

Cellphone-Mate, Inc.

ADDENDUM TO EMC TEST REPORT 97222-8

**Mobile Wideband Consumer Booster
Model: Fusion2go**

Tested To The Following Standards:

FCC Part 27

Report No.: 97222-8A

Date of issue: August 5, 2015



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	3
Test Report Information	3
Revision History	3
Report Authorization	3
Test Facility Information	4
Software Versions	4
Site Registration & Accreditation Information	4
Summary of Results	5
Modifications During Testing	5
Conditions During Testing	5
Equipment Under Test	6
FCC Part(s) 2 / 27	7
2.1049 Occupied Bandwidth	7
2.1051 / 27.53(f) Spurious Emissions at Antenna Terminals	33
Summary of Results	35
2.1053 / 27.53(c)(f)(g)(h) Field Strength of Spurious Radiation	61
Summary of Results	63
2.1055 Frequency Stability	66

ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Dennis Findley
Customer Reference Number: SC20150623

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

Morgan Tramontin
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 97222

June 26, 2015

June 26, 27, & July 20, 2015

Revision History

Original: Testing of the Mobile Wideband Consumer Booster, Fusion2go to FCC Part 27.

Addendum A: To add a statement that clarifies the lowest frequency of measurement to section 2.1051 / 27.53(f) Spurious Emissions at Antenna Terminals.

Report Authorization

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

A handwritten signature in black ink, appearing to read "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	5.02.00
EMITest Immunity	5.02.00

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Fremont	US0082	SL2-IN-E-1148R	3082B-1	958979	A-0149

SUMMARY OF RESULTS

Standard / Specification: FCC Part(s) 2 / 27

Test Procedure	Description	Modifications*	Results
2.1046	RF Power Output	NA	NA ¹
2.1047	Modulation Characteristics	NA	NA ¹
2.1049	Occupied Bandwidth	NA	Pass
2.1051 / 27.53(f)	Spurious Emissions at Antenna Terminals	NA	Pass
2.1053 / 27.53(c)(f)(g)(h)	Field Strength of Spurious Radiation	NA	Pass
2.1055	Frequency Stability	NA	NA ²

NA = Not Applicable

NA¹ = A different standard applies; see applicable test report.

NA² = Not applicable. See the section in the report for the reason.

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
Mobile Wideband Consumer Booster	Cellphone-Mate, Inc.	Fusion2go	1

Support Equipment:

Device	Manufacturer	Model #	S/N
Switching Power Adapter	SureCall	GFP451DA-1238-1	1406-0000611
Signal Generator	Agilent	E4438C	MY42082260
Signal Generator	Agilent	E4433B	US40052164

FCC PART(S) 2 / 27

2.1049 Occupied Bandwidth

Test Equipment

Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
ANP05713	Attenuator	PE7015-20	Pasternack	03/24/2015	03/24/2017
ANP06710	Cable	32026-29094K-29094K-72TC	AstroLab	09/18/2014	09/18/2016
AN02869	Spectrum Analyzer	E4440A	Agilent	07/10/2014	07/10/2015

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: Cellphone-Mate, Inc.
 Specification: **Occupied Bandwidth**
 Work Order #: **97222** Date: 6/26/2015
 Test Type: **Conducted Emissions** Time: 16:34:39
 Tested By: Daniel Bertran Sequence#: 1
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Configuration 1
 The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
 The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.

 Part 27
 UL: 1710-1755MHz, 698-716MHz, 776-787MHz
 DL: 2110-2155MHz, 728-746MHz, 746-757MHz

 All adjustable settings on the test sample are set at max gain.

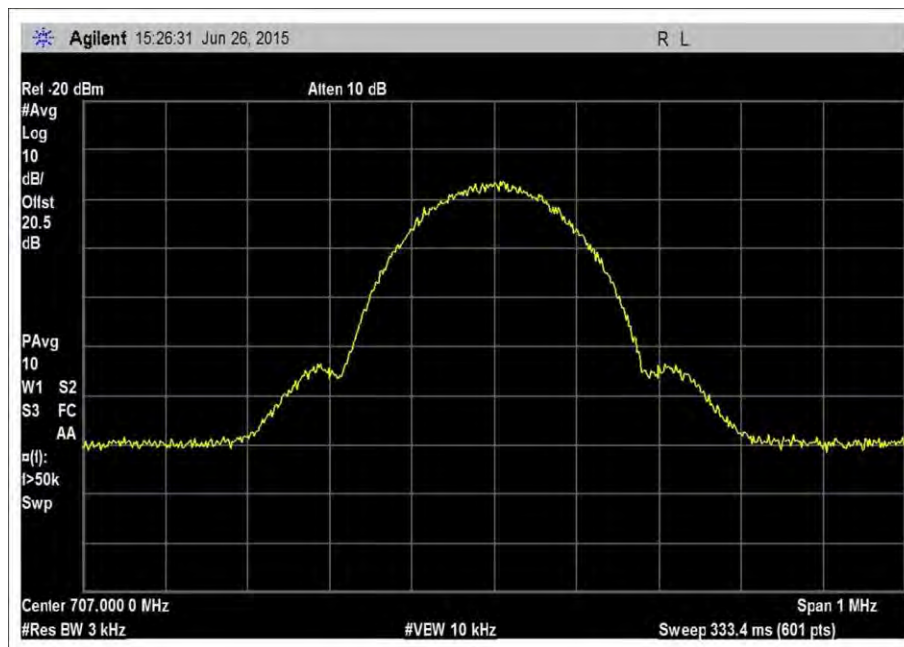
 Test environment conditions: Temperature: 20.8°C, Relative Humidity: 42%, Atmospheric Pressure: 101.5kPa

 Test procedure:
 The test was performed in accordance with section 7.10 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v03 Dated June 5, 2015.

