Cellphone-Mate, Inc.

ADDENDUM TO TEST REPORT 98360-13A

Dual Band Consumer Booster
Model: EZ CALL

Tested to The Following Standard:

FCC Part 2 / 22

Report No.: 98360-13B

Date of issue: August 10, 2016

ACCREDITED
Testing Certificates:
803.01, 803.02, 803.05, 803.06

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

Testing the Future
CKC LABORATORIES, INC.

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ADMINISTRATIVE INFORMATION

Test Report Information

REPORT PREPARED FOR:

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

Representative: Dennis Findley
Customer Reference Number: CKC20160429

REPORT PREPARED BY:

Dianne Dudley
CKC Laboratories, Inc.
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Mariposa, CA 95338

Project Number: 98360

DATE OF EQUIPMENT RECEIPT: April 26, 2016
DATE(S) OF TESTING: April 26-May 4, 2016

Revision History

Original: Testing of Dual Band Consumer Booster, Model: EZ-3G, to FCC Part 2/22.
Addendum A: Since the time of testing, the manufacturer has chosen to rename the model EZ CALL.
Addendum B: To correct calibration typos in section 2.1053 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.

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

Test Facility Information

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

TEST LOCATION(S):
CKC Laboratories, Inc.
1120 Fulton Place
Fremont, CA 94539

Software Versions

CKC Laboratories Proprietary Software	Version
EMITest Emissions	5.03.02
EMITest Immunity	5.03.02

Site Registration & Accreditation Information

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

SUMMARY OF RESULTS

Standard / Specification: FCC Part 2/22

KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04, Feb 12, 2016		FCC Part Section Correlation		Mods	Results
Guidance Sec #	**Guidance Description**	**FCC Sec #**	**FCC Rule Description**		
7.1 a) - k)	Authorized Frequency Band Verification Test	20.21(e)(3)	Frequency Bands	NA	NA[1]
7.2.2 a) - k)	Maximum Power Measurement Procedure	2.1046/20.21(e)(8)(i)(D)	Power Limit	NA	NA[1]
7.3 a) - d)	Maximum Booster Gain Computation	20.21(e)(8)(i)(B)	Bidirectional Capabilities	NA	NA[1]
7.4 a) - n)	Intermodulation Product	20.21(e)(8)(i)(F)	Intermodulation Limit	NA	NA[1]
7.5 a) - n)	Out of Band Emissions	20.21(e)(8)(i)(E)	Out of Band Emission	NA	NA[1]
7.6 a) - e)	Conducted Spurious Emission	2.1051/22/24	Spurious emission	NA	Pass
7.7.1 a) - g) 7.7.1 h) - n) 7.7.2 a) - g)	Noise Limit Procedure Variable Noise Variable Noise Timing	20.21(e)(8)(i)(A)(2)(i) 20.21(e)(8)(i)(A)(1) 20.21(e)(8)(i)(H)	Noise Limits Transmit Power Off Mode	NA	NA[1]
7.8 a) - l)	Uplink inactivity	20.21(e)(8)(i)(I)	Uplink Inactivity	NA	NA[1]
7.9.1 a) - l) 7.9.2 a) - f)	Variable Booster Gain Variable Uplink Gain Timing	20.21(e)(8)(i)(C) (1), (2)(i) 20.21(e)(8)(i)(H)	Booster Gain Transmit Power Off Mode	NA	NA[1]
7.10.a) - j)	Occupied Band Width	2.1049/22/24	Occupied Band Width	NA	Pass

KDB 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04, Feb 12, 2016		FCC Part Section Correlation		Mods	Results
Guidance Sec #	**Guidance Description**	**FCC Sec #**	**FCC Rule Description**		
7.11.2 a) - r) 7.11.3 a) - h) 7.11.4 a) - h) (alternate to 7.11.3)	Anti-Oscillation	20.21(e)(8)(ii)(A)	Anti-Oscillation	NA	NA[1]
7.12a) - f)	Radiated Spurious Emission	2.1053/ 22/24	Spurious Emission	NA	Pass
7.13 a) - c)	Spectrum Block Filter[2]	NA[1]	NA[1]	NA	NA[1]

Na= Not Applicable
NA[1] = A different standard applies; see applicable test report.

Modifications During Testing

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

Summary of Conditions
No modifications were made during testing.

Modifications listed above must be incorporated into all production units.

Conditions During Testing

This list is a summary of the conditions noted to the equipment during testing.

Summary of Conditions
None

EQUIPMENT UNDER TEST (EUT)

During testing numerous configurations may have been utilized. The configurations listed below support compliance to the standard(s) listed in the Summary of Results section.

Configuration 1

Equipment Tested:

Device	Manufacturer	Model #	S/N
Switching Power Adapter	GME	GME18A-050300FUR	1511-0000069
Dual Band Consumer Booster	Cellphone-Mate, Inc.	EZ CALL	01

Support Equipment:

Device	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4438C	MY42082260

FCC PART(S) 2 / 22

2.1049 Occupied Bandwidth

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.10 Occupied Band Width**		
Work Order #:	**98360**	Date:	04/26/2016
Test Type:	**Conducted Emissions**	Time:	15:53:32
Tested By:	Daniel Bertran	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Donor port is a type SMA connector and 50ohm impedance.
The EUT Server port is type F connector and 75ohm impedance.
During testing there is a 75 ohm to 50 ohm matching pad connected to the EUT type F connector.
This matching pad has a 5.8dB correction factor.

Part 22
UL: 824-849MHz
DL: 869-894MHz

Test environment conditions: 22°C, 48% Relative Humidity, 101.7 kPa
Test procedure:
The test was performed in accordance with section 7.10 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.

Firmware: V1.0

Test Equipment:

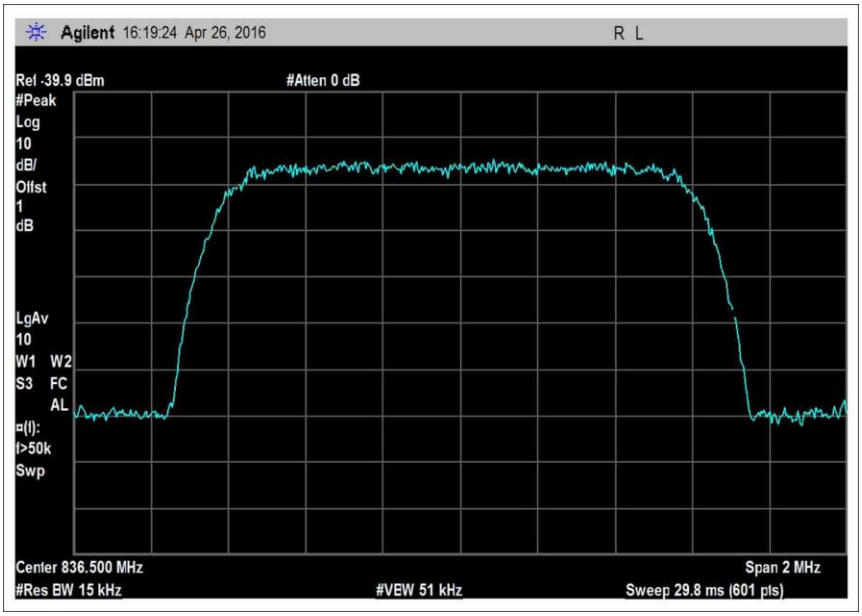
ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP06709	Cable	32026-29094K-29094K-72TC	9/18/2014	9/18/2016
	ANP06710	Cable	32026-29094K-29094K-72TC	9/18/2014	9/18/2016
	AN03470	Spectrum Analyzer	E4440A	12/9/2015	12/9/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Summary of Results

