

Cellphone-Mate, Inc.

ADDENDUM TO TEST REPORT 95255-8

Fixed Wideband Consumer Signal Booster Model: Force-5

Tested To The Following Standards:

FCC Part 27C

Report No.: 95255-8A

Date of issue: February 11, 2014



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

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

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Hongtao Zhan
Customer Reference Number: CKC2013226

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

Dianne Dudley
CKC Laboratories, Inc.
5046 Sierra Pines Drive
Mariposa, CA 95338

Project Number: 95255

January 3, 2014

January 3-15, 2014

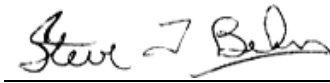
Revision History

Original: Testing of the Fixed Wideband Consumer Signal Booster, Force-5 to FCC Part 27C.

Addendum A: To add 27.53(e) test data to report.

Report Authorization

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



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

Test Facility Information



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

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

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.00.14

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea D	US0060	SL2-IN-E-1146R	3082D-2	100638	A-0147

SUMMARY OF RESULTS

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

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

NA = Not applicable.

Conditions During Testing

This list is a summary of the conditions noted for or modifications made to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Fixed Wideband Consumer Signal Booster

Manuf: Cellphone-Mate, Inc.

Model: Force-5

Serial: None

PERIPHERAL DEVICES

The EUT was tested with the following peripheral device(s):

AC to 18VDC Power Adapter

Manuf: Adapter Tech.

Model: STD-1805

Serial: None

FCC PART 27

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) requirements for licensed devices. 47 CFR Part 27: Miscellaneous Wireless Communication Services.

2.1046 RF Power Output

NA = Not applicable because the EUT also falls under other FCC rule parts; see applicable FCC test report.

2.1047 Modulation Characteristics

NA = Not applicable because the EUT does not employ modulation characteristics.

2.1049 Occupied Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Cellphone-Mate, Inc.**
 Specification: **47 CFR §2.1049(I) Occupied Bandwidth**
 Work Order #: **95255** Date: 01/10/2014
 Test Type: **Conducted Emissions**
 Equipment: Fixed Wideband Consumer Signal
 Booster
 Manufacturer: Cellphone-Mate, Inc. Tested By: Yamamoto
 Model: Force-5 110V 60Hz
 S/N: (none)

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014
T2	AN03431	Attenuator	89-20-21	9/5/2013	9/5/2015
T3	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Fixed Wideband Consumer Signal Booster	Cellphone-Mate, Inc.	Force-5	(none)

Support Devices:

Function	Manufacturer	Model #	S/N
AC to 18Vdc Power Adapter	Adapter Tech.	STD-1805	(none)

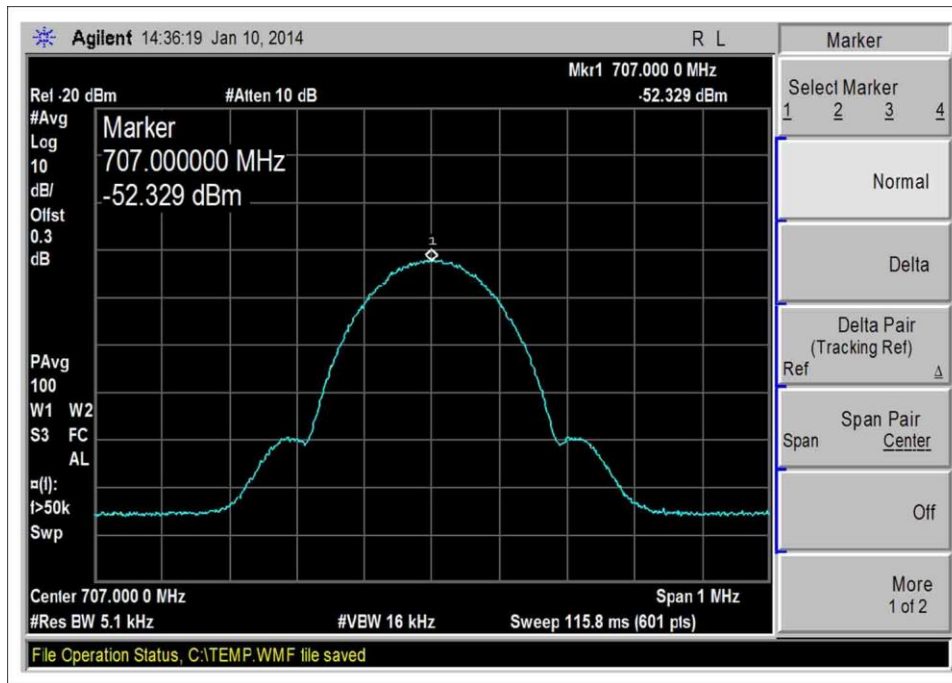
Test Conditions / Notes:

The EUT is placed on the test bench. Gain is set to maximum gain. All dip switches are set to Off position. Evaluation performed at the Outside (Donor) and Inside (Server) antenna ports. Input and output screen captures were made at the center frequency of each of the following six bands: UL 776-787MHz, UL 698-716MHz, UL 1710-1755MHz, DL 746-757MHz, DL 728-746MHz, DL 2110-2155MHz. Carrier was modulated with GSM, CDMA, and LTE.

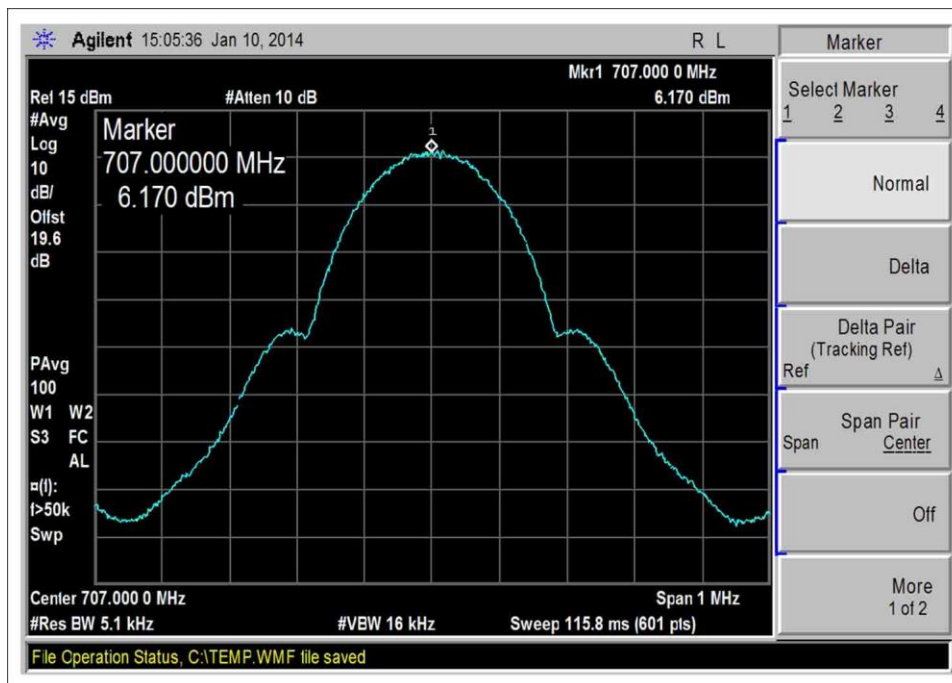
Test procedure:
 The test was performed in accordance with section 7.10 of the FCC Publication: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 August 7, 2013.

