

Cellphone-Mate, Inc.

TEST REPORT FOR

**5 Band Mobile Booster
Model: Fusion2Go-Max**

Tested to The Following Standard:

FCC Part 20.21 / 22H / 24E / 27

Report No.: 102180-12

Date of issue: February 28, 2019



Test Certificate # 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 testing for CKC Laboratories, Inc.

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

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

Cellphone-Mate, Inc.
48346 Milmont Drive
Fremont CA 94538

Representative: Dennis Findley
Customer Reference Number: CKC01112019

DATE OF EQUIPMENT RECEIPT:**DATE(S) OF TESTING:****REPORT PREPARED BY:**

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

Project Number: 102180

January 14, 2019

January 14-29, 2019

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, reading "Steve Behm", is written over a horizontal line.

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 20.21/22H/24E/27

Wideband Consumer Signal Booster Measurement Guidance: KDB #935210 DO3 v04r02, June 19, 2018

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	Mod. #1	Pass
7.3 a) - d)	Maximum Booster Gain Computation	20.21(e)(8)(i)(B)	Bidirectional Capabilities	Mod. #1	Pass
7.4 a) - n)	Intermodulation Product	20.21(e)(8)(i)(F)	Intermodulation Limit	Mod. #1	Pass
7.5 a) - n)	Out of Band Emissions	20.21(e)(8)(i)(E)	Out of Band Emission	Mod. #1	Pass
7.6 a) - e)	Conducted Spurious Emission	2.1051/22H/24E/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	Mod. #1	Pass
7.8 a) - l)	Uplink inactivity	20.21(e)(8)(i)(I)	Uplink Inactivity	NA	Pass

NA = Not applicable

NA1 = Not applicable because

Standard / Specification: FCC Part 20.21/22H/24E/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) 20.21(e)(8)(i)(H)	Booster Gain	Mod. #1	Pass
7.9.2 a) - f)	Variable Uplink Gain Timing		Transmit Power Off Mode		
7.10.a) - j)	Occupied Band Width	2.1049/22H/24E/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	Mod. #1	Pass
7.12a) - f)	Radiated Spurious Emission	2.1053/ 22H/24E/27	Spurious Emission	Mod. #1	Pass
7.13 a) - c)	Spectrum Block Filter	NA	NA	NA	NA1
7.14	Additional requirements for dual-enclosure wideband consumer signal boosters	NA	NA	NA	NA2

NA = Not applicable

NA1 = Not applicable because the EUT does not employ spectrum block filter.

NA2 = Not applicable because the EUT is not dual-enclosure wideband consumer signal booster.

ISO/IEC 17025 Decision Rule

The declaration of pass or fail herein is based upon assessment to the specification(s) listed above, including where applicable, assessment of measurement uncertainties. For performance related tests, equipment was monitored for specified criteria identified in that section of testing.

Modifications During Testing

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

Summary of Conditions
Modification #1: - Increased the 850 UL output power by 1dB - Increased the AWS UL gain by 1dB - Increased the PCS UL gain by 1dB - Increased the LTE-V UL gain by 1dB - Increased the 850 DL gain by 1dB - Decreased the AWS DL gain by 1dB - Decreased the AWS DL gain by 1dB

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
5 Band Mobile Booster	Cellphone-Mate, Inc.	Fusion2Go-Max	2

Support Equipment:

Device	Manufacturer	Model #	S/N
Power Supply	Surecall	GME36A-120300FDS	NA

General Product Information:

Product Information	Manufacturer-Provided Details
Equipment Type:	Stand-Alone Equipment
Type of Equipment	Wideband Consumer booster/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)) See Section 7.10 for OBW
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:	Donor/Outdoor antenna/ UL: 50-ohm UFL Server / indoor antenna/ DL: 50-ohm FME
Nominal Input Voltage:	12VDC
Firmware used for Test:	SC_HB_CarTop50_V1.0_No2_20181206

FCC PART 20.21/22H/24E/27

General Test Setup

Summary of Conditions

The equipment under test (EUT) is a Mobile Wideband Consumer Booster intended for automotive.

The EUT is placed on the Styrofoam platform for radiated emission and a test bench for conducted emission measurement.

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 the FCC document: 935210 D03 Signal Booster Measurements v04r02, dated June19, 2018.

Firmware: SC_HB_CarTop50_V1.0_No2_20181206

Device is powered by a support 12V DC power supply

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 #: **102180** Date 01/14/2019
 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: 22.0°C, 60% relative humidity, Pressure: 100.9 kPa

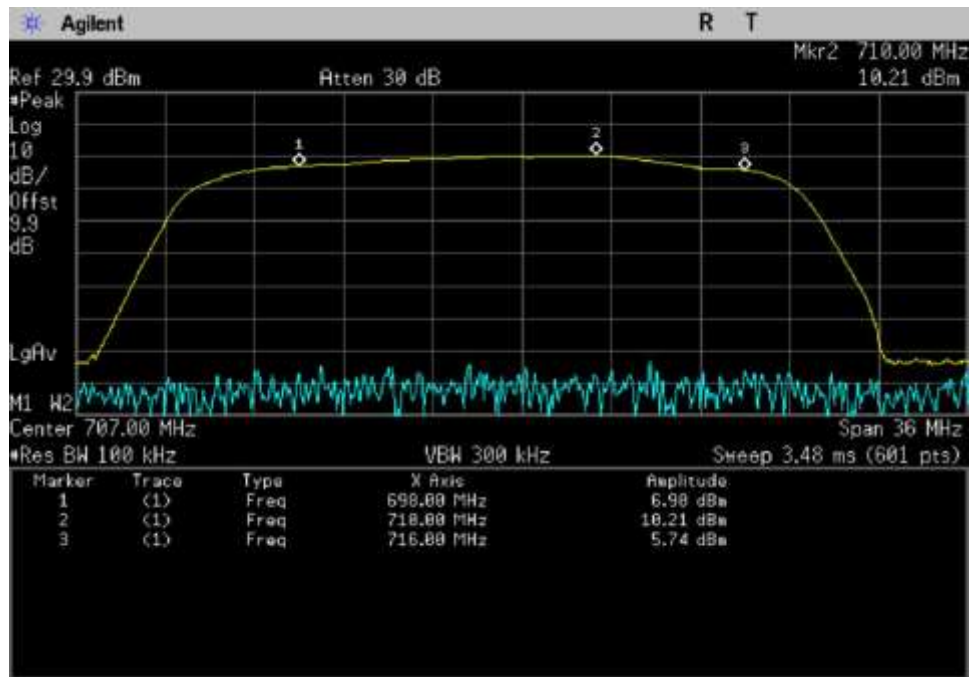
Test Equipment:

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
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020

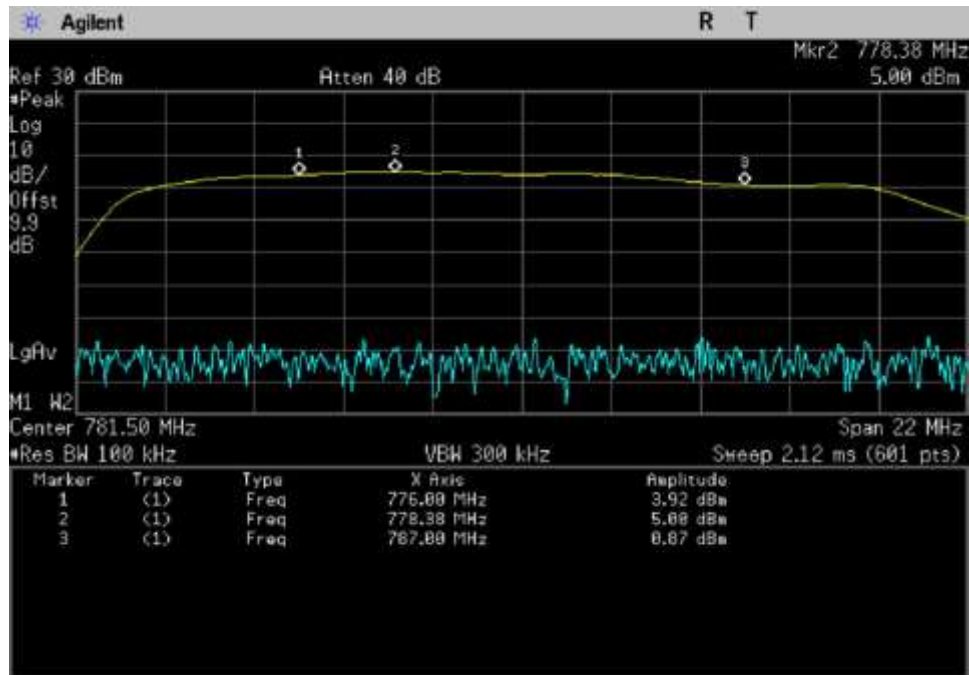
Summary of Results

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

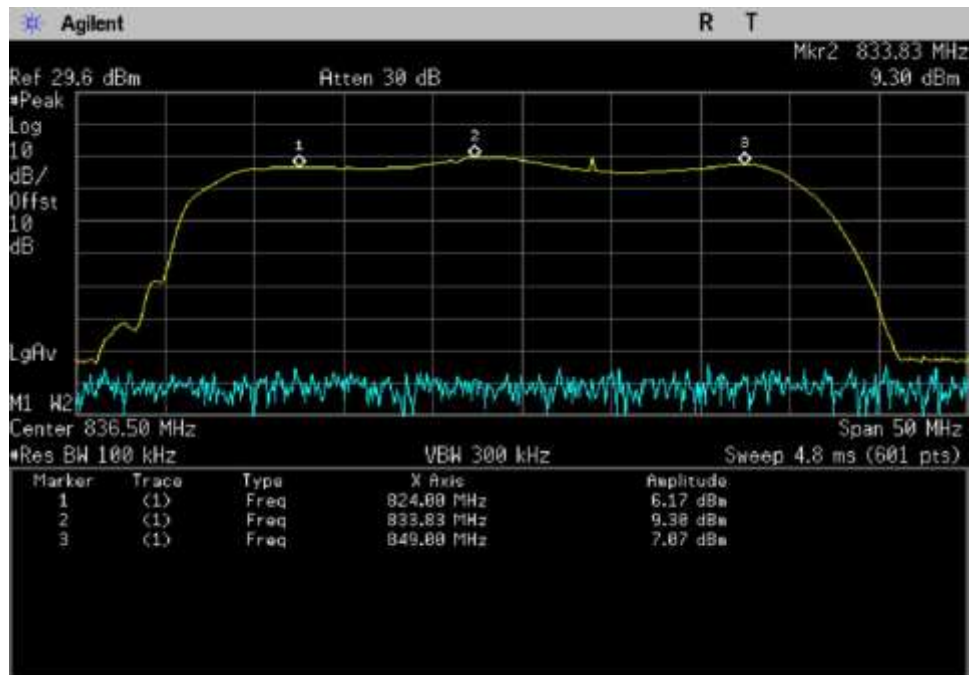
Plots



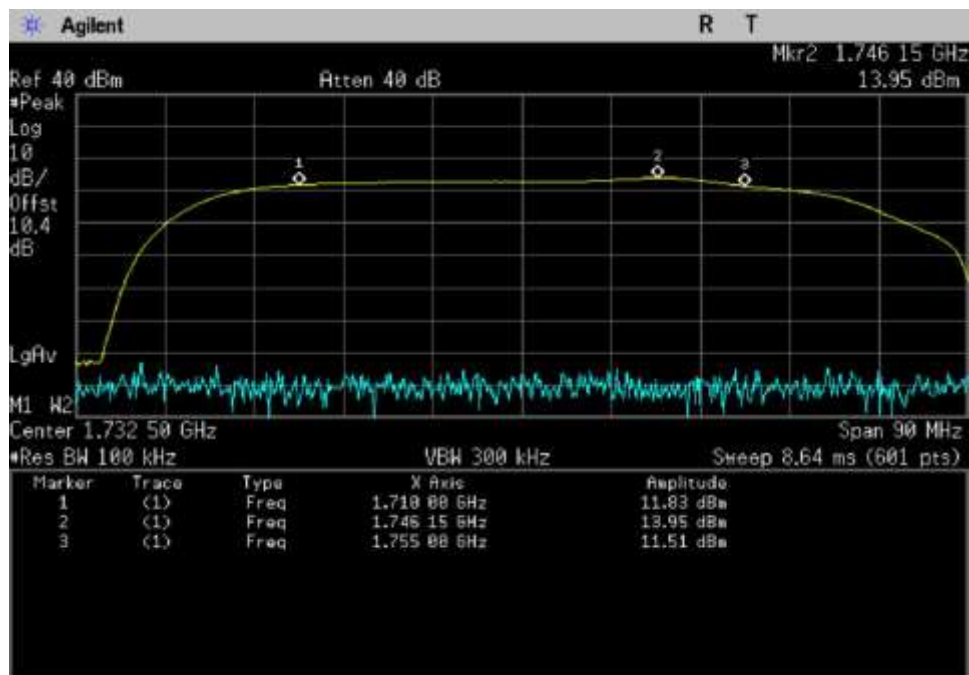
UL_698-716_698- 710MHz



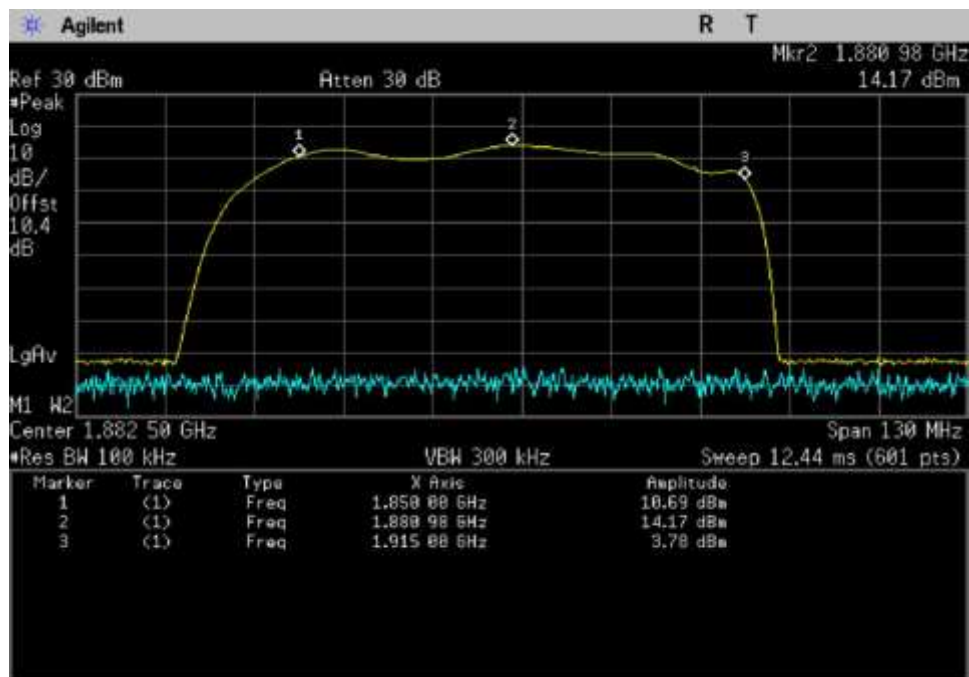
UL_776-787_776- 778.38MHz



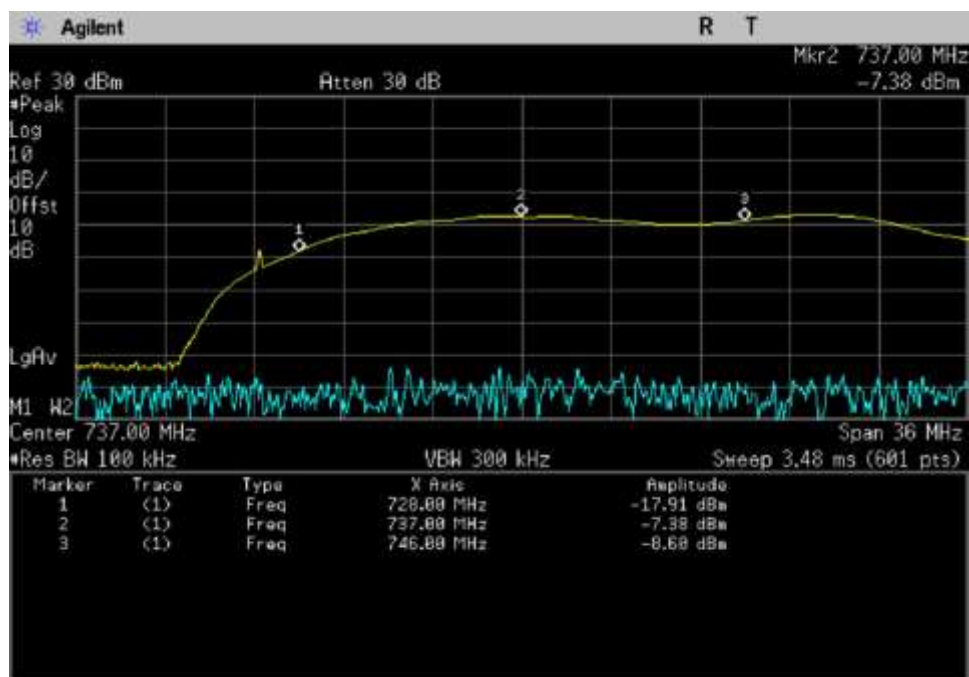
UL_824-849_ 824- 833.83MHz



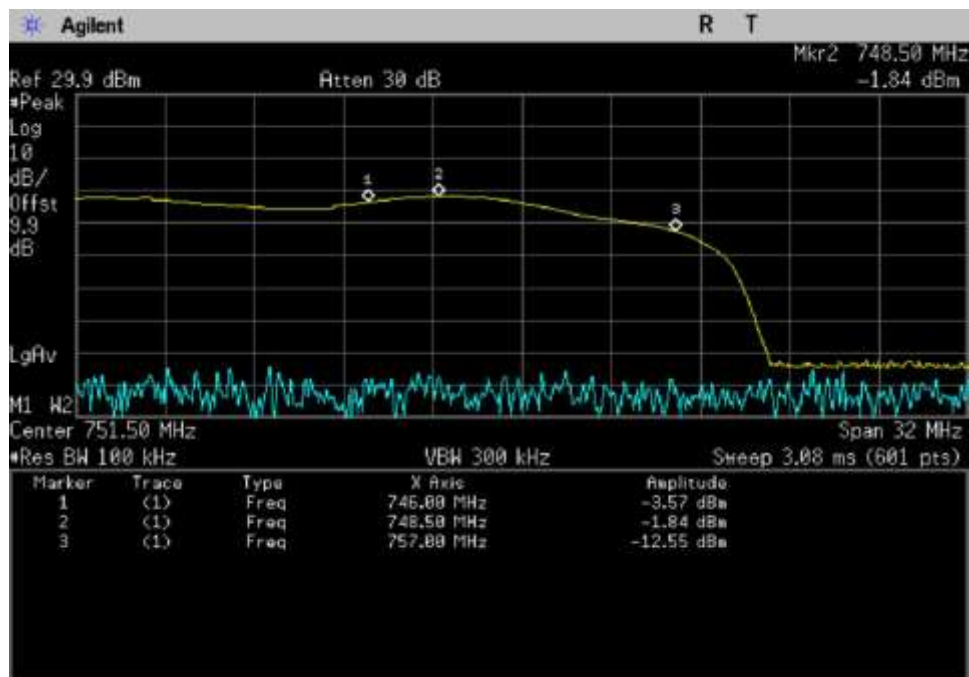
UL_1710-1755_ 1710- 1746.15MHz



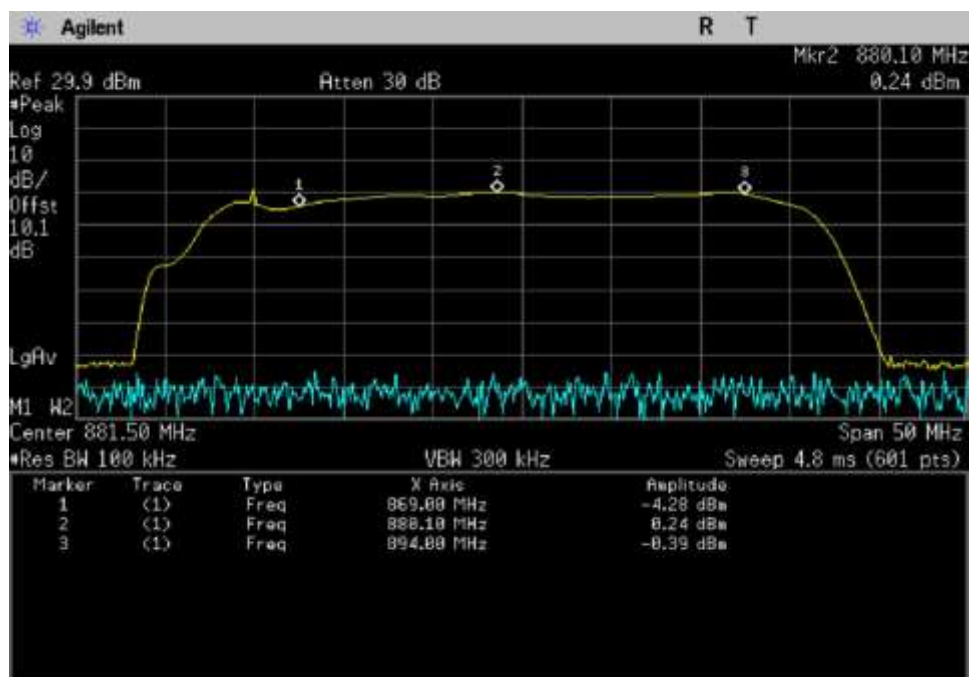
UL_1850-1915_ 1850- 1880.98MHz



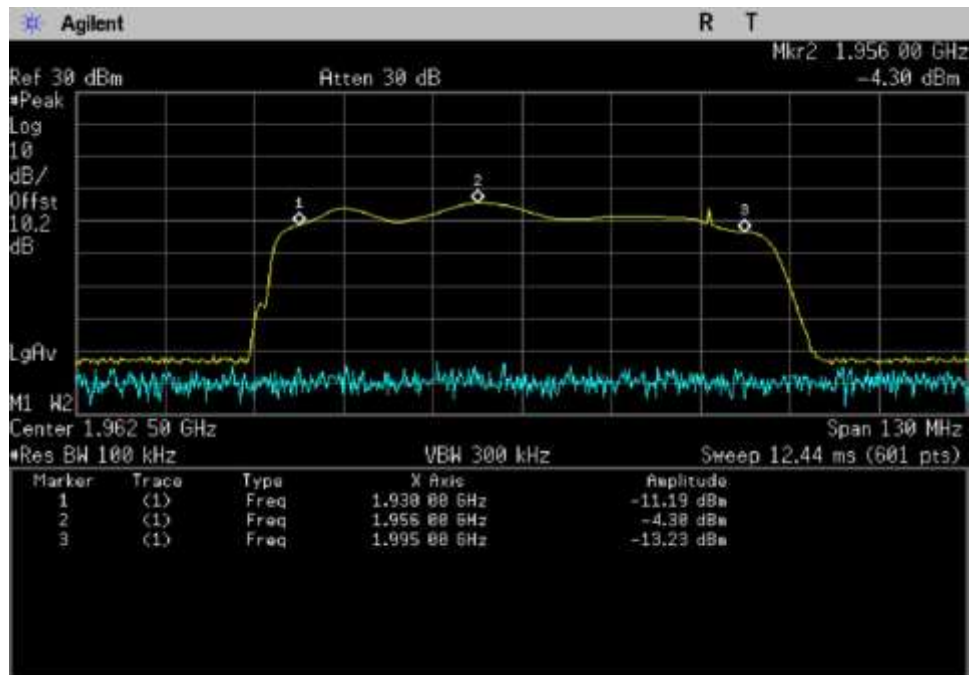
DL_728-746_ 728- 737MHz



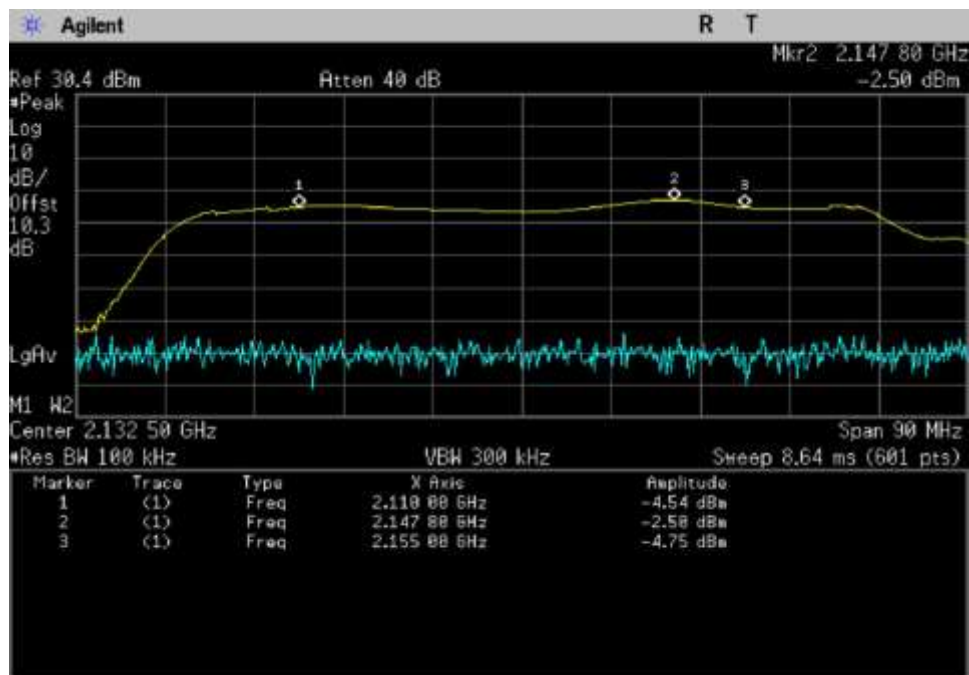
DL_746-757_ 746- 748.5MHz



DL_869-894_ 869- 880.1MHz



DL_1930-1995_ 1930- 1956MHz



DL_2110-2155_ 2110- 2147.8MHz

7.2 Maximum Power / 7.3 Maximum Booster 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 #: **102180** Date 01/16/2019
 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: 22.5°C, 52% relative humidity, Pressure: 101.5kPa

Modification #1 was in place during testing.

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
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020

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	-24.9	22.3	47.2	-26.4	20.1	46.5
UL1850-1915	-23.2	24.3	47.5	-24.6	21.8	46.4
UL824-894	-14.8	26.4	41.2	-16.3	24.3	40.6
UL 698-716	-17.7	24.9	42.6	-17.9	24.0	41.9
UL776-787	-16.6	25.4	42.0	-15.8	25.3	41.1
DL2110-2155	-36.3	3.0	39.3	-39.9	-0.3	39.6
DL1930-1995	-38.0	2.9	40.9	-39.1	2.0	41.1
DL869-894	-39.8	6.0	45.8	-41.9	3.9	45.8
DL:728-746	-40.6	2.3	42.9	-42.7	0.6	43.3
DL 746-757	-38.3	5.0	43.3	-40.5	2.8	43.3

Pulse GSM					Conducted	Conducted and EIRP
Frequency (MHz)	Output Power (dBm)	*Ant Gain (dBi)	Cable (dB)	EIRP (dBm)	Limit Min (dBm)	Limit Max (dBm)
UL1710-1755	22.3	2.2	0.2	24.3	17	30
UL1850-1915	24.3	3.2	0.2	27.3	17	30
UL824-894	26.4	2.6	0.1	28.9	17	30
UL 698-716	24.9	0.6	0.1	25.4	17	30
UL776-787	25.4	-0.4	0.1	24.9	17	30
DL2110-2155	3.0	10.0	3.8	9.2	NA	17
DL1930-1995	2.9	10.0	3.6	9.3	NA	17
DL869-894	6.0	7.0	2.3	10.7	NA	17
DL:728-746	2.3	7.0	2.1	7.2	NA	17
DL 746-757	5.0	7.0	2.1	9.9	NA	17

4.1MHz AWGN					Conducted	Conducted and EIRP
Frequency (MHz)	Output Power (dBm)	*Ant Gain (dBi)	Cable (dB)	EIRP (dBm)	Limit Min (dBm)	Limit Max (dBm)
UL1710-1755	20.1	2.2	0.2	22.1	17	30
UL1850-1915	21.8	3.2	0.2	24.8	17	30
UL824-894	24.3	2.6	0.1	26.8	17	30
UL 698-716	24.0	0.6	0.1	24.5	17	30
UL776-787	25.3	-0.4	0.1	24.8	17	30
DL2110-2155	-0.3	10.0	3.8	5.9	NA	17
DL1930-1995	2.0	10.0	3.6	8.4	NA	17
DL869-894	3.9	7.0	2.3	8.6	NA	17
DL:728-746	0.6	7.0	2.1	5.5	NA	17
DL 746-757	2.8	7.0	2.1	7.7	NA	17

* Antenna gain and cable losses indicated from Fusion2Go-Max Marine-1 Kit

UL SC328W

DL SC248W and SC240-20FN

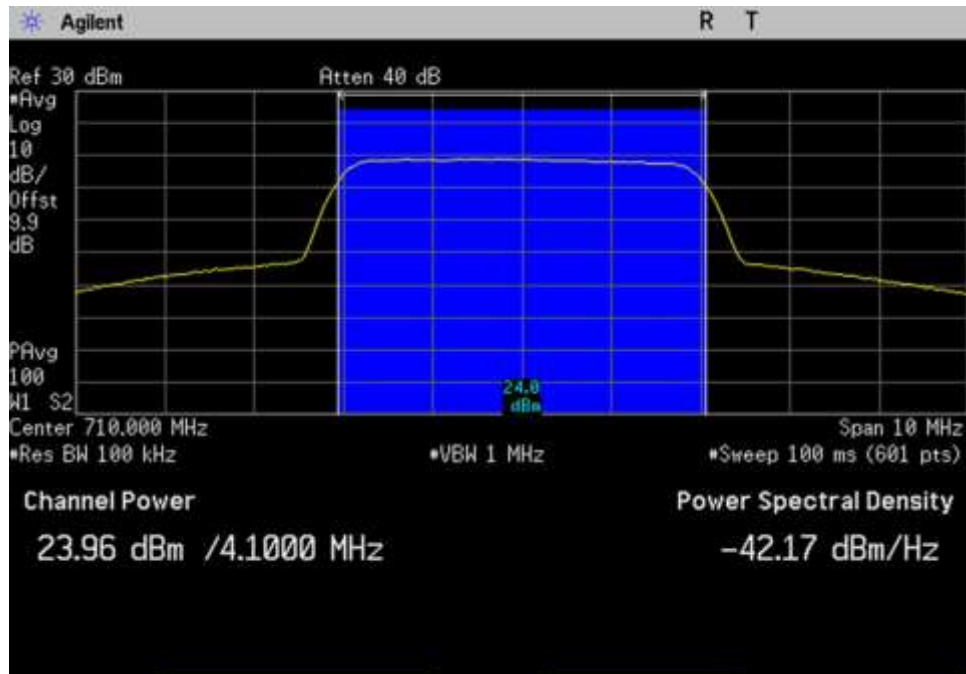
Section 5.5 power						
Frequency (MHz)	Pulse GSM			4.1 MHz AWGN		
	Input (dBm)	Output (dBm)	Gain (dB)	Input (dBm)	Output (dBm)	Gain (dB)
UL1710-1755	10.0	22.3	12.3	10.0	19.8	9.8
UL1850-1915	10.0	23.8	13.8	10.0	21.5	11.5
UL824-894	10.0	26.0	16.0	10.0	22.6	12.6
UL 698-716	10.1	24.2	14.1	10.1	24.0	13.9
UL776-787	10.1	24.6	14.5	10.1	24.6	14.5
DL2110-2155	-32.4	2.6	35.0	-34.9	-0.7	34.2
DL1930-1995	-34.9	2.4	37.3	-33.9	1.4	35.3
DL869-894	-35.0	5.6	40.6	-36.9	3.8	40.7
DL:728-746	-35.8	2.3	38.1	-37.4	0.2	37.6
DL 746-757	-34.3	5.0	39.3	-34.9	2.8	37.7

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	7.9	6.9	9.0
UL gain vs DL gain 1850/1930	6.6	5.3	9.0
UL gain vs DL gain 824/869	-4.6	-5.2	9.0
UL gain vs DL gain 776/728	-0.3	-1.4	9.0
UL gain vs DL gain 776/746	-1.3	-2.2	9.0

