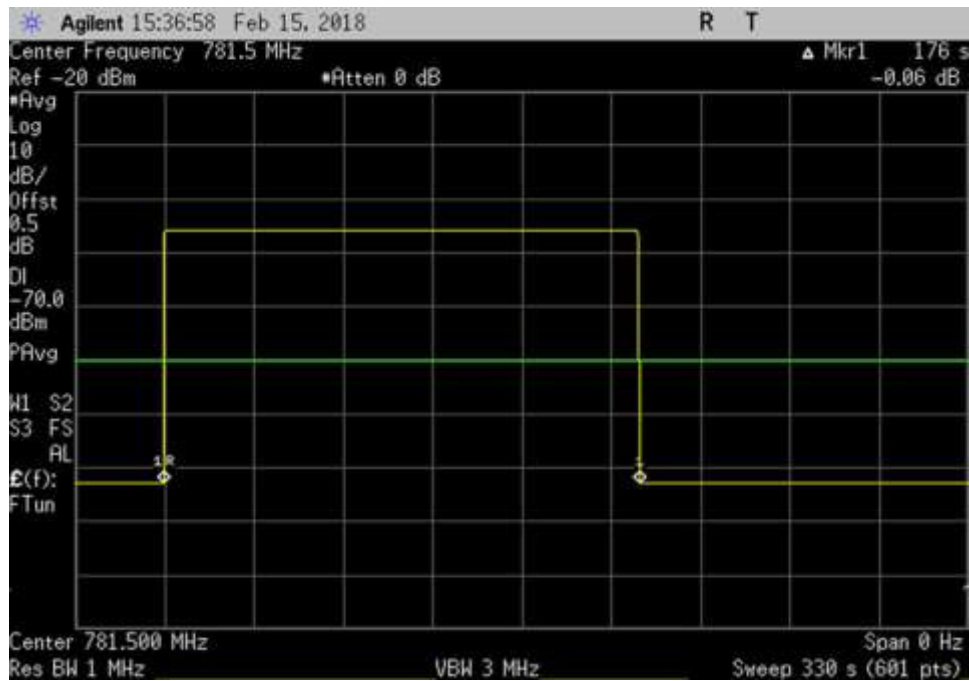
Pass: As demonstrated, when the booster is not serving an active device connection after 5 minutes the uplink noise power does not exceed -70dBm/MHz

Uplink Inactivity		
Frequency	Measured	Limit
MHz	Min	Min
UL1710-1755	3.0	5.0
UL1850-1915	3.0	5.0
UL824-849	2.9	5.0
UL 698-716	3.0	5.0
UL776-787	2.9	5.0