Test environment conditions: 23°C, 32%, 100kPa

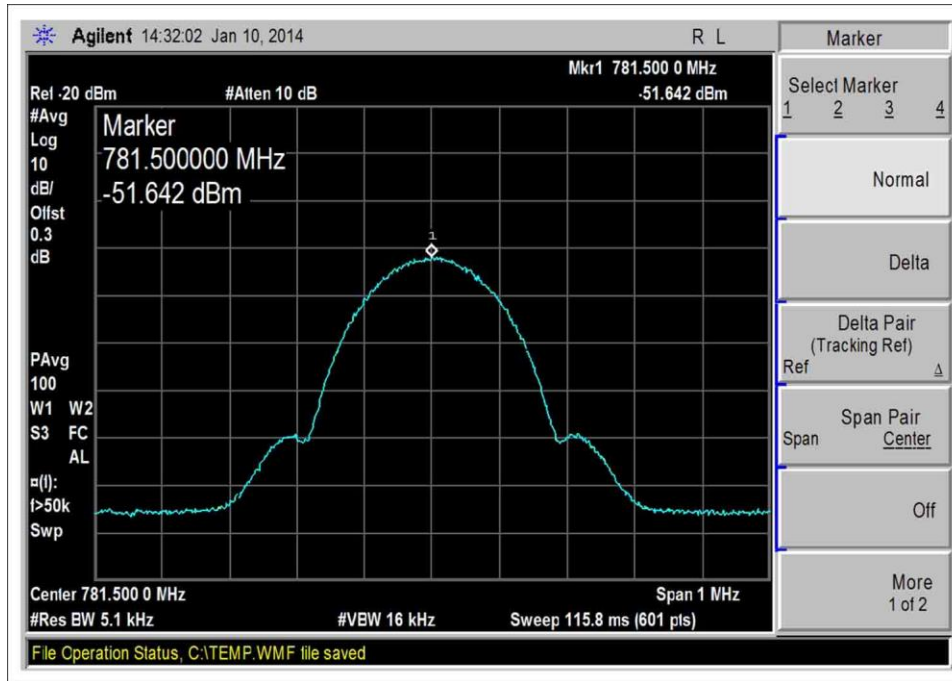
Test Data



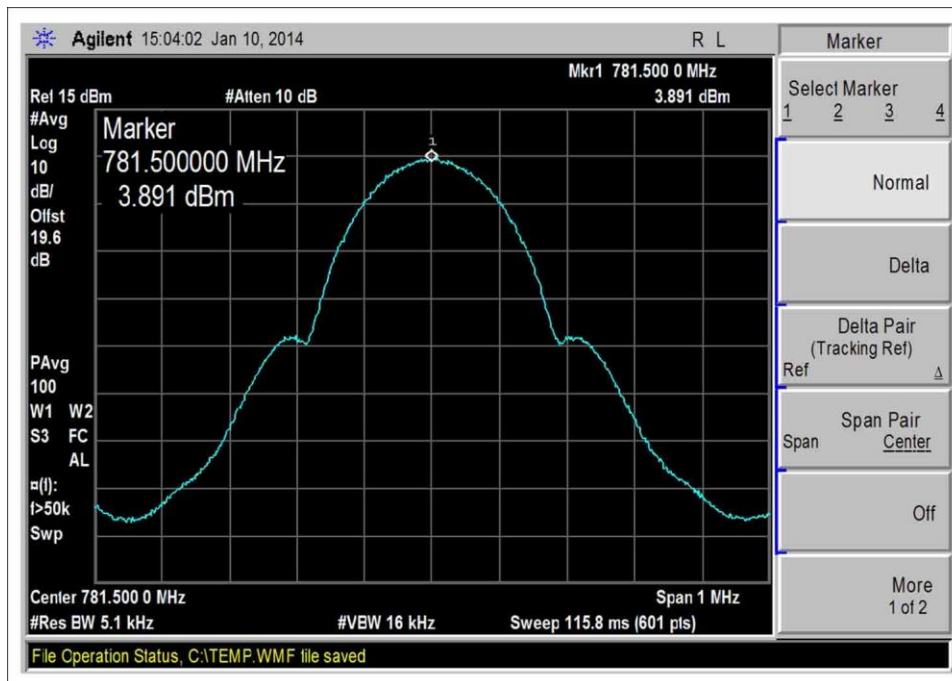
698-716MHz UL, GSM-Input



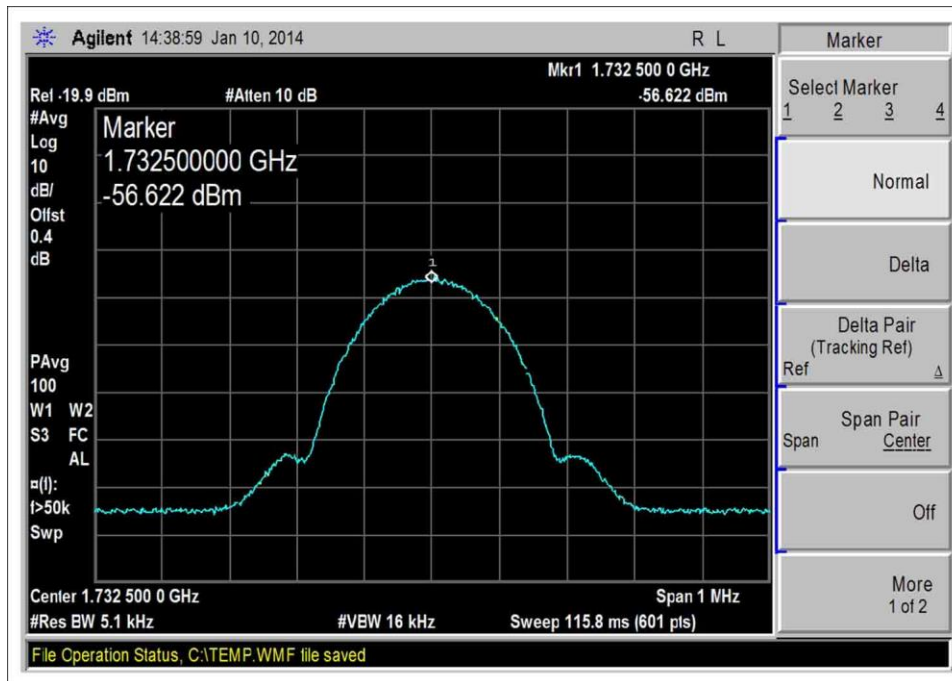
698-716MHz UL, GSM-Input



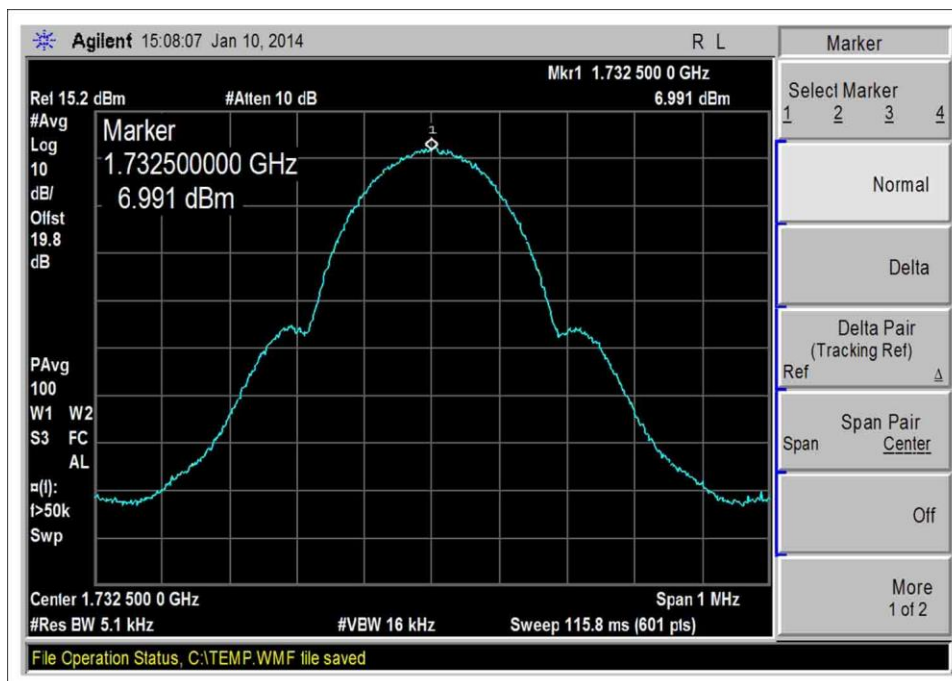
776-787MHz UL, GSM-Input



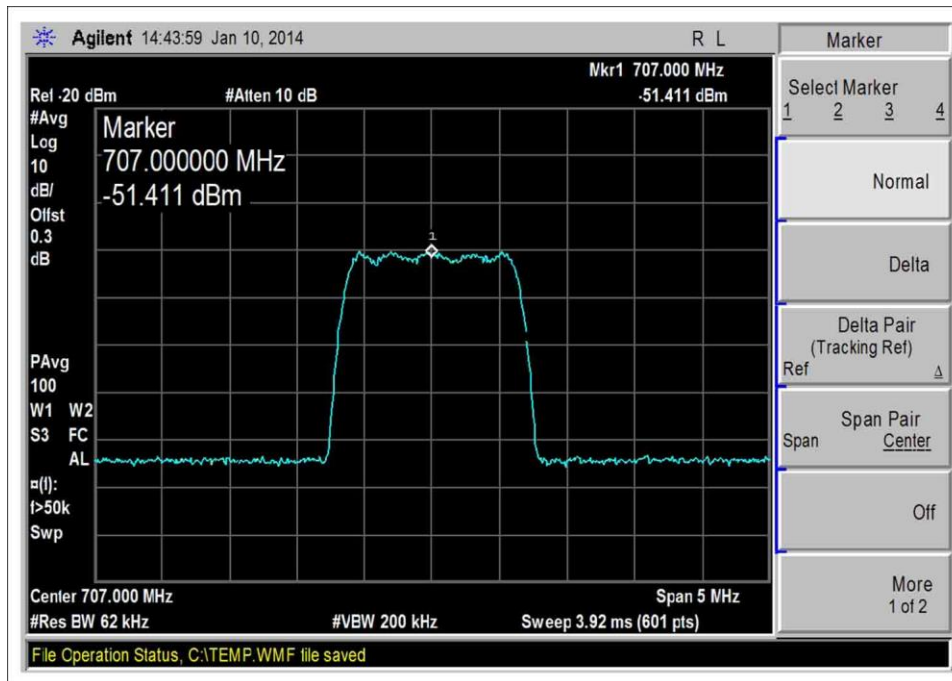
776-787MHz UL, GSM-Output



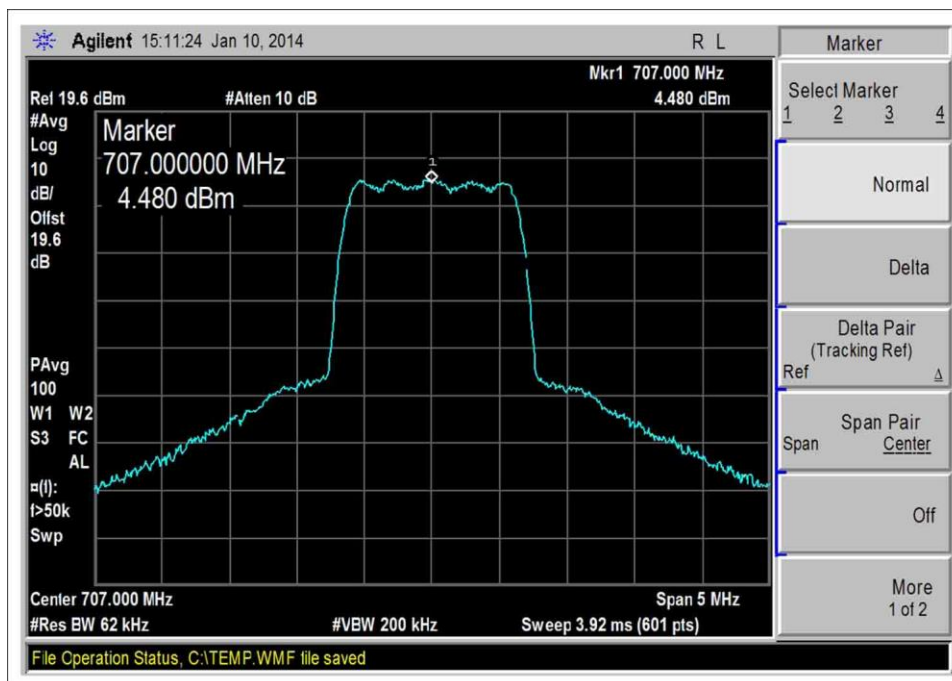
1710-1755 UL, GSM-Input



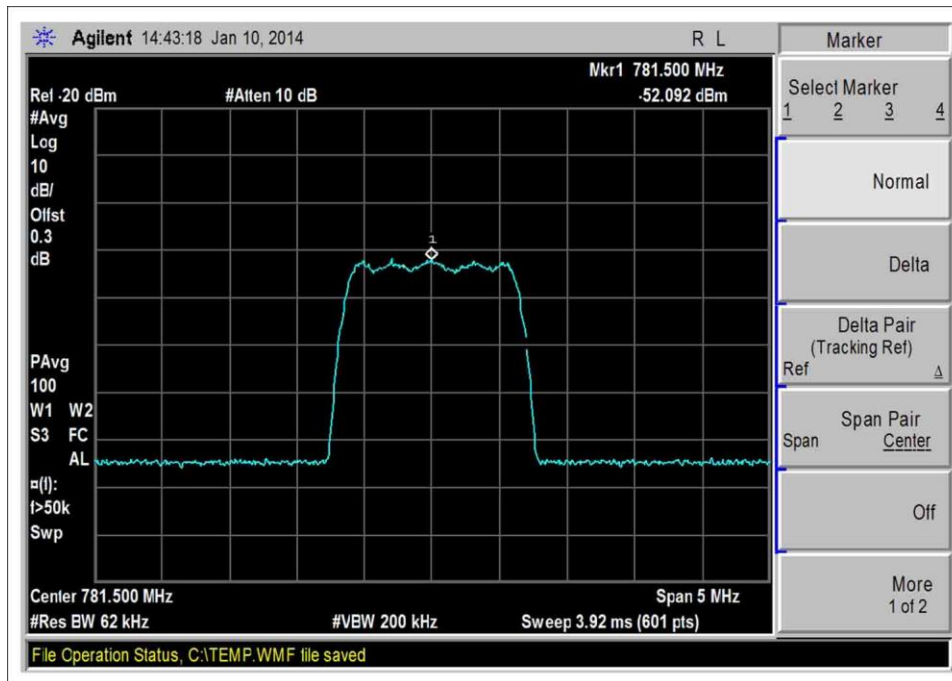
1710-1755MHz UL, GSM-Output



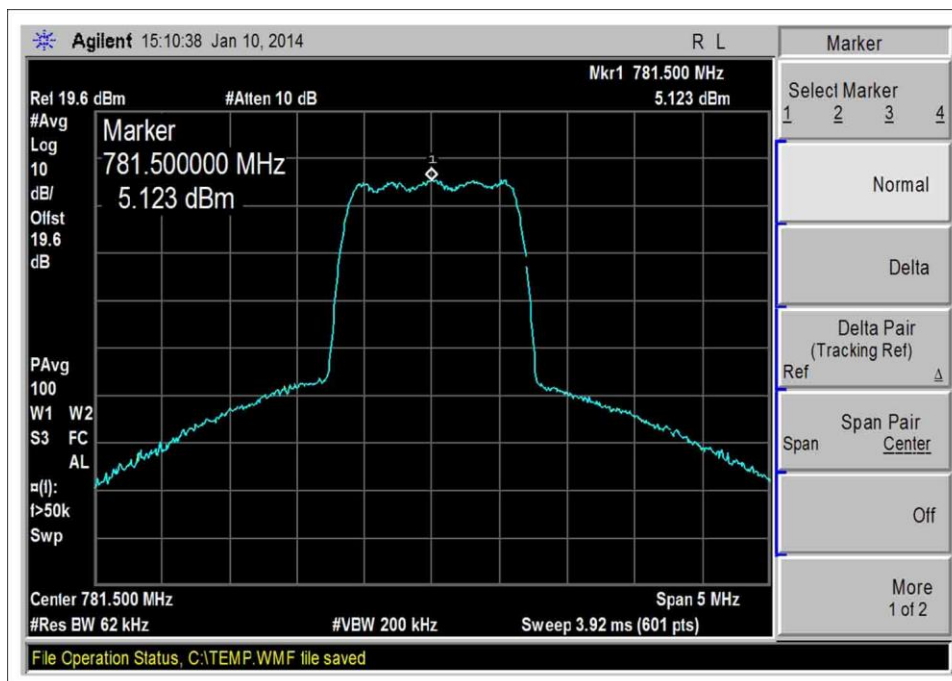
698-716MHz UL, CDMA-Input



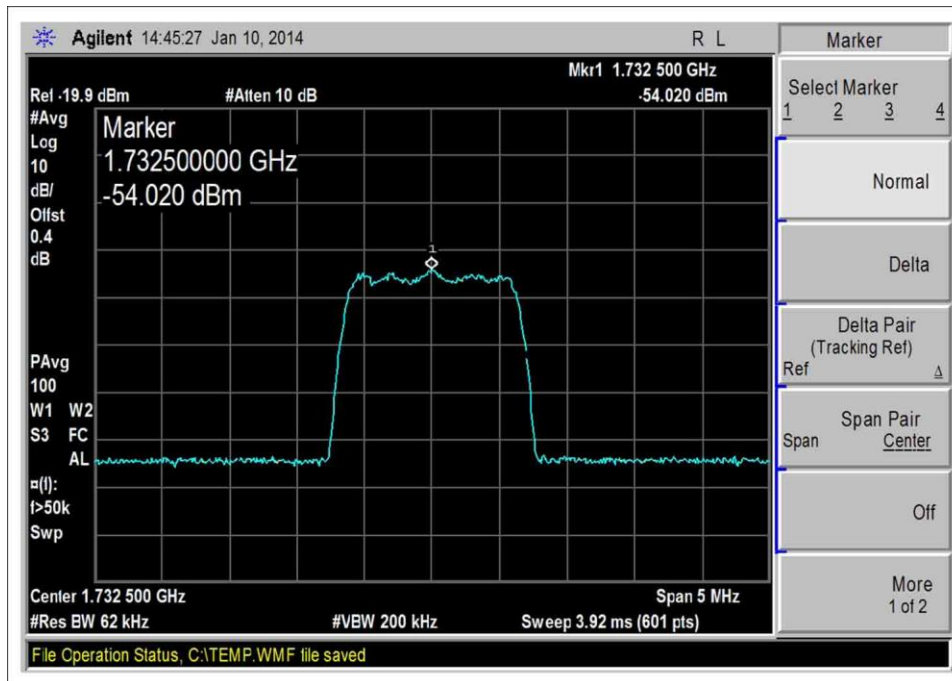
698-716MHz UL, CDMA-Output



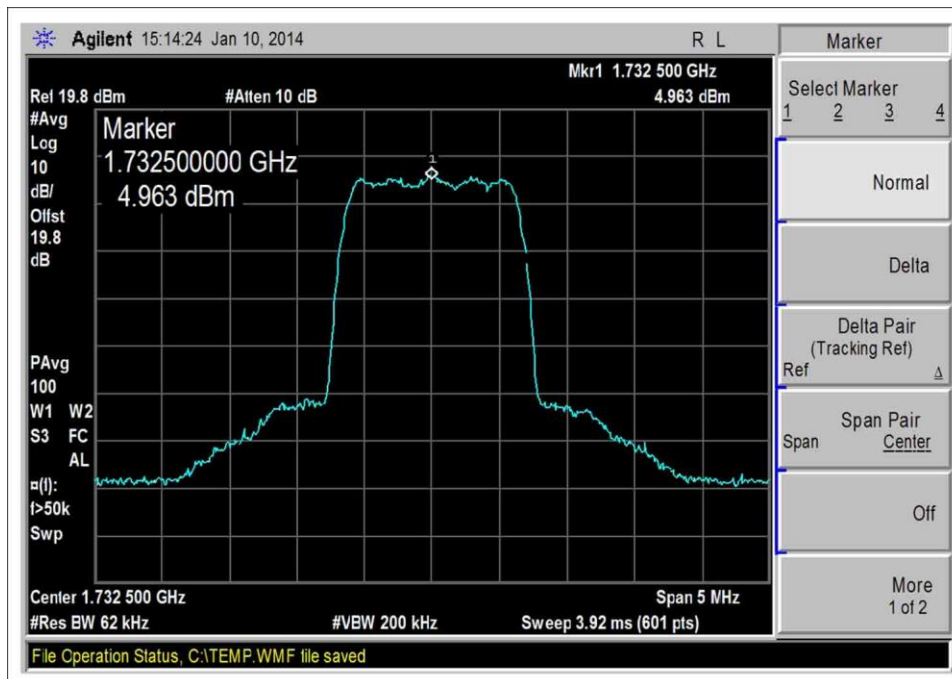
776-787MHz UL, CDMA-Input



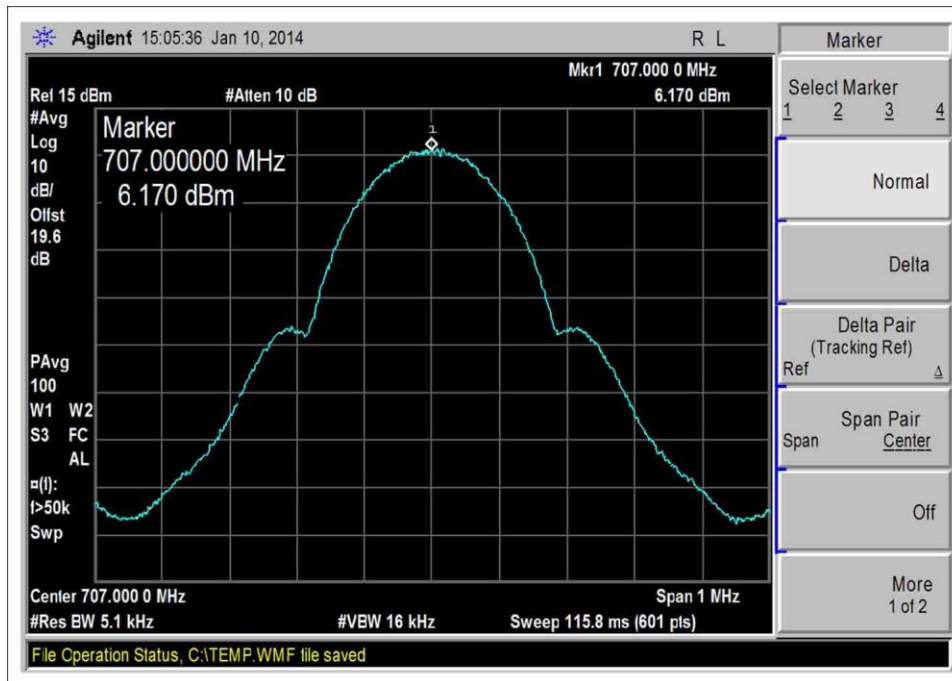
776-787MHz UL, CDMA-Output



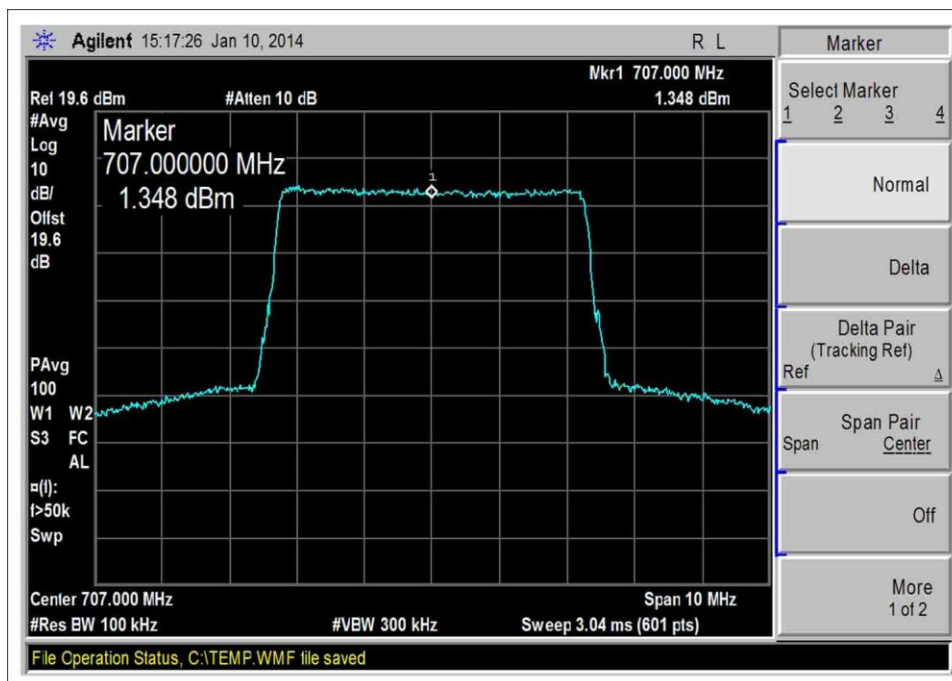