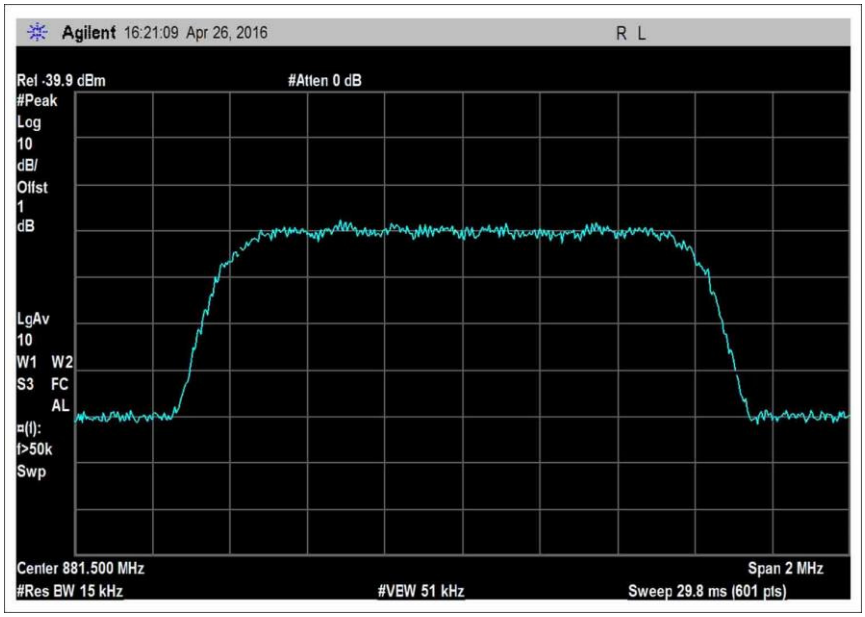
Pass: As summarized in plots below, the uniformity of the output signal relative to the input signal are practically identical. Therefore, the comparison is within limits.

