

# Cellphone-Mate, Inc.

## ADDENDUM TO TEST REPORT 95252-8

### Mobile Wideband Consumer Signal Booster Model: TriFlex-2Go-A

#### Tested To The Following Standards:

#### FCC Part 27C

Report No.: 95252-8A

Date of issue: April 4, 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: CKC20140123

**REPORT PREPARED BY:**

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

Project Number: 95252

**DATE OF EQUIPMENT RECEIPT:**

January 23, 2014

**DATE(S) OF TESTING:**

January 30-February 10, 2014

### Revision History

**Original:** Testing of Mobile Wideband Consumer Signal Booster, TriFlex-2Go-A to FCC Part 20, Section 20.21.

**Addendum A:** Replace readings data and plot in section 2.1053 / 27.53(c) / 27.53(f) / 27.53(g) Field Strength of Spurious Radiation.

### 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.



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*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 <sup>1</sup>
2.1047	Modulation Characteristics	NA <sup>1</sup>
2.1049(l)	Occupied Bandwidth	Pass
2.1051 / 27.53(c) / 27.53(f) / 27.53(g)	Spurious Emissions at Antenna Terminals	Pass
2.1053 / 27.53(c) / 27.53(f) / 27.53(g)	Field Strength of Spurious Radiation	Pass
2.1055	Frequency Stability	NA <sup>2</sup>

NA<sup>1</sup> = A different standard applies, see applicable test report.

NA<sup>2</sup> = Not applicable. See the section in the report for the reason.

## 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

#### Mobile Wideband Consumer Signal Booster

Manuf: Cellphone-Mate, Inc.

Model: TriFlex-2Go-A

Serial: None

### PERIPHERAL DEVICES

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

#### Signal Generator

Manuf: Agilent

Model: E4433B

Serial: US40052164

#### Signal Generator

Manuf: Agilent

Model: E4433B

Serial: US40053279

#### Power Divider

Manuf: Anaren

Model: 44000

Serial: 0583

#### 50 ohm Load

Manuf: Generic

Model: Generic

Serial: None

#### Power Supply

Manuf: SureCall

Model: GFP451DA-0945-1

Serial: 1211-0000323

#### Signal Generator

Manuf: Agilent

Model: E4438C

Serial: MY42081492

#### Programmer

Manuf: Cellphone-Mate, Inc.

Model: SureCall

Serial: None

#### Signal Generator

Manuf: Agilent

Model: E4438C

Serial: MY42081492

## 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

### 2.1049(i) 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 #: **95252** Date: 1/30/2014  
 Test Type: **Conducted Emissions** Time: 16:01:09  
 Equipment: **Mobile Wideband Consumer Signal Booster** Sequence#: 9  
 Manufacturer: Cellphone-Mate, Inc. Tested By: Don Nguyen  
 Model: TriFlex-2Go-A 120V 60Hz  
 S/N: NA

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03431	Attenuator	89-20-21	9/5/2013	9/5/2015
T2	AN02945	Cable	32022-2-2909K-36TC	10/30/2013	10/30/2015
T3	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Mobile Wideband Consumer Signal Booster*	Cellphone-Mate, Inc.	TriFlex-2Go-A	NA

**Support Devices:**

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40052164
Signal Generator	Agilent	E4438C	MY42081492
Power Supply	SureCall	GFP451DA-0945-1	1211-0000323

**Test Conditions / Notes:**

The equipment under test (EUT) is placed on the table top. EUT set at maximum gain. Signal generator is connected to input port of EUT. Output port of EUT is connected to spectrum analyzer via 20db attenuator and RF cable.

Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.

Input and output screen captures were made at the center frequency of each of the following two bands:

UL 698-716  
 DL 728-746

Carrier was modulated with GSM, CDMA, and LTE.

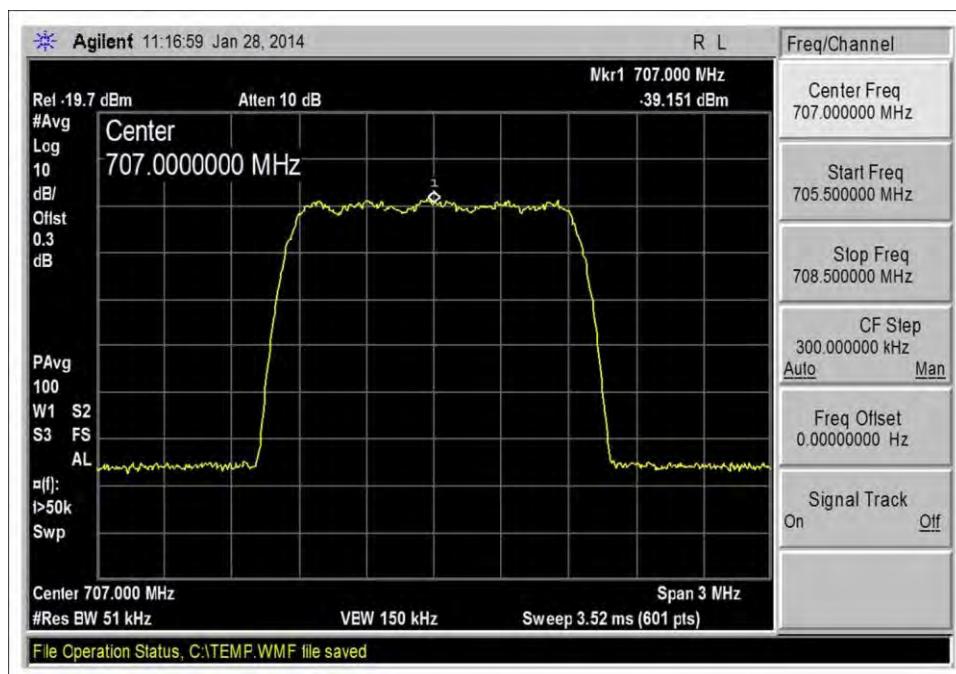
Test procedure: The test was performed in accordance with section 7.10 of the FCC Publication: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 January 21, 2014

