

# Cellphone-Mate, Inc.

ADDENDUM TO TEST REPORT 95353-10

**Mobile Wideband Consumer Signal Booster  
Model: TriFlex-2Go-T**

Tested To The Following Standards:

FCC Part 22H

Report No.: 95353-10A

Date of issue: April 29, 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: CKC20140129

**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: 95353

February 10, 2014

February 10-14, 2014

April 24, 2014

### Revision History

**Original:** Testing of the Mobile Wideband Consumer Signal Booster, TriFlex-2Go-T to FCC Part 22H.

**Addendum A:** To insert corrected test data and setup photo in Section 2.1051 / 22.917(a), Conducted 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.



**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 / 22H**

| Test Procedure/Method | Description                             | Results         |
|-----------------------|---|-----------------|
| 2.1046                | RF Power Output                         | NA <sup>1</sup> |
| 2.1049(l)             | Occupied Bandwidth                      | Pass            |
| 2.1051 / 22.917(a)    | Spurious Emissions at Antenna Terminals | Pass            |
| 2.1053 // 22.917(a)   | Field Strength of Spurious Radiation    | Pass            |
| 2.1055(d)             | 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-T  
Serial: NA

### PERIPHERAL DEVICES

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

#### Signal Generator

Manuf: Agilent  
Model: E4433B  
Serial: US40052164

#### Power Divider

Manuf: Anaren  
Model: 44000  
Serial: 0583

#### Signal Generator

Manuf: Agilent  
Model: E4438C  
Serial: MY42081492

#### Power Supply

Manuf: SureCall  
Model: GFP451DA-0945-1  
Serial: 1308-0000300

#### Signal Generator

Manuf: Agilent  
Model: E4433B  
Serial: US40053279

#### 50 ohm Load

Manuf: Generic  
Model: Generic  
Serial: NA

#### Programmer

Manuf: Cellphone-Mate, Inc.  
Model: SureCall  
Serial: NA

## FCC PART(S) 2 / 22H

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) requirements for 47 CFR Part 2: Frequency Allocations and Radio Treaty Matters, General Rules and Regulations and Licensed Device falling under Part 22: Public Mobile Services.

## 2.1049(I) Occupied Bandwidth

### Test Conditions / Setup

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

Customer: **Cellphone-Mate, Inc.**  
 Specification: **2.1049(I) Occupied Bandwidth**  
 Work Order #: **95353** Date: 2/14/2014  
 Test Type: **Conducted Emissions** Time: 08:53:16  
 Equipment: **Mobile Wideband Consumer Signal Booster** Sequence#: 10  
 Manufacturer: Cellphone-Mate, Inc. Tested By: Don Nguyen  
 Model: TriFlex-2Go-T 120V 60Hz  
 S/N: NA

**Test Equipment:**

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

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

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

**Support Devices:**

| Function         | Manufacturer | Model #         | S/N          |
|------------------|--------------|-----------------|--------------|
| Signal Generator | Agilent      | E4433B          | US40052164   |
| Power Supply     | SureCall     | GFP451DA-0945-1 | 1308-0000325 |

**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.  
 EUT is powered by 9V power supply.

UL 824-849  
 DL 869-894

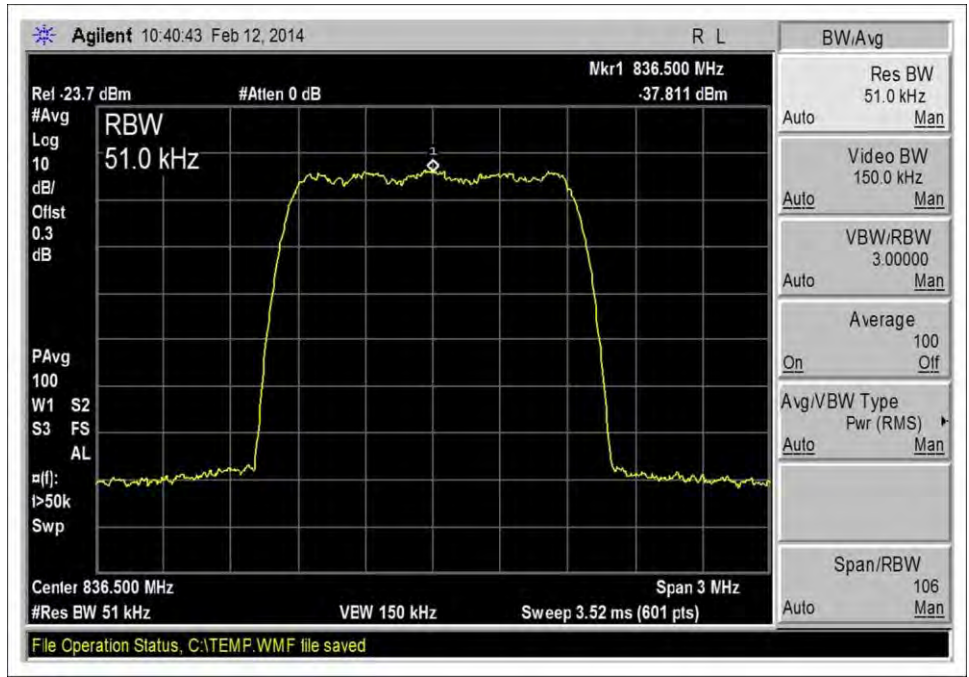
Test procedure: The test was performed in accordance with section 7.10 of the FCC Publication: 935210 D03 Signal Booster Measurements v01r01: January 22, 2014.