Plots

Input – CDMA

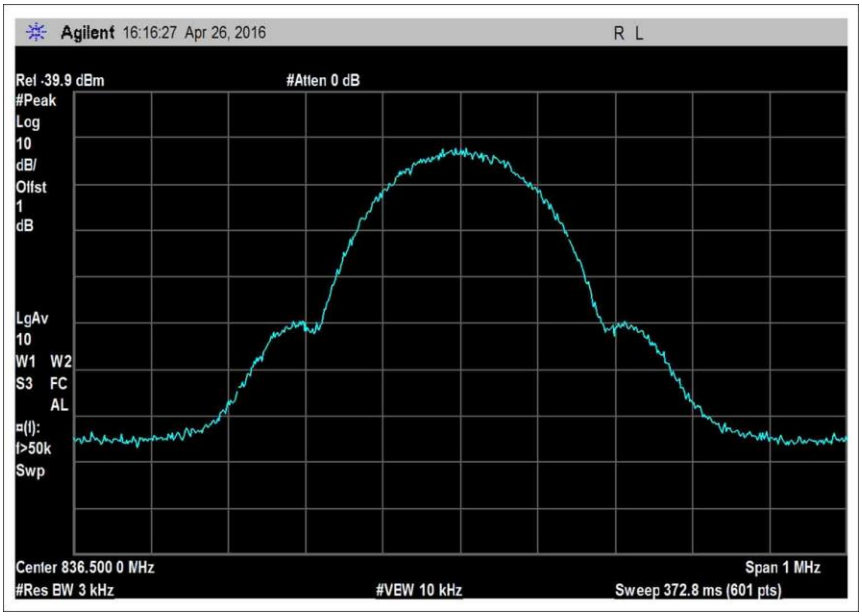


OBW_UL_824-849MHz_CDMA

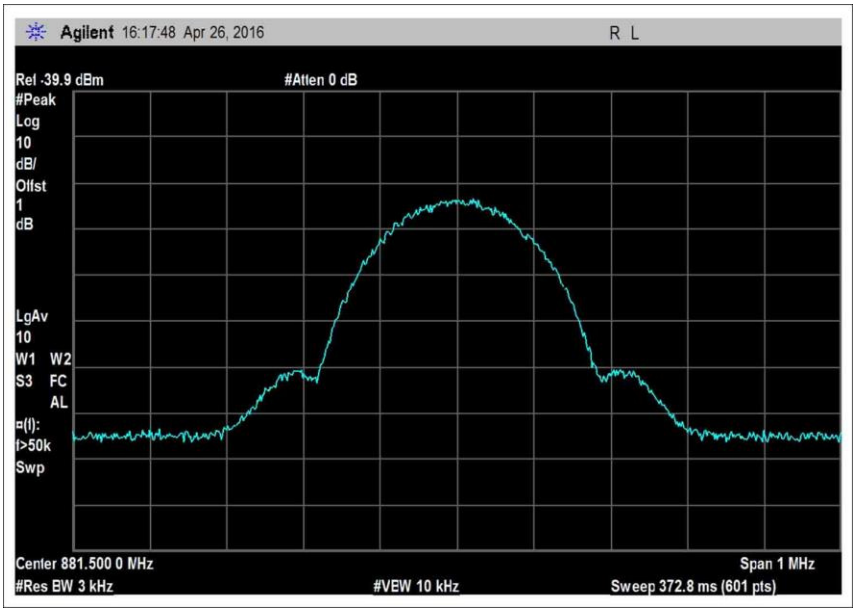


OBW_DL_869-894MHz_CDMA

Input - GSM

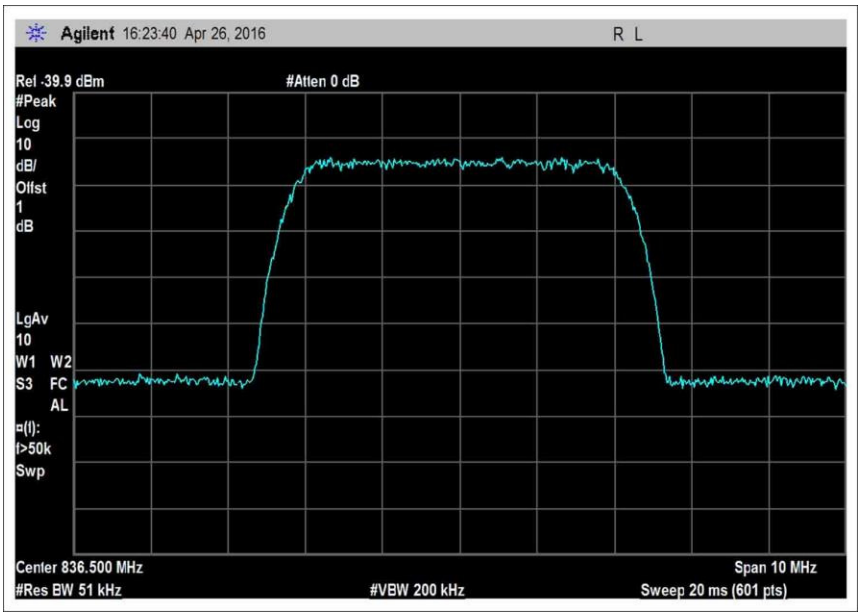


OBW_UL_824-849MHz_GSM

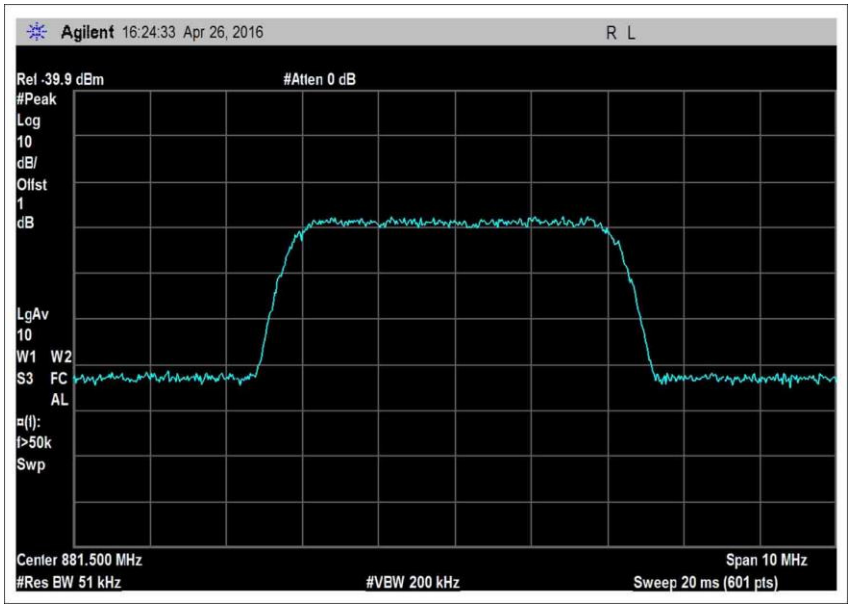


OBW_DL_869-894MHz_GSM

Input – WCDMA

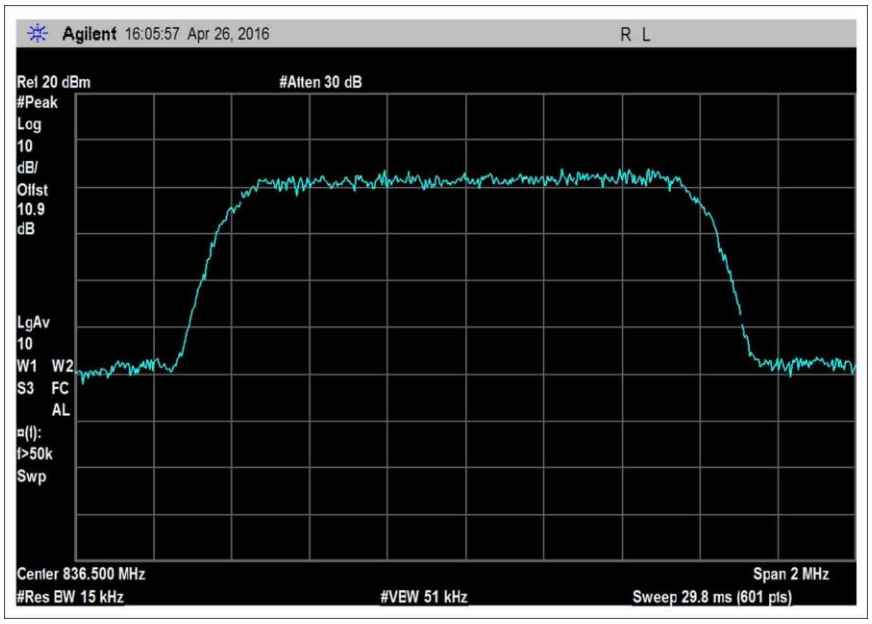


OBW_UL_824-849MHz_WCDMA

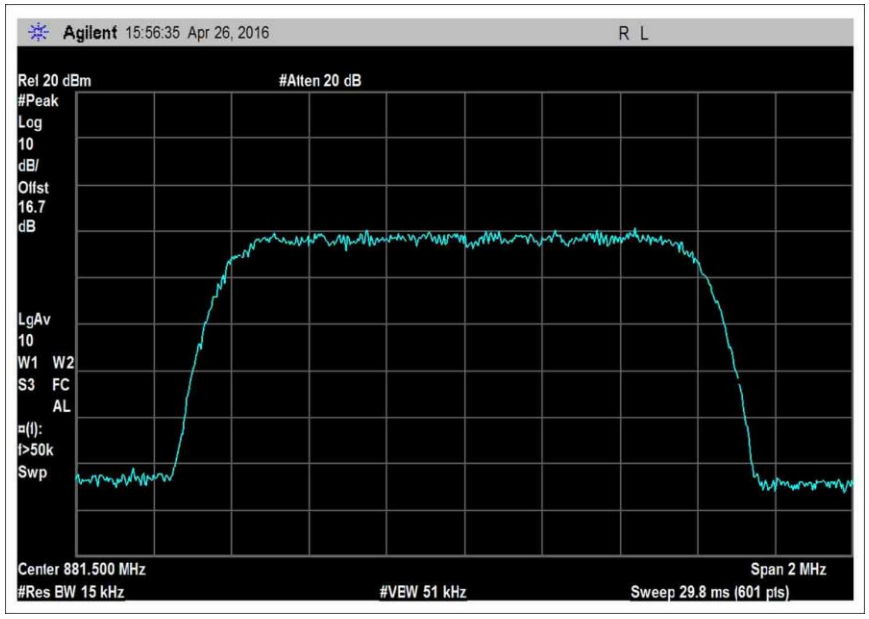


OBW_DL_869-894MHz_WCDMA