Test environment conditions: 22°C, 31%, 100kPa

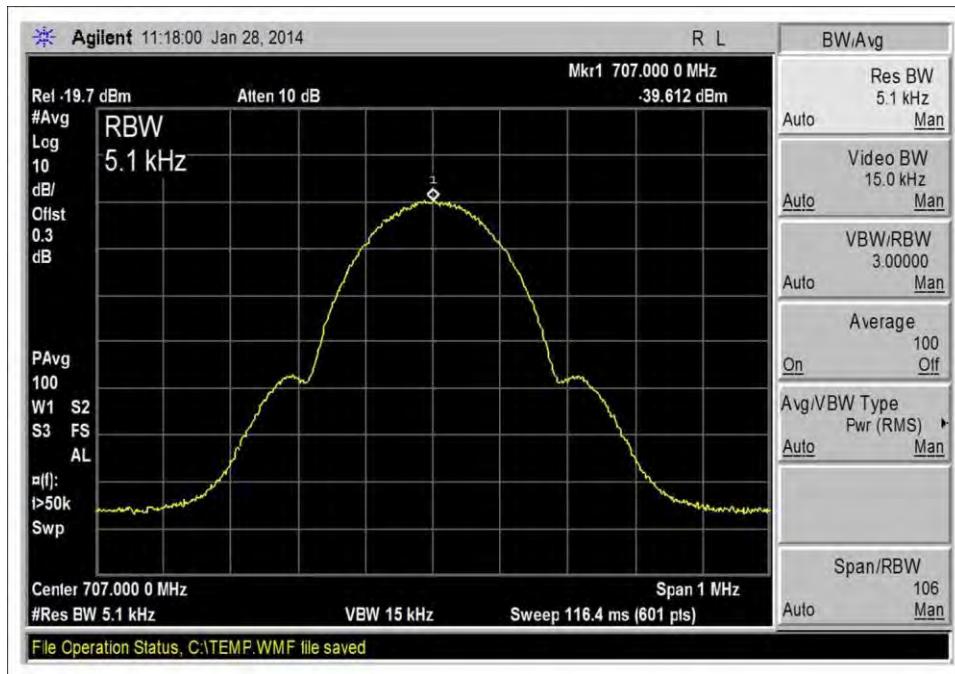
Temperature: 21°C, Humidity: 39%, Pressure: 100kPa