Temperature: 19°C, Humidity: 36%, Pressure: 100.1kPa

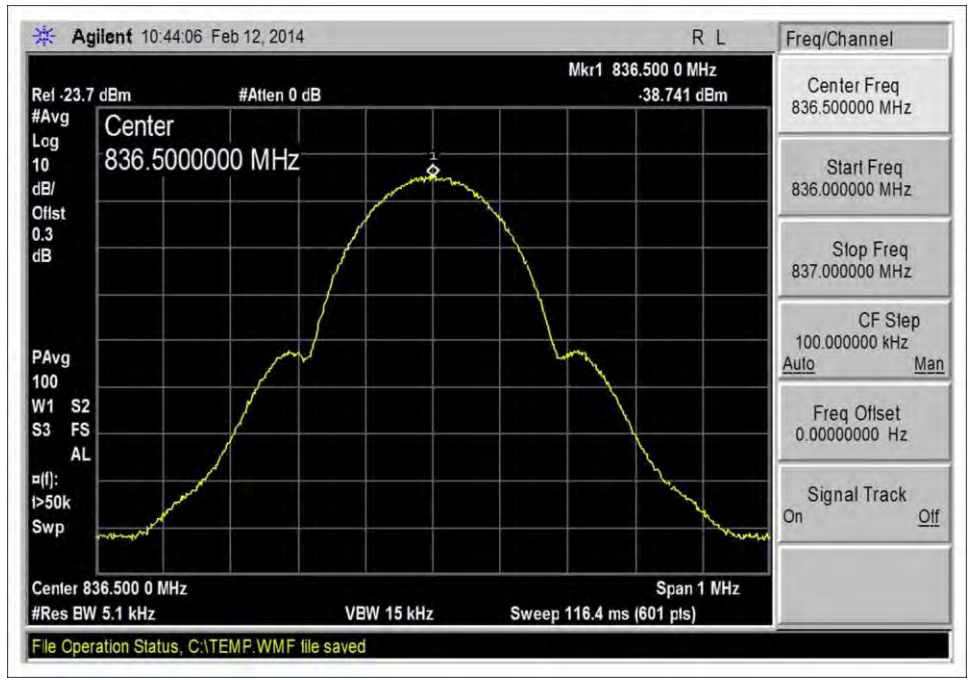
Site D



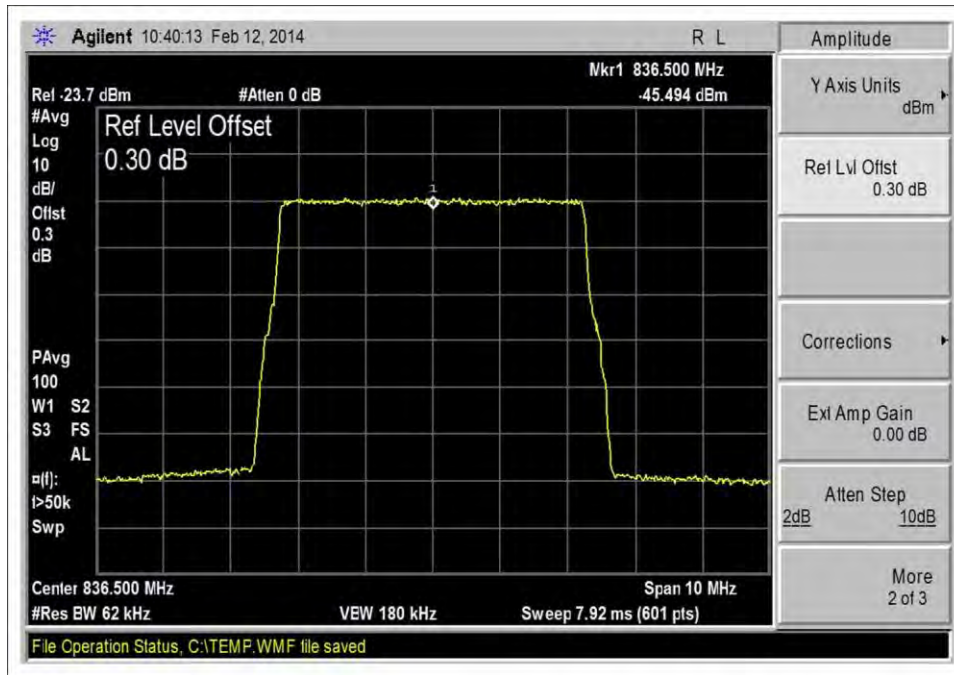
## Test Data



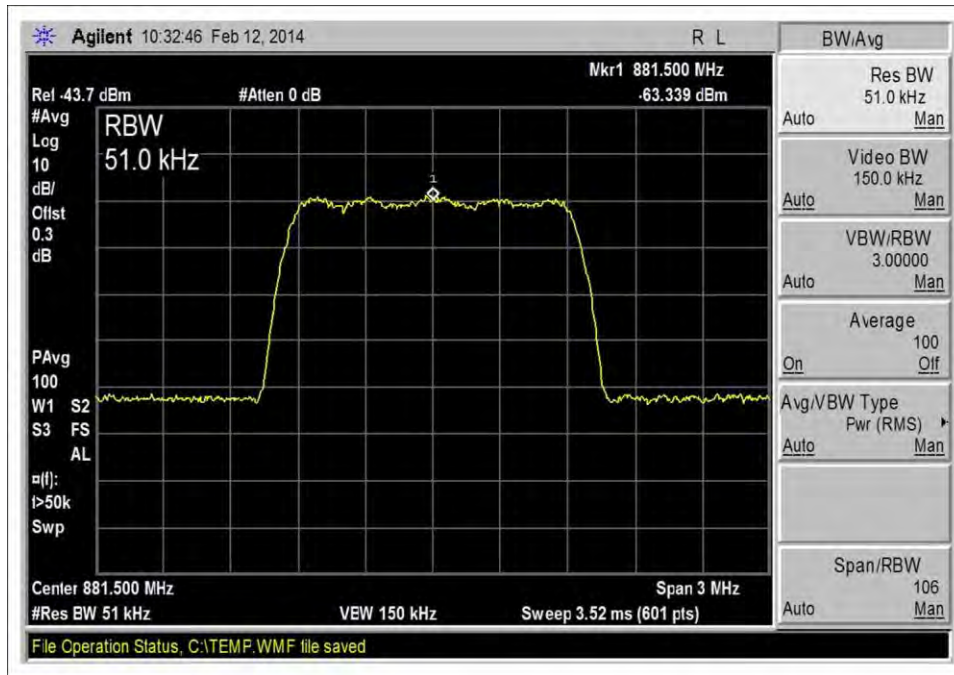
UL - 824-849, CDMA Input



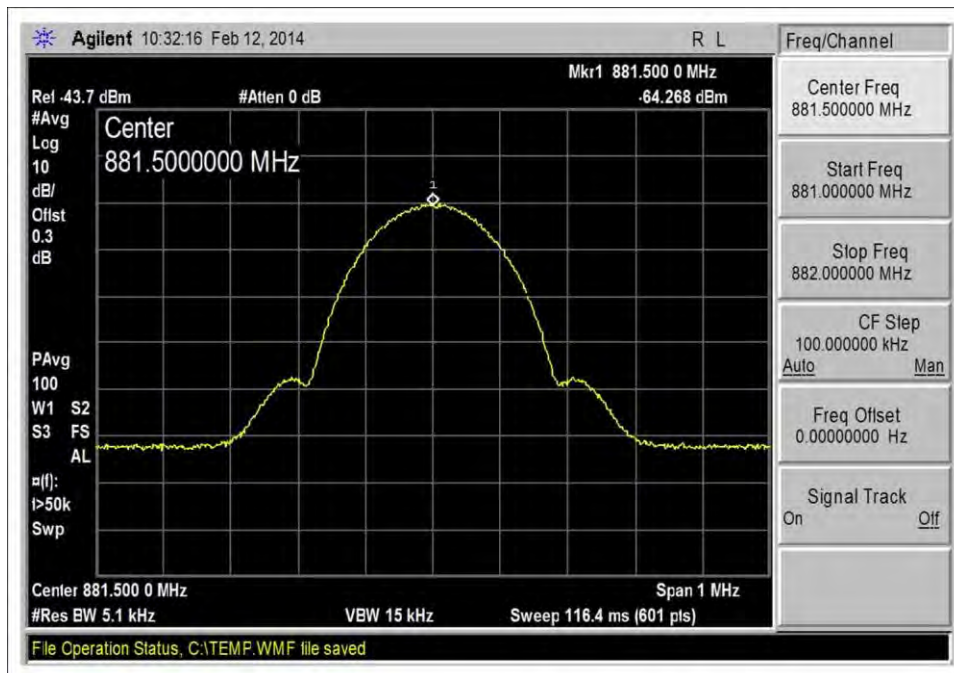