Output– CDMA

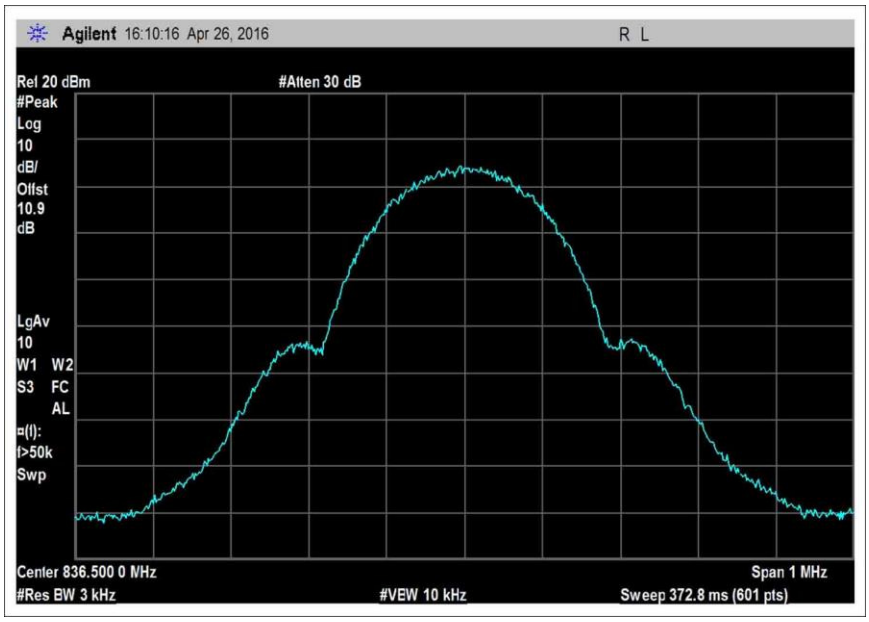


OBW_UL_824-849MHz_CDMA

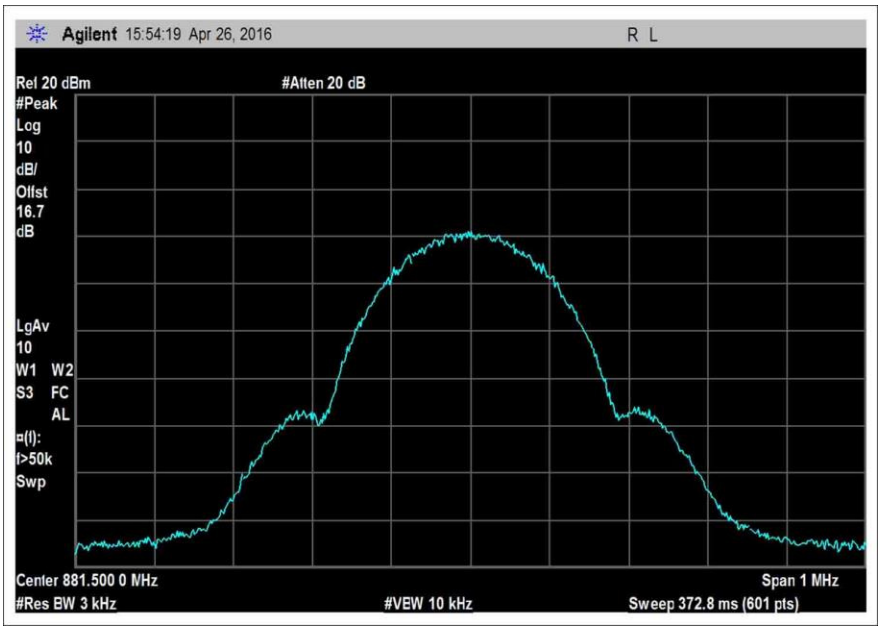


OBW_DL_869-894MHz_CDMA

Output– GSM

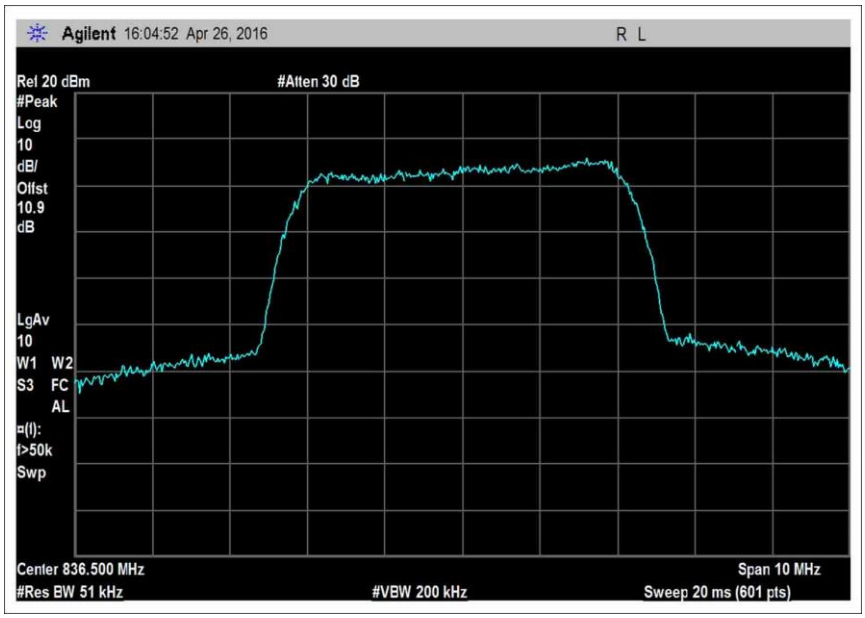


OBW_UL_824-849MHz_GSM

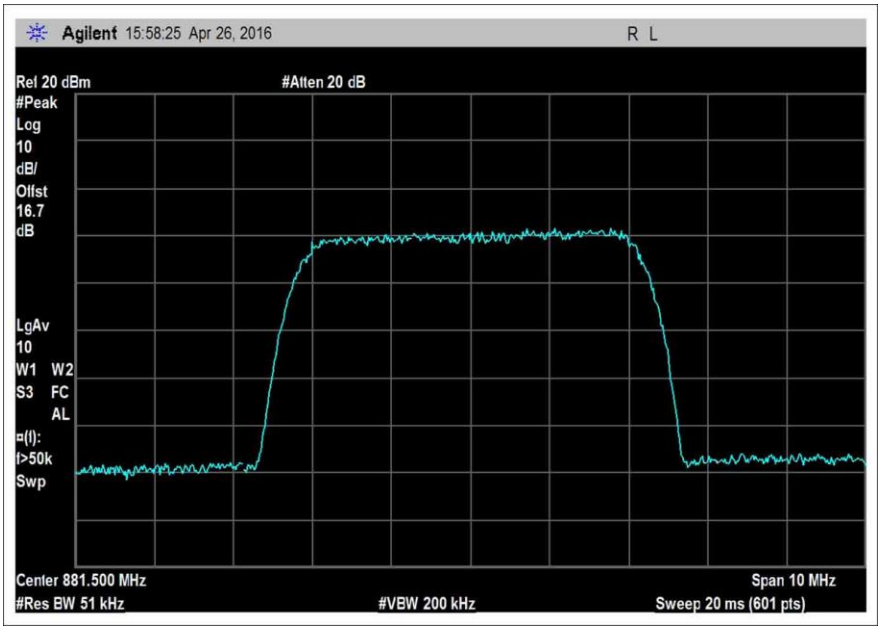


OBW_DL_869-894MHz_GSM

Output – WCDMA

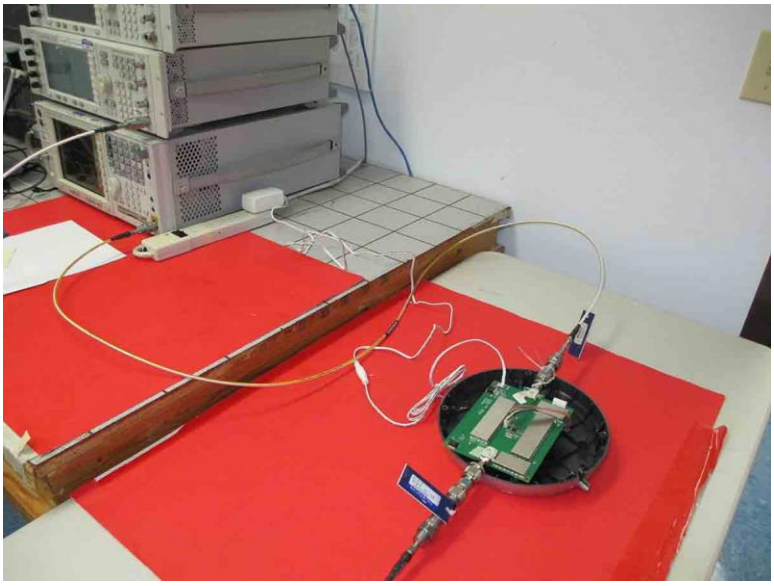


OBW_UL_824-849MHz_WCDMA



OBW_DL_869-894MHz_WCDMA

Test Setup Photo(s)