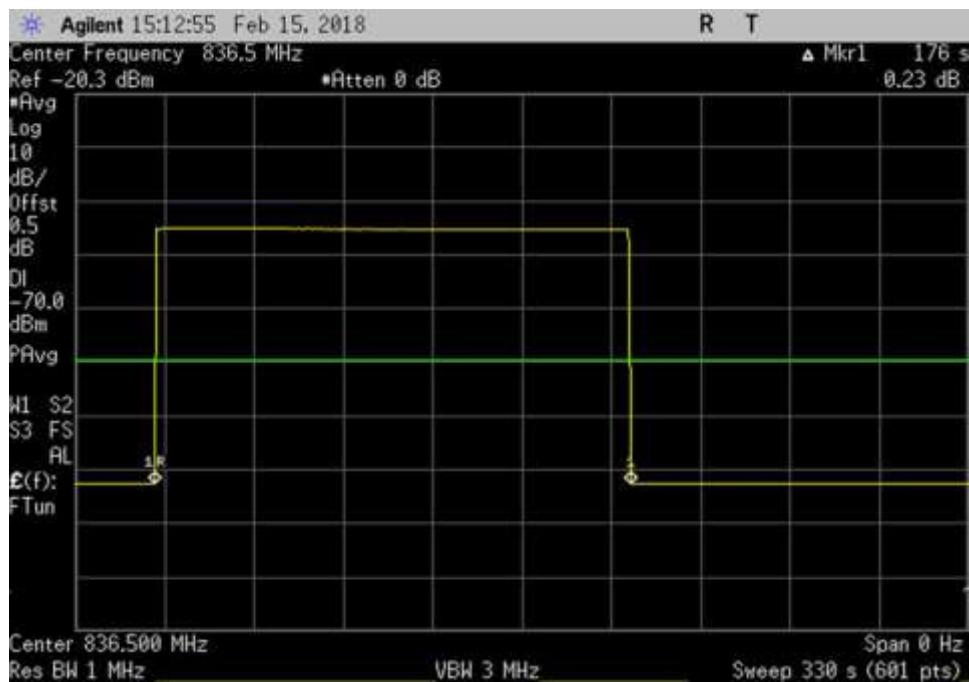
Plots



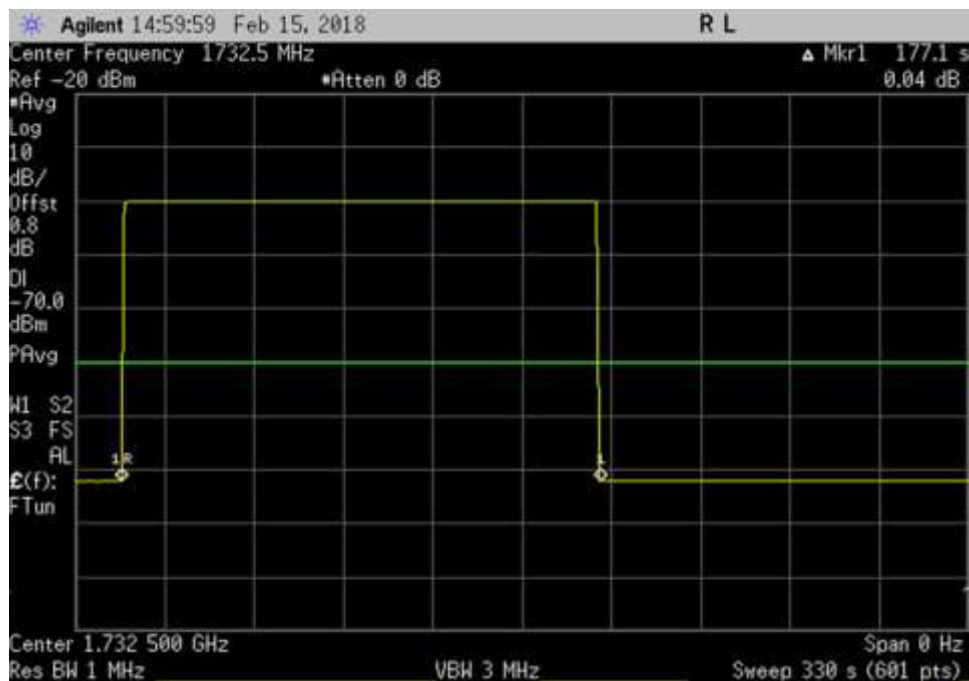
UL_698-716_707MHz



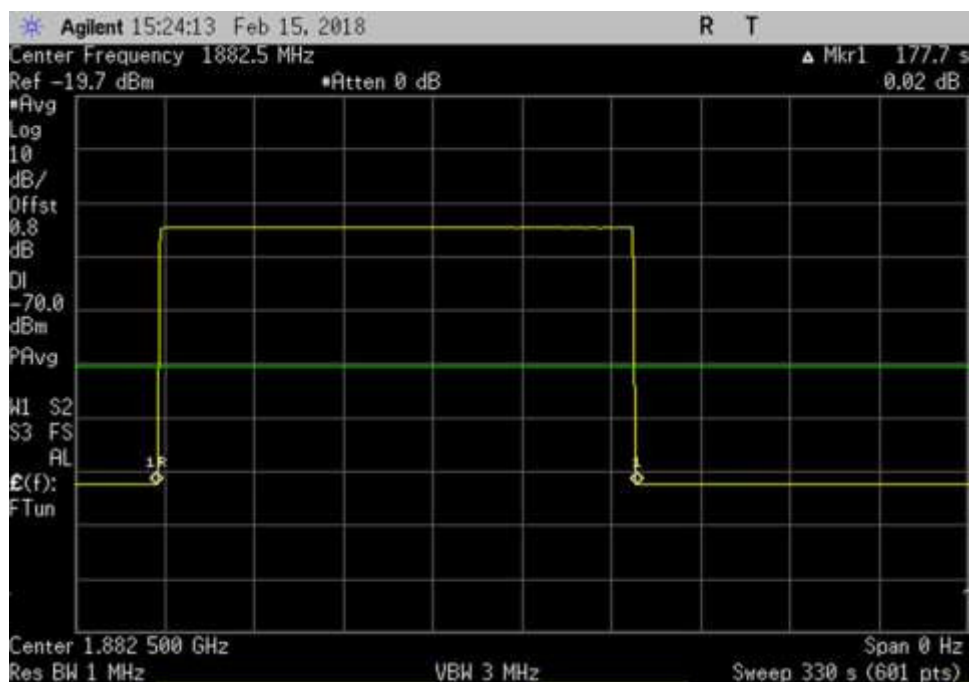
UL_776-787_ 781.5MHz



UL_824-849_ 836.5MHz



UL_1710-1755_ 1732.5MHz



UL_1850-1915_ 1882.5MHz

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 #: **100827**
 Test Type: **Conducted Emissions** Date 02/19/18
 Tested By: **Hieu Song Nguyenpham/Eddie Wong**
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:

Temperature: 19.8°C

Relative Humidity: 50%

Pressure: 101.5kPa

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.

$$L P = 20 \log f + 20 \log d - 27.5$$

Where:

L P = basic free space path loss,

f = Center frequency,

d = 0.6 meters.

Frequency (MHz)	MSCL (dB)
PCS(1850-1915)	46.7
Cellular(824-849)	41.1
LTE(698-716)	39.4
LTE(776-787)	40.4
AWS(1710-1755)	45.7

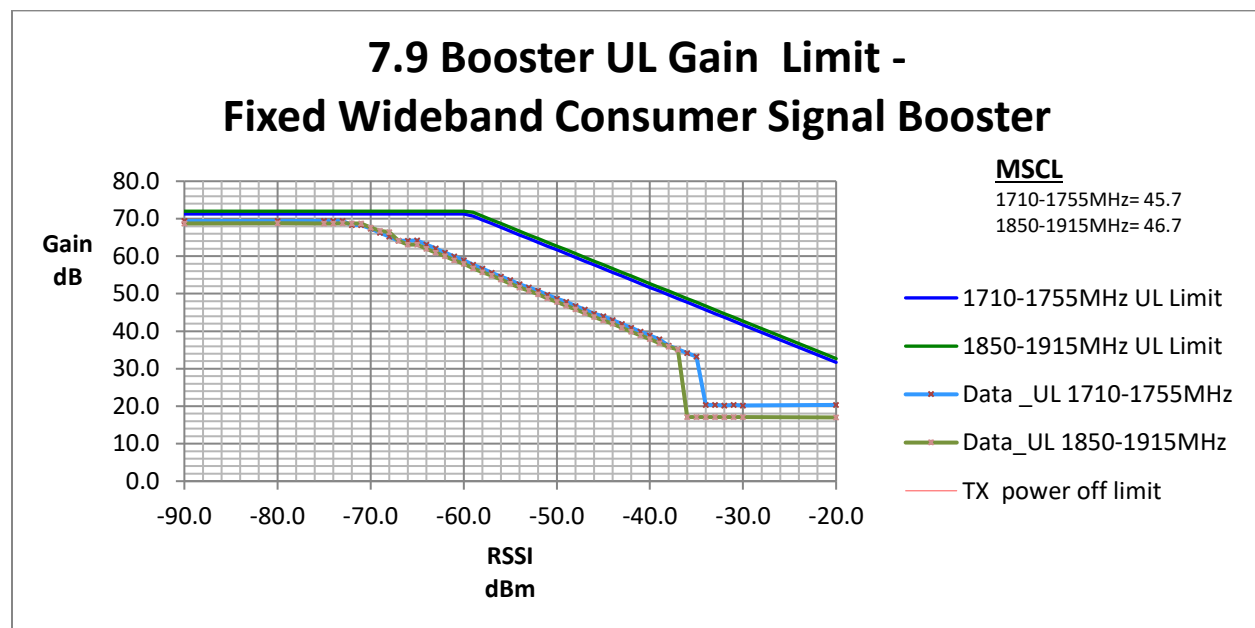
Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020
P06909	Attenuator	Pasternack	PE7083	12/20/2017	12/20/2019
P06904	Cable	Astrolab	32022-29094K-29094K-36TC	1/4/2018	1/4/2020
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019
C00032	Arbitrary Waveform Generator	Agilent	E4433B	2/26/2016	2/26/2018

Summary of Results

Pass: As demonstrated, computed gains are within the gain limit. All maximum variable uplink gain timings are within 1 second limit.

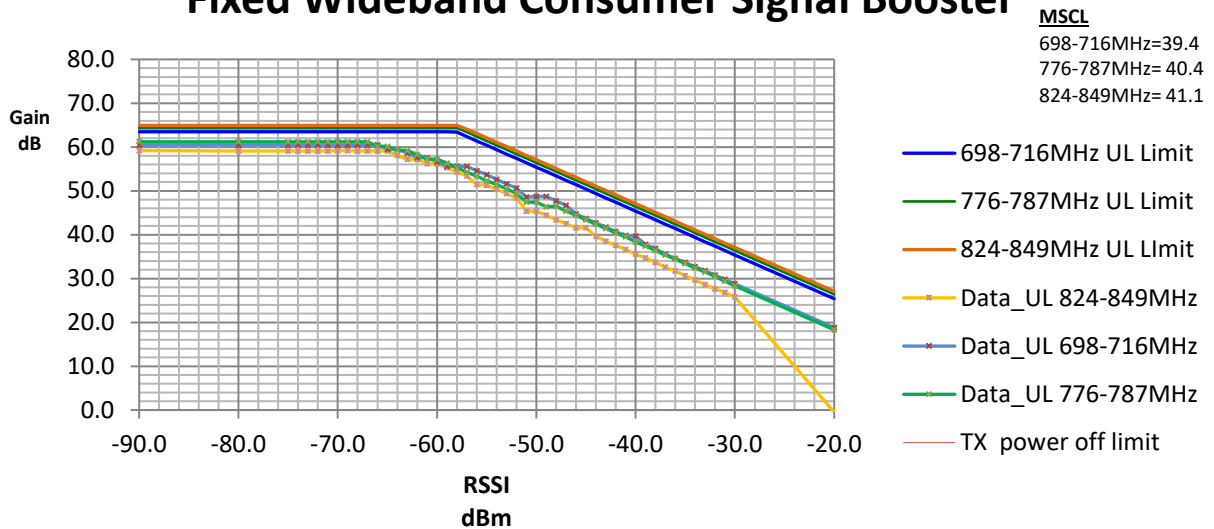
7.9.1 Maximum gain



1710.0 - 1755.0MHz							
				Limit			Margin
RSSI	Input	Measured	Measured	RSSI Dependent	Fixed Booster	TX off	
(dBm)	(dBm)	Output (dBm)	Gain (dBm)				
-90.0	-53.9	15.5	69.4	-	71.3	-	-1.9
-80.0	-53.9	15.5	69.4	-	71.3	-	-1.9
-75.0	-53.9	15.5	69.4	-	71.3	-	-1.9
-45.0	-53.9	-9.9	44.0	56.7	-	-	-12.7
-44.0	-53.9	-10.9	43.0	55.7	-	-	-12.7
-20.0	-53.9	-33.6	20.3	31.7	-	-	-11.4