UL - 824-849, GSM Input



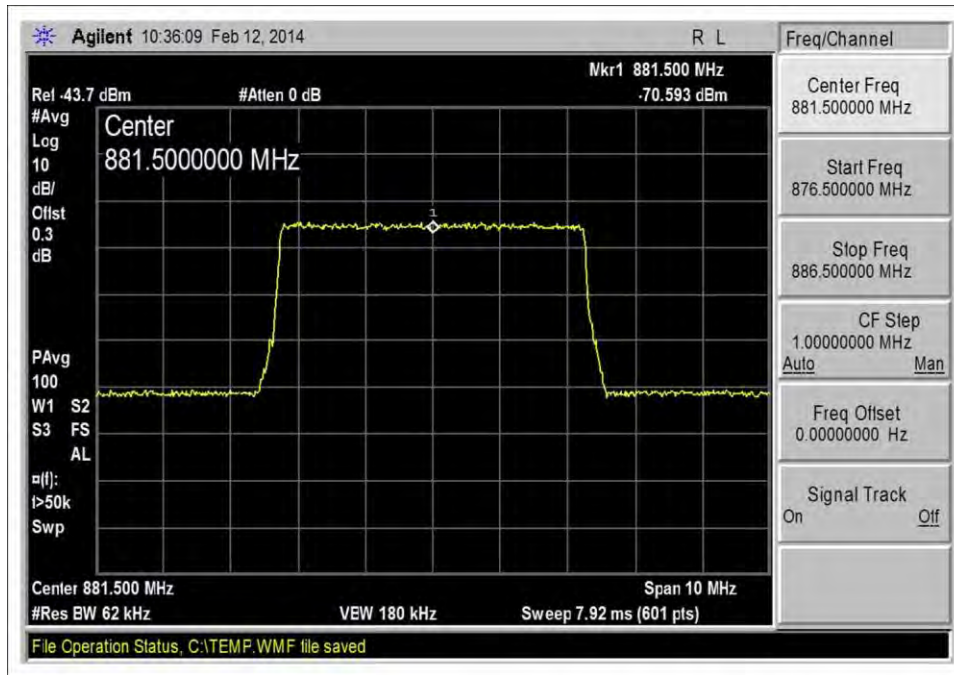
UL -824-849, LTE Input



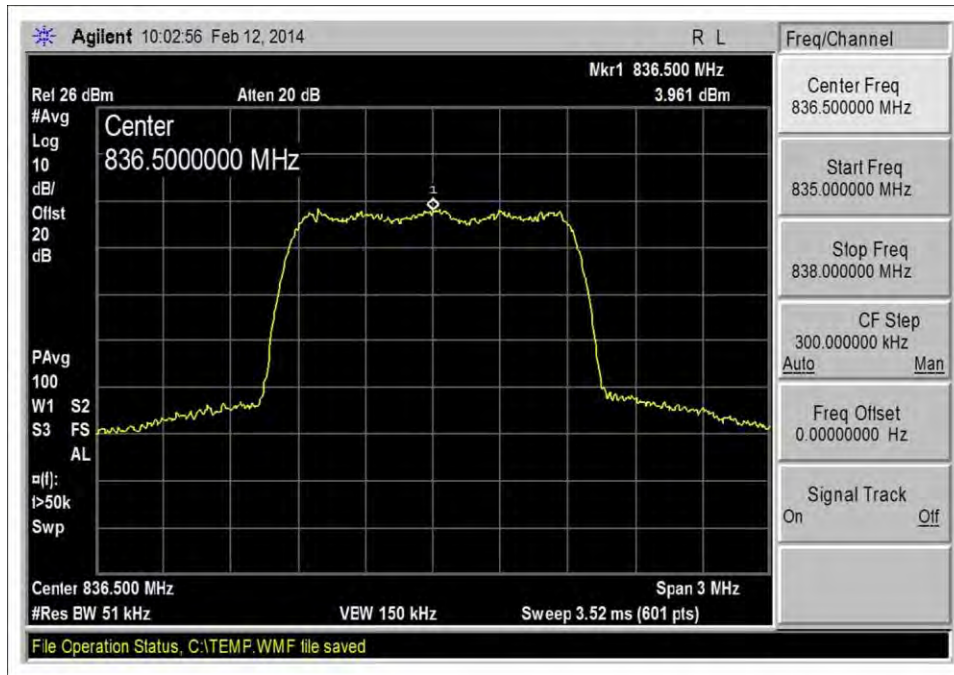
DL - 869-894, CDMA Input



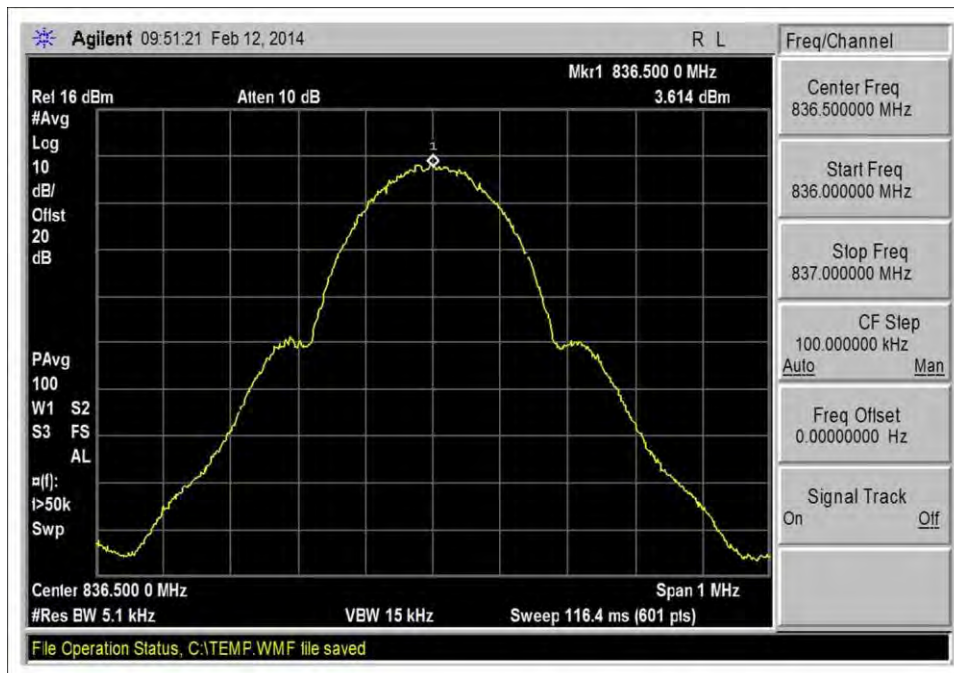
DL - 869-894, GSM Input



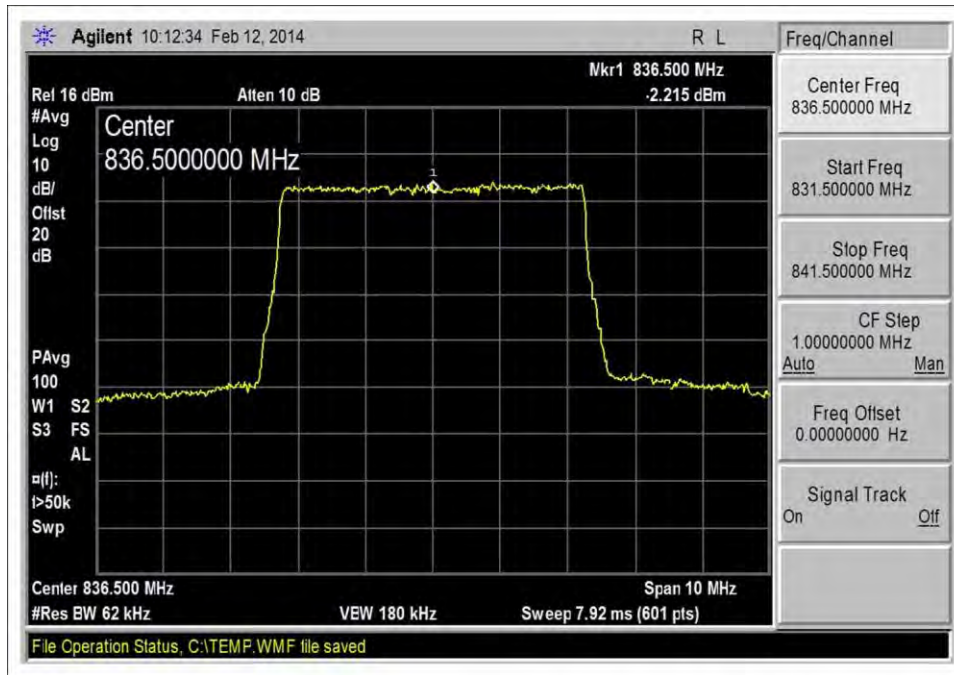