1710-1755MHz UL, CDMA-Input



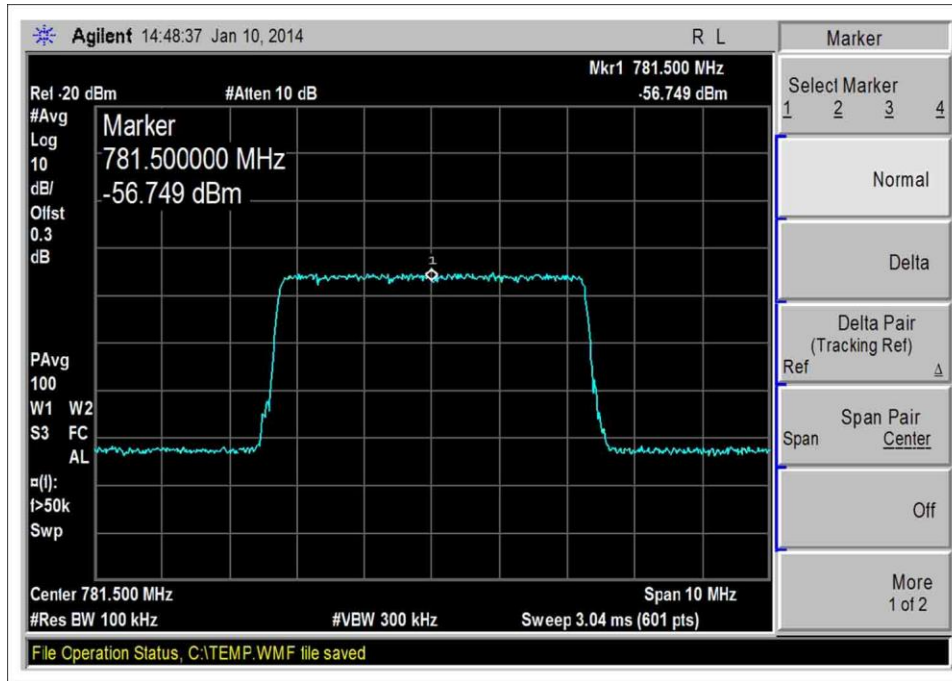
1710-1755MHz UL, CDMA-Output



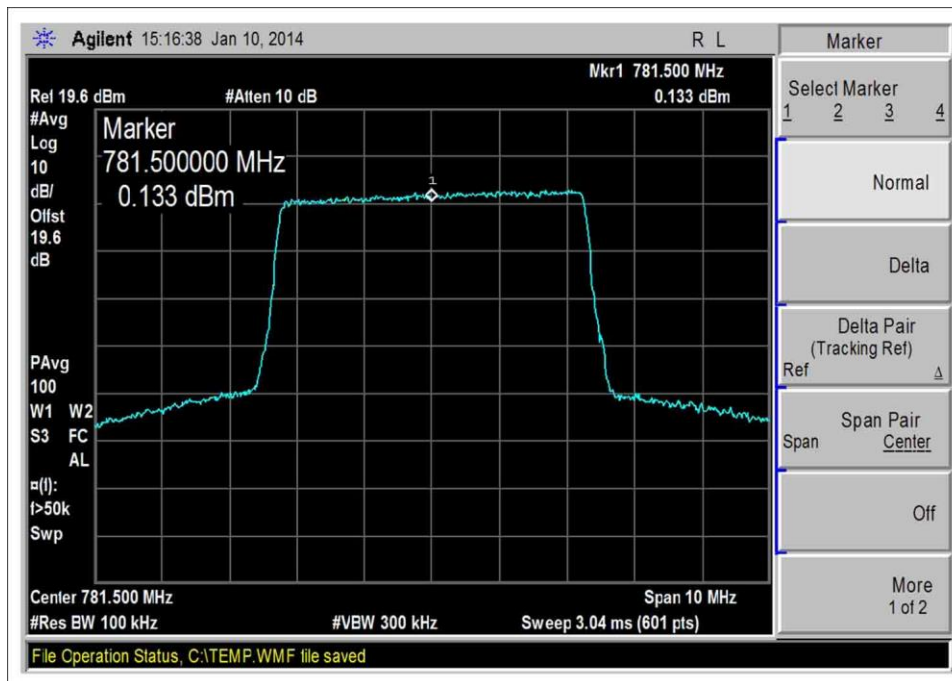
698-716MHz UL, LTE-Input



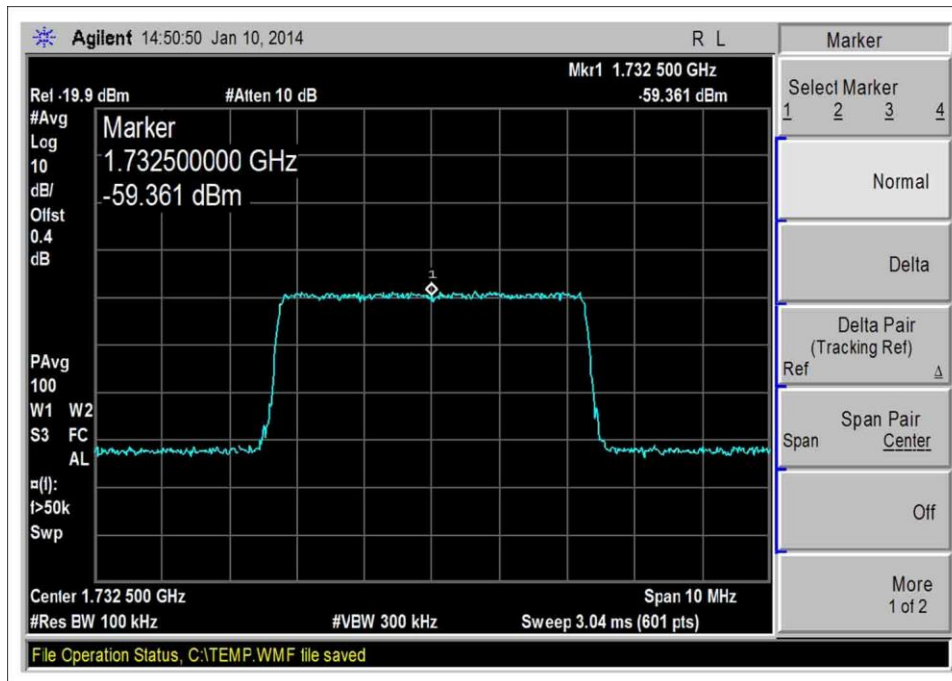
698-716MHz UL, LTE-Output



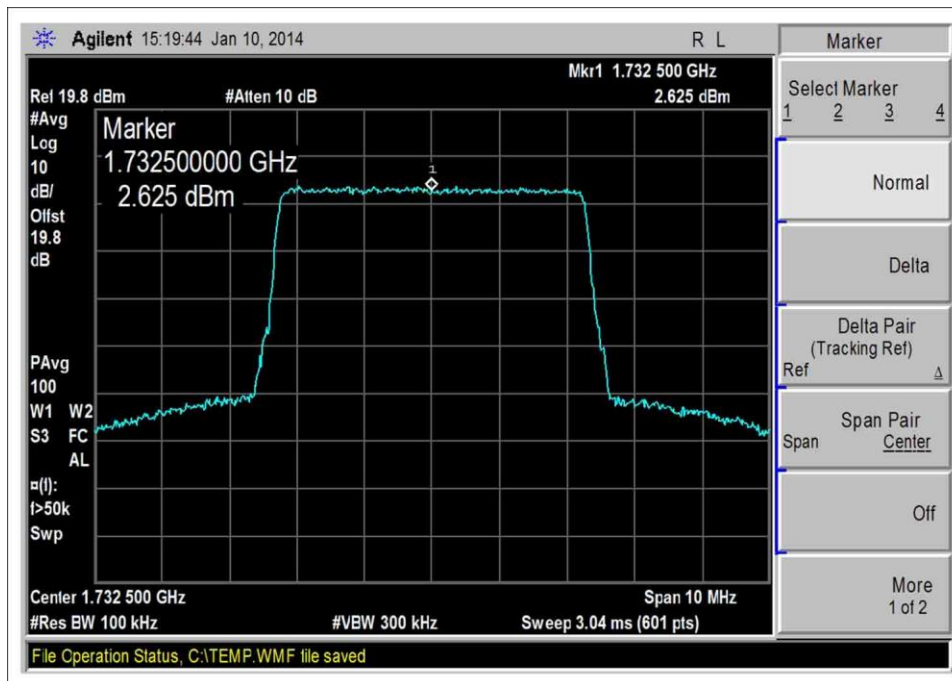
776-787MHz UL, LTE-Input



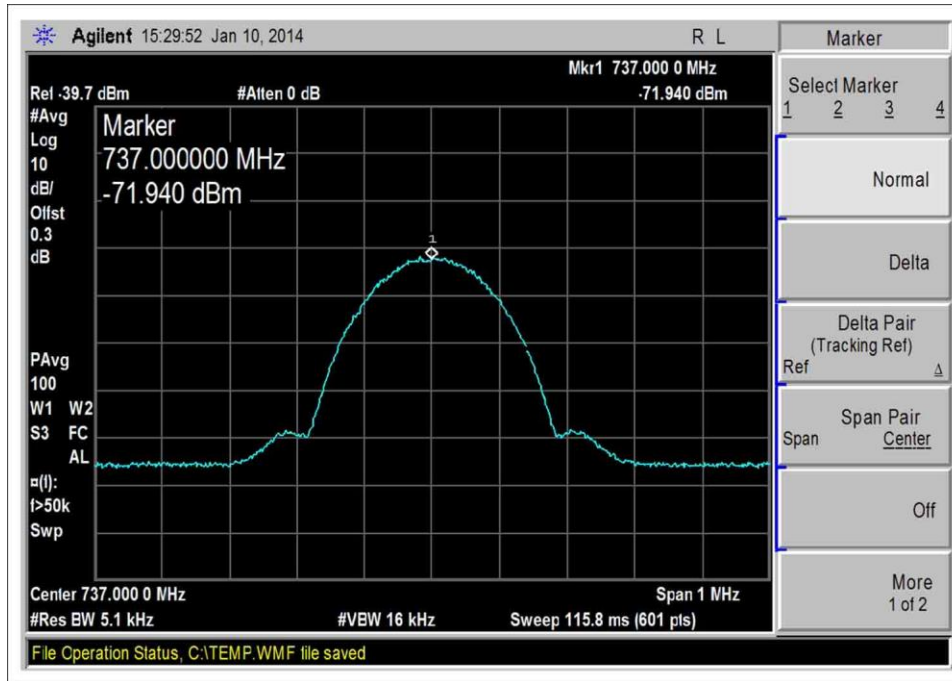
776-787MHz UL, LTE-Output



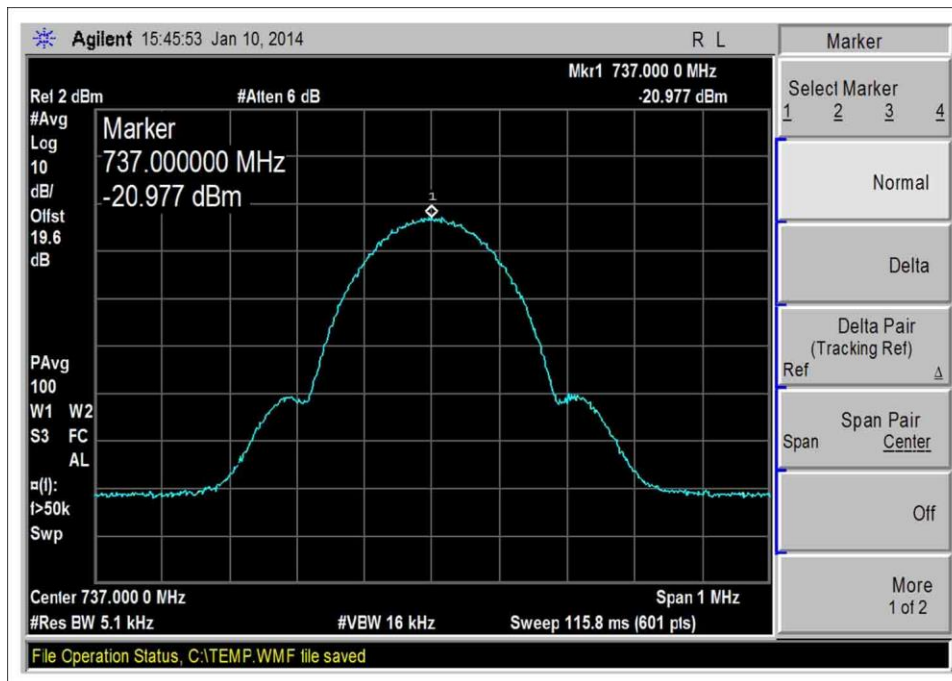
1710-1755MHz UL, LTE-Input



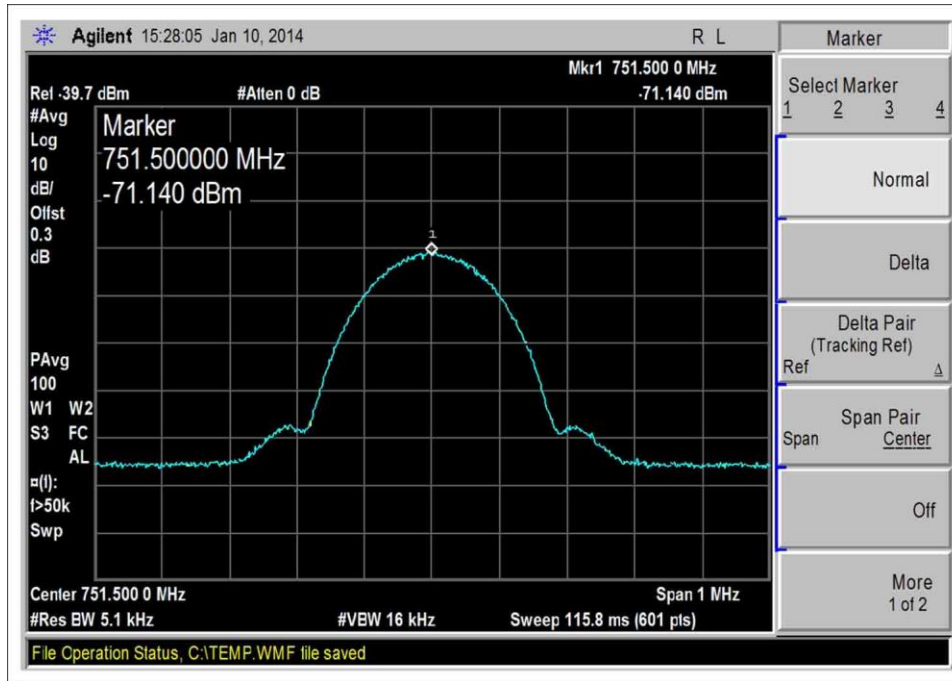
1710-1755MHz UL, LTE-Output



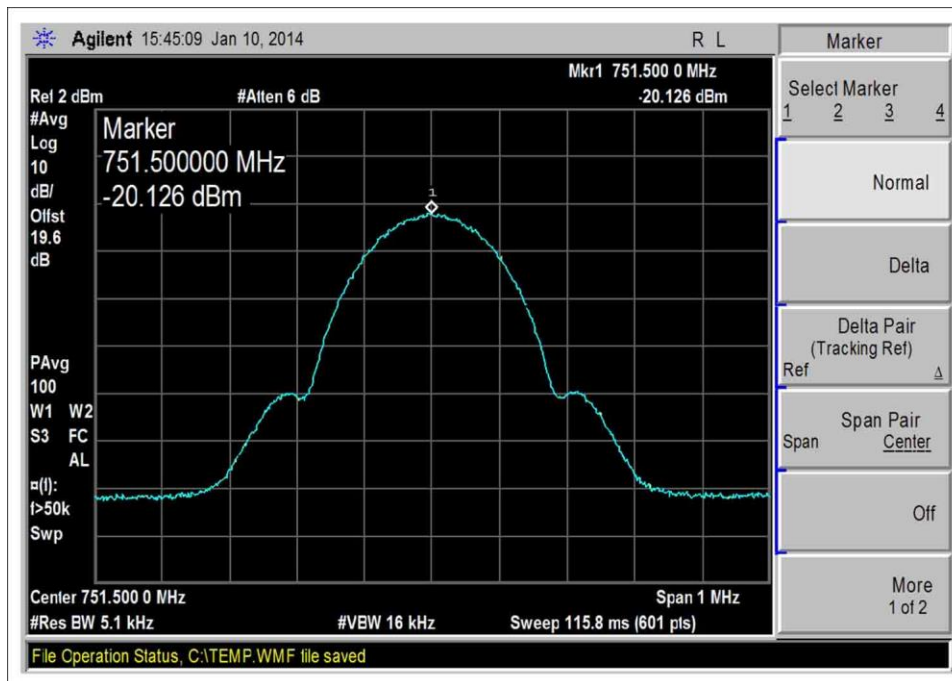
728-746MHz DL, GSM-Input



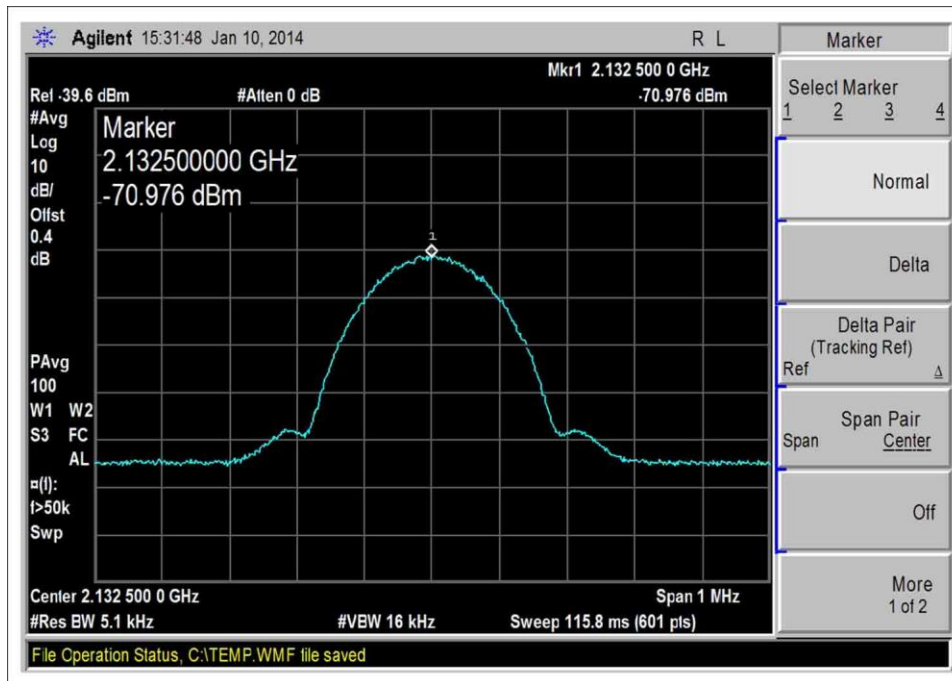
728-746MHz DL, GSM-Output



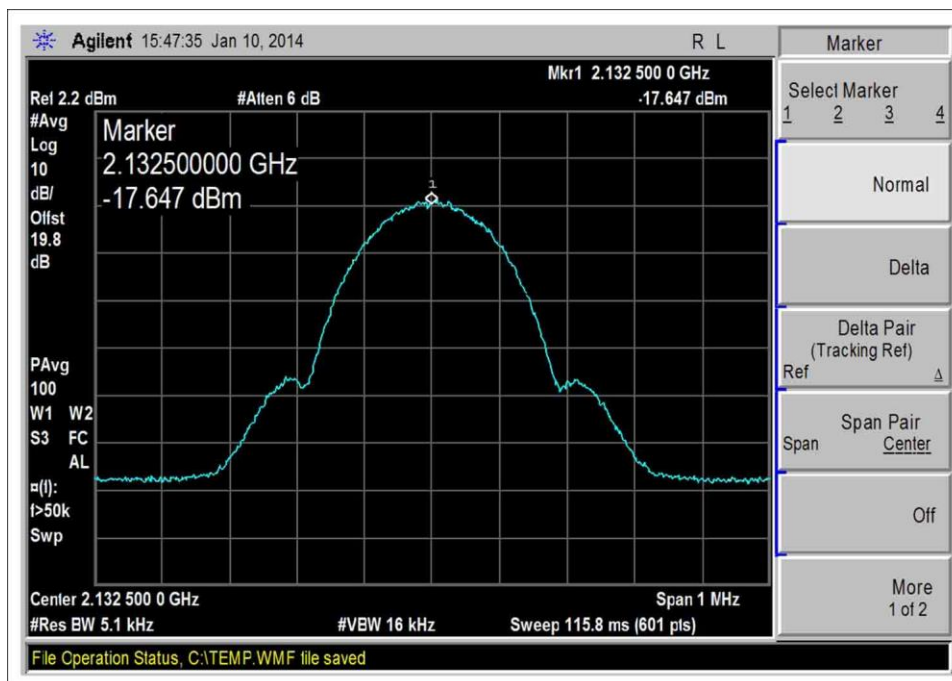
746-757MHz DL, GSM-Input



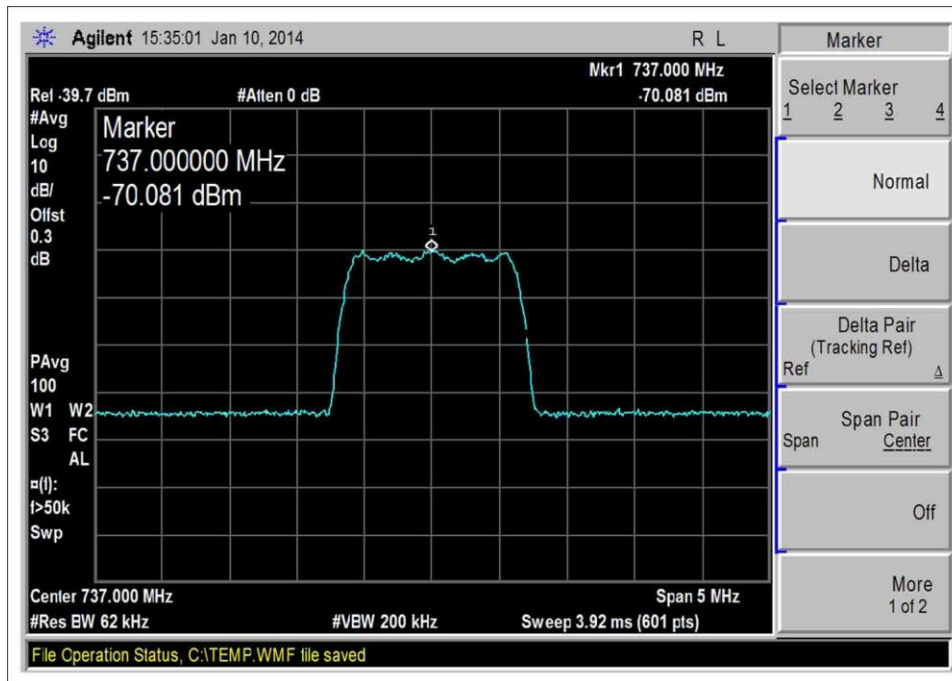
746-757MHz DL, GSM-Output



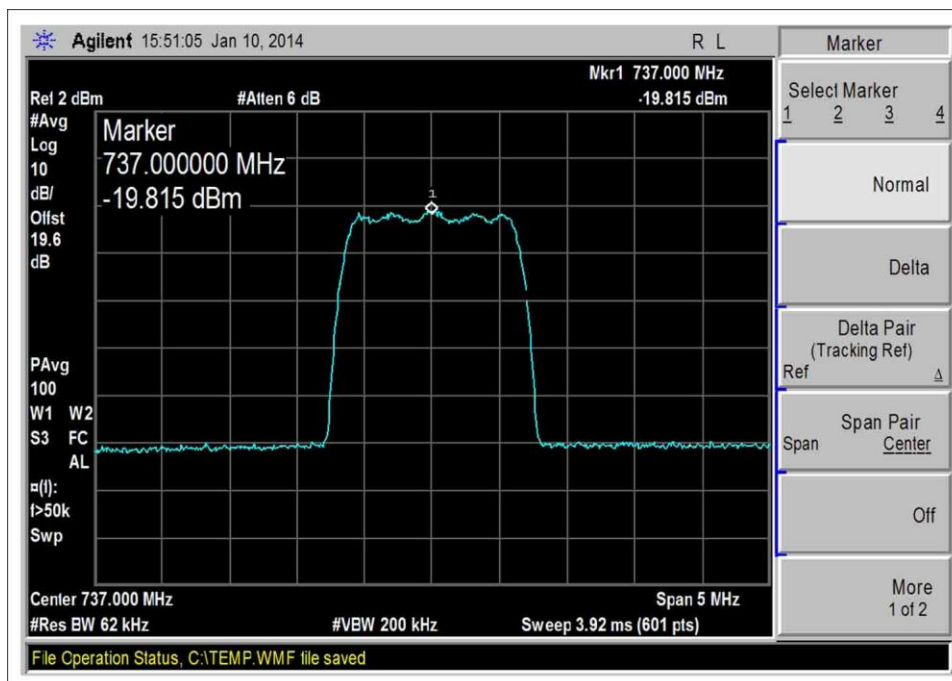