1850.0- 1915.0MHz							
				Limit			Margin
RSSI	Input	Measured	Measured	RSSI Dependent	Fixed Booster	TX off	
(dBm)	(dBm)	Output (dBm)	Gain (dBm)				
-90.0	-50.8	17.9	68.7	-	72.0	-	-3.3
-80.0	-50.8	18	68.8	-	72.0	-	-3.2
-75.0	-50.8	17.9	68.7	-	72.0	-	-3.3
-45.0	-50.8	-7.9	42.9	61.1	-	-	-14.8
-44.0	-50.8	-8.8	42.0	60.1	-	-	-14.7
-37.0	-50.8	-15.7	35.1	53.1	-	-	-14.6

7.9 Booster UL Gain Limit - Fixed Wideband Consumer Signal Booster



824.0 - 849.0MHz							
RSSI (dBm)	Input (dBm)	Measured Output (dBm)	Measured Gain (dBm)	Limit			Margin
				RSSI Dependent	Fixed Booster	TX off	
-90.0	-44.4	14.8	59.2	-	64.9	-	-5.7
-80.0	-44.4	14.7	59.1	-	64.9	-	-5.8
-75.0	-44.4	14.7	59.1	-	64.9	-	-5.8
-53.0	-44.4	5.0	49.4	64.4	-	-	-10.7
-52.0	-44.4	4.0	48.4	63.4	-	-	-10.7
-45.0	-44.4	-2.8	41.6	56.4	-	-	-10.5

698.0 - 716.0MHz							
RSSI	Input	Measured	Measured	Limit			Margin
(dBm)	(dBm)	Output (dBm)	Gain (dBm)	RSSI Dependent	Fixed Booster	TX off	
-90.0	-43.5	17.0	60.5	-	63.5	-	-3.0
-80.0	-43.5	17.0	60.5	-	63.5	-	-3.0
-75.0	-43.5	17.0	60.5	-	63.5	-	-3.0
-49.0	-43.5	5.2	48.7	54.4	-	-	-5.7
-48.0	-43.5	4.2	47.7	53.4	-	-	-5.7
-47.0	-43.5	3.2	46.7	52.4	-	-	-5.7

776.0 - 787.0MHz							
RSSI	Input	Measured	Measured	Limit			Margin
(dBm)	(dBm)	Output (dBm)	Gain (dBm)	RSSI Dependent	Fixed Booster	TX off	
-90.0	-45.6	15.6	61.2	-	64.4	-	-3.2
-80.0	-45.6	15.6	61.2	-	64.4	-	-3.2
-75.0	-45.6	15.6	61.2	-	64.4	-	-3.2
-48.0	-45.6	0.9	46.5	58.9	-	-	-7.9
-41.0	-45.6	-6.1	39.5	51.9	-	-	-7.9
-33.0	-45.6	-14.1	31.5	43.9	-	-	-7.9

7.9.2 Variable uplink gain timing

Uplink Gain Timing		
Frequency	Measured	Limit
(MHz)	(Sec)	(Sec)
UL 1710-1755	0.72	3
UL 1850-1915	0.37	3
UL 824-849	0.13	3
UL 698-716	0.10	3
UL 776-787	0.10	3