DL - 869-894, LTE Input



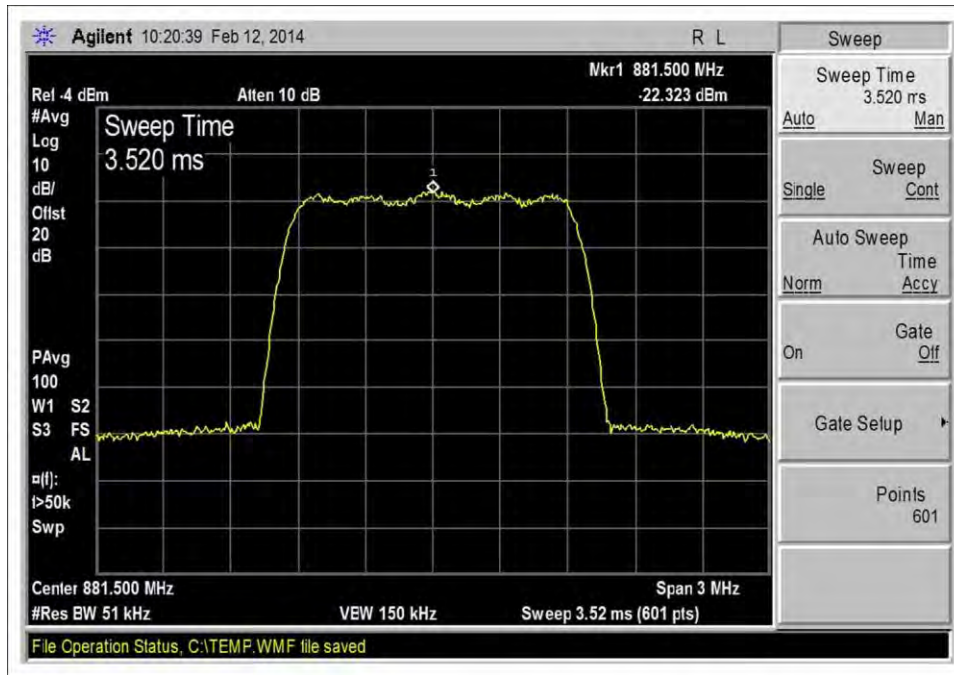
UL - 824-849, CDMA Output



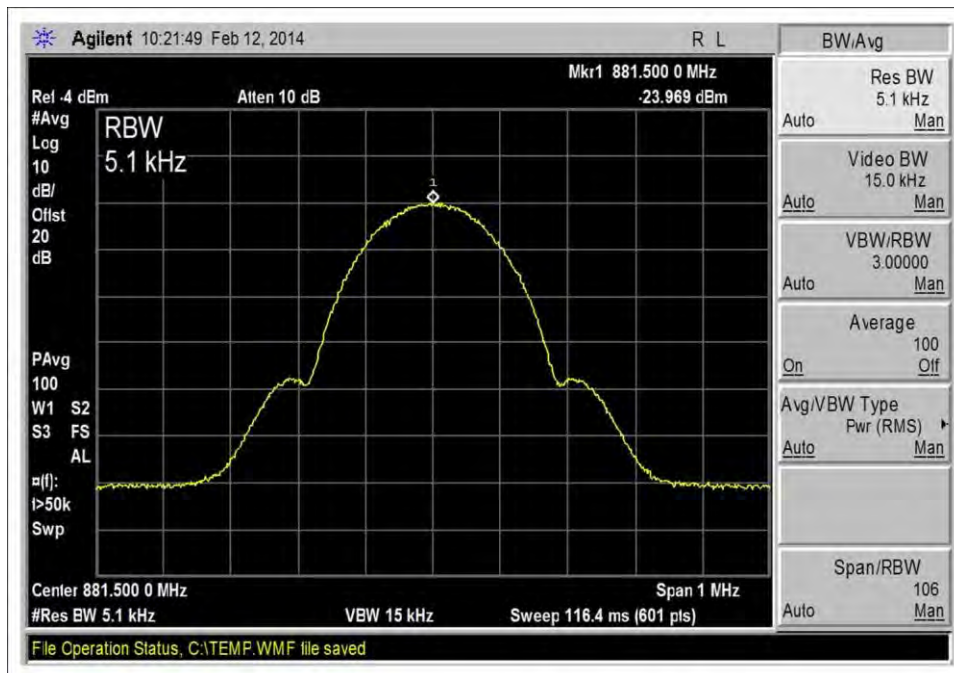
UL -824-849, GSM Output



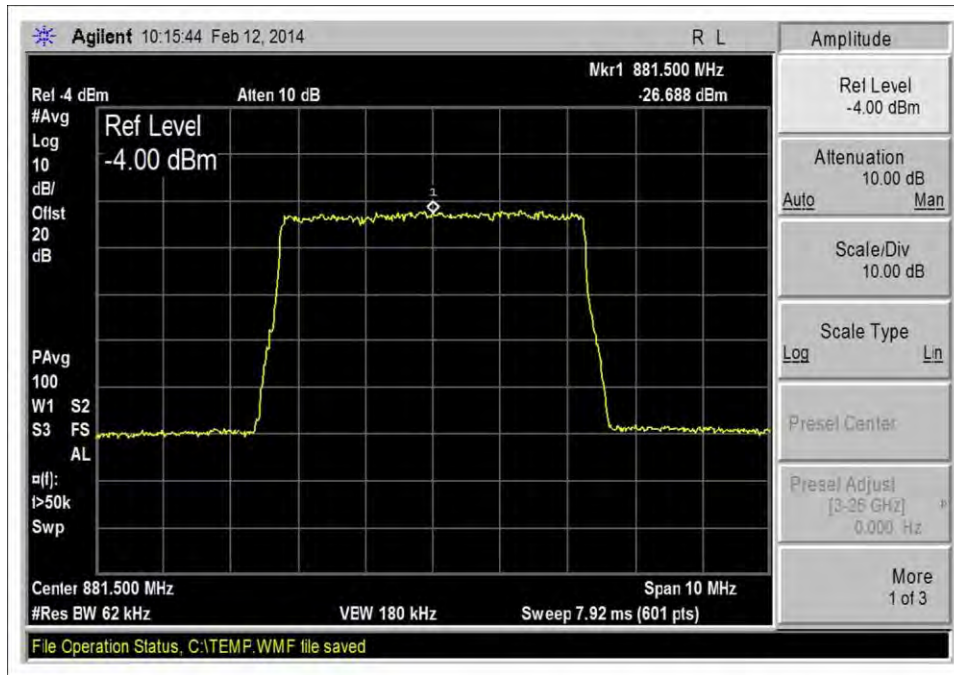
UL - 824-849, LTE Output



DL - 824-849, CDMA Output



DL - 824-849, GSM Output



DL -824-849, LTE Output

**Test Setup Photo(s)**





**2.1051 / 22.917(a) Spurious Emissions at Antenna Terminals**

**Test Conditions / Setup**

Test Location: CKC Laboratories Inc. • 110 N Olinda Pl • Brea CA 92823 • 714-993-6112

