Cellphone-Mate, Inc.

TEST REPORT FOR

Dual Band Cellphone Signal Booster
Model: Dual Force

Tested To The Following Standards:

FCC Part 22H

Report No.: 95115-8

Date of issue: January 17, 2014

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:

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48346 Milmont Drive
Fremont, CA 94538

Representative: Hongtao Zhan
Customer Reference Number: CKC20131113

REPORT PREPARED BY:

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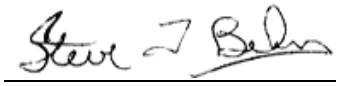
Mariposa, CA 95338

Project Number: 94297

DATE OF EQUIPMENT RECEIPT: November 9, 2013
DATE(S) OF TESTING: November 9 – December 18, 2013

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
Immunity	5.00.07

Site Registration & Accreditation Information

Location	CB #	TAIWAN	CANADA	FCC	JAPAN
Brea A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147

SUMMARY OF RESULTS

Standard / Specification: FCC Part 2 / 22H

Test Procedure/Method	Description	Results
2.1046	RF Power Output	NA
2.1047	Modulation Characteristics	NA
2.1049	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	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

Dual Band Cellphone Signal Booster
Manuf: Cellphone-Mate, Inc.
Model: Dual Force
Serial: 2

PERIPHERAL DEVICES

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

Signal Generator
Manuf: Agilent
Model: E4438C
Serial: MY42082260

Power Supply
Manuf: SureCall
Model: GFP451DA-0945-1
Serial: 1211-0000323

FCC PART 22H C

This report contains EMC emissions test results under United States Federal Communications Commission (FCC) 47 CFR 22H requirements for Cellular Radiotelephone Systems.

2.1046 RF Power Output

Not applicable because the power requirements are contained in FCC Part 20.

2.1047 Modulation Characteristics

Not applicable because the EUT does not employ modulation characteristics.

2.1049 Occupied Bandwidth

Test Conditions / Setup

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

Customer:	**Cellphone-Mate, Inc.**		
Specification:	**Occupied Bandwidth**		
Work Order #:	**95115**	Date:	12/18/2013, 01/02/2014
Test Type:	**Conducted Emissions**		
Equipment:	Dual Band Cellphone Signal Booster	Sequence#:	1
Manufacturer:	Cellphone-Mate, Inc.	Tested By:	E. Wong, S. Yamamoto
Model:	Dual Force		110V 60Hz
S/N:	2		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	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
Dual Band Cellphone Signal Booster *	Cellphone-Mate, Inc.	Dual Force	2

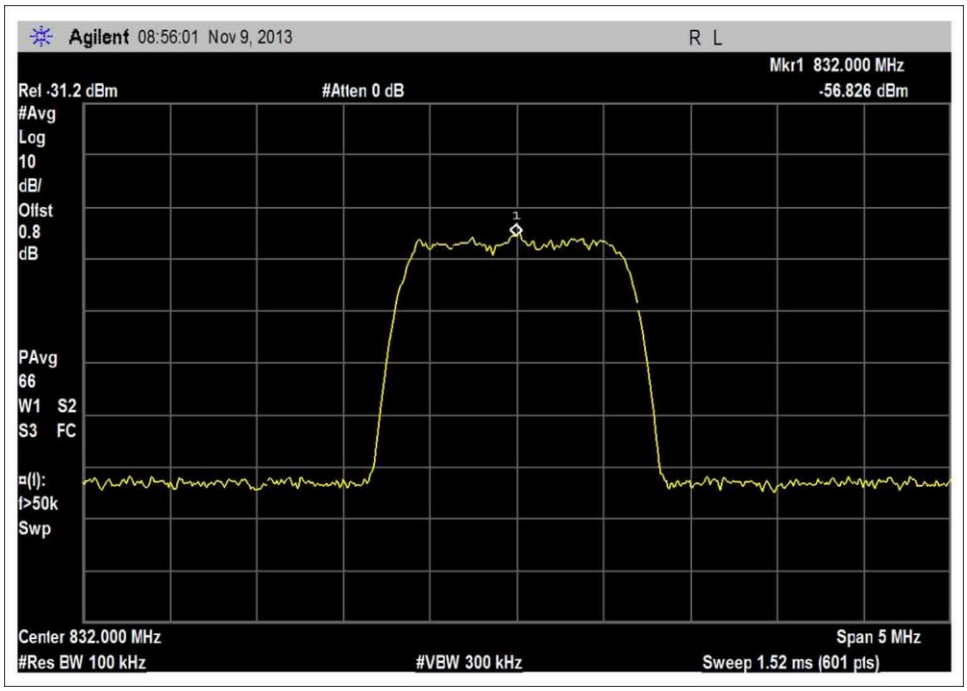
Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	SureCall	GFP451DA-0945-1	1211-0000323