Plots

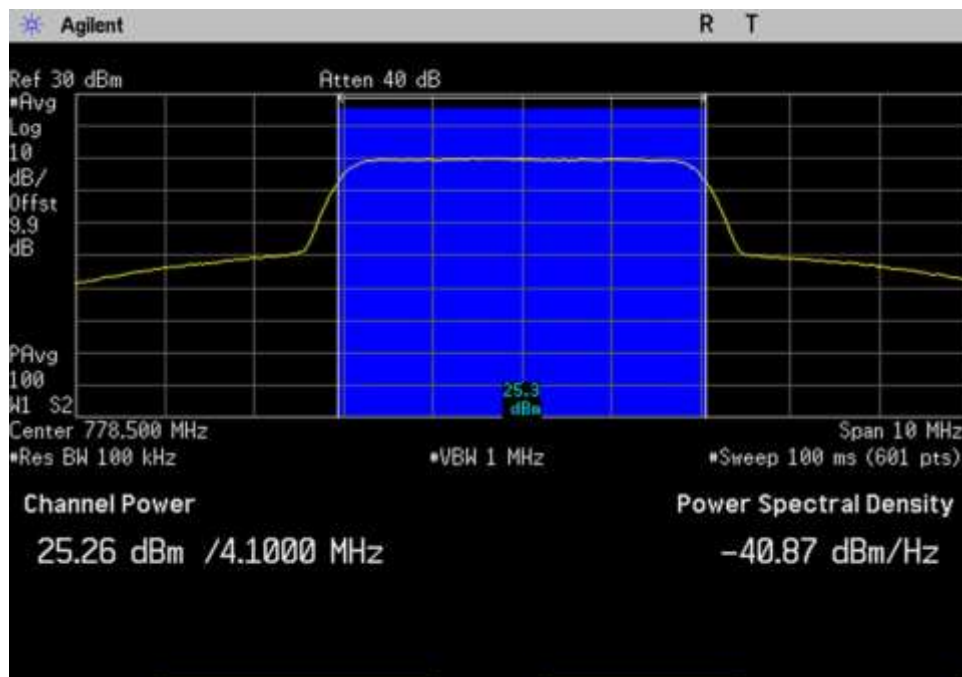
AWGN



UL_698-716_AWGN_710MHz



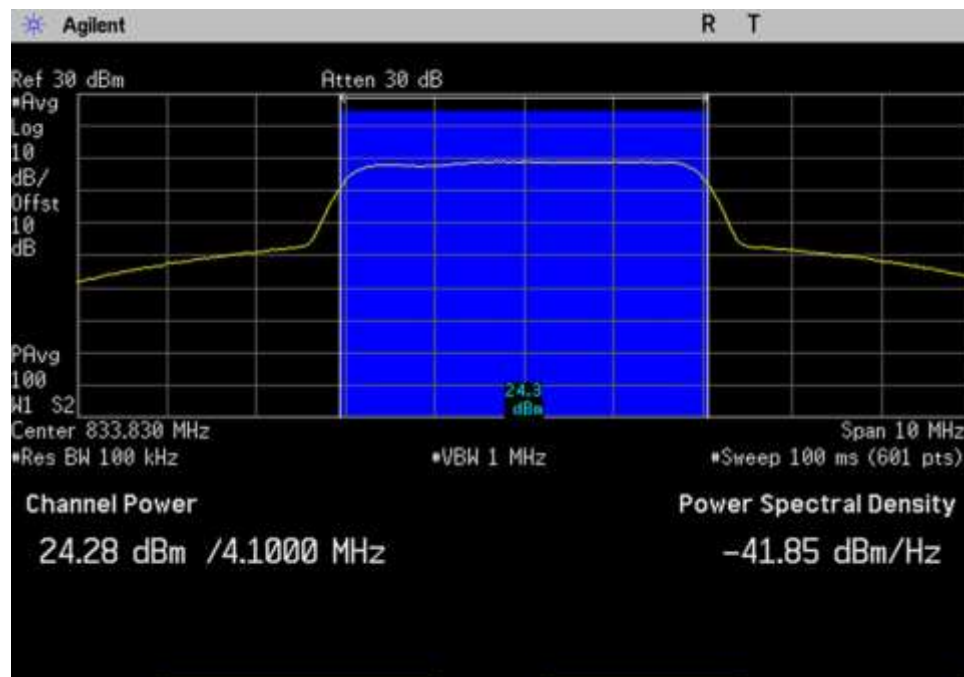
UL_698-716_AWGN_710MHz



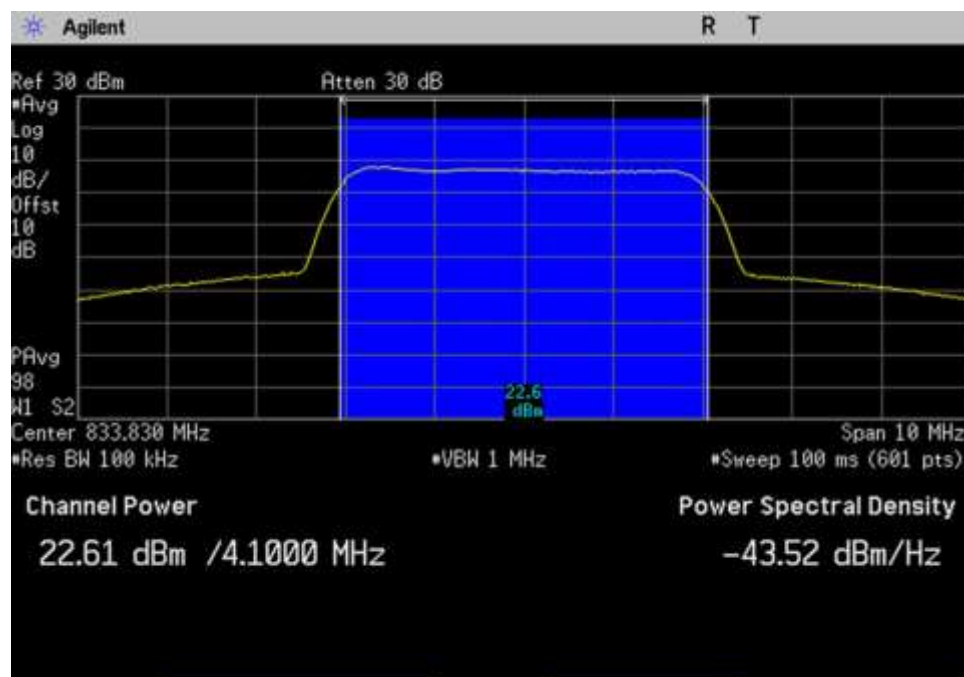
UL_776-787_AWGN_778.5MHz



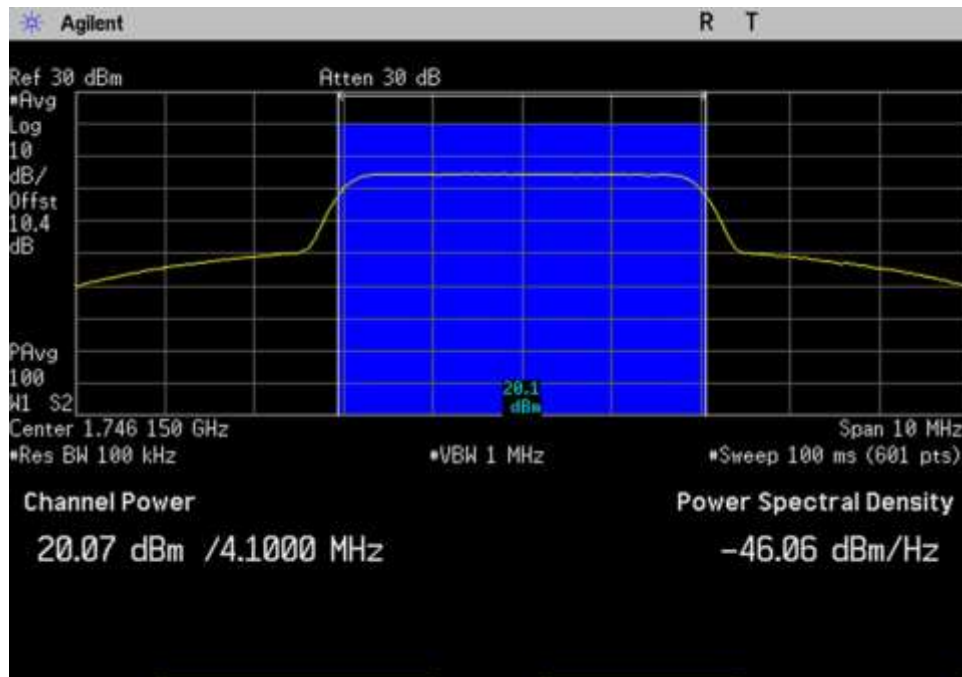
UL_776-787_AWGN_Max_778.5MHz



UL_824-849_AWGN_ 833.83MHz



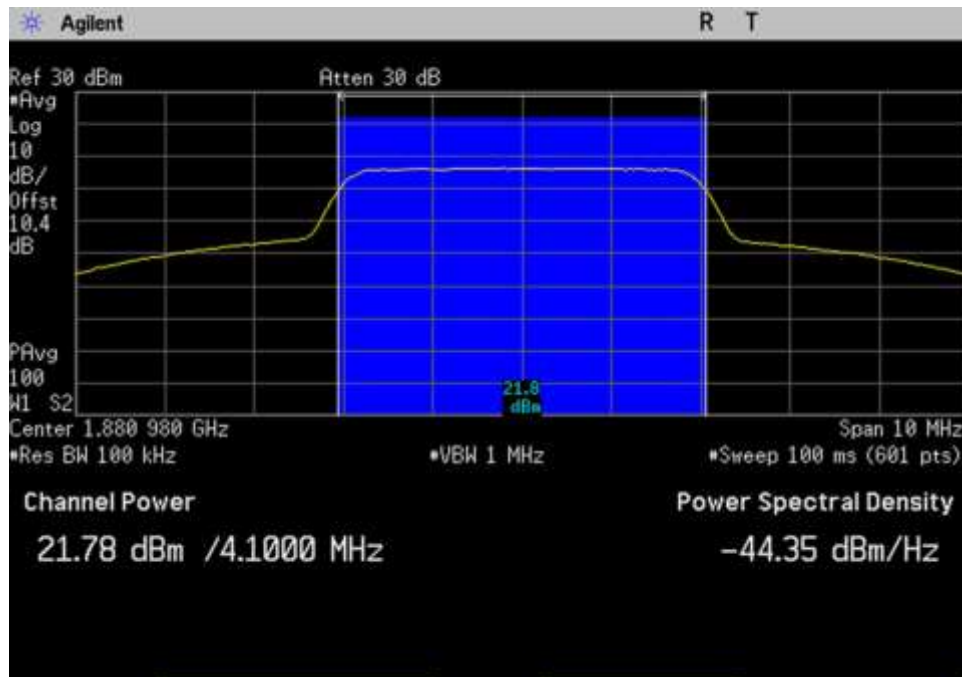
UL_824-849_AWGN_Max_ 833.83MHz



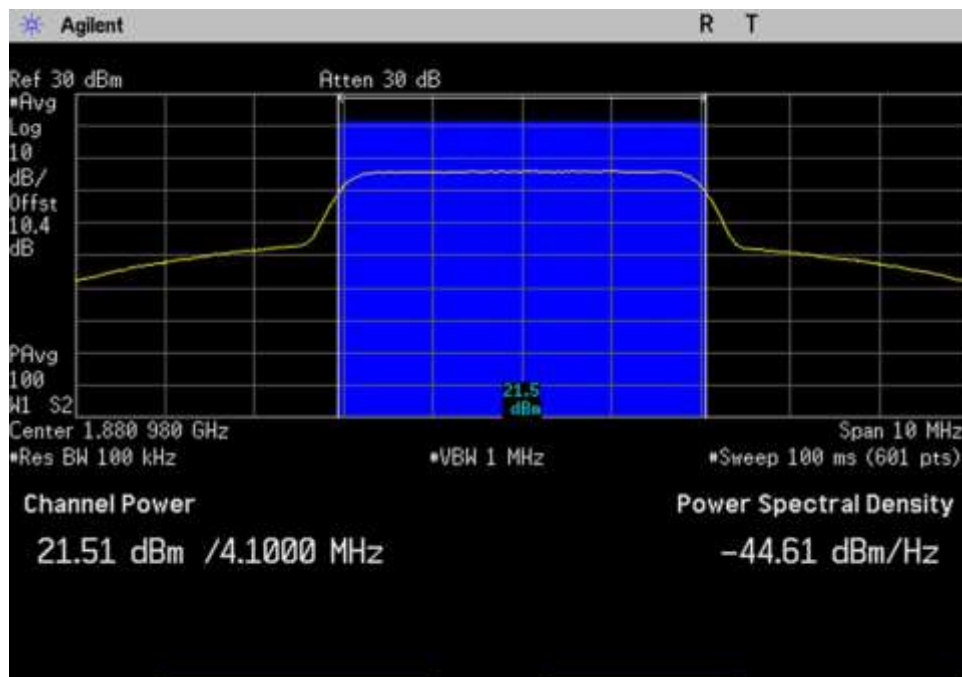
UL_1710-1755_AWGN_1746.15MHz



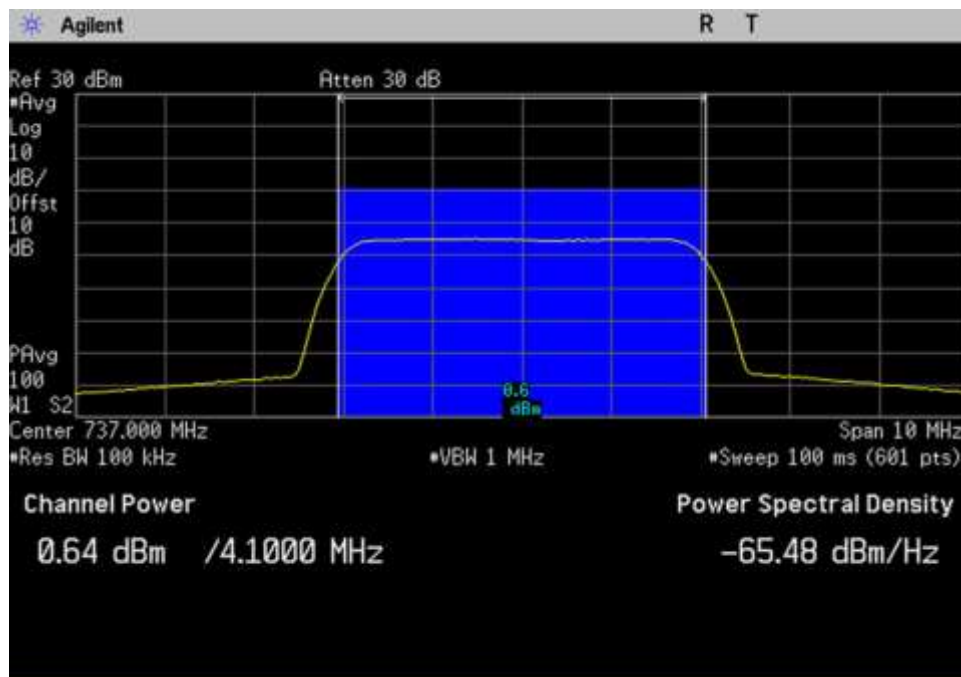
UL_1710-1755_AWGN_Max_1746.15MHz



UL_1850-1915_AWGN_1880.98MHz



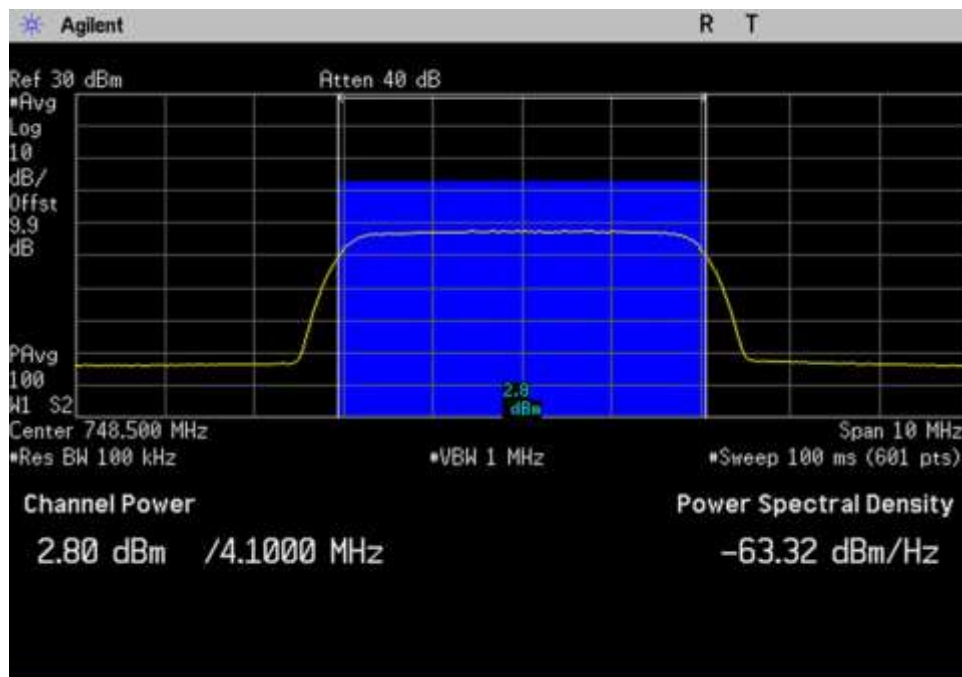
UL_1850-1915_AWGN_Max_1880.98MHz



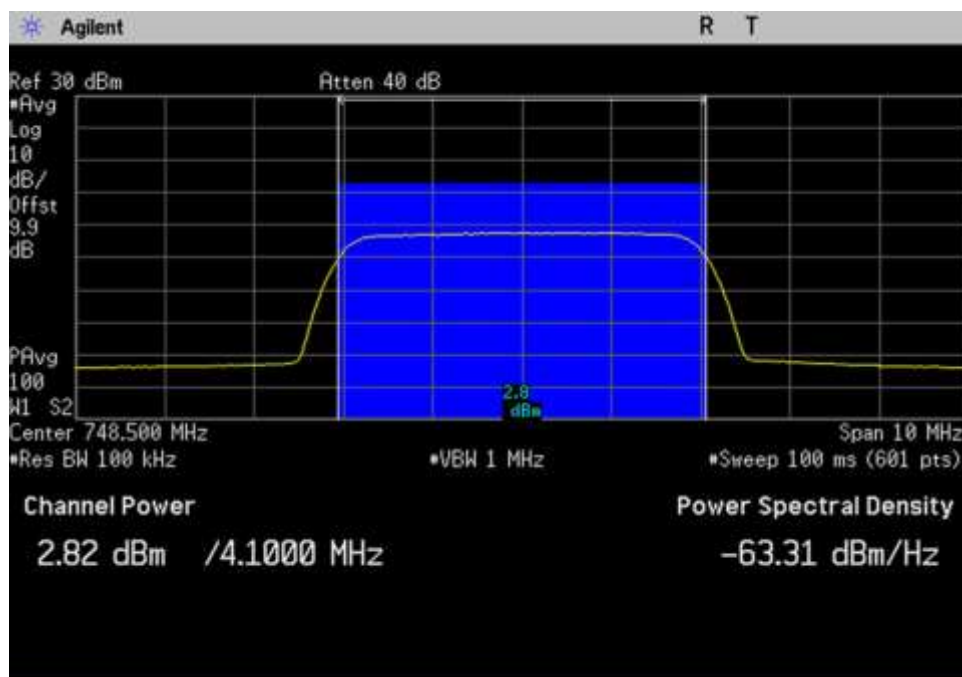
DL_728-746_AWGN_737MHz



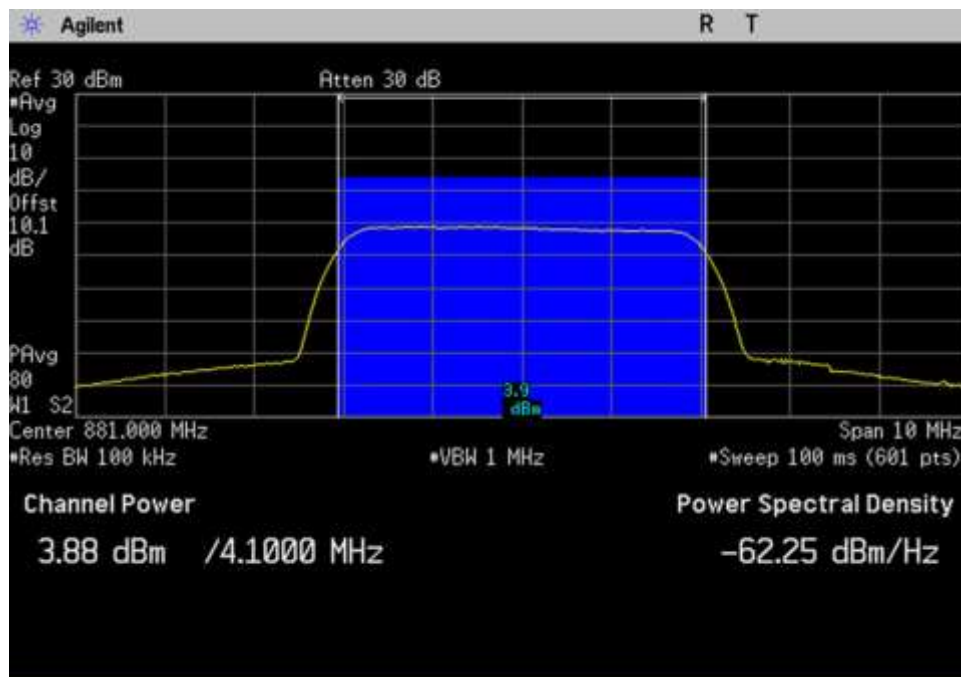
DL_728-746_AWGN_Max_737MHz



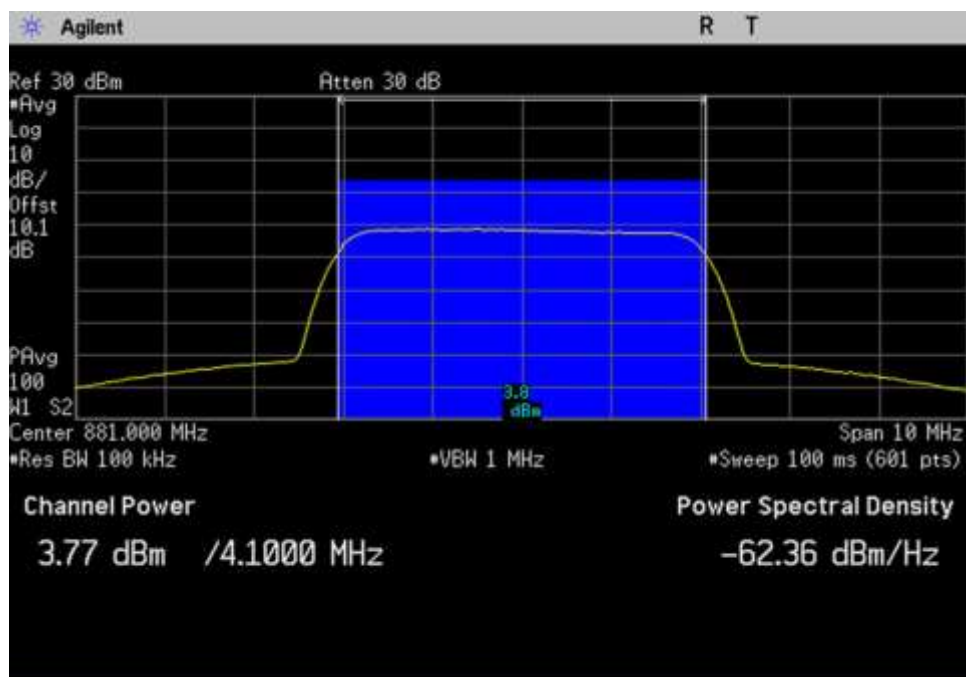
DL_746-757_AWGN_748.5MHz



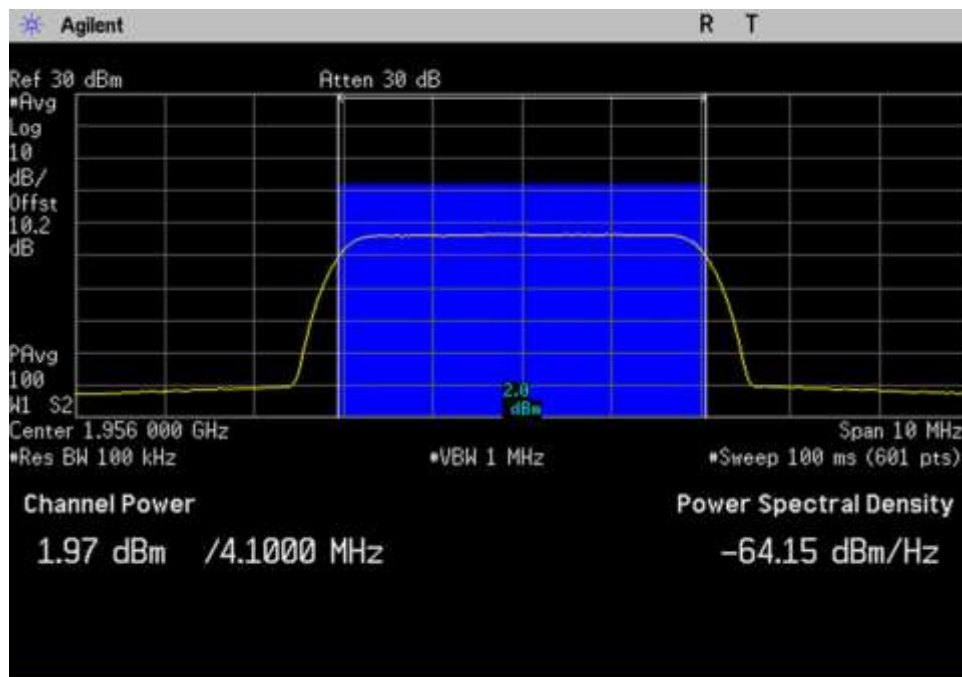
DL_746-757_AWGN_Max_748.5MHz



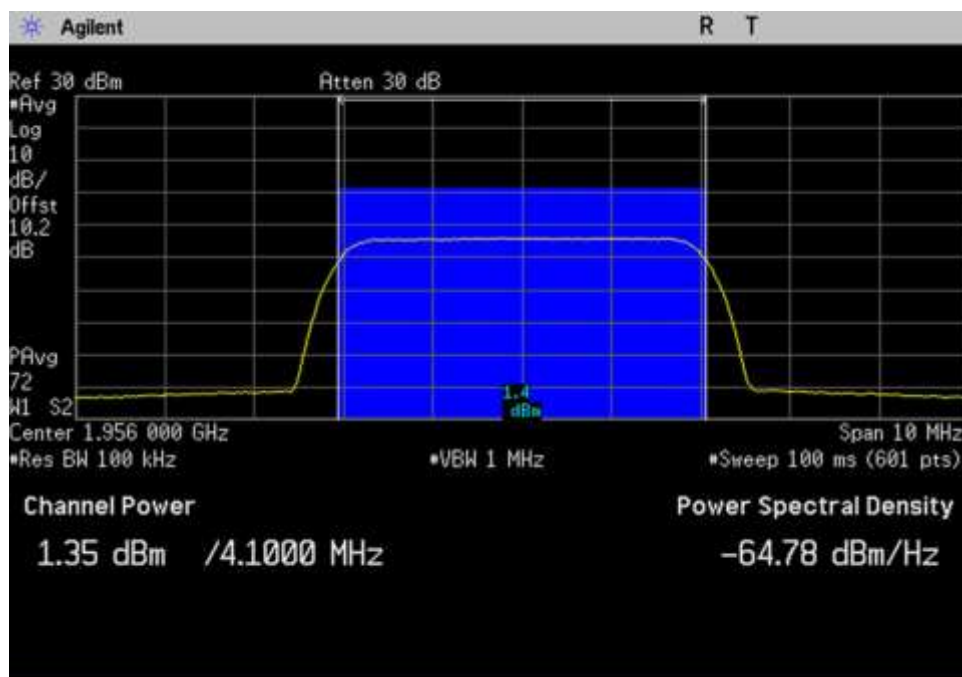
DL_869-894_AWGN_ 881MHz



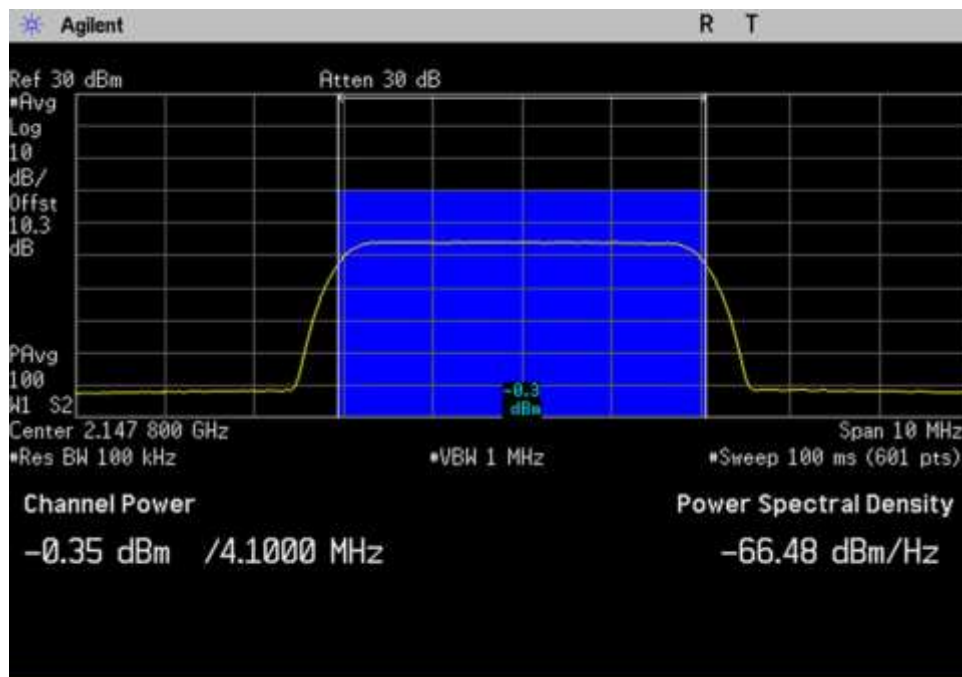
DL_869-894_AWGN_Max_ 881MHz



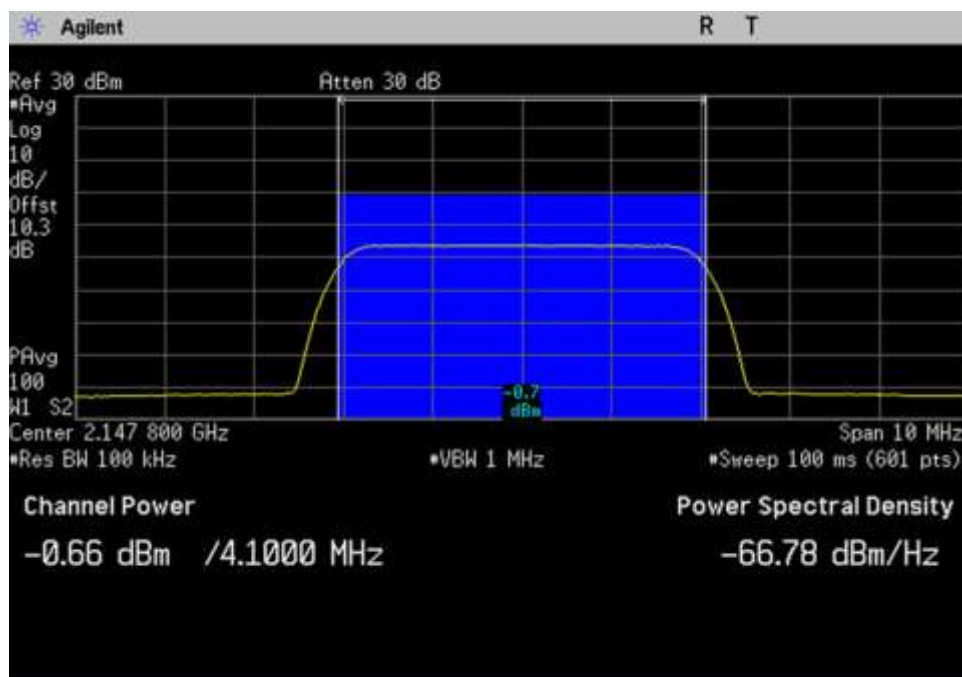
DL_1930-1995_AWGN_1956MHz



DL_1930-1995_AWGN_Max_1956MHz

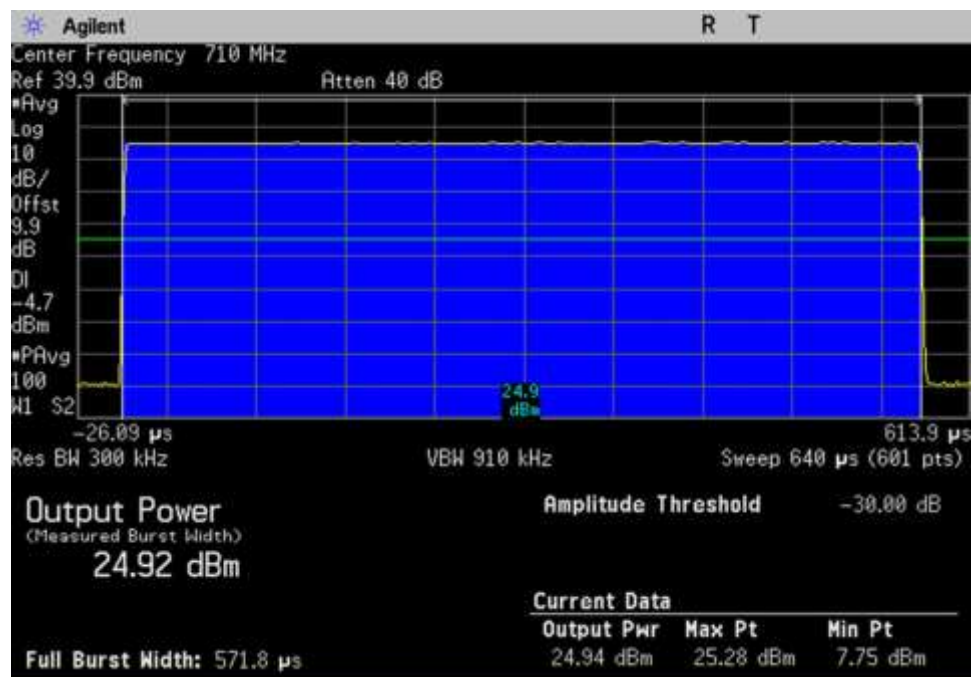


DL_2110-2155_AWGN_2147.8MHz

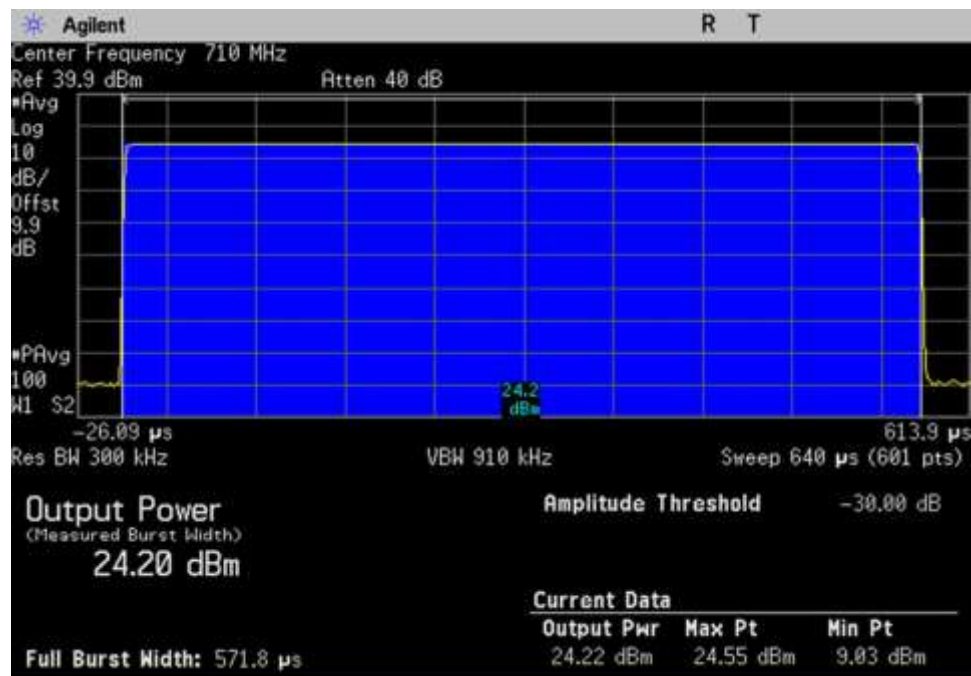


DL_2110-2155_AWGN_Max_2147.8MHz

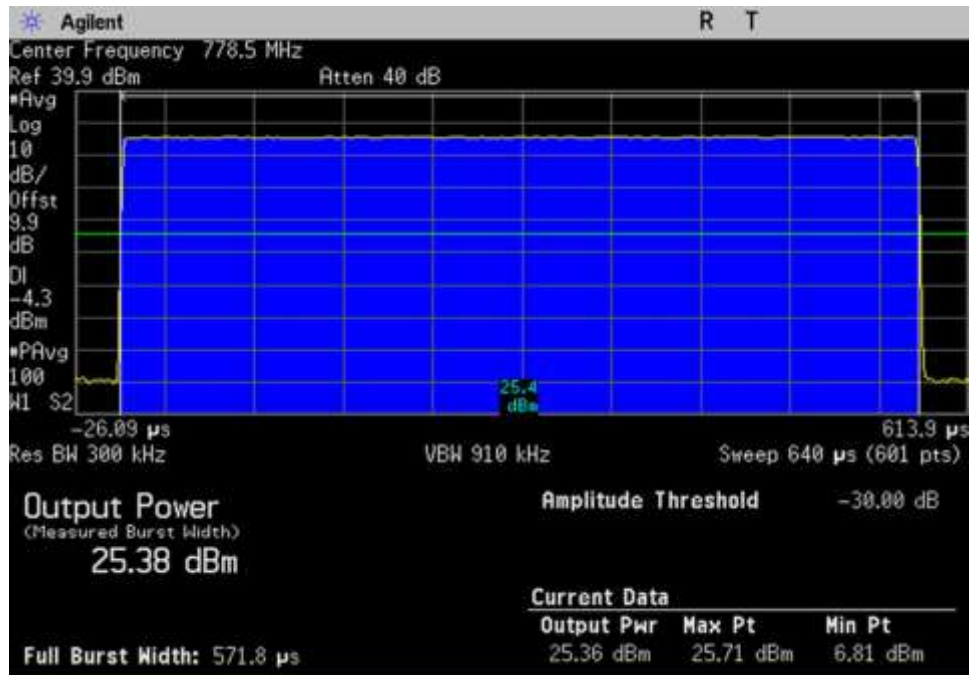
GSM



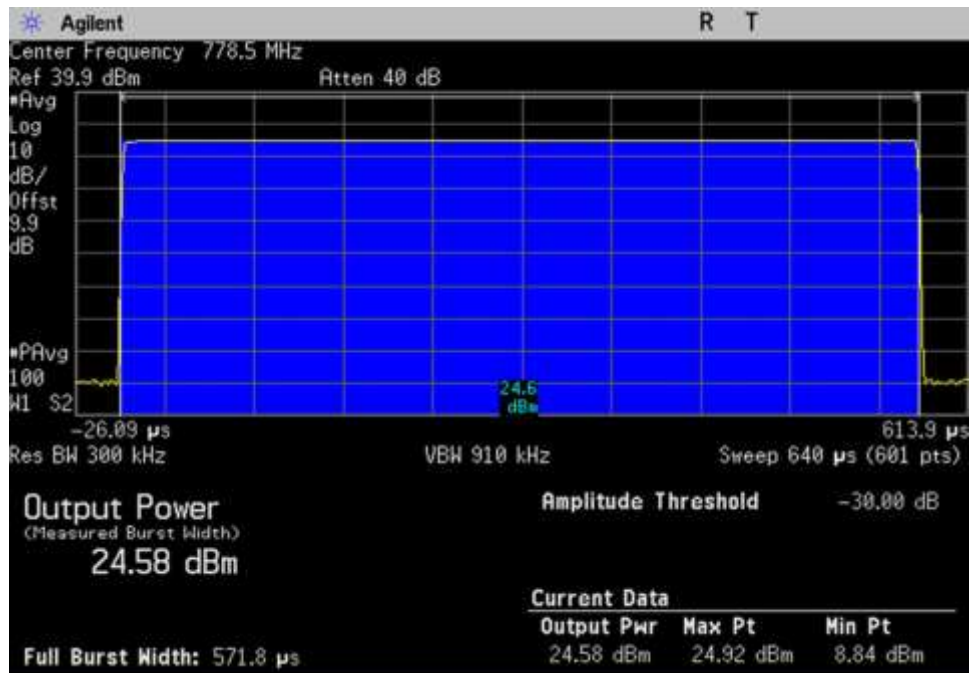
UL_698-716_GSM_710MHz



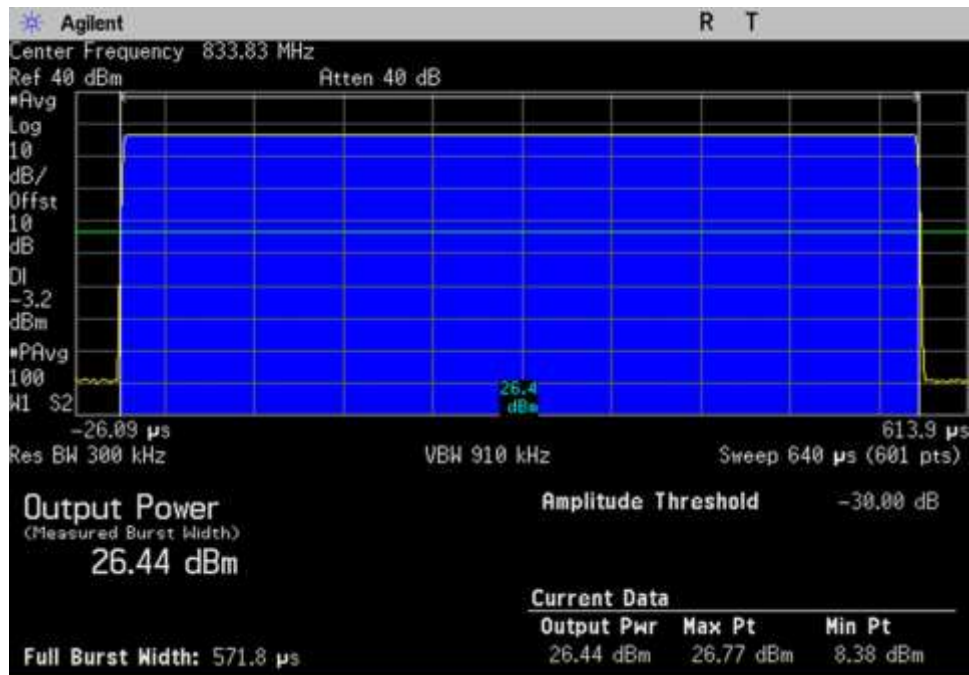
UL_698-716_GSM_Max_710MHz



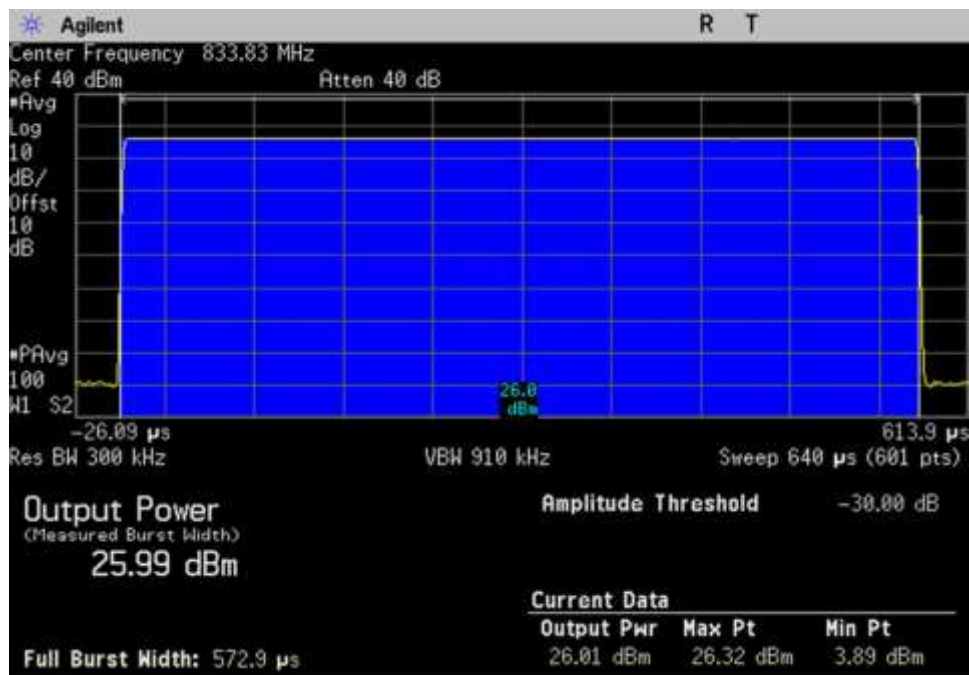
UL_776-787_GSM_ 778.5MHz



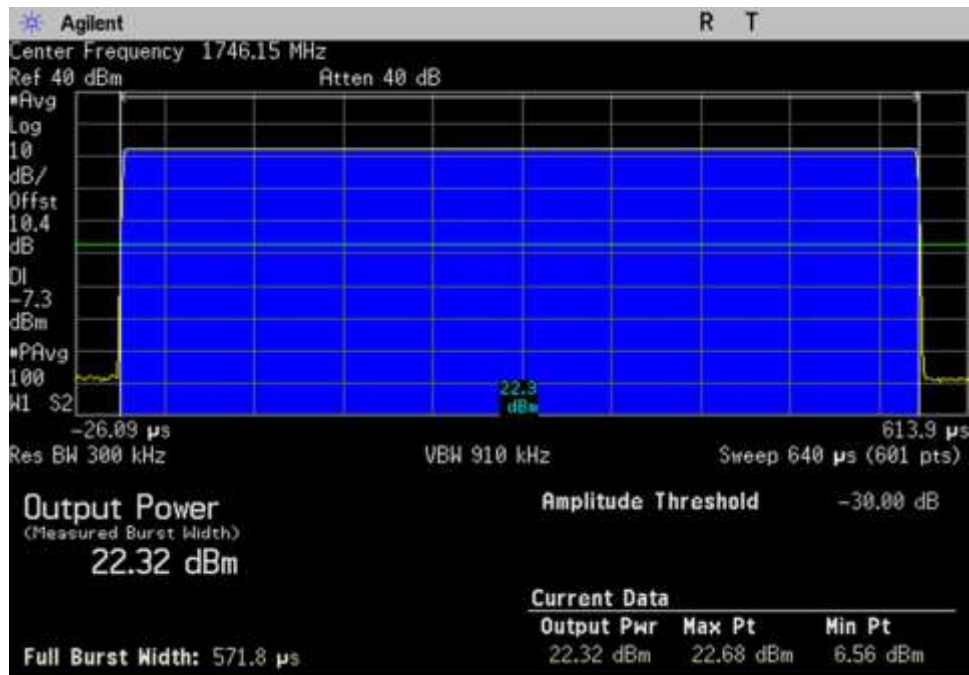
UL_776-787_GSM_Max_ 778.5MHz



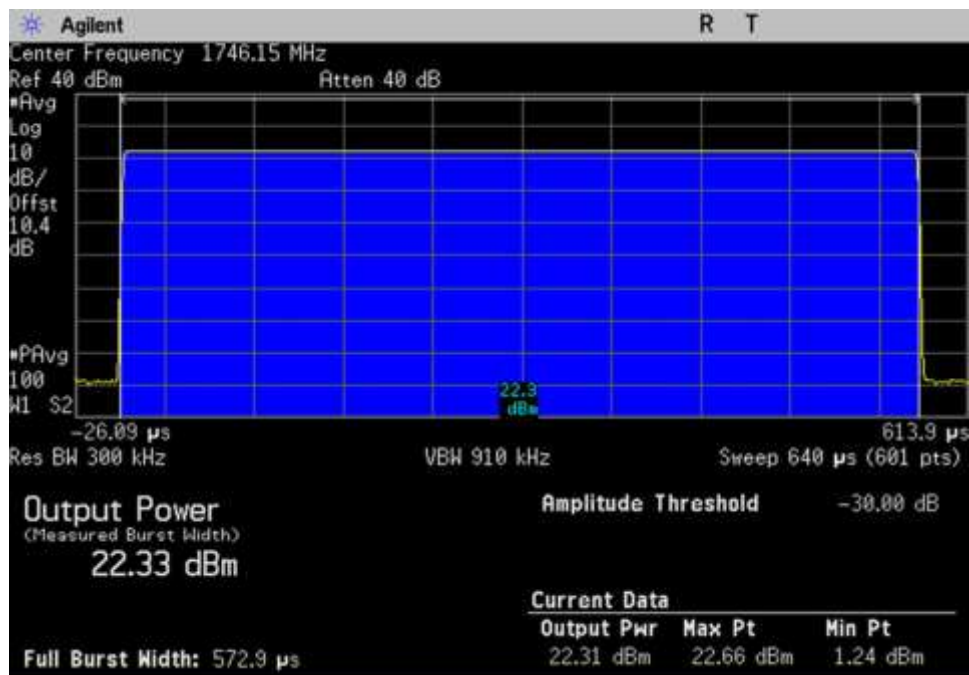
UL_824-849_GSM_ 833.83MHz



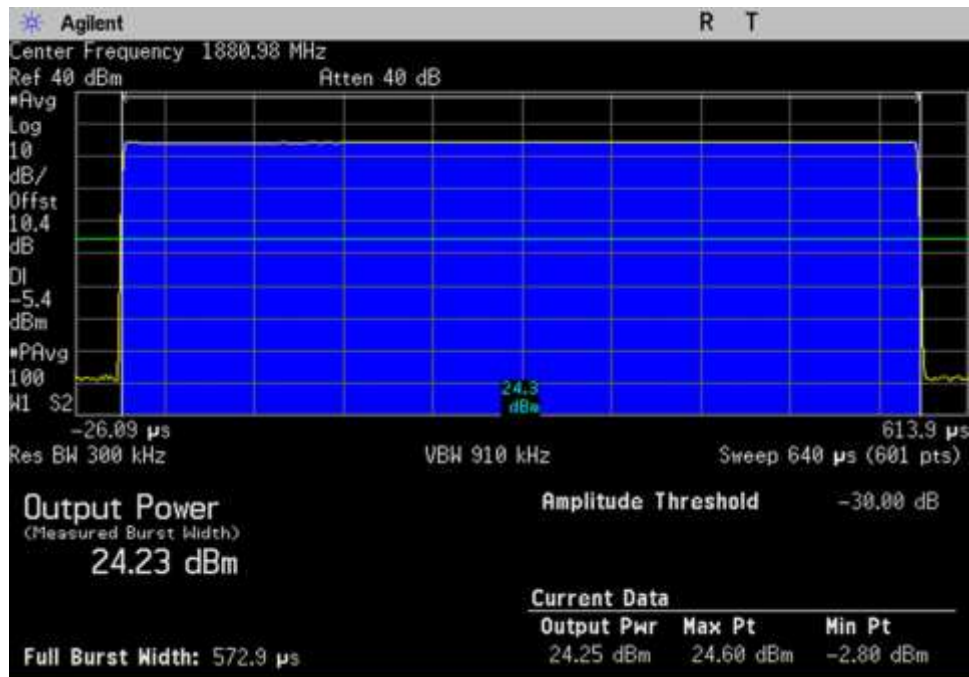
UL_824-849_GSM_Max_ 833.83MHz



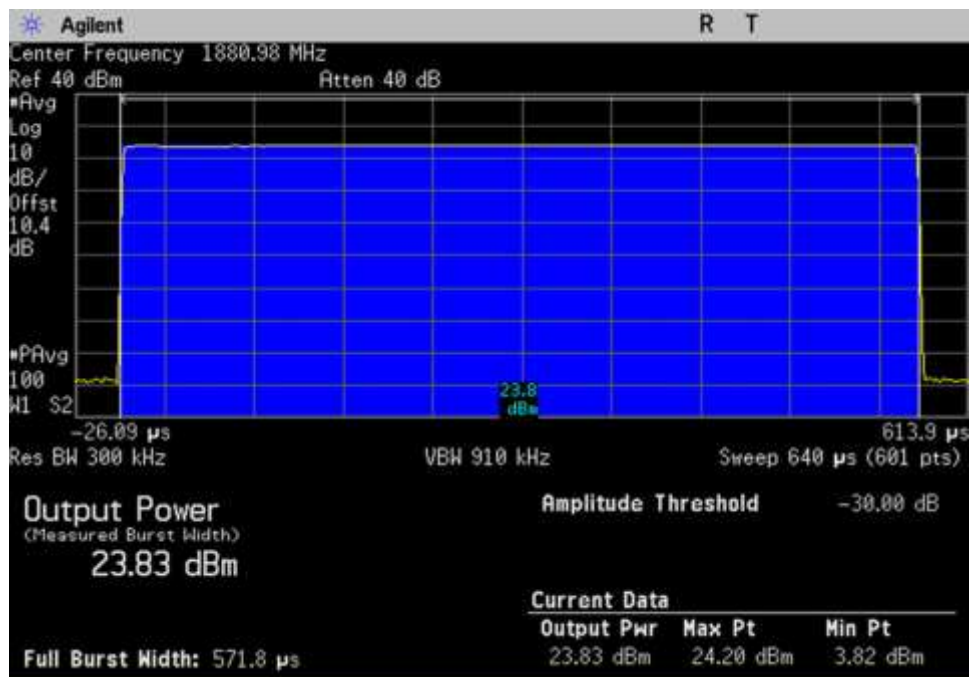
UL_1710-1755_GSM_ 1746.15MHz



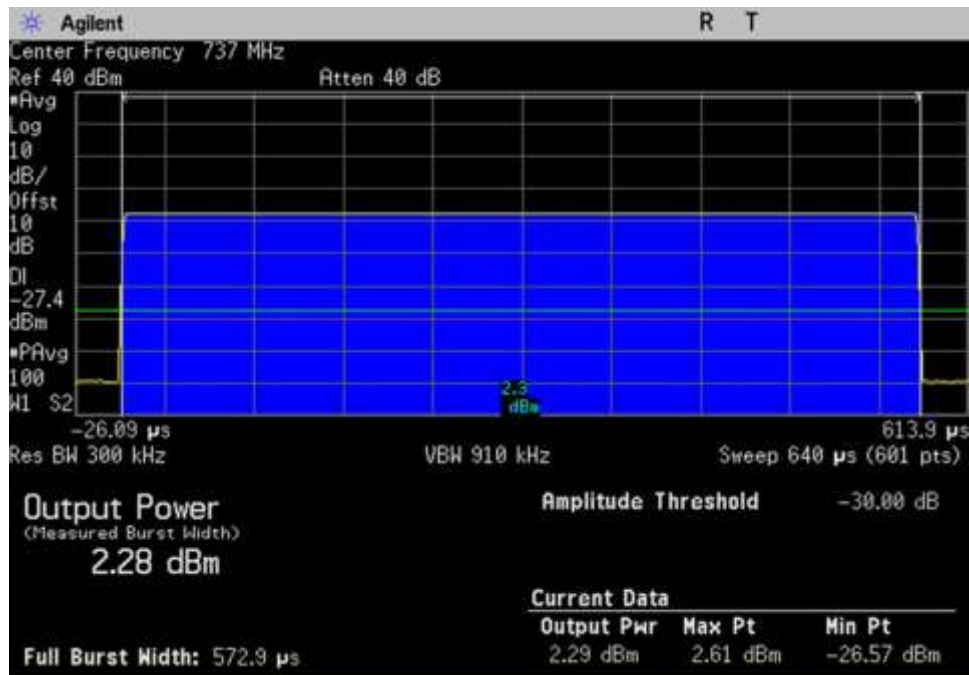
UL_1710-1755_GSM_Max_ 1746.15MHz



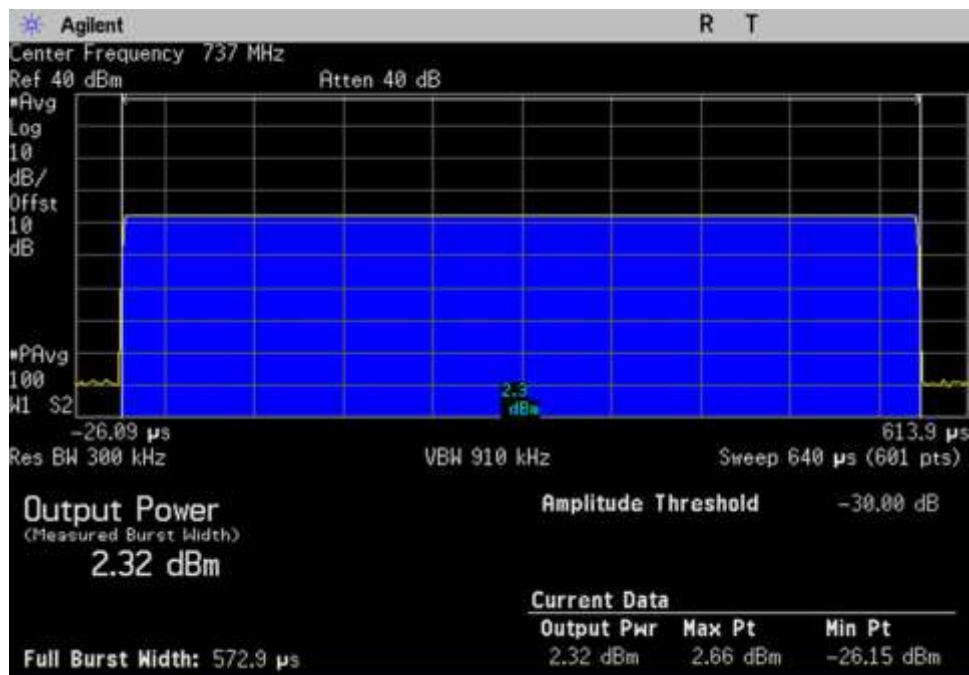
UL_1850-1915_GSM_ 1880.98MHz



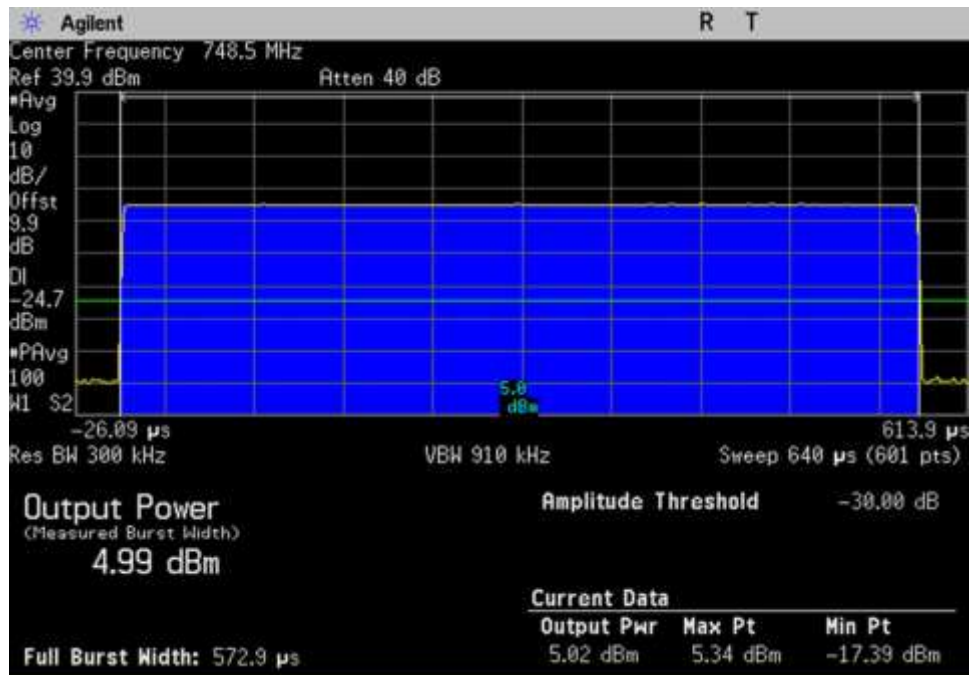
UL_1850-1915_GSM_Max_ 1880.98MHz



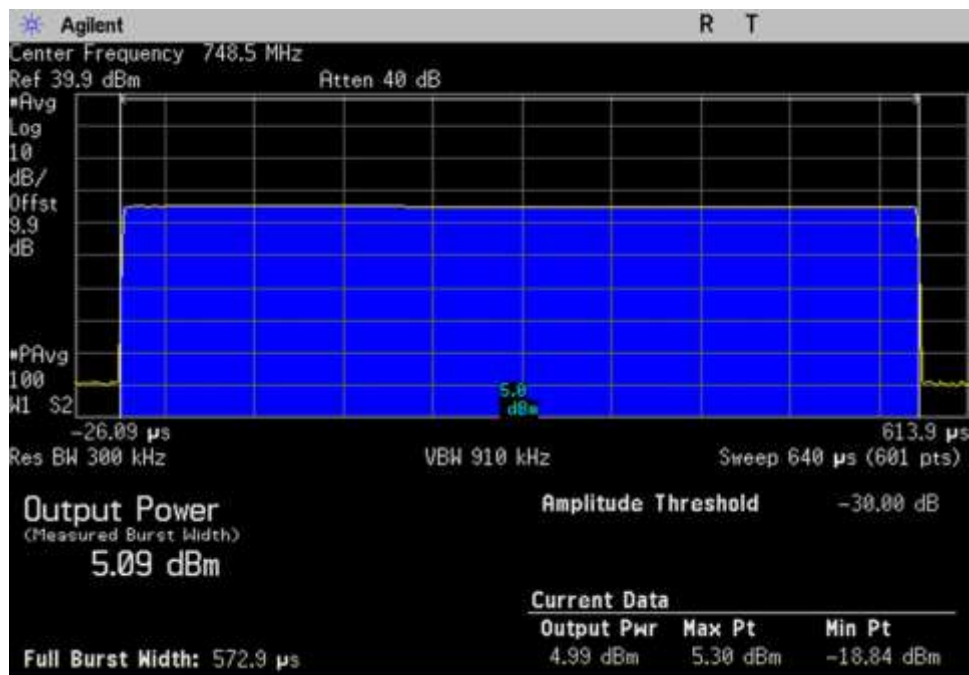
DL_728-746_GSM_737MHz



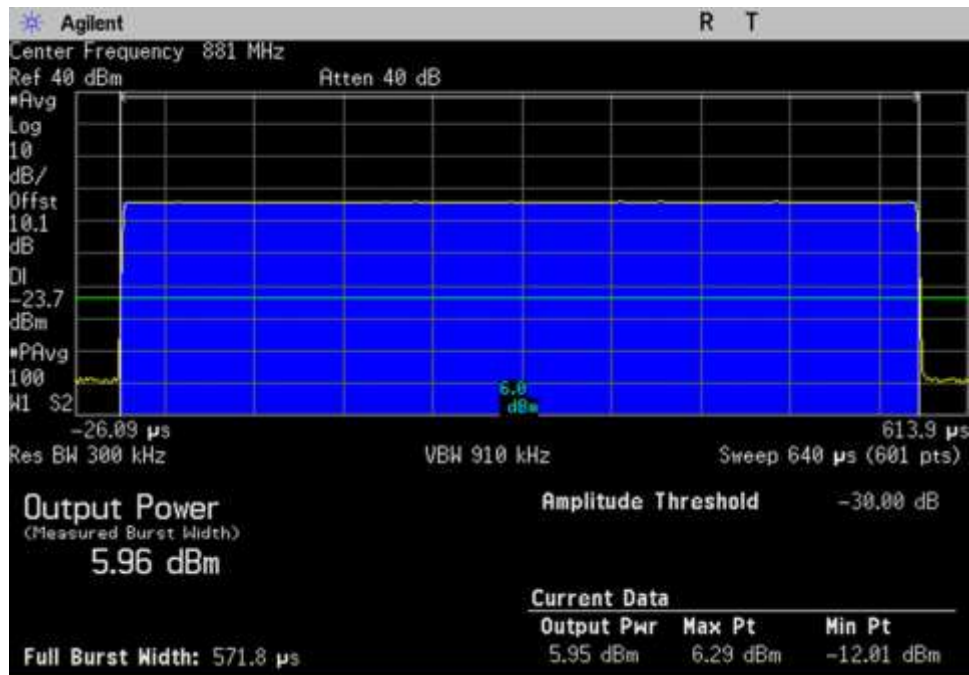
DL_728-746_GSM_Max_737MHz



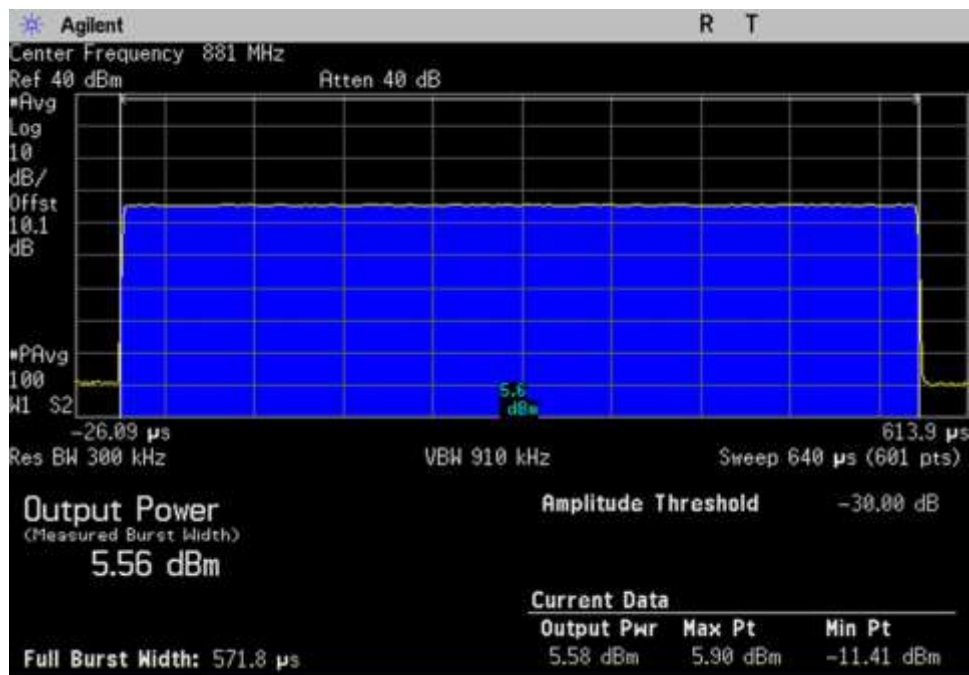
DL_746-757_GSM_ 748.5MHz



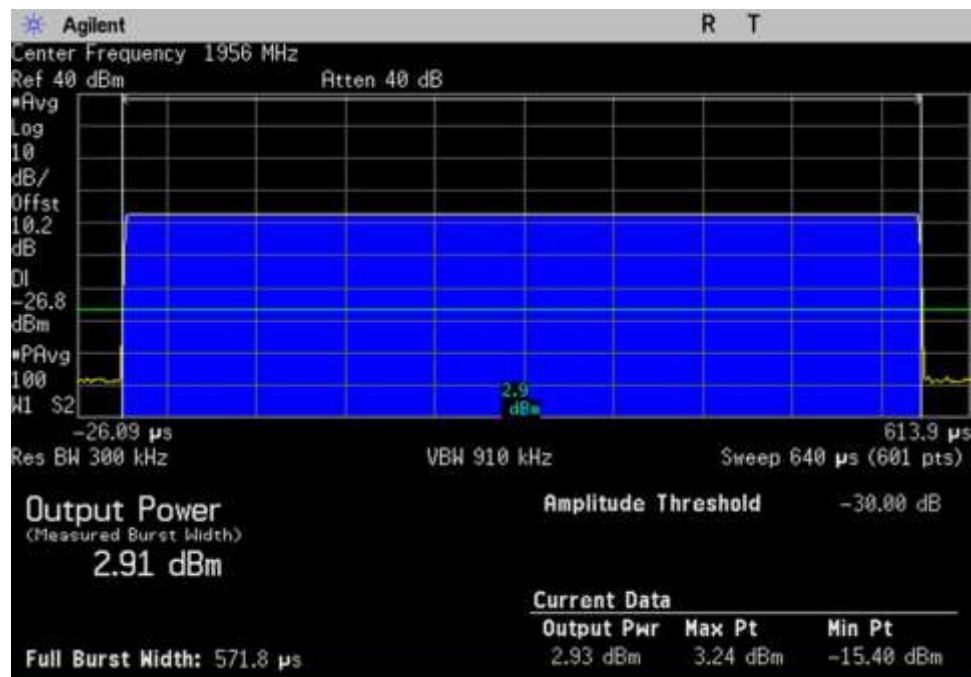
DL_746-757_GSM_Max_ 748.5MHz



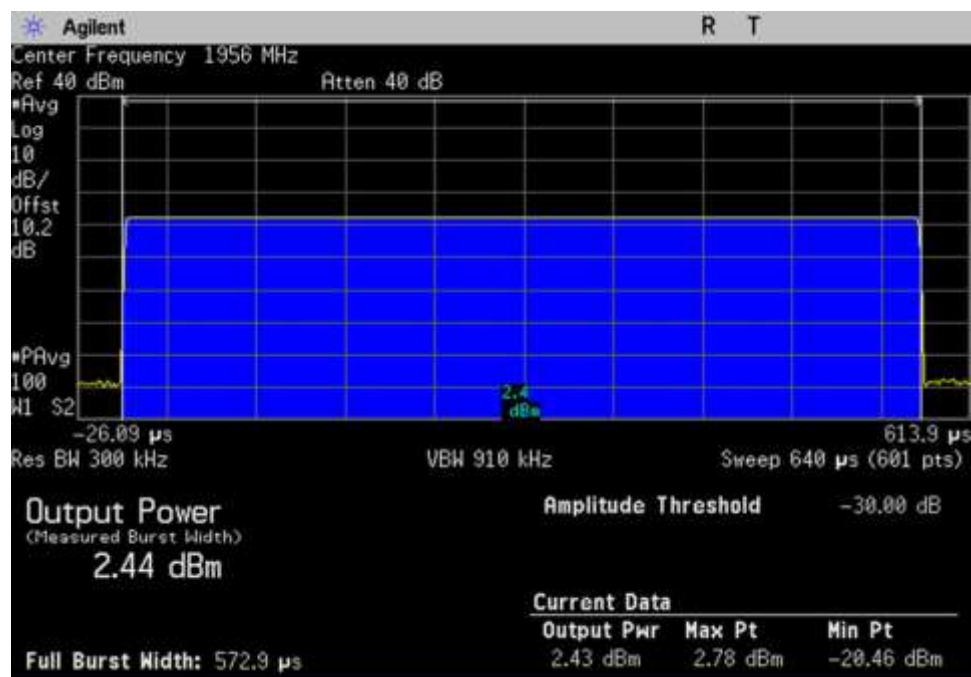
DL_869-894_GSM_881MHz



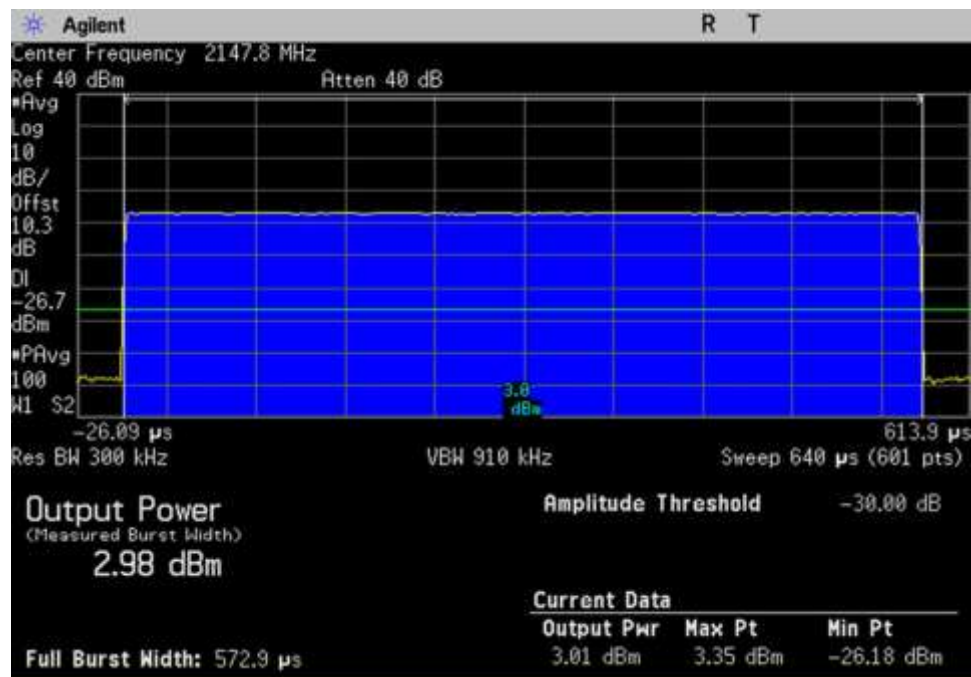
DL_869-894_GSM_Max_881MHz



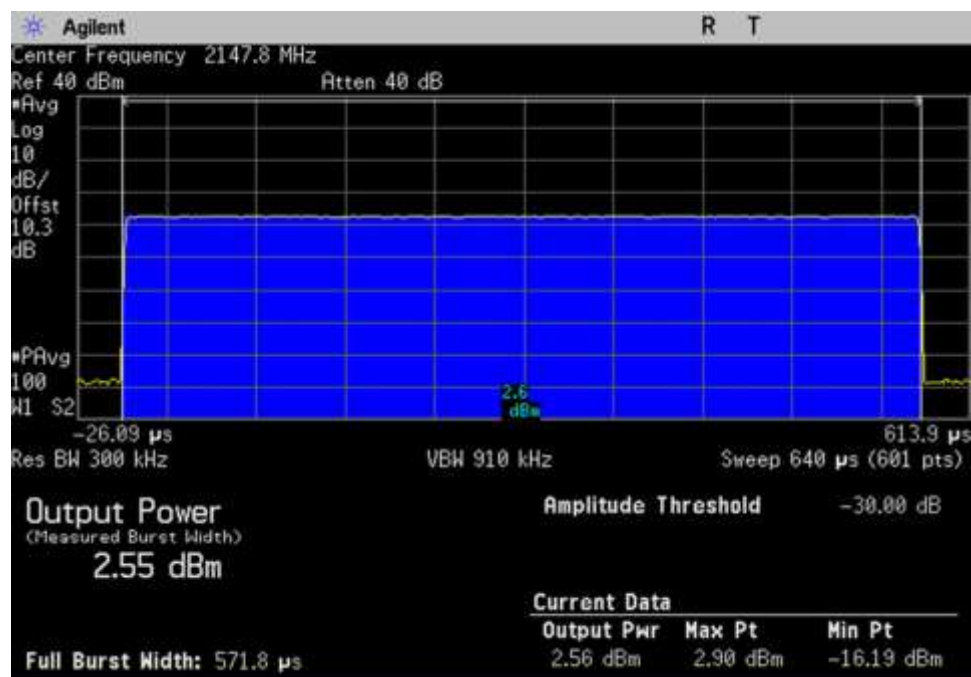
DL_1930-1995_GSM_1956MHz



DL_1930-1995_GSM_Max_1956MHz



DL_2110-2155_GSM_ 2147.8MHz



DL_2110-2155_GSM_Max_ 2147.8MHz

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 #: **102180** Date 01/21/2019
 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			

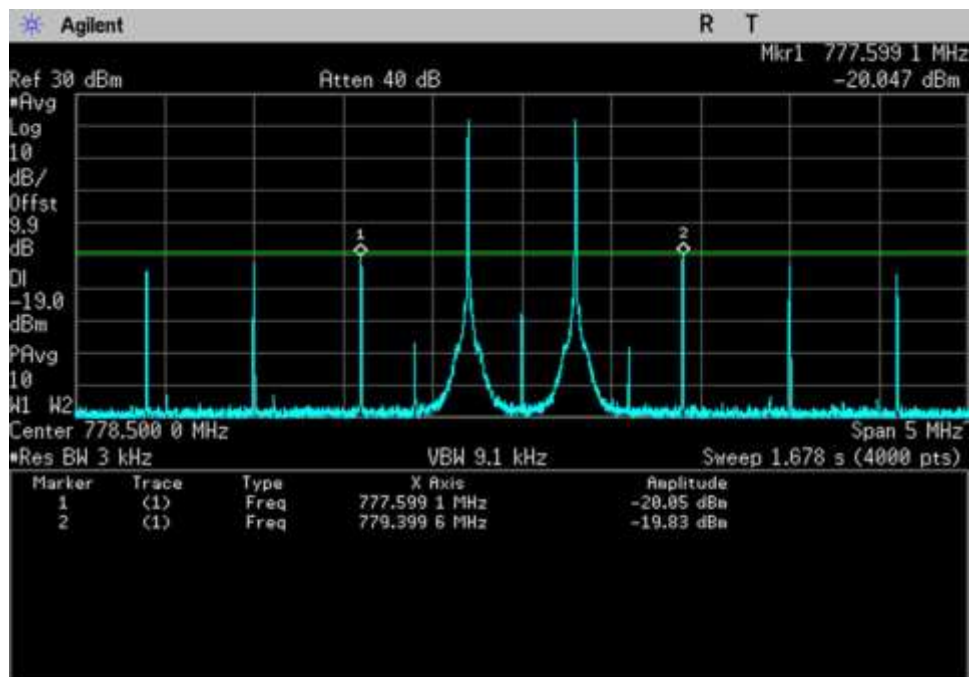
Test Conditions / Notes:

Test environment conditions: Temperature: 21.2°C, 46% relative humidity, Pressure: 101.6kPa

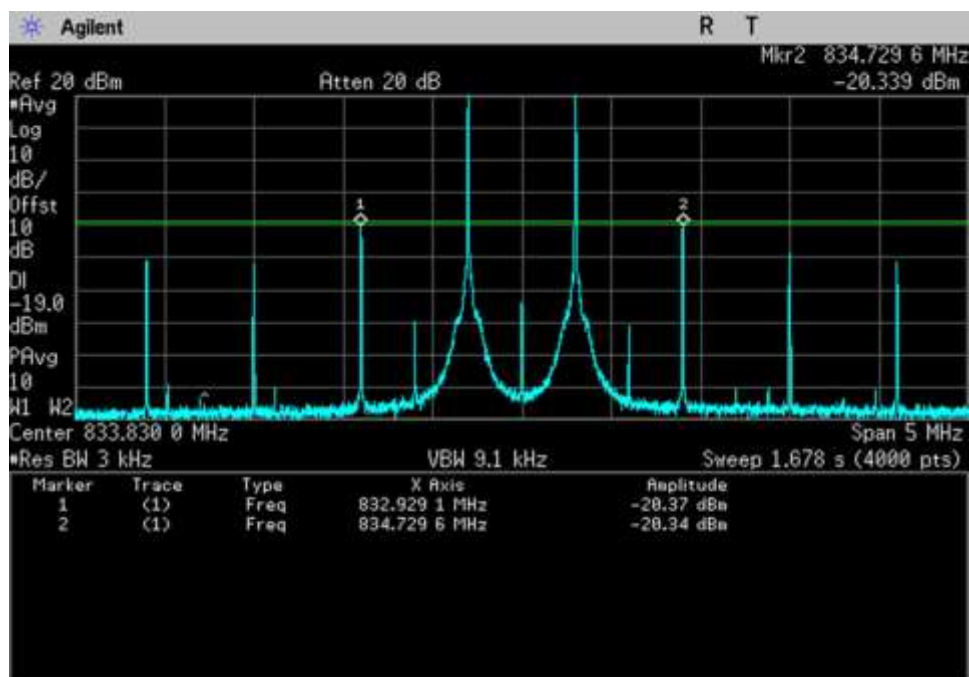
Modification #1 was in place during testing.

Test Equipment:

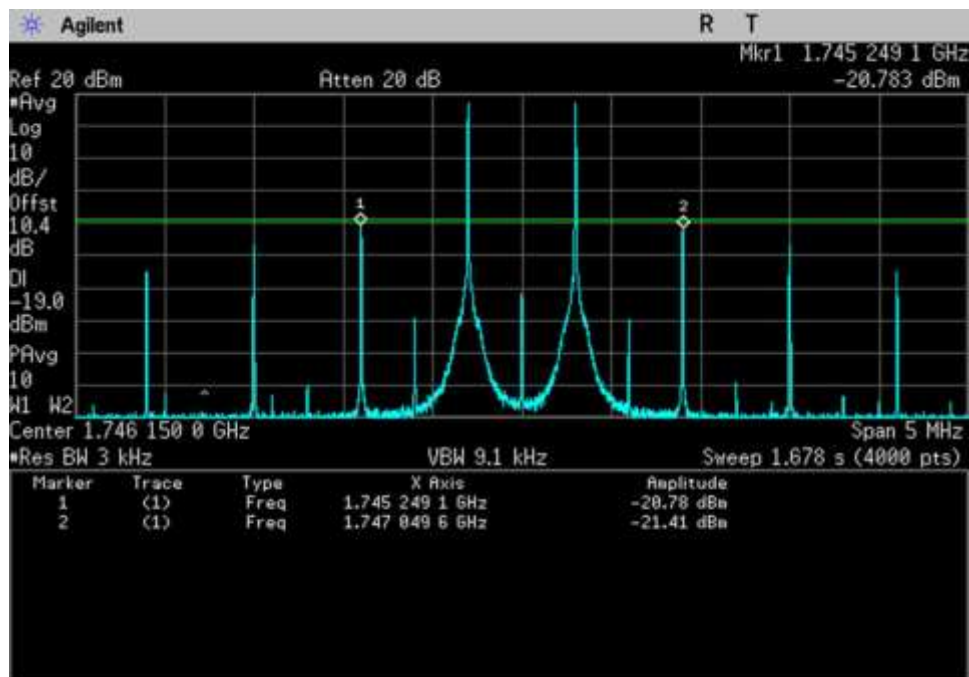
Asset #	Description	Manufacturer	Model	Calibration Date	Cal Due Date
P05411	Attenuator	Weinschel	54A-10	1/19/2018	1/19/2020