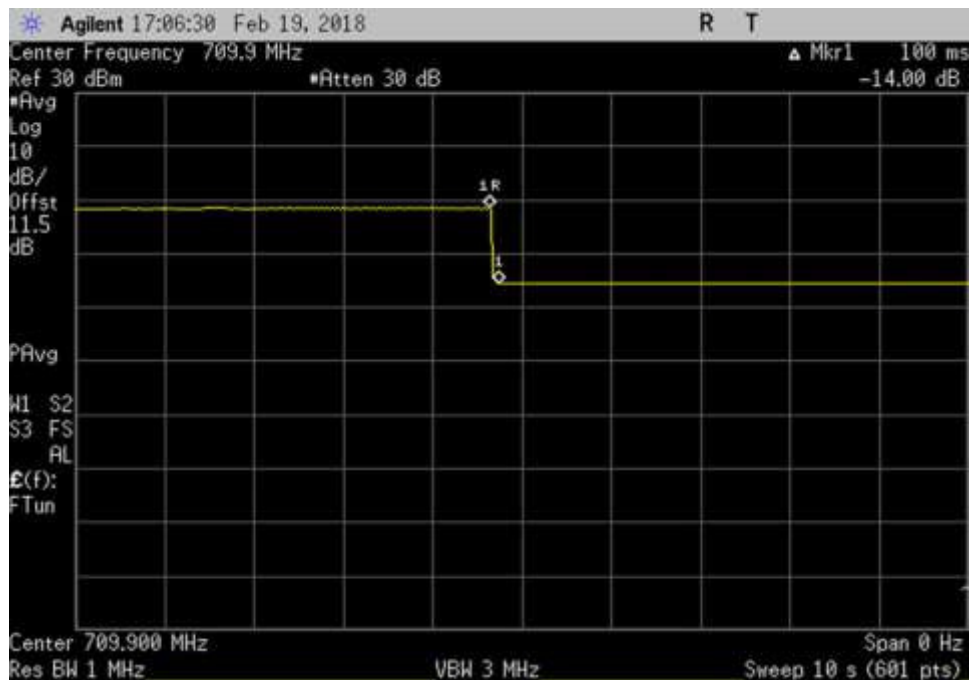
7.9.1 Maximum Gain

For this subsection, see summary of results of 7.9

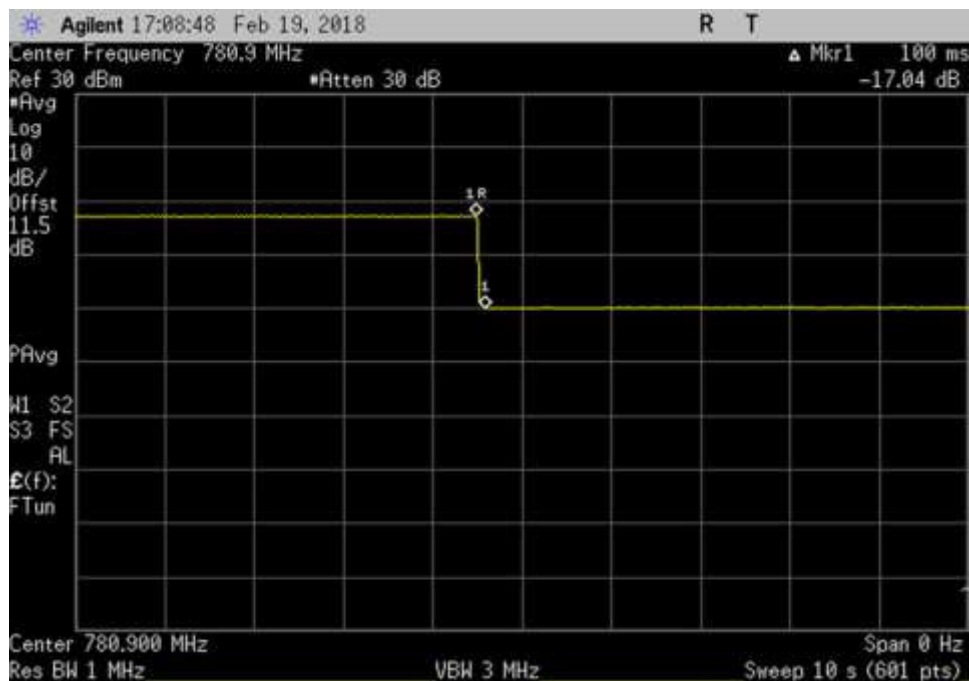
7.9.1 Maximum gain

7.9.2 Variable uplink Gain Timing

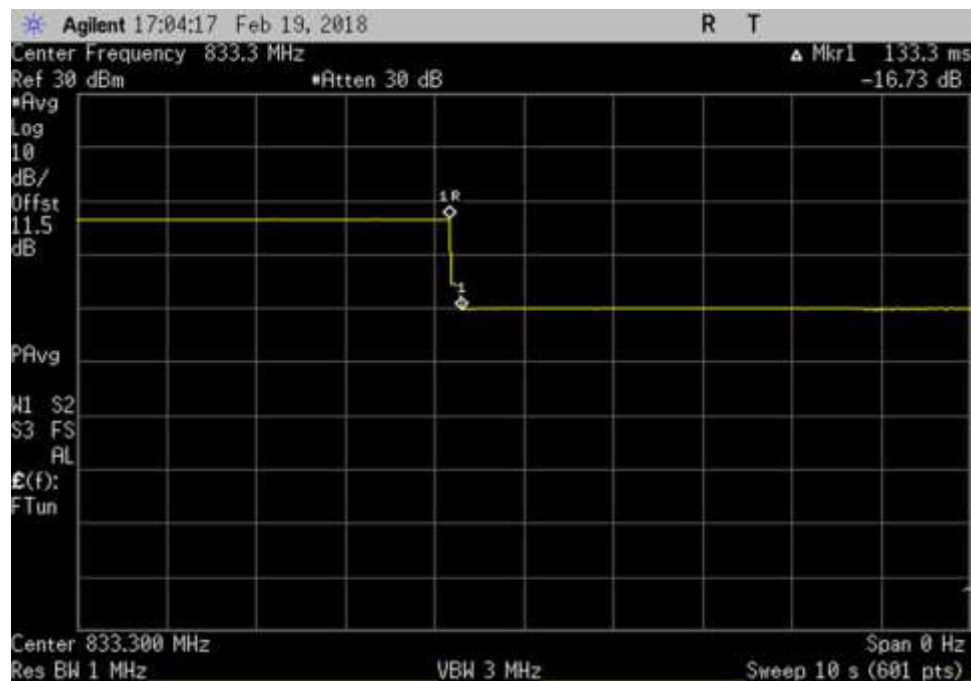
Plots



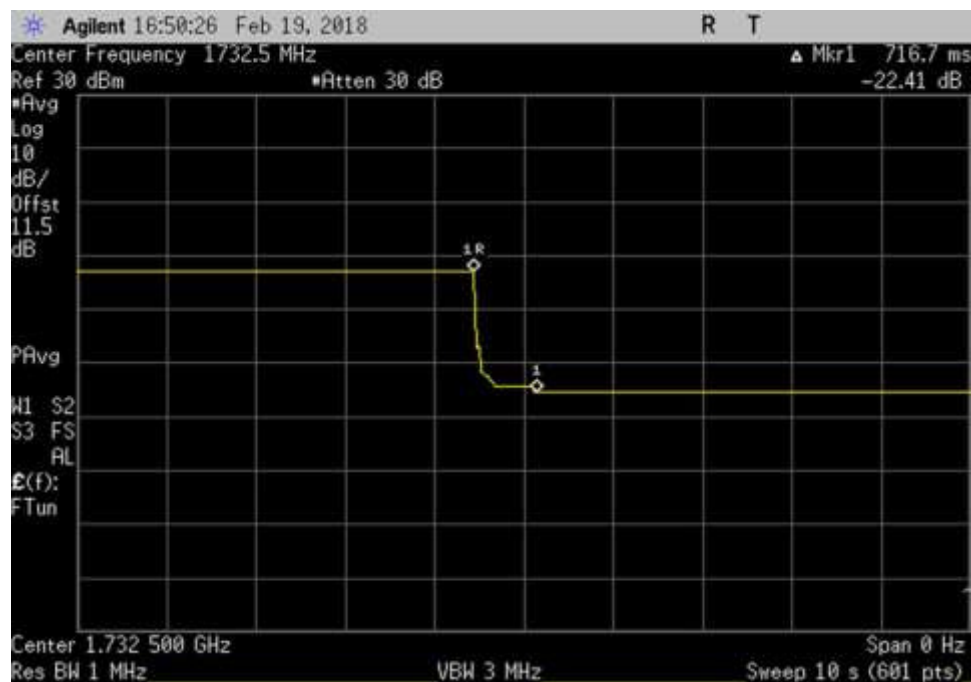
UL_698-716_709.9MHz_Var



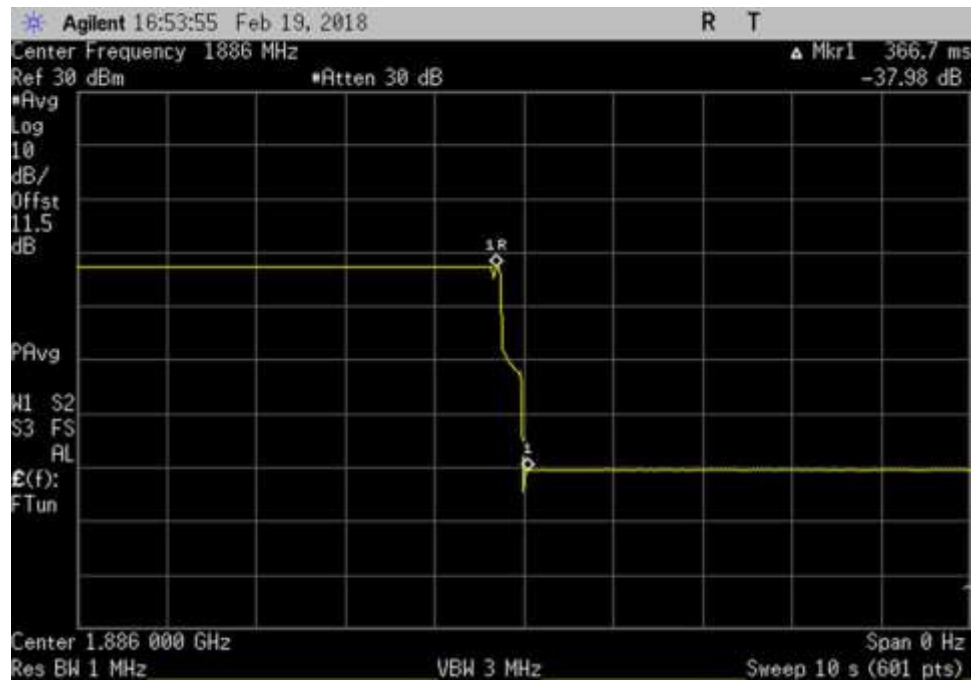
UL_776-787_780.9MHz_Var



UL_824-849_ 833.3MHz_Var



UL_1710-1755_ 1732.5MHz_Var



UL_1850-1915_1886MHz_Var

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 #: **100827**
 Test Type: **Conducted Emissions** Date 02/20/18
 Tested By: **Hieu Song Nguyenpham**
 Software: EMITest 5.03.11