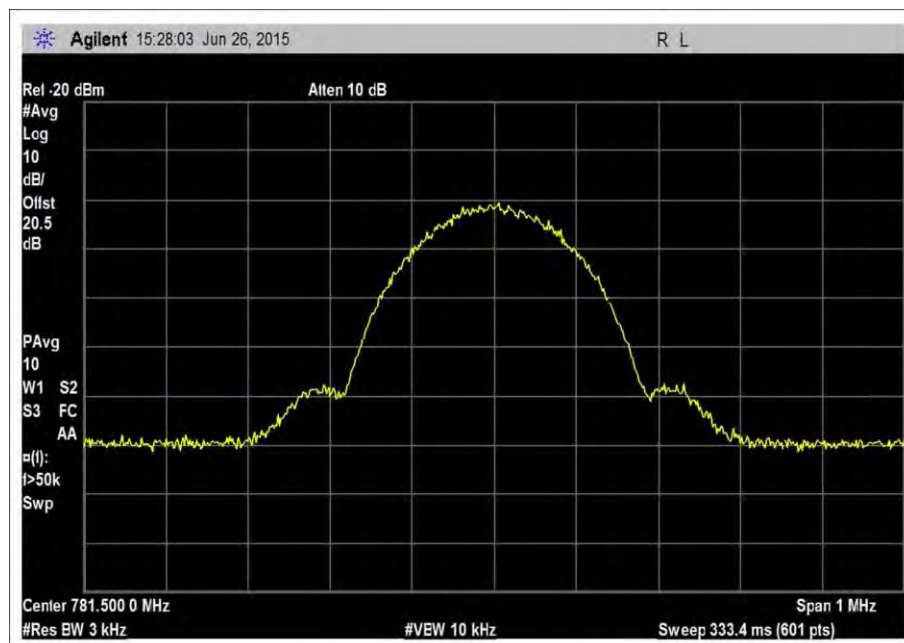
 Firmware: V1.0

Test Data

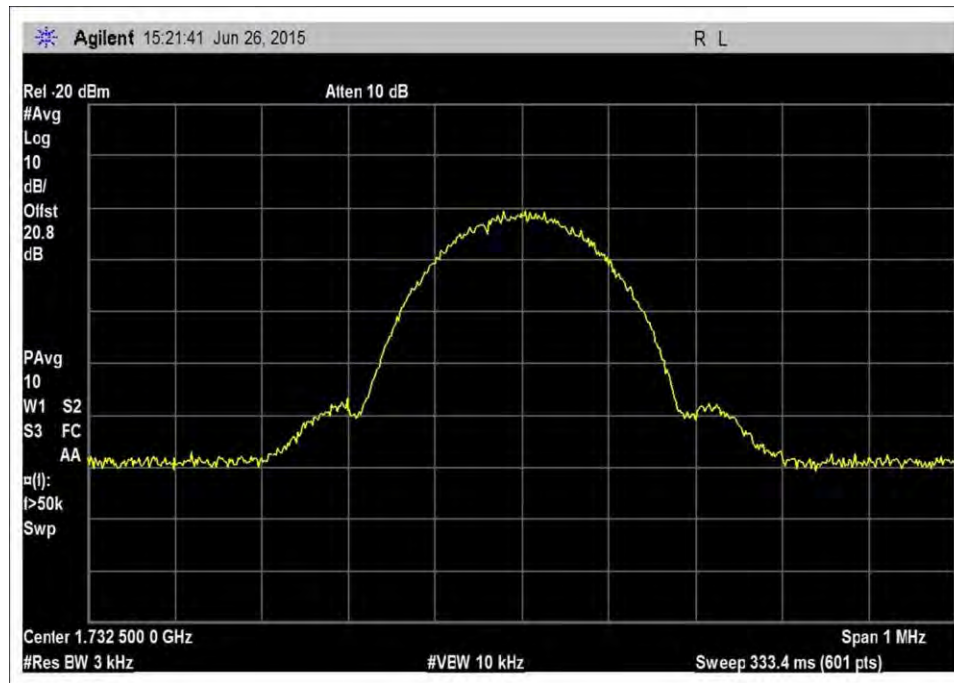
Input-UL



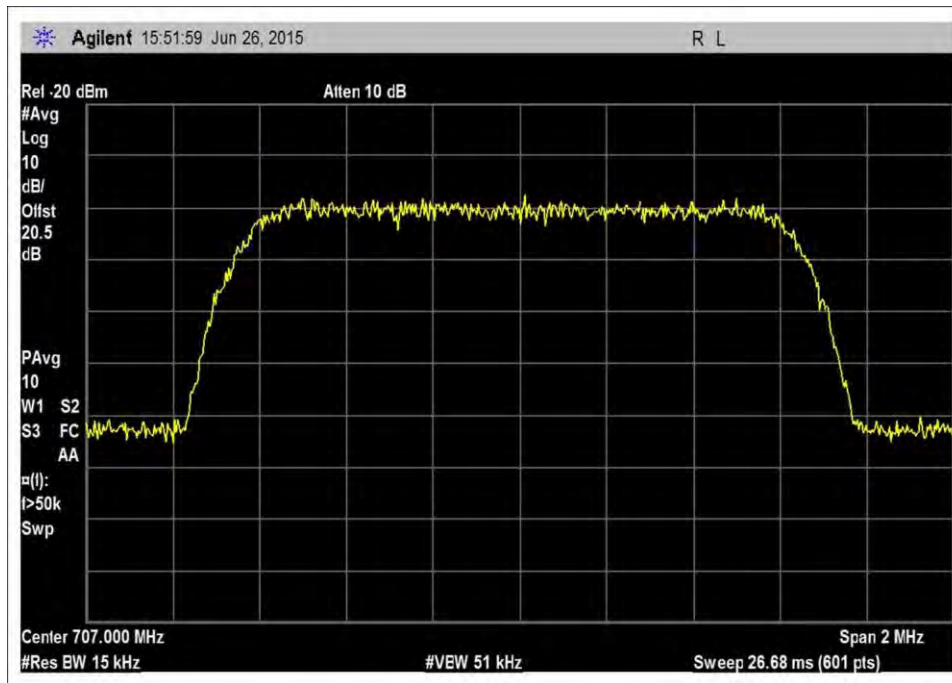
UL_698-716MHz_GSM



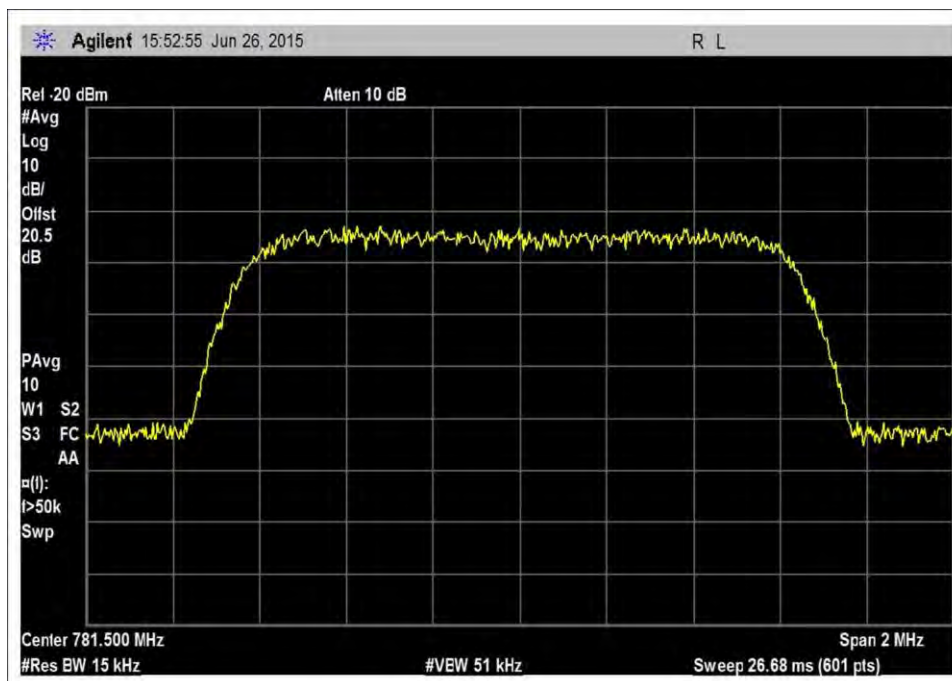
UL_776-787MHz_GSM



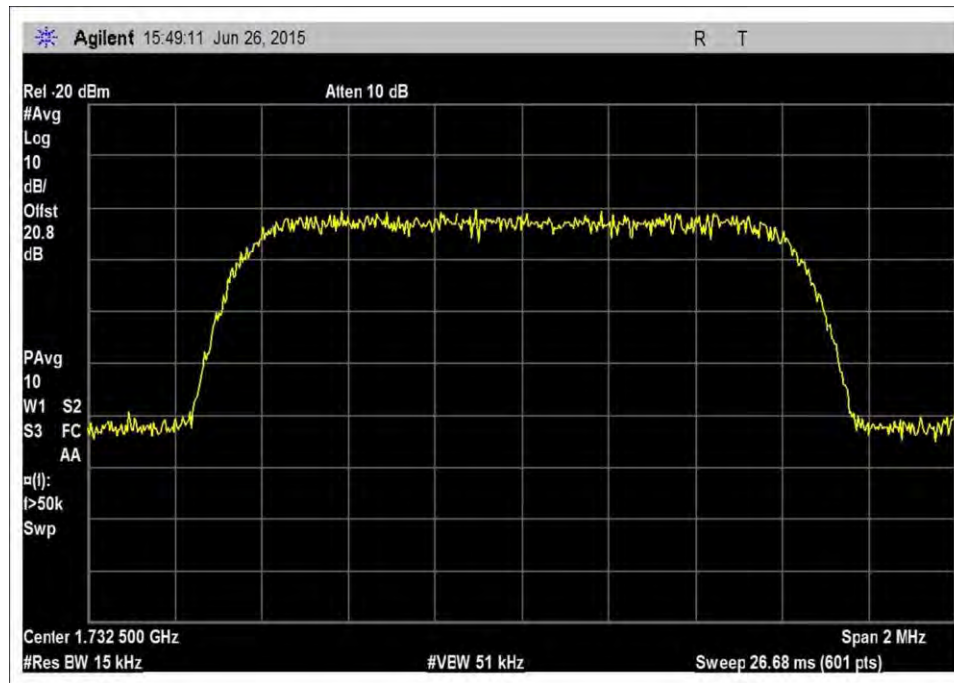
UL_1710-1755MHz_GSM



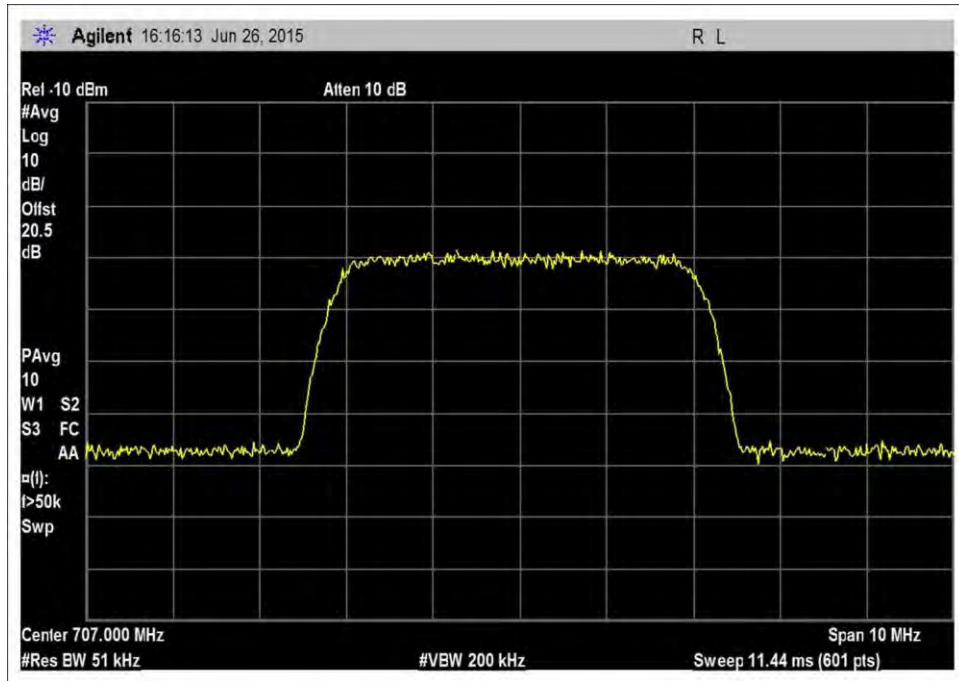
UL_698-716MHz_CDMA



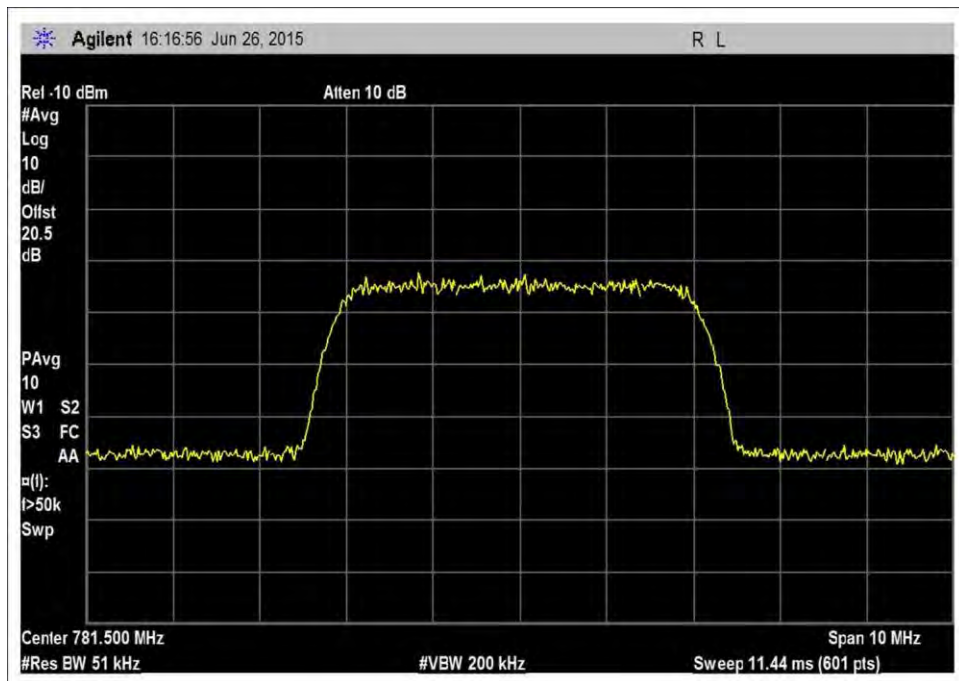
UL_776-787MHz_CDMA



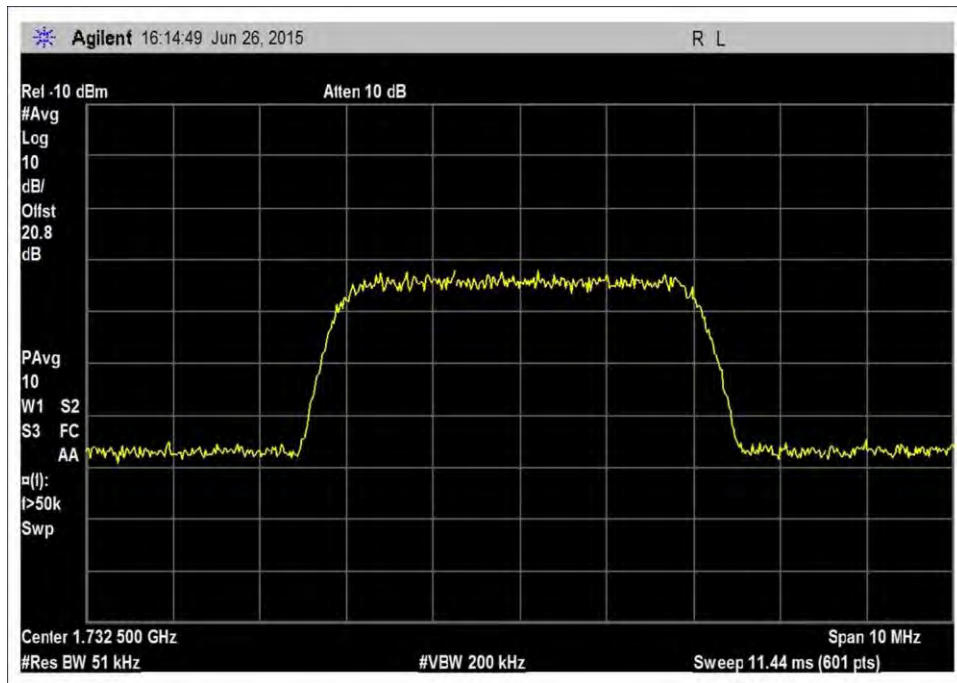
UL_1710-1755MHz_CDMA



UL_698-716MHz_WCDMA

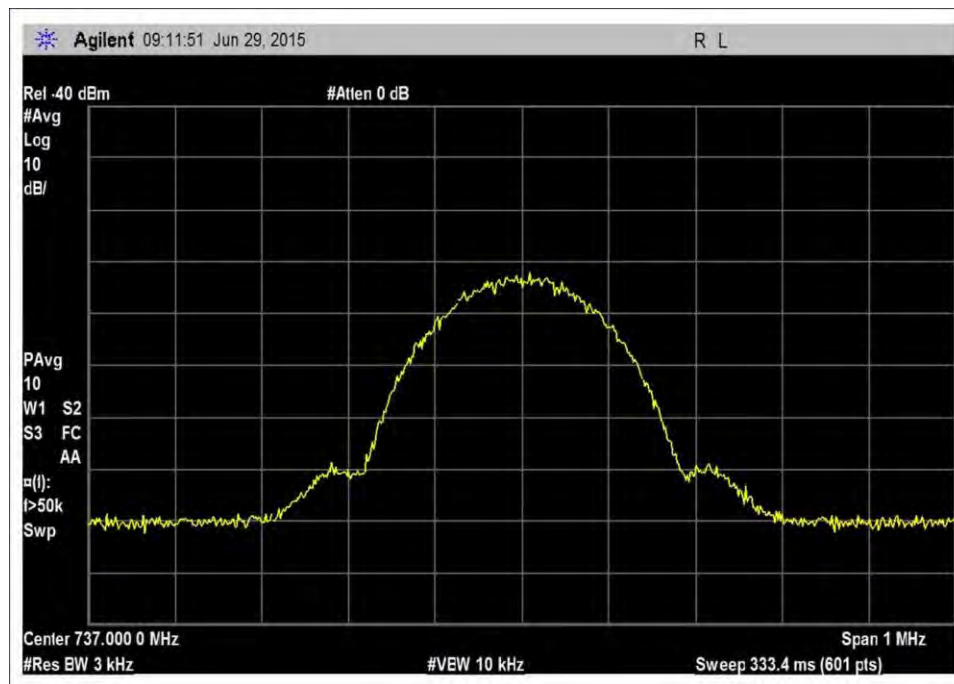


UL_776-787MHz_WCDMA

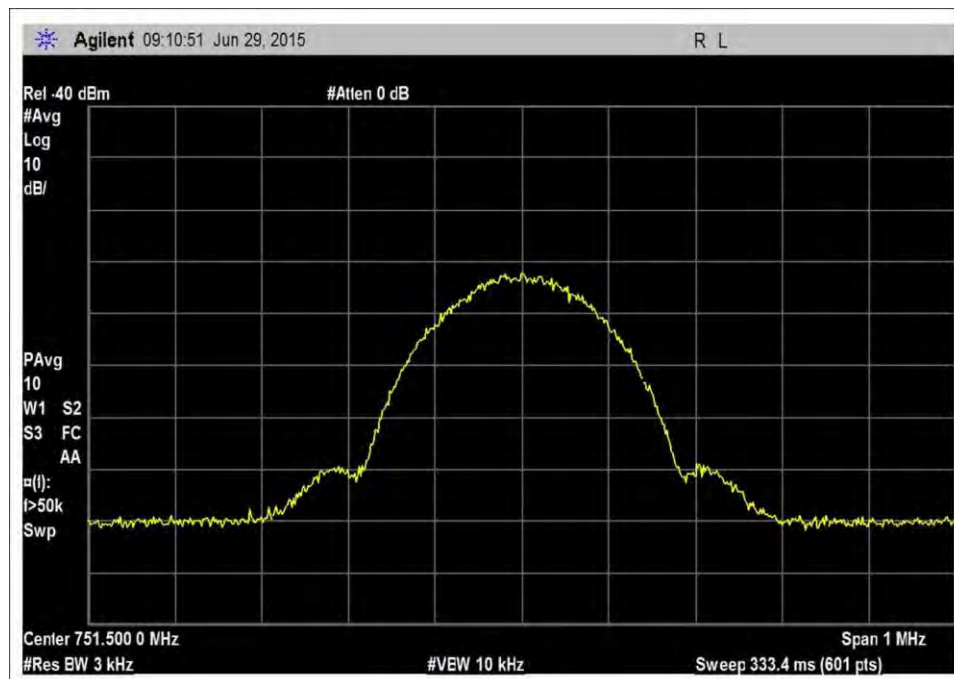


UL_1710-1755MHz_WCDMA

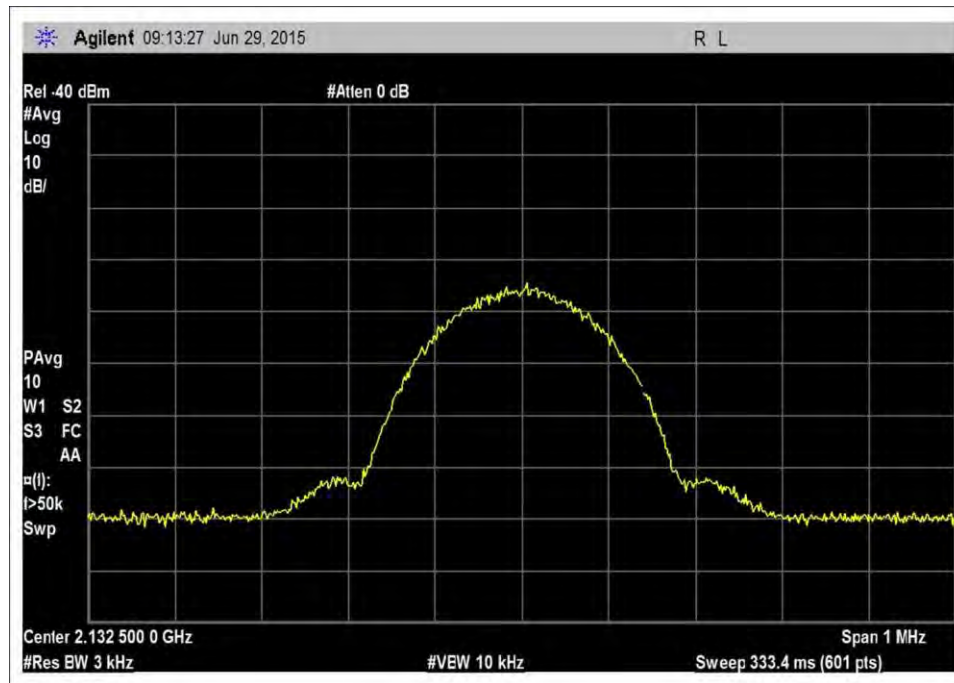
Input-DL



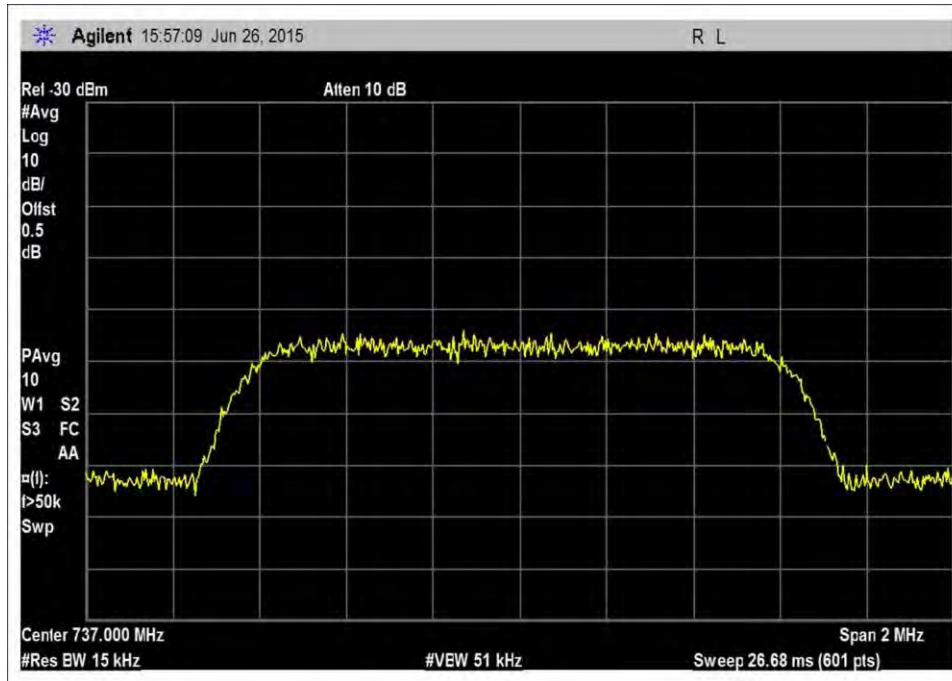
DL_728-746MHz_GSM



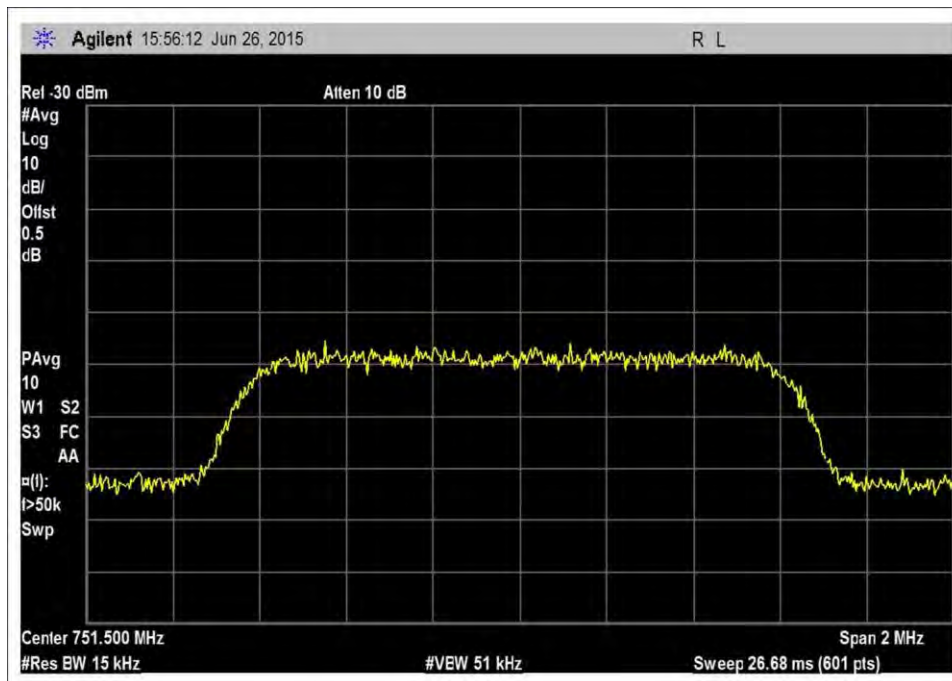
DL_746-757MHz_GSM



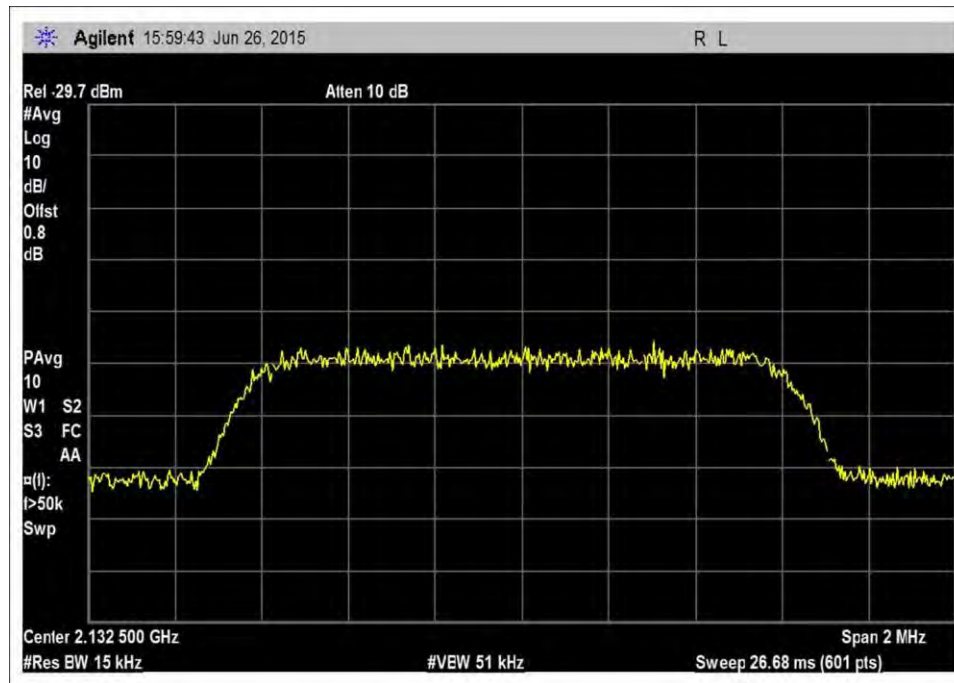
DL_2110-2155MHz_GSM



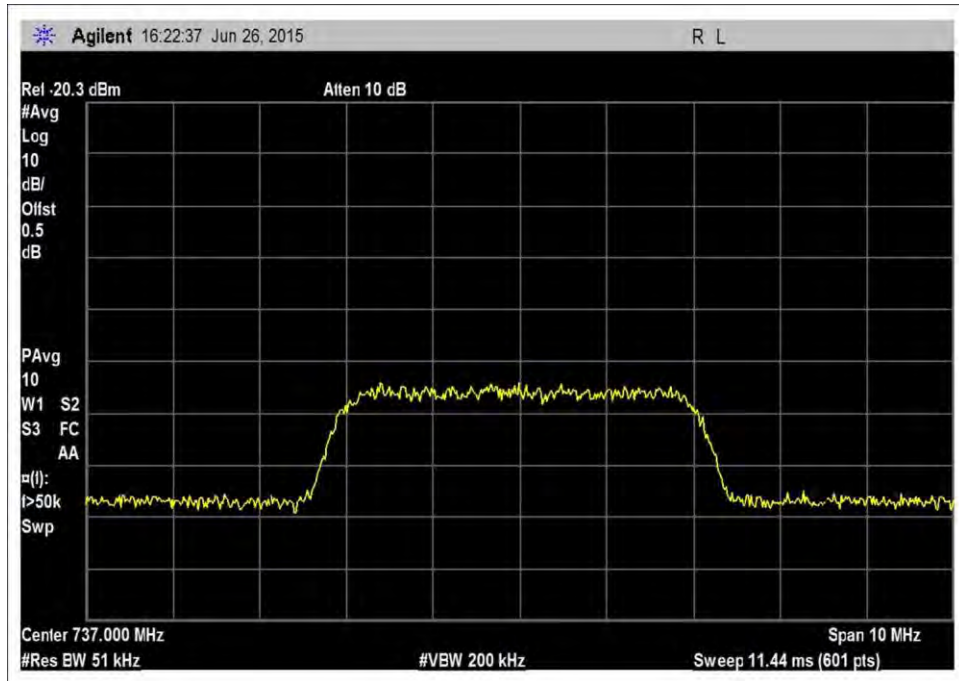
DL_728-746MHz_CDMA



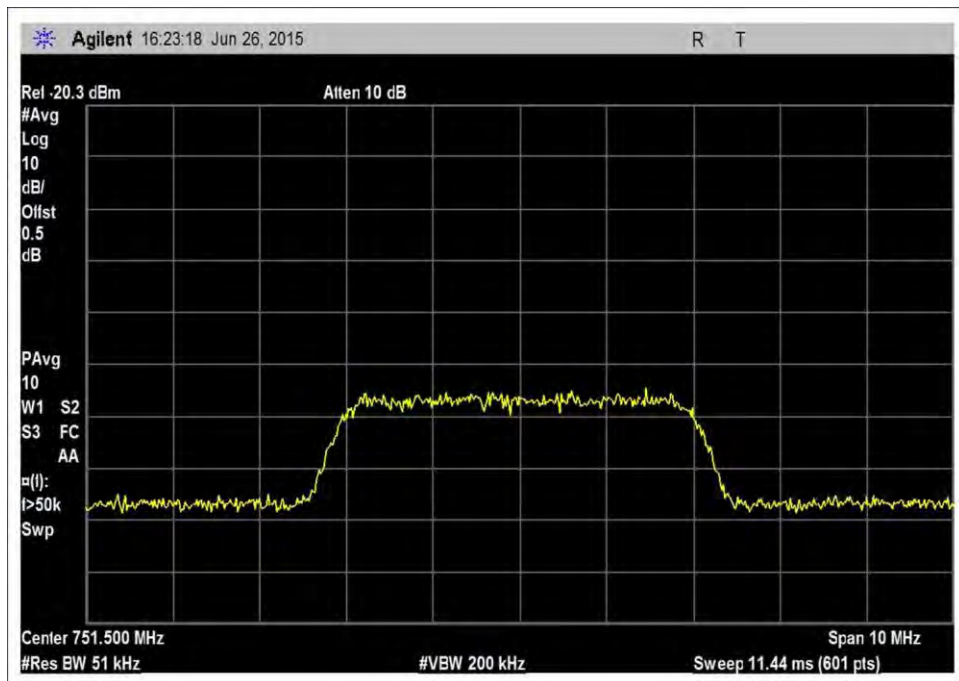
DL_746-757MHz_CDMA



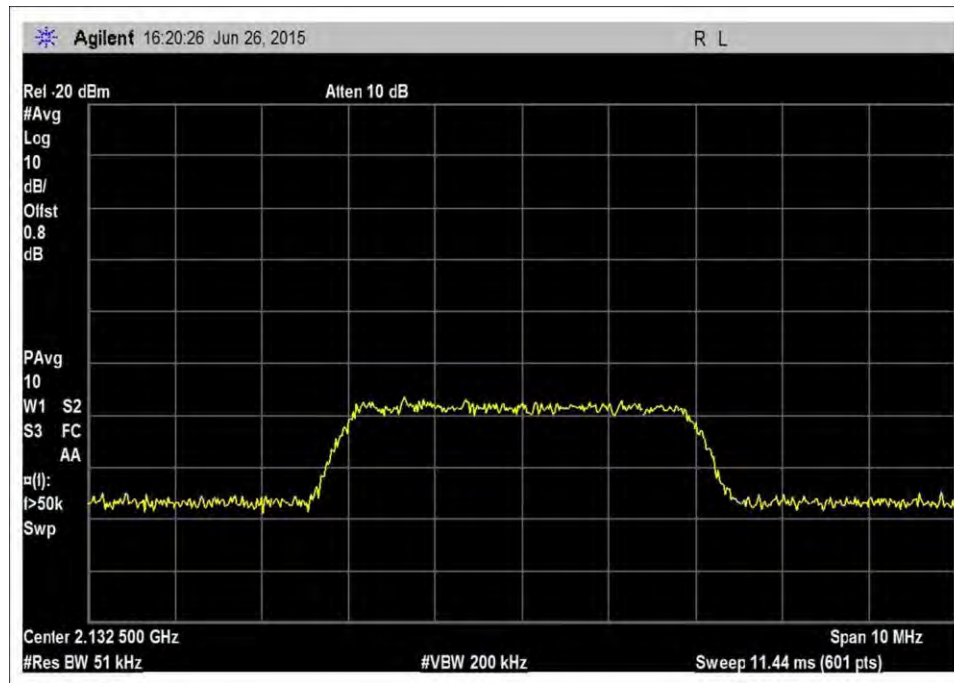
DL_2110-2155MHz_CDMA



DL_728-746MHz_WCDMA

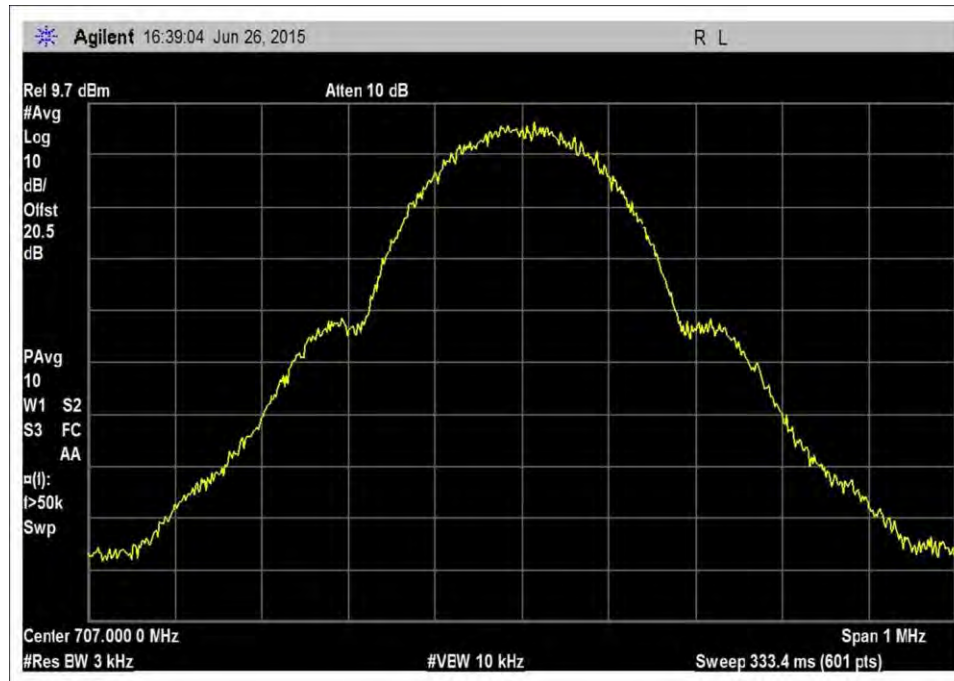


DL_746-757MHz_WCDMA

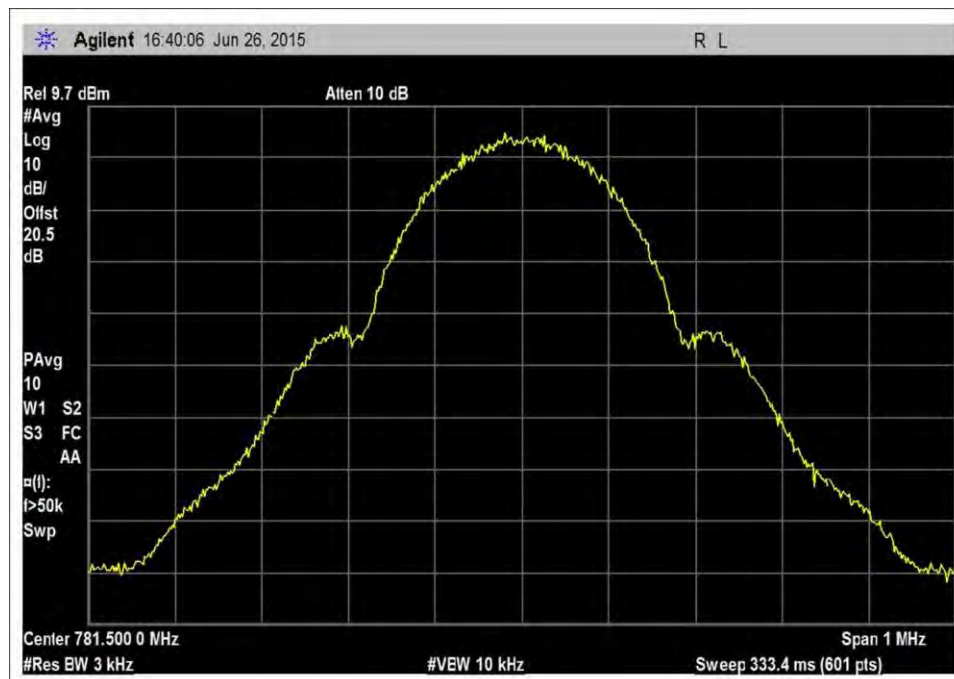


DL_2110-2155MHz_WCDMA

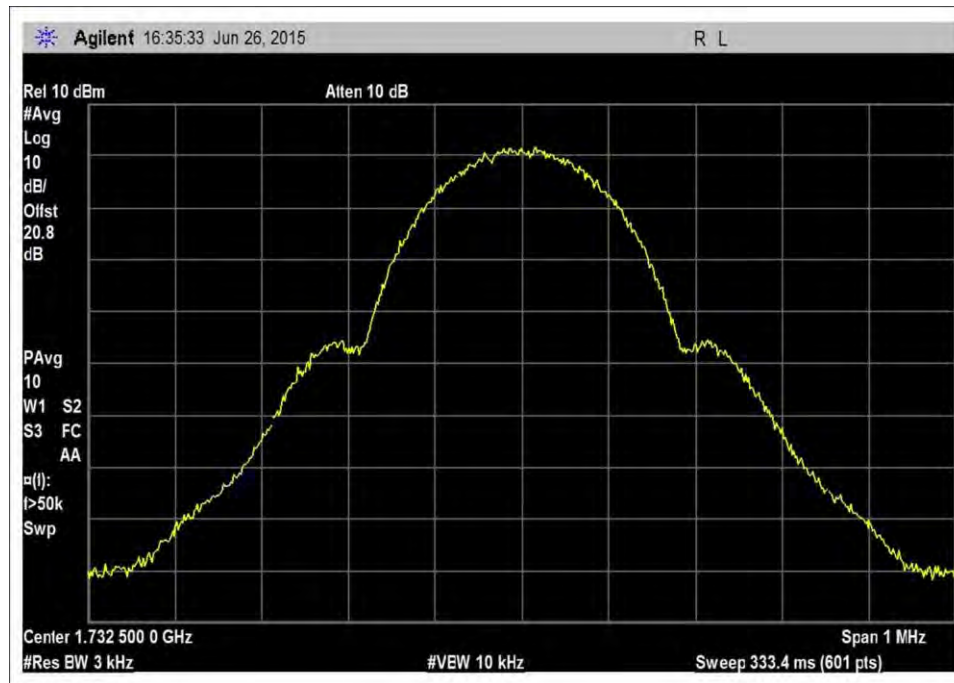
Output-UL



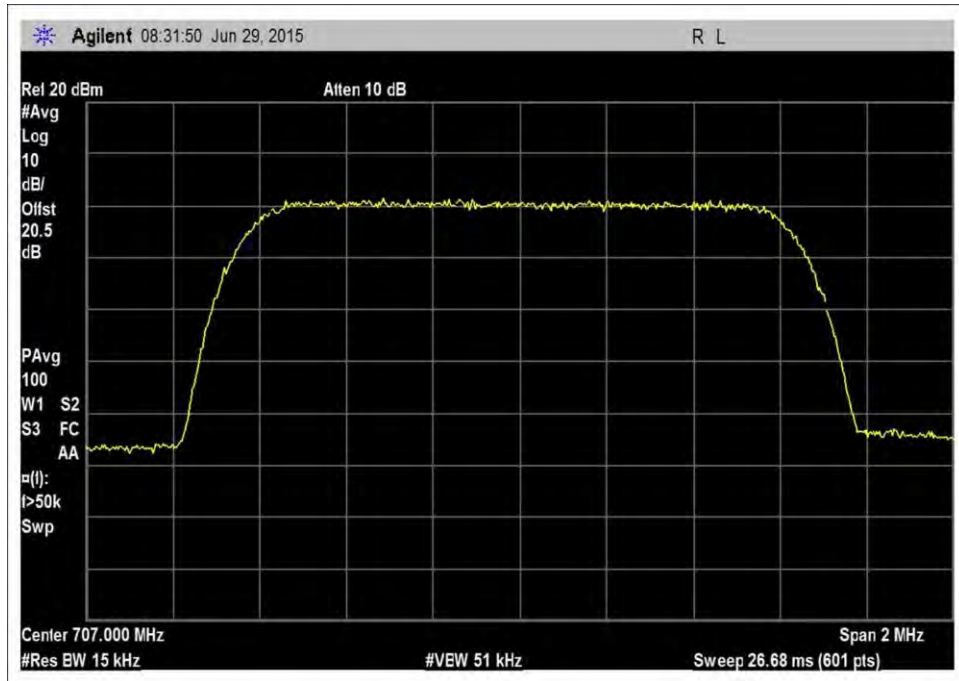
UL_698-716MHz_GSM



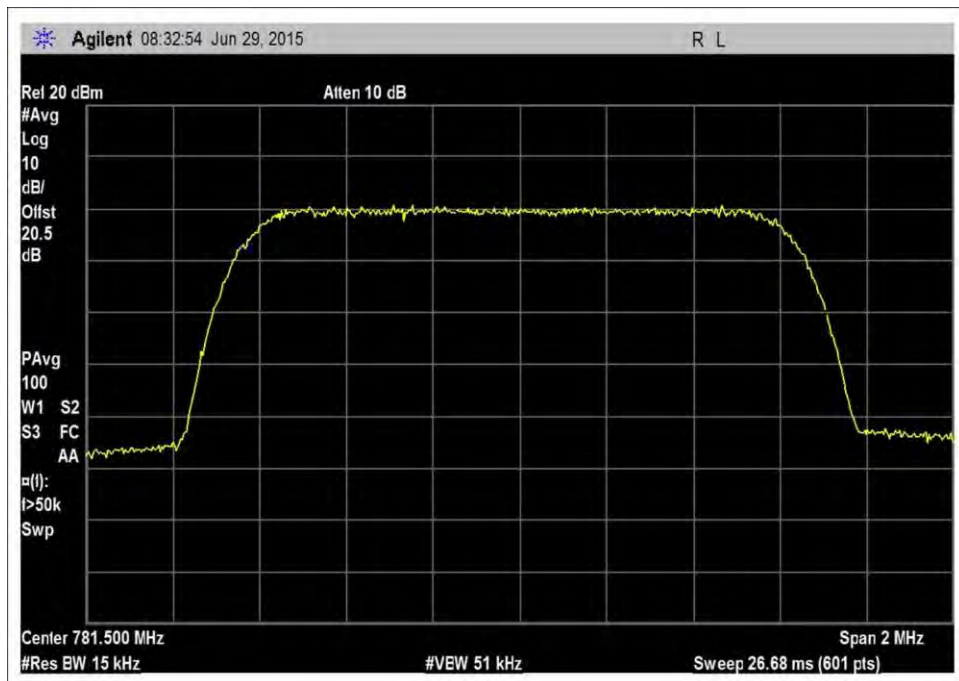
UL_776-787MHz_GSM