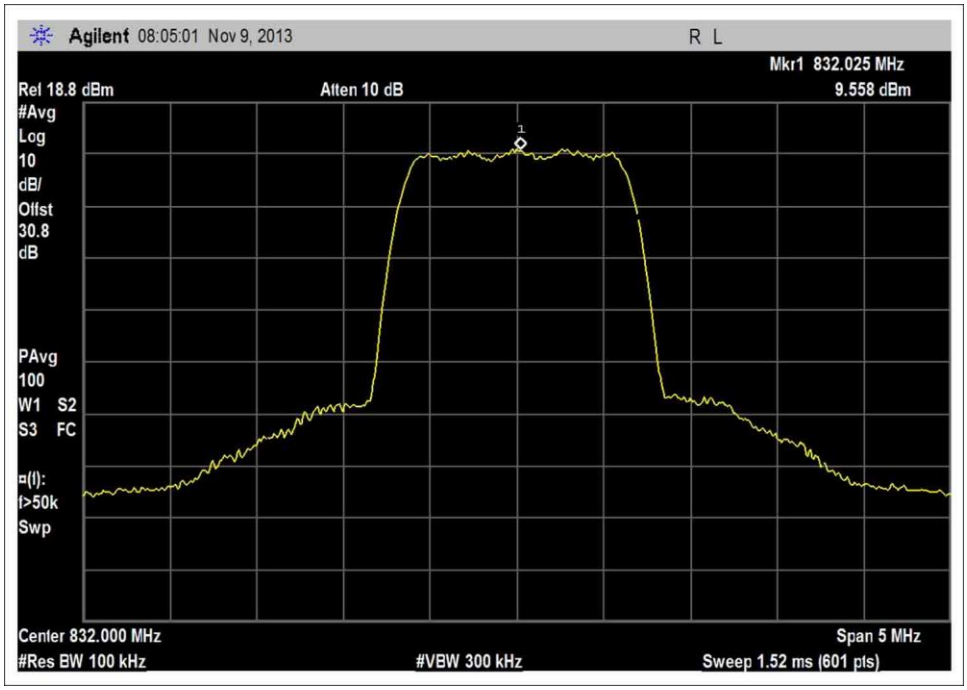
Test Conditions / Notes:

The EUT is placed on the test bench. Cellular -800 gain is set at Max gain and PCS-1900 Gain is set at max 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.
CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz
The booster operates in the following frequency band.
UL: 824-849, 1850-1915 MHz
DL: 869-894, 1930-1995 MHz
Test procedure: The test was performed in accordance with section 7.10 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance DR04-41516 August 7, 2013.
Test environment conditions: 23.9°C, 37% Relative Humidity, 100kPa