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Test environment conditions:
 Temperature: 20.1°C
 Relative Humidity: 47%
 Pressure: 102.5kPa

Test Equipment:

Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03470	Spectrum Analyzer	Agilent	E4440A	1/3/2018	1/3/2020

Summary of Results

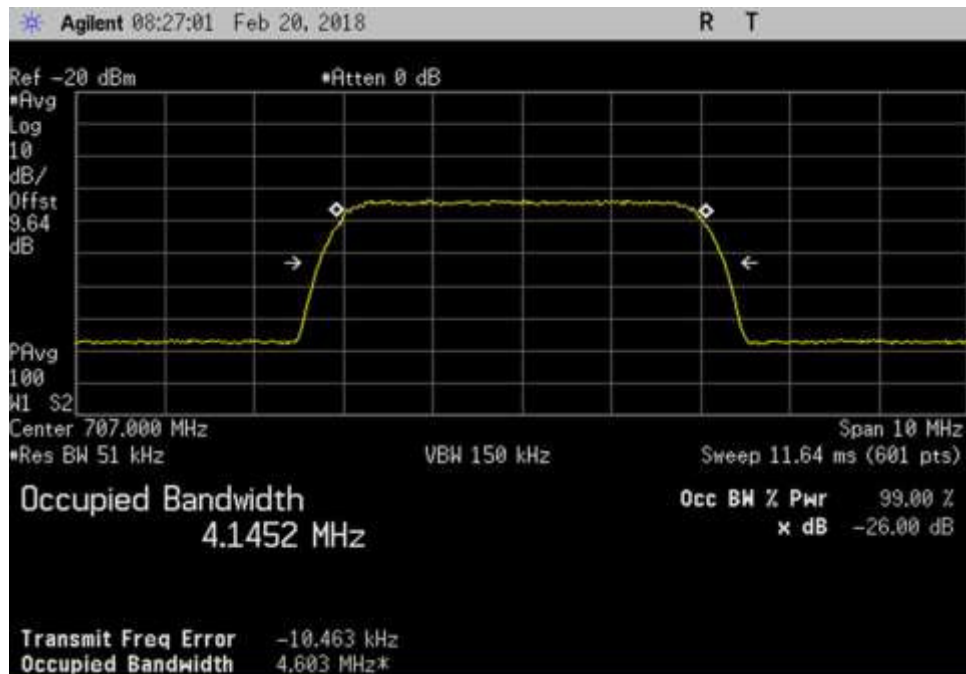
Pass: As summarized in plots and tables below, the uniformity of the output signal relative to the input signal are practically identical. Therefore, the comparison is within limits.

OBW-Input (Hz)					OBW-Output (Hz)				
EDGE	GSM	CDMA	AWGN	LTE	EDGE	GSM	CDMA	AWGN	LTE
244601	244435	1262000	4126600	4457100	243380	245282	1254800	4107200	4453500
245789	244214	1254000	4100000	4458700	247192	247227	1257000	4134400	4451900
245016	246158	1247800	4067700	4449900	251464	245040	1256000	4108500	4454100
245486	246874	1249700	4145200	4440600	247980	244296	1260100	4141300	4461500
244868	247123	1255800	4123300	4426700	248458	248582	1260000	4123400	4452500
245501	244034	1263000	4082900	4467600	245502	242397	1256300	4115200	4453200
246018	244413	1258500	4109900	4467600	243161	245663	1260700	4105000	4454600
244968	244693	1262000	4089700	4448800	246651	244202	1254100	4075000	4444200
244164	243641	1268800	4091900	4435200	244976	243268	1262300	4119800	4451100
244647	245589	1260900	4107500	4456300	244112	244050	1257500	4071800	4430400

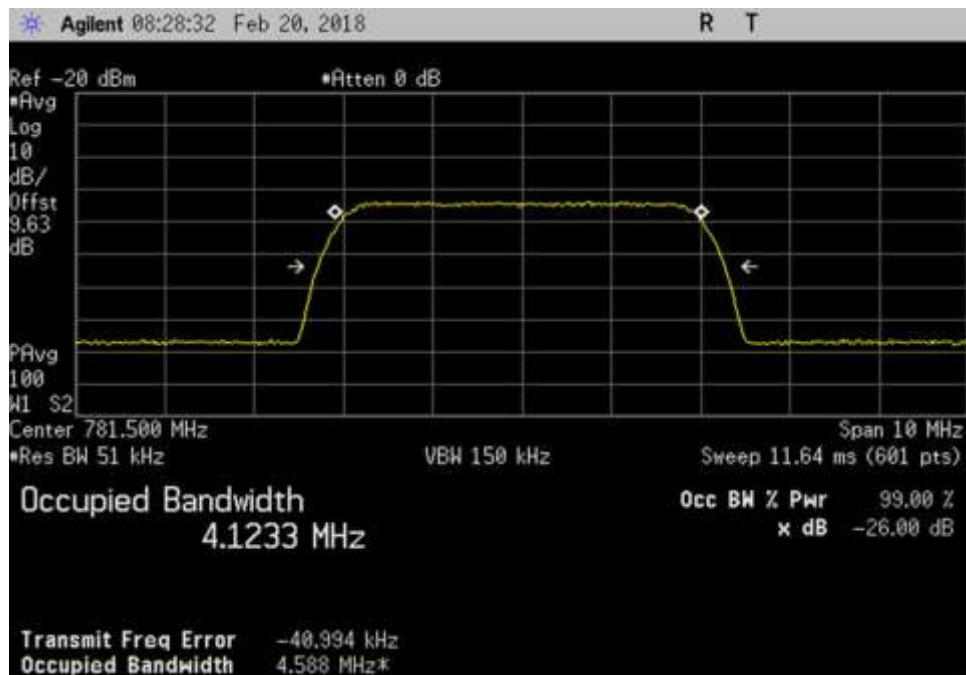
Max Difference In&Out Occ BW 99% Pwr					
Frequency Range	EDGE	GSM	CDMA	AWGN	LTE
UL_1710-1755MHz	0.50%	0.35%	0.57%	0.47%	0.08%
UL_1850-1915MHz	0.57%	1.23%	0.24%	0.84%	0.15%
UL_824-849MHz	2.63%	0.45%	0.66%	1.00%	0.09%
UL_698-716MHz	1.02%	1.04%	0.83%	0.09%	0.47%
UL_777-787MHz	1.47%	0.59%	0.33%	0.00%	0.58%
DL_2110-2155MHz	0.00%	0.67%	0.53%	0.79%	0.32%
DL_1930-1995MHz	1.16%	0.51%	0.17%	0.12%	0.29%
DL_869-894MHz	0.69%	0.20%	0.63%	0.36%	0.10%
DL_728-746MHz	0.33%	0.15%	0.51%	0.68%	0.36%
DL_746-756MHz	0.22%	0.63%	0.27%	0.87%	0.58%