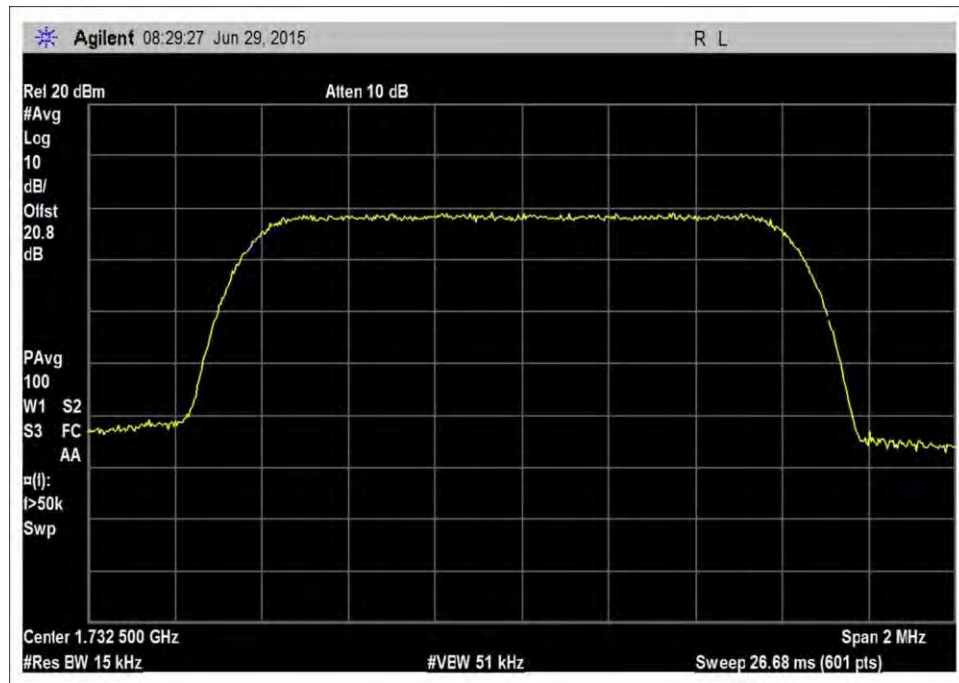
UL_1710-1755MHz_GSM



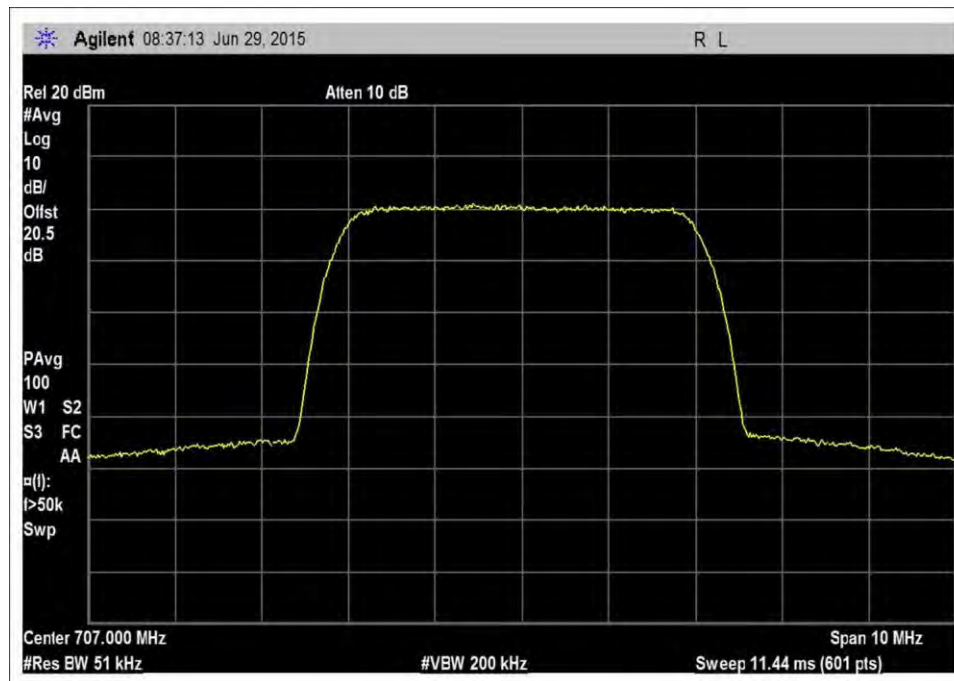
UL_698-716MHz_CDMA



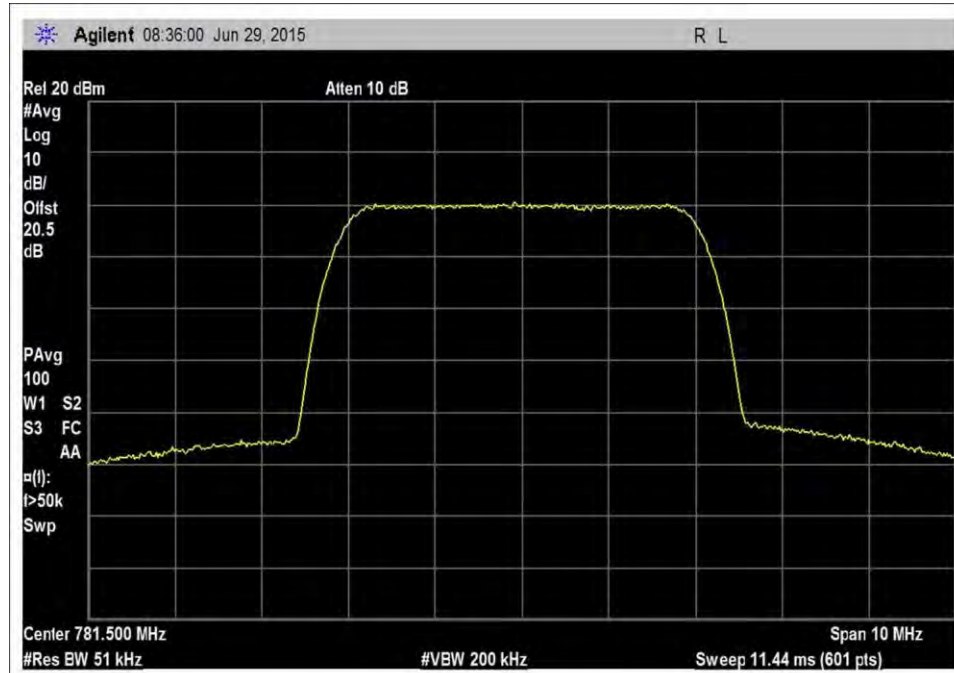
UL_776-787MHz_CDMA



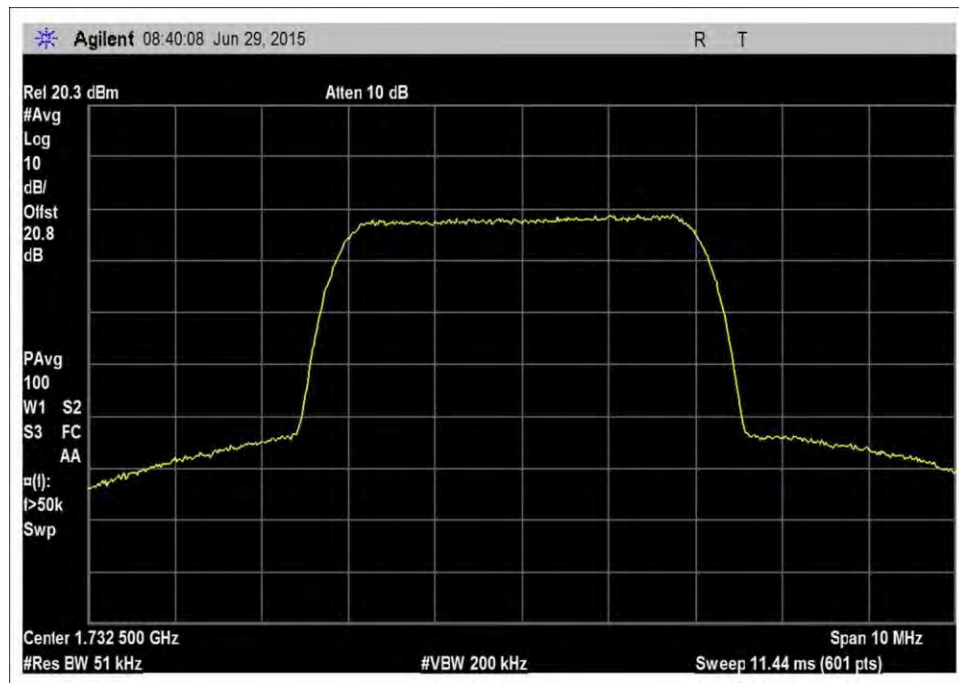
UL_1710-1755MHz_CDMA



UL_698-716MHz_WCDMA

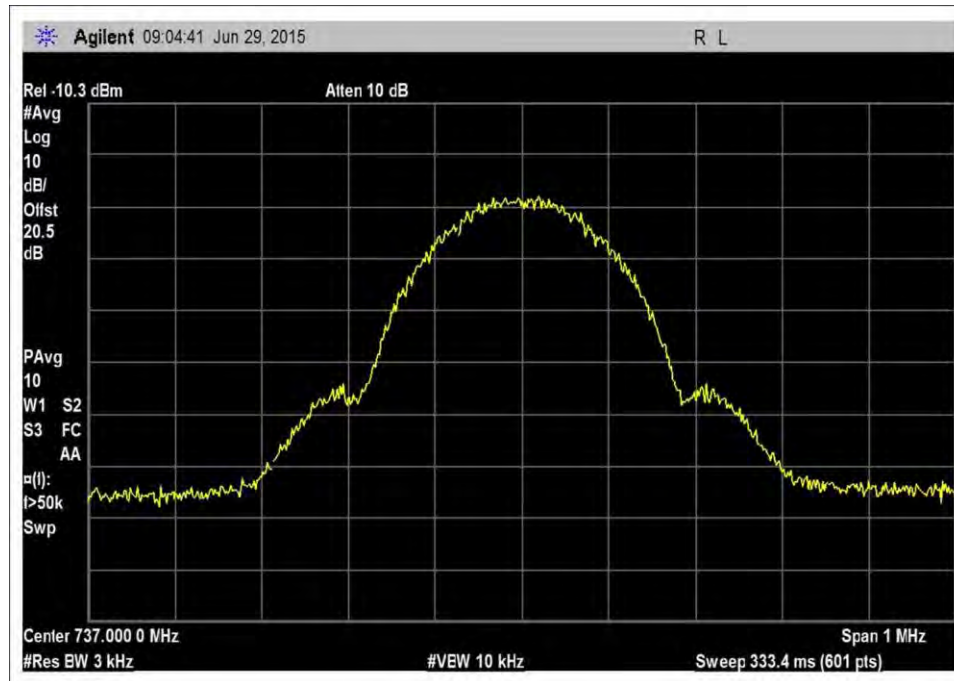


UL_776-787MHz_WCDMA

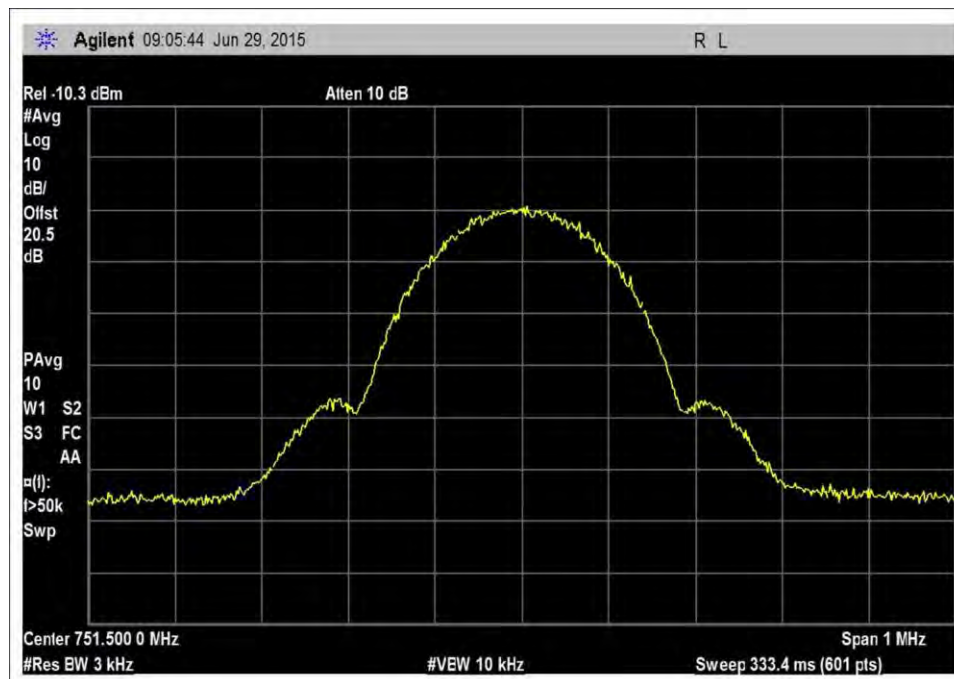


UL_1710-1755MHz_WCDMA

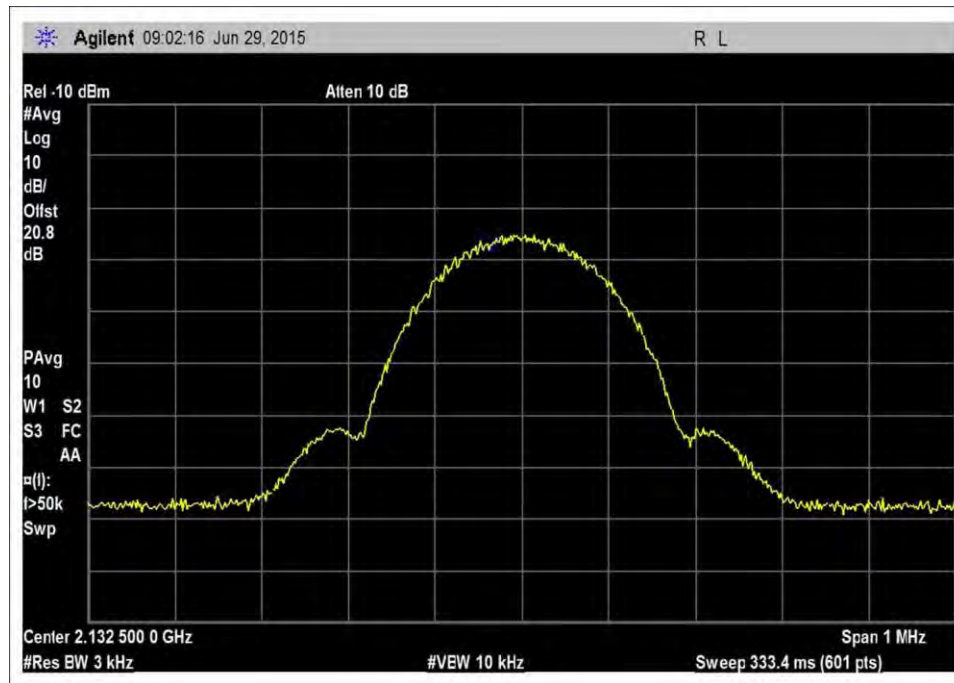
Output-DL



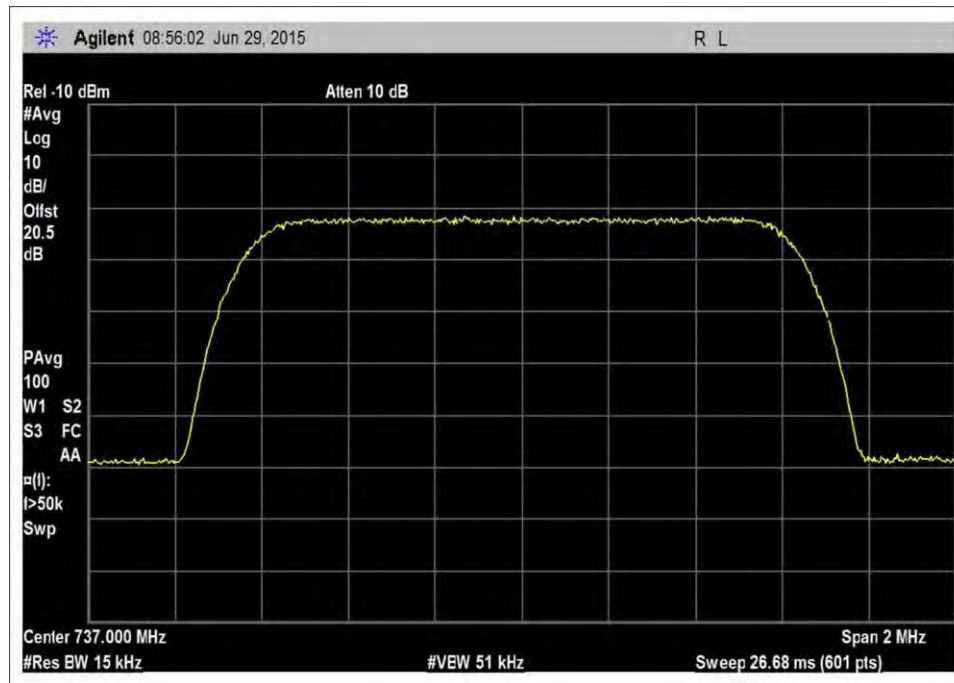
DL_728-746MHz_GSM



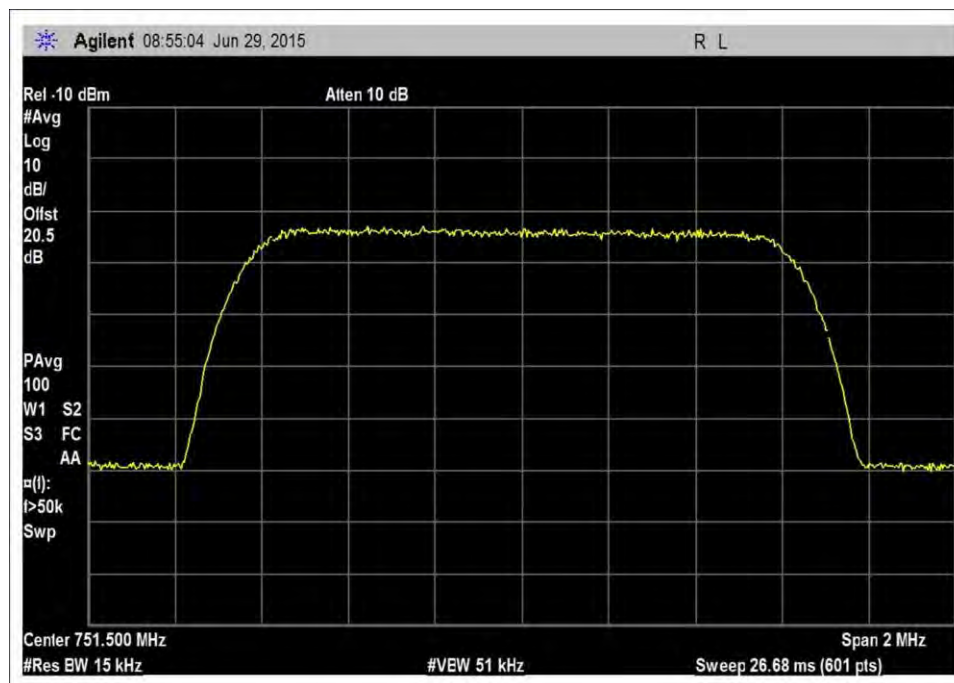
DL_746-757MHz_GSM



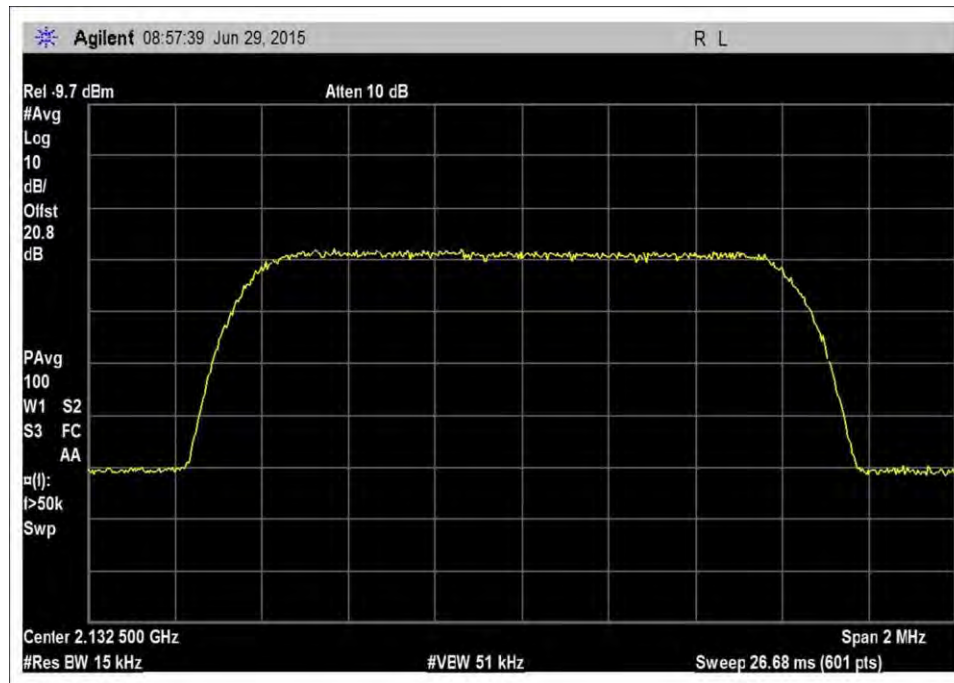
DL_2110-2155MHz_GSM



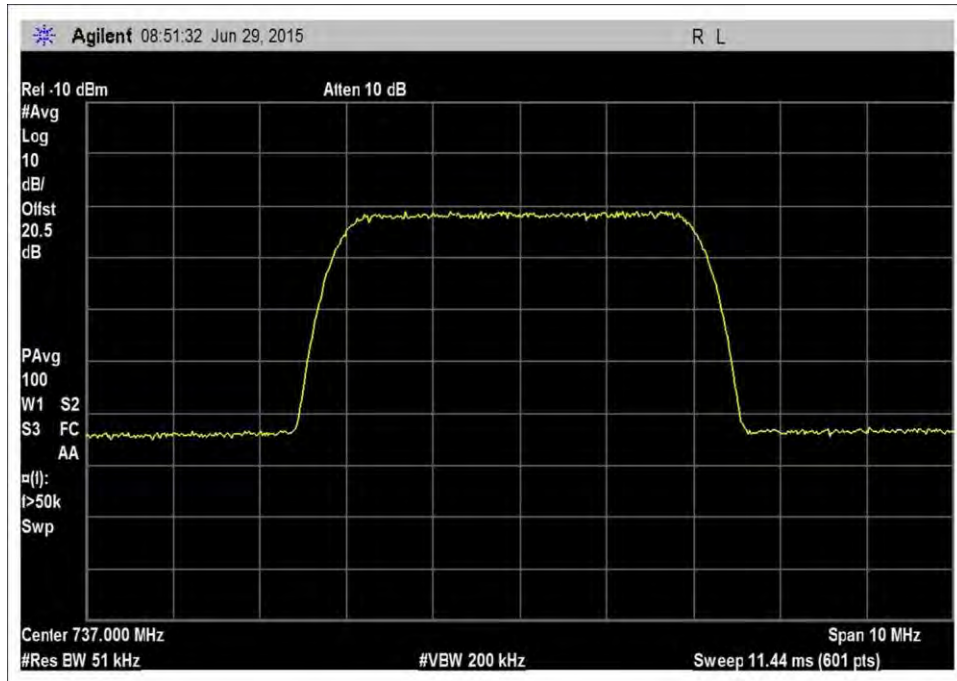
DL_728-746MHz_CDMA



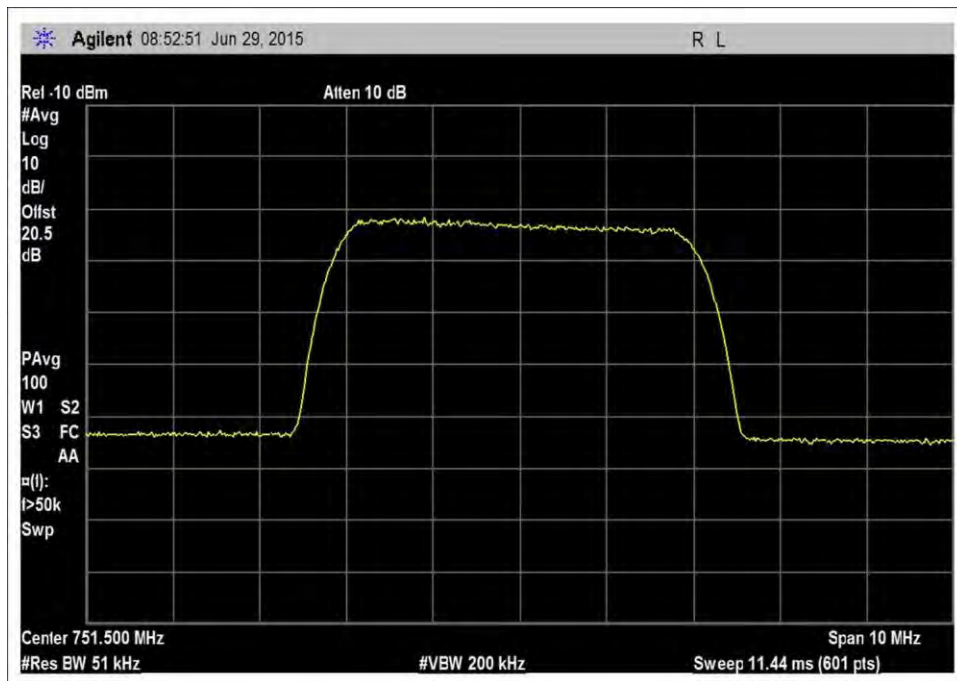
DL_746-757MHz_CDMA



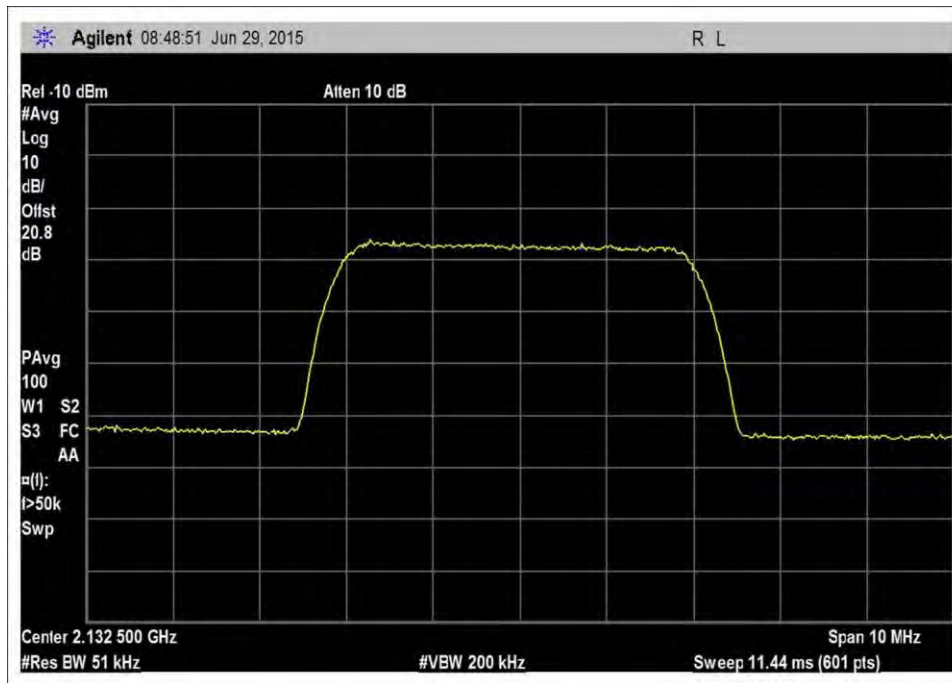
DL_2110-2155MHz_CDMA



DL_728-746MHz_WCDMA



DL_746-757MHz_WCDMA



DL_2110-2155MHz_WCDMA

Test Setup Photo



2.1051 / 27.53(f) Spurious Emissions at Antenna Terminals

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
ANP05389	Attenuator	766-10	Narda	02/27/2014	02/27/2016
ANP05713	Attenuator	PE7015-20	Pasternack	03/24/2015	03/24/2017
ANP06709	Cable	32026-29094K-29094K-72TC	AstroLab	09/18/2014	09/18/2016
ANP06710	Cable	32026-29094K-29094K-72TC	AstroLab	09/18/2014	09/18/2016
AN02869	Spectrum Analyzer	E4440A	Agilent	07/10/2014	07/10/2015

Test Conditions / Setup

Test Location: CKC Laboratories, Inc • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: Cellphone-Mate, Inc