Site D

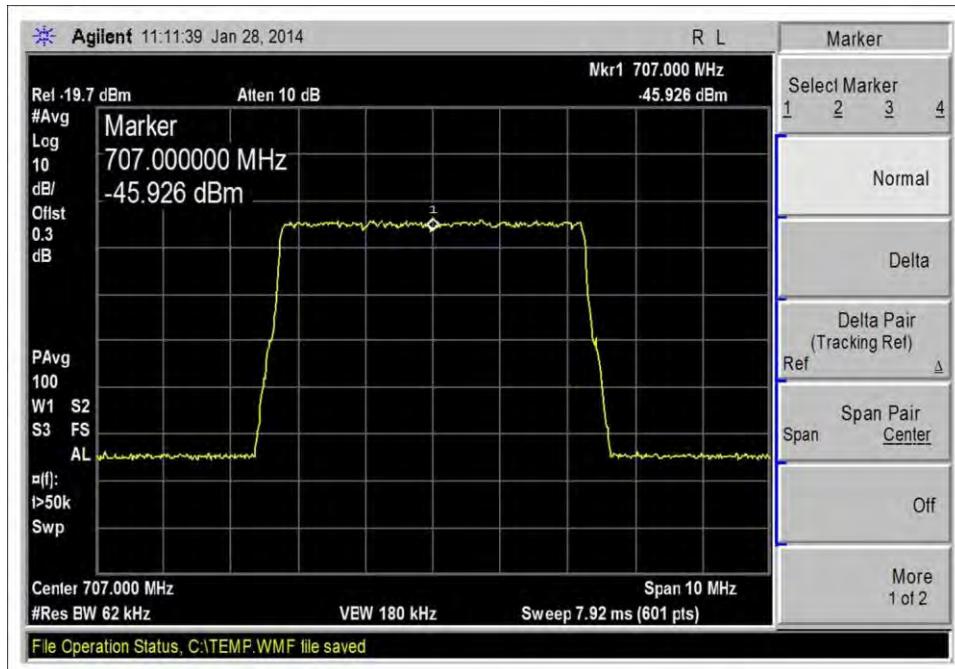
## Test Data



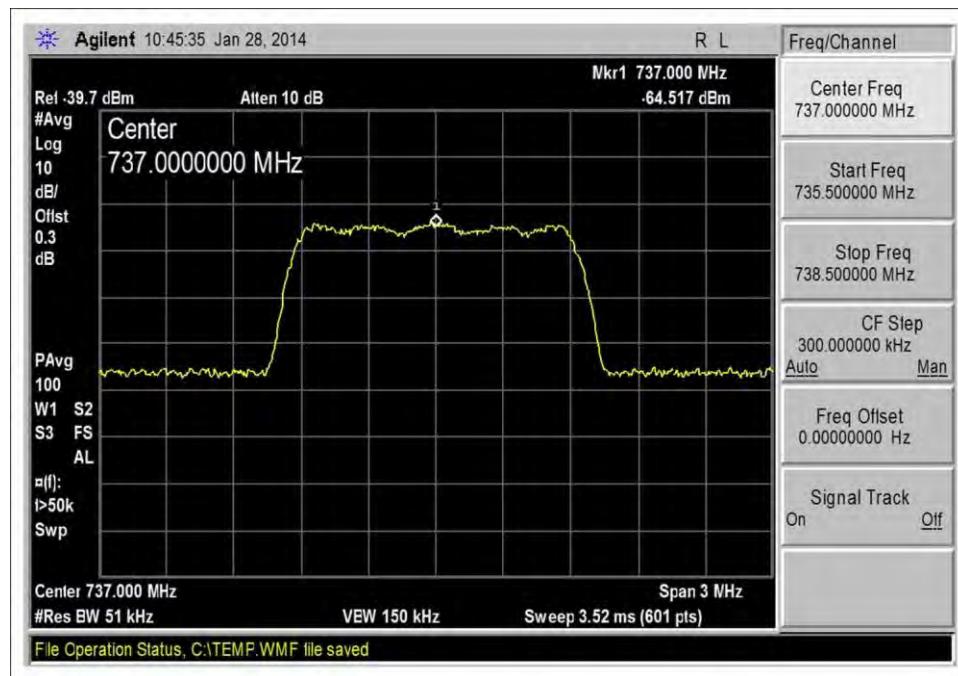
CDMA\_UL 698-716\_Input



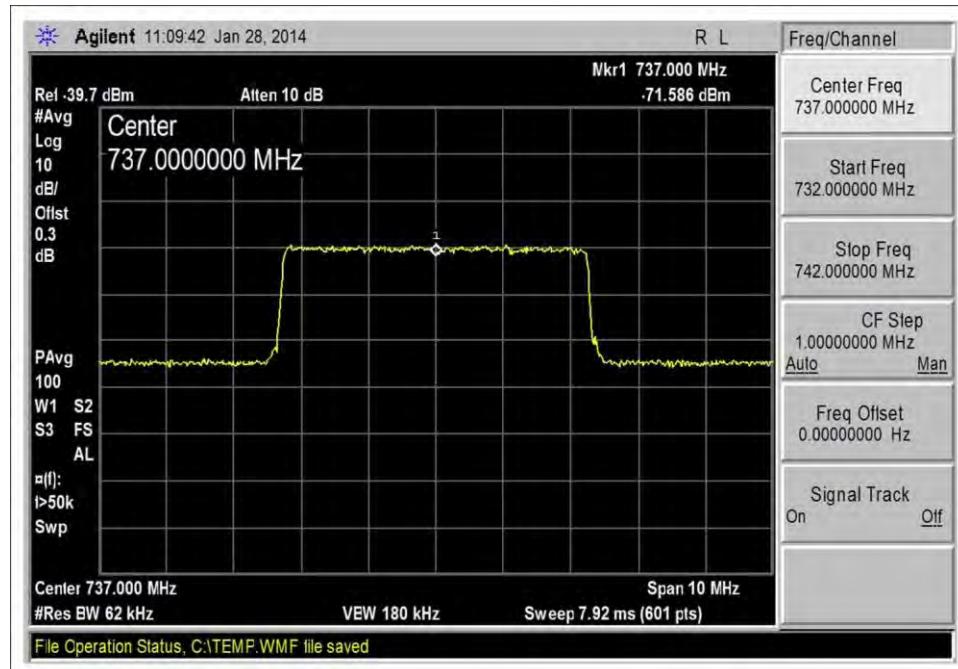
## GSM\_UL 698-716\_Input



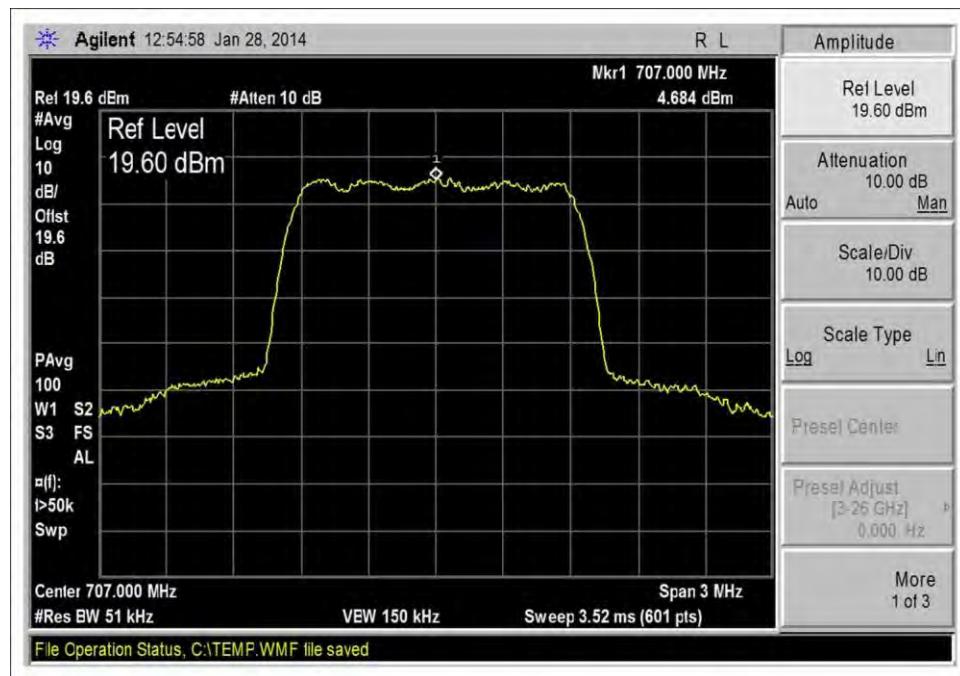
## LTE\_UL 698-716\_Input



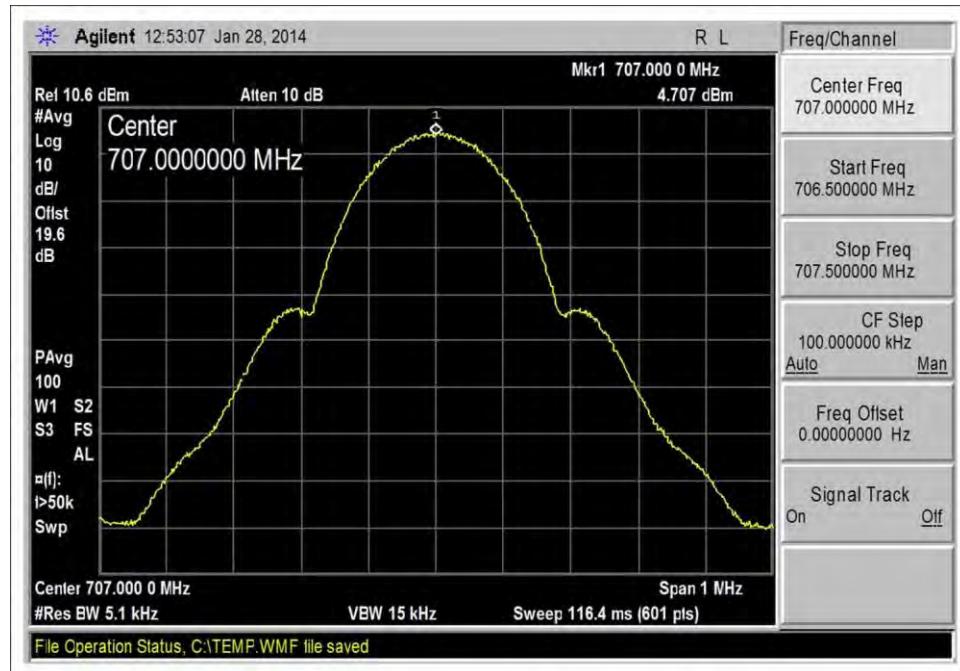
CDMA\_DL 728-746\_Input



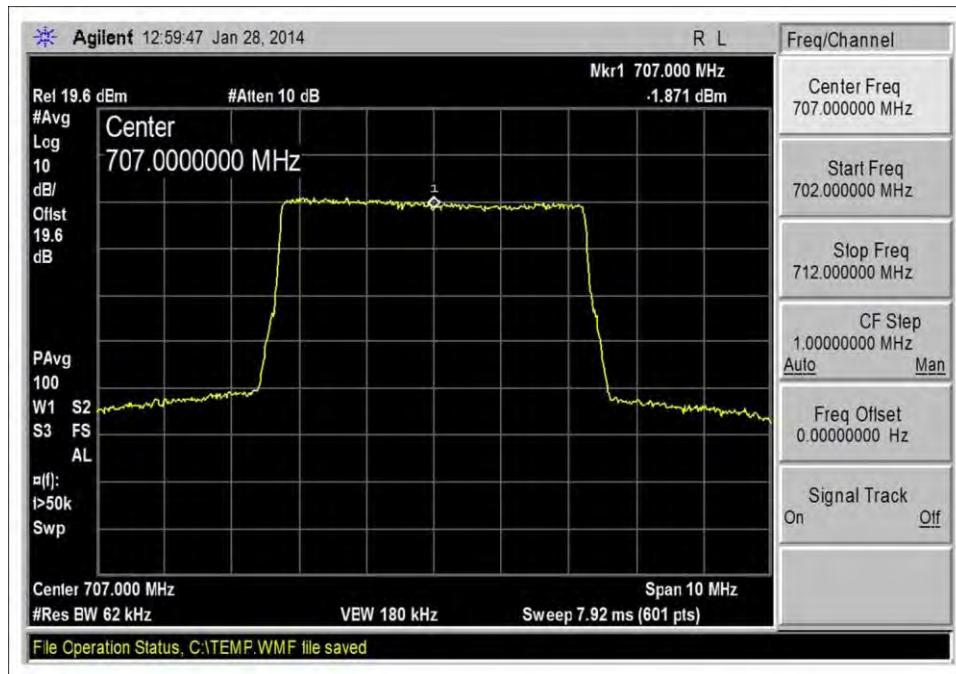
LTE\_DL 728-746\_Input



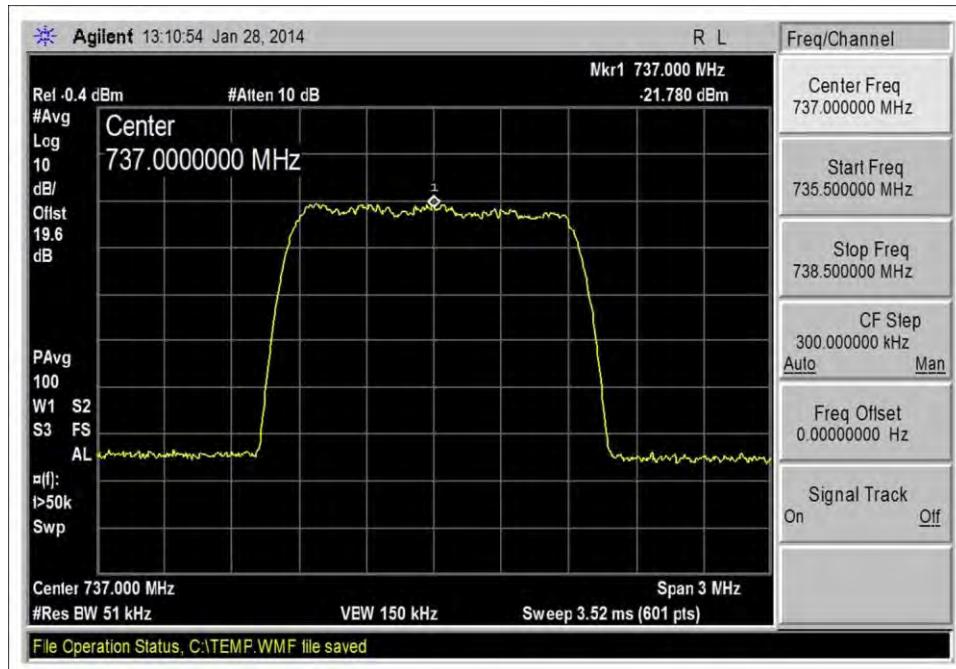
CDMA\_UL 698-716\_Output



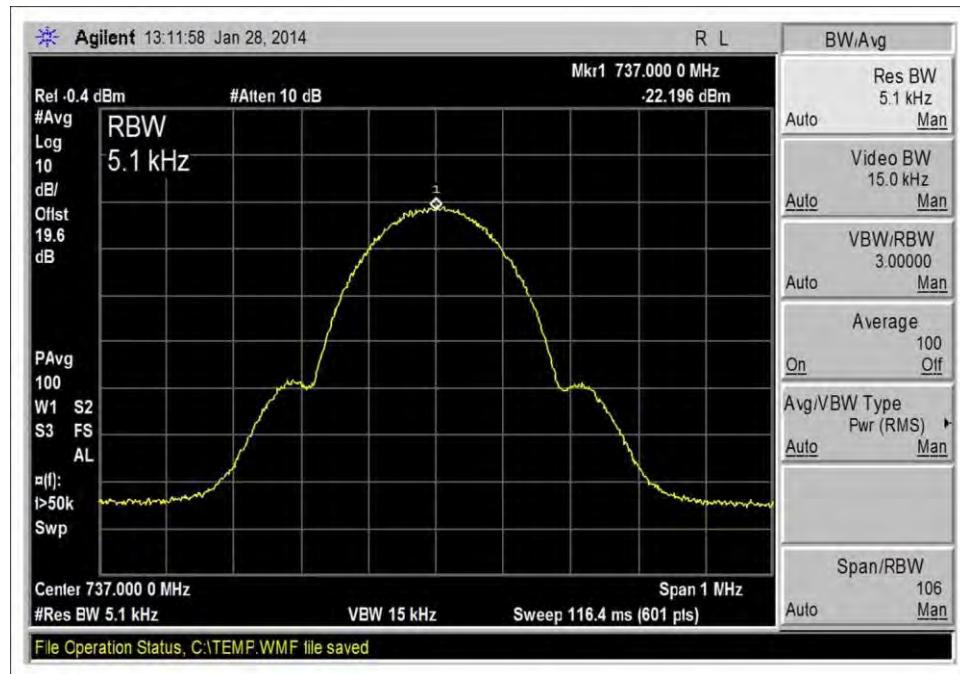
GSM\_UL 698-716\_Output



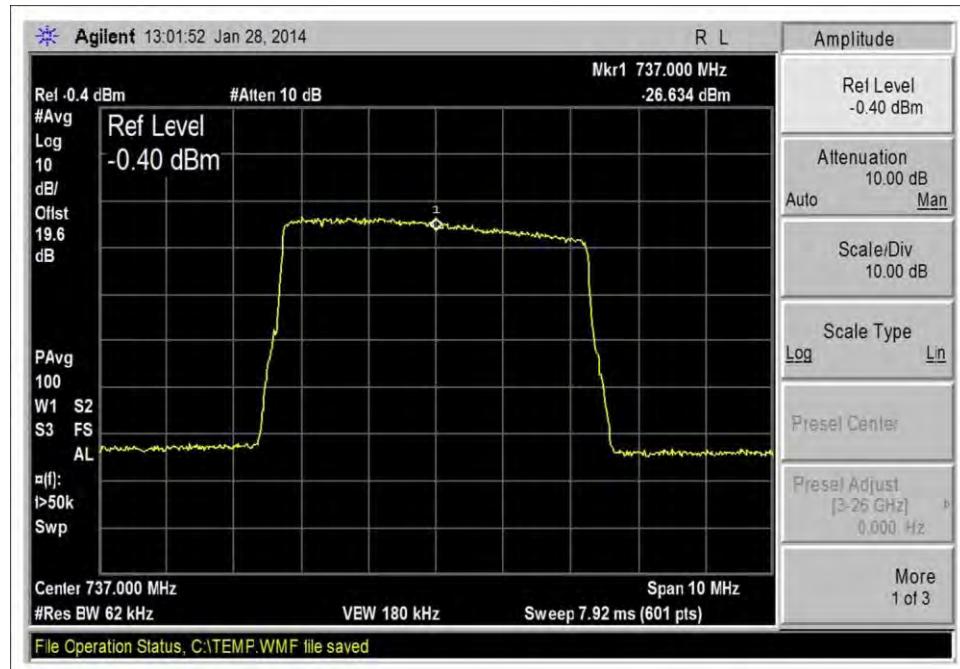
LTE\_UL 698-716\_Output



CDMA\_DL 728-746\_Output

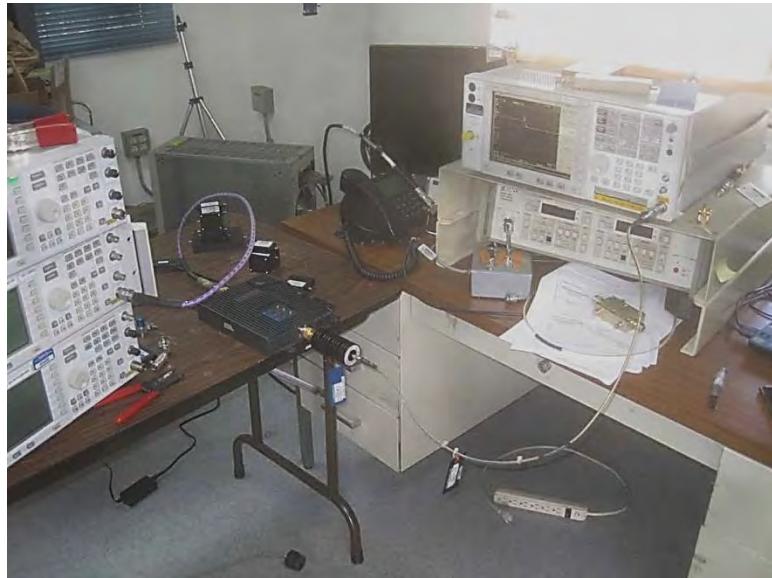


GSM\_DL 728-746\_Output



LTE\_DL 728-746\_Output

**Test Setup Photo(s)**



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

### **Test Data**

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 #: **95252** Date: **1/30/2014**  