2.1051 Spurious Emissions at Antenna Terminals

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**7.6 Conducted Spurious Emissions / 47 CFR §2.1051 Spurious Emissions at Antenna Terminals**		
Work Order #:	**98360**	Date:	04/26/2016
Test Type:	**Conducted Emissions**	Time:	15:22:04
Tested By:	Daniel Bertran	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed Wideband Consumer Booster.
The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.
The EUT Donor port is a type SMA connector and 50ohm impedance.
The EUT Server port is type F connector and 75ohm impedance.
During testing there is a 75 ohm to 50 ohm matching pad connected to the EUT type F connector.
This matching pad has a 5.8dB correction factor.
Part 22
UL: 824-849MHz
DL: 869-894MHz
Frequency range of measurement = 9 kHz- 9 GHz.

9 kHz -	150 kHz ->	RBW= 200Hz	VBW= 200Hz
150 kHz -	30 MHz ->	RBW= 9kHz	VBW= 9kHz
30 MHz -	1000MHz ->	RBW*= 1MHz	VBW= 3MHz
1000 MHz -	22000MHz ->	RBW= 1MHz	VBW= 3MHz

*Note: As specified on 7.6 Conducted spurious emissions test procedure of 935210 D03 Signal Booster Measurements v04, for frequencies below 1 GHz, an RBW of 1 MHz may be used in a preliminary measurement. If non-compliant emissions are detected, a final measurement shall be made with a 100 kHz RBW. Additionally, a peak detector may also be used for the preliminary measurement. If non-compliant emissions are detected, then a final measurement of these emissions shall be made with the power averaging (RMS) detector.

Test environment conditions: 22°C, 48% Relative Humidity, 101.7kPa

Test procedure: The test was performed in accordance with section 7.1 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.
Firmware: V1.0

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	ANP06709	Cable	32026-29094K-29094K-72TC	9/18/2014	9/18/2016
	ANP06710	Cable	32026-29094K-29094K-72TC	9/18/2014	9/18/2016
	AN03470	Spectrum Analyzer	E4440A	12/9/2015	12/9/2017
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017
	ANP06239	Attenuator	54A-10	7/9/2014	7/9/2016

Summary of Results

Pass: As summarized in plots below, the conducted spurious emissions are within limits.

9 KHz-30 MHz

No Conducted Spurious Emissions were found within 20dB of the limit.

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

LIMIT LINE FOR SPURIOUS CONDUCTED EMISSION

REQUIRED ATTENUATION = 43+10 LOG P DB

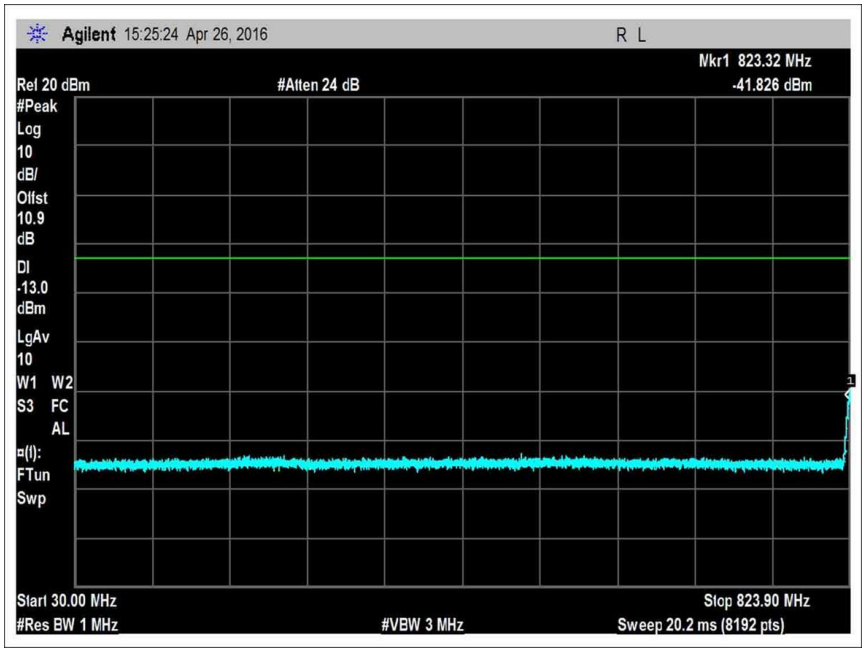
Limit line (dBuV) = V_{dBuv} - Attenuation

$$V_{dBuV} = 20 \text{ Log } \frac{V}{1 \text{ x } 10^{-6}}$$
$$= 20\left(\text{Log } V - \text{Log } 1 \text{ x } 10^{-6}\right)$$
$$= 20 \text{ Log } V - 20 \text{ Log} 1 \text{ x } 10^{-6}$$
$$= 20 \text{ Log } V - 20(-6)$$
$$= 20 \text{ Log } V + 120$$

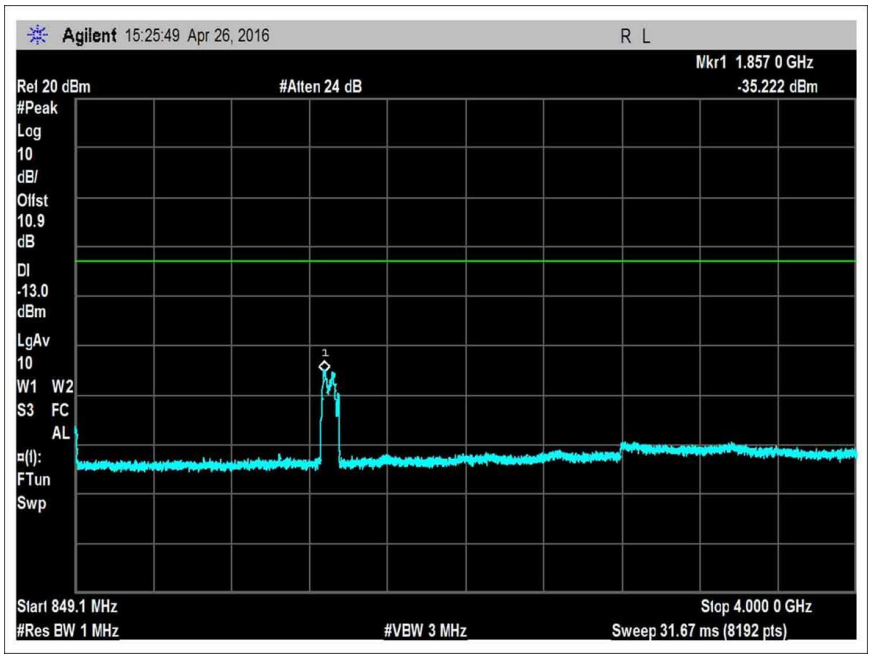
$$\text{Attenuation} = 43 + 10 \text{ Log } P$$
$$= 43 + 10 \text{ Log } \frac{V^2}{R}$$
$$= 43 + 10\left(\text{Log } V^2 - \text{Log } R\right)$$
$$= 43 + 10\left(2 \text{ Log } V - \text{Log } R\right)$$
$$= 43 + 20 \text{ Log } V - 10 \text{ Log } R$$