2110-2135MHz DL, GSM-Input



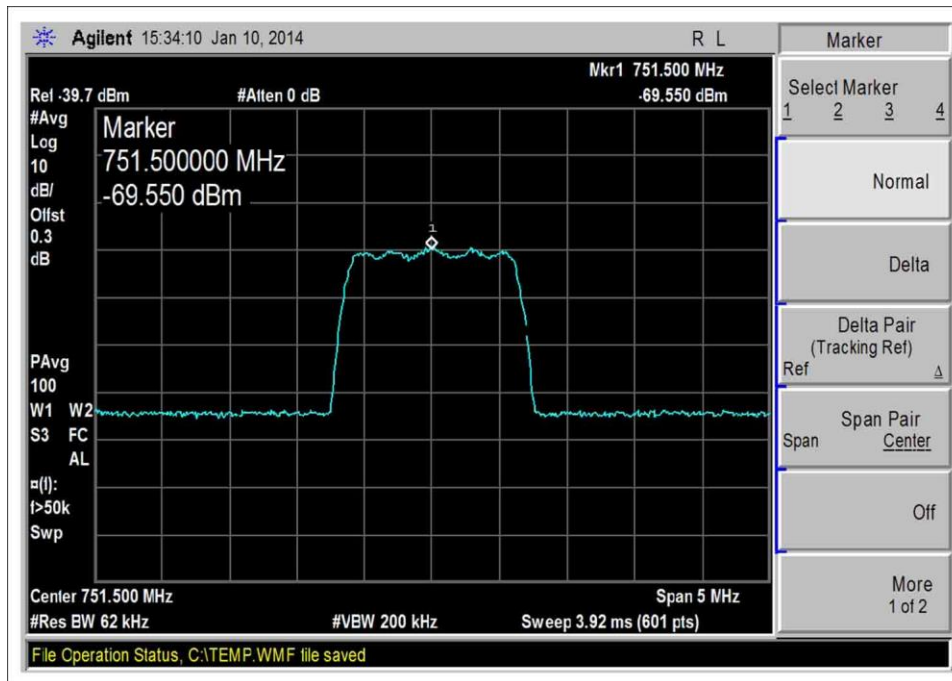
2110-2135MHz DL, GSM-Output



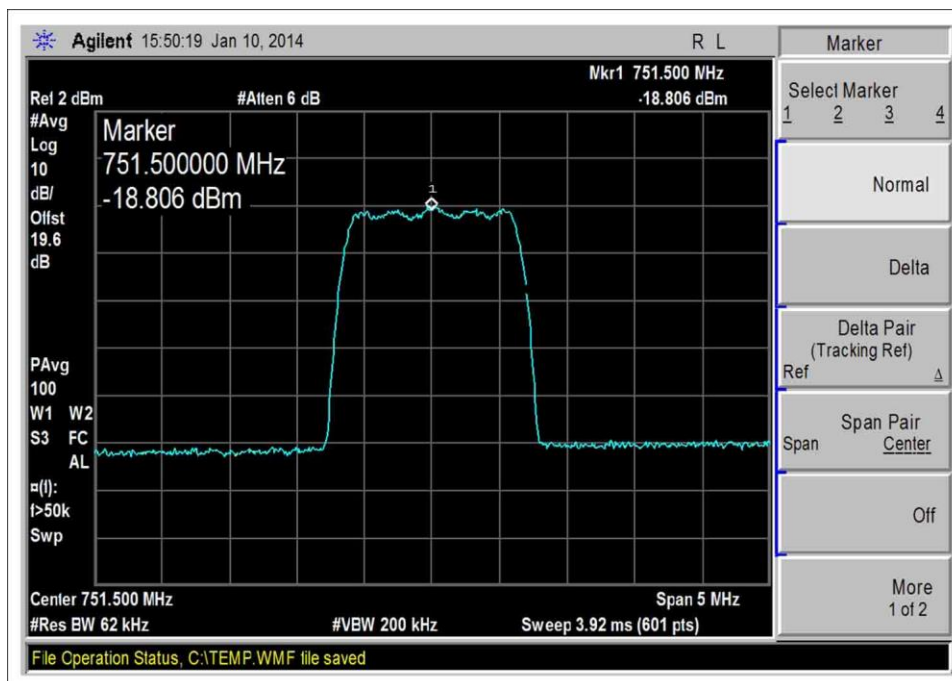
728-746MHz DL, CDMA-Input



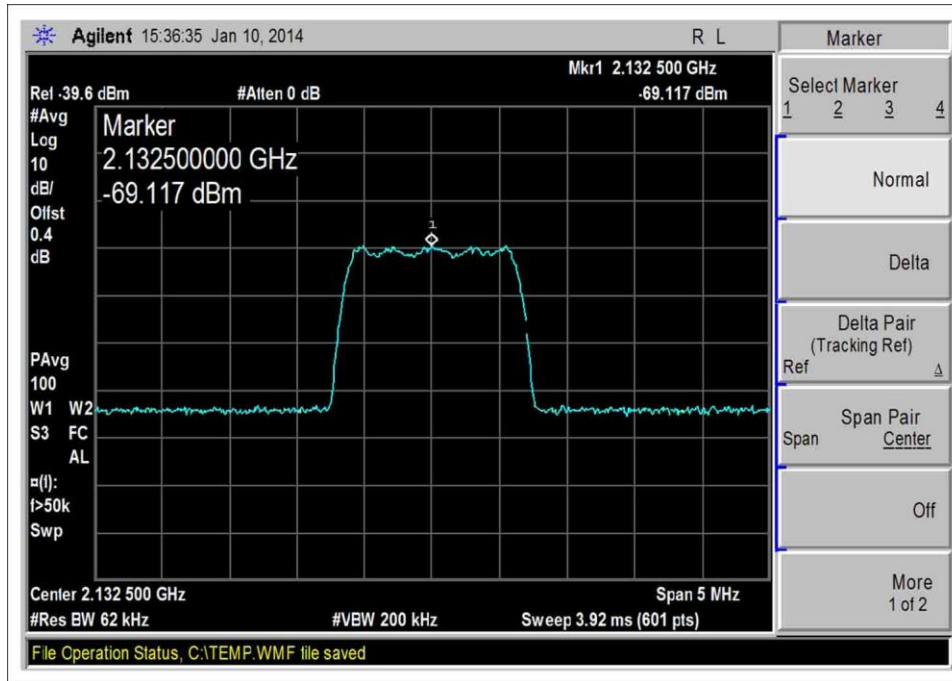
728-746MHz DL, CDMA-Output



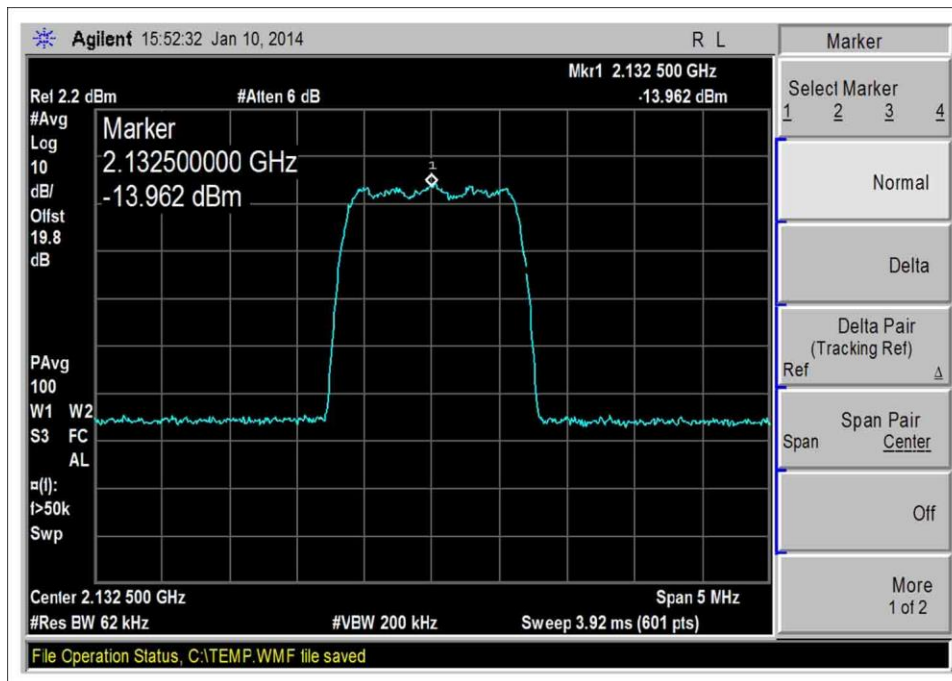
746-757MHz DL, CDMA-Input



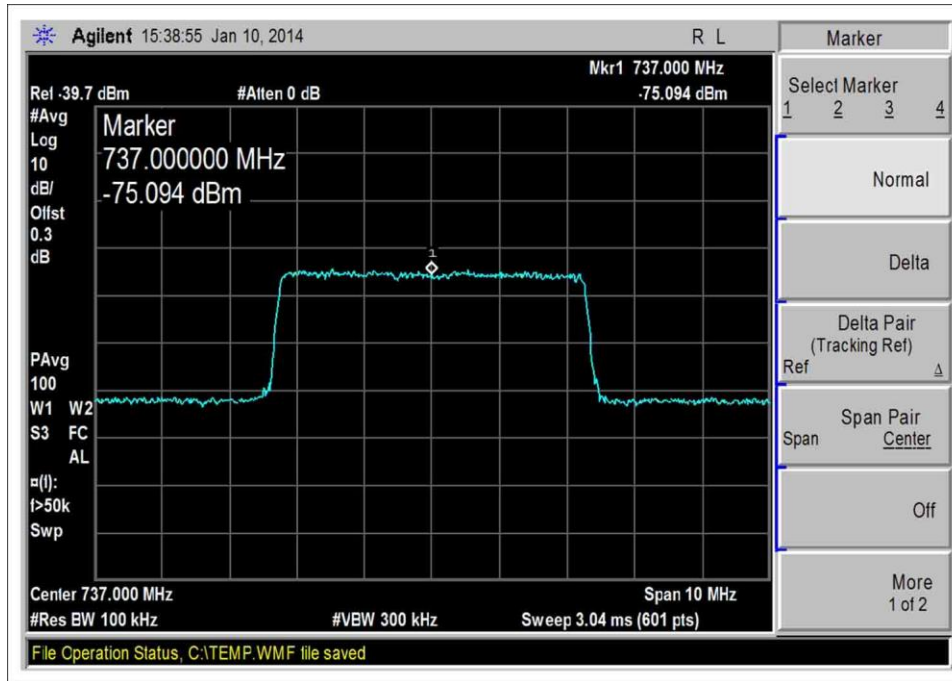
746-757MHz DL, CDMA-Output



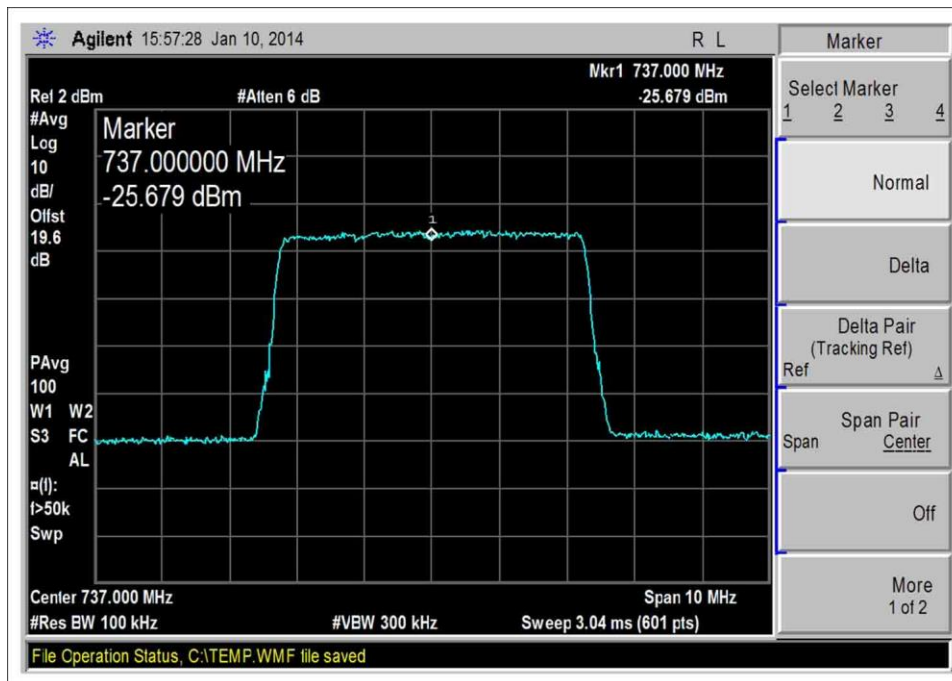
2110-2135MHz DL, CDMA-Input



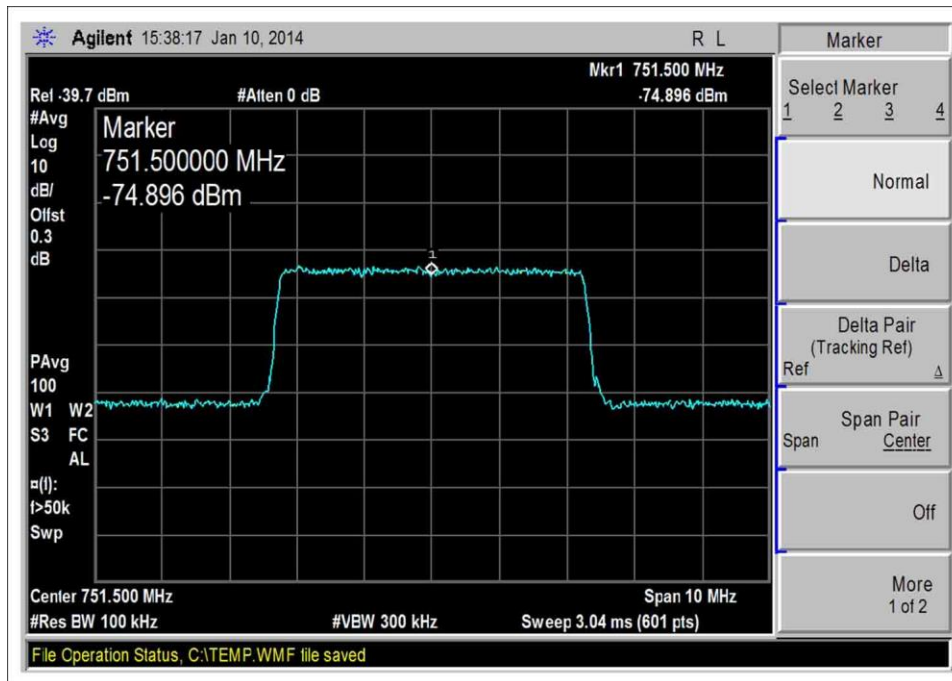
2110-2135MHz DL, CDMA-Output



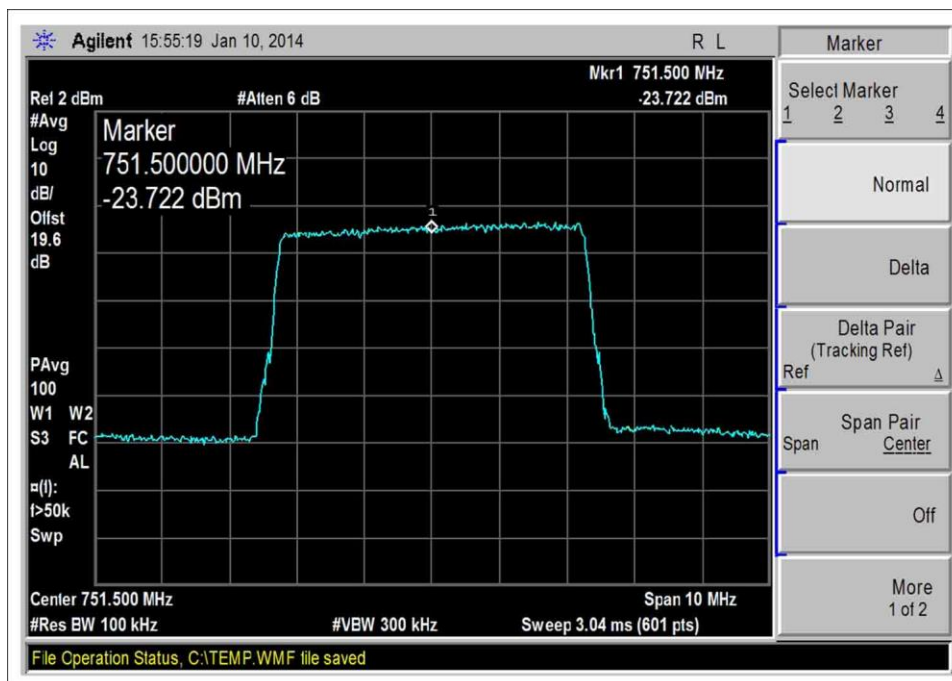
728-746MHz DL, LTE-Input



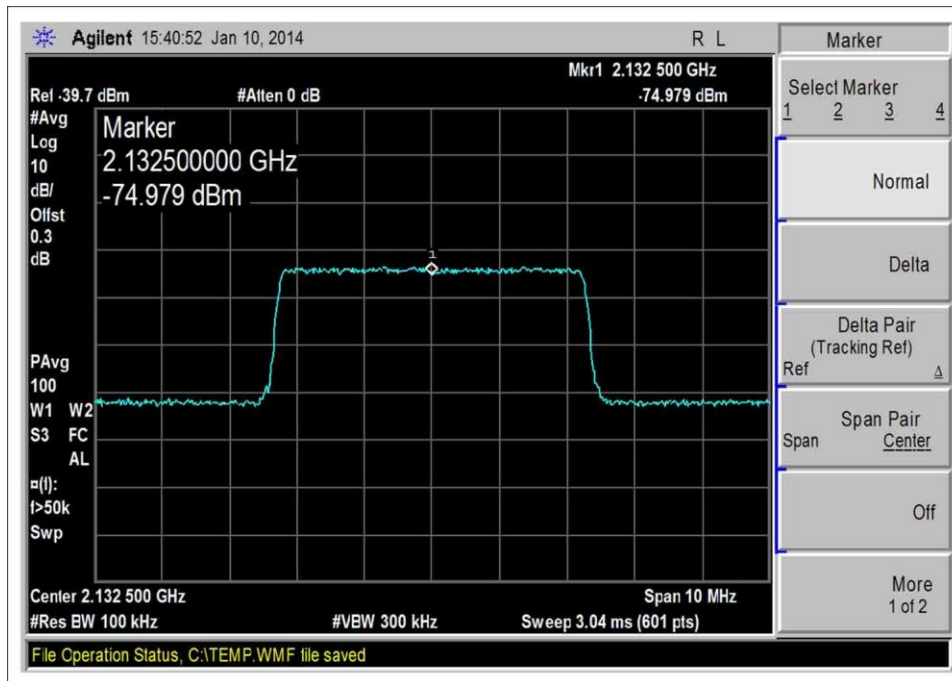
728-746MHz DL, LTE-Output



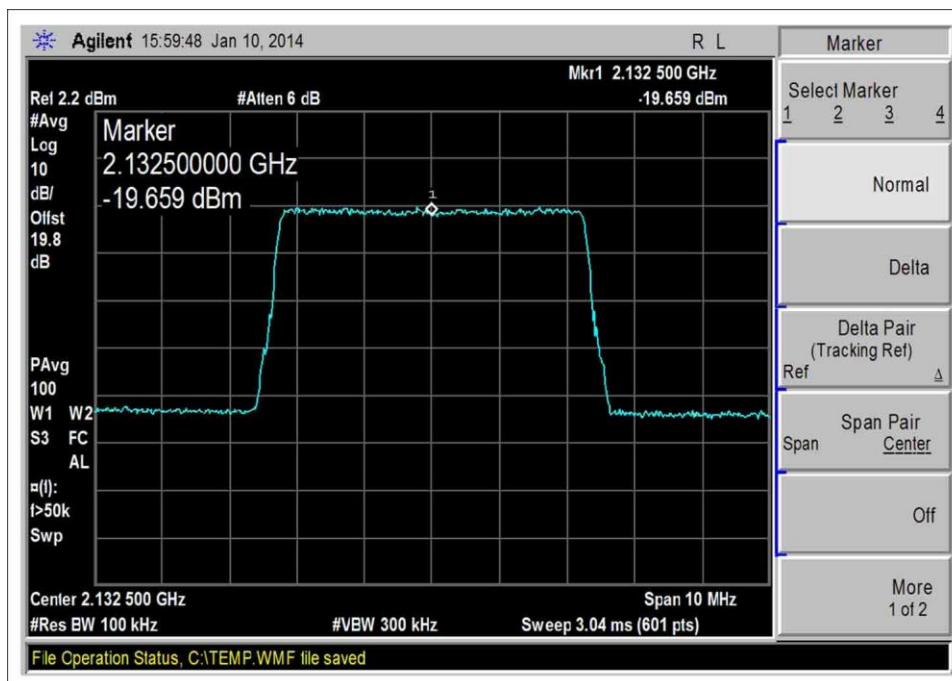
746-757MHz DL, LTE-Input



746-757MHz DL, LTE-Output

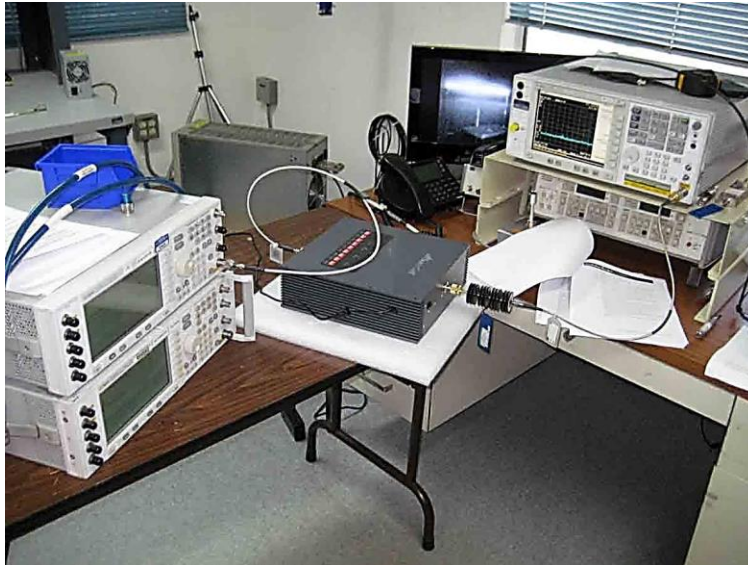


2110-2135MHz DL, LTE-Input