 Test Type: **Conducted Emissions** Time: **16:01:09**  
 Equipment: **Mobile Wideband Consumer Signal Booster** Sequence#: **9**  
 Manufacturer: Cellphone-Mate, Inc. Tested By: **Don Nguyen**  
 Model: **TriFlex-2Go-A** **120V 60Hz**  
 S/N: **NA**

**Test Equipment:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN03431	Attenuator	89-20-21	9/5/2013	9/5/2015
T2	AN02945	Cable	32022-2-2909K-36TC	10/30/2013	10/30/2015
T3	AN02672	Spectrum Analyzer	E4446A	9/4/2012	9/4/2014

**Equipment Under Test (\* = EUT):**

Function	Manufacturer	Model #	S/N
Mobile Wideband Consumer Signal Booster*	Cellphone-Mate, Inc.	TriFlex-2Go-A	NA

**Support Devices:**

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40052164
Power Supply	SureCall	GFP451DA-0945-1	1211-0000323

**Test Conditions / Notes:**

The equipment under test (EUT) is placed on the table top. EUT set at maximum gain. Signal generator is connected to input port of EUT. Output port of EUT is connected to spectrum analyzer via 20db attenuator and RF cable. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.

UL 698-716

DL 728-746

TXFreq = Center frequency of above listed bands.

Modulation: CW

Frequency range of measurement = 9kHz to 8 GHz.

9kHz-150 kHz, RBW=200 Hz, VBW=200Hz;150kHz-30MHz, RBW=9kHz,VBW=9kHz;30MHz-1000MHz, RBW=120kHz,VBW=120kHz;1000MHz-8000MHz, RBW=1MHz,VBW=1MHz

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 January 21, 2014

Temperature: 21°C, Humidity: 39%, Pressure: 100kPa

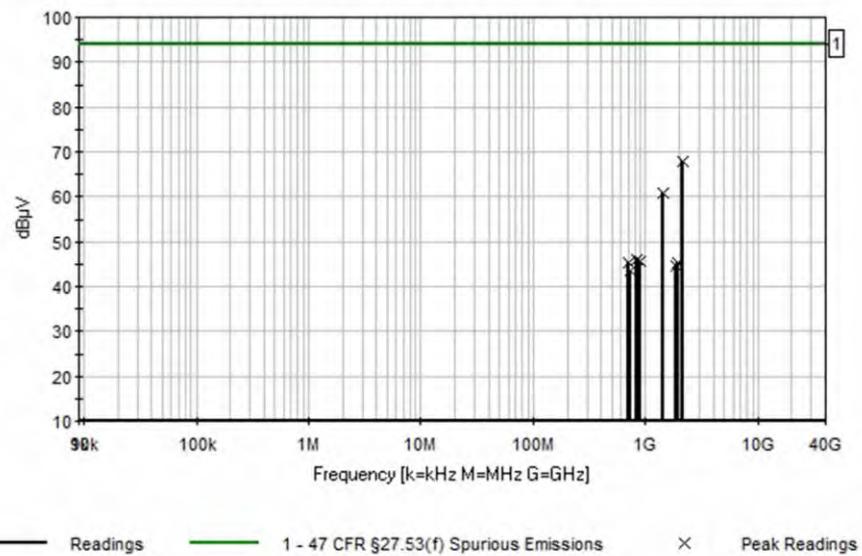
Site D

**No emission found when measuring downlink output port.**

Ext Attn: 0 dB

<b>Measurement Data:</b>		Reading listed by order taken.					Test Lead: Antenna port				