P07192	Cable	Astro	32022-29094K-29094K-48TC	10/9/2017	10/9/2019
P07191	Cable	Astro	32022-29094K-29094K-48TC	10/30/2017	10/30/2019
03418	Signal Generator	Agilent	E4438C	6/19/2017	6/19/2019
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020



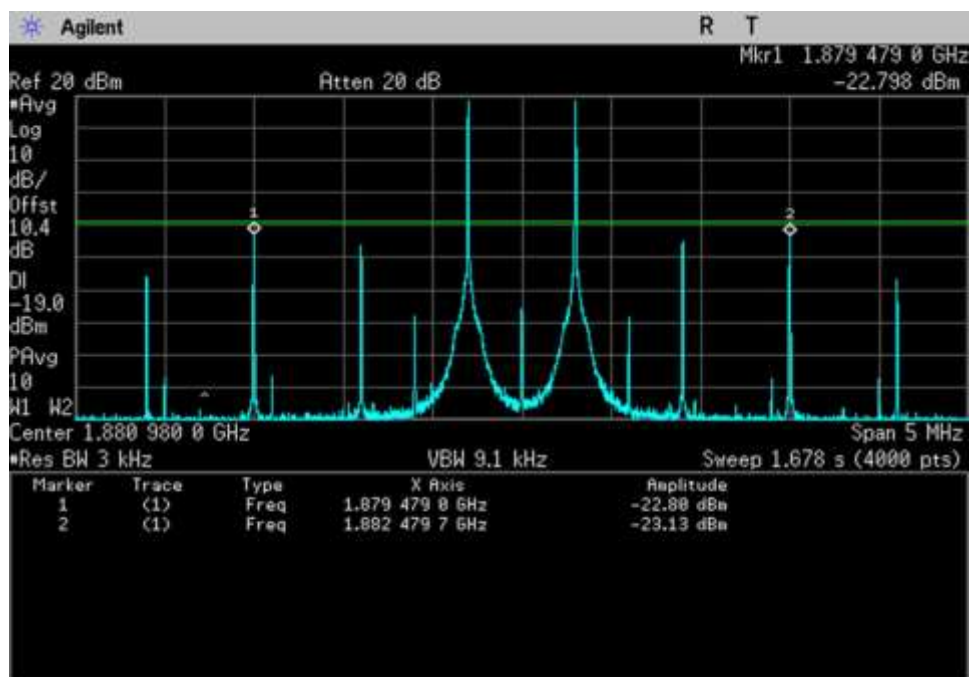
UL_776-787_ 778.5MHz



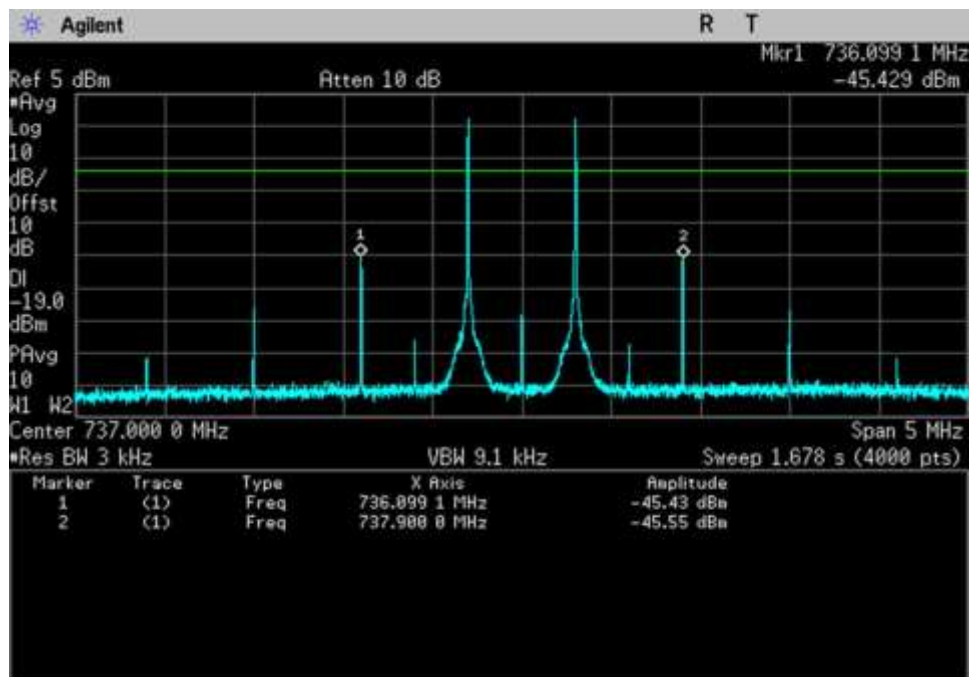
UL_824-849_ 833.83MHz



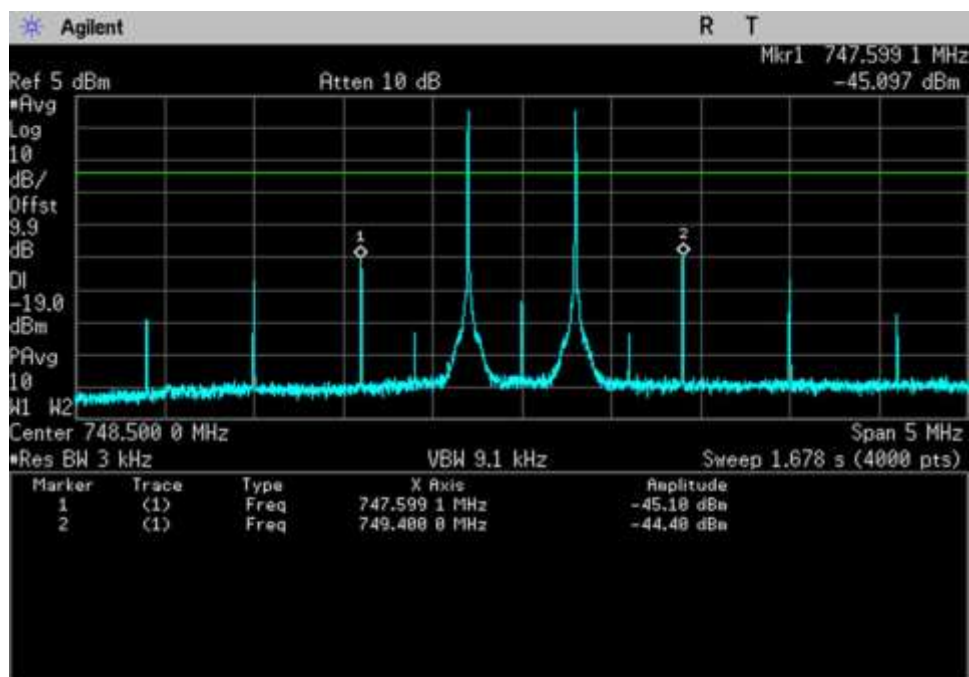
UL_1710-1755_ 1746.15MHz



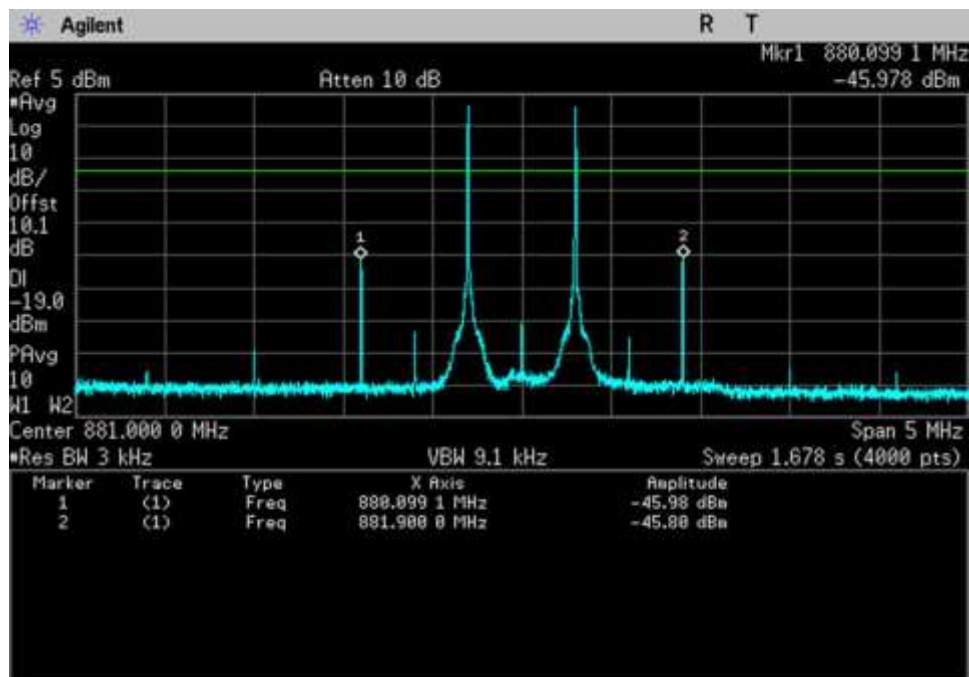
UL_1850-1915_ 1880.98MHz



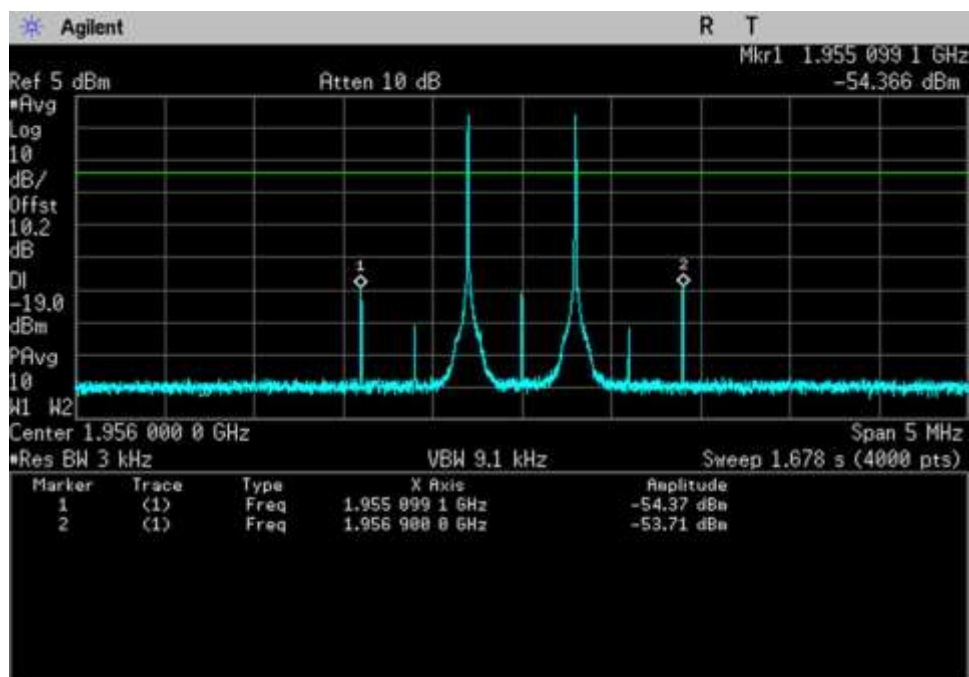
DL_728-746_ 737MHz



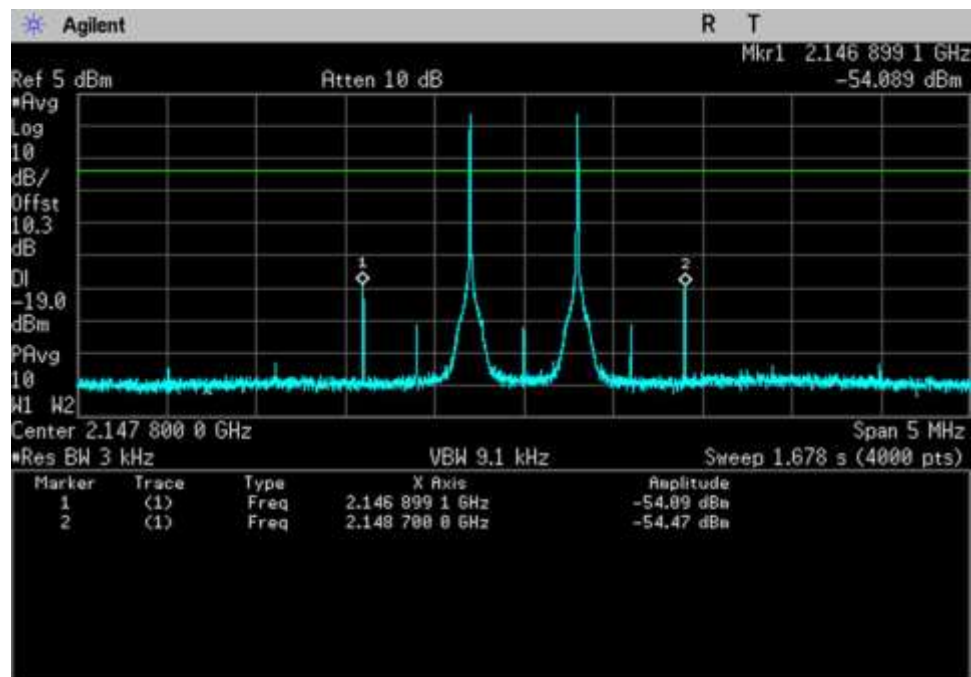
DL_746-757_ 748.5MHz



DL_869-894_ 881MHz



DL_1930-1995_ 1956MHz



DL_2110-2155_ 2147.8MHz

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 #: **102180** Date 01/22/2019 and 01/28/2019
 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:

01/22/2019: Test environment conditions: Temperature: 20.3°C, 36.4% relative humidity, Pressure: 102.5kPa
 01/28/2019: Test environment conditions: Temperature: 20.5°C, 38% relative humidity, Pressure: 102.2kPa

Modification #1 was in place during testing.

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
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020

Summary of Results

Pass: As indicated in plots below, 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)	Result
UL1710-1755	-25.1	-19	Pass	UL1710-1755	-25.3	-19	Pass
UL1850-1915	-25.6	-19	Pass	UL1850-1915	-29.0	-19	Pass
UL824-849	-19.7	-19	Pass	UL824-849	-20.5	-19	Pass
UL 698-716	-19.4	-19	Pass	UL 698-716	-21.3	-19	Pass
UL776-787	-19.1	-19	Pass	UL776-787	-20.3	-19	Pass
DL2110-2155	-44.7	-19	Pass	DL2110-2155	-43.9	-19	Pass
DL1930-1995	-46.3	-19	Pass	DL1930-1995	-43.9	-19	Pass
DL869-894	-41.2	-19	Pass	DL869-894	-39.1	-19	Pass
DL:728-746	-47.7	-19	Pass	DL:728-746	-42.9	-19	Pass
DL 746-757	-43.0	-19	Pass	DL 746-757	-43.7	-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)	Result
UL1710-1755	-19.7	-19	Pass	UL1710-1755	-19.2	-19	Pass
UL1850-1915	-19.8	-19	Pass	UL1850-1915	-24.8	-19	Pass
UL824-849	-21.1	-19	Pass	UL824-849	-19.6	-19	Pass
UL 698-716	-21.7	-19	Pass	UL 698-716	-26.6	-19	Pass
UL776-787	-20.7	-19	Pass	UL776-787	-21.0	-19	Pass
DL2110-2155	-61.4	-19	Pass	DL2110-2155	-61.3	-19	Pass
DL1930-1995	-60.7	-19	Pass	DL1930-1995	-59.6	-19	Pass
DL869-894	-53.6	-19	Pass	DL869-894	-53.2	-19	Pass
DL:728-746	-63.7	-19	Pass	DL:728-746	-59.0	-19	Pass
DL 746-757	-59.9	-19	Pass	DL 746-757	-60.3	-19	Pass

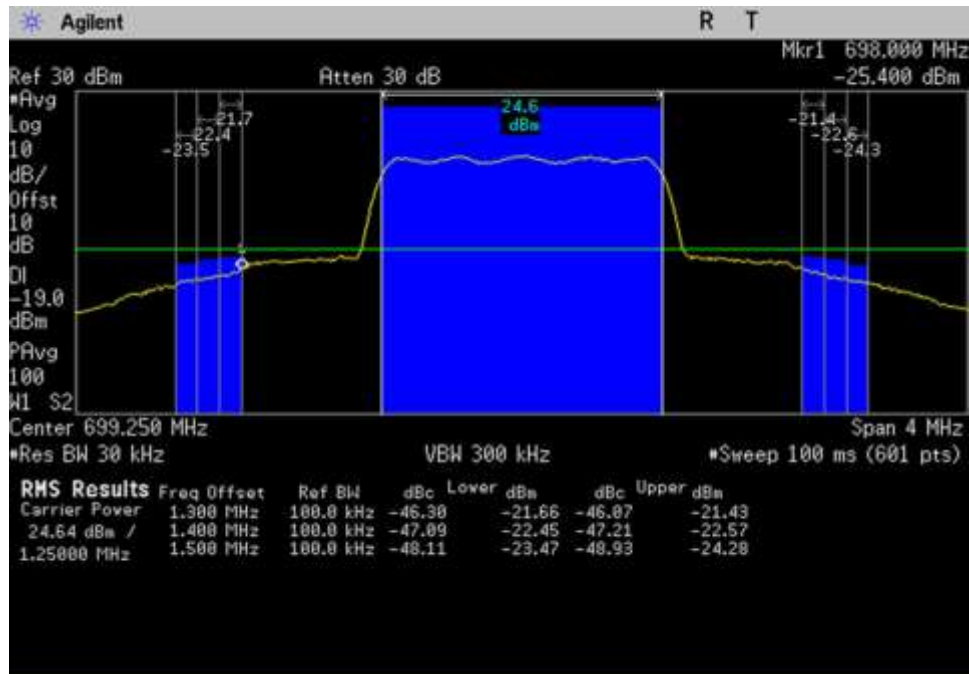
LTE (alternative 4.1MHz AWGN)

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	-25.0	-19	Pass		UL1710-1755	-19.1	-19	Pass
UL1850-1915	-21.0	-19	Pass		UL1850-1915	-19.6	-19	Pass
UL824-849	-25.5	-19	Pass		UL824-849	-24.8	-19	Pass
UL 698-716	-27.7	-19	Pass		UL 698-716	-30.4	-19	Pass
UL776-787	-26.0	-19	Pass		UL776-787	-29.2	-19	Pass
DL2110-2155	-52.6	-19	Pass		DL2110-2155	-52.2	-19	Pass
DL1930-1995	-53.3	-19	Pass		DL1930-1995	-52.0	-19	Pass
DL869-894	-51.6	-19	Pass		DL869-894	-48.3	-19	Pass
DL:728-746	-61.3	-19	Pass		DL:728-746	-52.0	-19	Pass
DL 746-757	-48.0	-19	Pass		DL 746-757	-57.3	-19	Pass

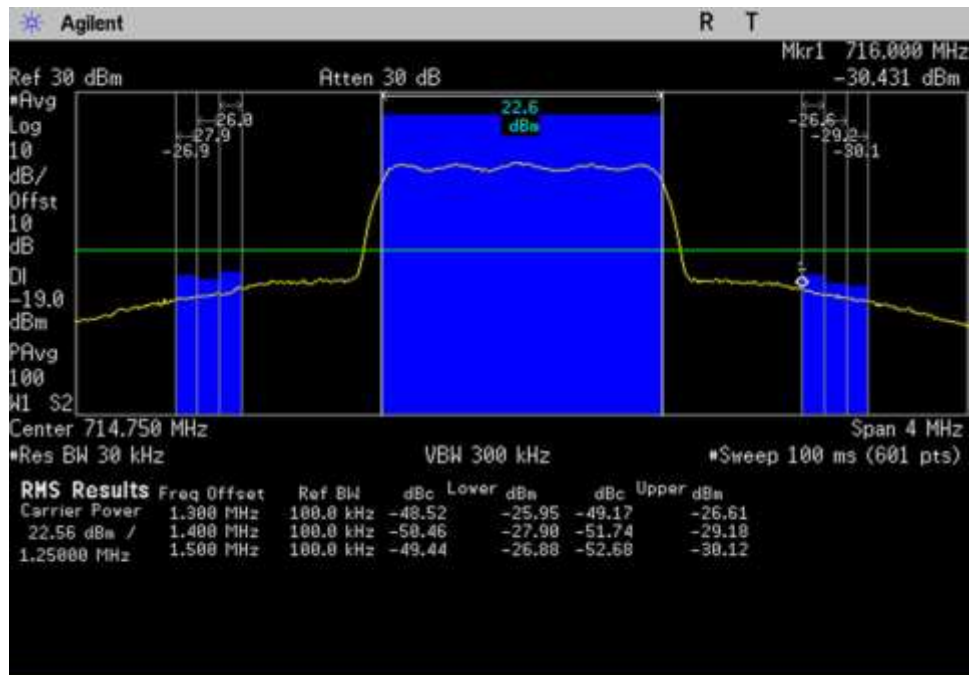
Note: The EUT also maintains compliance with the out-of-band emissions limit at input power indicated in section 5.5.