 Specification: **2.1051 Spurious Emissions at Antenna Terminals / 7.6 Conducted Spurious Emissions**
 Work Order #: **97222** Date: 6/29/2015
 Test Type: **Conducted Emissions** Time: 12:50:18
 Tested By: Daniel Bertran Sequence#: 1
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Configuration 1
 The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
 The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.

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

Frequency range of measurement = 9 kHz- 22GHz.
 9 kHz - 150 kHz -> RBW= 200Hz VBW= 200Hz

150 kHz - 30 MHz -> RBW= 9kHz VBW= 9kHz
30 MHz - 1000MHz -> RBW*= 1MHz VBW= 3MHz
1000 MHz - 22000MHz ->RBW= 1MHz VBW= 3MHz

*Note: As specified on 7.6 Conducted spurious emissions test procedure of 935210 D03 Signal Booster Measurements v03, 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.

All adjustable settings on the test sample are set at max gain.

Test environment conditions: Temperature: 20.8°C, Relative Humidity: 42%, Atmospheric Pressure: 101.5kPa

Test procedure: The test was performed in accordance with section 7.6 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v03 Dated June 5, 2015.

Firmware: V1.0

Note: 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.

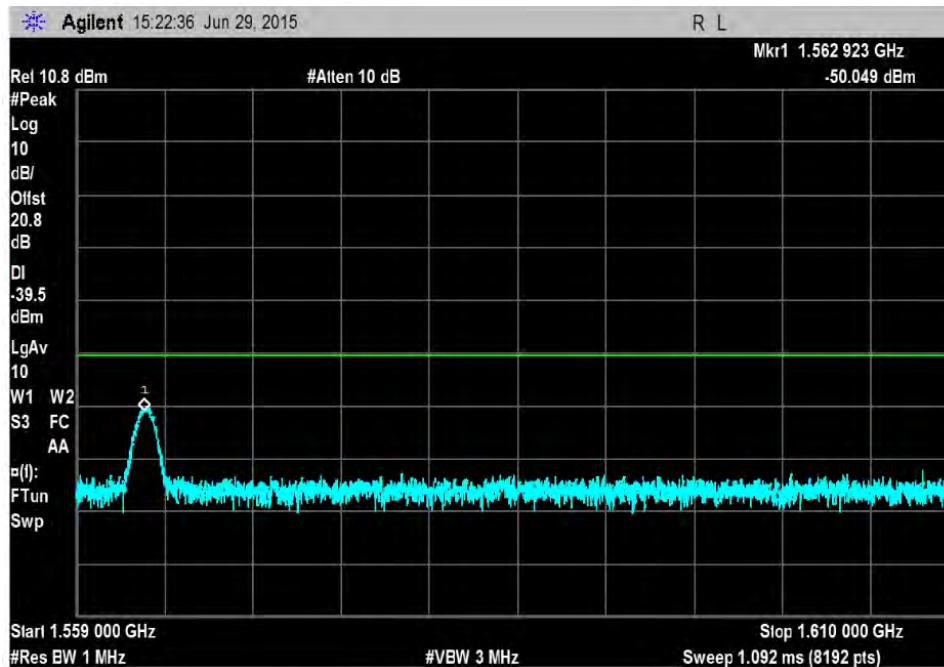
Summary of Results

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).