#	Freq MHz	Rdng dB $\mu$ V	T1 dB	T2 dB	T3 dB	Dist Table	Corr dB $\mu$ V	Spec dB $\mu$ V	Margin dB	Polar Ant	
1	1413.370M	40.8	+19.3	+0.6	+0.0	+0.0	60.7	94.0	-33.3	Anten	
							UL 698-716MHz				
2	2119.670M	47.5	+19.4	+0.8	+0.0	+0.0	67.7	94.0	-26.3	Anten	
							UL 698-716MHz				
3	703.360M	25.6	+19.3	+0.3	+0.0	+0.0	45.2	94.0	-48.8	Anten	
							Max Noise_UL 698-716, no input signal				
4	845.330M	26.4	+19.2	+0.3	+0.0	+0.0	45.9	94.0	-48.1	Anten	
							Max Noise_UL 824-849, no input signal				
5	1869.400M	24.7	+19.3	+0.7	+0.0	+0.0	44.7	94.0	-49.3	Anten	
							Max Noise_UL 1850-1910, no input signal				
6	735.920M	24.1	+19.2	+0.3	+0.0	+0.0	43.6	94.0	-50.4	Anten	
							Max Noise_DL 728-746, no input signal				
7	882.080M	25.9	+19.3	+0.3	+0.0	+0.0	45.5	94.0	-48.5	Anten	
							Max Noise_DL 869-894, no input signal				
8	1952.600M	25.2	+19.4	+0.7	+0.0	+0.0	45.3	94.0	-48.7	Anten	
							Max Noise_DL 1930-1990, no input signal				