Plots

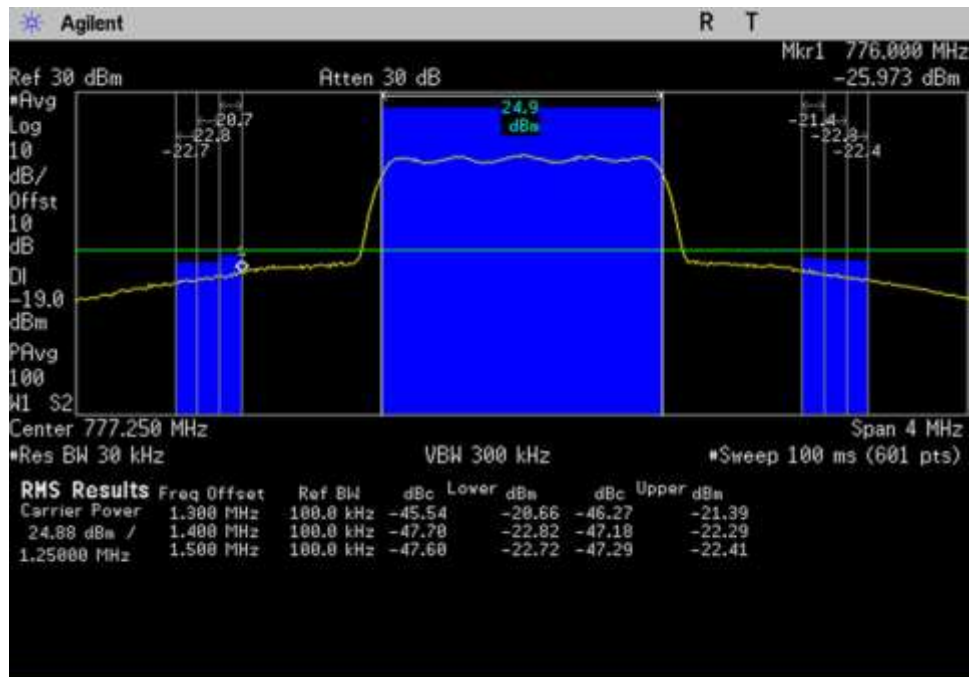
CDMA



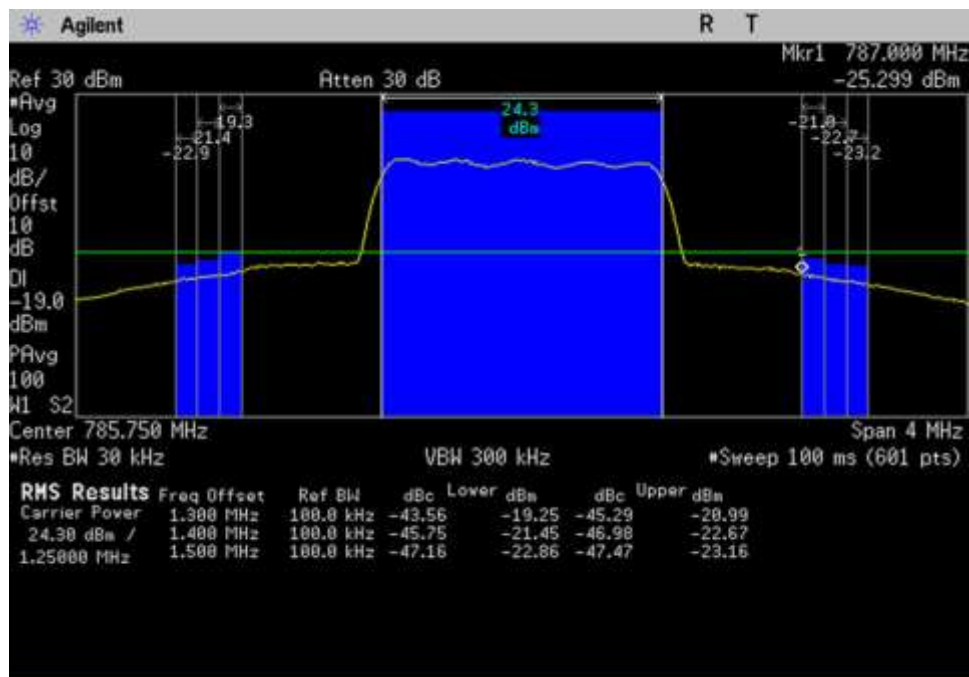
UL_698-716_CDMA_697.25-701.25MHz



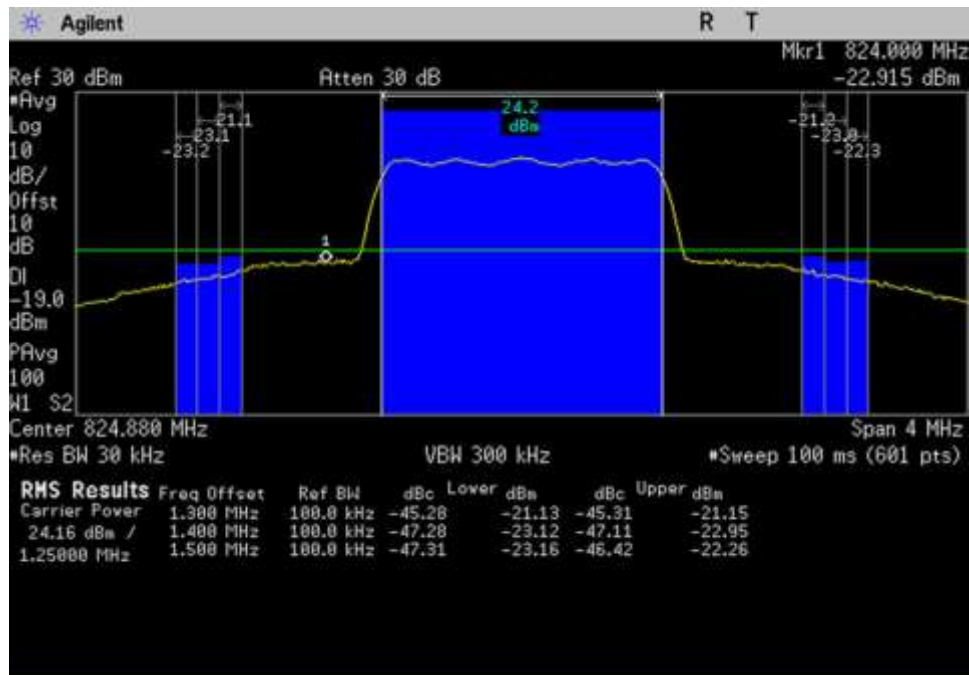
UL_698-716_CDMA_712.75-716.75MHz



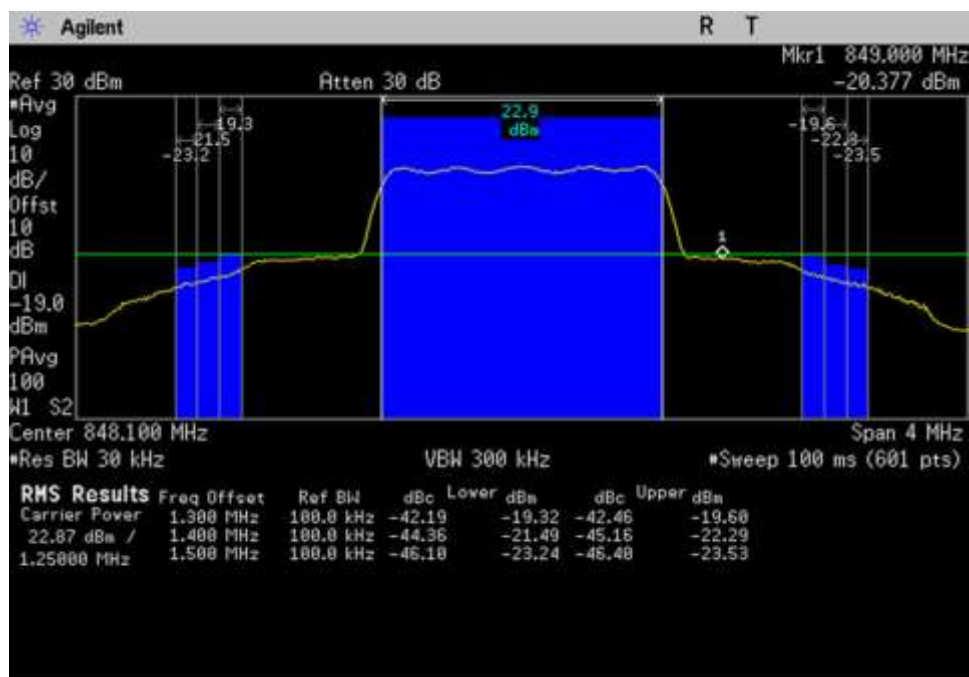
UL_776-787_CDMA_775.25-779.25MHz



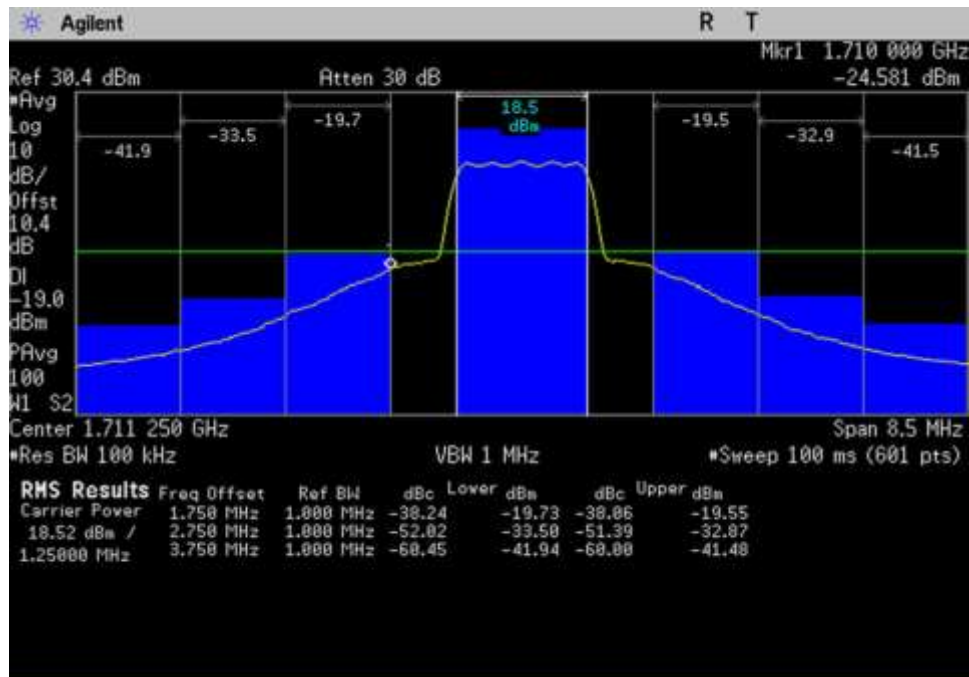
UL_776-787_CDMA_783.75-787.75MHz



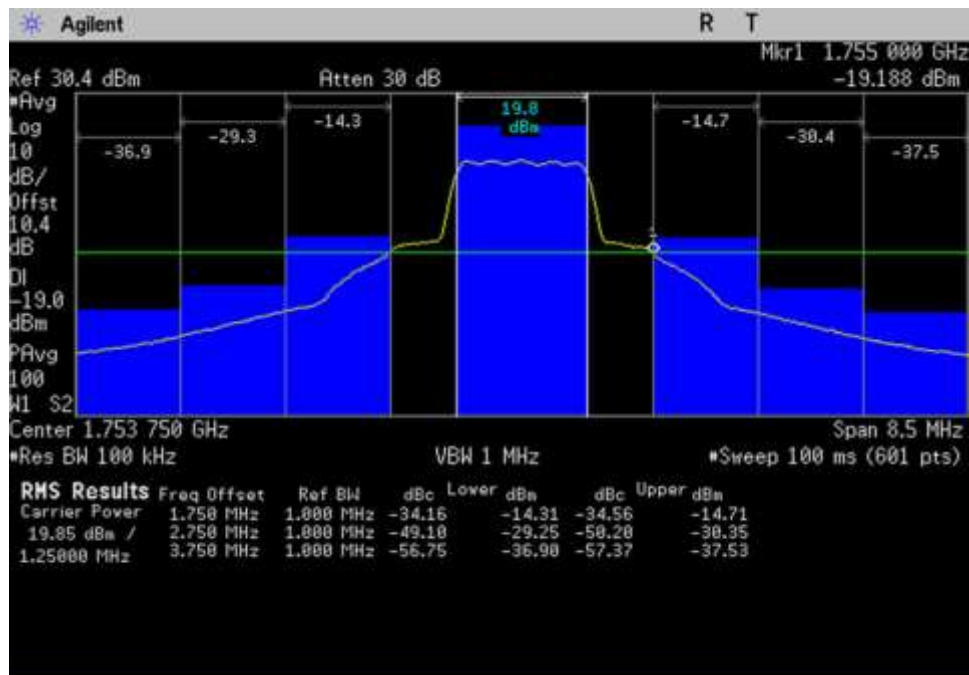
UL_824-849_CDMA_ 822.88- 826.88MHz



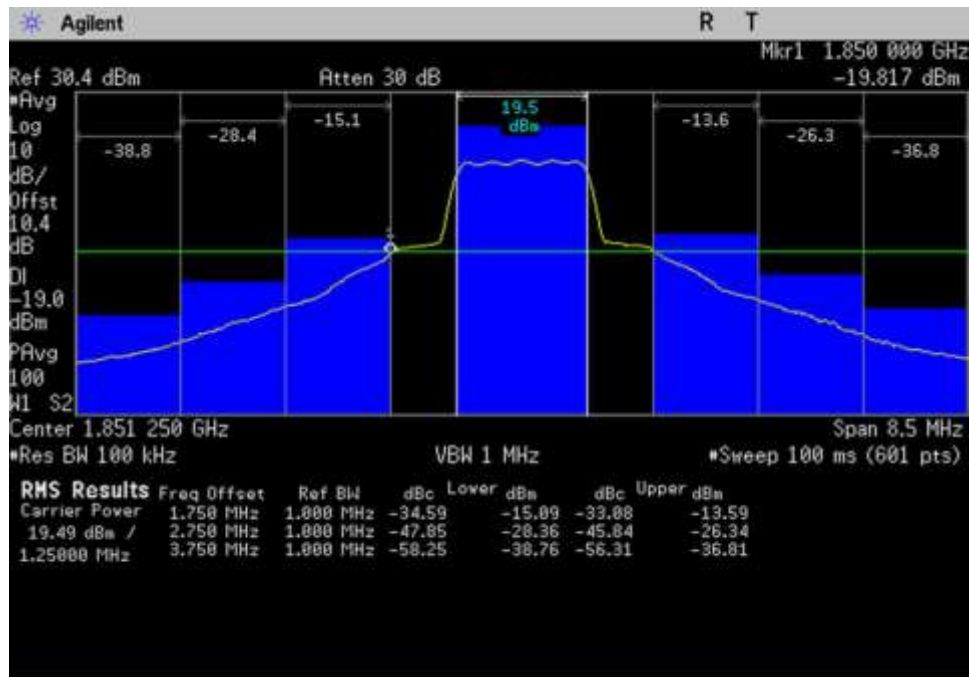
UL_824-849_CDMA_ 846.1- 850.1MHz



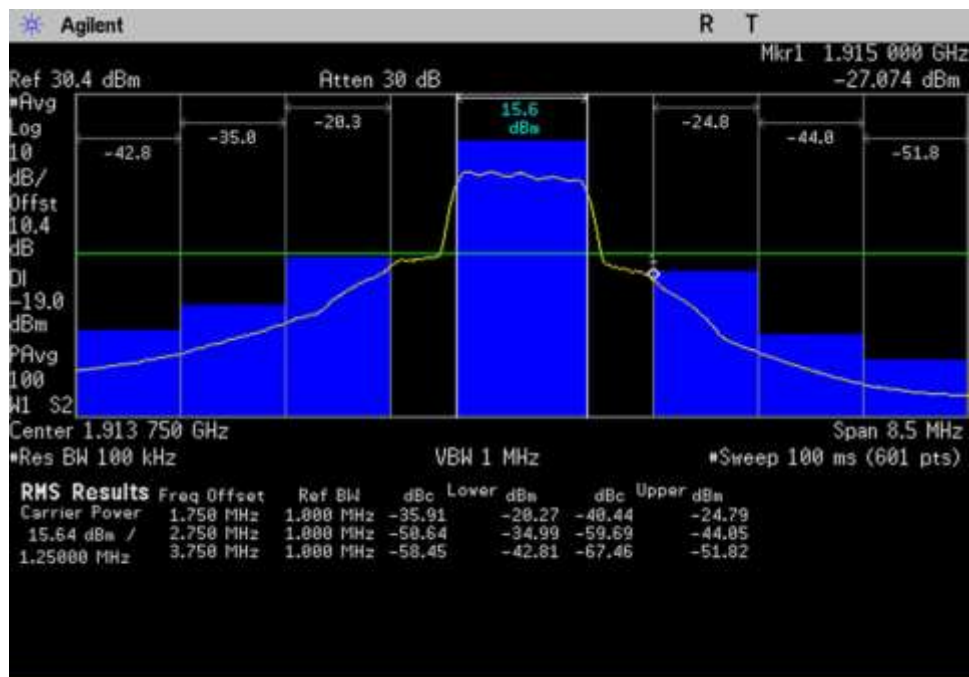
UL_1710-1755_CDMA_1707-1715.5MHz



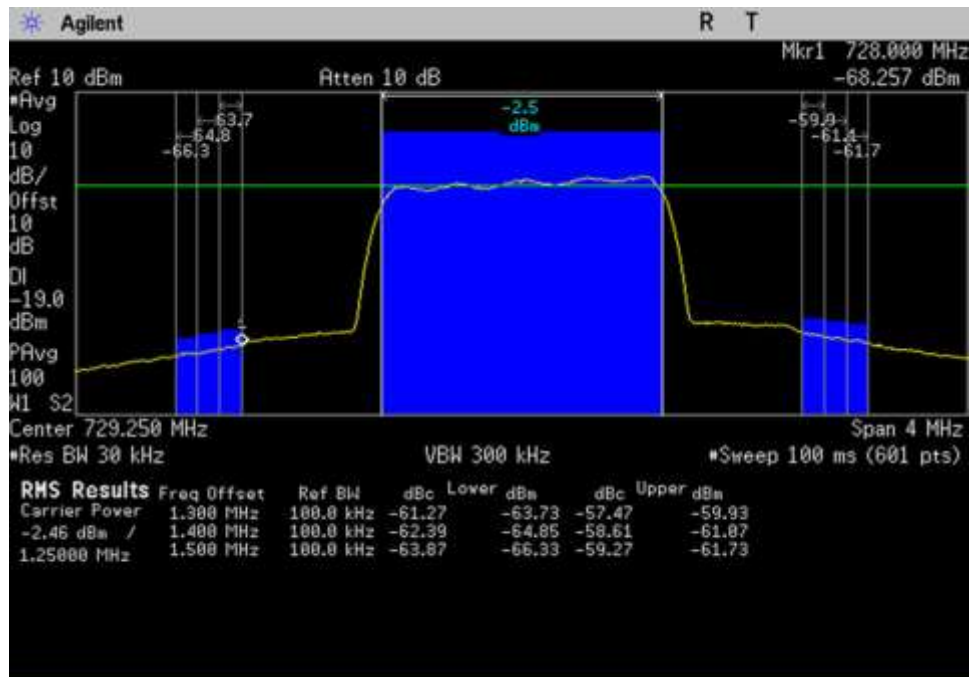
UL_1710-1755_CDMA_1749.5-1758MHz



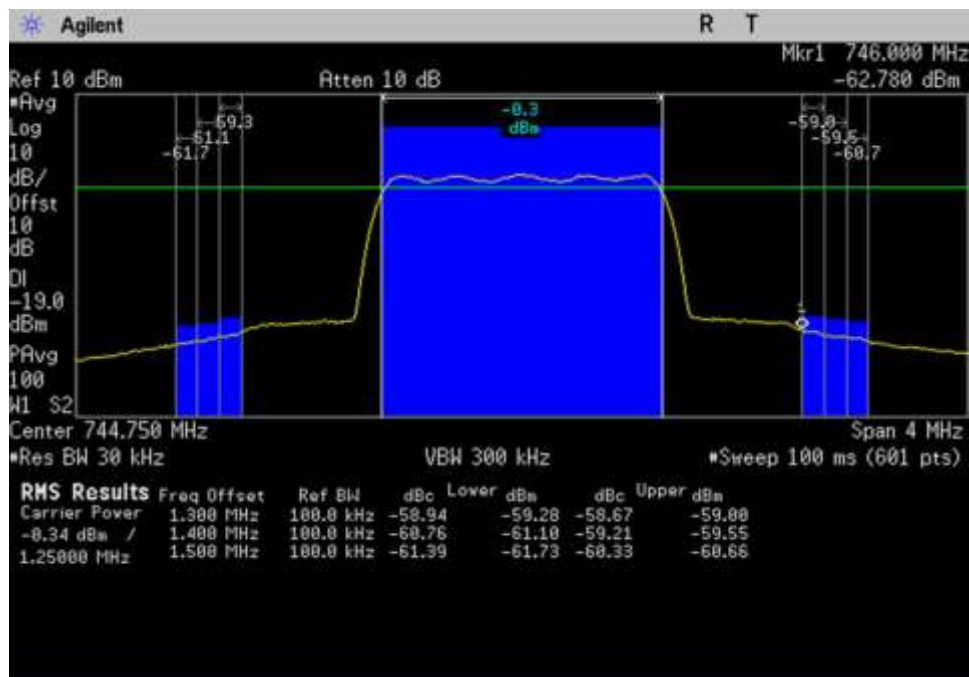
UL_1850-1915_CDMA_ 1847- 1855.5MHz



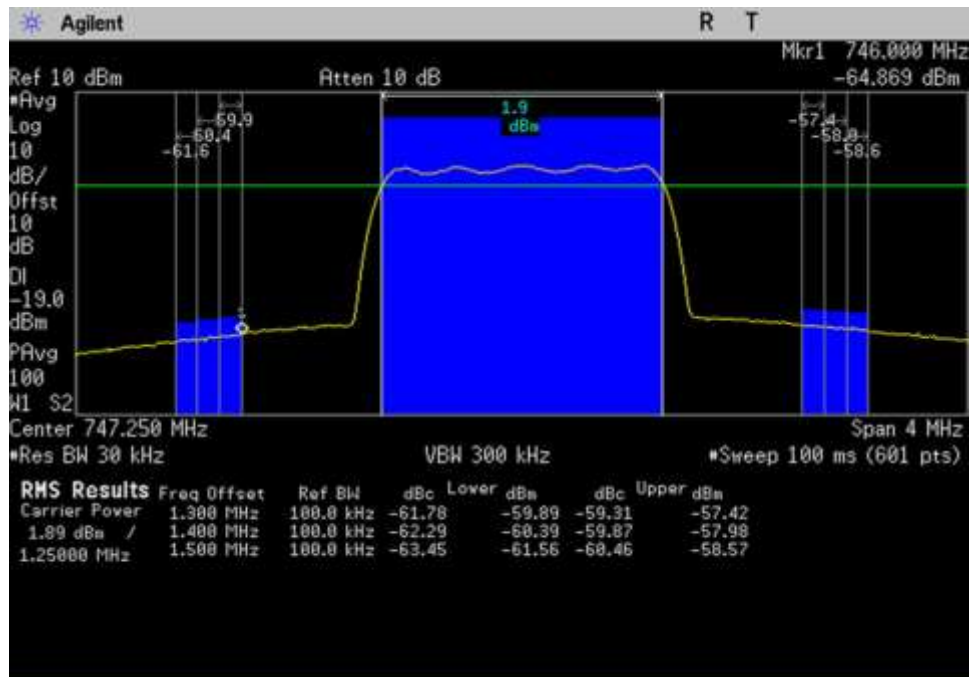
UL_1850-1915_CDMA_ 1909.5- 1918MHz



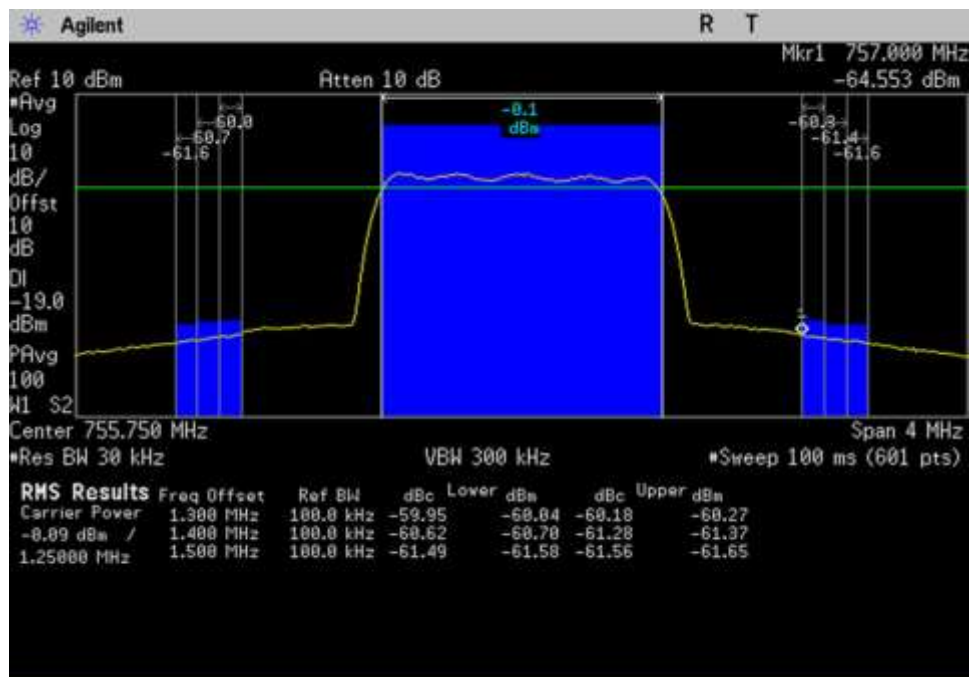
DL_728-746_CDMA_727.25-731.25MHz



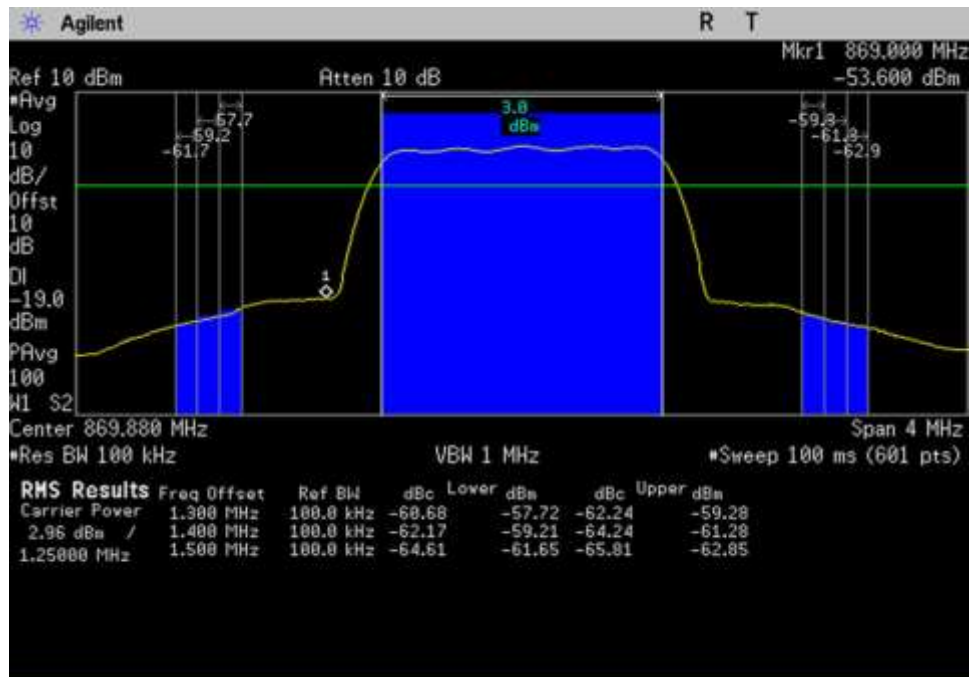
DL_728-746_CDMA_742.75-746.75MHz



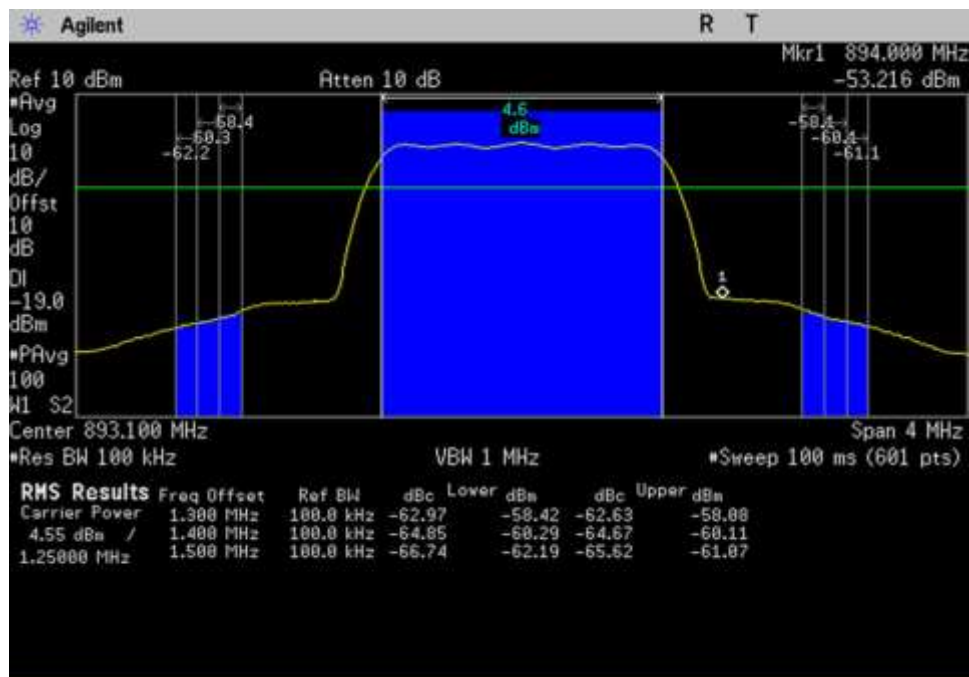
DL_746-757_CDMA_745.25-749.25MHz



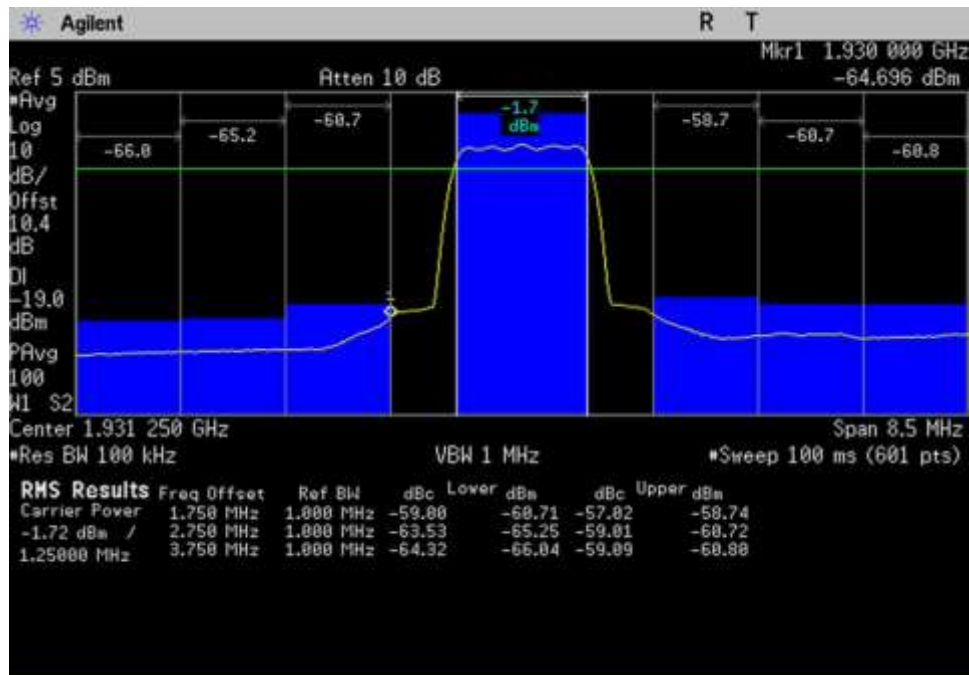
DL_746-757_CDMA_753.75-757.75MHz



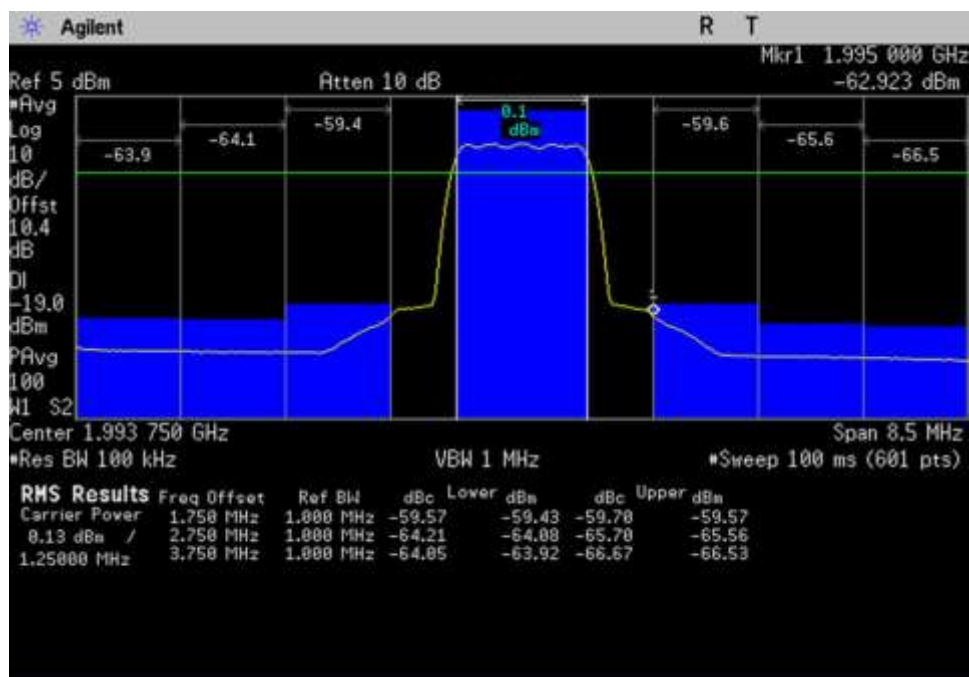
DL_869-894_CDMA_867.88-871.88MHz



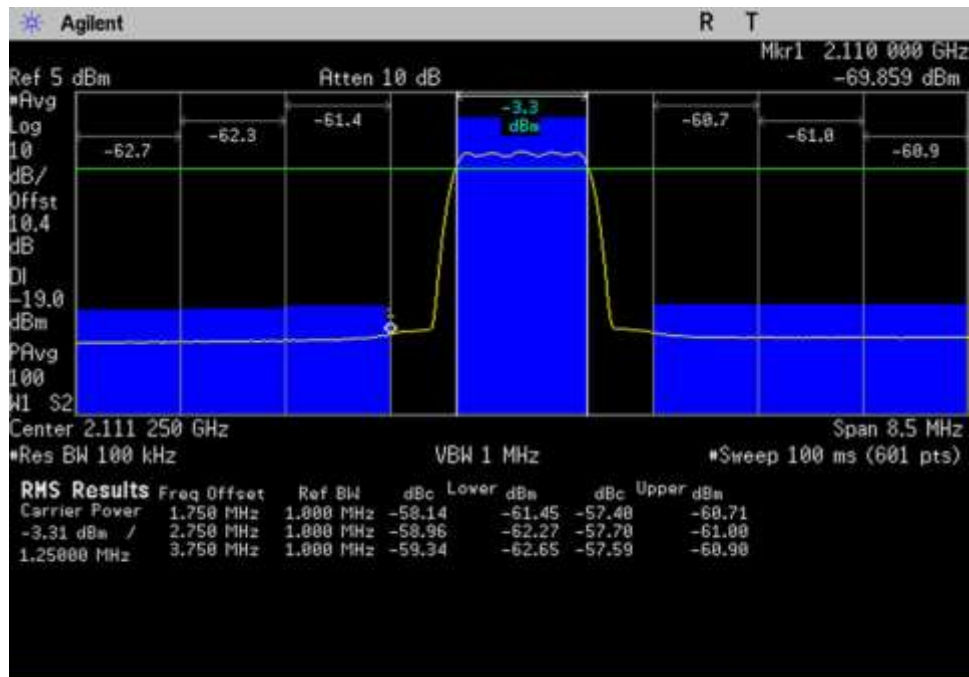
DL_869-894_CDMA_891.1-895.1MHz



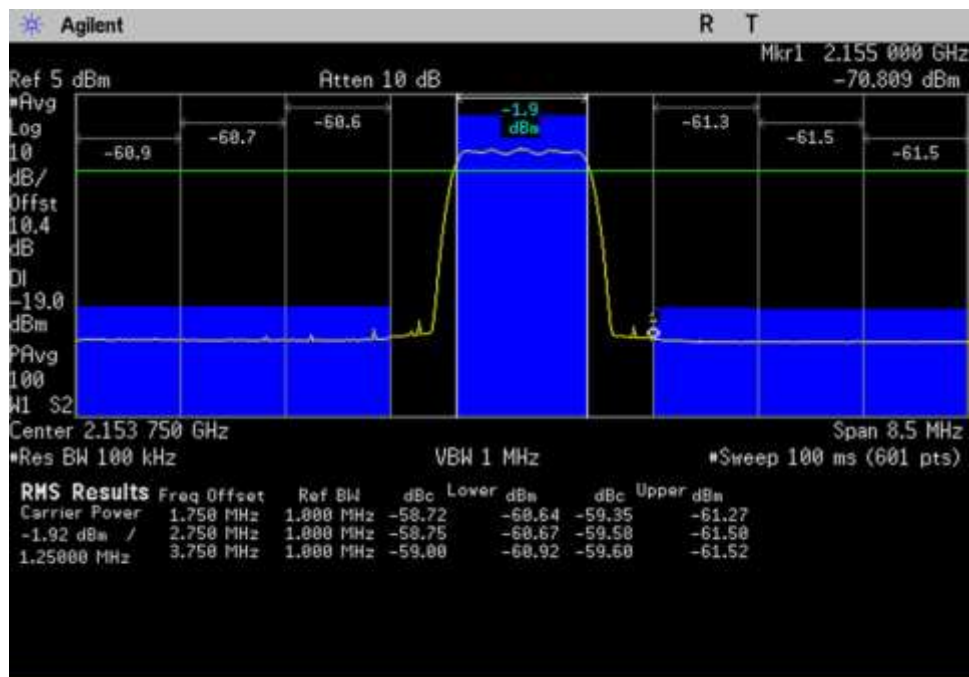
DL_1930-1995_CDMA_ 1927- 1935.5MHz



DL_1930-1995_CDMA_ 1989.5- 1998MHz

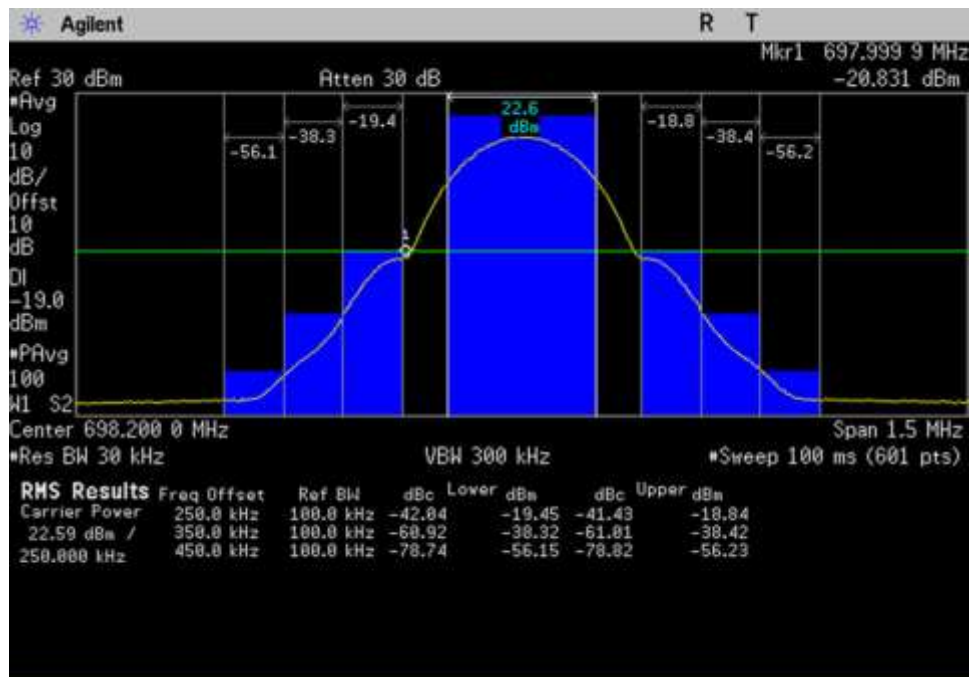


DL_2110-2155_CDMA_ 2107- 2115.5MHz

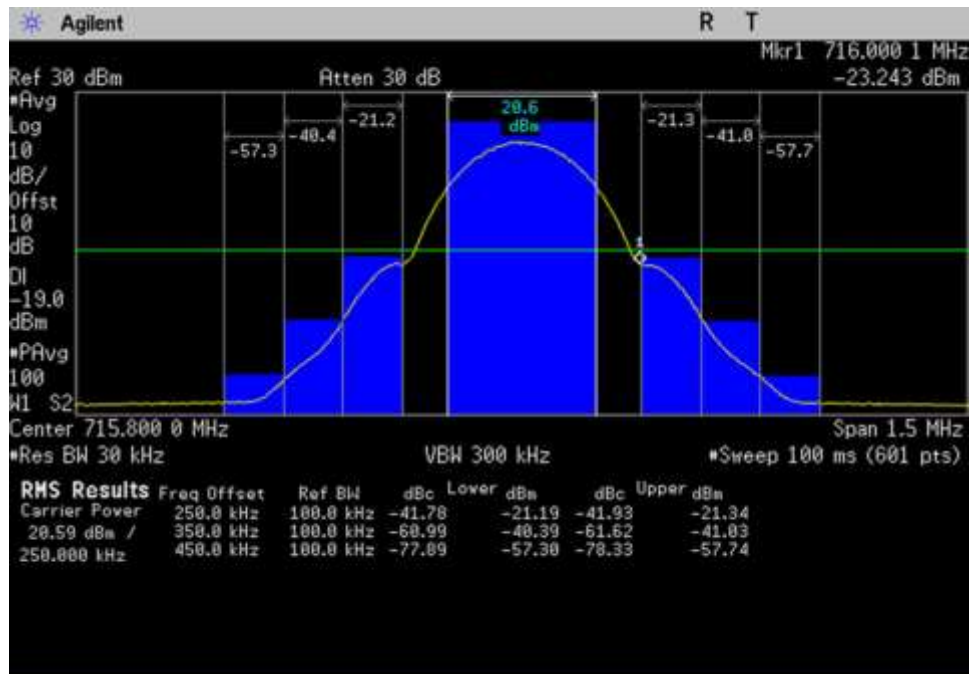


DL_2110-2155_CDMA_ 2149.5- 2158MHz

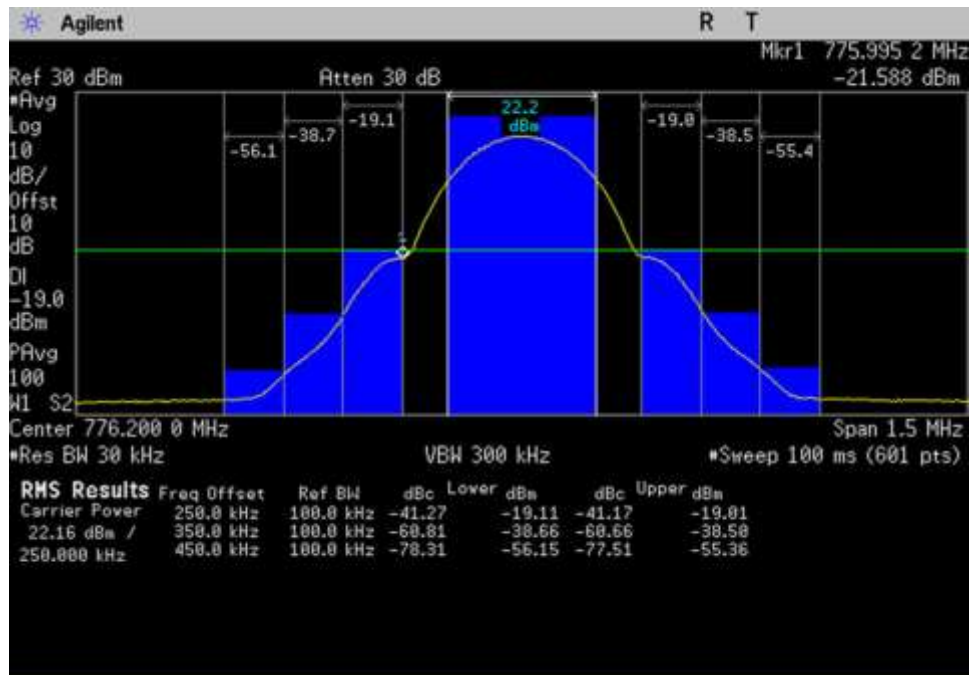
GSM



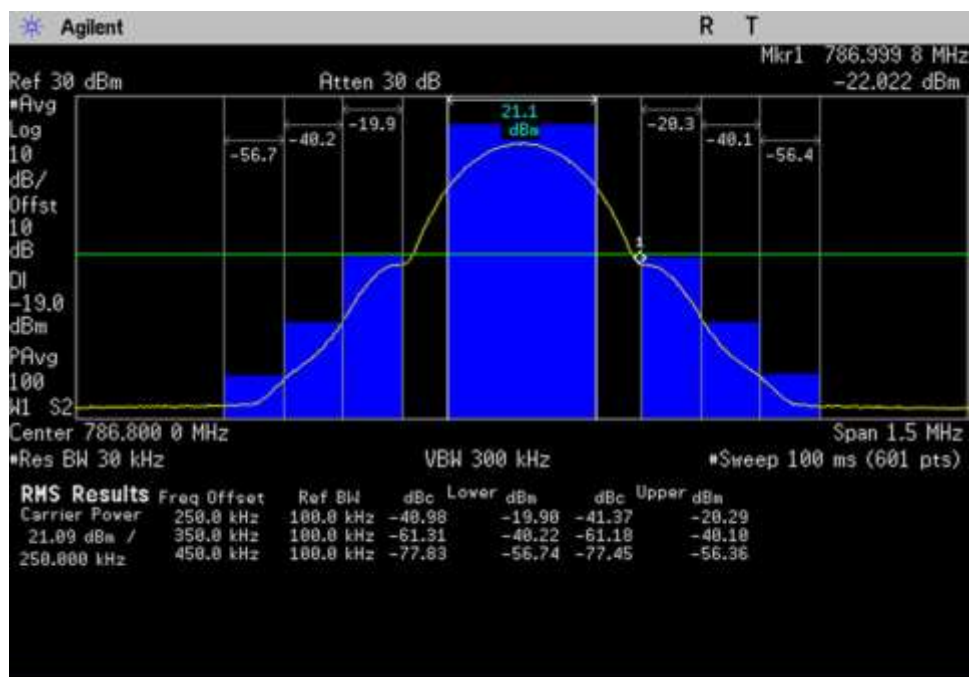
UL_698-716_GSM_697.45-698.95MHz



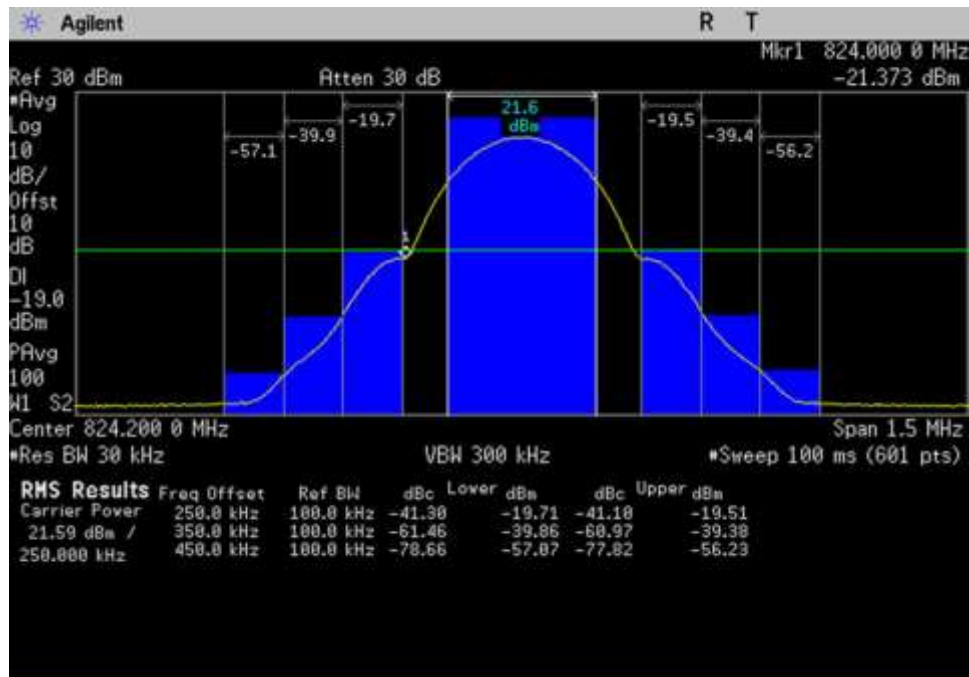
UL_698-716_GSM_715.05-716.55MHz



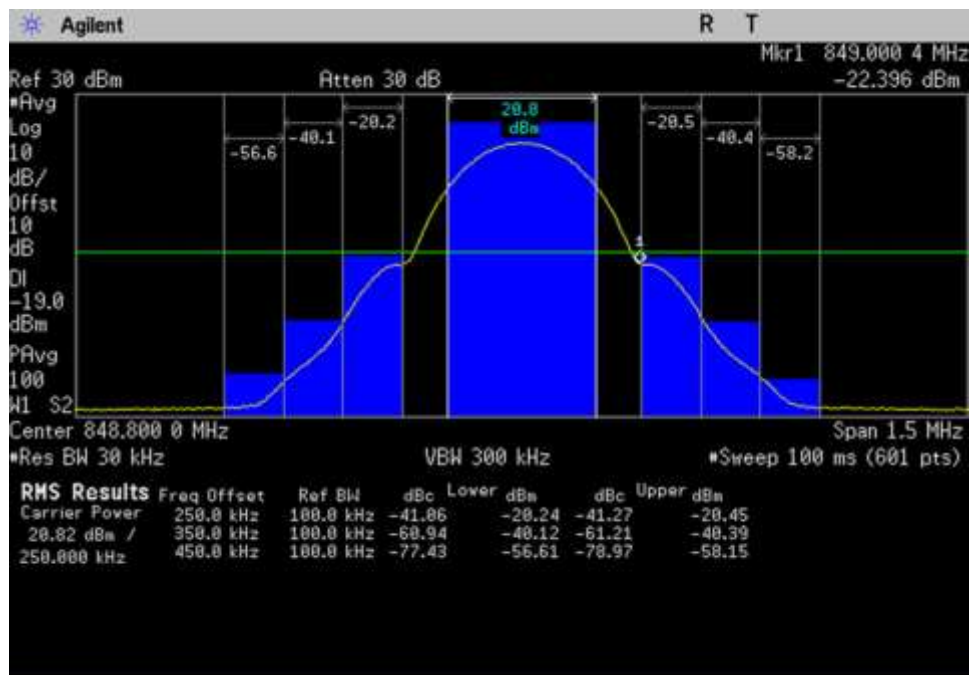
UL_776-787_GSM_775.45-776.95MHz