Calculation:

UL776-787MHz=>

Limit line EIRP on this band 1559-1610MHz =>

Limit line EIRP corrected =>

Antenna Gain (3dB) / Cable Loss (3.5dB)

-70 dBW/MHz =>-40dBm

-40dBm-3dBi+3.5dB=> -39.5dBm

Test Data

Limit line for Spurious Conducted Emission

$$\text{Required Attenuation} = 43 + 10 \log P \text{ dB}$$

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

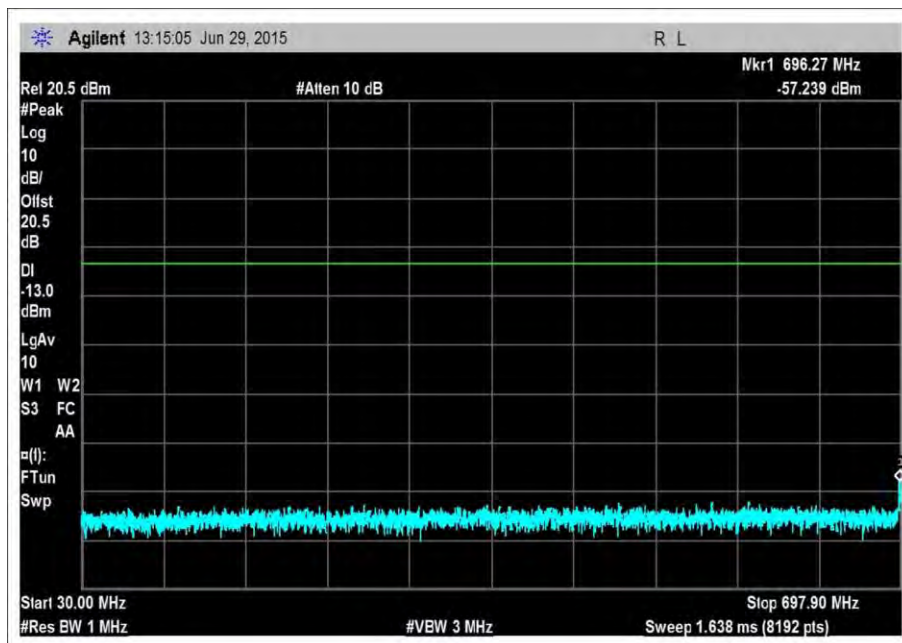
$$\begin{aligned} V_{\text{dBuV}} &= 20 \log \frac{V}{1 \times 10^{-6}} \\ &= 20 (\log V - \log 1 \times 10^{-6}) \\ &= 20 \log V - 20 \log 1 \times 10^{-6} \\ &= 20 \log V - 20(-6) \\ &= 20 \log V + 120 \end{aligned}$$

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

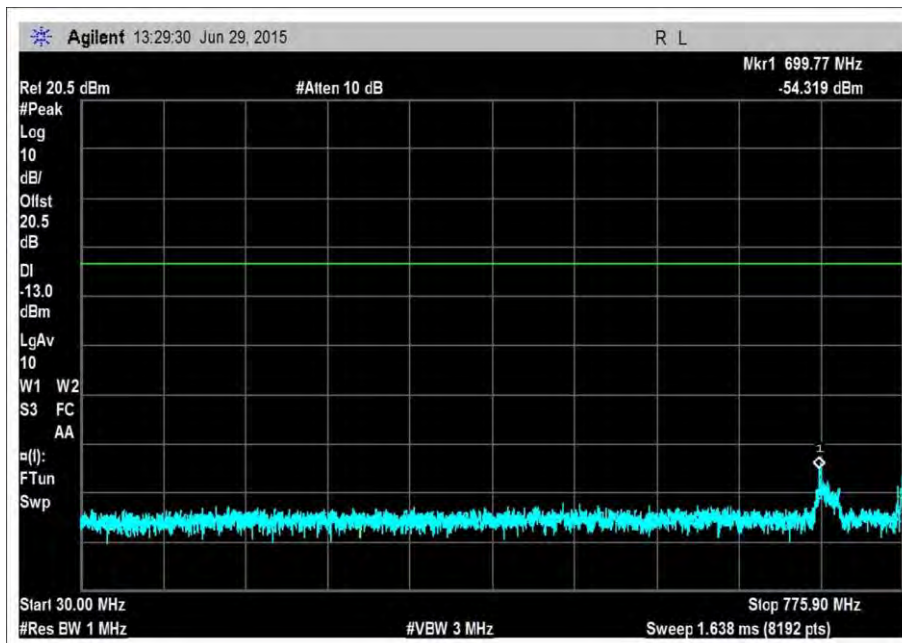
$$\begin{aligned} \text{Limit line} &= V_{\text{dBuV}} - \text{Attenuation} \\ &= 20 \log V + 120 - (43 + 20 \log V - 10 \log R) \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 20 \log V + 120 - 43 - 20 \log V + 10 \log R \\ &= 120 - 43 + 10 \log 50 \quad \text{Note : } R = 50 \Omega \\ &= 120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

Test Plot(s)