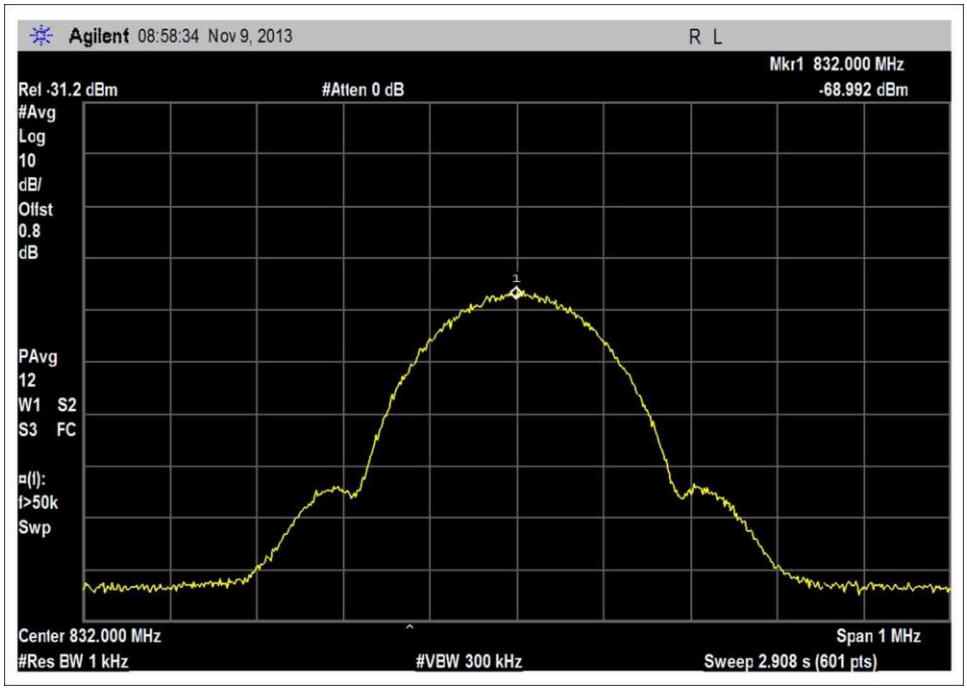
Test Data



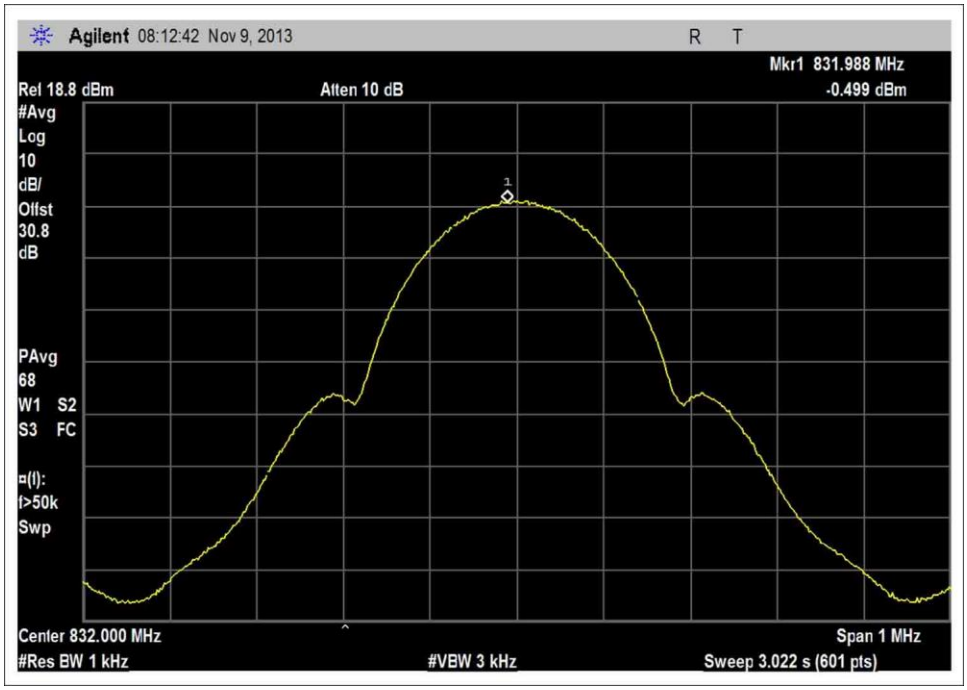
UL 824-849MHz, CDMA Input