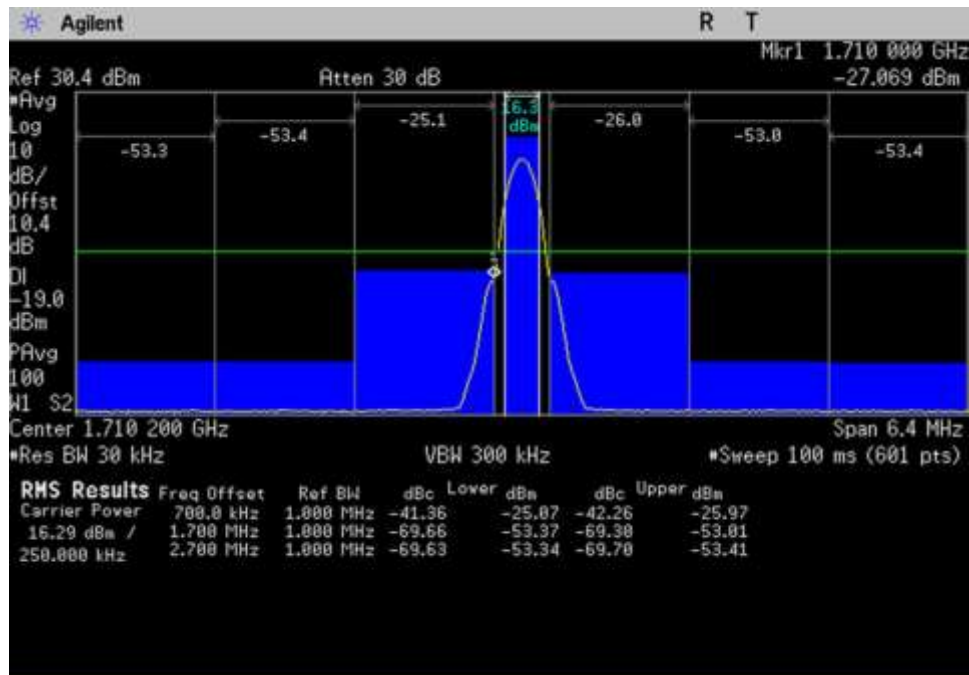
UL_776-787_GSM_786.05-787.55MHz



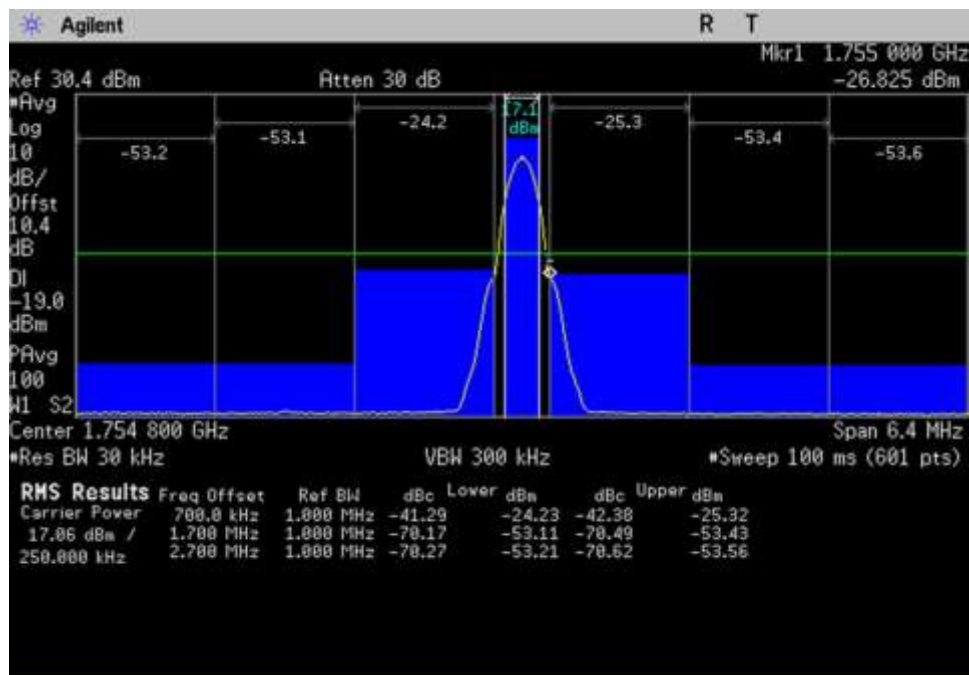
UL_824-849_GSM_848.05-849.55MHz



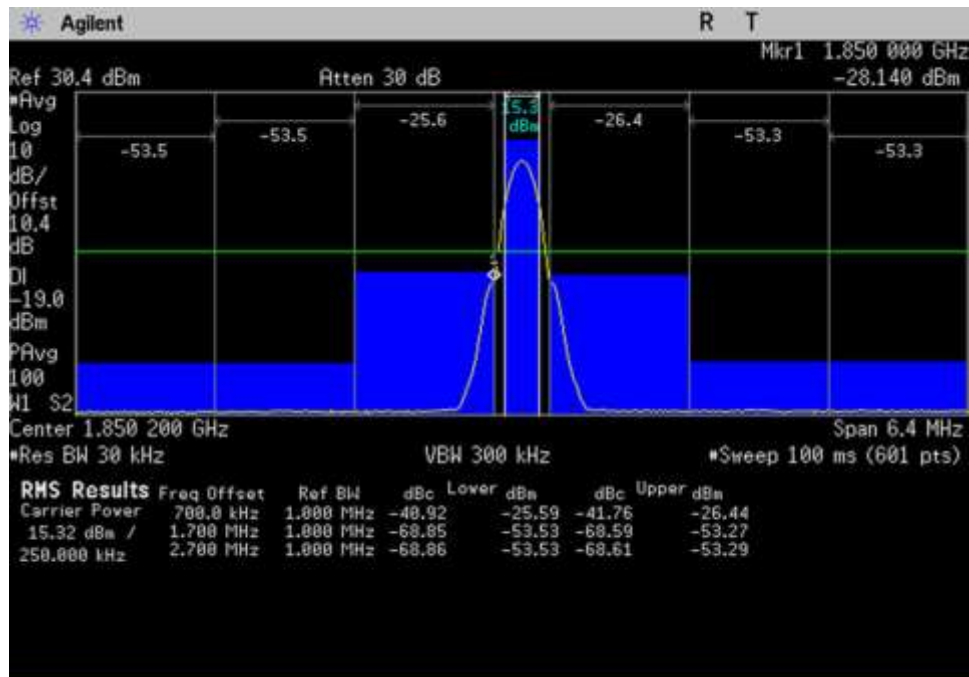
UL_824-849_LTE_822.5-830.5MHz



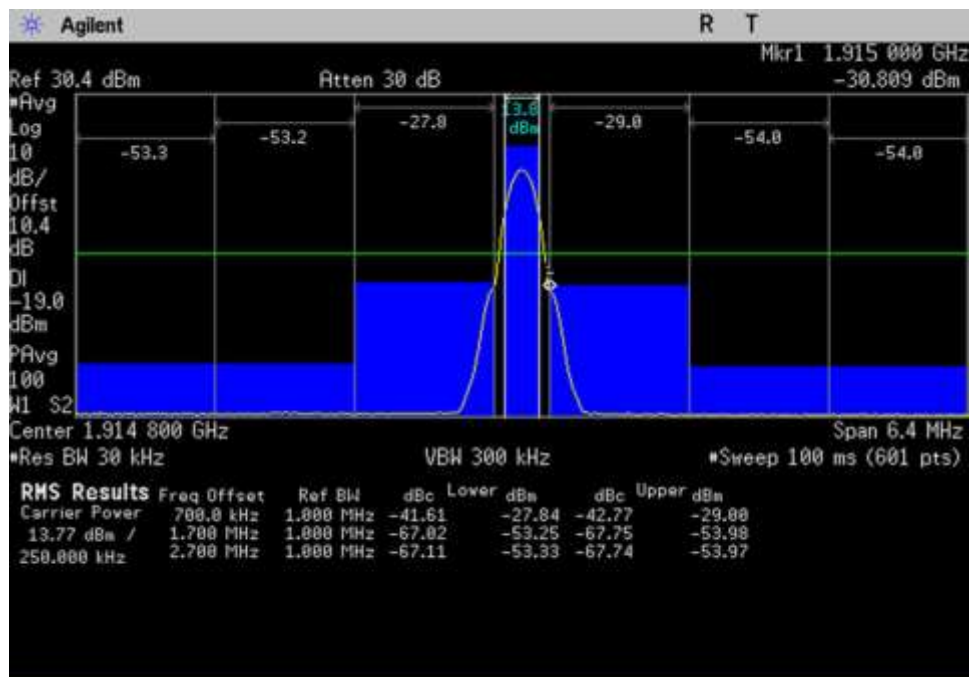
UL_1710-1755_GSM_1707-1713.4MHz



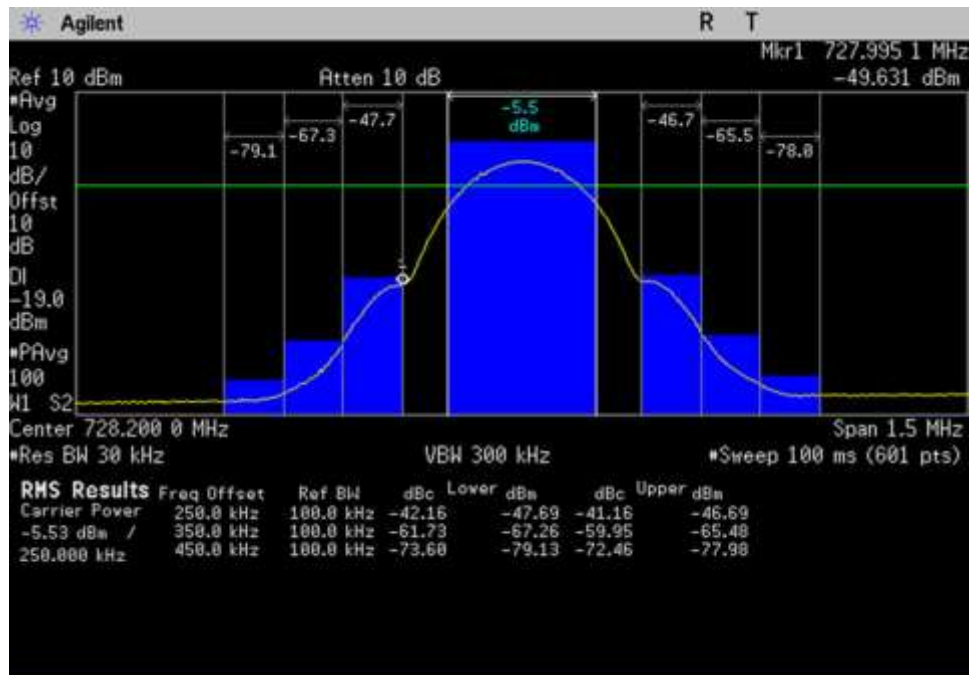
UL_1710-1755_GSM_1751.6-1758MHz



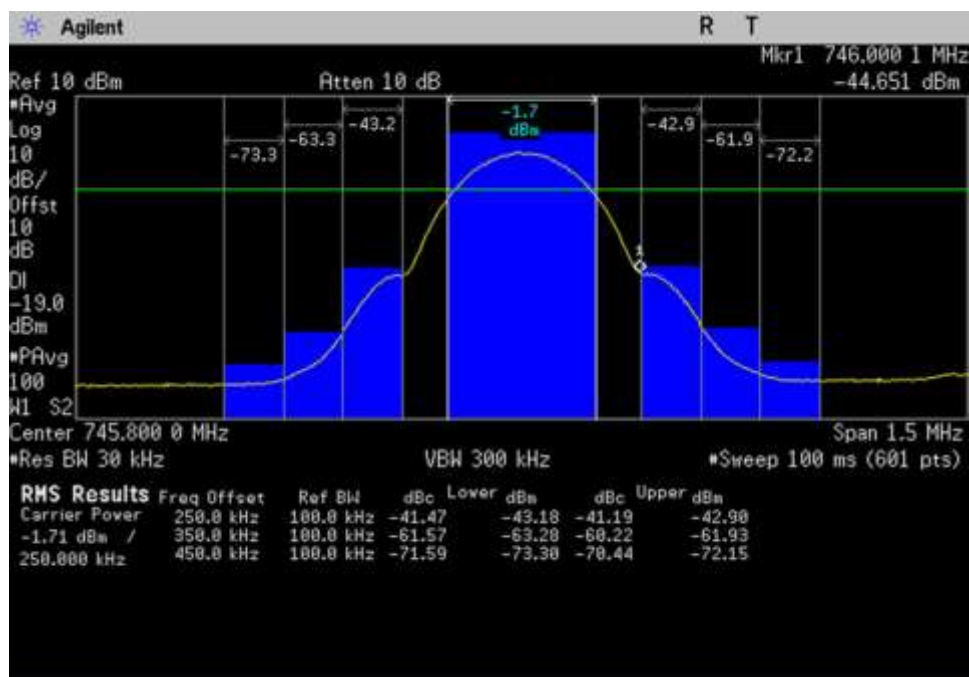
UL_1850-1915_GSM_1847-1853.4MHz



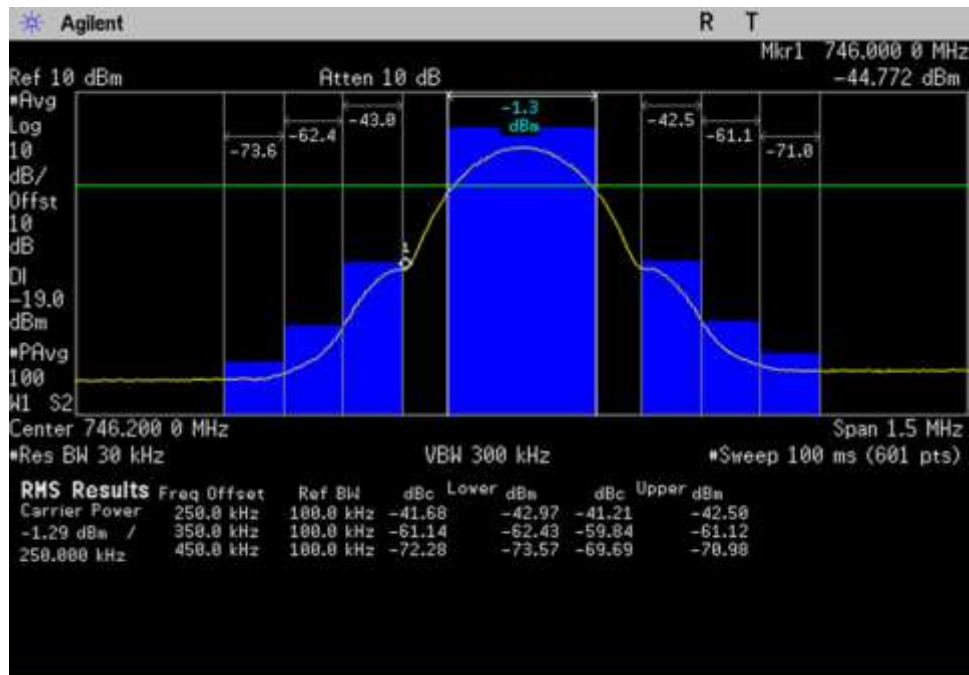
UL_1850-1915_GSM_1911.6-1918MHz



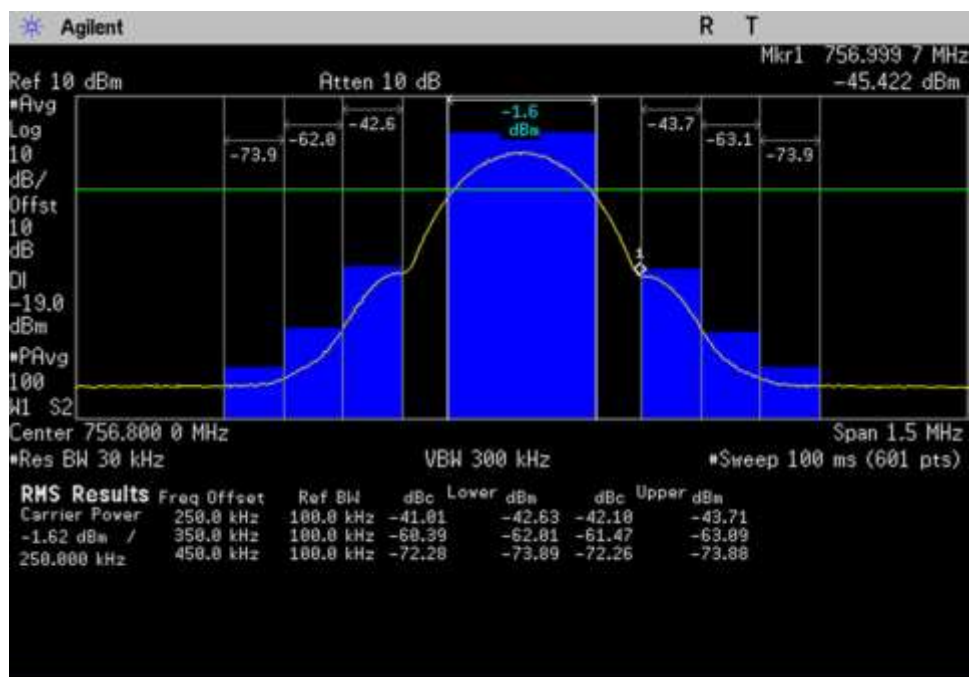
DL_728-746_GSM_ 727.45- 728.95MHz



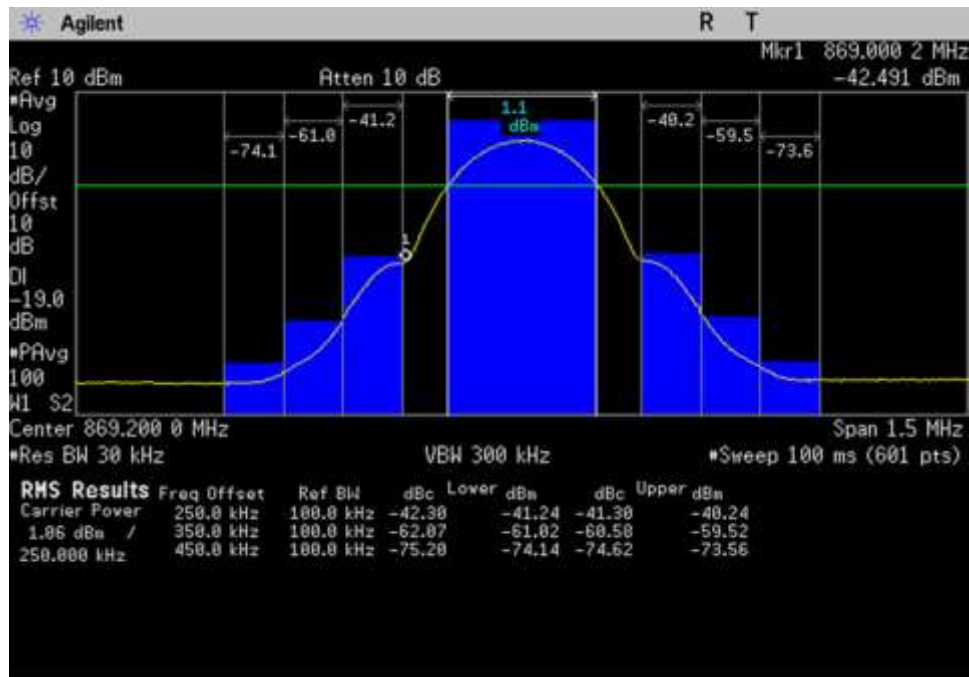
DL_728-746_GSM_ 745.05- 746.55MHz



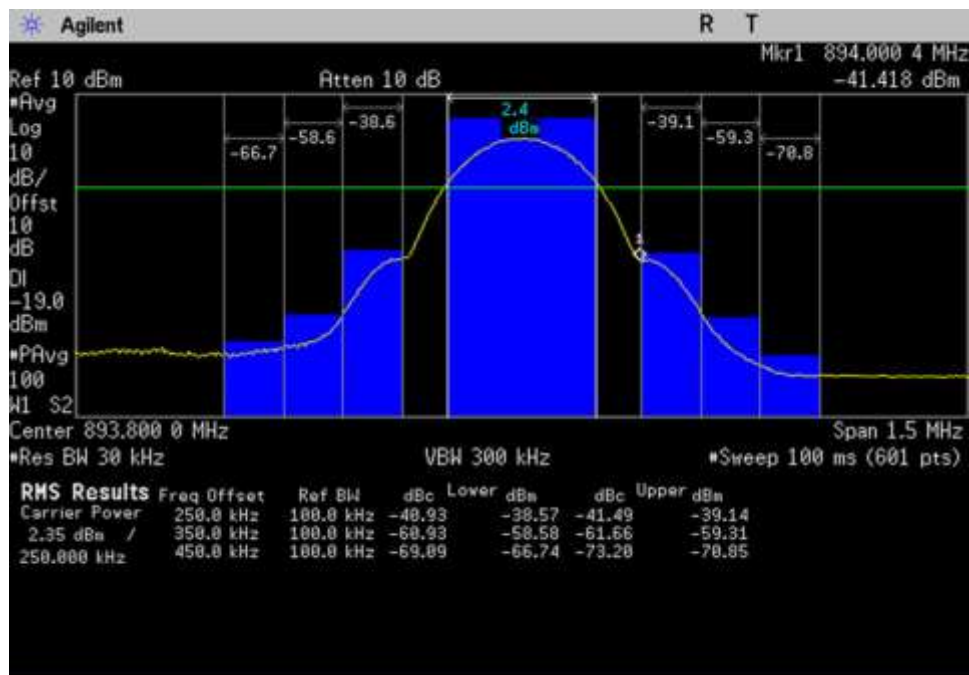
DL_746-757_GSM_745.45-746.95MHz



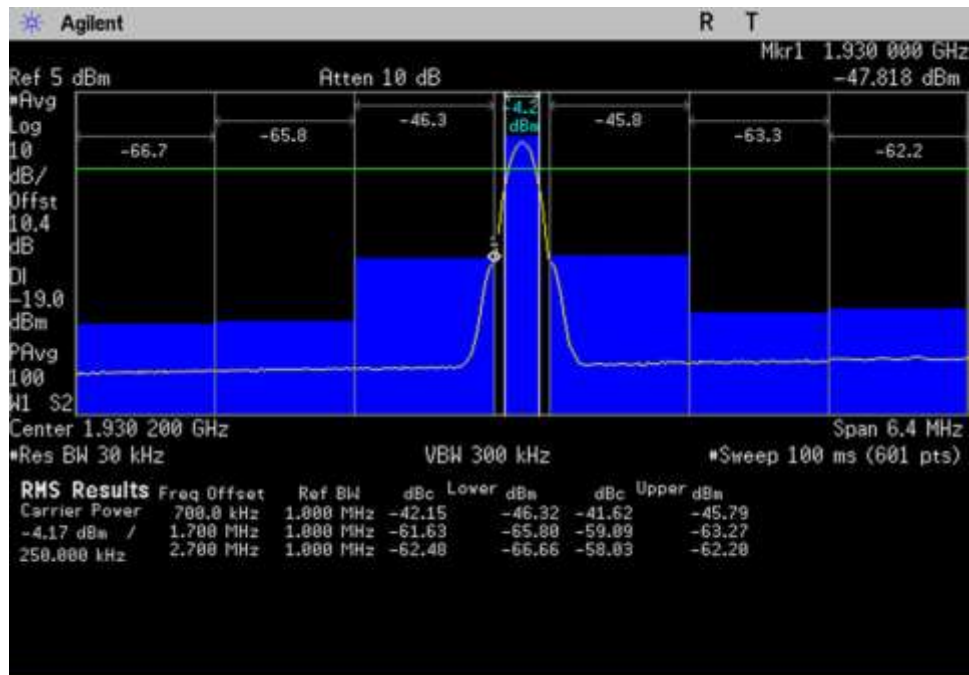
DL_746-757_GSM_756.05-757.55MHz



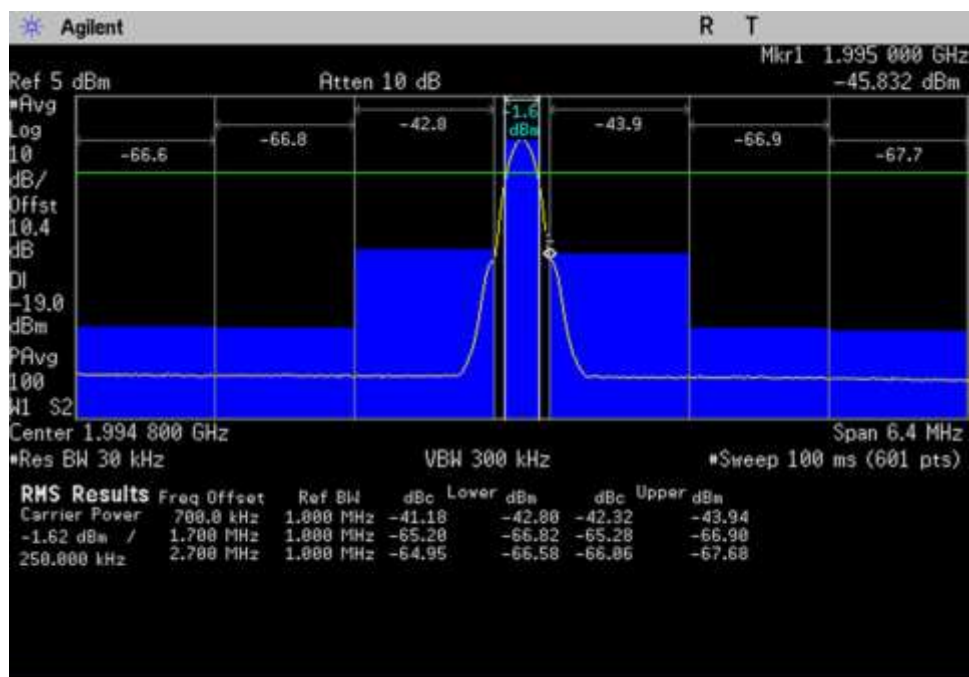
DL_869-894_GSM_ 868.45- 869.95MHz



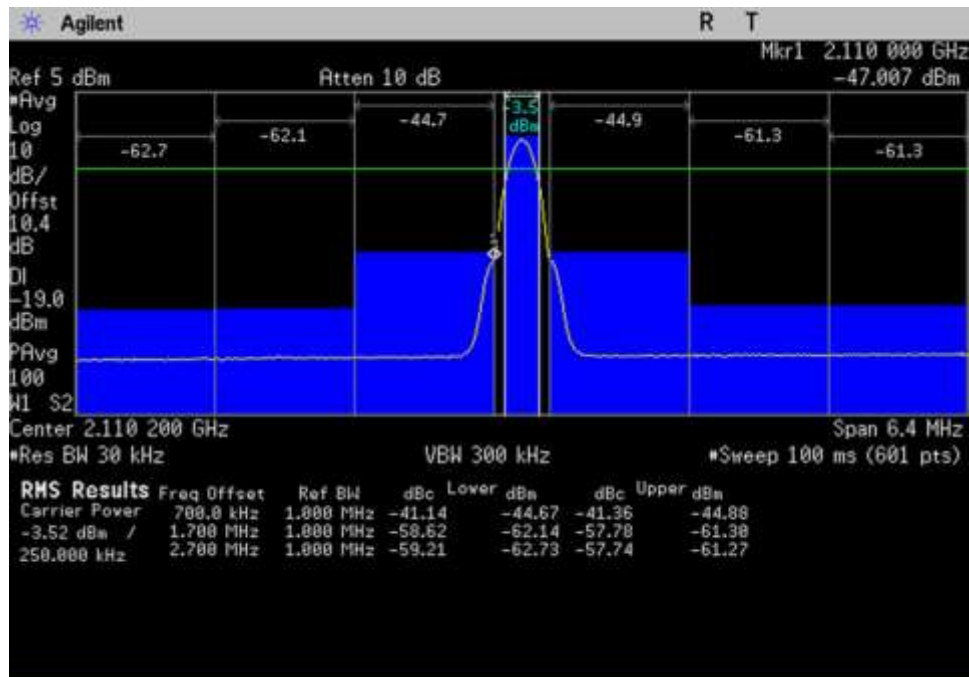
DL_869-894_GSM_ 893.05- 894.55MHz



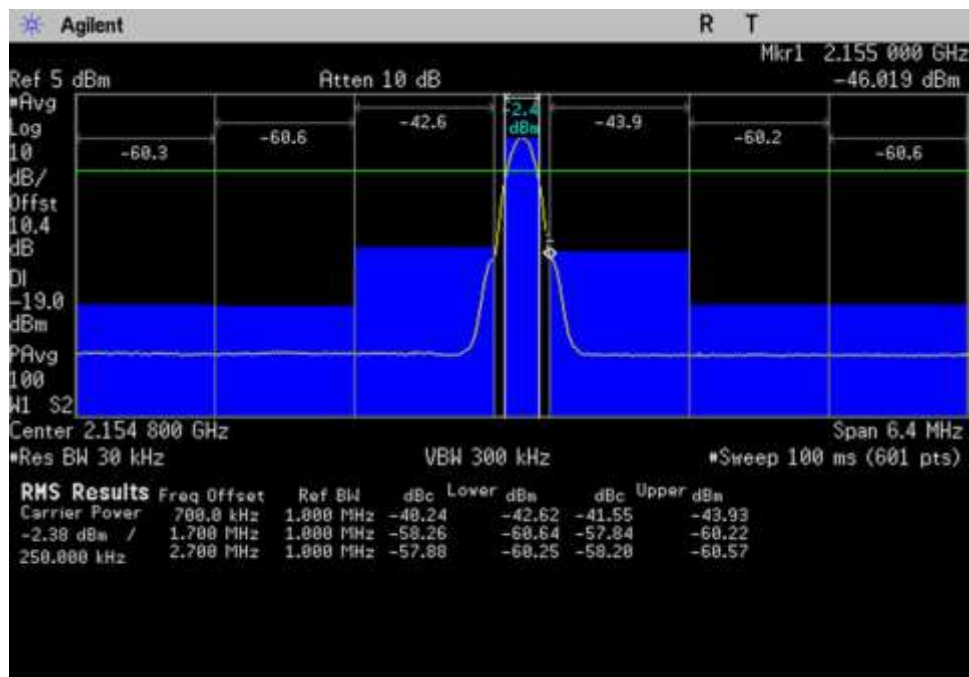
DL_1930-1995_GSM_1927- 1933.4MHz



DL_1930-1995_GSM_1991.6- 1998MHz

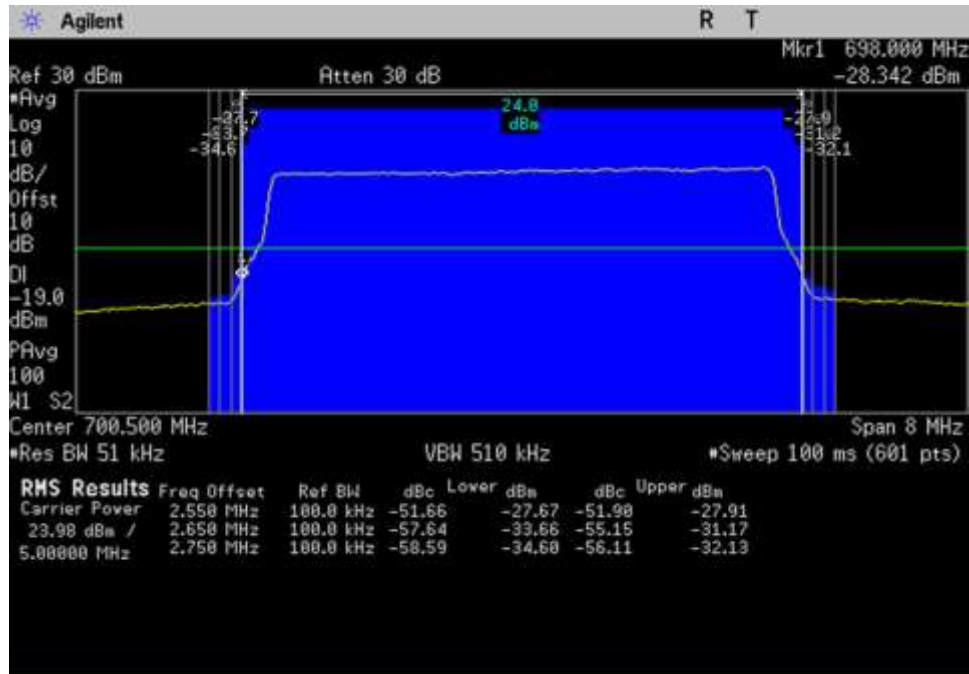


DL_2110-2155_GSM_ 2107- 2113.4MHz

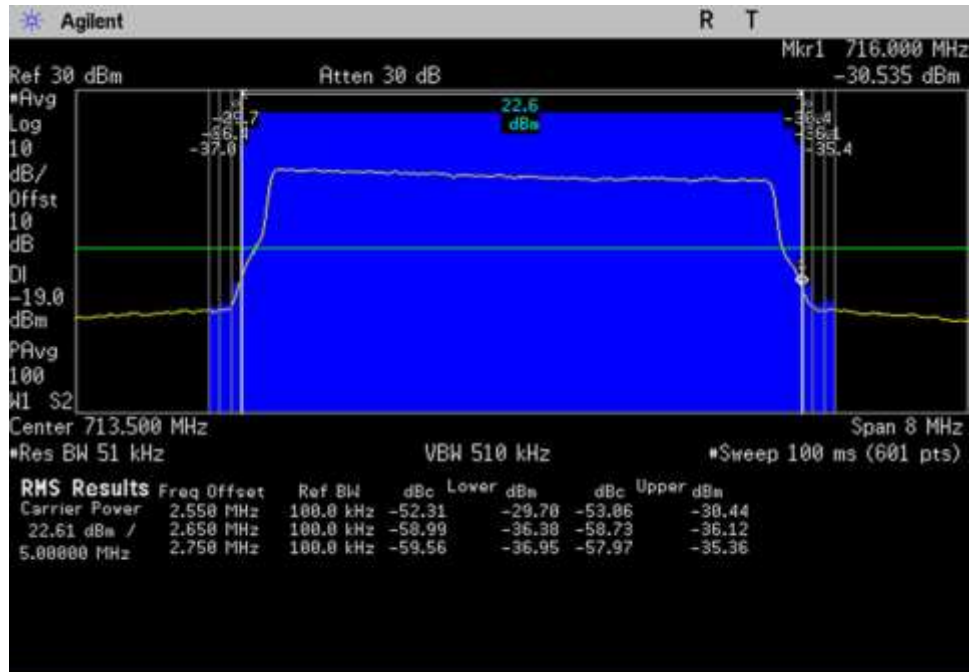


DL_2110-2155_GSM_ 2151.6- 2158MHz

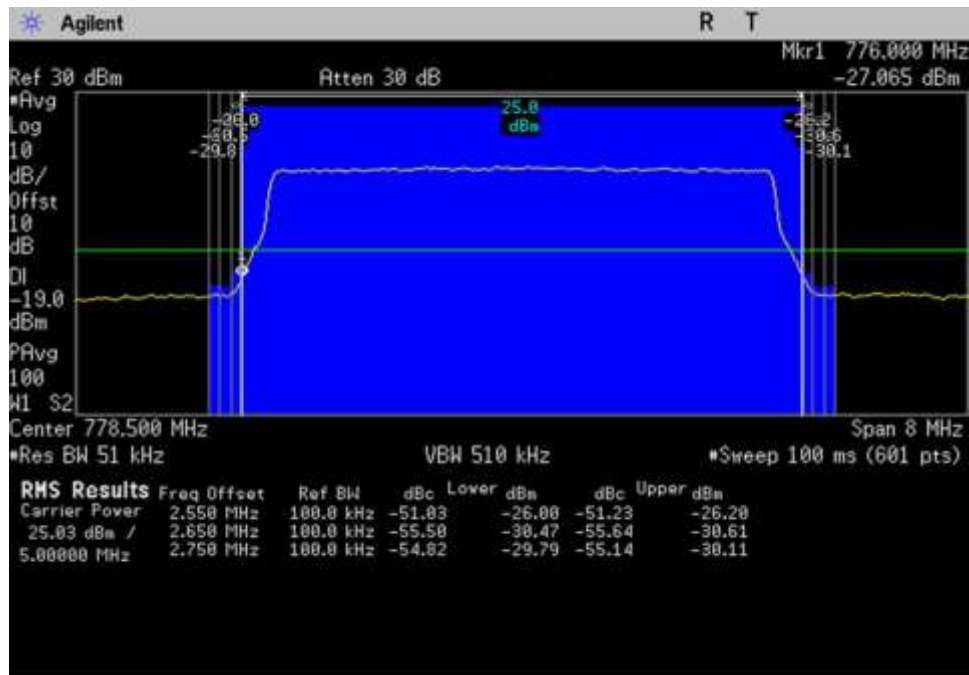
LTE



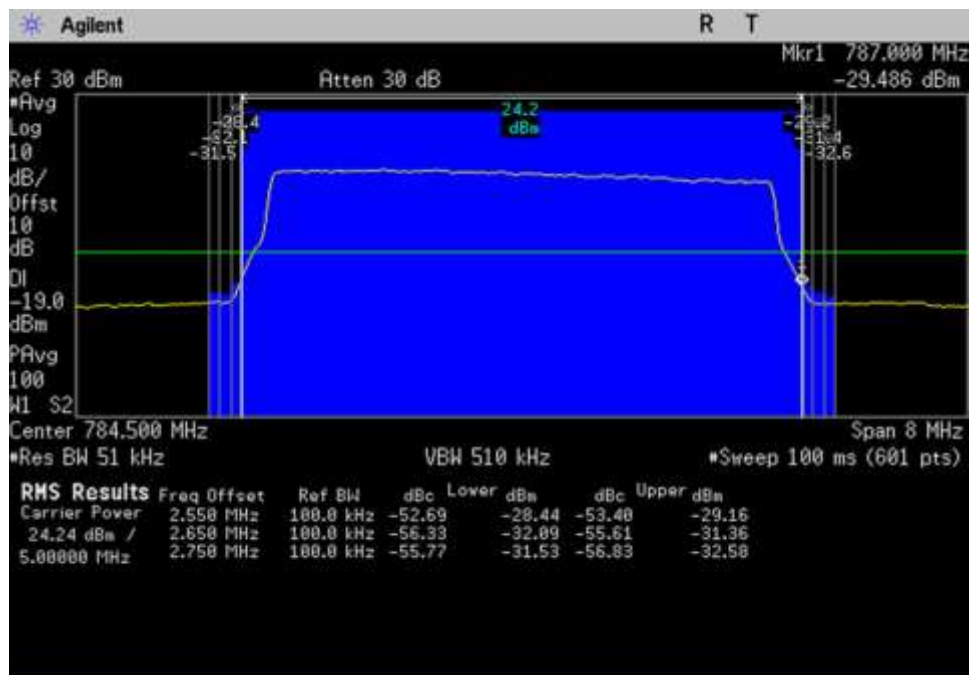
UL_698-716_LTE_696.5- 704.5MHz



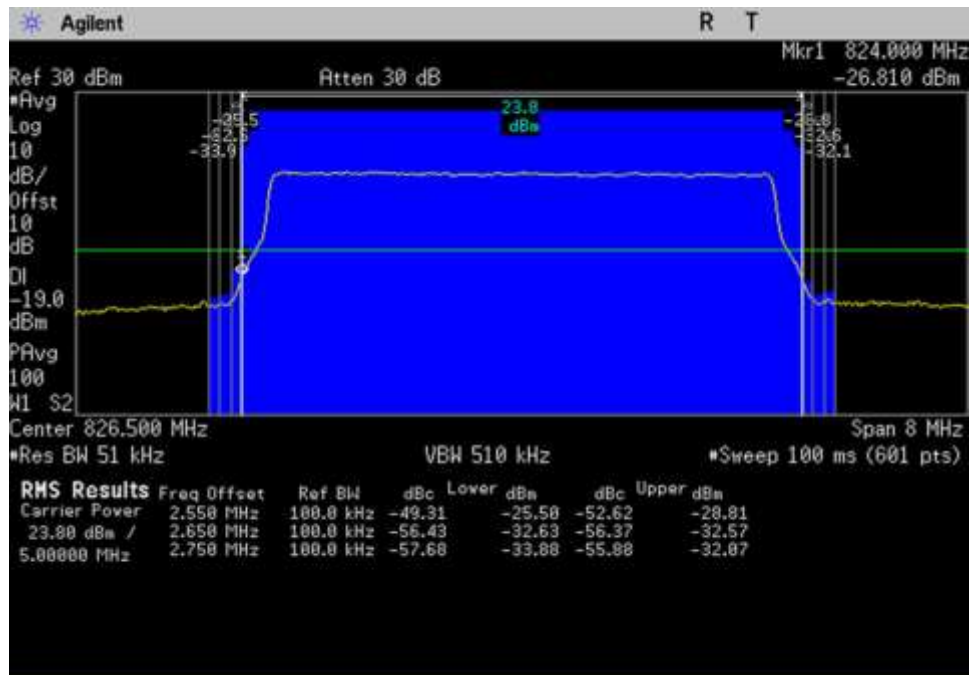
UL_698-716_LTE_709.5- 717.5MHz



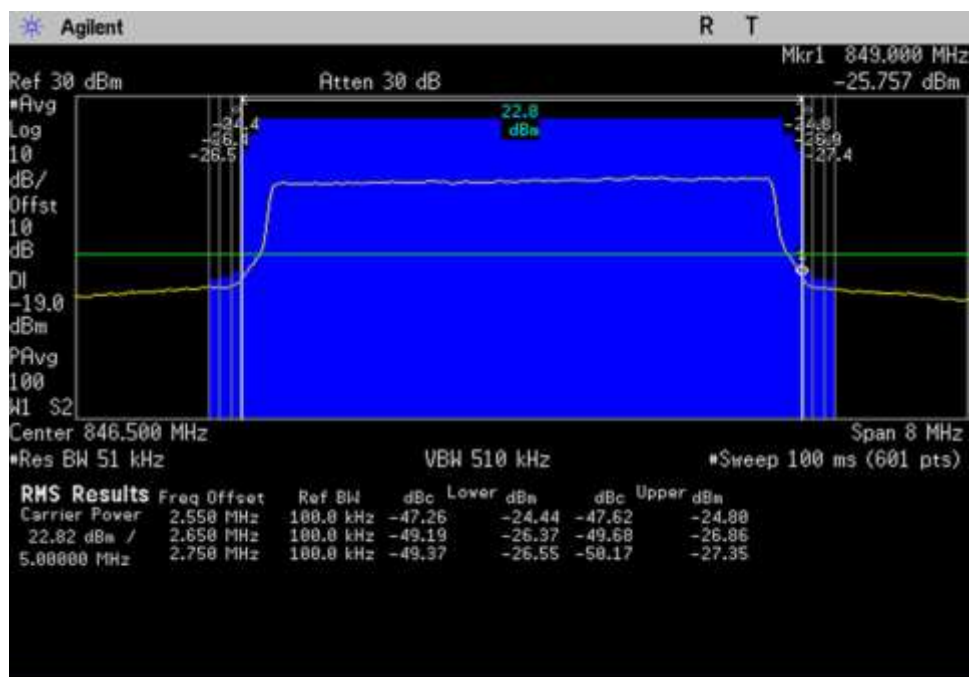
UL_776-787_LTE_774.5-782.5MHz



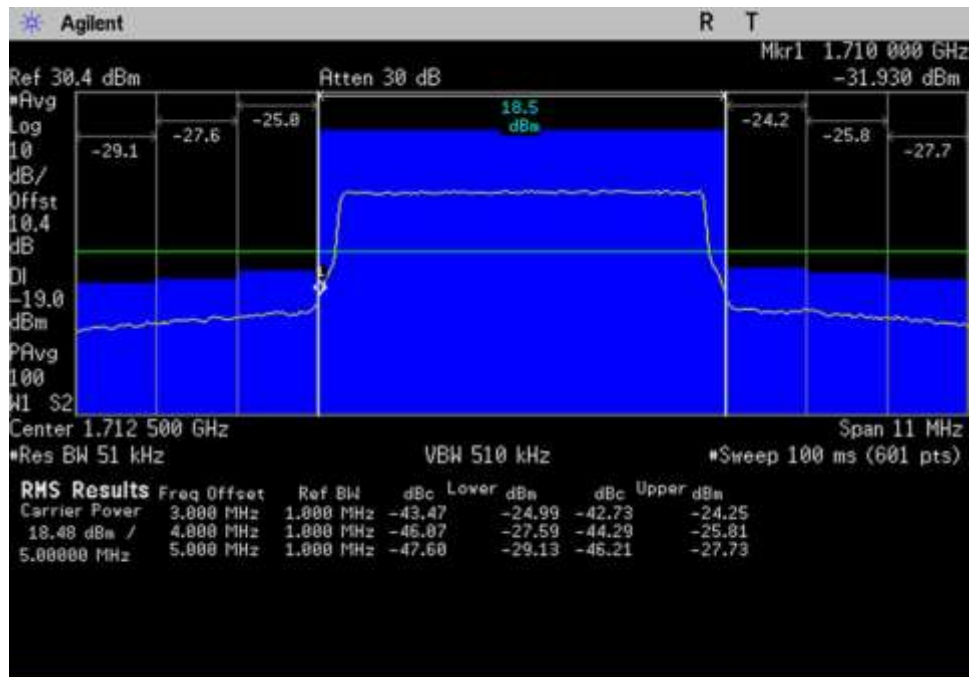
UL_776-787_LTE_780.5-788.5MHz



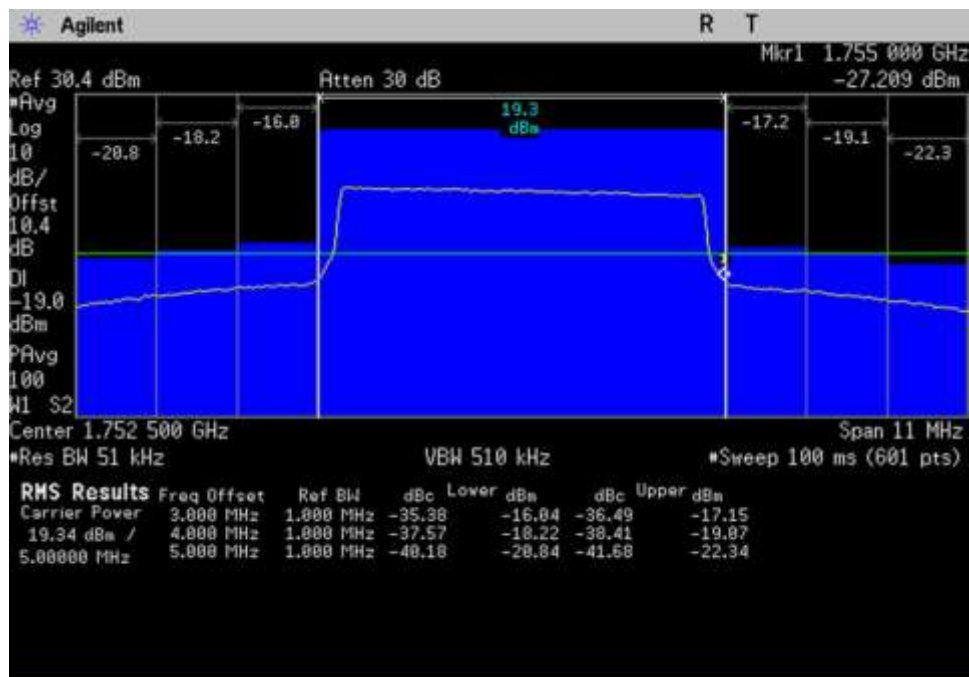
UL_824-849_LTE_822.5-830.5MHz



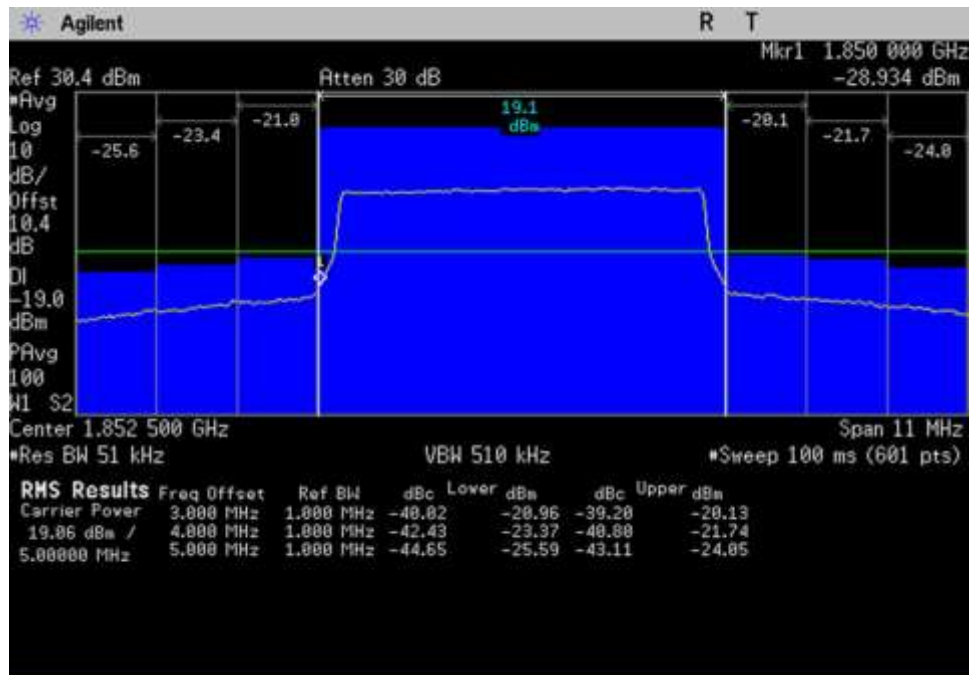
UL_824-849_LTE_842.5-850.5MHz



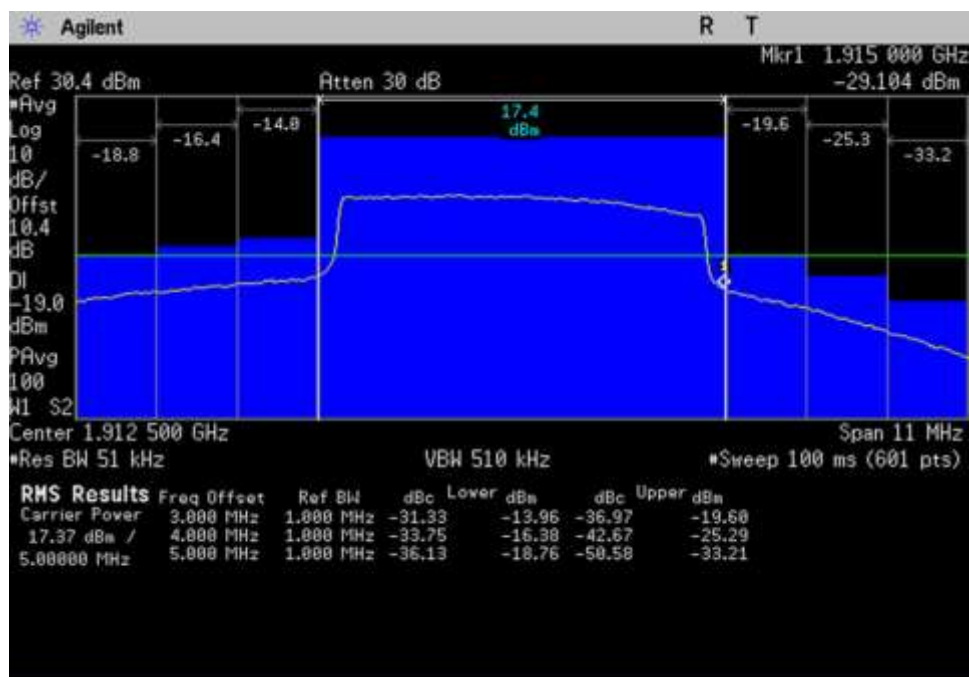
UL_1710-1755_LTE_1707-1718MHz



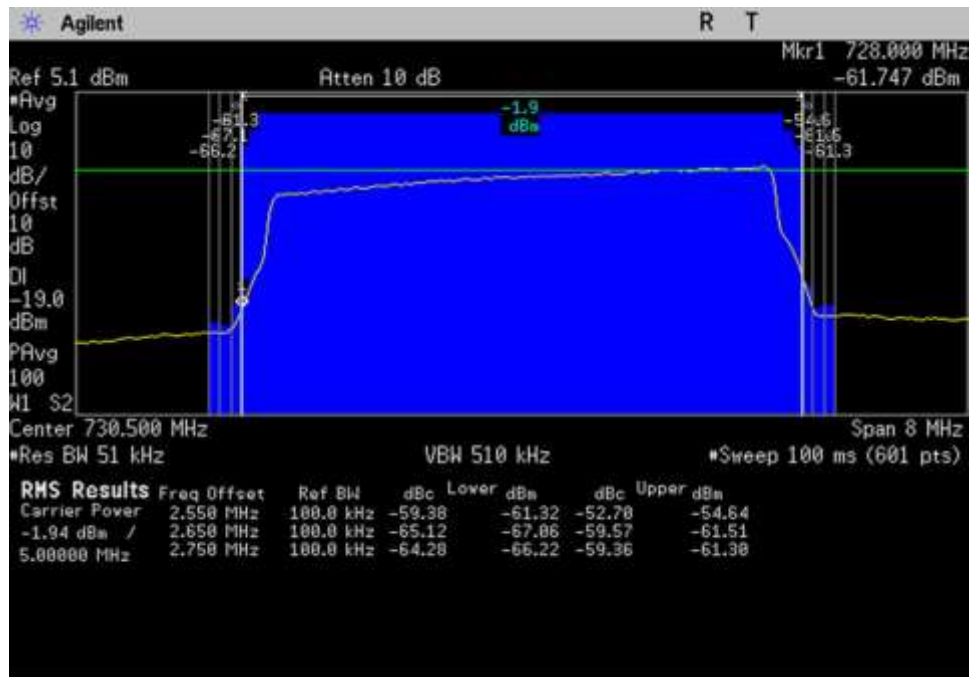