Limit line = V_{dBuv} - Attenuation
= 20 Log V + 120 – (43 + 20 Log V – 10Log R)
= 20 Log V + 120 – 43 – 20 Log V + 10Log R
= 20 Log V + 120 – 43 – 20 Log V + 10Log R
= 120 – 43 + 10 Log 50 Note : R = 50 Ω
= 120 –43 + 16.897
= 94 dBuV at any power level

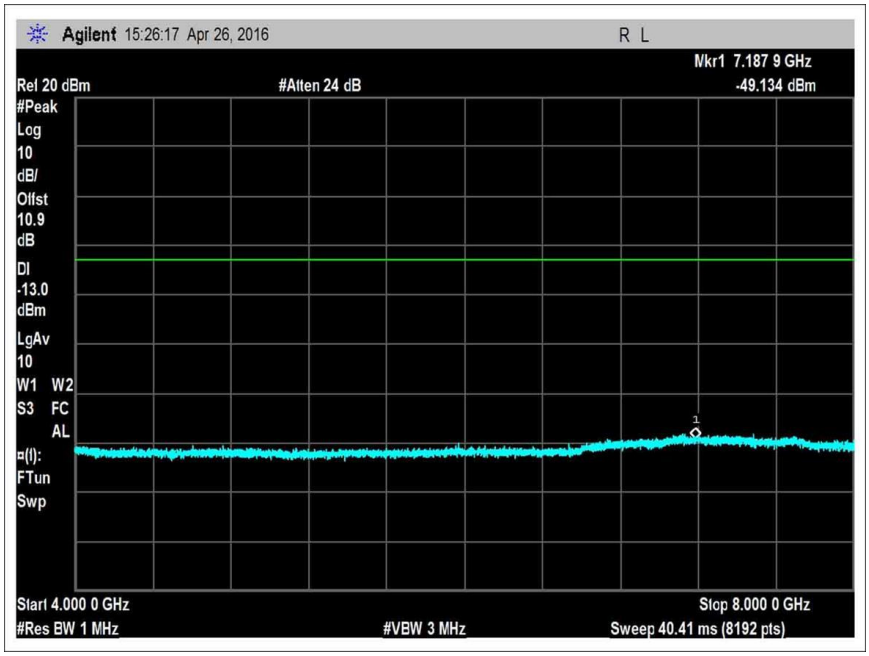
Plots



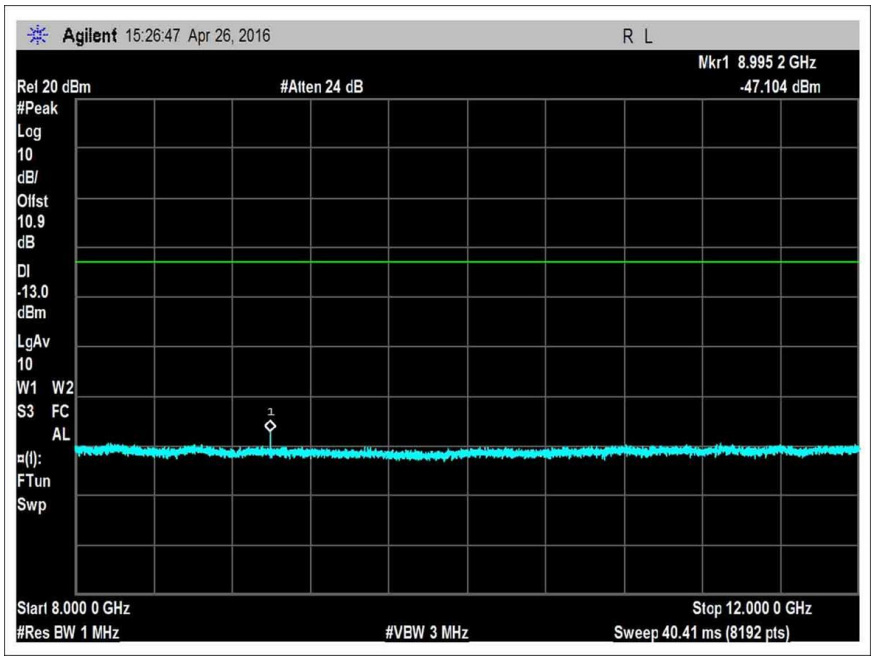
2.1051_UL_824-849L



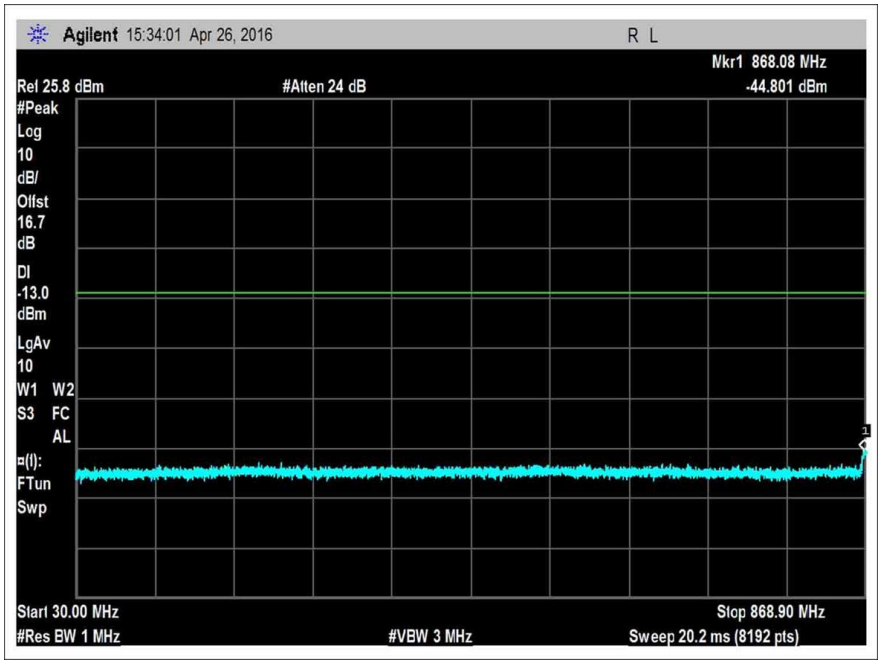
2.1051_UL_824-849R1



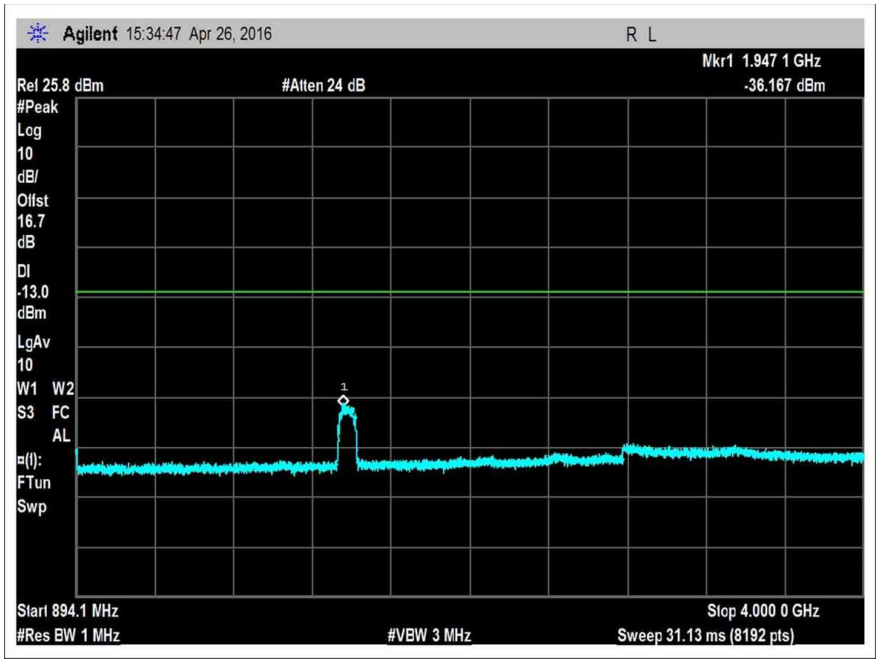
2.1051_UL_824-849R2



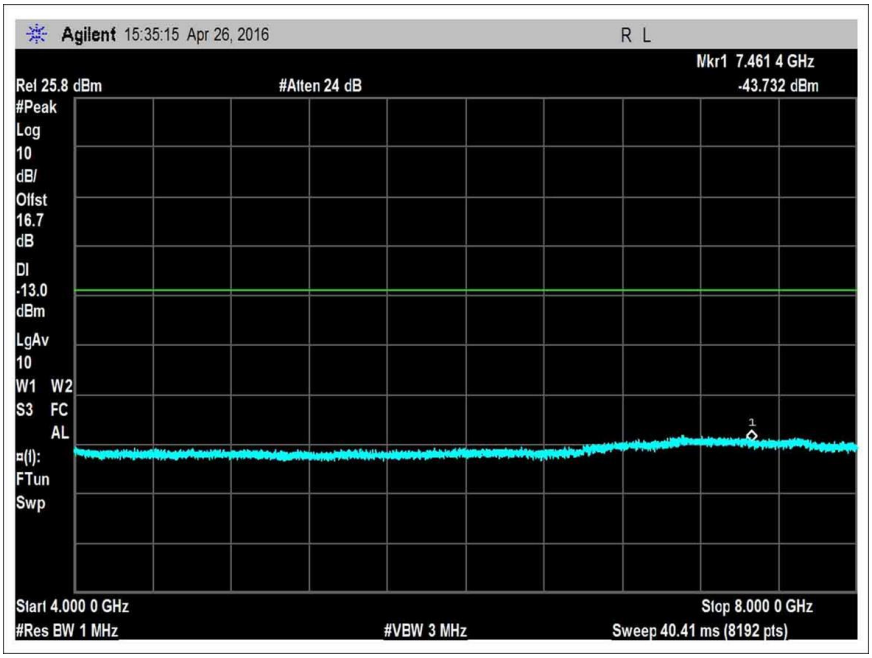
2.1051_UL_824-849R3



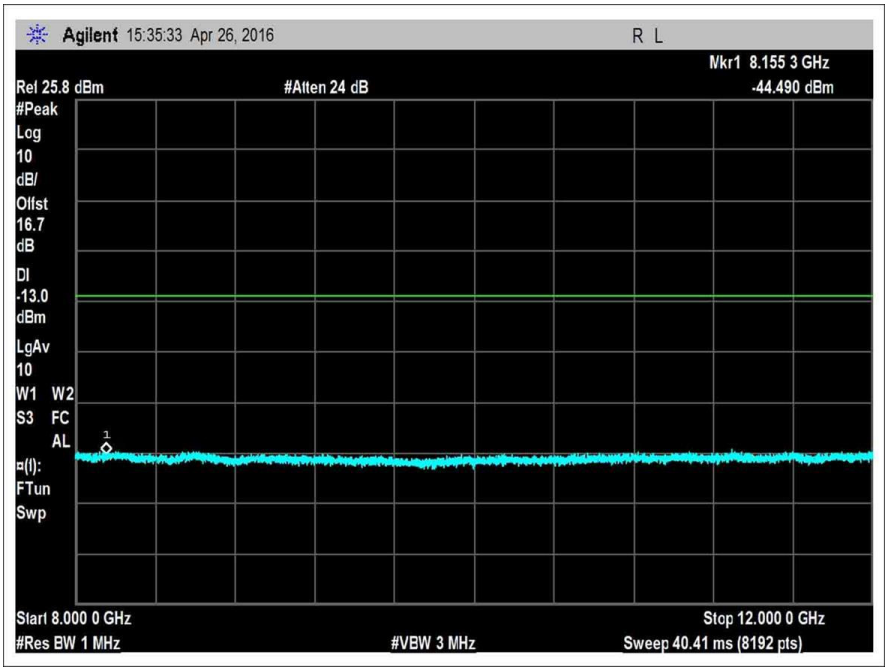
2.1051_DL_869-894L



2.1051_DL_869-894R1

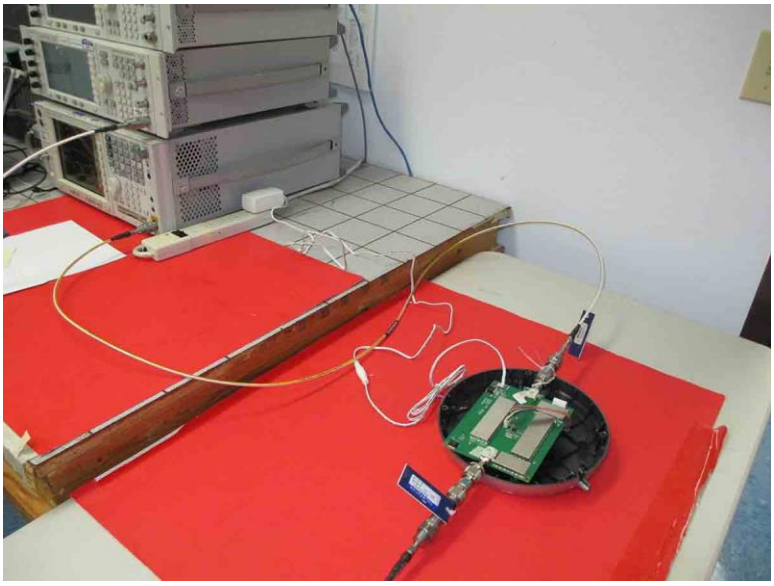


2.1051_DL_869-894R2



2.1051_DL_869-894R3

Test Setup Photo(s)



2.1053 Field Strength of Spurious Radiation

Test Conditions / Setup

Test Location:	CKC Laboratories, Inc. • 1120 Fulton Place • Fremont, CA 94539 • (510) 249-1170		
Customer:	Cellphone-Mate, Inc.		
Specification:	**47 CFR §22.917(a) Radiated Spurious Emissions**		
Work Order #:	**98360**	Date:	05/04/2016
Test Type:	**Radiated Emissions**	Time:	08:23:39
Tested By:	Daniel Bertran	Sequence#:	1
Software:	EMITest 5.03.02		

Equipment Tested:

Device	Manufacturer	Model #	S/N
Configuration 1			

Support Equipment:

Device	Manufacturer	Model #	S/N
Configuration 1			

Test Conditions / Notes:

The equipment under test (EUT) is a Fixed CMRS Wideband Consumer Booster. During testing, the (EUT) is placed on the Styrofoam table top. Five different CW signals (one per each band) are injected sequentially to the input port of EUT using a signal generator. The signal generator is set to produce a CW signal with the frequency set to the center of each operational band under test and the power level is set at Pin (obtained for report 98021-25) as determined from 7.2 section of the test procedure indicated further below. Evaluation of DL path was performed with signals fed into the Outside antenna port while Inside antenna port was terminated with 50 Ohm Pasternack load (MN: PE6187 / SN: 1443).
Evaluation of UL path was performed with signal fed into the Inside antenna port while Outside antenna port was terminated with the same above 50 Ohm load.