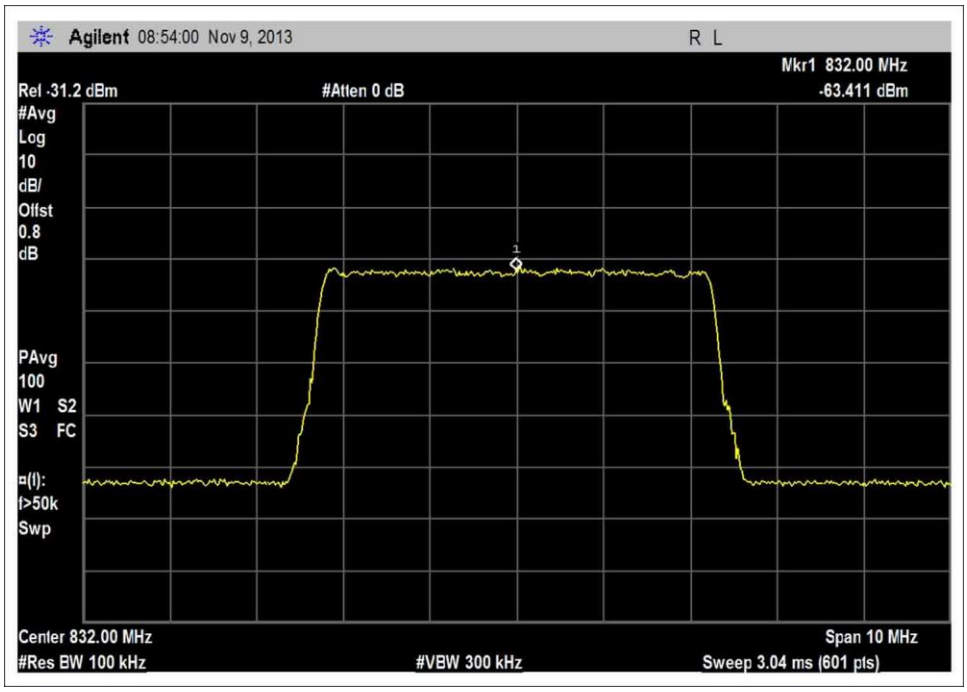
UL 824-849MHz, CDMA Output



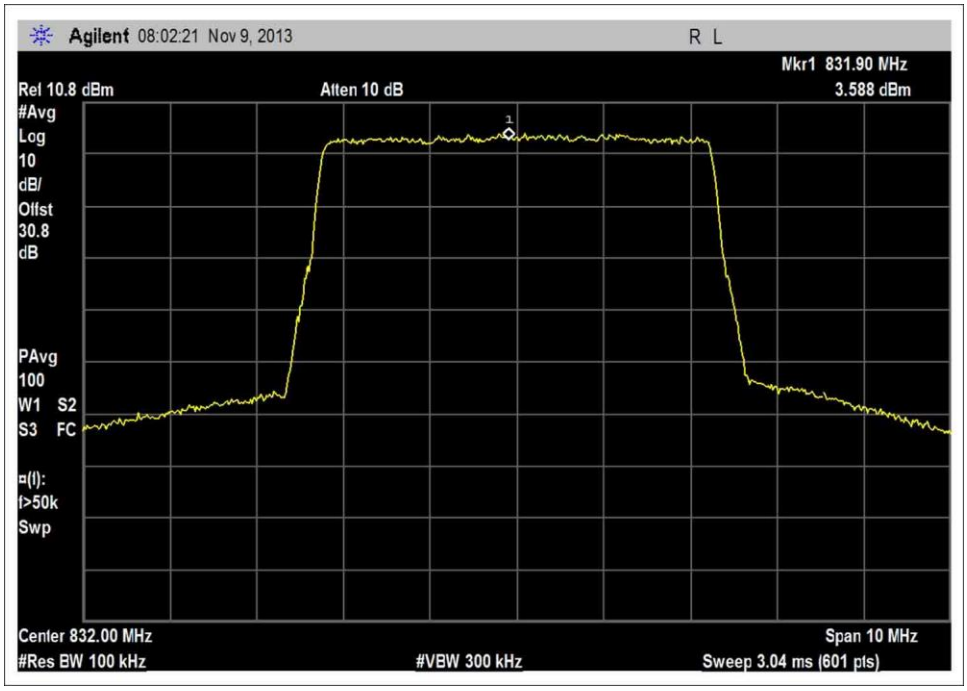
UL 824-849MHz, GSM Input