CKC Laboratories Inc Date: 1/30/2014 Time: 16:01:09 Cellphone-Mate, Inc. WO#: 95252  
47 CFR §27.53(f) Spurious Emissions Test Lead: Antenna port 120V 60Hz Sequence#: 9 Ext ATTN: 0 dB



**LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION**

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

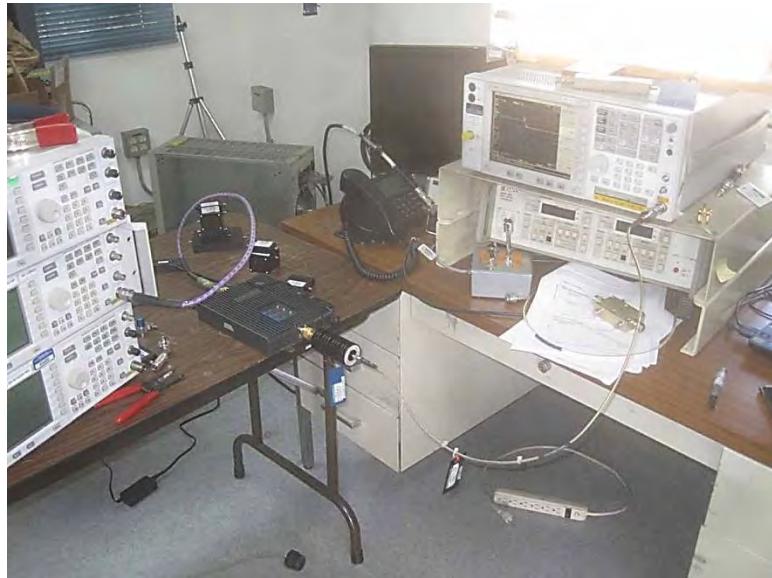
$$\text{Limit line (dBuV)} = V_{\text{dBuV}} - \text{Attenuation}$$

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

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

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

**Test Setup Photo(s)**



## 2.1053 / 27.53(c) / 27.53(f) / 27.53(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(f) Spurious Emissions**  
 Work Order #: **95252** Date: **1/30/2014**  
 Test Type: **Maximized Emissions** Time: **12:47:59**  
 Equipment: **Mobile Wideband Consumer Signal Booster** Sequence#: **8**  
 Manufacturer: Cellphone-Mate, Inc.  
 Model: TriFlex-2Go-A  
 S/N: NA  
 Tested By: Don Nguyen

***Test Equipment:***

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

***Equipment Under Test (\* = EUT):***

Function	Manufacturer	Model #	S/N
Mobile Wideband Consumer Signal Booster*	Cellphone-Mate, Inc.	TriFlex-2Go-A	NA

***Support Devices:***

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4433B	US40052164
Signal Generator	Agilent	E4433B	US40053279
Power Divider	Anaren	44000	0583
50 ohm Load	Generic	Generic	NA
Power Supply	SureCall	GFP451DA-0945-1	1211-0000323
Signal Generator	Agilent	E4438C	MY42081492
Programmer	Cellphone-Mate, Inc.	SureCall	NA

**Test Conditions / Notes:**

The equipment under test (EUT) is placed on the Styrofoam table top. EUT set at maximum gain.

Three remotely located signal generators are connected to power divider. The output of power divider is connected to input of EUT. Port GUI is terminated with supported programmer.

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.

UL 698-716

DL 728-746

TXFreq = Center frequency of above listed bands.

Modulation: CW

Frequency range of measurement = 9 kHz to 8 GHz.

9kHz-150kHz, RBW=200Hz, VBW=200Hz;150kHz-30MHz, RBW=9kHz,VBW=9kHz;30MHz-1000MHz, RBW=120kHz,VBW=120kHz;1000MHz-20000MHz, RBW=1MHz,VBW=1MHz