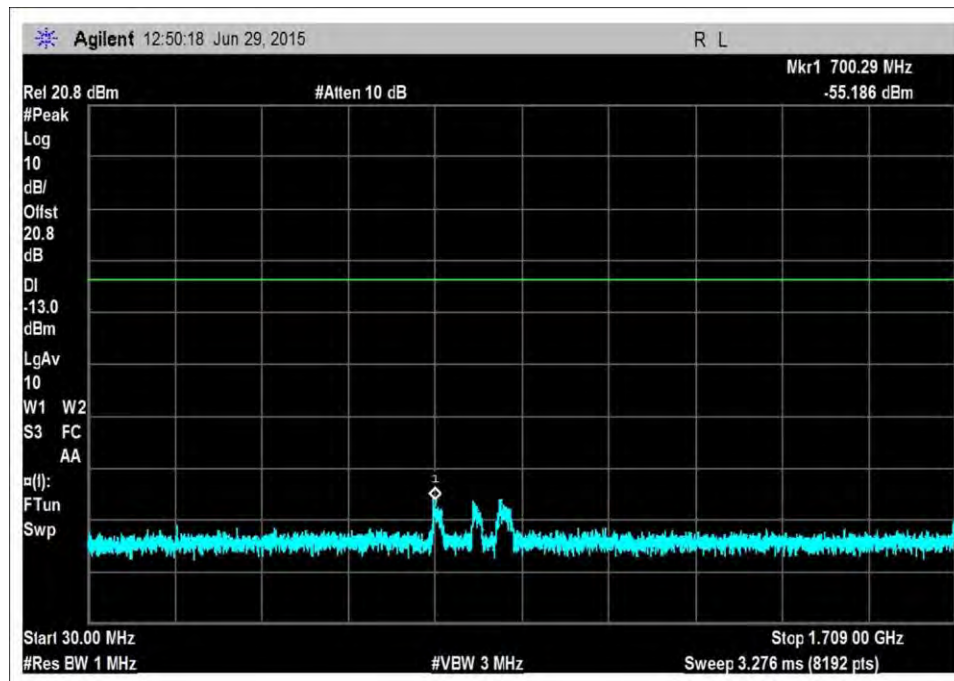
UL



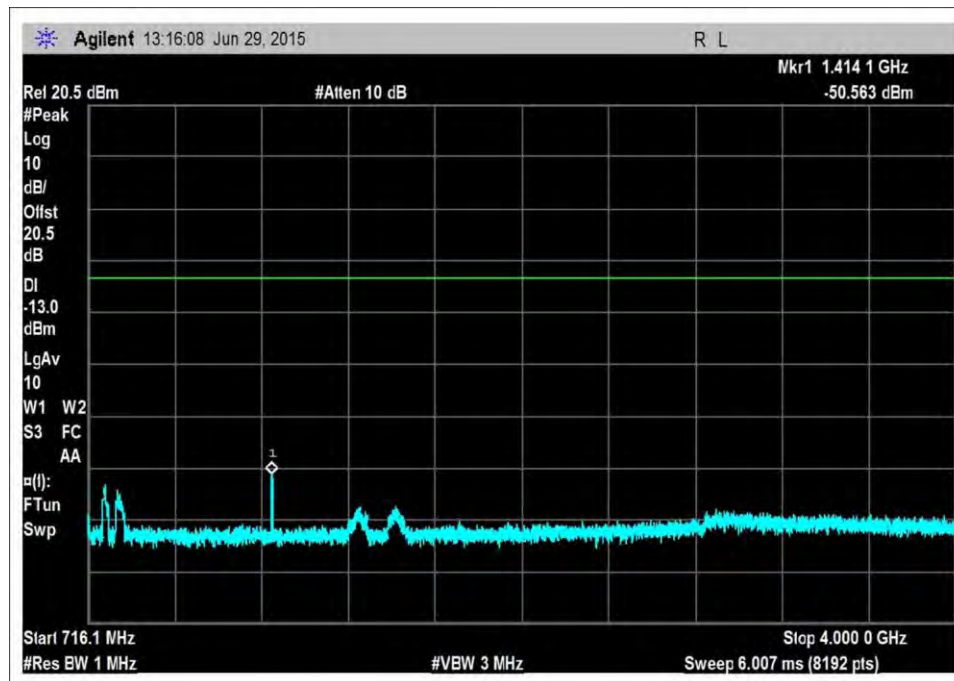
UL_698-716L



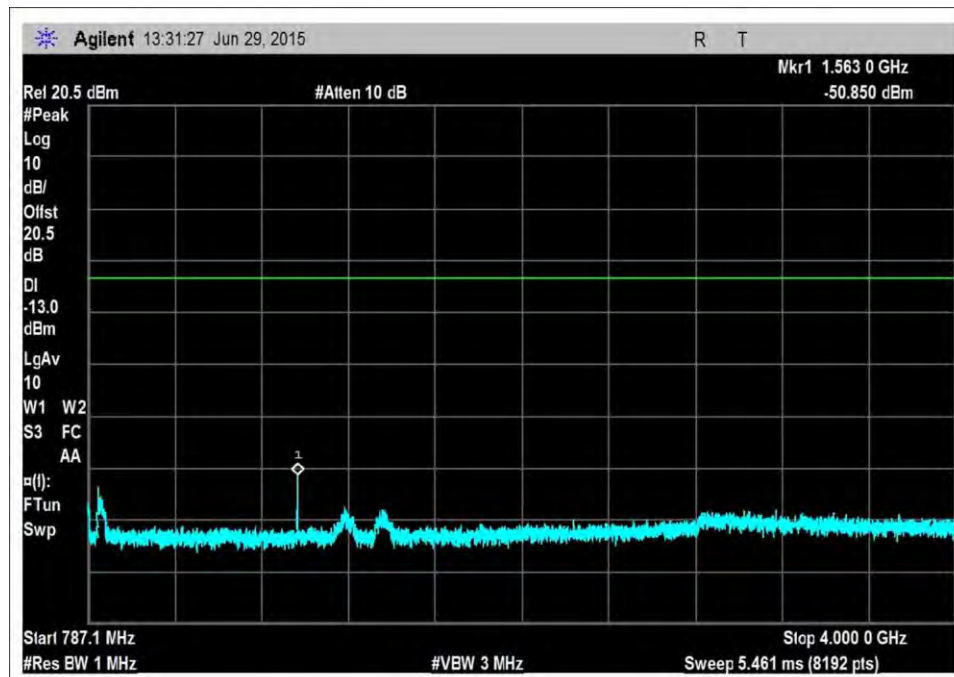
UL_776-787L



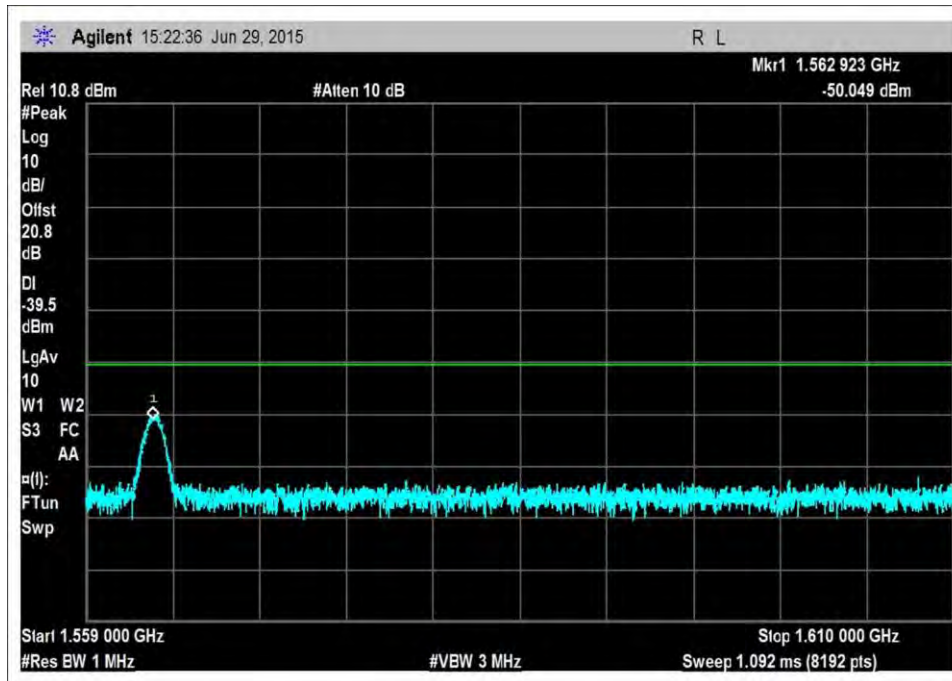
UL_1710-1755L



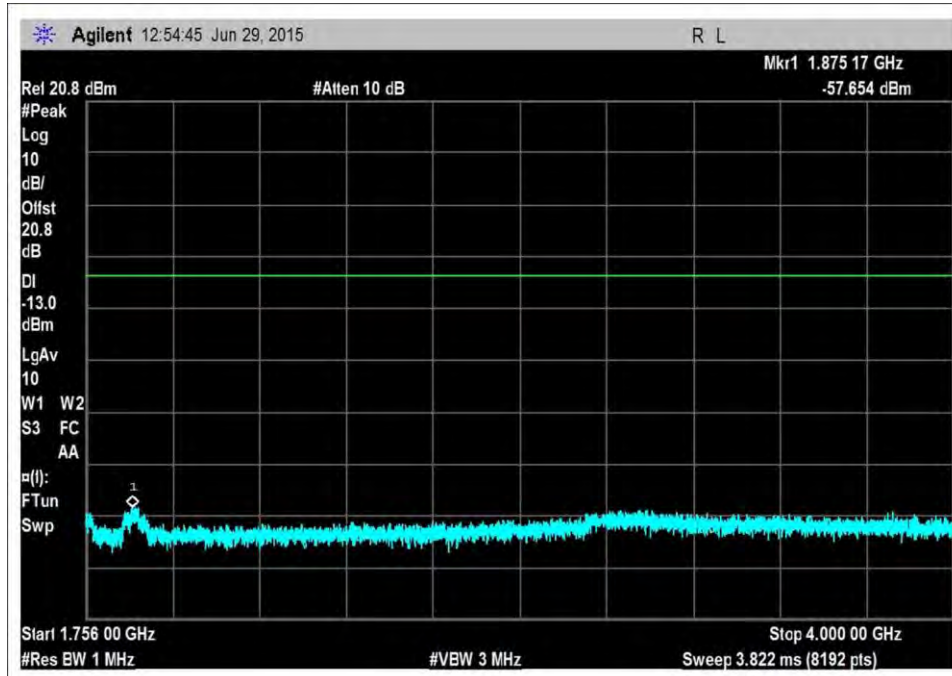
UL_698-716R1



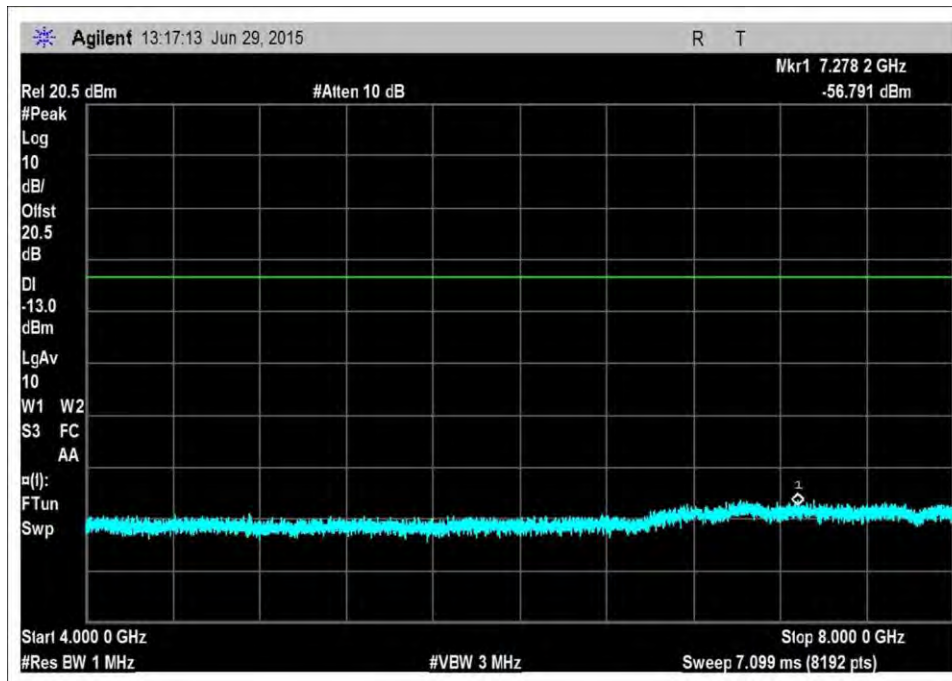
UL_776-787R1



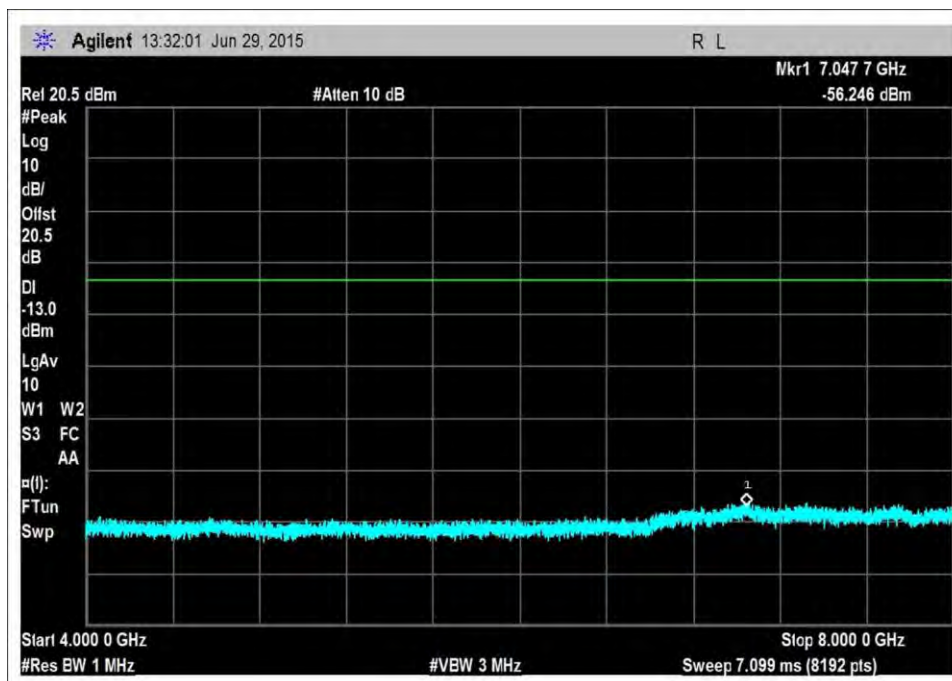
UL_776-787R1-Zoom



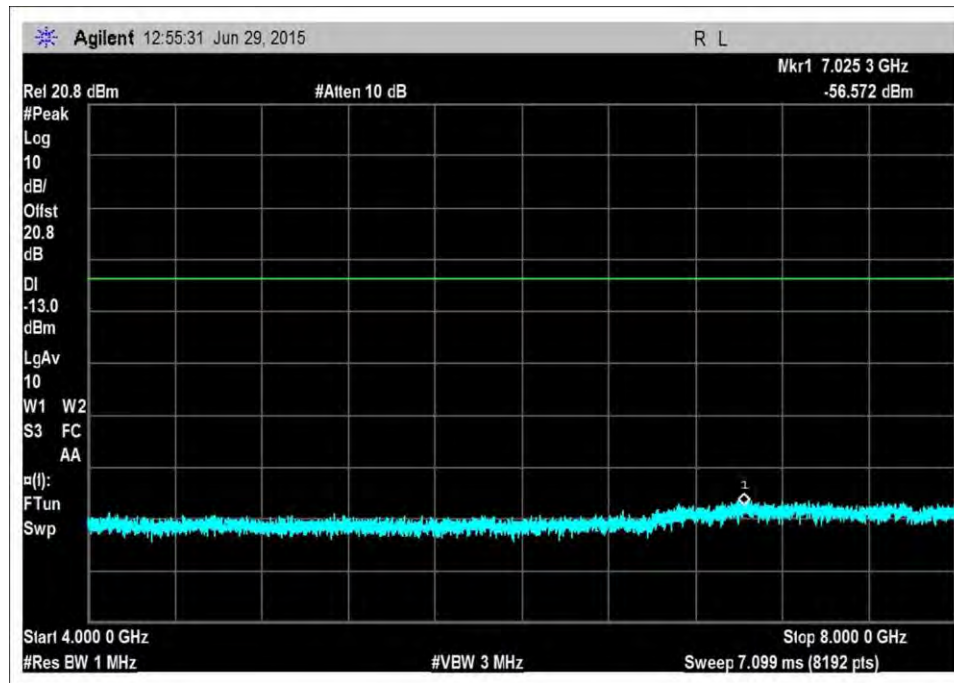
UL_1710-1755R1



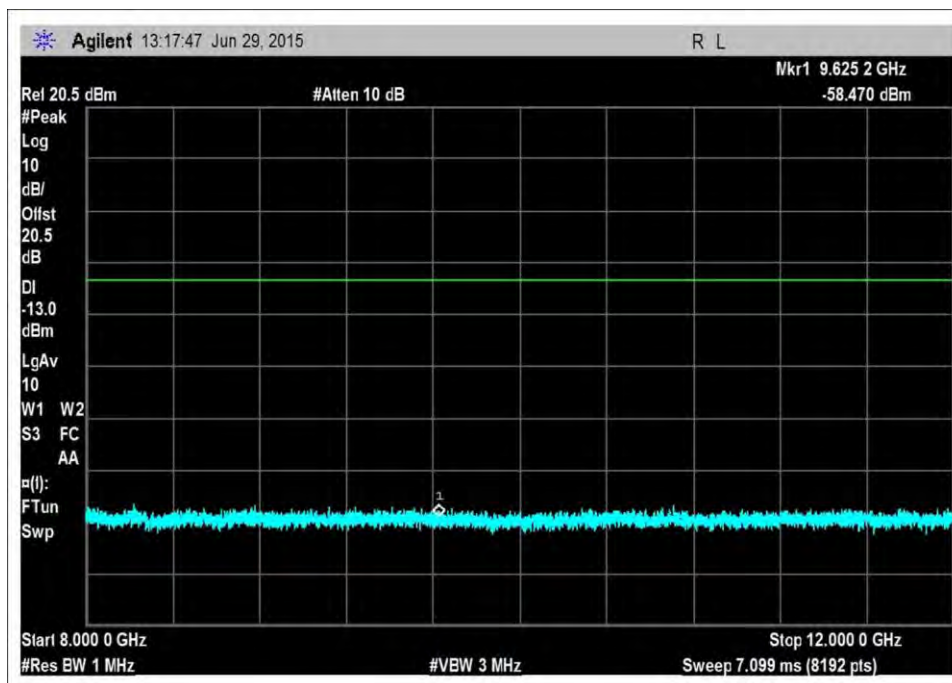
UL_698-716R2



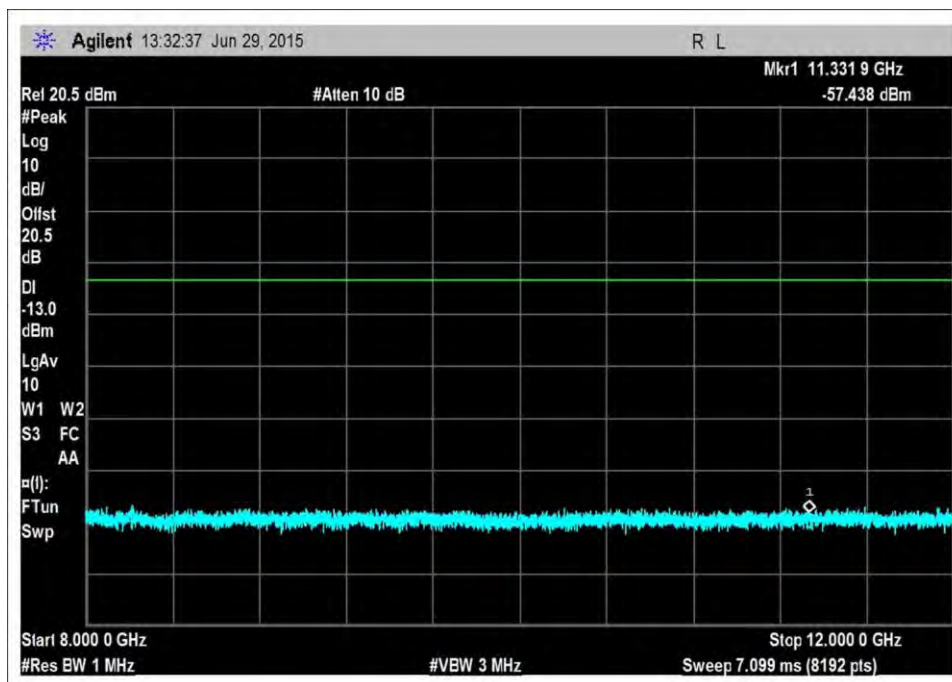
UL_776-787R2



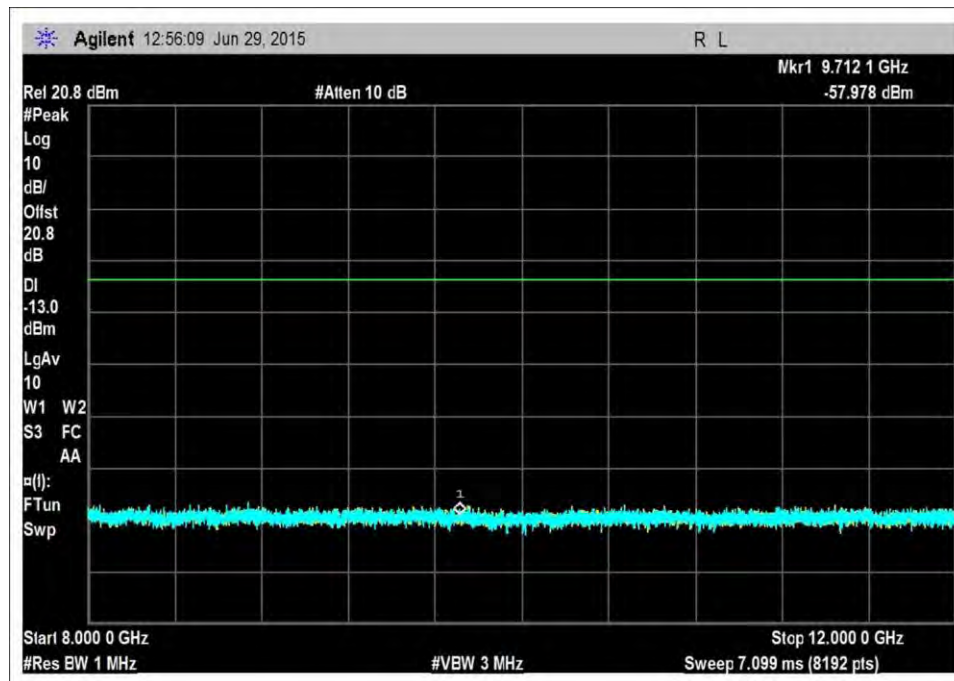
UL_1710-1755R2



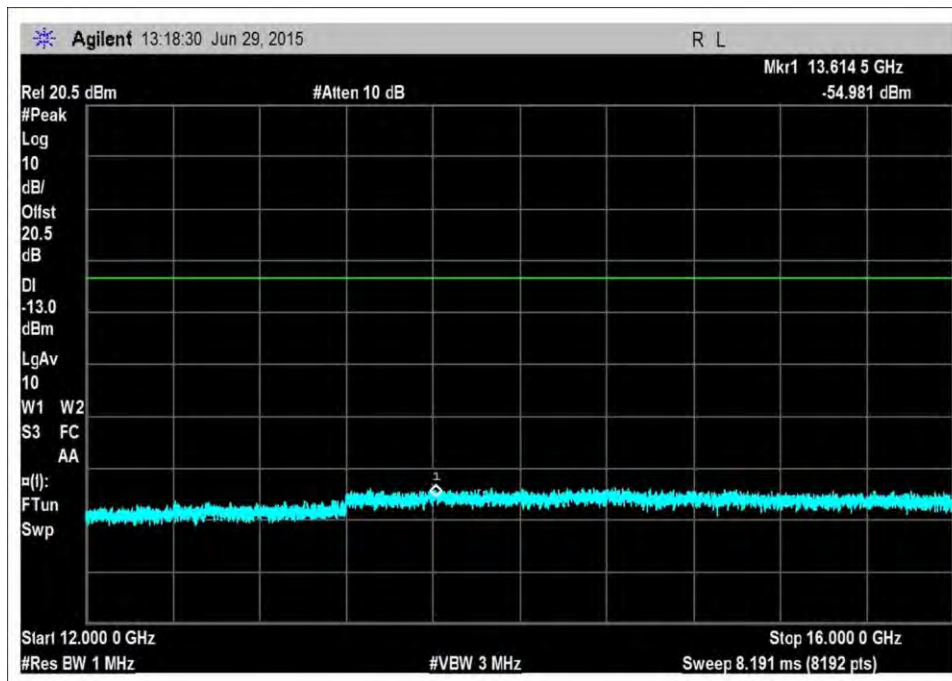
UL_698-716R3



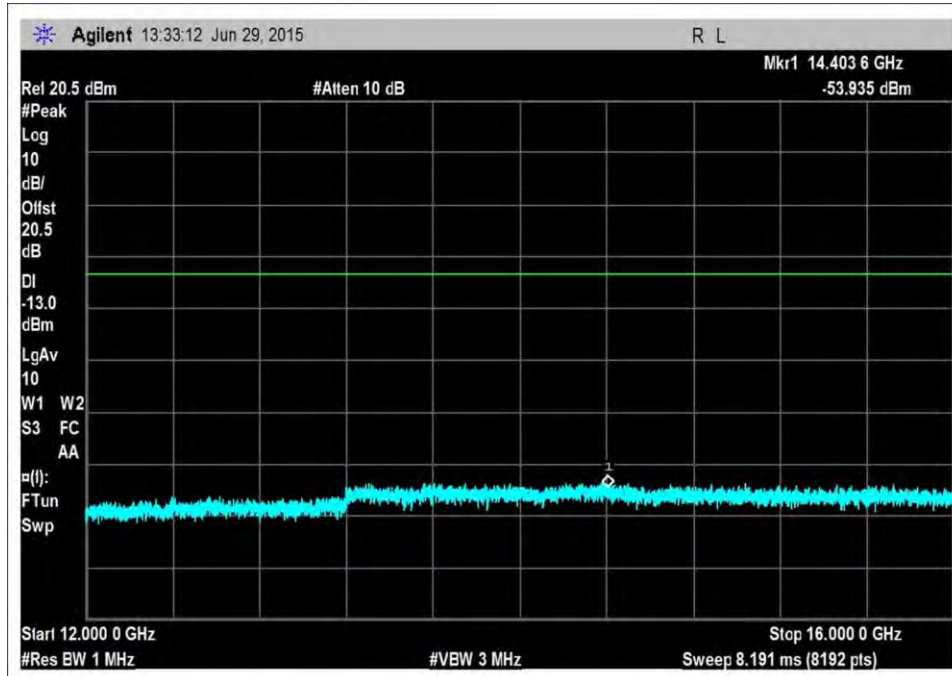
UL_776-787R3



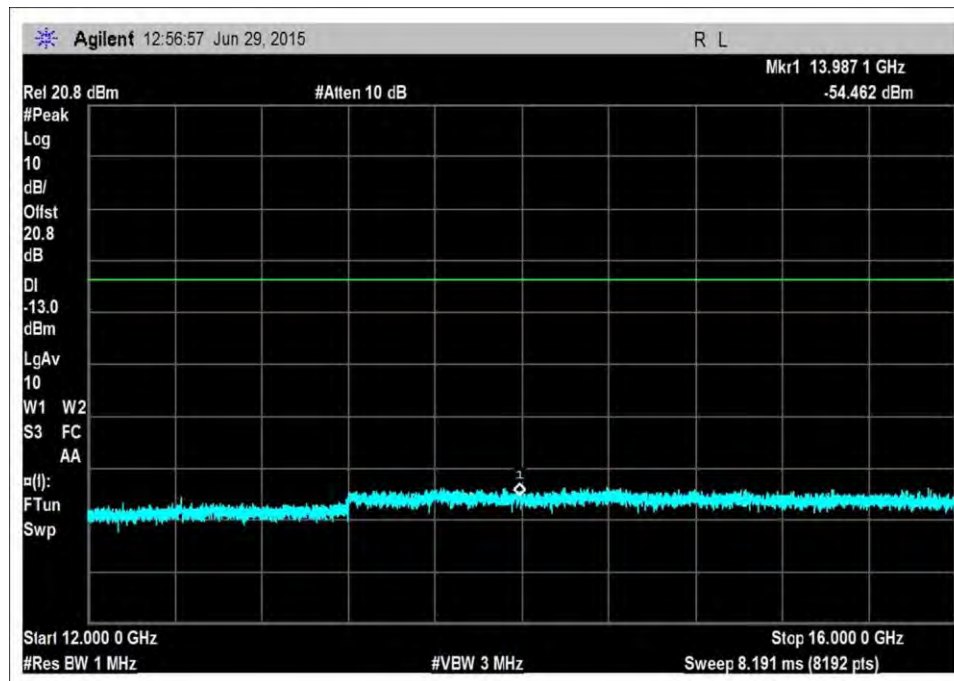
UL_1710-1755R3



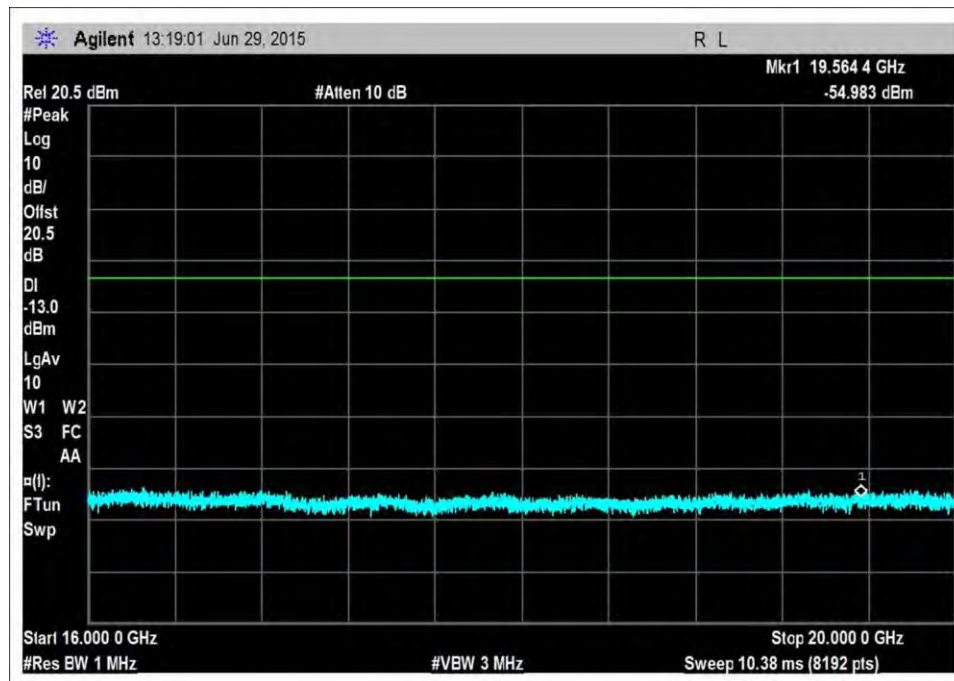
UL_698-716R4



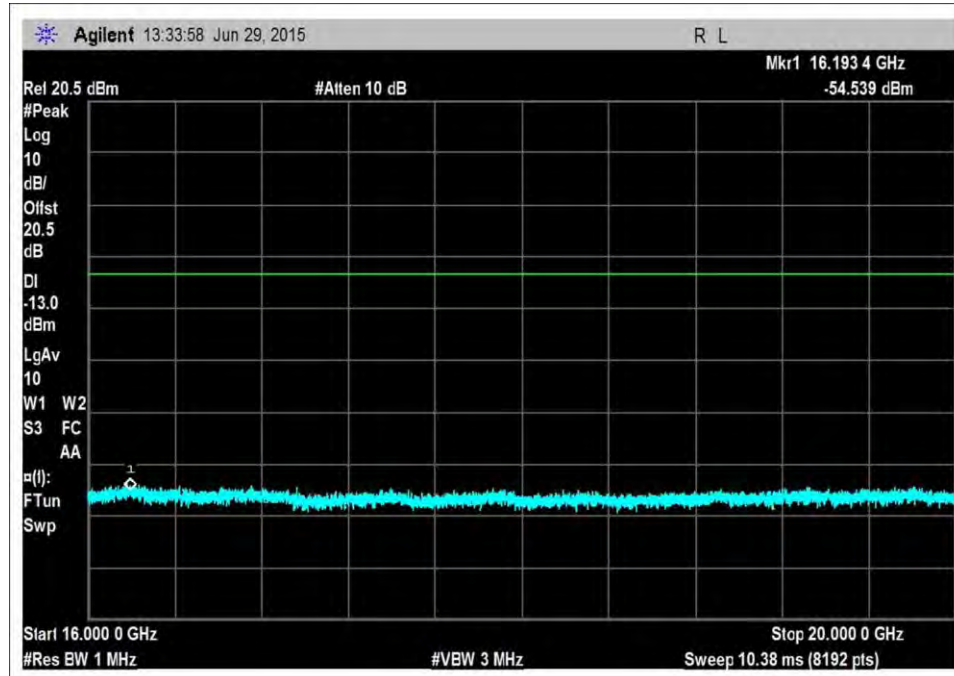
UL_776-787R4



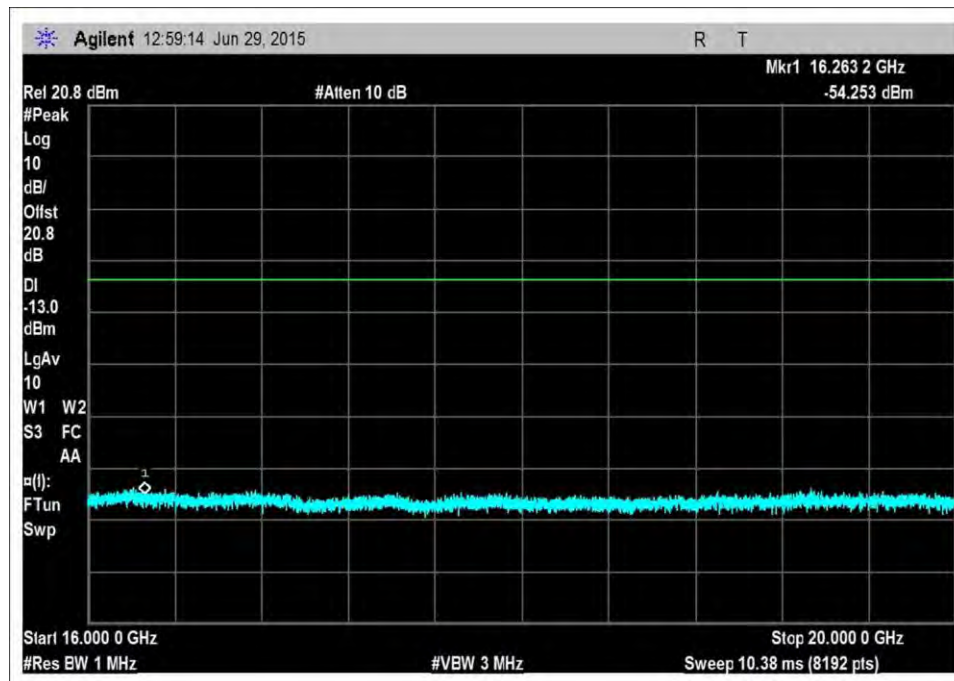
UL_1710-1755R4



UL_698-716R5

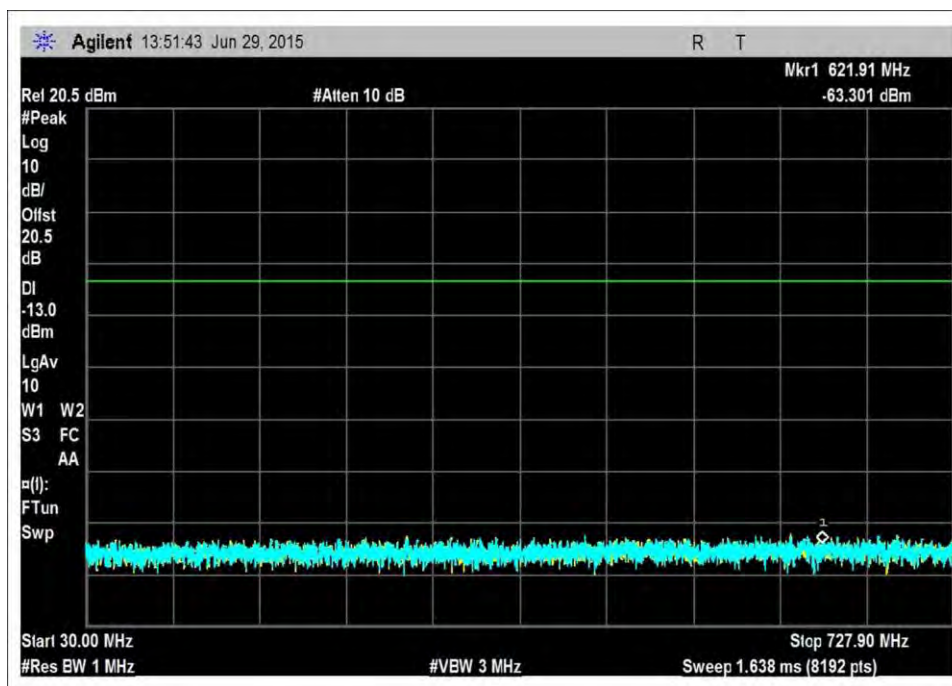


UL_776-787R5

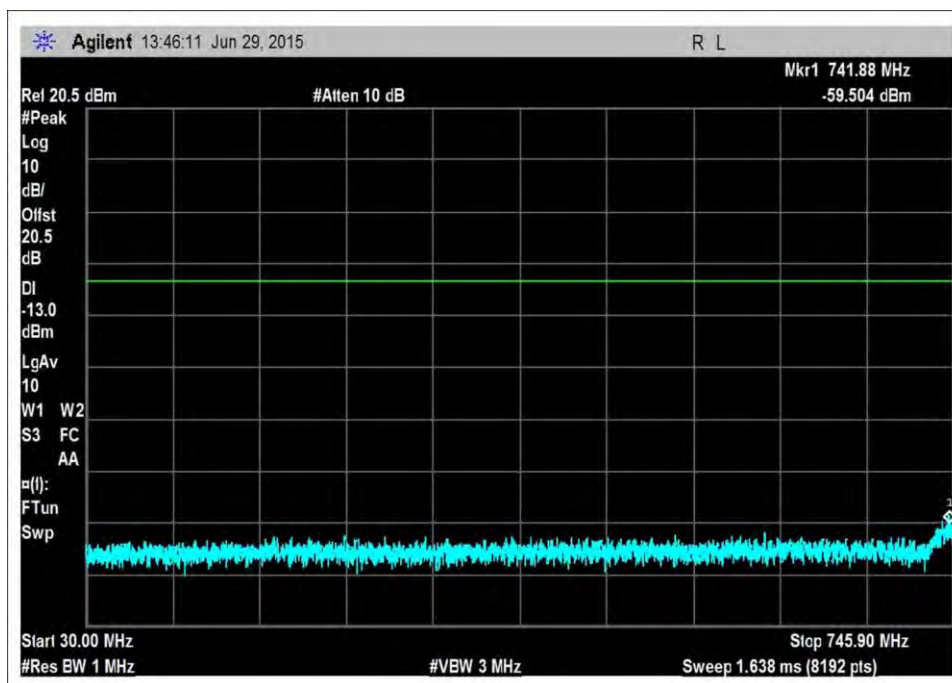


UL_1710-1755R5

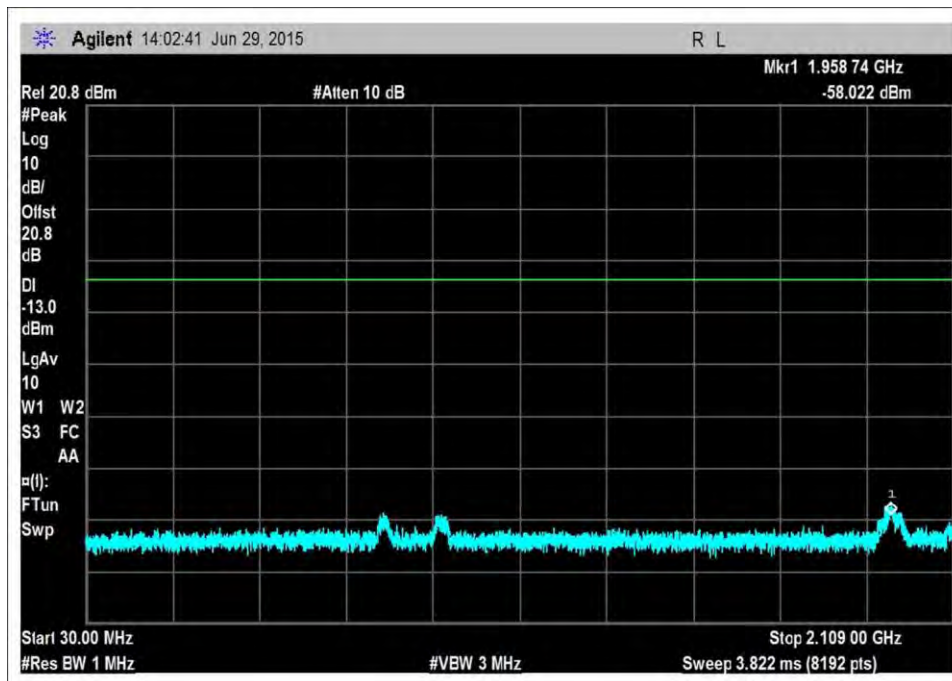
DL



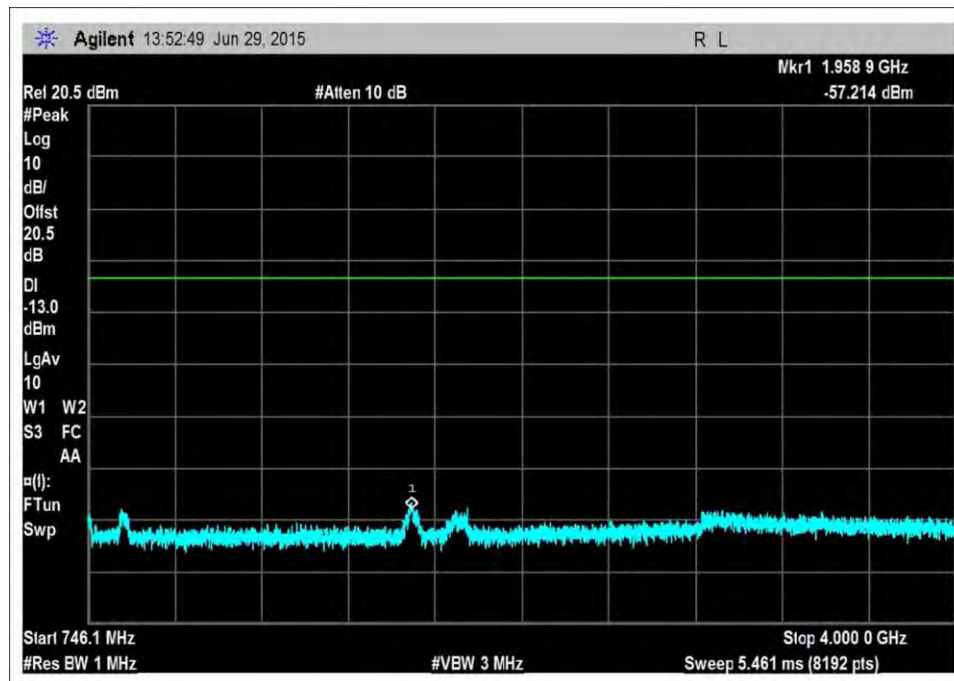
DL_728-746L



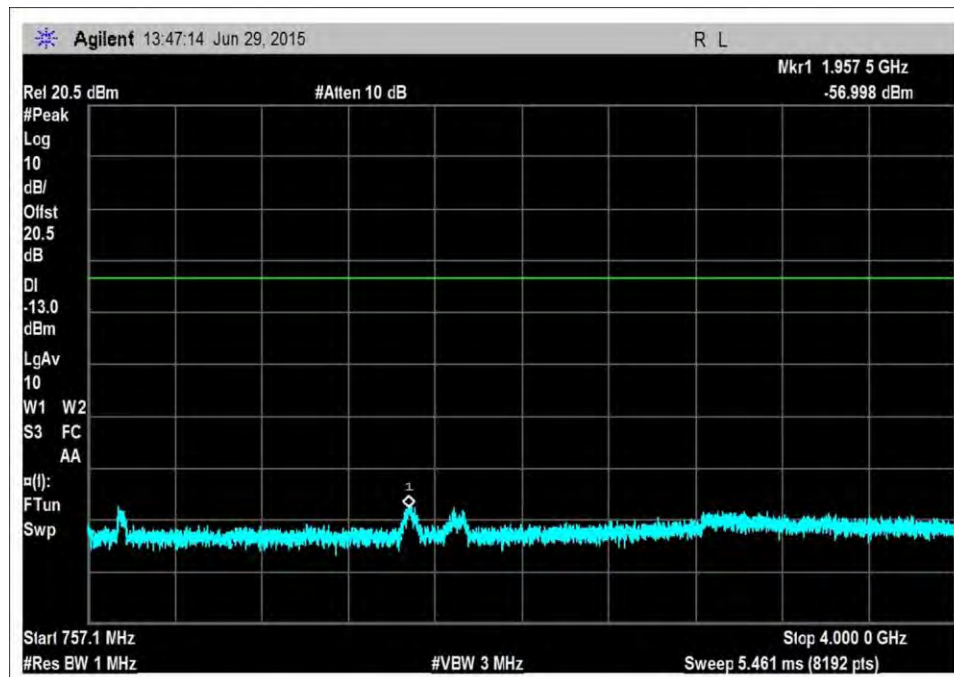
DL_746-757L



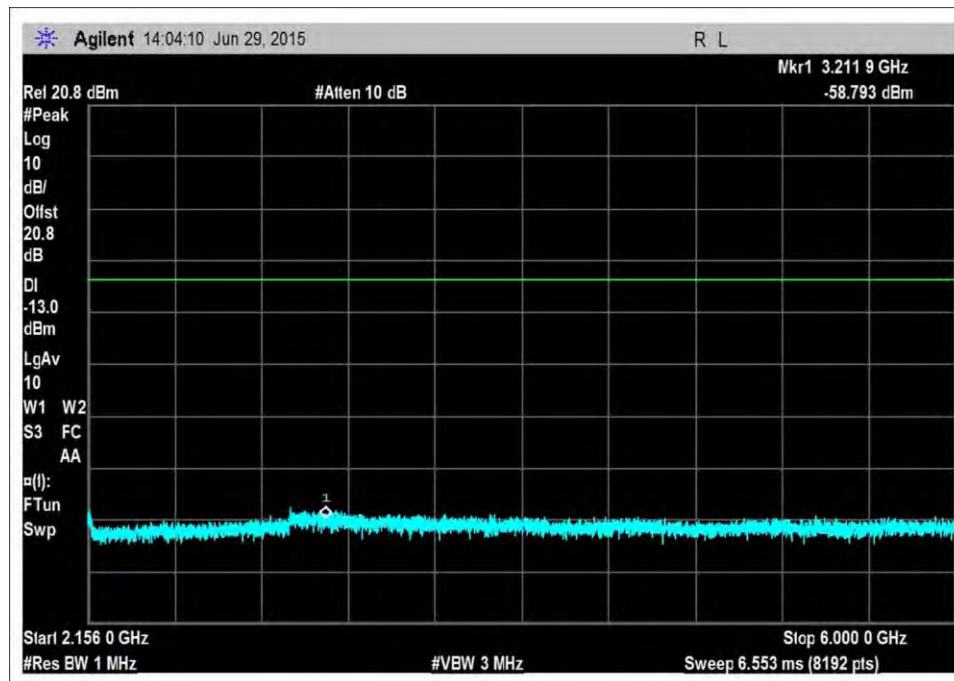
DL_2110-2155L



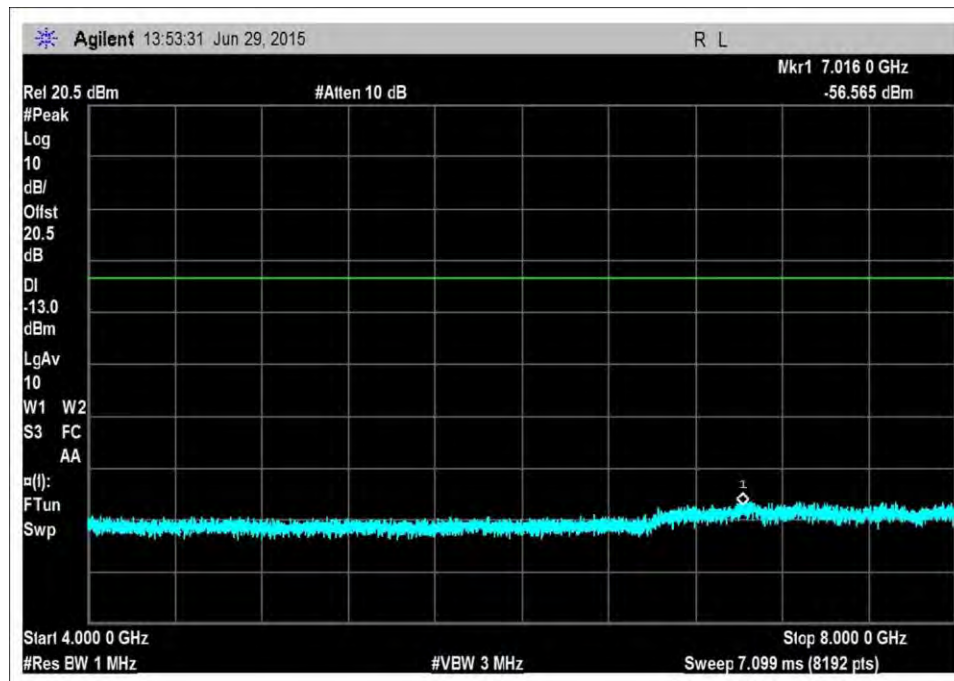
DL_728-746R1



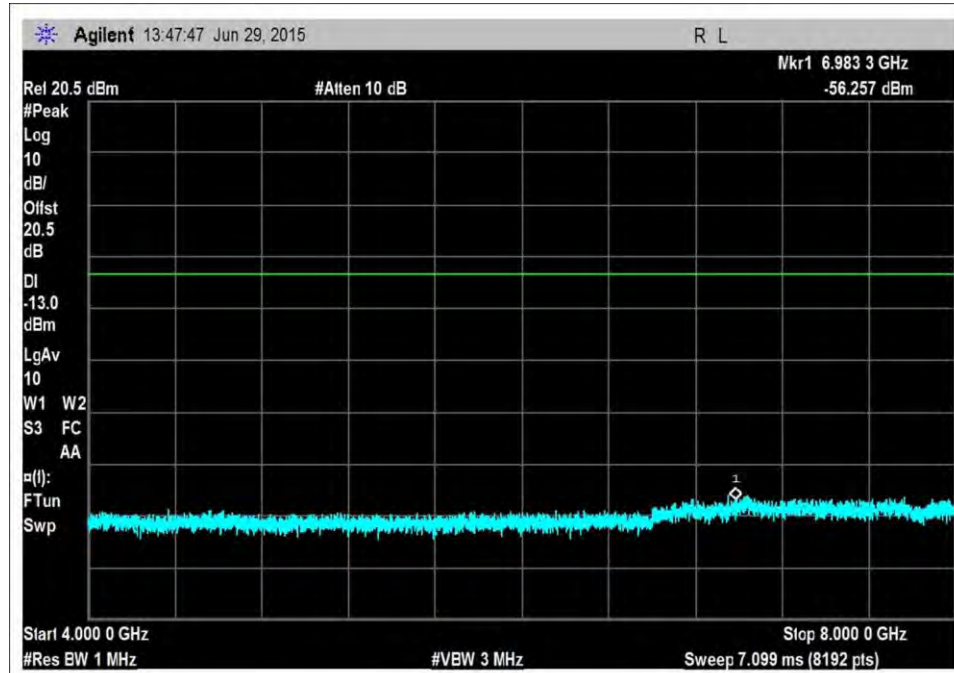
DL_746-757R1



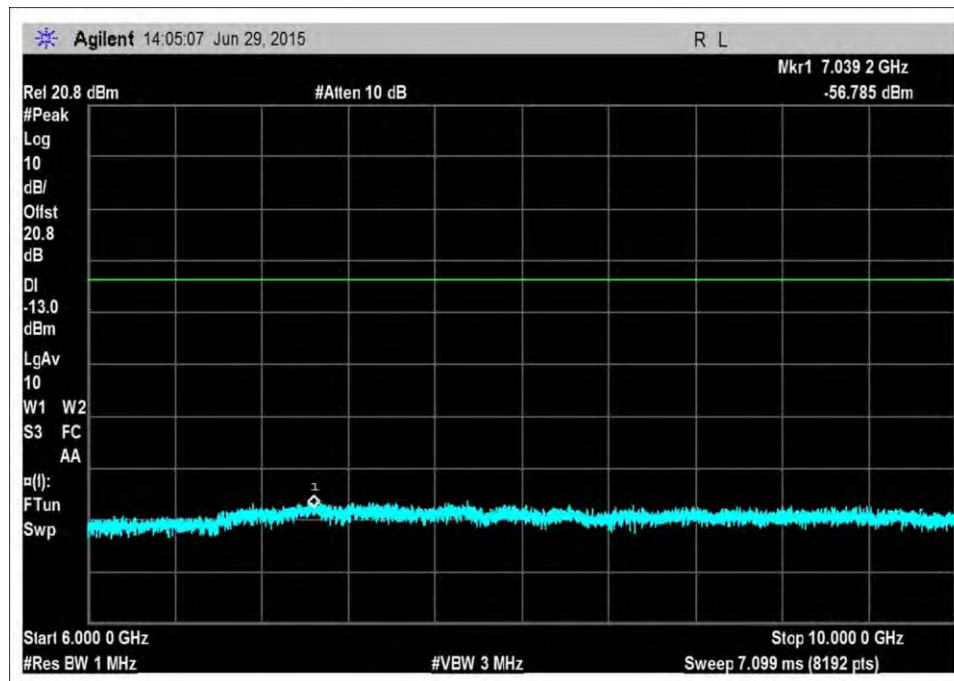
DL_2110-2155R1



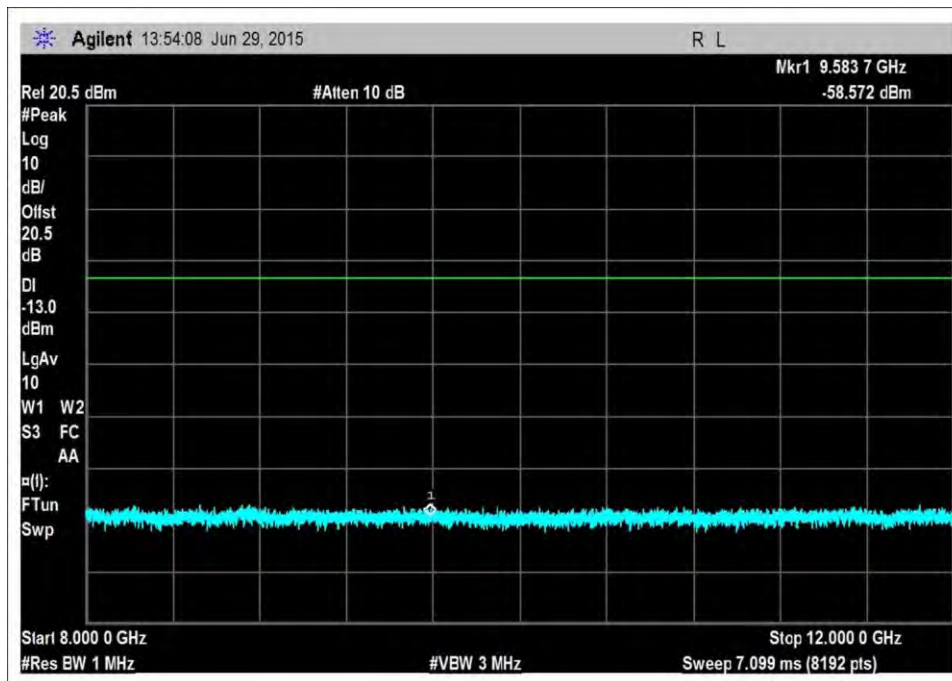
DL_728-746R2



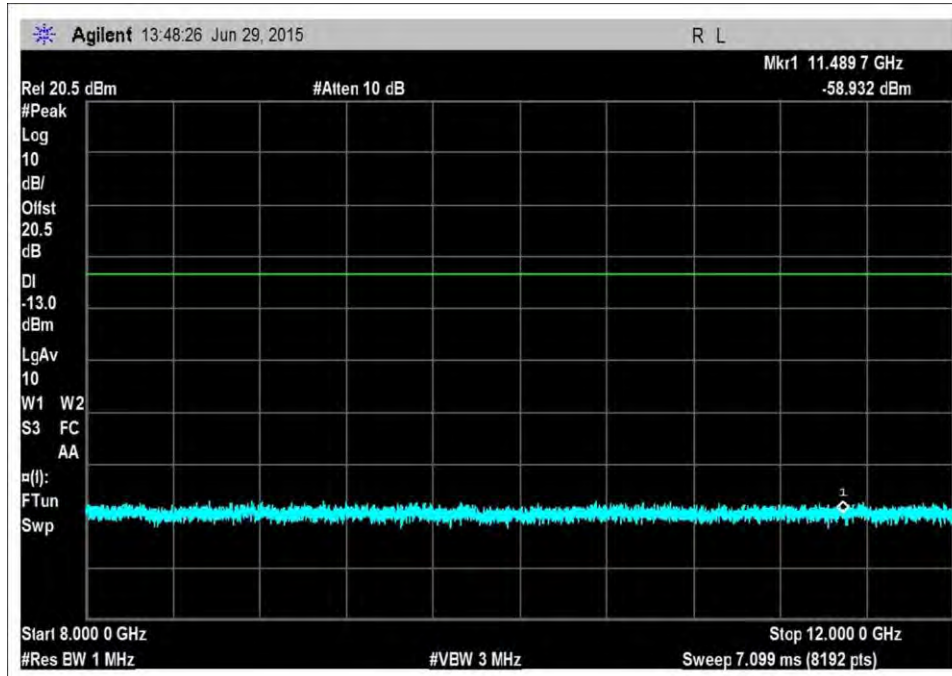
DL_746-757R2



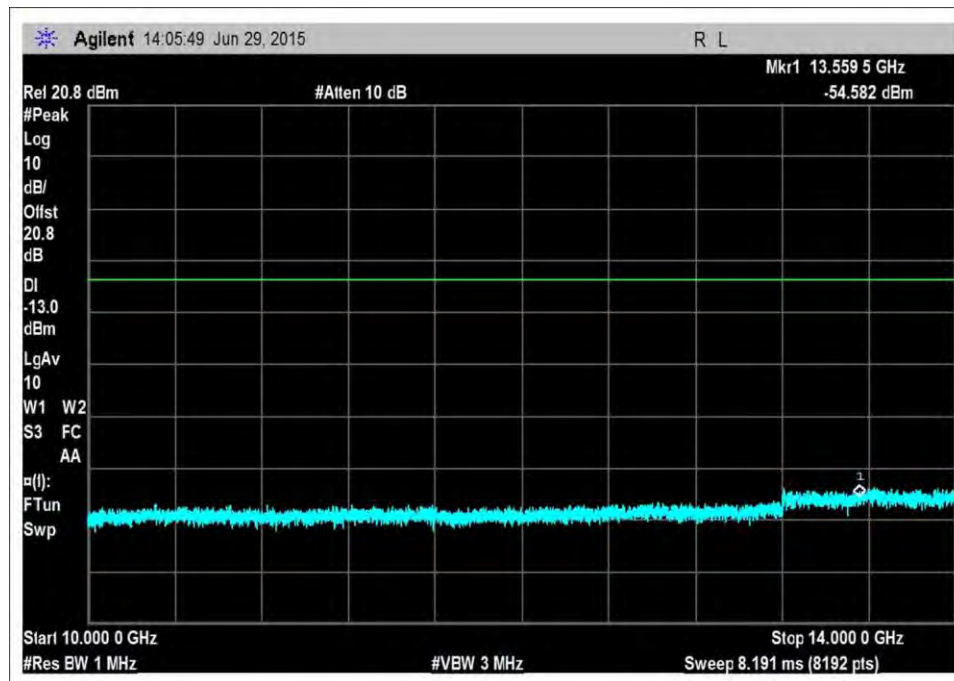
DL_2110-2155R2



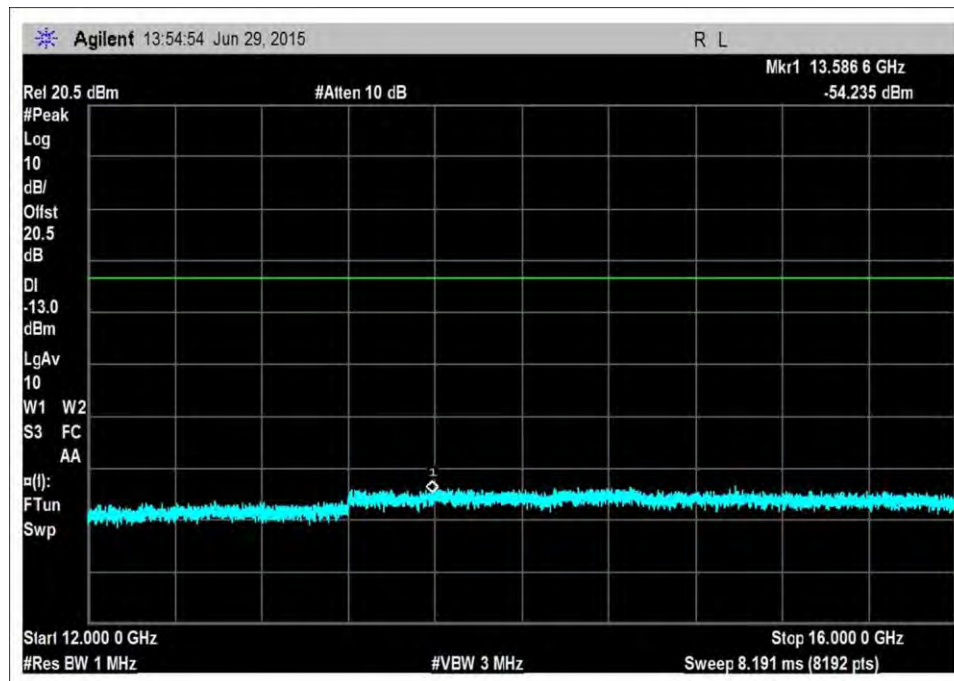
DL_728-746R3



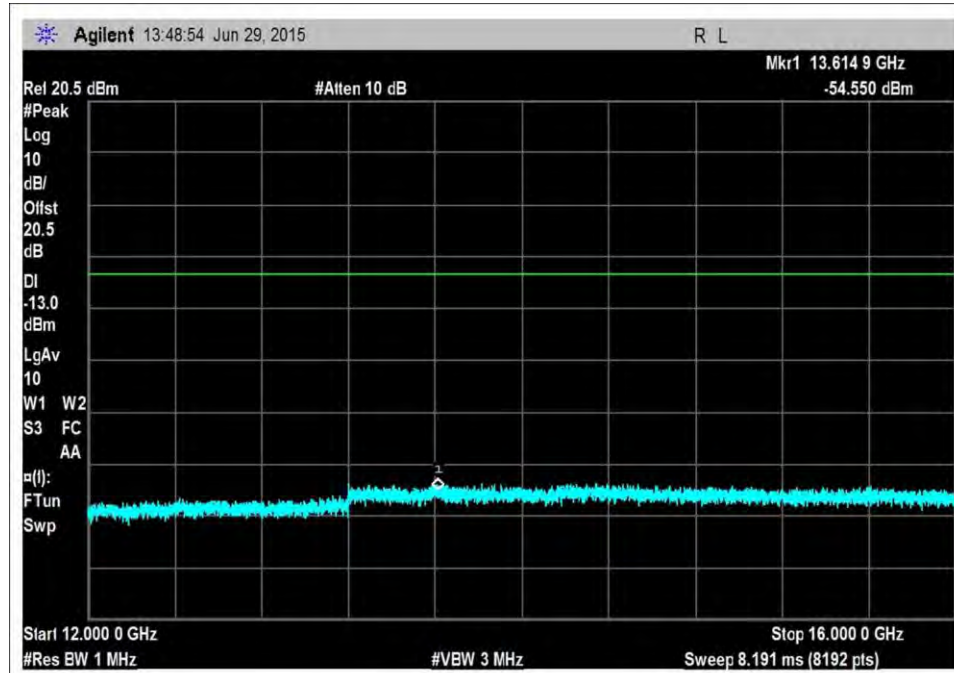
DL_746-757R3



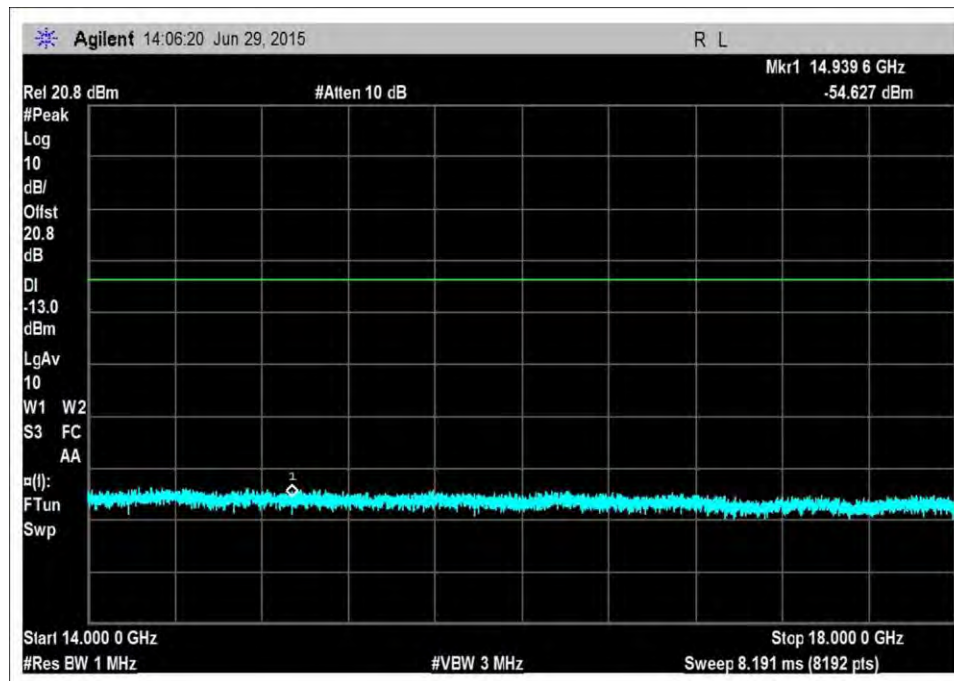
DL_2110-2155R3



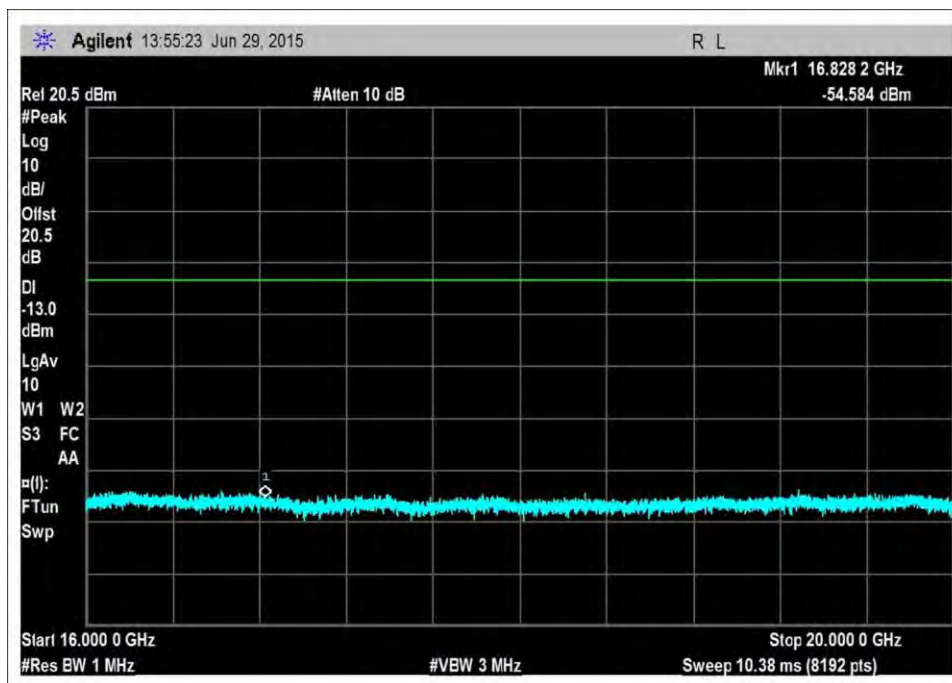
DL_728-746R4



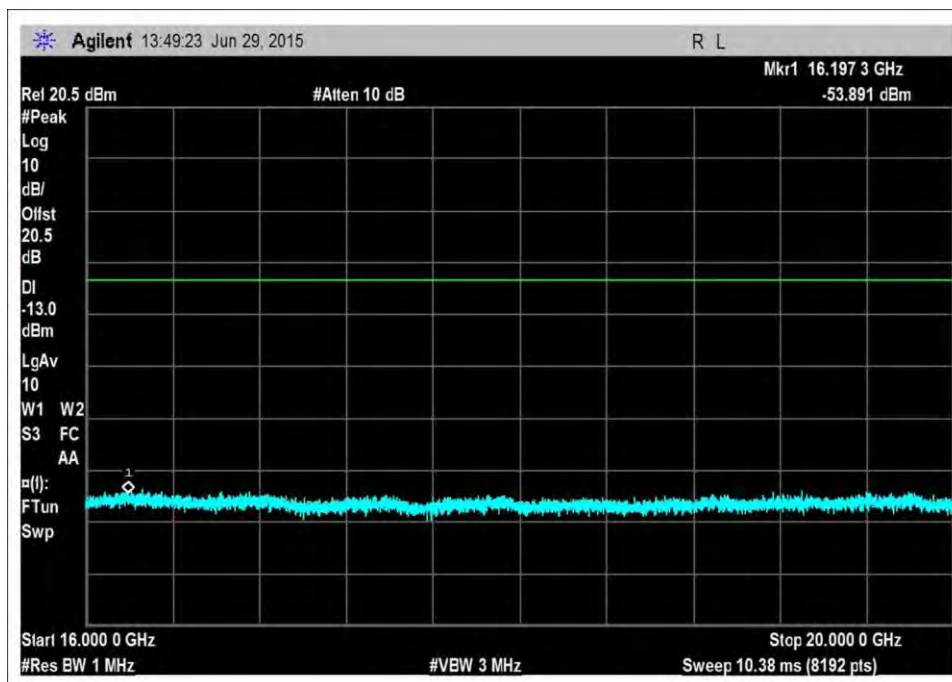
DL_746-757R4



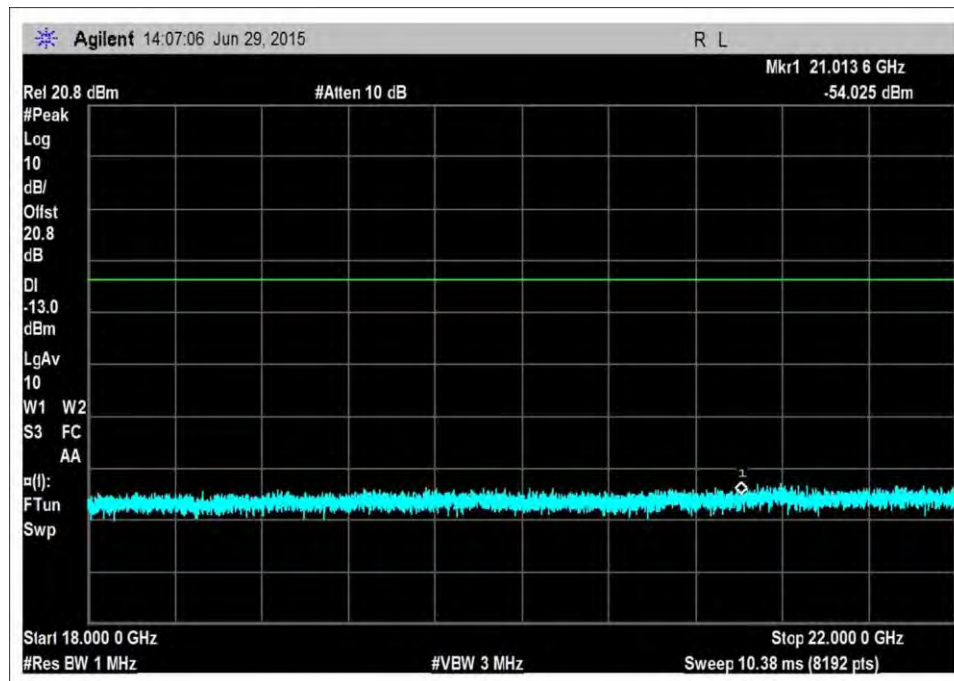
DL_2110-2155R4



DL_728-746R5



DL_746-757R5



DL_2110-2155R5

Test Setup Photo



2.1053 / 27.53(c)(f)(g)(h) Field Strength of Spurious Radiation

Test Equipment					
Asset #	Description	Model	Manufacturer	Cal Date	Cal Due
AN02157	Horn Antenna-ANSI C63.5 Calibration	3115	EMCO	12/02/2014	12/02/2016
ANP06710	Cable	32026-29094K-29094K-72TC	AstroLab	09/18/2014	09/18/2016