2110-2135MHz DL, LTE-Output

Test Setup Photo(s)



2.1051 / 27.53(c)(e)(f)(g) Spurious Emissions at Antenna Terminals

Test Conditions / Setup

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Cellphone-Mate, Inc.**
 Specification: **47 CFR §27.53(c) Spurious Emissions**
 Work Order #: **95255** Date: 1/8/2014
 Test Type: **Conducted Emissions** Time: 15:32:11
 Equipment: **Fixed Wideband Consumer Signal Boosters** Sequence#: 5
 Manufacturer: Cellphone-Mate, Inc. Tested By: S. Yamamoto
 Model: Force-5 110V 60Hz
 S/N:

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015
T2	AN03431	Attenuator	89-20-21	9/5/2013	9/5/2015
	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Fixed Wideband Consumer Signal Boosters*	Cellphone-Mate, Inc.	Force 5	

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4438C	MY42082260
Power Supply	Adapter Tech.	STD-1805	

Test Conditions / Notes:

The equipment under test (EUT) is placed on the test bench. EUT gain set to maximum gain. All dip switches are set to Off position, ie toward the 1 2 4 8 16 direction.
 Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
 The EUT operates in the following band: UL 776-787MHz DL 746-757MHz
 EUT set to transmit on the following frequencies: UL 781.5MHz DL 751.5MHz
 Protocol: 4.1MHz AWGN
 Frequency range of measurement = 9kHz to 10GHz. 9kHz-150kHz RBW=200Hz VBW=600Hz, 150kHz-30MHz RBW=9kHz VBW=27kHz, 30MHz-1000MHz RBW=120kHz VBW=360kHz, 1000MHz-10000MHz RBW=1MHz VBW=3MHz.
 Site D test environment conditions: 21°C, 31%, 100kPa
 Test procedure: The test was performed in accordance with section 7.6 of the FCC Publication: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 August 7, 2013.