Temperature: 19°C, Humidity: 39%, Pressure: 100kPa

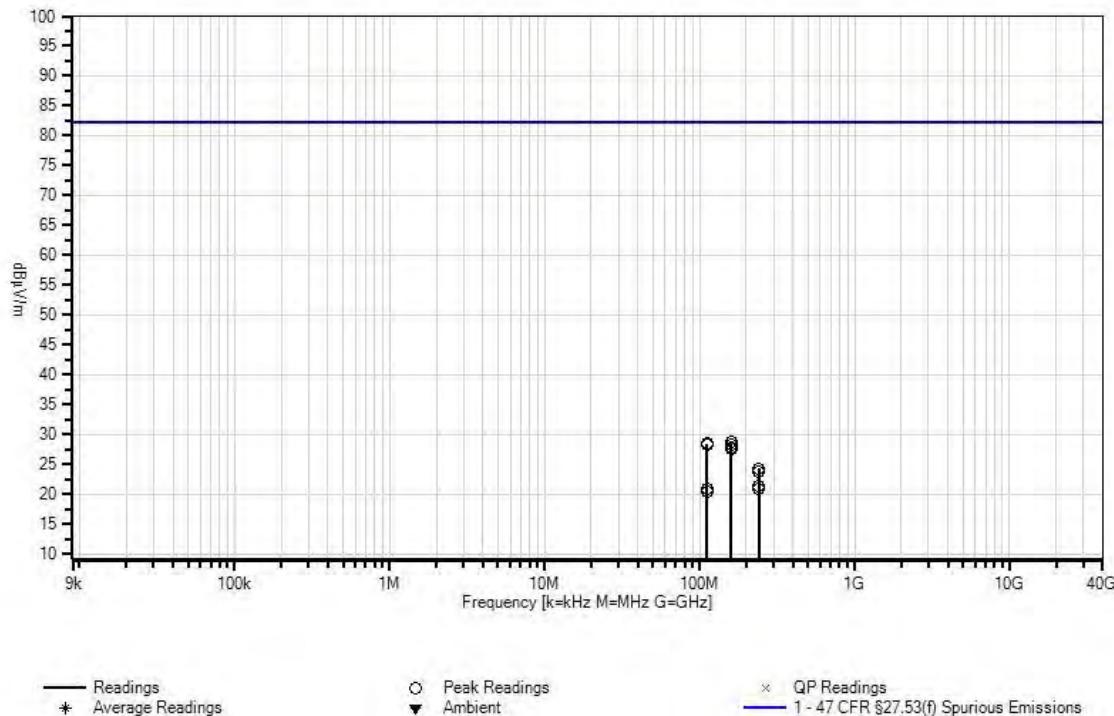
Site D

**No emission above 1GHz was found.**

Ext Attn: 0 dB

#	Freq MHz	Rdng dB $\mu$ V	Reading listed by margin.				Test Distance: 3 Meters				
			T1 dB	T2 dB	T3 dB	T4 dB	Dist Table	Corr dB $\mu$ V/m	Spec dB $\mu$ V/m	Margin dB	
			T5 dB	T6 dB						Ant	
1	160.170M	42.6	-26.8 +1.5	+10.4 +0.0	+0.2	+0.8	+0.0	28.7	82.2 DL 728-746, 869-894, 1930-1990	-53.5	Horiz
2	111.670M	42.3	-26.9 +1.2	+11.0 +0.0	+0.2	+0.7	+0.0	28.5	82.2 UL 698-716, 824-849, 1850-1910	-53.7	Vert
3	160.170M	42.2	-26.8 +1.5	+10.4 +0.0	+0.2	+0.8	+0.0	28.3	82.2 UL 698-716, 824-849, 1850-1910	-53.9	Horiz
4	111.670M	42.1	-26.9 +1.2	+11.0 +0.0	+0.2	+0.7	+0.0	28.3	82.2 DL 728-746, 869-894, 1930-1990	-53.9	Vert
5	160.170M	41.8	-26.8 +1.5	+10.4 +0.0	+0.2	+0.8	+0.0	27.9	82.2 DL 728-746, 869-894, 1930-1990	-54.3	Vert
6	160.170M	41.5	-26.8 +1.5	+10.4 +0.0	+0.2	+0.8	+0.0	27.6	82.2 UL 698-716, 824-849, 1850-1910	-54.6	Vert
7	241.170M	35.7	-26.5 +1.8	+12.0 +0.0	+0.3	+1.0	+0.0	24.3	82.2 DL 728-746, 869-894, 1930-1990	-57.9	Vert

8	241.170M	35.1	-26.5 +1.8	+12.0 +0.0	+0.3	+1.0	+0.0	23.7	82.2	-58.5	Vert
									UL 698-716, 824-849, 1850-1910		
9	241.170M	32.7	-26.5 +1.8	+12.0 +0.0	+0.3	+1.0	+0.0	21.3	82.2	-60.9	Horiz
									UL 698-716, 824-849, 1850-1910		
10	241.170M	32.4	-26.5 +1.8	+12.0 +0.0	+0.3	+1.0	+0.0	21.0	82.2	-61.2	Horiz
									DL 728-746, 869-894, 1930-1990		
11	111.670M	34.6	-26.9 +1.2	+11.0 +0.0	+0.2	+0.7	+0.0	20.8	82.2	-61.4	Horiz
									UL 698-716, 824-849, 1850-1910		
12	111.670M	34.3	-26.9 +1.2	+11.0 +0.0	+0.2	+0.7	+0.0	20.5	82.2	-61.7	Horiz
									DL 728-746, 869-894, 1930-1990		

CKC Laboratories Inc Date: 1/30/2014 Time: 12:47:59 Cellphone-Mate, Inc. WO#: 95252  
47 CFR §27.53(f) Spurious Emissions Test Distance: 3 Meters Sequence#: 8 Ext ATTN: 0 dB


## 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,

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

$E_{\text{dBuV}}$  = 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 /m<sup>2</sup>

$P_t$  = 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

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

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

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

**Since  $20 \log E (V/m) = 20 \log E (\mu V/m) - 120$**

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

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

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

Since  $20 \log E (\mu V/m) = E$  in dBuV/m

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

Radiated Emission limit 3 meter = 82.23 dBuV at any power level measured in dBuV

**Test Setup Photo(s)**



## 2.1055 Frequency Stability

**Note:** Not applicable because the EUT is an amplified device.

## 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  $\text{dB}\mu\text{V}/\text{m}$ , the spectrum analyzer reading in  $\text{dB}\mu\text{V}$  was corrected by using the following formula. This reading was then compared to the applicable specification limit.

<b>SAMPLE CALCULATIONS</b>	
Meter reading	(dB $\mu$ V)
+ Antenna Factor	(dB)
+ Cable Loss	(dB)
- Distance Correction	(dB)
- Preamplifier Gain	(dB)
= Corrected Reading	(dB $\mu$ V/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.

<b>MEASURING EQUIPMENT BANDWIDTH SETTINGS PER FREQUENCY RANGE</b>			
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