AN03114	Preamp	AMF-7D-00101800-30-10P	Miteq	04/22/2015	04/22/2017
ANP06126	Cable	32022-29094K-29094K-168TC	Astrolab	03/18/2015	03/18/2017
AN03302	Cable	32026-29094K-29094K-72TC	Astrolab	03/24/2014	03/24/2016
AN03471	RF Characteristics Analyzer	E4440A	Agilent	12/19/2013	12/19/2015
ANP00880	Cable	RG214U	Pasternack	06/13/2014	06/13/2016
ANP06691	Cable	PE3062-180	Pasternack	08/08/2014	08/08/2016
ANP01183	Cable	CNT-195	Andrews	09/03/2013	09/03/2015
AN00686	Preamp	8447D Opt 010	HP	05/27/2014	05/27/2016
AN00852	Biconilog Antenna	CBL 6111C	Schaffner	11/24/2014	11/24/2016
ANP00929	Cable	Various	Various	01/23/2014	01/23/2016
AN00432	Loop Antenna	6502	EMCO	05/08/2015	05/08/2017
AN02694	Active Horn Antenna	AMFW-5F-18002650-20-10P	Miteq	05/07/2015	05/07/2017
ANP05389	Attenuator	766-10	Narda	02/27/2014	02/27/2016
ANP06710	Cable	32026-29094K-29094K-72TC	AstroLab	09/18/2014	09/18/2016

Test Conditions / Setup

Test Location: CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170
 Customer: Cellphone-Mate, Inc.
 Specification: **47 CFR §27.53(c), (f), (g) and (h) Spurious Emissions**
 Work Order #: **97222** Date: 7/20/2015
 Test Type: **Radiated Emissions** Time: 08:24:38
 Tested By: Daniel Bertran Sequence#: 1
 Software: EMITest 5.02.00

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

Configuration 1

The equipment under test (EUT) is a Mobile Wideband Consumer Booster.
 During testing, the (EUT) is placed on the Styrofoam table top.
 A remotely located signal generator is connected to input port of EUT.
 All adjustable settings on the test sample are set at max gain.
 Firmware: V1.0

Evaluation of DL path was performed with signal fed into the Outside antenna port while Inside antenna port was terminated with 50 Ohm Weinschel load (MN:1424-4 and SN:21874).
 Evaluation of UL path was performed with signal fed into the Inside antenna port while Outside antenna port was terminated with the same above 50 Ohm load.

Part 27
 UL: 1710-1755MHz, 698-716MHz, 776-787MHz
 DL: 2110-2155MHz, 728-746MHz, 746-757MHz

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

Test environment conditions: Temperature: 21.1°C, Relative Humidity: 45%, Atmospheric Pressure: 101.5kPa
 Test procedure: The test was performed in accordance with section 7.1 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v03 Dated June 5, 2015.

Notes:
No emissions were found within 20dB of the limit line.
 Emissions in the band 1559-1610 MHz were investigated but were not found within 20dB of the limit line.
 27.53(f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. 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.

Summary of Results

Pass: No data provided since all emissions were found more than 20dB below the limit.

Test Data

Limit line for Spurious Radiated Emission

$$\text{Required Attenuation} = 43 + 10 \log P \text{ (dB)}$$

For radiated spurious emission measured at 3 meter test distance,

$$\begin{aligned} \text{Required attenuation} &= 43 + 10 \log P_{t \text{ at 3 meter}} \text{ dB} \\ \text{Limit line (dBuV)} &= E_{\text{dBuV}} - \text{Attenuation} \end{aligned}$$

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

Power Density (Isotropic)

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

P_D = Power Density in Watts /m²

P_t = Average Transmit Power

r = Test distance

Field Intensity E (V/m)

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

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

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

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

$$10 \log P_t = 10 \log E^2 (V/m) + 10 \log r^2 - 10 \log 30$$

$$10 \log P_t = 20 \log E (V/m) + 20 \log r - 10 \log 30$$

At 3 meter, r = 3 m

$$10 \log P_t = 20 \log E (V/m) + 20 \log 3 - 10 \log 30$$

$$10 \log P_t = 20 \log E (V/m) + 9.54 - 14.77$$

$$10 \log P_t = 20 \log E (V/m) - 5.23$$

$$\text{Since } 20 \log E (V/m) = 20 \log E (uV/m) - 120$$

$$10 \log P_t = 20 \log E (uV/m) - 120 - 5.23$$

$$10 \log P_t = 20 \log E (uV/m) - 125.23$$

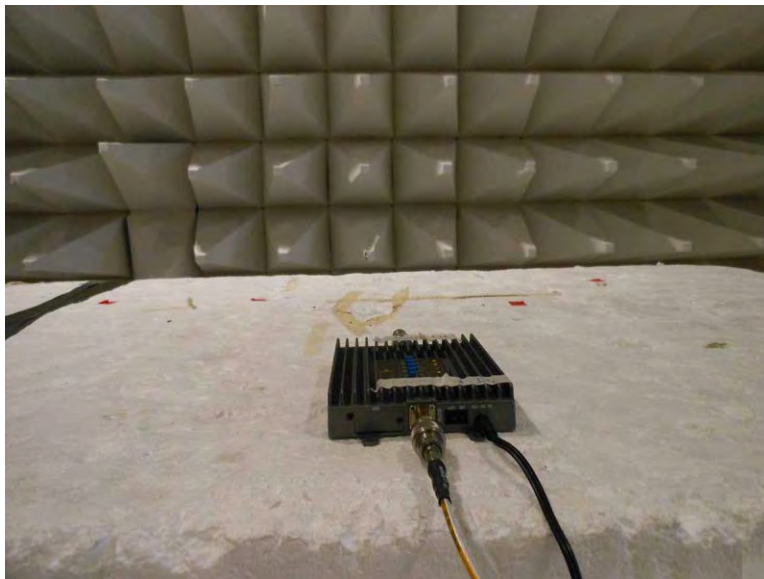
$$\begin{aligned} \text{Limit line (dBuV) at 3 meter} &= E_{dBuV} - \text{Attenuation} \\ &= E_{dBuV} - (43 + 10 \log P_{t \text{ at 3 meter}}) \\ &= E_{dBuV} - 43 - 10 \log P_{t \text{ at 3 meter}} \\ &= E_{dBuV} - 43 - (20 \log E (uV/m) - 125.23) \\ &= E_{dBuV} - 43 - 20 \log E (uV/m) + 125.23 \\ &= E_{dBuV} - 20 \log E (uV/m) + 82.23 \end{aligned}$$

$$\text{Since } 20 \log E (uV/m) = E \text{ in dBuV/m}$$

$$= E_{dBuV} - E_{dBuV} + 82.23$$

$$\text{Radiated Emission limit 3 meter} = 82.23 \text{ dBuV at any power level measured in dBuV}$$

Test Setup Photo(s)



2.1055 Frequency Stability

Note: This test is not applicable because the EUT does not alter the input signal.