Plots

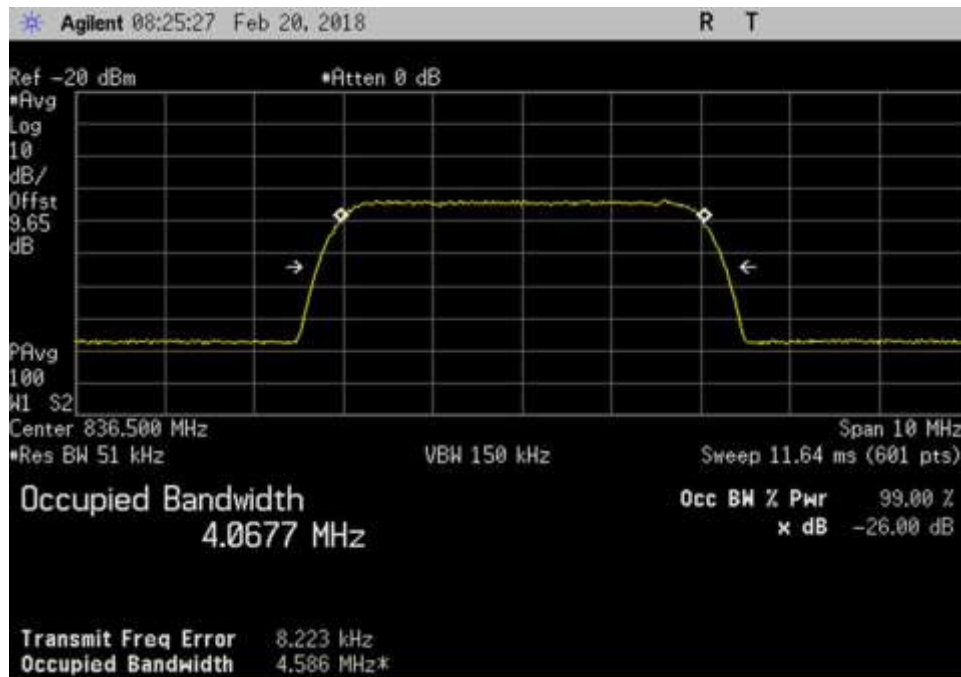
AWGN Input



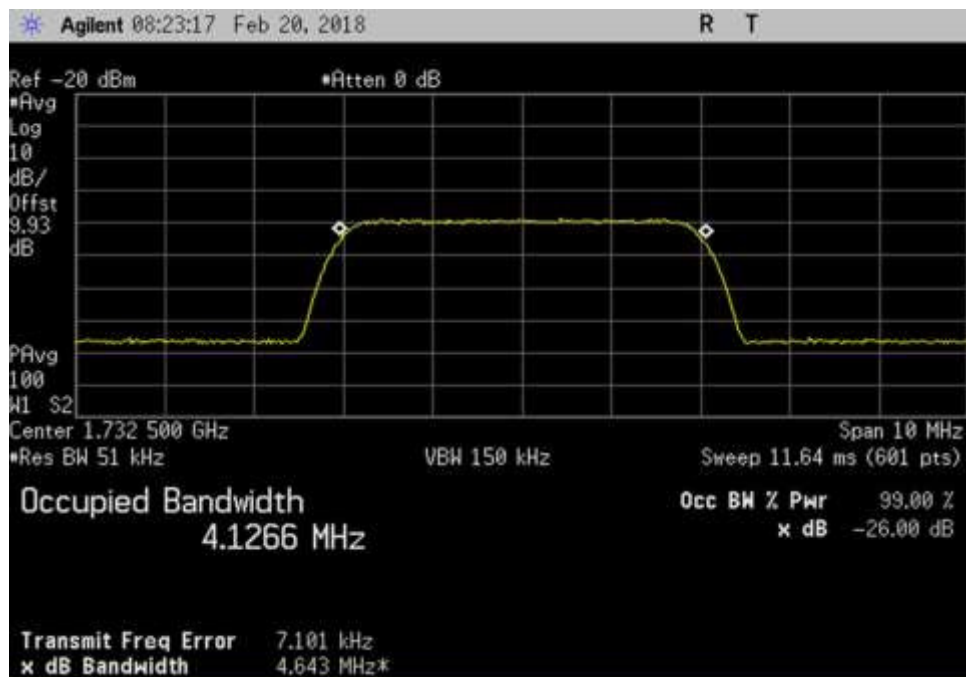
UL_698-716_AWGN_707MHz



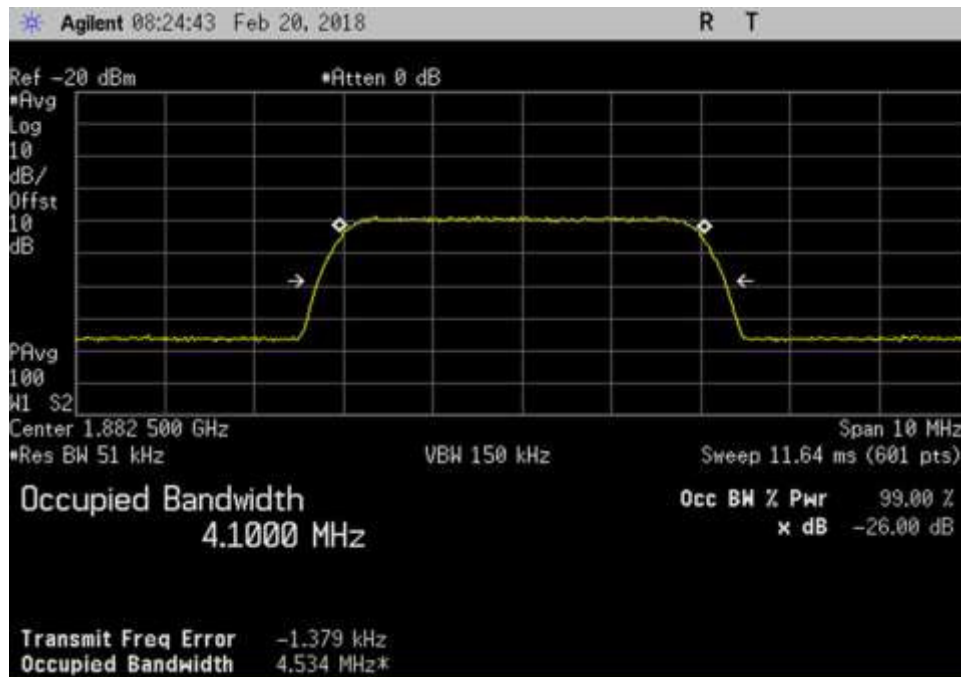
UL_776-787_AWGN_781.5MHz



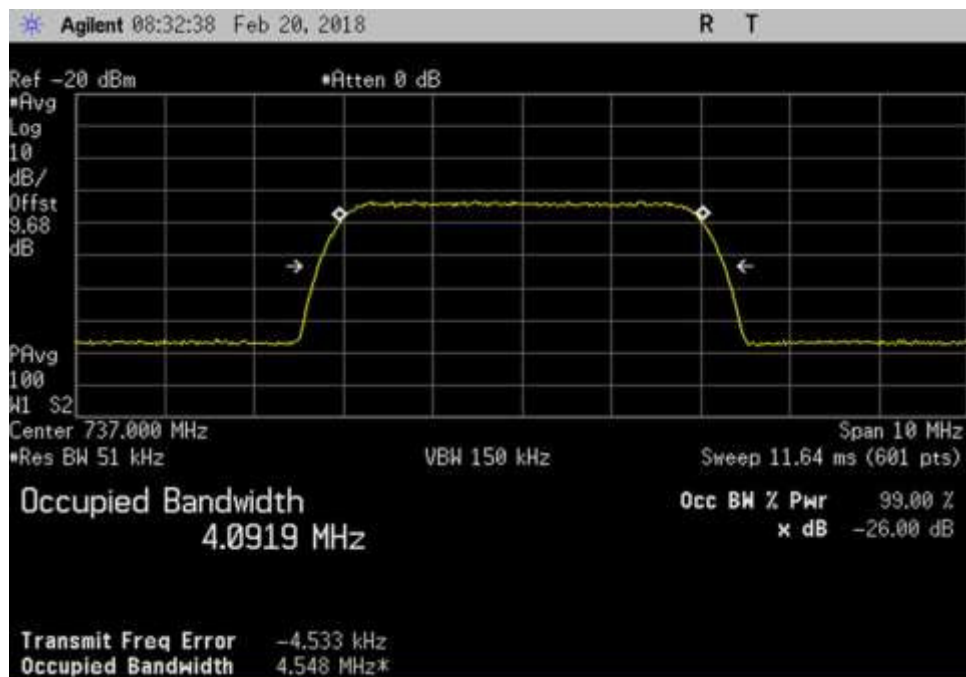
UL_824-849_AWGN_ 836.5MHz