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

Specification: **47 CFR §27.53(g) Spurious Emissions**

Work Order #: **95353** Date: 4/24/2014

Test Type: **Conducted Emissions** Time: 09:05:16

Equipment: **Mobile Wideband Consumer Signal Booster** Sequence#: 11

Manufacturer: Cellphone-Mate, Inc. Tested By: Don Nguyen

Model: TriFlex-2Go-T 120V 60Hz

S/N: NA

**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 | ANP06544 | Cable             | 32026-29094K-29094K-36TC | 11/20/2013       | 11/20/2015   |

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

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

**Support Devices:**

| Function         | Manufacturer                           | Model # | S/N              |
|------------------|--|---------|------------------|
| Signal Generator | Agilent                                | E4433B  | US40052164       |
| Power Supply     | Guang Zhou Ji Yin Electronics Co., LTD | TH-242  | 2008010907286265 |

**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 1710-1755; DL 2110-2155

TXFreq = Center frequency of above listed bands.  
Modulation: AWGN 4.1MHz, 99% occupied bandwidth  
Frequency range of measurement = 9 kHz to 22 GHz.  
9kHz-150kHz, RBW=200Hz, VBW=200Hz;150kHz-30MHz, RBW=9kHz, VBW=9kHz; 30MHz-1000MHz, RBW=120kHz,VBW=120kHz;1000MHz-22000MHz, RBW=1MHz,VBW=1MHz  
Temperature: 22°C, Humidity: 41%, Pressure: 100.1kPa  
Site D

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

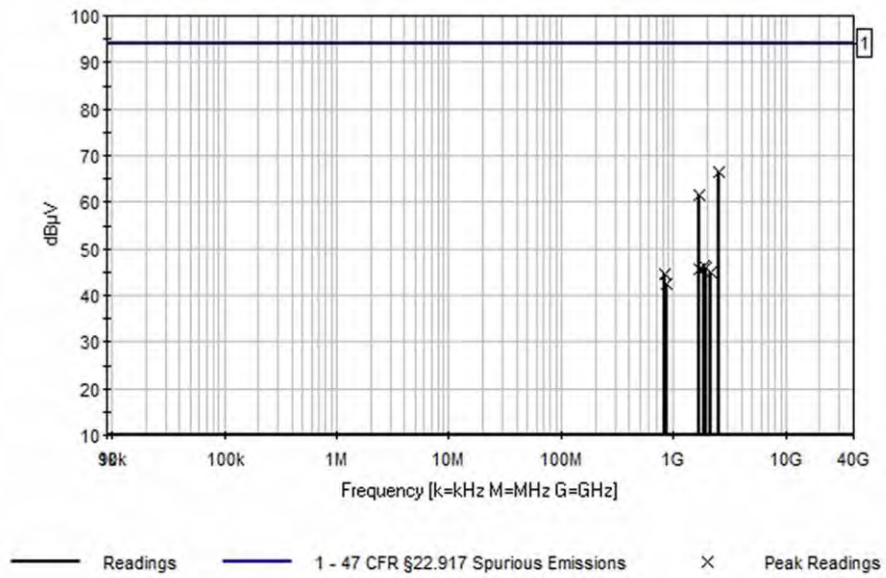
### Test Data

**Measurement Data:** Reading listed by order taken.

Test Lead: Antenna port

| # | Freq<br>MHz | Rdng<br>dB $\mu$ V | T1<br>dB | T2<br>dB | T3<br>dB | dB | Dist<br>Table | Corr<br>dB $\mu$ V | Spec<br>dB $\mu$ V                     | Margin<br>dB | Polar<br>Ant |
|---|-------------|--------------------|----------|----------|----------|----|---------------|--------------------|--|--------------|--------------|
| 1 | 843.830M    | 43.9               | +0.0     | +0.0     | +0.7     |    | +0.0          | 44.6               | 94.0                                   | -49.4        | Anten        |
|   |             |                    |          |          |          |    |               |                    | Max noise UL 824-849, no input power   |              |              |
| 2 | 1719.300M   | 45.2               | +0.0     | +0.0     | +0.5     |    | +0.0          | 45.7               | 94.0                                   | -48.3        | Anten        |
|   |             |                    |          |          |          |    |               |                    | Max noise UL 1710-1755, no input power |              |              |
| 3 | 1874.800M   | 45.8               | +0.0     | +0.0     | +0.6     |    | +0.0          | 46.4               | 94.0                                   | -47.6        | Anten        |
|   |             |                    |          |          |          |    |               |                    | Max noise UL 1850-1910, no input power |              |              |
| 4 | 869.580M    | 41.9               | +0.0     | +0.0     | +0.7     |    | +0.0          | 42.6               | 94.0                                   | -51.4        | Anten        |
|   |             |                    |          |          |          |    |               |                    | Max noise DL 869-894, no input power   |              |              |
| 5 | 1962.000M   | 45.4               | +0.0     | +0.0     | +0.6     |    | +0.0          | 46.0               | 94.0                                   | -48.0        | Anten        |
|   |             |                    |          |          |          |    |               |                    | Max noise DL 1930-1990, no input power |              |              |
| 6 | 2121.850M   | 44.2               | +0.0     | +0.0     | +0.6     |    | +0.0          | 44.8               | 94.0                                   | -49.2        | Anten        |
|   |             |                    |          |          |          |    |               |                    | Max noise DL 2110-2155, no input power |              |              |
| 7 | 3465.140M   | 34.8               | +0.0     | +19.4    | +0.8     |    | +0.0          | 55.0               | 94.0                                   | -39.0        | Anten        |
|   |             |                    |          |          |          |    |               |                    | UL 1710-1755                           |              |              |

CKC Laboratories Inc Date: 4/24/2014 Time: 09:05:16 Cellphone-Mate, Inc. WO#: 95353  
47 CFR §22.917 Spurious Emissions Test Lead: Antenna port 120V 60Hz Sequence#: 11 Ext ATTN: 0 dB



### LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

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

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

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

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

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

**Test Setup Photo(s)**



**2.1053 / 22.917(a) Field Strength of Spurious Radiation**

**Test Conditions / Setup**

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

Customer: **Cellphone-Mate, Inc.**  
 Specification: **47 CFR §22.917 Spurious Emissions**  
 Work Order #: **95353** Date: 2/13/2014  
 Test Type: **Maximized Emissions** Time: 14:24:31  
 Equipment: **Mobile Wideband Consumer Signal Booster** Sequence#: 9  
 Manufacturer: Cellphone-Mate, Inc. Tested By: Don Nguyen  
 Model: TriFlex-2Go-T  
 S/N: NA

**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-PNMMN-48        | 8/29/2012        | 8/29/2014    |
| T5 | ANP04382 | Cable                          | LDF-50             | 8/30/2012        | 8/30/2014    |
|    | 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 C63.5 (dB/m) | 84125-80008        | 11/9/2012        | 11/9/2014    |

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

| Function                                 | Manufacturer         | Model #       | S/N |
|--|----------------------|---------------|-----|
| Mobile Wideband Consumer Signal Booster* | Cellphone-Mate, Inc. | TriFlex-2Go-T | 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           |
| Signal Generator | Agilent              | E4438C          | MY42081492   |
| Programmer       | Cellphone-Mate, Inc. | SureCall        | NA           |
| Power Supply     | SureCall             | GFP451DA-0945-1 | 1308-0000300 |

**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 824-849

DL 869-894

TXFreq = Center frequency of above listed bands.

Modulation: CW

Frequency range of measurement = 9 kHz to 9 GHz.

9kHz-150 kHz, RBW=200Hz, VBW=200Hz;150kHz-30MHz, RBW=9kHz,VBW=9kHz;30MHz-1000MHz, RBW=120kHz,VBW=120kHz;1000MHz-9000MHz, RBW=1MHz,VBW=1MHz

Test procedure: The test was performed in accordance with section 7.12 of the FCC Publication: 935210 D03 Signal Booster Measurements v01r01: January 22, 2014

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

Site D

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

**Test Data**

Ext Attn: 0 dB

**Measurement Data:**

Reading listed by margin.

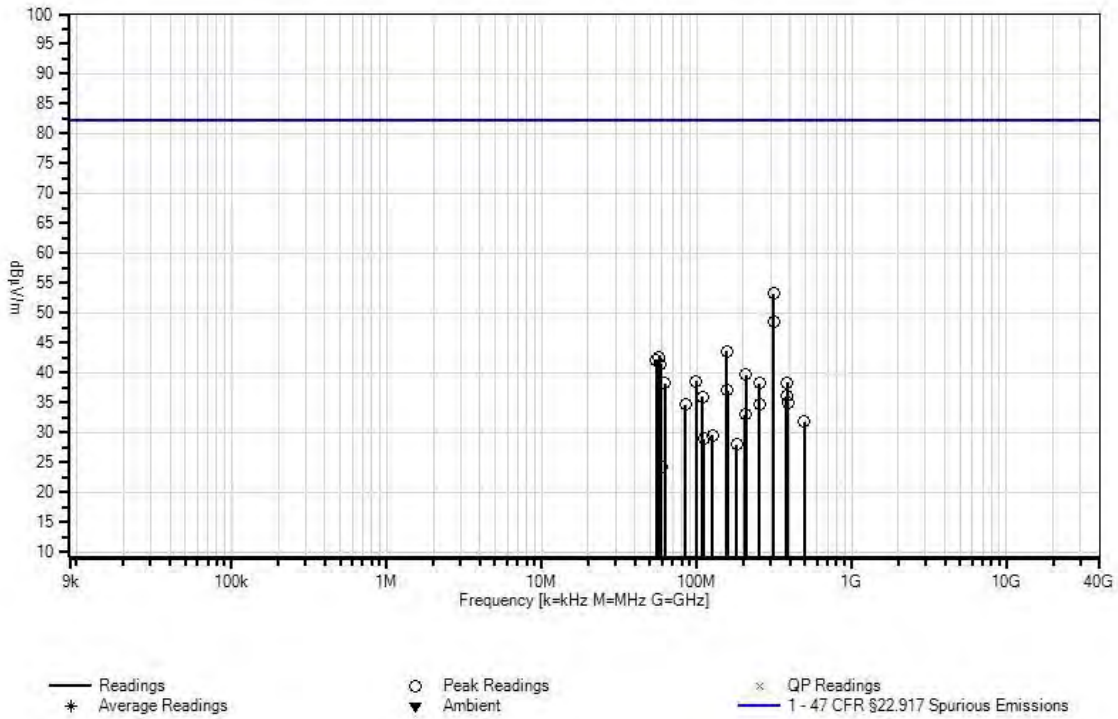
Test Distance: 3 Meters

| # | Freq<br>MHz | Rdng<br>dBμV | T1<br>T5<br>dB | T2<br>dB | T3<br>dB | T4<br>dB | Dist<br>Table | Corr<br>dBμV/m | Spec<br>dBμV/m | Margin<br>dB | Polar<br>Ant |
|---|-------------|--------------|----------------|----------|----------|----------|---------------|----------------|----------------|--------------|--------------|
| 1 | 313.700M    | 62.7         | -26.5<br>+2.1  | +13.5    | +0.3     | +1.1     | +0.0          | 53.2           | 82.2           | -29.0        | Horiz        |
| 2 | 312.700M    | 58.1         | -26.5<br>+2.1  | +13.4    | +0.3     | +1.1     | +0.0          | 48.5           | 82.2           | -33.7        | Vert         |
| 3 | 155.980M    | 57.2         | -26.8<br>+1.5  | +10.7    | +0.2     | +0.8     | +0.0          | 43.6           | 82.2           | -38.6        | Vert         |
| 4 | 57.460M     | 61.7         | -27.1<br>+0.9  | +6.4     | +0.2     | +0.5     | +0.0          | 42.6           | 82.2           | -39.6        | Vert         |
| 5 | 54.860M     | 60.5         | -27.1<br>+0.9  | +7.1     | +0.2     | +0.5     | +0.0          | 42.1           | 82.2           | -40.1        | Vert         |
| 6 | 58.660M     | 60.8         | -27.1<br>+0.9  | +6.1     | +0.2     | +0.5     | +0.0          | 41.4           | 82.2           | -40.8        | Vert         |