UL_1710-1755_LTE_1747-1758MHz



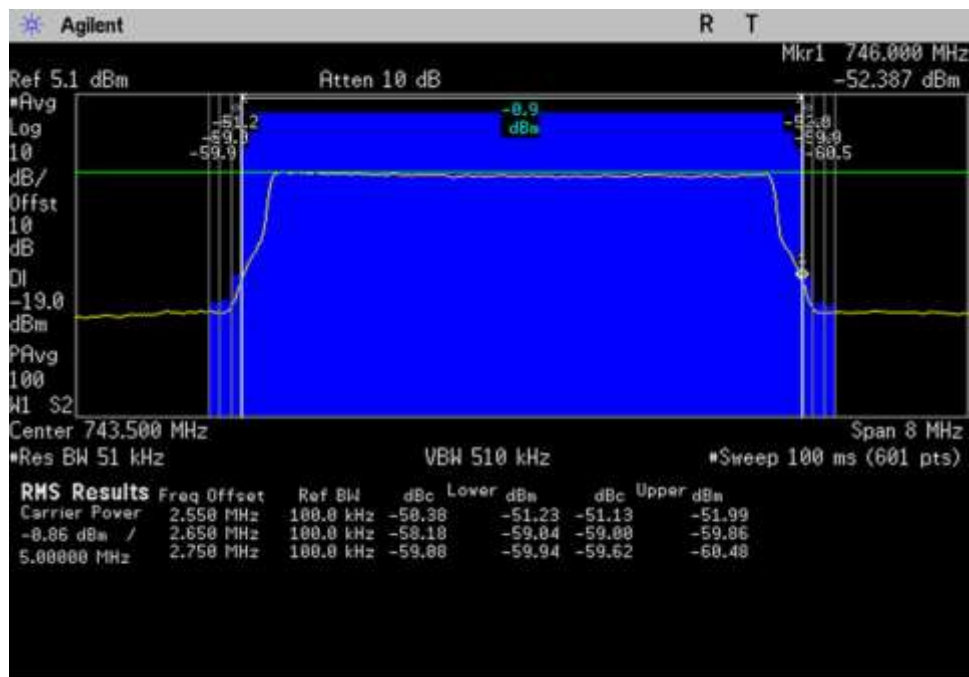
UL_1850-1915_LTE_1847-1858MHz



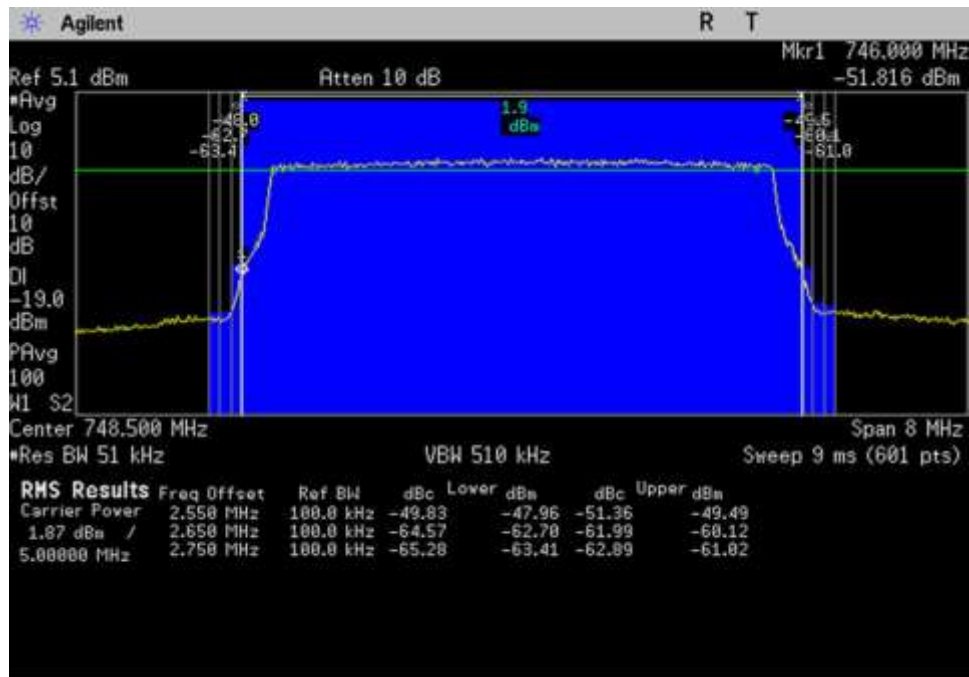
UL_1850-1915_LTE_1907-1918MHz



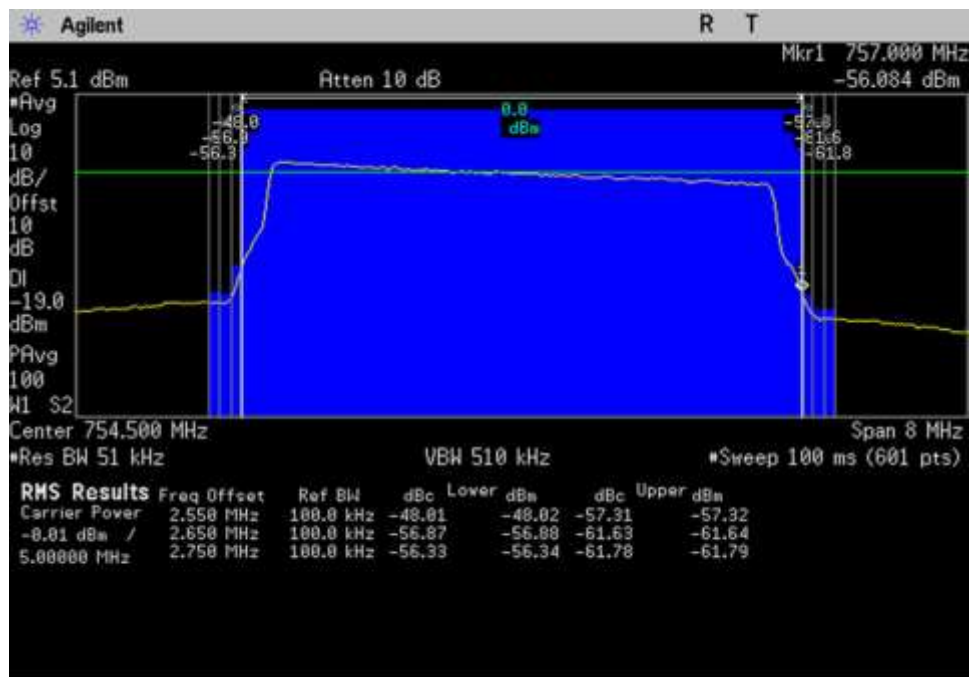
DL_728-746_LTE_ 726.5- 734.5MHz



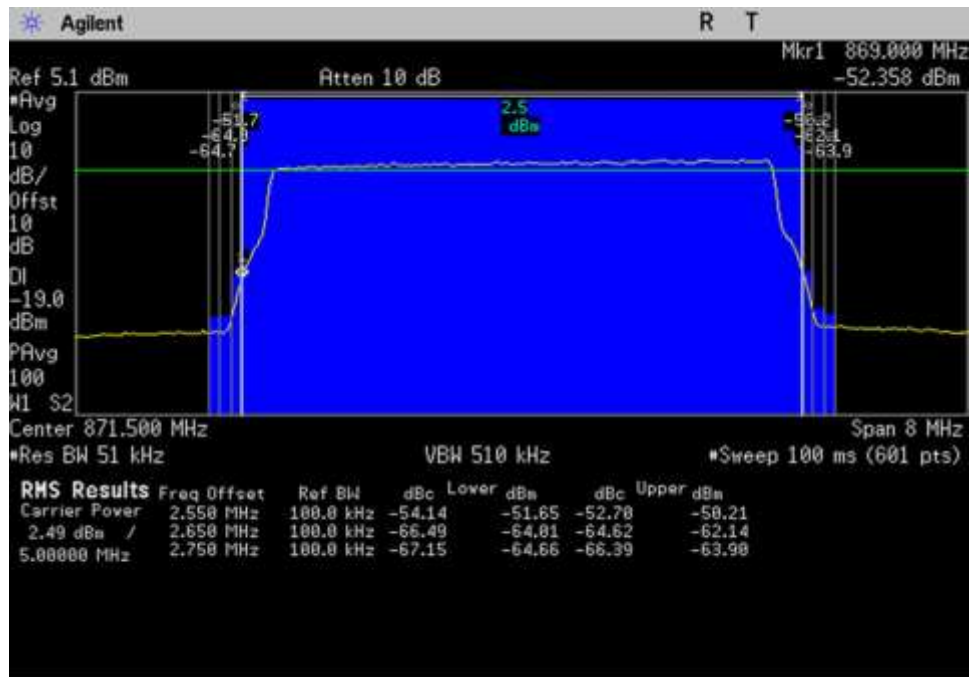
DL_728-746_LTE_ 739.5- 747.5MHz



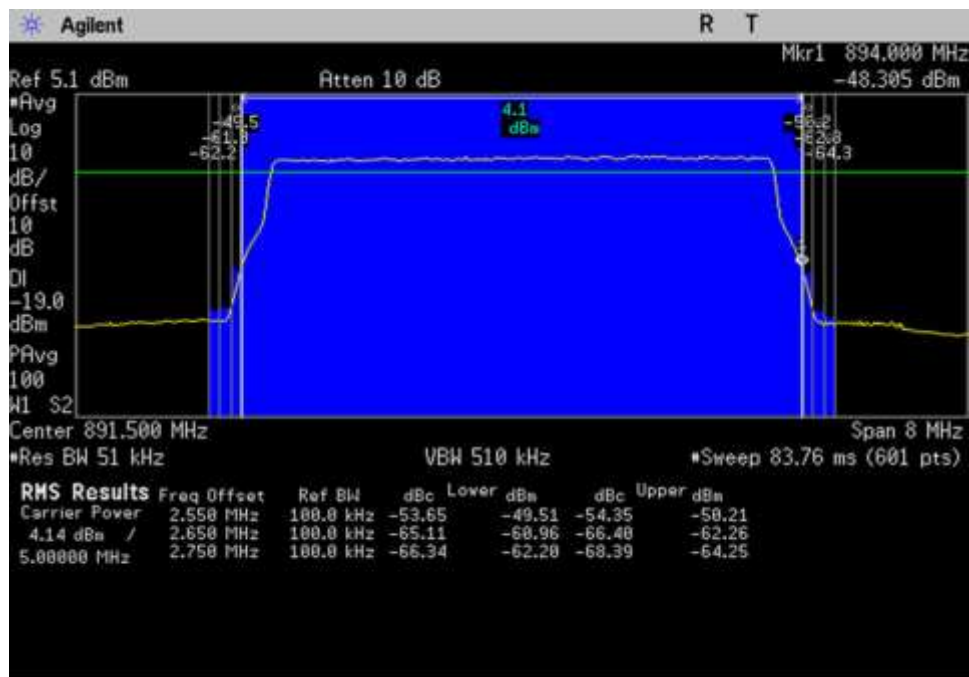
DL_746-757_LTE_ 744.5- 752.5MHz



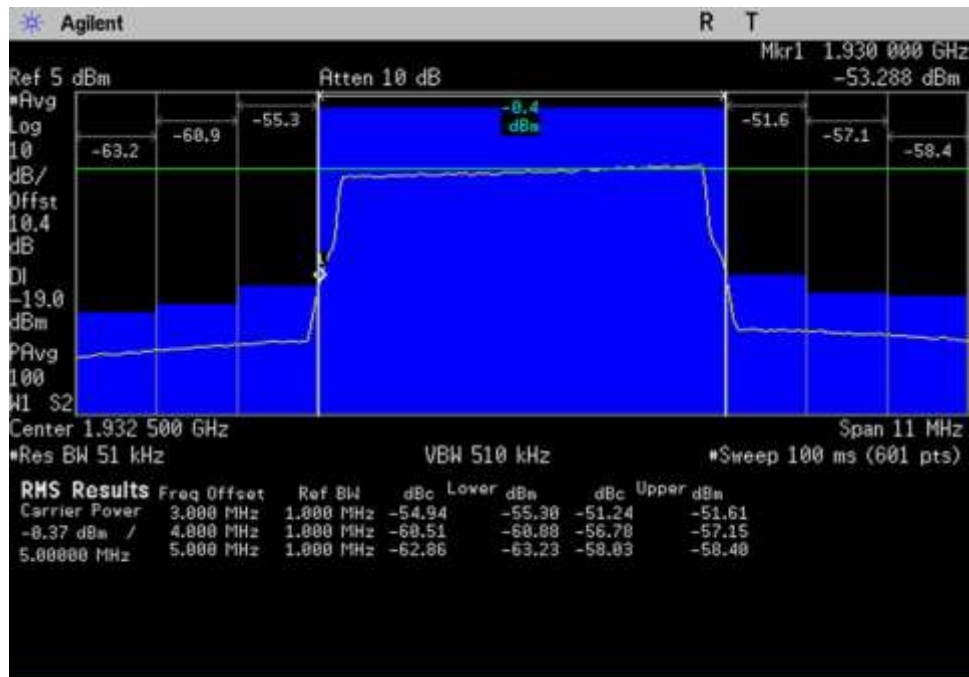
DL_746-757_LTE_ 750.5- 758.5MHz



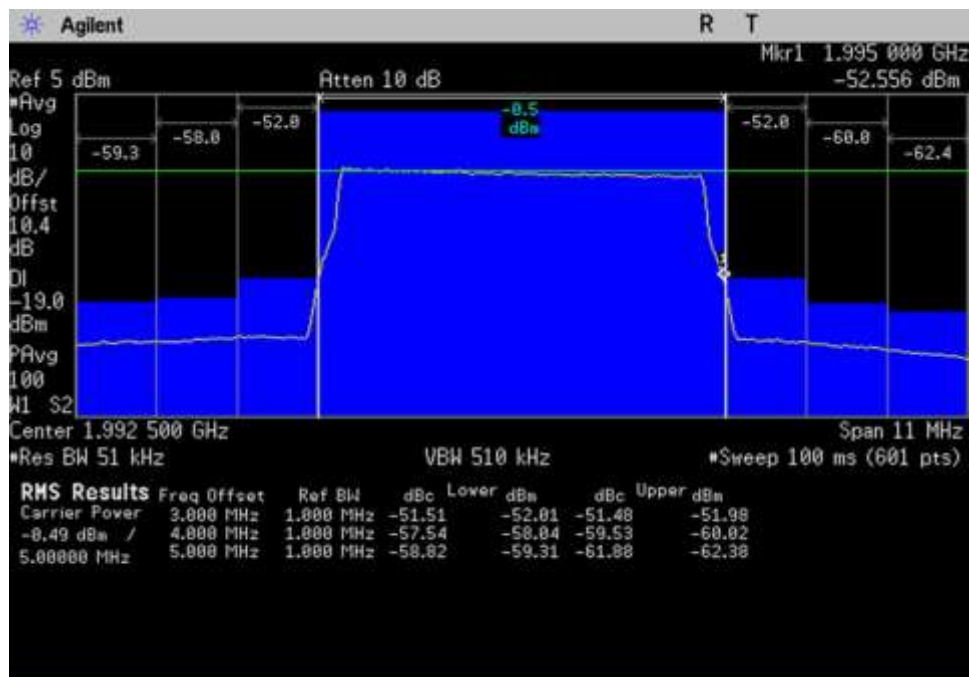
DL_869-894_LTE_867.5-875.5MHz



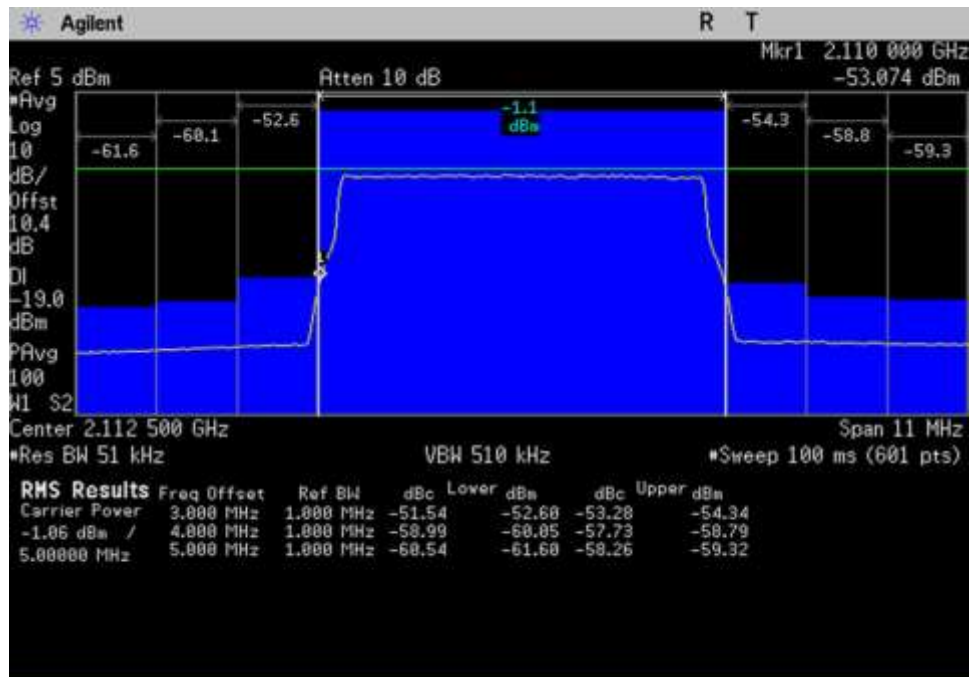
DL_869-894_LTE_887.5-895.5MHz



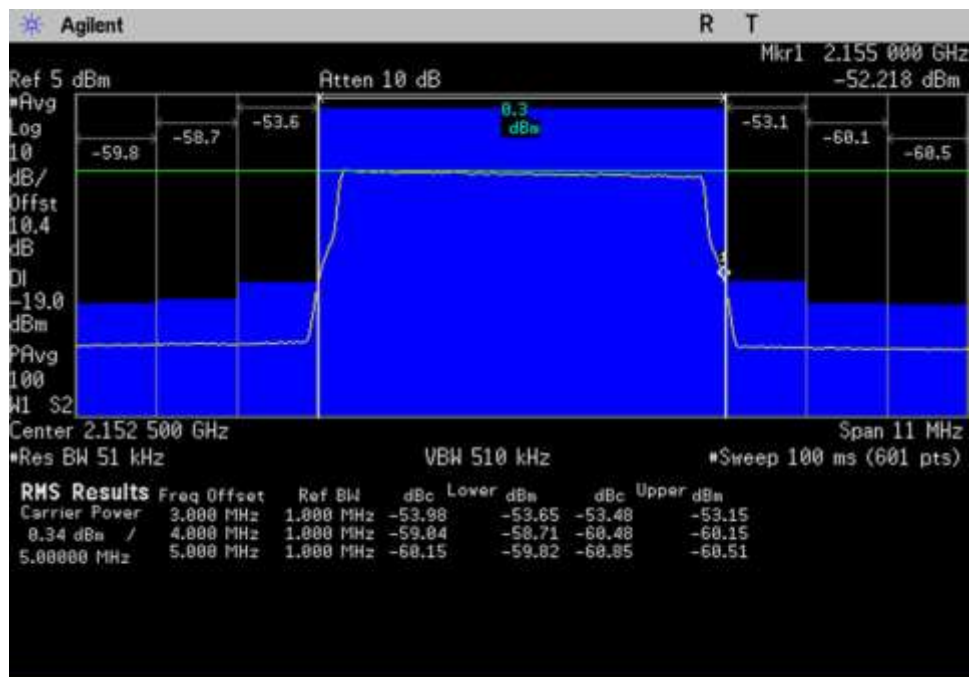
DL_1930-1995_LTE_1927-1938MHz



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 #: **102180** Date 01/15/2019
 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: 20.6°C, 57.2% relative humidity, Pressure: 102.3kPa

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 v04r02, 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
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020

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).

<u>Limit Line Calculation*</u>				
Frequency (MHz)	Antenna Gain- cable loss (dBi)	Limit line EIRP (dBW/MHz)	Limit line EIRP (dBm)	Limit line EIRP corrected (dBm)
UL 776-787	-0.5	-70.0	-40	-40.5

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

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

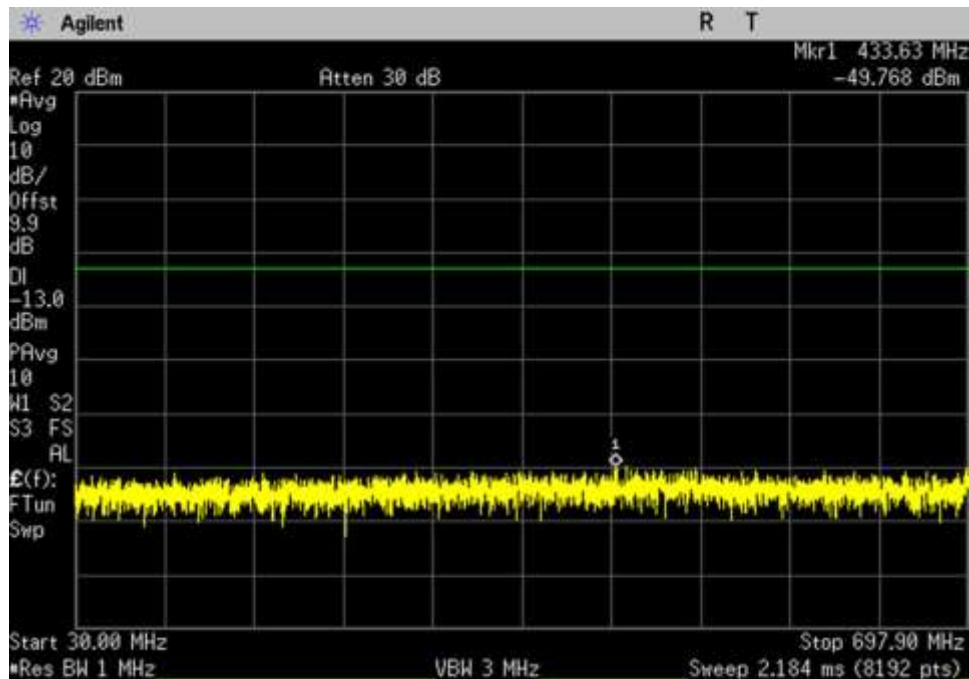
$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

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

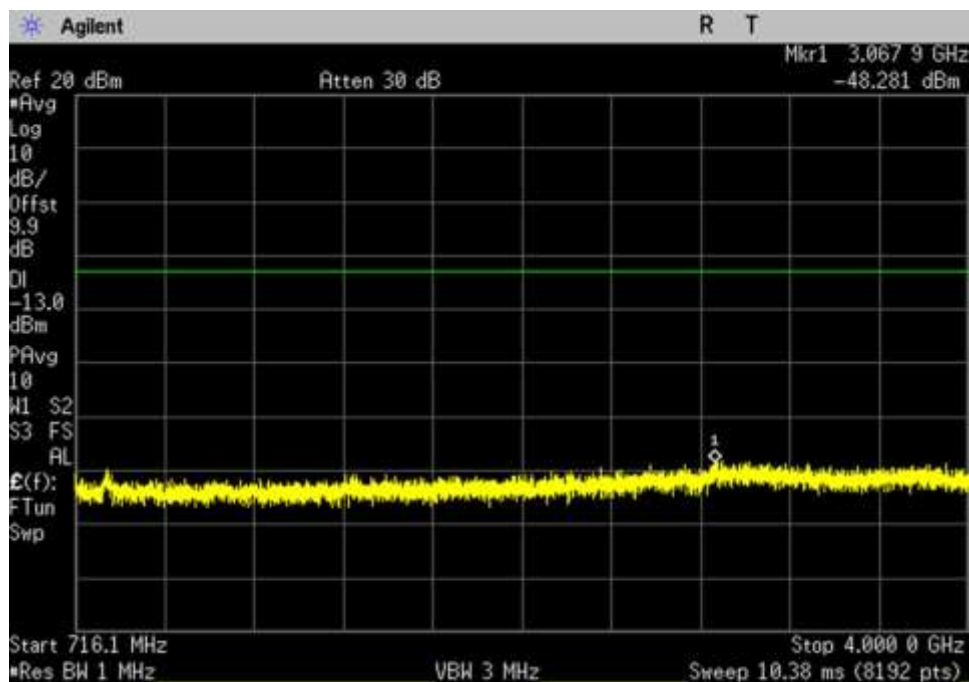
$$\begin{aligned} \text{Attenuation} &= 43 + 10 \log P \\ &= 43 + 10 \log \frac{V^2}{R} \\ &= 43 + 10 (\log V^2 - \log R) \\ &= 43 + 10 (2 \log V - \log R) \\ &= 43 + 20 \log V - 10 \log R \end{aligned}$$