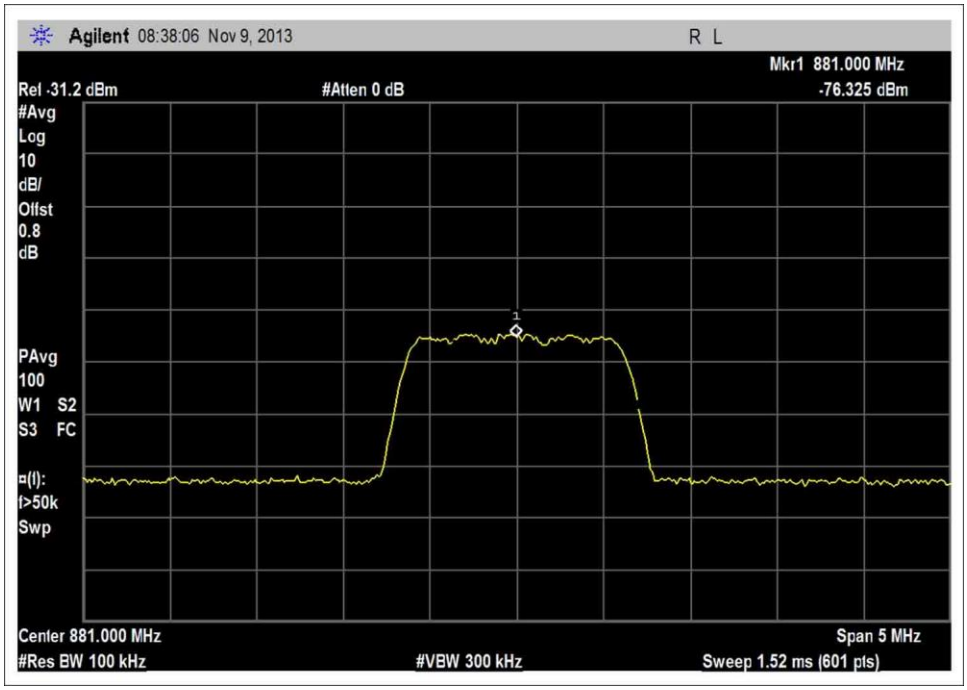
UL 824-849MHz, GSM Output



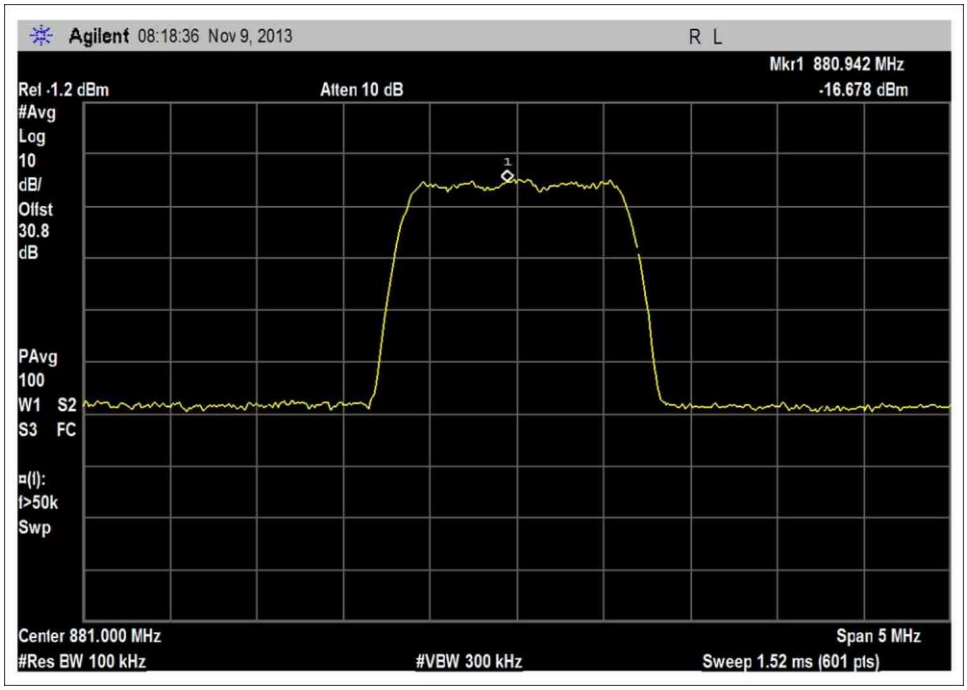
UL 824-849MHz, LTE Input