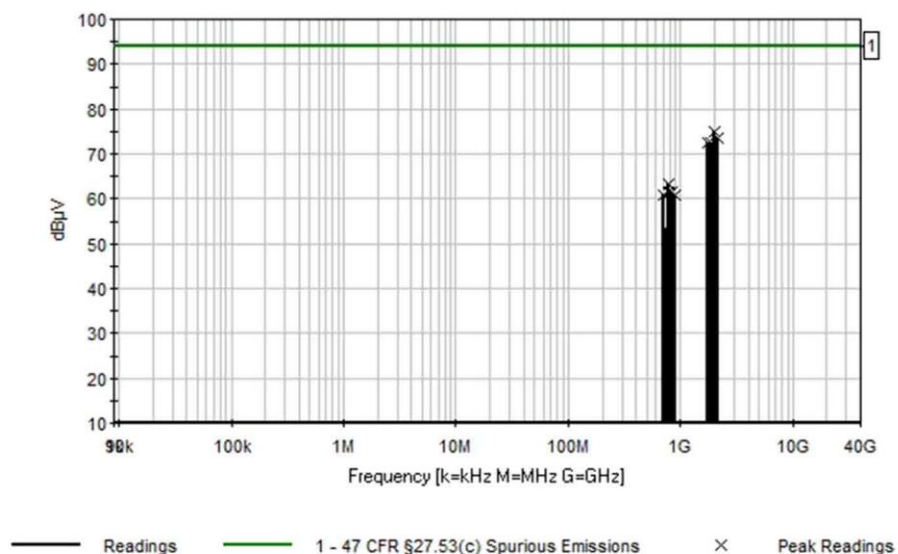
Measurement Data:

Reading listed by margin.

Test Lead: Ant Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1970.800M	55.0	+0.5	+19.4			+0.0	74.9	94.0	-19.1	Ant P
2	2139.200M	53.4	+0.8	+19.4			+0.0	73.6	94.0	-20.4	Ant P
3	1865.800M	52.8	+0.4	+19.3			+0.0	72.5	94.0	-21.5	Ant P
4	1728.300M	52.6	+0.3	+19.4			+0.0	72.3	94.0	-21.7	Ant P
5	788.000M	43.7	+0.5	+19.2			+0.0	63.4	94.0	-30.6	Ant P
6	847.800M	41.9	+0.5	+19.2			+0.0	61.6	94.0	-32.4	Ant P
7	775.000M	41.8	+0.5	+19.2			+0.0	61.5	94.0	-32.5	Ant P
8	708.800M	41.2	+0.5	+19.3			+0.0	61.0	94.0	-33.0	Ant P
9	881.700M	41.1	+0.5	+19.3			+0.0	60.9	94.0	-33.1	Ant P
10	758.000M	33.5	+0.5	+19.2			+0.0	53.2	94.0	-40.8	Ant P
11	745.000M	33.2	+0.5	+19.2			+0.0	52.9	94.0	-41.1	Ant P

CKC Laboratories Inc Date: 1/8/2014 Time: 15:32:11 Cellphone-Mate, Inc WO#: 95255
47 CFR §27.53(c) Spurious Emissions Test Lead: Ant Port 110V 60Hz Sequence#: 5 Ext ATTN: 0 dB



Test Location: CKC Laboratories Inc. • 110 N Olinda Pl • Brea CA 92823 • 7149936112

Customer: **Cellphone-Mate, Inc.**
 Specification: **47 CFR §27.53(e) Spurious Emissions**
 Work Order #: **95255** Date: 1/8/2014
 Test Type: **Conducted Emissions** Time: 15:12:02
 Equipment: **Fixed Wideband Consumer Signal Boosters** Sequence#: 3
 Manufacturer: Cellphone-Mate, Inc. Tested By: S. Yamamoto
 Model: Force-5 110V 60Hz
 S/N:

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015
T2	AN03431	Attenuator	89-20-21	9/5/2013	9/5/2015
	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Fixed Wideband Consumer Signal Boosters*	Cellphone-Mate, Inc.	Force 5	

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4438C	MY42082260
Power Supply	Adapter Tech.	STD-1805	

Test Conditions / Notes:

The equipment under test (EUT) is placed on the test bench. EUT gain set to maximum gain. All dip switches are set to Off position, i.e. toward the 1 2 4 8 16 direction.
 Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
 The EUT operates in the following band: UL 776-787MHz DL 746-757MHz
 EUT set to transmit on the following frequencies: UL 781.5MHz DL 751.5MHz
 Protocol: 4.1MHz AWGN
 Frequency range of measurement = 1559-1610MHz
 RBW=1MHz VBW=3MHz.
 Site D test environment conditions: 21°C, 31%, 100kPa
 Test procedure: The test was performed in accordance with section 7.6 of the FCC Publication: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 August 7, 2013.
 Limit:
 27.53(e) 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.

No emissions found in band 1559-1610MHz

Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Cellphone-Mate, Inc.**
 Specification: **47 CFR §27.53(f) Spurious Emissions**
 Work Order #: **95255** Date: 1/8/2014
 Test Type: **Conducted Emissions** Time: 15:24:43
 Equipment: **Fixed Wideband Consumer Signal Boosters** Sequence#: 4
 Manufacturer: Cellphone-Mate, Inc. Tested By: S. Yamamoto
 Model: Force-5 110V 60Hz
 S/N:

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015
T2	AN03431	Attenuator	89-20-21	9/5/2013	9/5/2015
	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Fixed Wideband Consumer Signal Boosters*	Cellphone-Mate, Inc.	Force 5	

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4438C	MY42082260
Power Supply	Adapter Tech.	STD-1805	

Test Conditions / Notes:

The equipment under test (EUT) is placed on the test bench. EUT gain set to maximum gain. All dip switches are set to Off position, ie toward the 1 2 4 8 16 direction.
 Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
 The EUT operates in the following band: UL 698-716MHz DL 728-746MHz
 EUT set to transmit on the following frequencies: UL 707MHz DL 737MHz
 Protocol: 4.1MHz AWGN
 Frequency range of measurement = 9kHz to 10GHz. 9kHz-150kHz RBW=200Hz VBW=600Hz, 150kHz-30MHz RBW=9kHz VBW=27kHz, 30MHz-1000MHz RBW=120kHz VBW=360kHz, 1000MHz-10000MHz RBW=1MHz VBW=3MHz.
 Site D test environment conditions: 21°C, 31%, 100kPa
 Test procedure: The test was performed in accordance with section 7.6 of the FCC Publication: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 August 7, 2013.

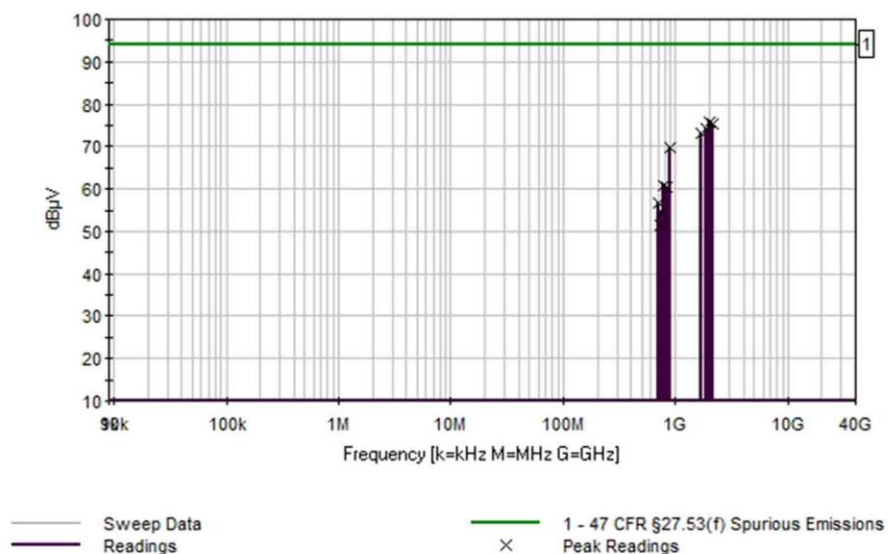
Measurement Data:

Reading listed by margin.

Test Lead: Ant Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1971.700M	55.8	+0.5	+19.4			+0.0	75.7	94.0	-18.3	Ant P
2	2127.500M	55.1	+0.8	+19.4			+0.0	75.3	94.0	-18.7	Ant P
3	1894.200M	54.4	+0.4	+19.4			+0.0	74.2	94.0	-19.8	Ant P
4	1720.000M	53.5	+0.4	+19.3			+0.0	73.2	94.0	-20.8	Ant P
5	881.700M	49.8	+0.5	+19.3			+0.0	69.6	94.0	-24.4	Ant P
6	785.000M	41.1	+0.5	+19.2			+0.0	60.8	94.0	-33.2	Ant P
7	847.500M	40.9	+0.5	+19.2			+0.0	60.6	94.0	-33.4	Ant P
8	697.000M	37.0	+0.5	+19.3			+0.0	56.8	94.0	-37.2	Ant P
9	717.000M	36.7	+0.5	+19.3			+0.0	56.5	94.0	-37.5	Ant P
10	747.000M	34.9	+0.5	+19.2			+0.0	54.6	94.0	-39.4	Ant P
11	727.000M	31.7	+0.5	+19.2			+0.0	51.4	94.0	-42.6	Ant P

CKC Laboratories Inc Date: 1/8/2014 Time: 15:24:43 Cellphone-Mate, Inc WO#: 95255
47 CFR §27.53(f) Spurious Emissions Test Lead: Ant Port 110V 60Hz Sequence#: 4 Ext ATTN: 0 dB



Test Location: CKC Laboratories • 110 Olinda Place • Brea, CA 92823 • 714-993-6112

Customer: **Cellphone-Mate, Inc.**
 Specification: **47 CFR §27.53(g) Spurious Emissions**
 Work Order #: **95255** Date: 1/8/2014
 Test Type: **Conducted Emissions** Time: 15:12:02
 Equipment: **Fixed Wideband Consumer Signal Boosters** Sequence#: 3
 Manufacturer: Cellphone-Mate, Inc. Tested By: S. Yamamoto
 Model: Force-5 110V 60Hz
 S/N:

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015
T2	AN03431	Attenuator	89-20-21	9/5/2013	9/5/2015
	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Fixed Wideband Consumer Signal Boosters*	Cellphone-Mate, Inc.	Force 5	

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4438C	MY42082260
Power Supply	Adapter Tech.	STD-1805	

Test Conditions / Notes:

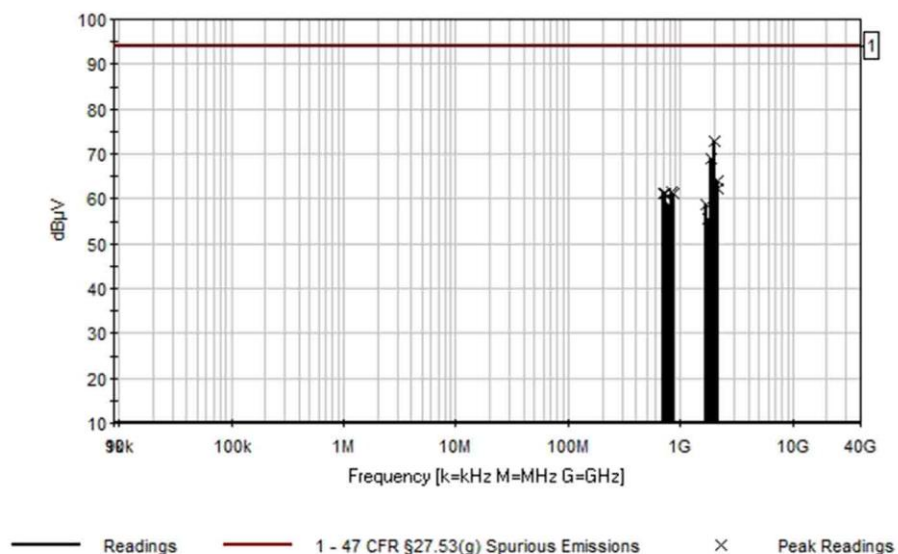
The equipment under test (EUT) is placed on the test bench. EUT gain set to maximum gain. All dip switches are set to Off position, ie toward the 1 2 4 8 16 direction.
 Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
 The EUT operates in the following band: UL 1710-1755MHz DL 2110-2155MHz
 EUT set to transmit on the following frequencies: UL 1732.5MHz DL 2132.5MHz
 Protocol: 4.1MHz AWGN
 Frequency range of measurement = 9kHz to 22GHz. 9kHz-150kHz RBW=200Hz VBW=600Hz, 150kHz-30MHz RBW=9kHz VBW=27kHz, 30MHz-1000MHz RBW=120kHz VBW=360kHz, 1000MHz-22000MHz RBW=1MHz VBW=3MHz.
 Site D test environment conditions: 21°C, 31%, 100kPa
 Test procedure: The test was performed in accordance with section 7.6 of the FCC Publication: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 August 7, 2013.

Measurement Data: Reading listed by margin.