Part 22
UL: 824-849MHz
DL: 869-894MHz

TX Freq = > Center frequency of above listed bands.
Modulation=> CW

Frequency range of measurement = 9 kHz- 22 GHz.

9 kHz - 150 kHz ->	RBW=200 Hz	VBW=200 Hz
150 kHz - 30 MHz ->	RBW=9 kHz	VBW=9 kHz
30 MHz - 1000MHz ->	RBW=120 kHz	VBW=120 kHz
1000 MHz-22000MHz ->	RBW=1 MHz	VBW=1 MHz

Test environment conditions: 20°C, 45% Relative Humidity, 101.1 kPa

Test procedure: The test was performed in accordance with section 7.12 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v04 Dated February 12, 2016.
Firmware: V3.0

Note: No spurious emissions were found within 20dB of the limit line.

Test Equipment:

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN00852	Biconilog Antenna	CBL 6111C	11/24/2014	11/24/2016
	ANP00880	Cable	RG214U	6/13/2014	6/13/2016
	ANP06691	Cable	PE3062-180	8/8/2014	8/8/2016
	AN00567	Preamp	8447D	1/2/2015	1/2/2017
	ANP01187	Cable	CNT-195	12/30/2014	12/30/2016
	AN03471	RF Characteristics Analyzer	E4440A	1/4/2016	1/4/2018
	AN02113	Horn Antenna	3115	2/3/2015	2/3/2017
	ANP06900	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	AN03303	Preamp	AMF-7D-00101800-30-10P	1/4/2016	1/4/2018
	ANP01210	Cable	FSJ1P-50A-4A	1/15/2015	1/15/2017
	AN03302	Cable	32026-29094K-29094K-72TC	3/24/2014	3/24/2016
	AN02693	Active Horn Antenna-ANSI C63.5 3m	AMFW-5F-12001800-20-10P	5/6/2015	5/6/2017
	ANP06126	Cable	32022-29094K-29094K-168TC	3/18/2015	3/18/2017
	ANP00928	Cable	various	1/25/2016	1/25/2018
	ANP06901	Cable	32022-29094K-29094K-36TC	12/30/2015	12/30/2017
	AN02694	Horn Antenna-ANSI C63.5 3m	AMFW-5F-18002650-20-10P	5/7/2015	5/7/2017
	ANP00929	Cable	various	1/25/2016	1/25/2018
	AN00432	Loop Antenna	6502	5/8/2015	5/8/2017
	ANP06710	Cable	32026-29094K-29094K-72TC	9/18/2014	9/18/2016
	ANP06467	Attenuator	PE7014-10	5/13/2015	5/13/2017

Summary of Results

Pass: All Radiated Spurious Emissions were found with more than 20dB margin of the limit line except specific frequency indicated below:

Frequency Range of measurement 9kHz –> 22GHz

Worst spurious emissions were recorded at 8.9GHz.

Operating Frequency(ies):	UL: 1850-1915MHz DL: 1930-1995MHz UL: 824-849MHz DL: 869-894MHz
Operational Mode(s):	CW
Highest Measured Power:	21 dBm
Measurement Distance:	3 meters

Frequency Range		**Limit (dBc)**	**Limit Calculation**	
9kHz - 22GHz		34	43+10*LOG(P)	
Frequency (MHz)	**Reference Level (dBm)**	**Measured (dBc)**	**Margin**	**Antenna Polarity**
8989.445	-21.8*	42.8	-8.8	Vertical

*Average reading was obtained using RBW=1MHz.
Spurious emissions indicated above were observed even without injecting any signal to the to the input port of the EUT.

LIMIT LINE FOR SPURIOUS RADIATED EMISSION

LIMIT LINE FOR SPURIOUS RADIATED EMISSION

REQUIRED ATTENUATION = 43+10 LOG P (DB)

For radiated spurious emission measured at 3 meter test distance,

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

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 /m^2
Pt = Average Transmit Power
r = Test distance

Field Intensity E (V/m)

$$E = \sqrt{P_D \text{ x } 377}$$

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

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

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

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

<u>Since 20 Log E (V/m) = 20 Log E (uV/m) –120</u>

10 Log P_t = 20 Log E (uV/m) - 120 - 5.23

10 Log P_t = 20 Log E (uV/m) –125.23

Limit line (dBuV) at 3 meter = E_{dBuv} – Attenuation

= E_{dBuv} - (43+10 Log $P_{t\ at\ 3\ meter}$)

= E_{dBuv} - 43 - 10 Log $P_{t\ at\ 3\ meter}$

= E_{dBuv} - 43 – (20 Log E (uV/m) –125.23)

= E_{dBuv} - 43 - 20 Log E (uV/m) + 125.23

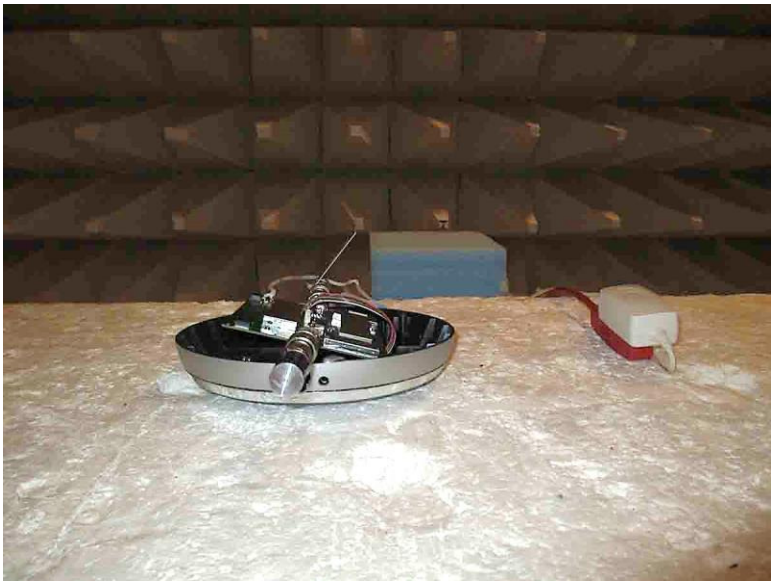
= E_{dBuv} - 20 Log E (uV/m) + 82.23

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

= $\cancel{E_{dBuv}}$ - $\cancel{E_{dBuv}}$ + 82.23

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

Test Setup Photo(s)



SUPPLEMENTAL INFORMATION

Measurement Uncertainty

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

Reported uncertainties represent expanded uncertainties expressed at approximately the 95% confidence level using a coverage factor of k=2.