|    |          |      |               |       |      |      |      |      |      |       |       |
|----|----------|------|---------------|-------|------|------|------|------|------|-------|-------|
| 7  | 208.600M | 53.9 | -26.6<br>+1.6 | +9.6  | +0.3 | +0.9 | +0.0 | 39.7 | 82.2 | -42.5 | Horiz |
| 8  | 99.202M  | 53.8 | -27.0<br>+1.2 | +9.8  | +0.2 | +0.6 | +0.0 | 38.6 | 82.2 | -43.6 | Vert  |
| 9  | 385.600M | 46.3 | -27.1<br>+2.3 | +15.2 | +0.4 | +1.3 | +0.0 | 38.4 | 82.2 | -43.8 | Horiz |
| 10 | 62.260M  | 57.9 | -27.1<br>+0.9 | +5.9  | +0.2 | +0.5 | +0.0 | 38.3 | 82.2 | -43.9 | Vert  |
| 11 | 254.600M | 49.0 | -26.5<br>+1.8 | +12.7 | +0.3 | +1.0 | +0.0 | 38.3 | 82.2 | -43.9 | Vert  |
| 12 | 157.600M | 50.7 | -26.8<br>+1.5 | +10.6 | +0.2 | +0.8 | +0.0 | 37.0 | 82.2 | -45.2 | Horiz |
| 13 | 381.600M | 44.1 | -27.1<br>+2.3 | +15.1 | +0.4 | +1.3 | +0.0 | 36.1 | 82.2 | -46.1 | Vert  |
| 14 | 109.060M | 50.1 | -26.9<br>+1.2 | +10.8 | +0.2 | +0.6 | +0.0 | 36.0 | 82.2 | -46.2 | Vert  |
| 15 | 387.700M | 42.8 | -27.1<br>+2.3 | +15.2 | +0.4 | +1.3 | +0.0 | 34.9 | 82.2 | -47.3 | Vert  |
| 16 | 253.600M | 45.5 | -26.5<br>+1.8 | +12.6 | +0.3 | +1.0 | +0.0 | 34.7 | 82.2 | -47.5 | Horiz |
| 17 | 84.553M  | 51.7 | -27.0<br>+1.0 | +8.2  | +0.2 | +0.6 | +0.0 | 34.7 | 82.2 | -47.5 | Vert  |
| 18 | 206.480M | 47.4 | -26.6<br>+1.6 | +9.4  | +0.3 | +0.9 | +0.0 | 33.0 | 82.2 | -49.2 | Vert  |
| 19 | 492.520M | 37.7 | -27.8<br>+2.6 | +17.5 | +0.4 | +1.4 | +0.0 | 31.8 | 82.2 | -50.4 | Horiz |
| 20 | 126.600M | 42.5 | -26.8<br>+1.3 | +11.6 | +0.2 | +0.7 | +0.0 | 29.5 | 82.2 | -52.7 | Horiz |
| 21 | 111.250M | 42.7 | -26.9<br>+1.2 | +11.0 | +0.2 | +0.7 | +0.0 | 28.9 | 82.2 | -53.3 | Horiz |
| 22 | 181.520M | 43.1 | -26.7<br>+1.6 | +9.0  | +0.2 | +0.8 | +0.0 | 28.0 | 82.2 | -54.2 | Horiz |
| 23 | 58.830M  | 43.7 | -27.1<br>+0.9 | +6.1  | +0.2 | +0.5 | +0.0 | 24.3 | 82.2 | -57.9 | Horiz |



CKC Laboratories Inc. Date: 2/13/2014 Time: 14:24:31 Cellphone-Mate, Inc. WO#: 95353  
 47 CFR §22.917 Spurious Emissions Test Distance: 3 Meters Sequence#: 9 Ext ATTN: 0 dB



### LIMIT LINE FOR SPURIOUS RADIATED EMISSION

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

For radiated spurious emission measured at 3 meter test distance,

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

$E_{\text{dBuV}}$  = 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)

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

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

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

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

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

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

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

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

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

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

**Since 20 Log E (V/m) = 20 Log E (uV/m) -120**

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

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

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

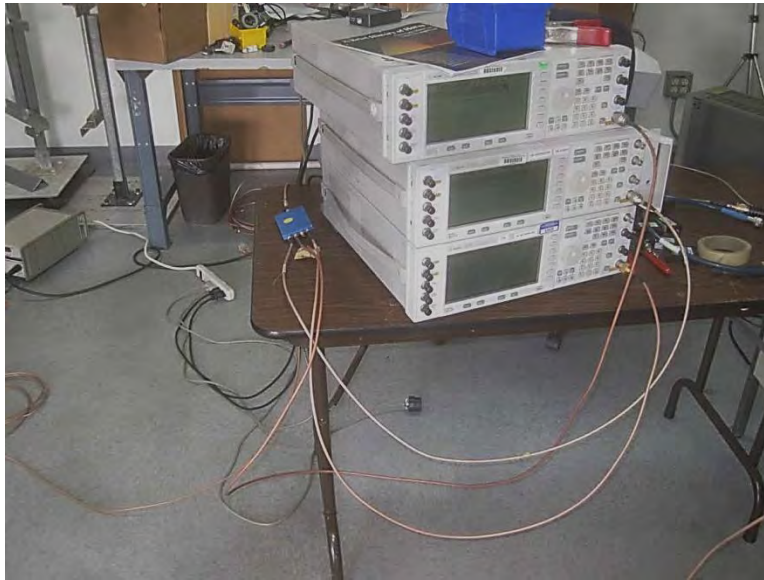
**Since 20 Log E (uV/m) = E in dBuV/m**

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

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

**Test Setup Photo(s)**





## 2.1055(d) Frequency Stability

|                       |   |                        |           |
|-----------------------|---|------------------------|-----------|
| <b>Test Engineer:</b> | Don Nguyen  | <b>Test Procedure:</b> | 2.1055(d) |
| <b>Test Level:</b>    | NA  |                        |           |
| <b>Declarations:</b>  | 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 dBμV/m, the spectrum analyzer reading in dBμV 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.