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

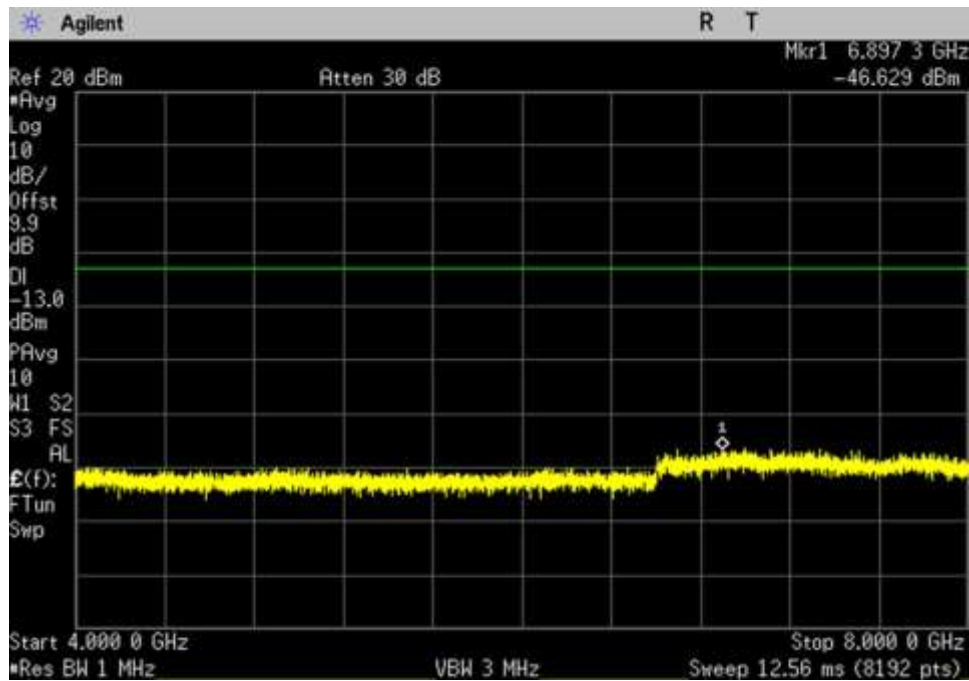
Plots



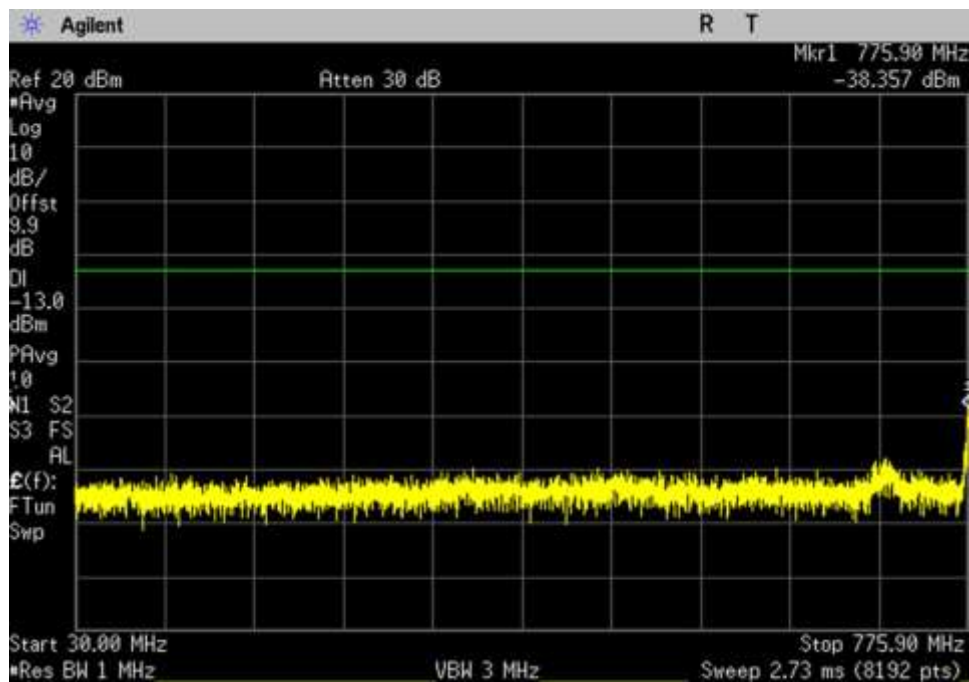
UL_698-716_30- 697.9MHz



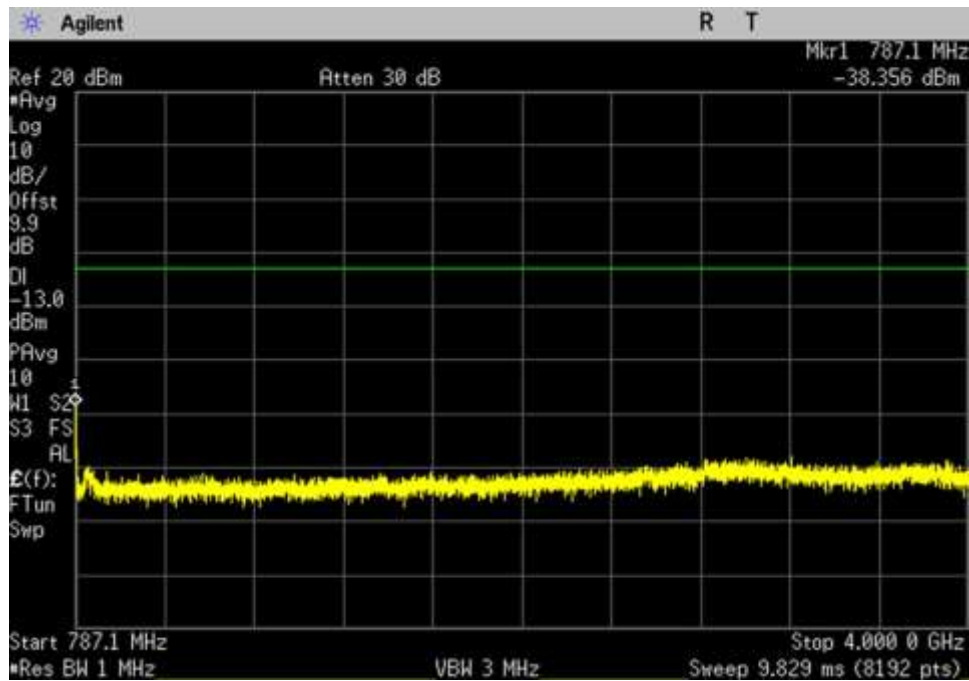
UL_698-716_716.1- 4000MHz



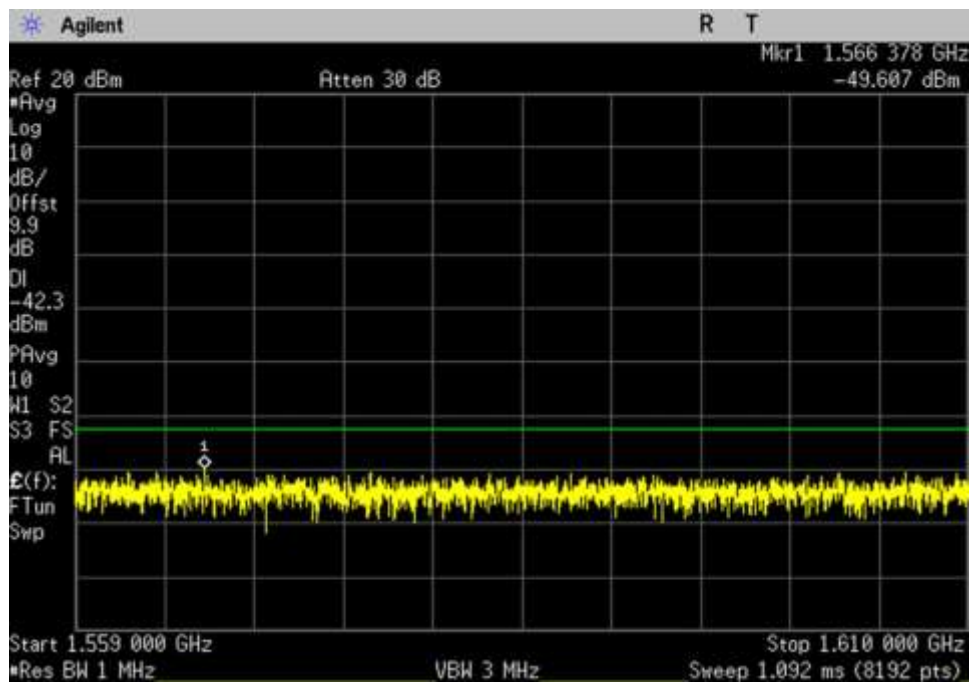
UL_698-716_ 4000- 8000MHz



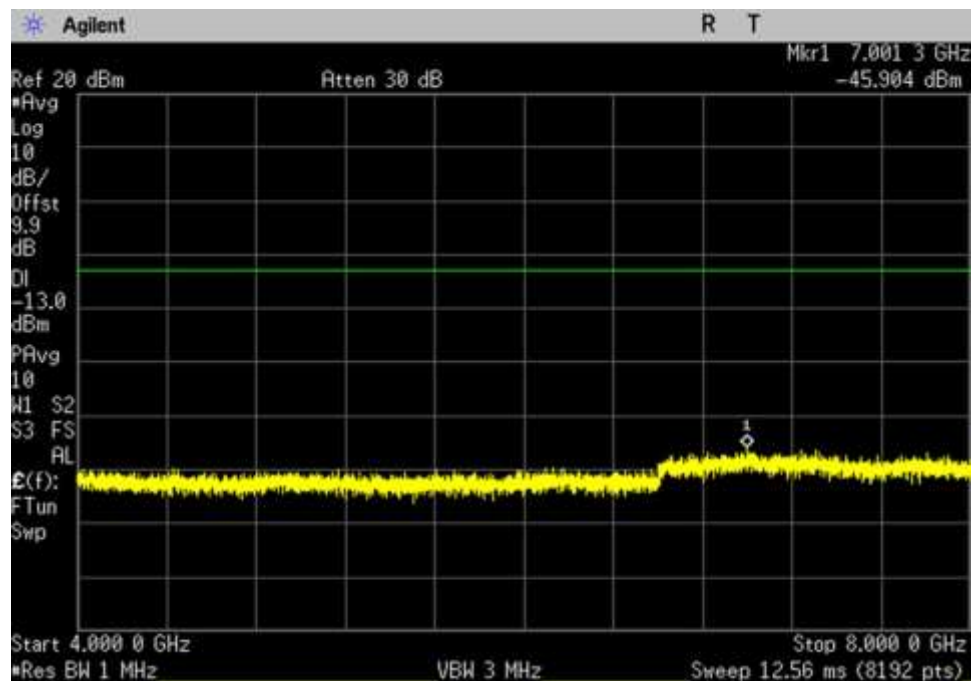
UL_776-787_ 30- 775.9MHz



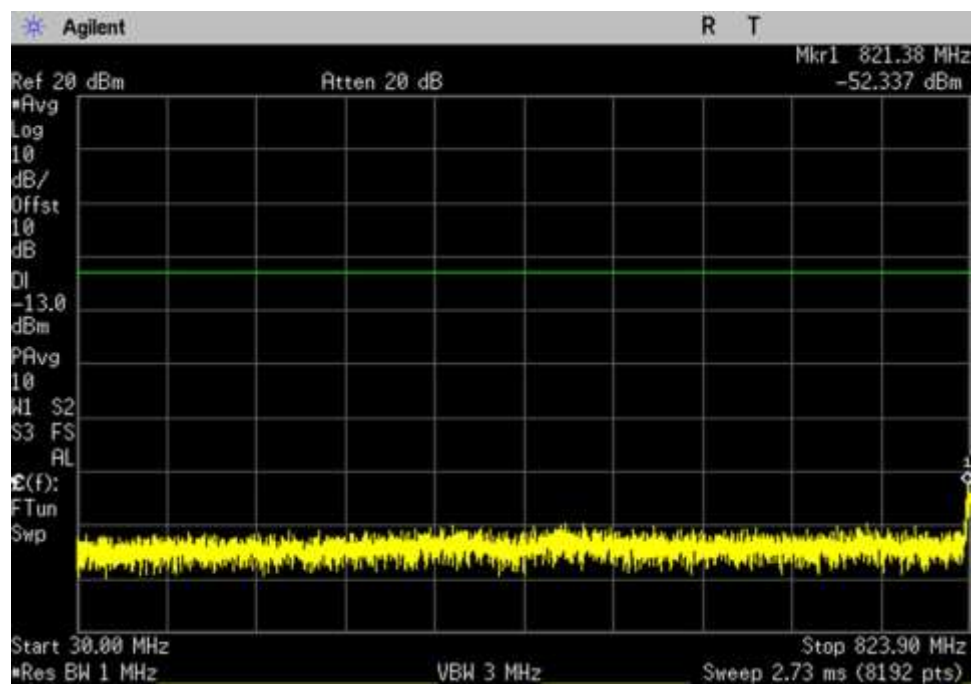
UL_776-787_ 787.1- 4000MHz



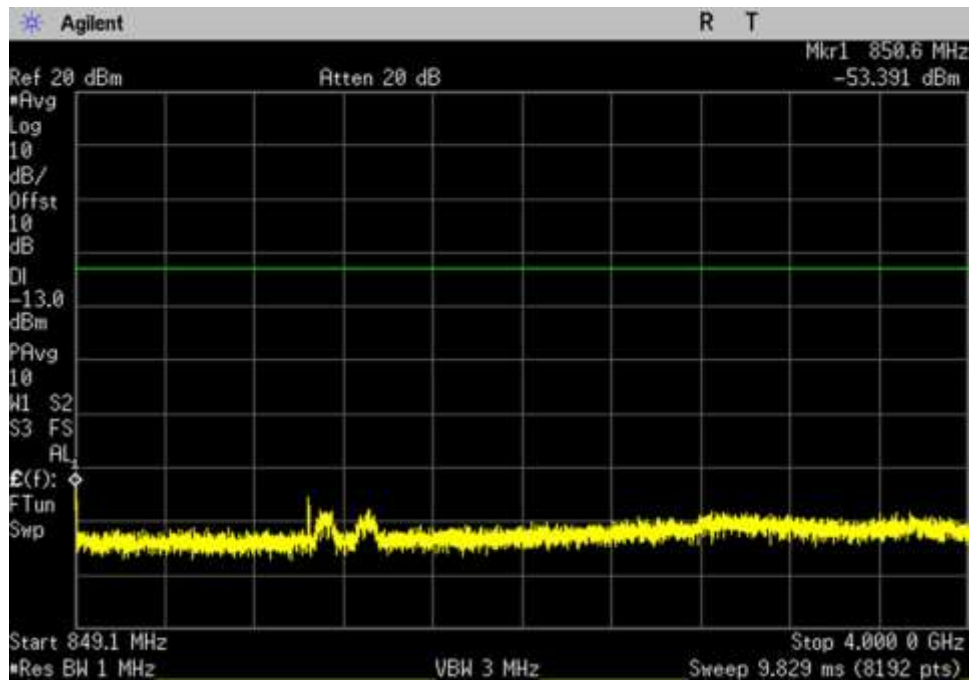
UL_776-787_ 1559- 1610MHz



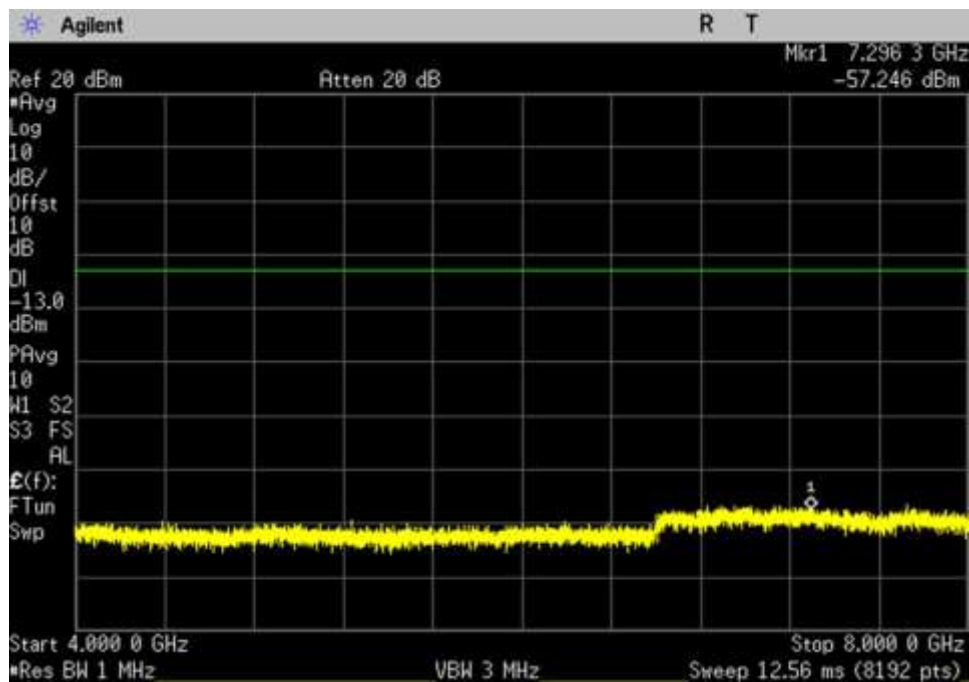
UL_776-787_ 4000- 8000MHz



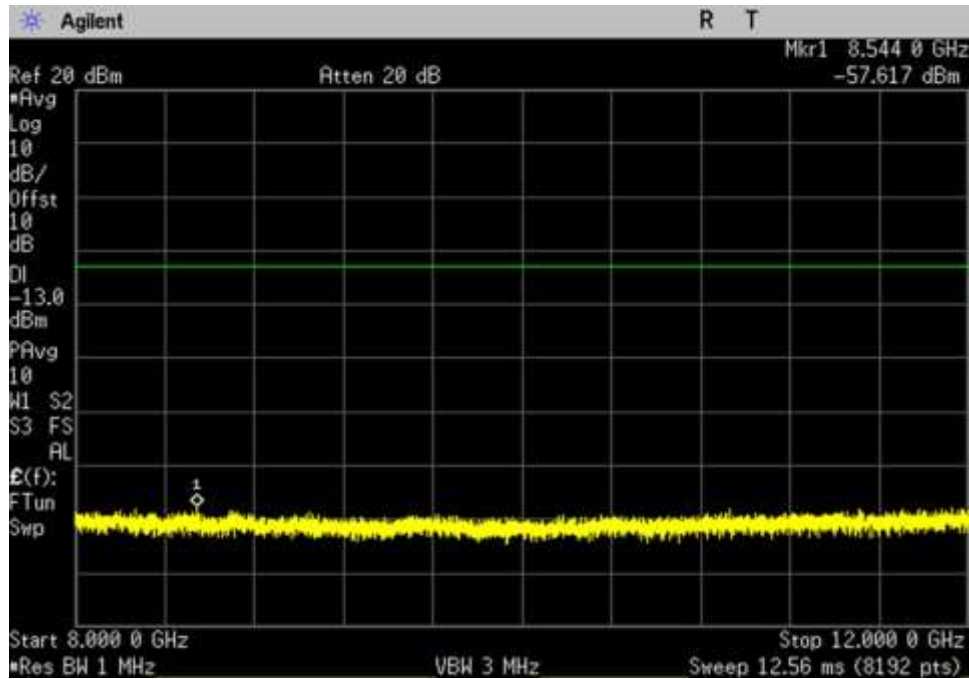
UL_824-849_ 30- 823.9MHz



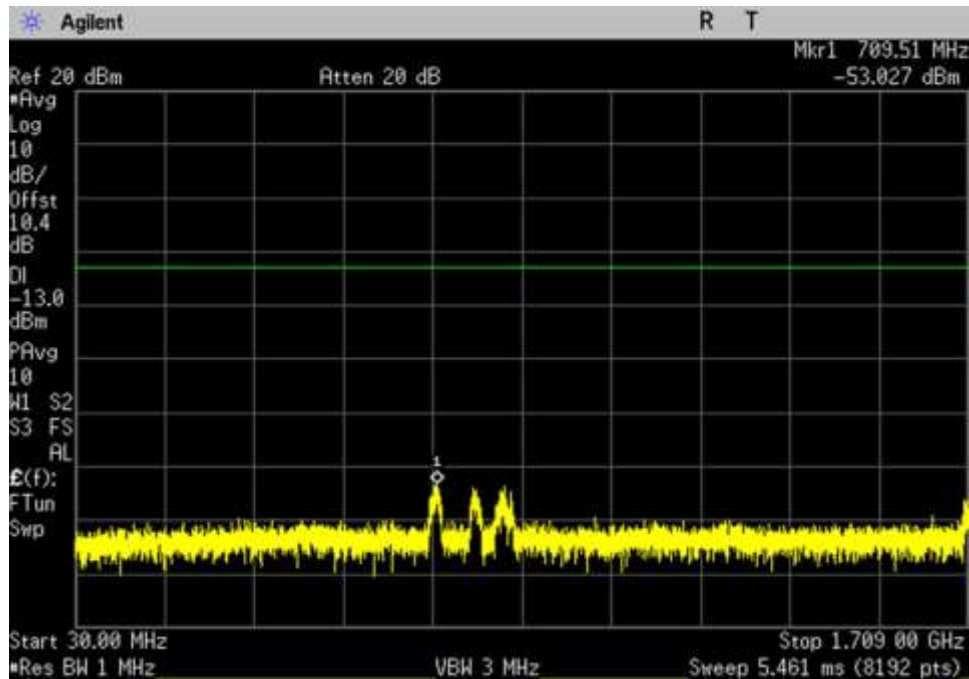
UL_824-849_ 849.1- 4000MHz



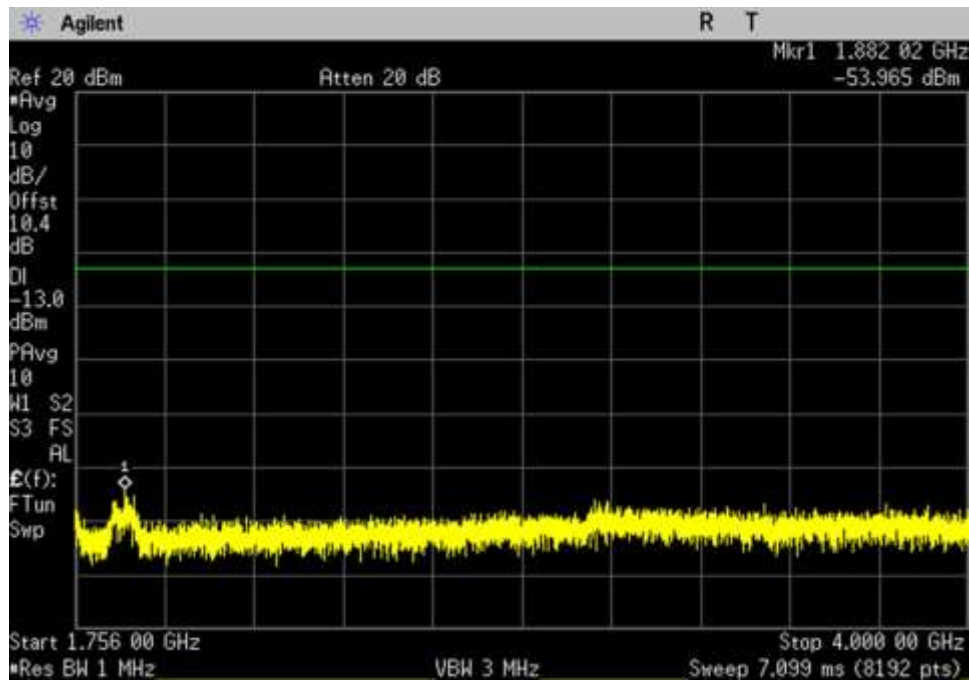
UL_824-849_ 4000- 8000MHz



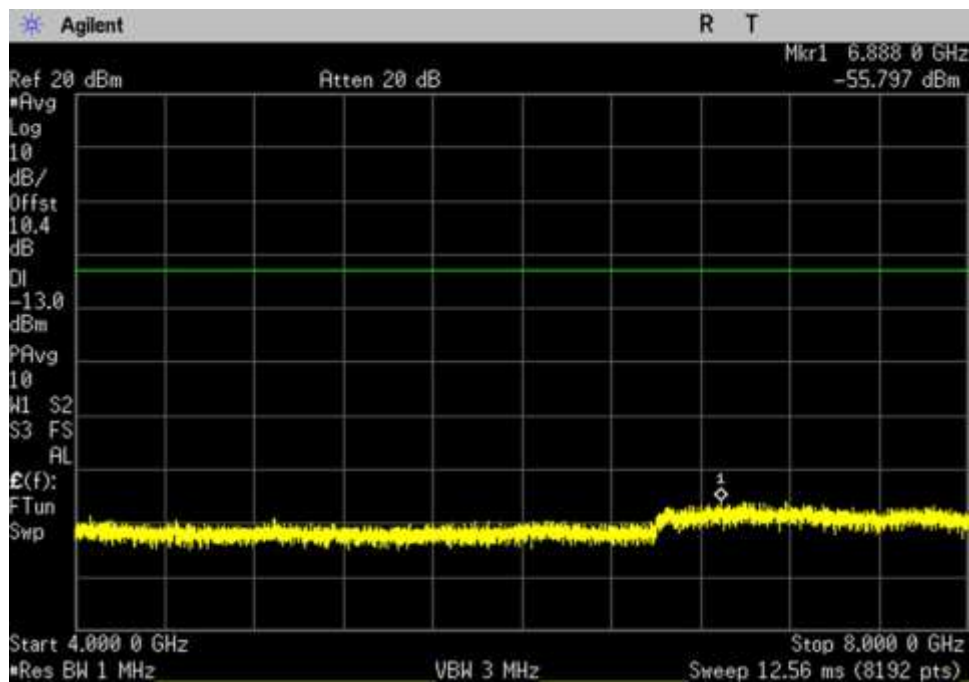
UL_824-849_ 8000- 12000MHz



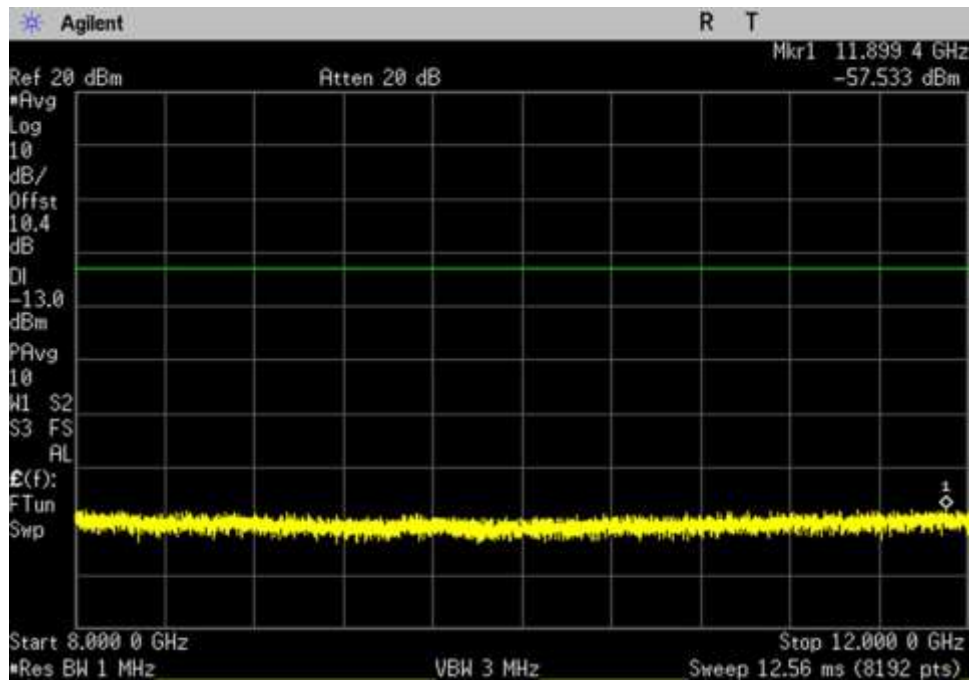
UL_1710-1755_ 30- 1709MHz



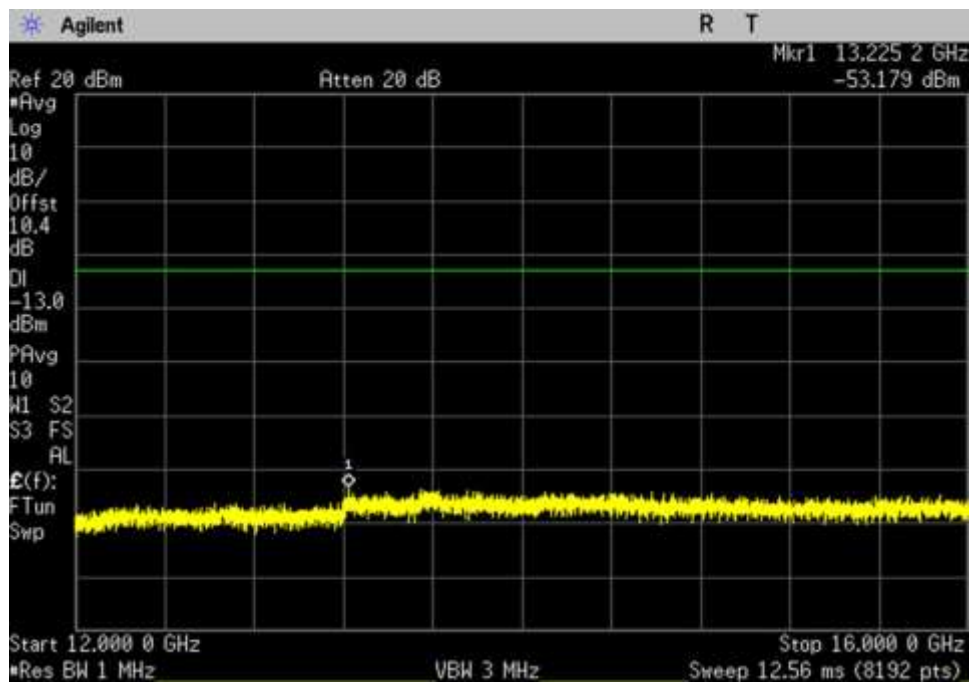
UL_1710-1755_ 1756- 4000MHz



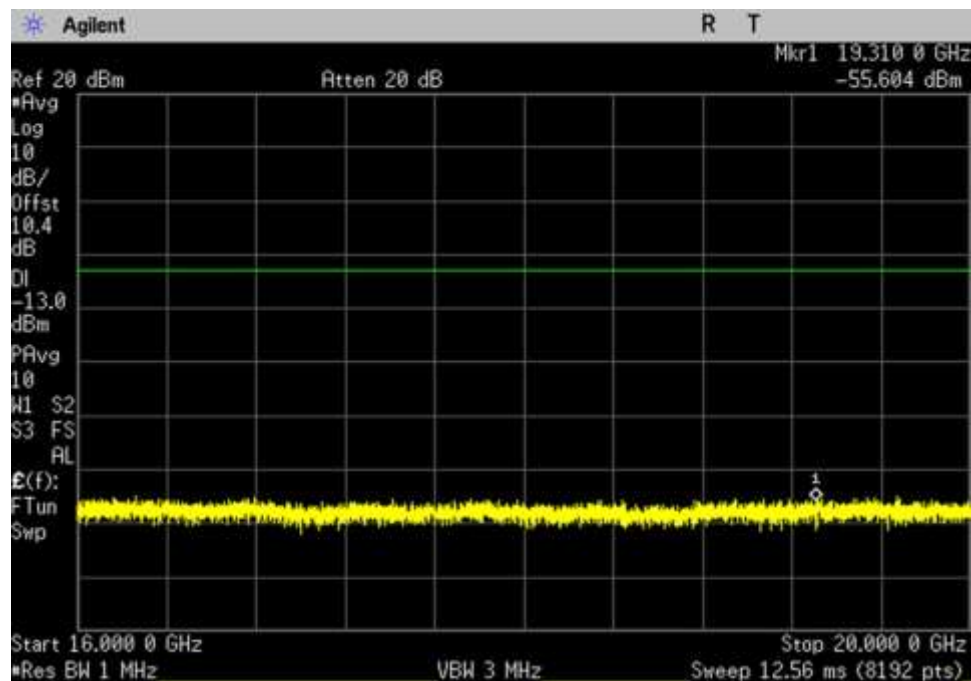
UL_1710-1755_ 4000- 8000MHz



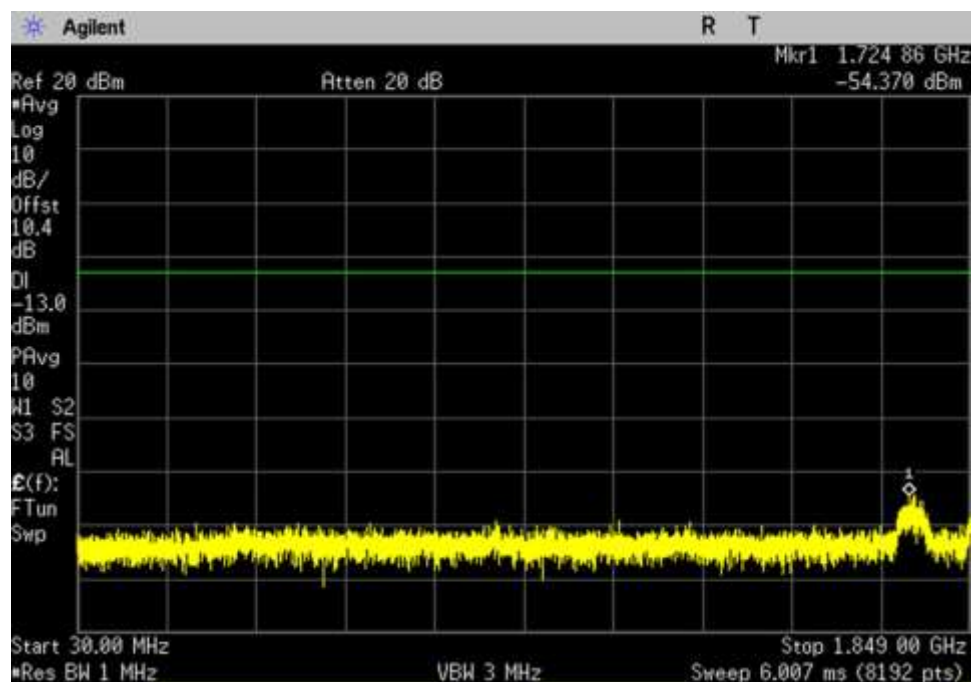
UL_1710-1755_ 8000- 12000MHz



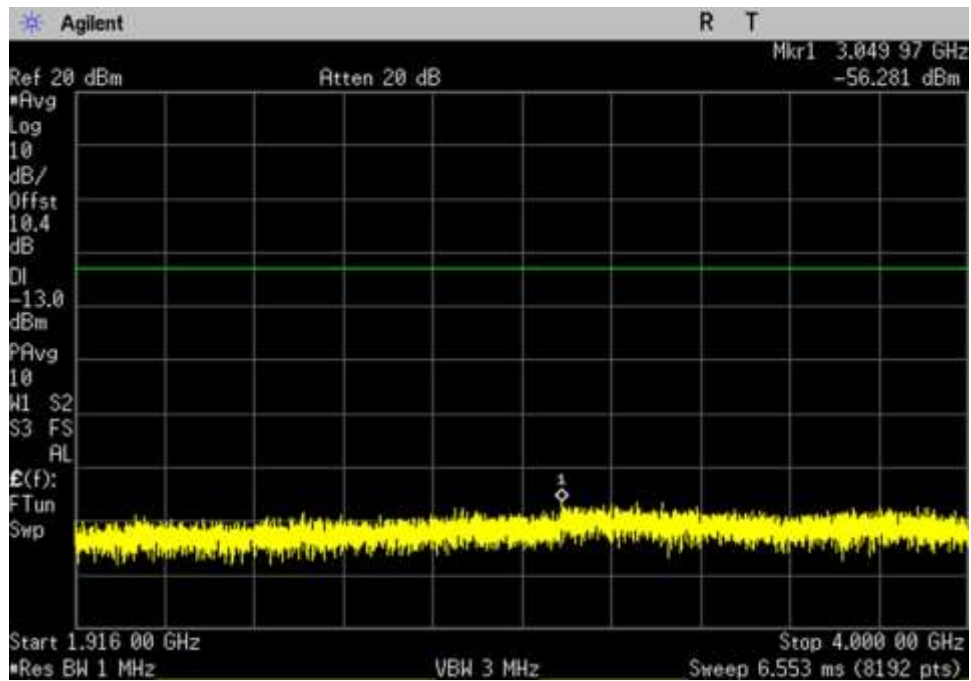
UL_1710-1755_ 12000- 16000MHz



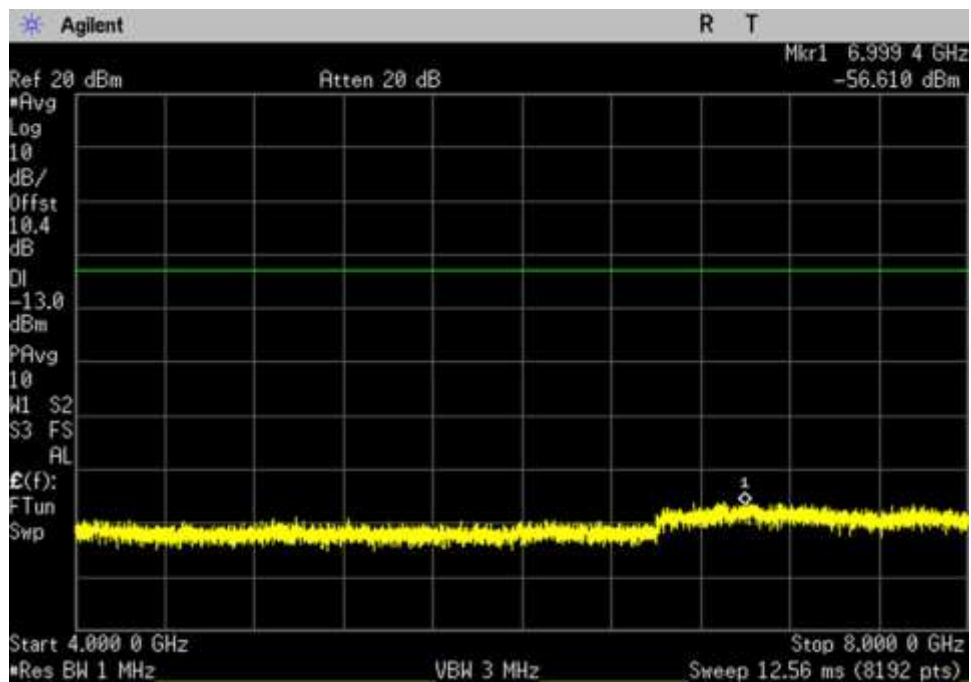
UL_1710-1755_ 16000- 20000MHz



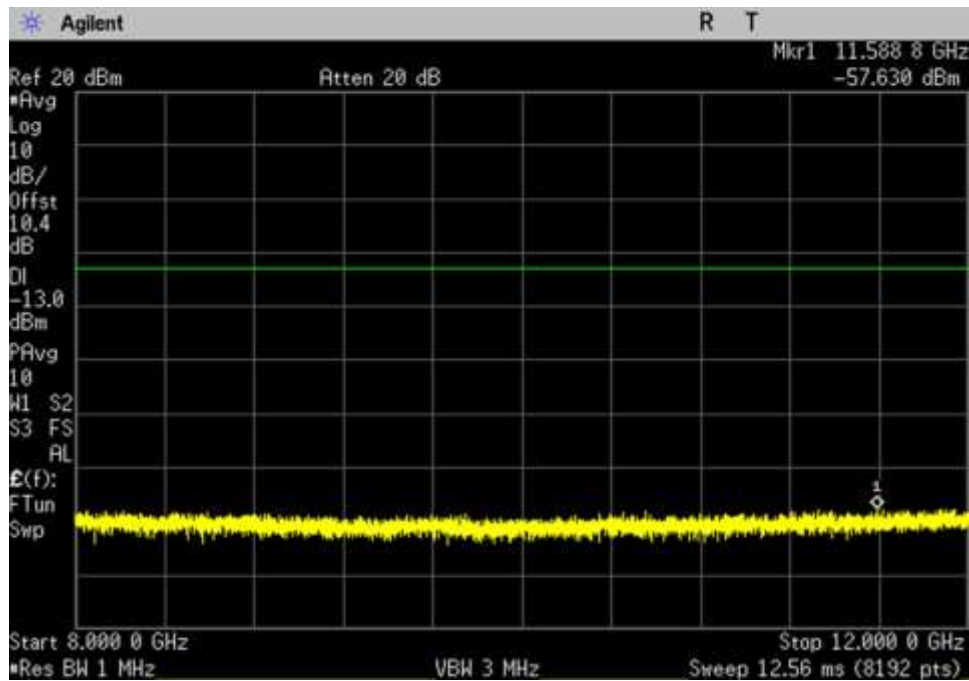
UL_1850-1915_ 30- 1849MHz



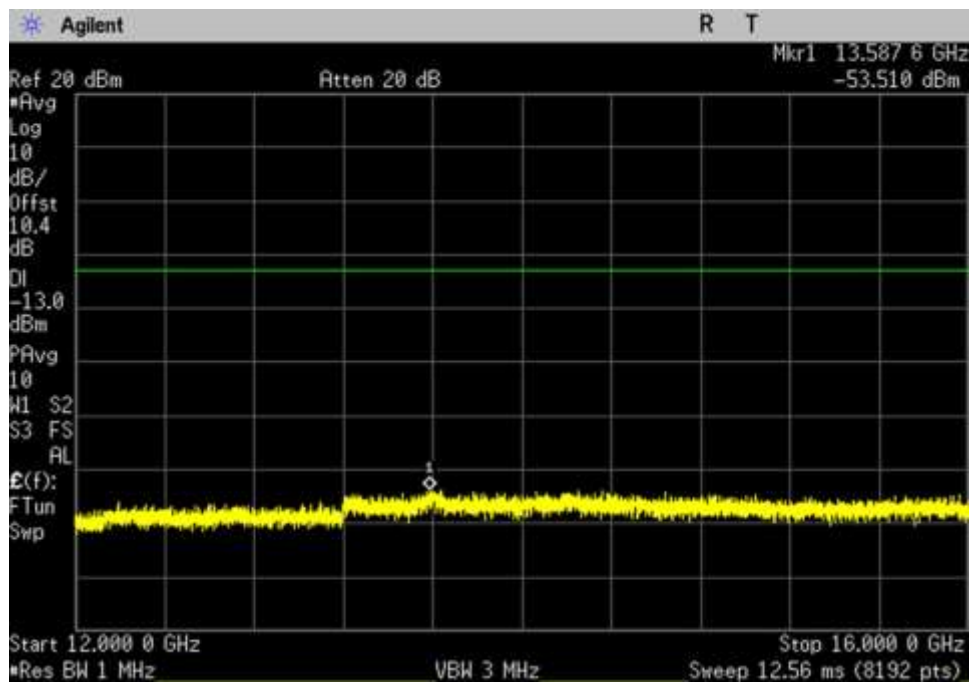
UL_1850-1915_ 1916- 4000MHz



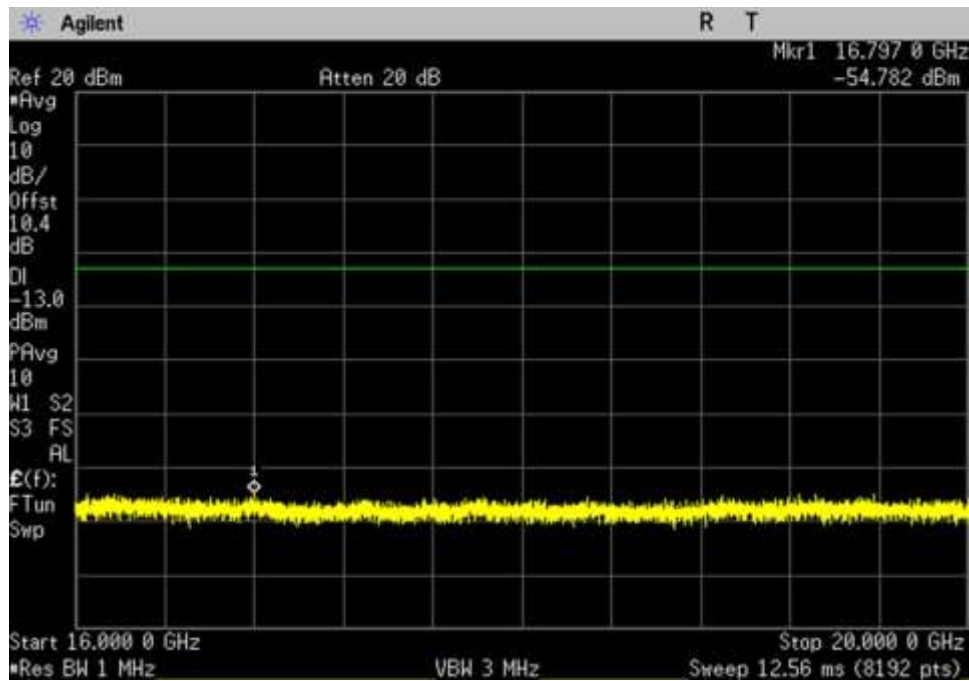
UL_1850-1915_ 4000- 8000MHz



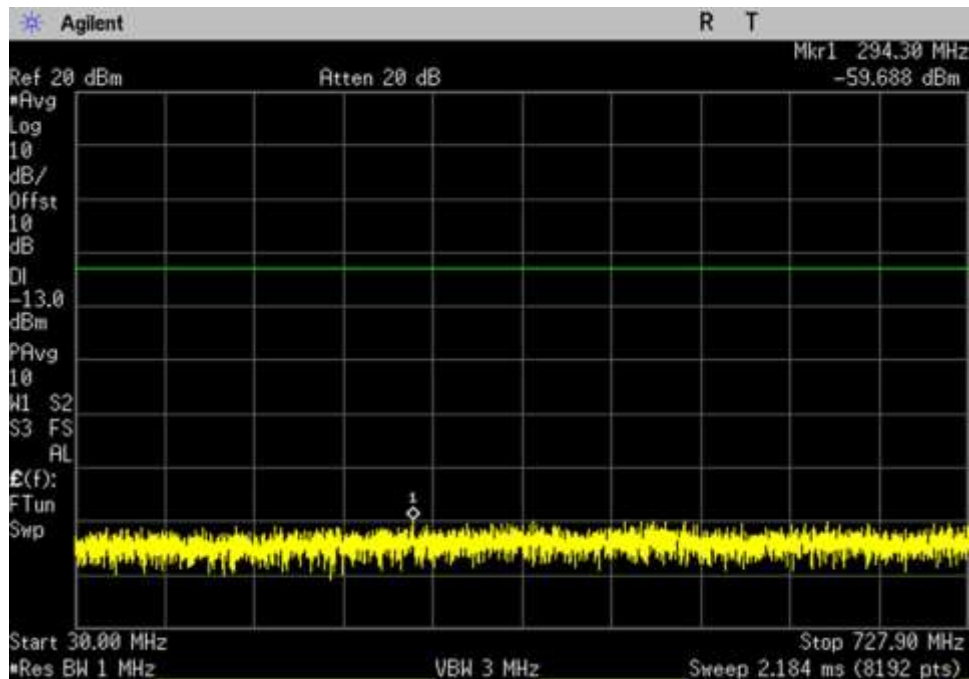
UL_1850-1915_ 8000- 12000MHz



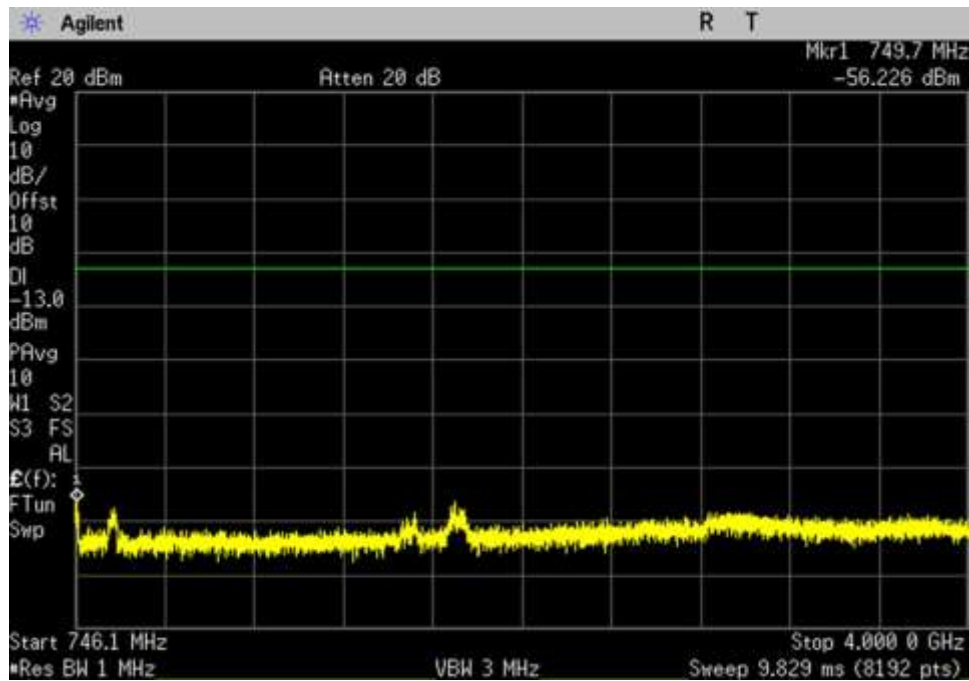
UL_1850-1915_ 12000- 16000MHz



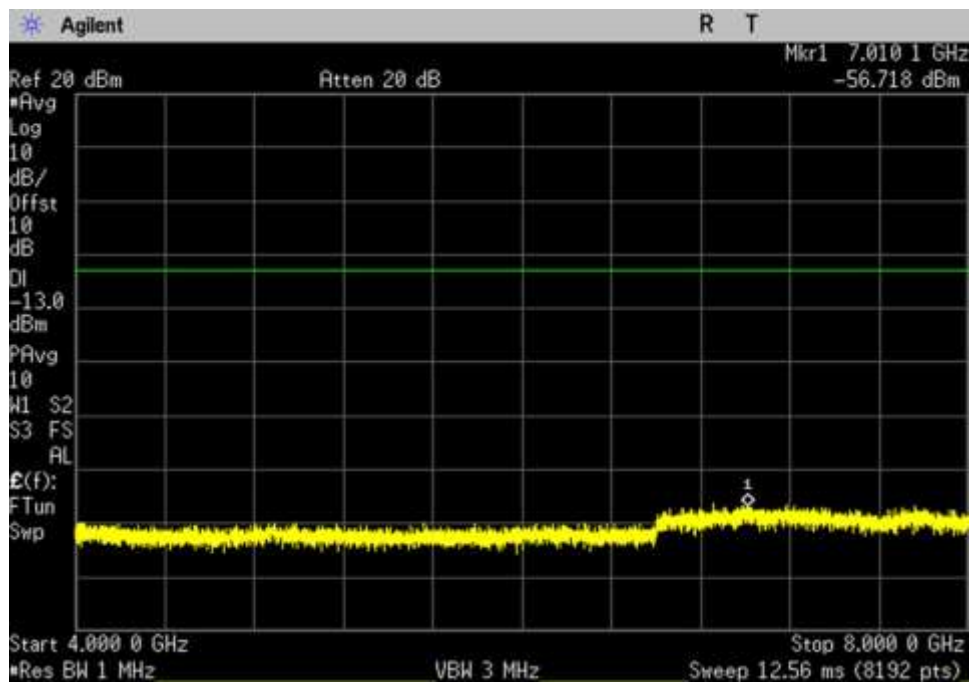
UL_1850-1915_ 16000- 20000MHz



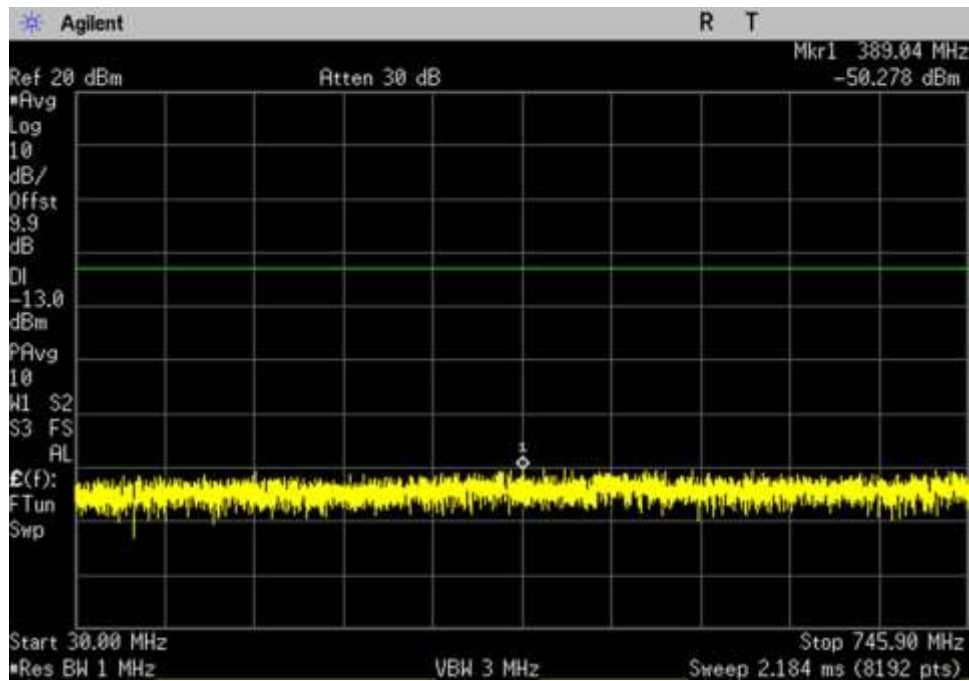
DL_728-746_ 30- 727.9MHz