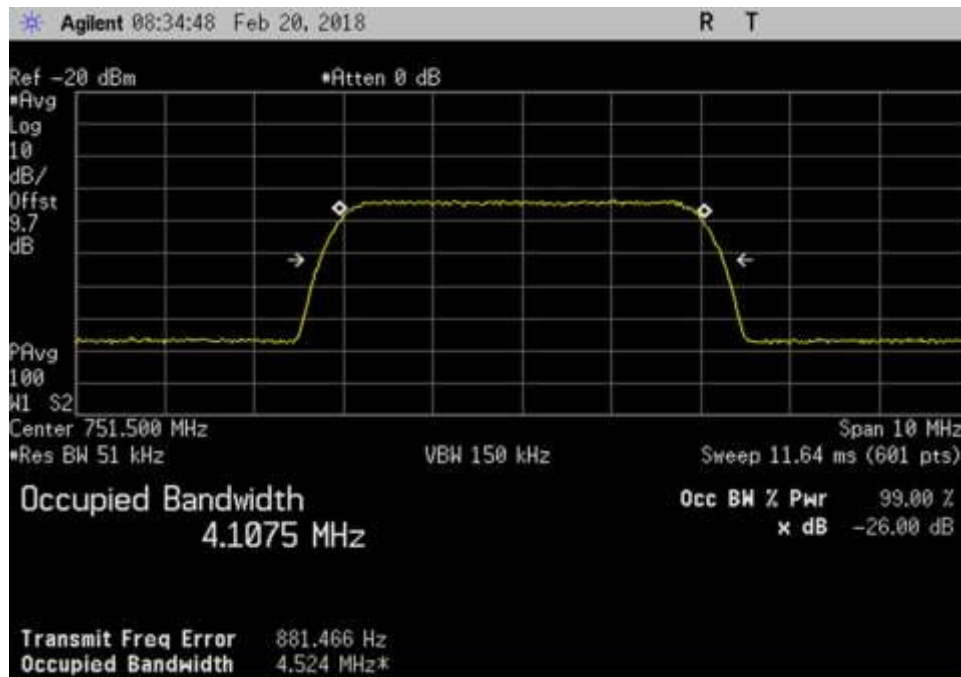
UL_1710-1755_AWGN_ 1732.5MHz



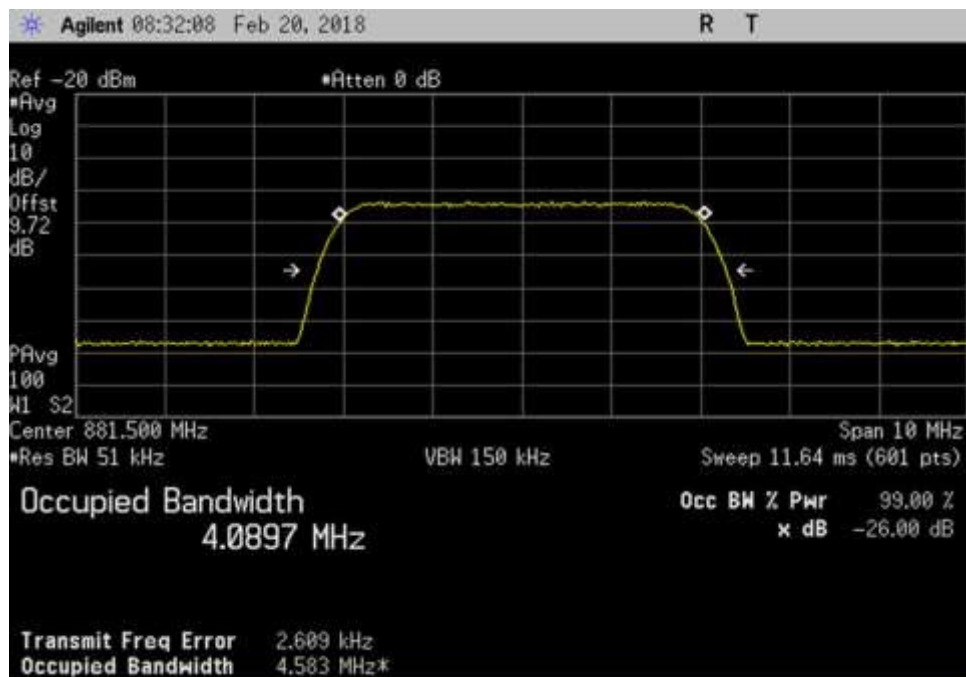
UL_1850-1915_AWGN_1882.5MHz



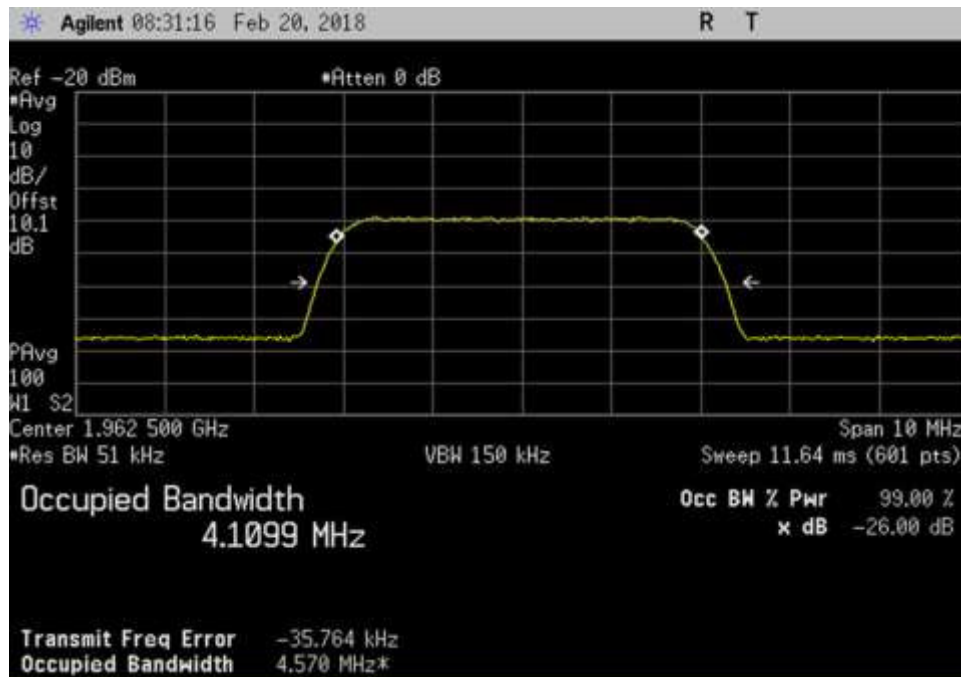
DL_728-746_AWGN_737MHz



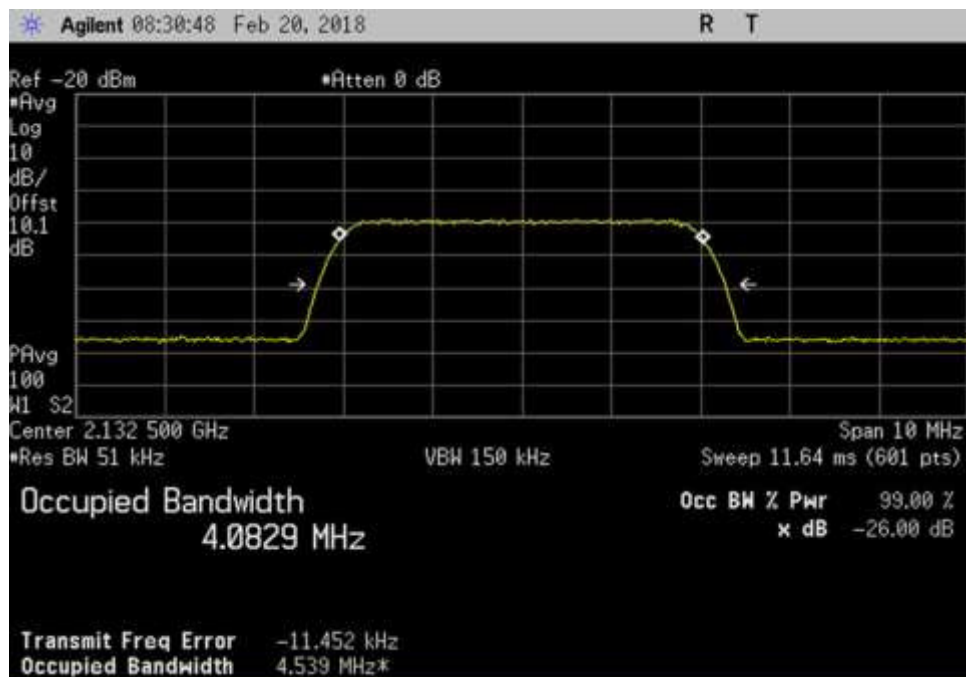