Test Lead: Ant Port

#	Freq MHz	Rdng dBμV	T1 dB	T2 dB			Dist Table	Corr dBμV	Spec dBμV	Margin dB	Polar Ant
1	1970.000M	53.1	+0.5	+19.4			+0.0	73.0	94.0	-21.0	Ant P
2	1892.500M	49.1	+0.4	+19.4			+0.0	68.9	94.0	-25.1	Ant P
3	2109.000M	43.8	+0.8	+19.4			+0.0	64.0	94.0	-30.0	Ant P
4	2156.000M	42.0	+0.7	+19.4			+0.0	62.1	94.0	-31.9	Ant P
5	848.300M	41.7	+0.5	+19.2			+0.0	61.4	94.0	-32.6	Ant P
6	876.700M	41.5	+0.5	+19.3			+0.0	61.3	94.0	-32.7	Ant P
7	741.700M	41.4	+0.5	+19.2			+0.0	61.1	94.0	-32.9	Ant P
8	712.500M	41.3	+0.5	+19.3			+0.0	61.1	94.0	-32.9	Ant P
9	781.700M	38.9	+0.5	+19.2			+0.0	58.6	94.0	-35.4	Ant P
10	1709.000M	38.9	+0.4	+19.3			+0.0	58.6	94.0	-35.4	Ant P
11	1756.000M	35.6	+0.5	+19.4			+0.0	55.5	94.0	-38.5	Ant P

CKC Laboratories Inc Date: 1/8/2014 Time: 15:12:02 Cellphone-Mate, Inc WO#: 95255
47 CFR §27.53(g) Spurious Emissions Test Lead: Ant Port 110V 60Hz Sequence#: 3 Ext ATTN: 0 dB



LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

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

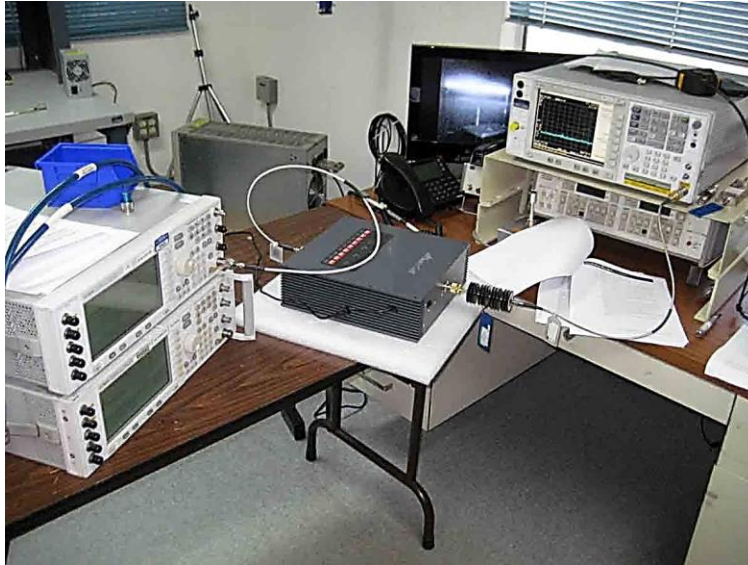
$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

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

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

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

Test Setup Photo(s)



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

Test Conditions / Setup

Test Location: CKC Laboratories Inc. • 110 N Olinda Pl • Brea CA 92823 • 7149936112

Customer: **Cellphone-Mate, Inc.**

Specification: **47 CFR §27.53(c),(f),and (g) Radiated Spurious Emissions**

Work Order #: **95255**

Date: 1/13/2014

Test Type: **Maximized Emissions**

Time: 14:58:57

Equipment: **Fixed Wideband Consumer Signal Boosters**

Sequence#: 1

Manufacturer: Cellphone-Mate, Inc.

Tested By: S. Yamamoto

Model: Force-5

S/N:

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014
	ANP05555	Cable	RG223/U	6/19/2012	6/19/2014
	AN00010	Preamp	8447D	3/29/2012	3/29/2014
	ANP05569	Cable	RG-214/U	6/19/2012	6/19/2014
T2	ANP04382	Cable	LDF-50	8/30/2012	8/30/2014
	AN00851	Biconilog Antenna	CBL6111C	5/16/2012	5/16/2014
T3	AN01646	Horn Antenna	3115	4/13/2012	4/13/2014
T4	AN03169	High Pass Filter	HM1155-11SS	7/30/2013	7/30/2015
T5	AN02945	Cable	32022-2-2909K-36TC	10/30/2013	10/30/2015
T6	AN00787	Preamp	83017A	5/31/2013	5/31/2015
T7	ANP06360	Cable	L1-PNMNM-48	8/29/2012	8/29/2014
	AN00314	Loop Antenna	6502	6/29/2012	6/29/2014
	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015
	AN01413	Horn Antenna-ANSI C63.5 (dB/m)	84125-80008	11/9/2012	11/9/2014
	AN01413	Horn Antenna-SAE ARP958 (dB/m)	84125-80008	11/9/2012	11/9/2014

Equipment Under Test (* = EUT):

Function	Manufacturer	Model #	S/N
Fixed Wideband Consumer Signal Boosters*	Cellphone-Mate, Inc.	Force-5	

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Adapter Tech.	STD-1805	
Signal Generator	Agilent	E4438C	MY42081492

Test Conditions / Notes:

The equipment under test (EUT) is placed on the styrofoam table top. The EUT set at maximum gain. All DIP switches are set to Off position, ie towards the 1 2 4 8 16 direction.

Evaluation of DL path was performed with signal fed into the Outside (Donor) antenna port while Inside (Server) antenna port terminated with 50 Ohm load.

Evaluation of UL path was performed with signal fed into the Inside (Server) antenna port while Outside (Donor) antenna port terminated with 50 Ohm load.

The EUT was tested while transmitting in each of the following bands: UL 776-787MHz, UL 698-716MHz, UL 1710-1755MHz, DL 746-757MHz, DL 728-746MHz, DL 2110-2155MHz

TXFreq = Center frequency of each operational band listed above.

Modulation: CW

Frequency range of measurement = 9 kHz to 22 GHz.

9kHz-150 kHz, RBW=200Hz, VBW=200Hz; 150kHz-30MHz, RBW=9kHz,VBW=9kHz;30MHz-1000MHz, RBW=120kHz,VBW=120kHz;1000MHz-10000MHz, RBW=1MHz,VBW=1MHz.

Site D. Temperature: 27°C, Humidity: 30%, Pressure: 100kPa

Test procedure: The test was performed in accordance with section 7.12 of the FCC Publication: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 August 7, 2013.

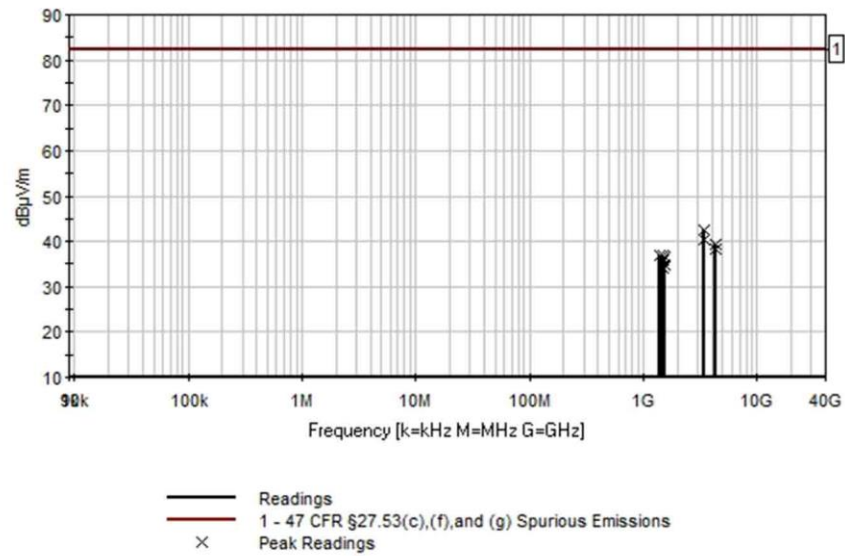
Measurement Data:

Reading listed by margin.

Test Distance: 3 Meters

#	Freq	Rdng	T1	T2	T3	T4	Dist	Corr	Spec	Margin	Polar
	MHz	dBμV	T5 dB	T6 dB	T7 dB	dB	Table	dBμV/m	dBμV/m	dB	Ant
1	3465.000M	37.2	+0.0 +1.0	+8.1 -39.9	+32.3 +3.9	+0.0	+0.0	42.6	82.2	-39.6	Vert
2	3465.000M	34.9	+0.0 +1.0	+8.1 -39.9	+32.3 +3.9	+0.0	+0.0	40.3	82.2	-41.9	Horiz
3	4265.000M	35.6	+0.0 +1.0	+7.1 -39.8	+31.0 +4.5	+0.0	+0.0	39.4	82.2	-42.8	Horiz
4	4265.000M	34.6	+0.0 +1.0	+7.1 -39.8	+31.0 +4.5	+0.0	+0.0	38.4	82.2	-43.8	Vert
5	1503.000M	42.5	+0.0 +0.6	+4.8 -39.8	+25.9 +2.5	+0.5	+0.0	37.0	82.2	-45.2	Vert
6	1414.000M	43.6	+0.0 +0.6	+4.5 -40.1	+25.3 +2.4	+0.6	+0.0	36.9	82.2	-45.3	Vert
7	1414.000M	43.6	+0.0 +0.6	+4.5 -40.1	+25.3 +2.4	+0.6	+0.0	36.9	82.2	-45.3	Horiz
8	1563.000M	41.6	+0.0 +0.6	+4.9 -39.8	+26.2 +2.6	+0.4	+0.0	36.5	82.2	-45.7	Horiz
9	1503.000M	41.7	+0.0 +0.6	+4.8 -39.8	+25.9 +2.5	+0.5	+0.0	36.2	82.2	-46.0	Horiz
10	1474.000M	41.9	+0.0 +0.6	+4.7 -39.9	+25.7 +2.5	+0.5	+0.0	36.0	82.2	-46.2	Horiz
11	1563.000M	39.9	+0.0 +0.6	+4.9 -39.8	+26.2 +2.6	+0.4	+0.0	34.8	82.2	-47.4	Vert
12	1474.000M	40.0	+0.0 +0.6	+4.7 -39.9	+25.7 +2.5	+0.5	+0.0	34.1	82.2	-48.1	Vert

CKC Laboratories Inc Date: 1/13/2014 Time: 14:58:57 Cellphone-Mate, Inc. WO#: 95255
 47 CFR §27.53(c),(f),and (g) Spurious Emissions Test Distance: 3 Meters Sequence#: 1 Ext ATTN: 0 dB



LIMIT LINE FOR SPURIOUS RADIATED EMISSION

$$\text{REQUIRED ATTENUATION} = 43+10 \text{ LOG } P \text{ (DB)}$$

For radiated spurious emission measured at 3 meter test distance,

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

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)

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

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

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

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

$$10 \text{ Log } P_t = 10 \text{ Log } E^2 \text{ (V/m)} + 10 \text{ Log } r^2 - 10 \text{ Log } 30$$

$$10 \text{ Log } P_t = 20 \text{ Log } E \text{ (V/m)} + 20 \text{ Log } r - 10 \text{ Log } 30$$

At 3 meter, $r = 3 \text{ m}$

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

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

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

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

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

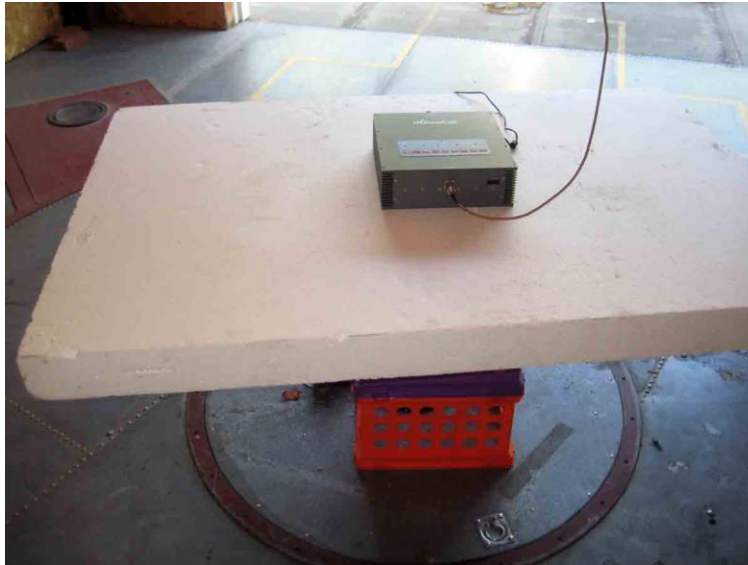
$$10 \log P_t = 20 \log E \text{ (uV/m)} - 125.23$$

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

$$\text{Since } 20 \log E \text{ (uV/m)} = E \text{ in dBuV/m} = E_{\text{dBuV}} - E_{\text{dBuV}} + 82.23$$

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

Test Setup Photo(s)



2.1055 Frequency Stability

NA = Frequency stability does not apply to this type of equipment.

SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

The reported measurement uncertainties are calculated based on the worst case of all laboratory environments from CKC Laboratories, Inc. test sites. Only those parameters which require estimation of measurement uncertainty are reported. The reported worst case measurement uncertainty is less than the maximum values derived in CISPR 16-4-2. Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of $k=2$. Compliance is deemed to occur provided measurements are below the specified limits.

Emissions Test Details

TESTING PARAMETERS

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

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

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

CORRECTION FACTORS

The basic spectrum analyzer reading was converted using correction factors as shown in the highest emissions readings in the tables. For radiated emissions in dB μ V/m, the spectrum analyzer reading in dB μ V was corrected by using the following formula. This reading was then compared to the applicable specification limit.

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

TEST INSTRUMENTATION AND ANALYZER SETTINGS

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

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

SPECTRUM ANALYZER/RECEIVER DETECTOR FUNCTIONS

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

Peak

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

Quasi-Peak

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

Average

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