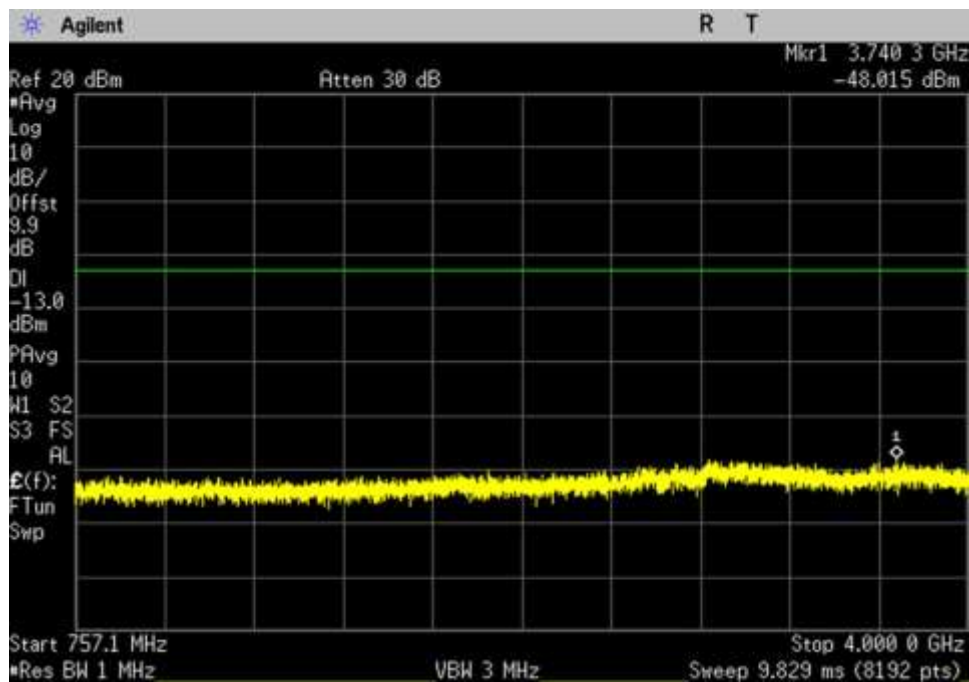
DL_728-746_ 746.1- 4000MHz



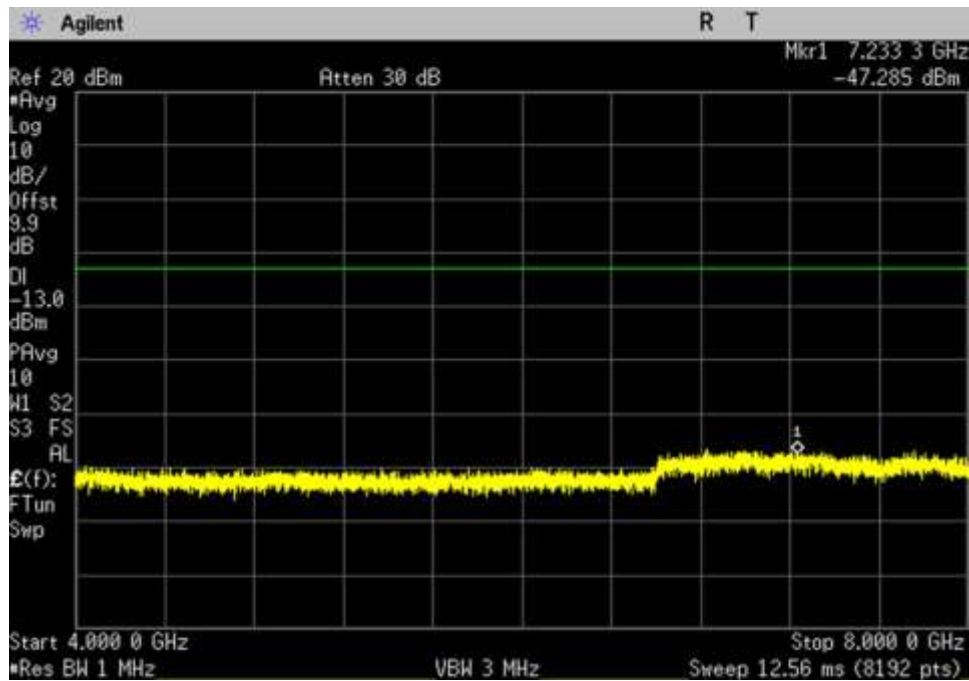
DL_728-746_ 4000- 8000MHz



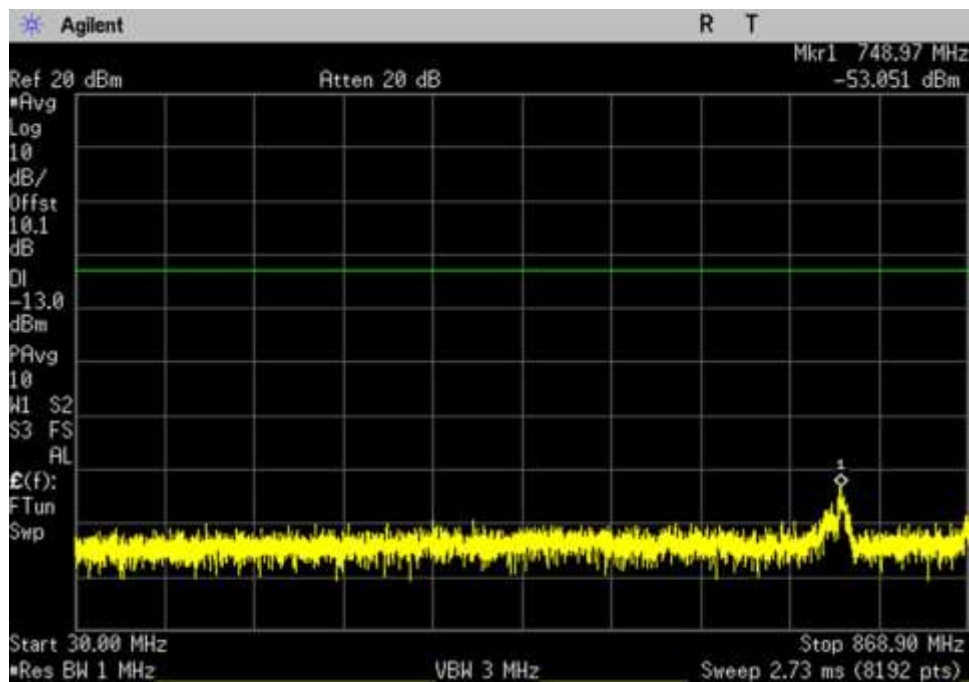
DL_746-757_ 30- 745.9MHz



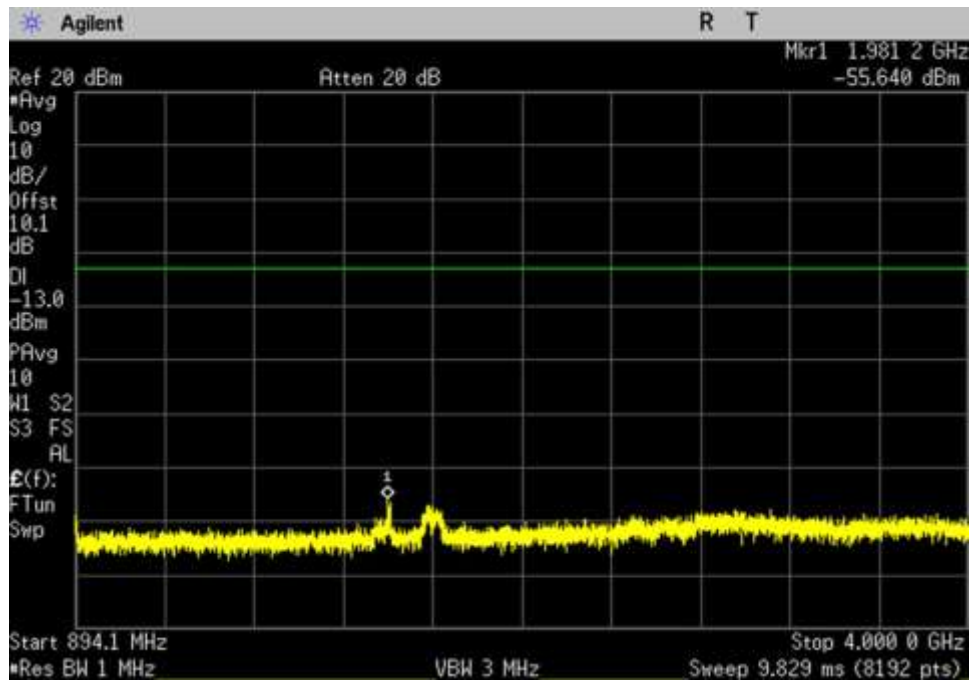
DL_746-757_ 757.1- 4000MHz



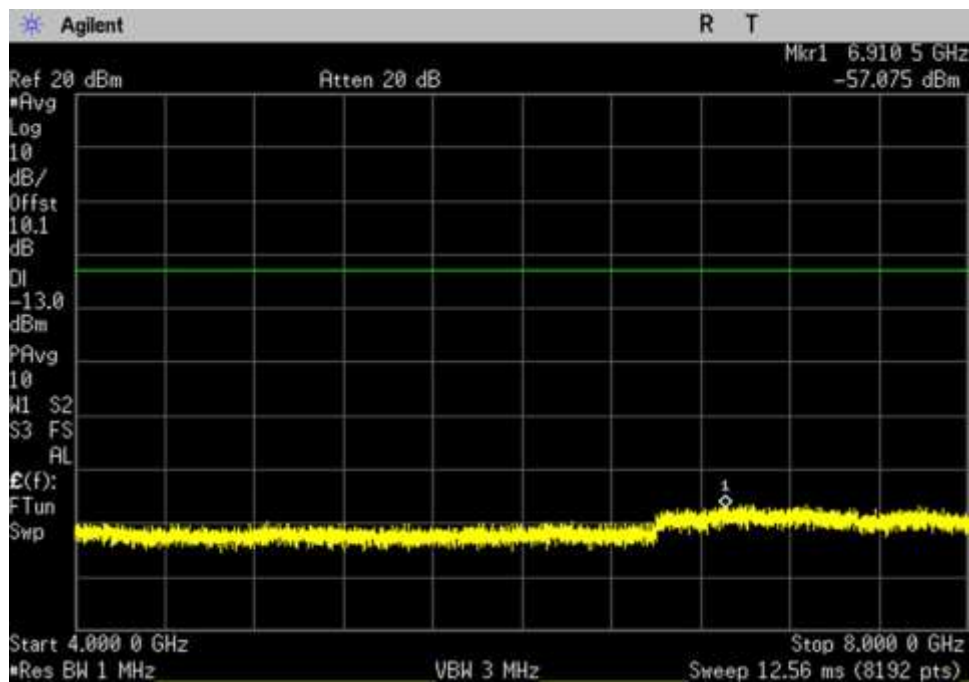
DL_746-757_ 4000- 8000MHz



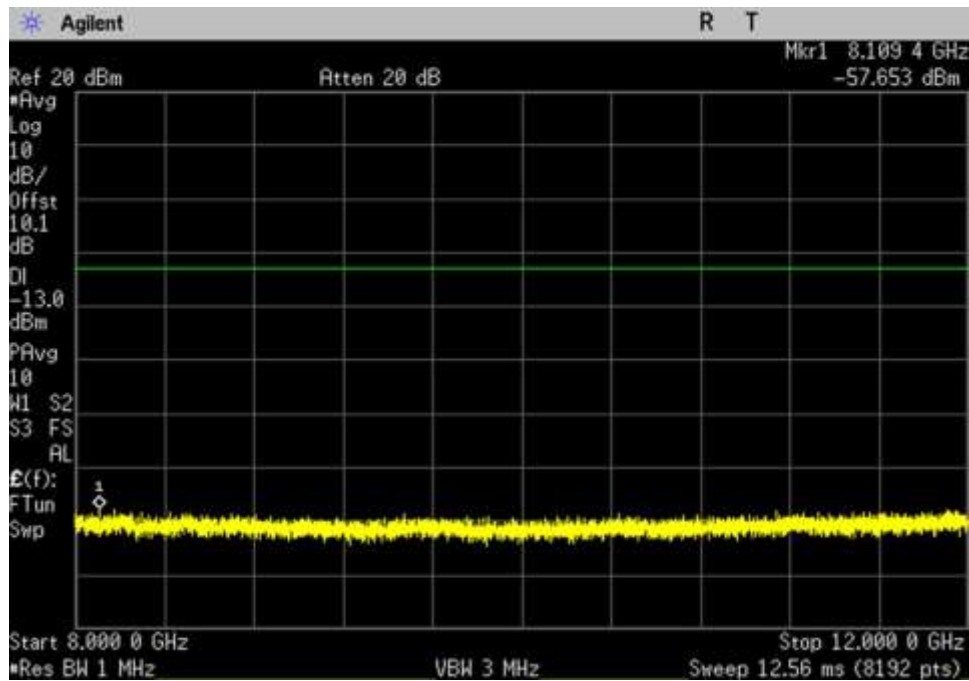
DL_869-894_ 30- 868.9MHz



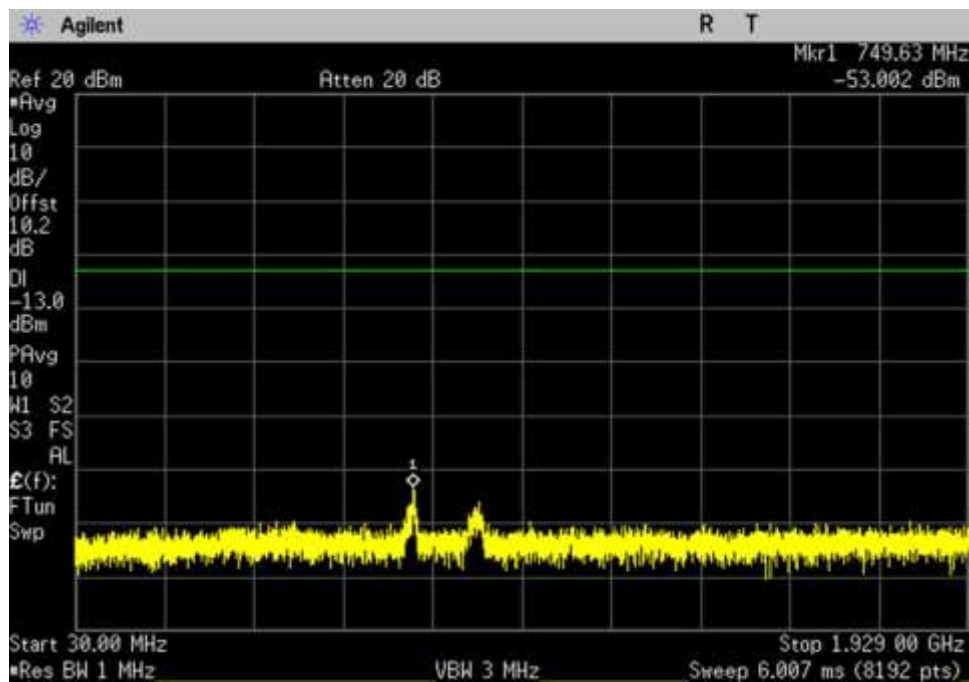
DL_869-894_ 894.1- 4000MHz



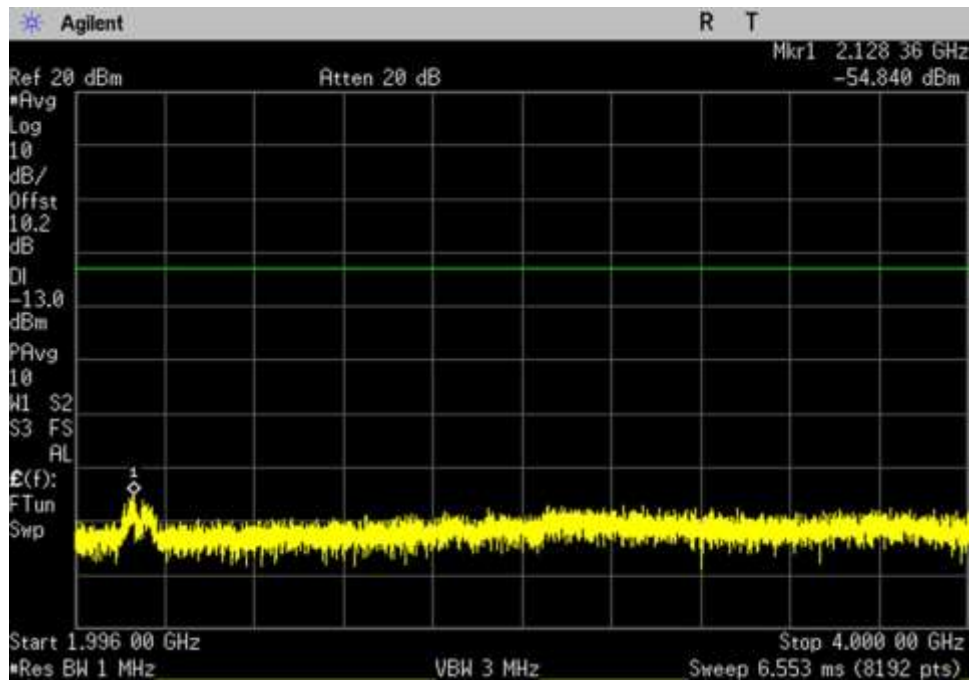
DL_869-894_ 4000- 8000MHz



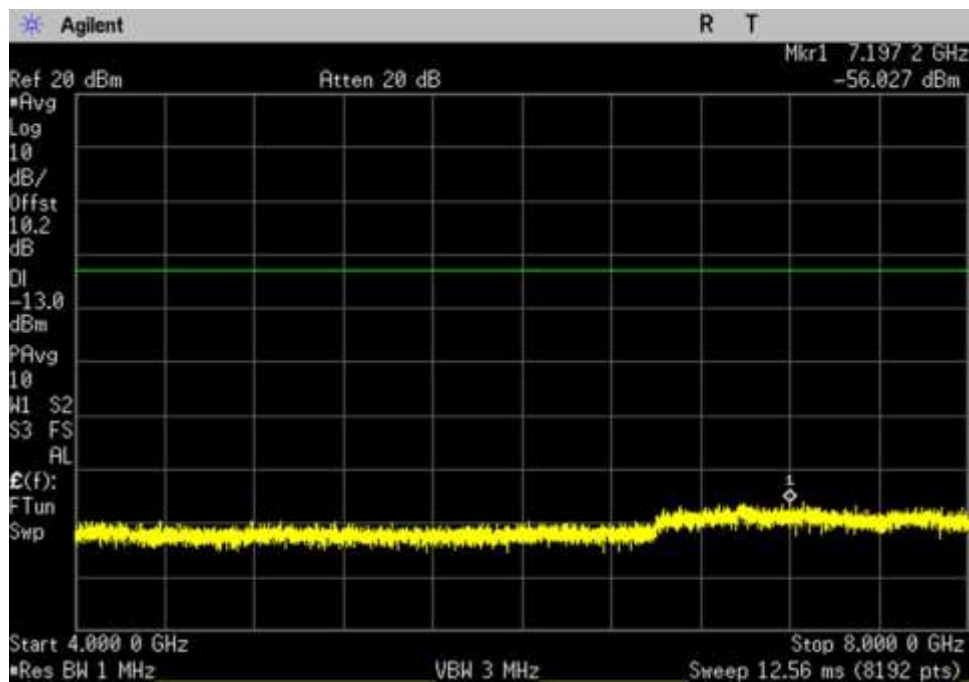
DL_869-894_ 8000- 12000MHz



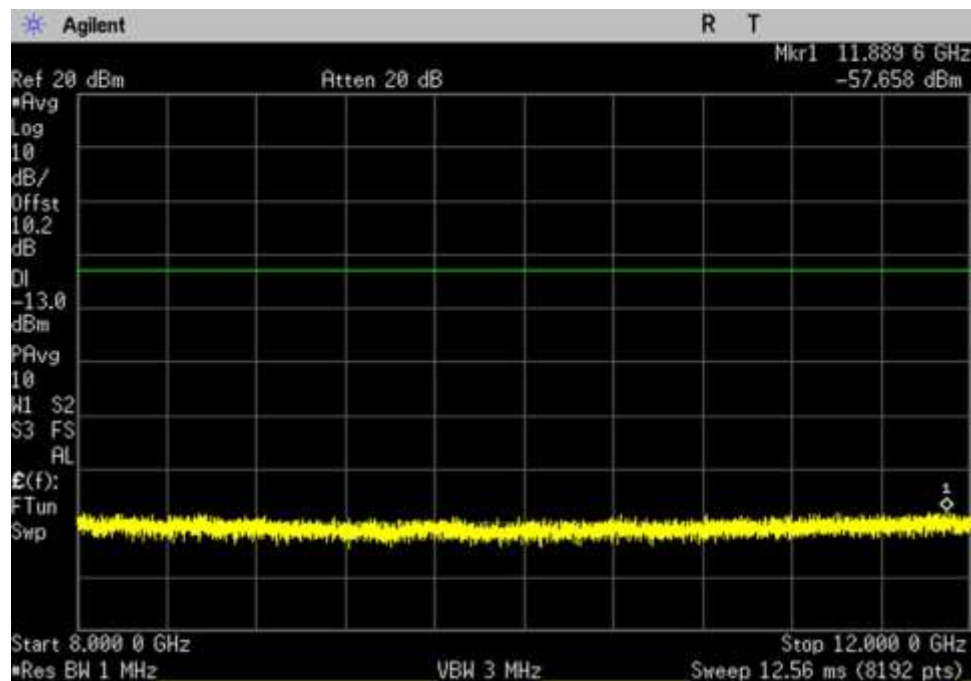
DL_1930-1995_ 30- 1929MHz



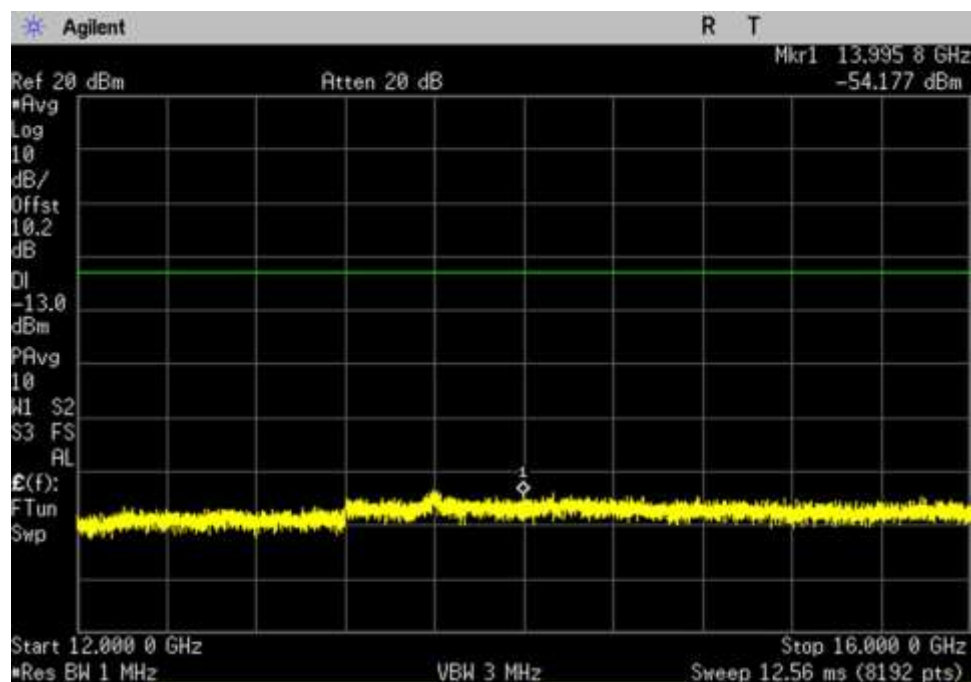
DL_1930-1995_ 1996- 4000MHz



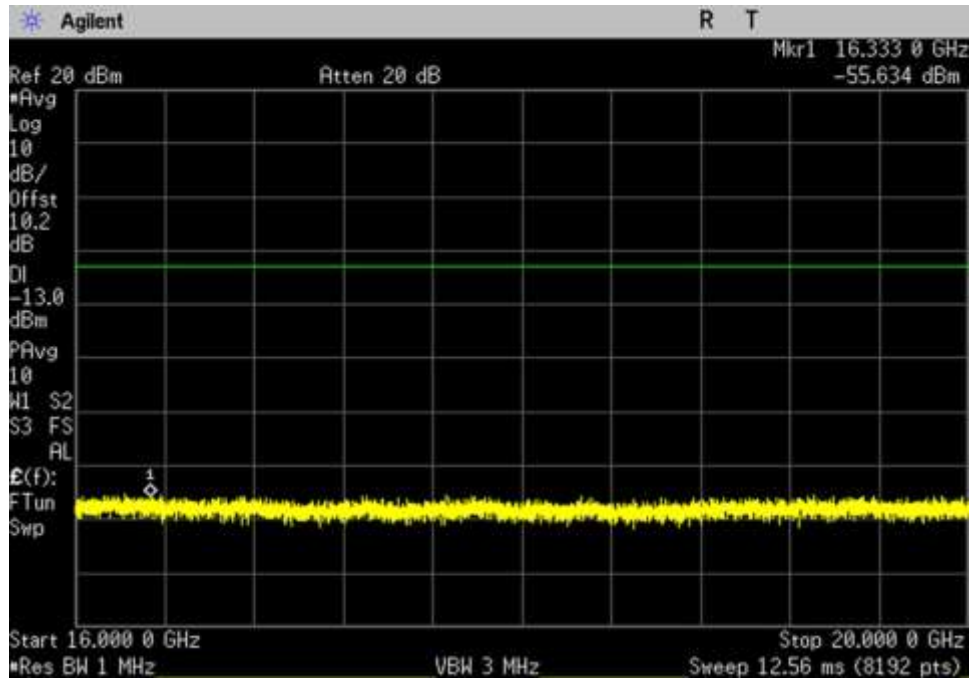
DL_1930-1995_ 4000- 8000MHz



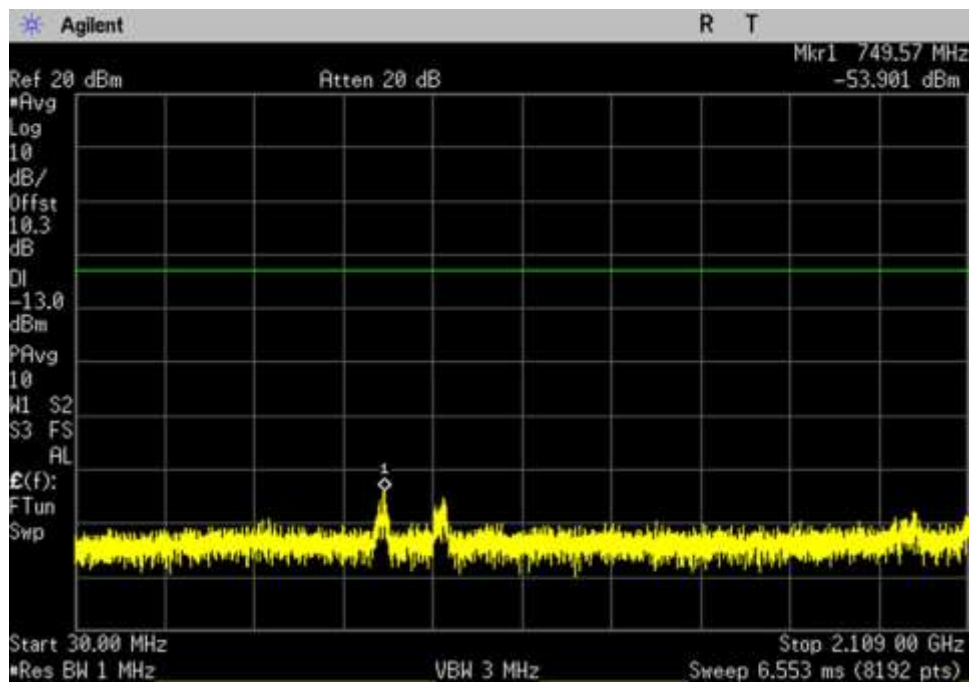
DL_1930-1995_ 8000- 12000MHz



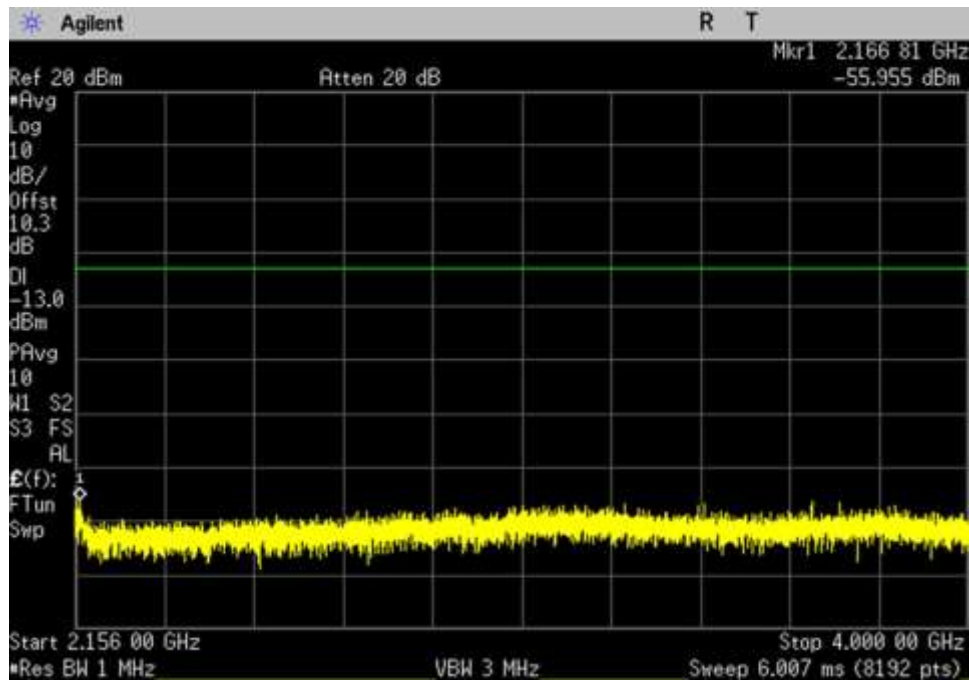
DL_1930-1995_ 12000- 16000MHz



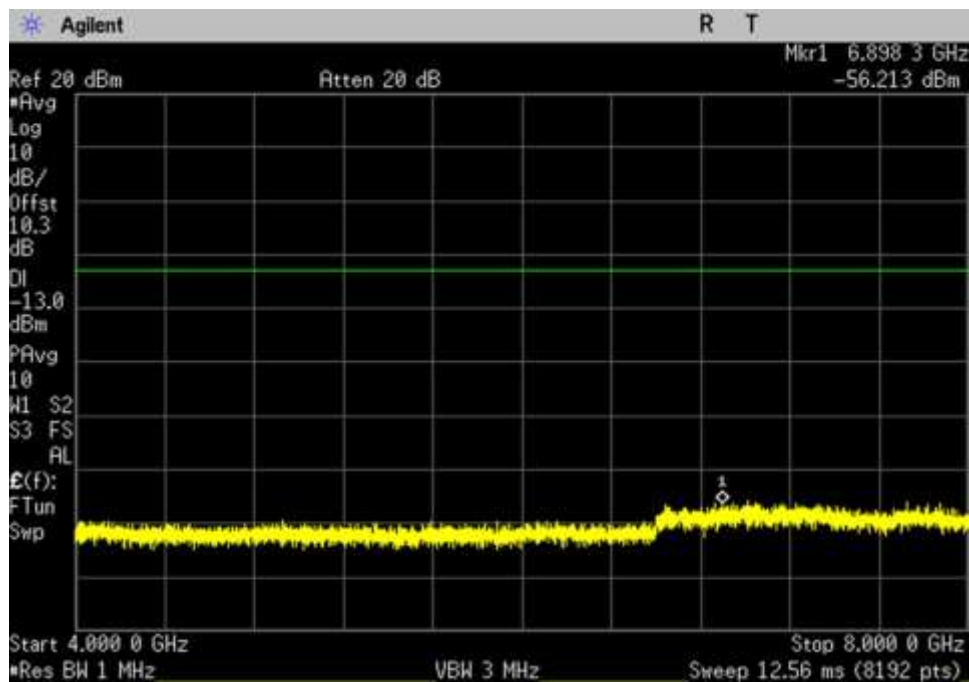
DL_1930-1995_ 16000- 20000MHz



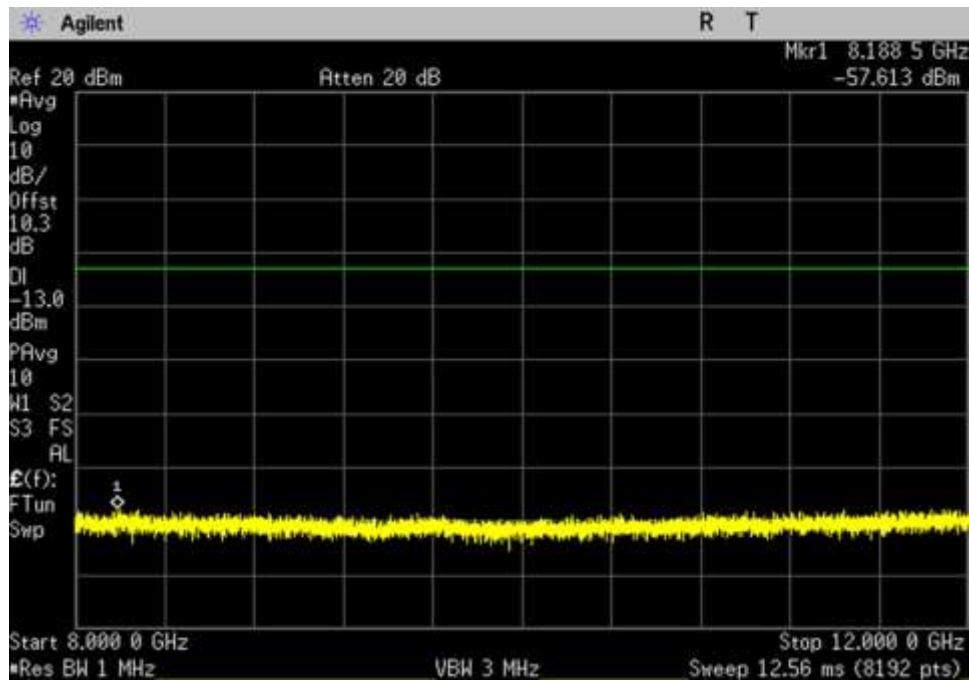
DL_2110-2155_ 30- 2109MHz



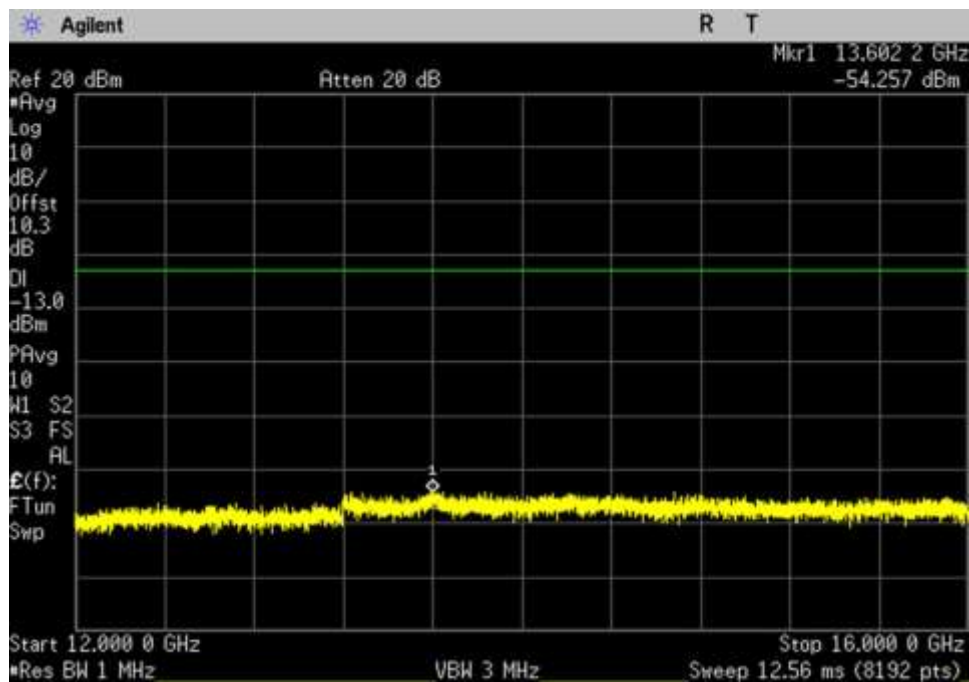
DL_2110-2155_ 2156- 4000MHz



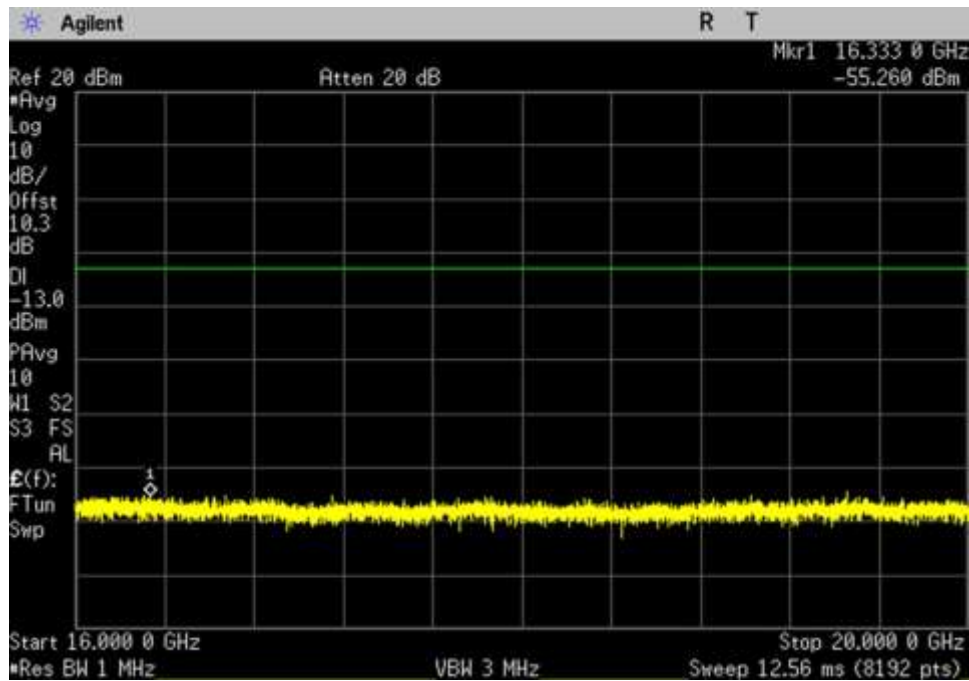
DL_2110-2155_ 4000- 8000MHz



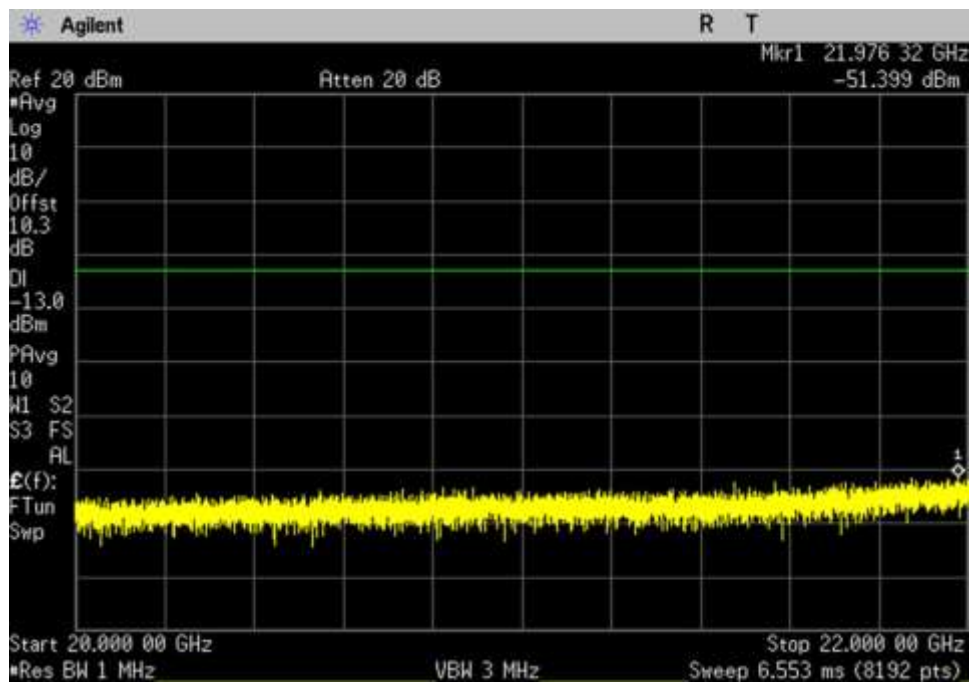
DL_2110-2155_ 8000- 12000MHz



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 #: **102180** Date: 01/28/2019
 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: 20.5°C, 38% relative humidity, Pressure: 102.2kPa

Modification #1 was in place during testing.

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
03471	Spectrum Analyzer	Agilent	E4440A	1/18/2018	1/18/2020
C00082	Directional Coupler	MECA Electronics, Inc.	722-10-1.500V	9/18/2017	9/18/2019