DL_746-757_AWGN_751.5MHz



DL_869-894_AWGN_881.5MHz

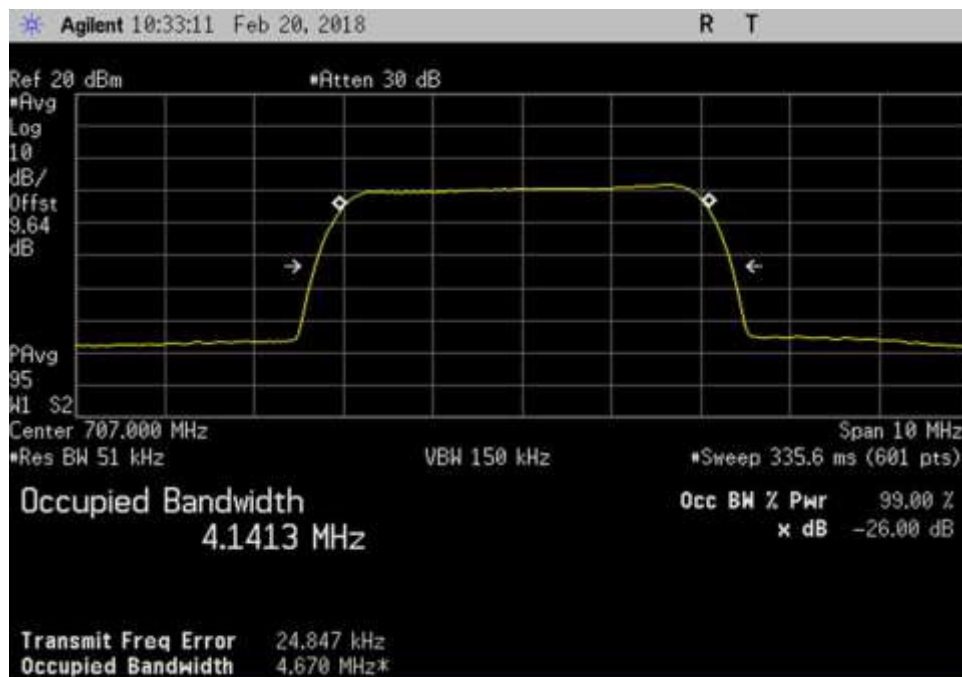


DL_1930-1995_AWGN_ 1962.5MHz

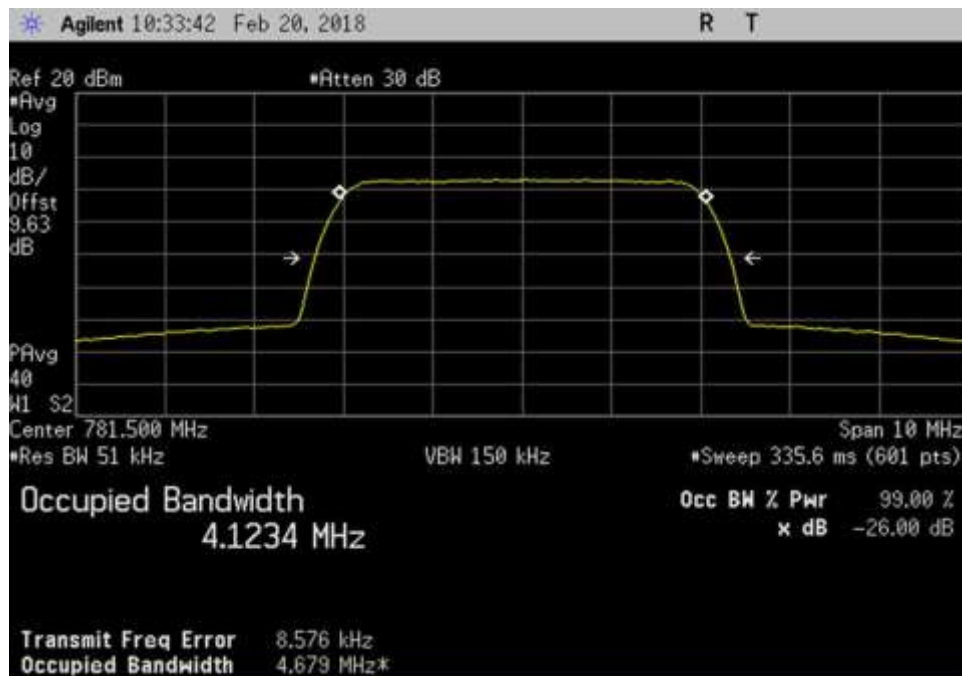


DL_2110-2155_AWGN_ 2132.5MHz

AWGN Output



UL_698-716_AWGN_707MHz



UL_776-787_AWGN_781.5MHz