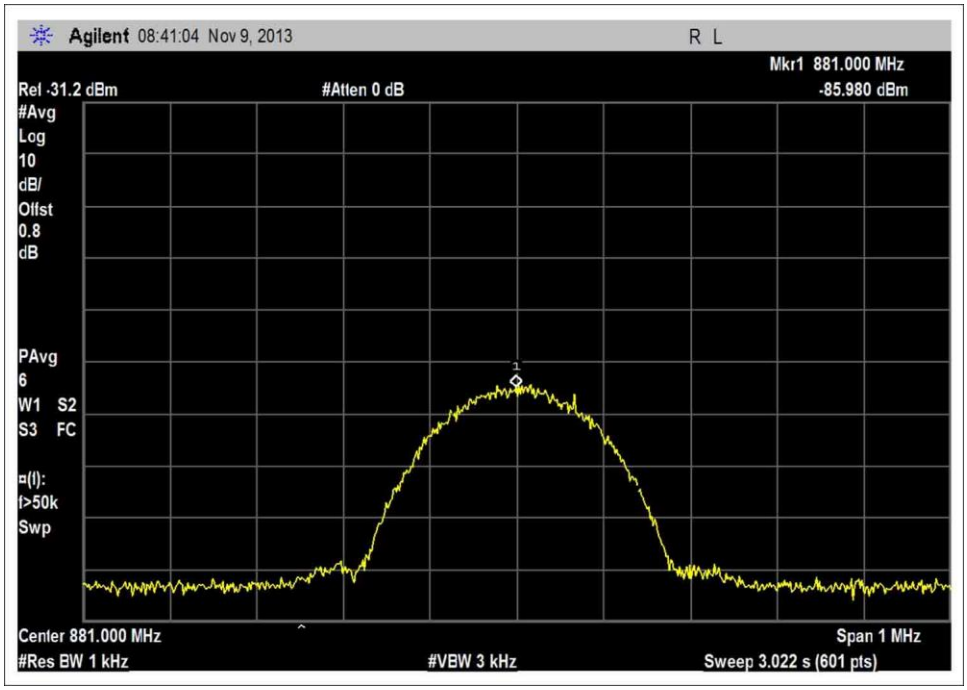
UL 824-849MHz, LTE Output



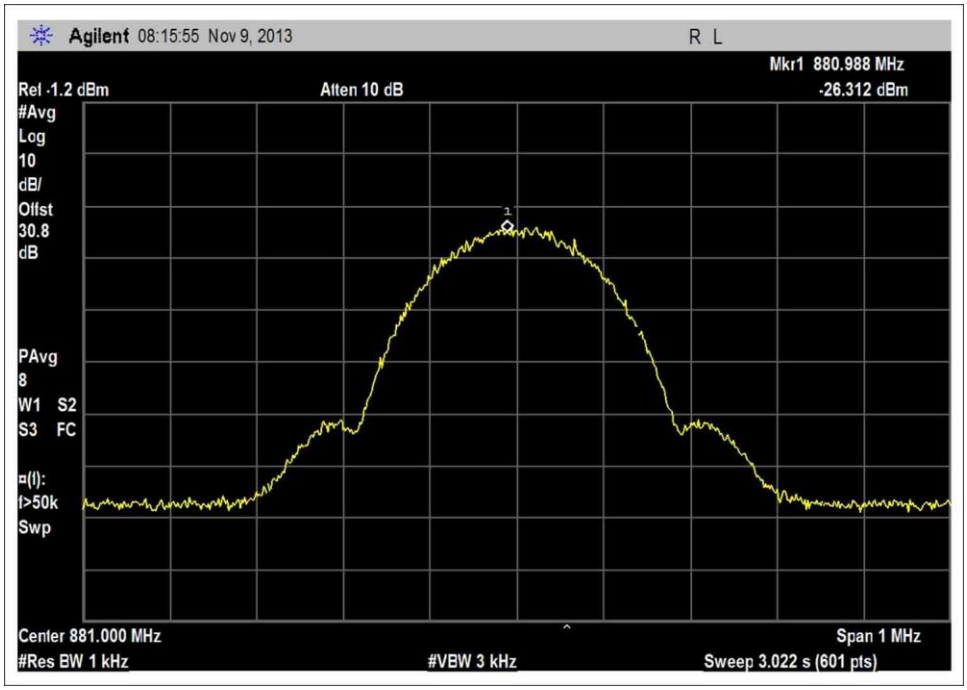
DL 869-894MHz, CDMA Input



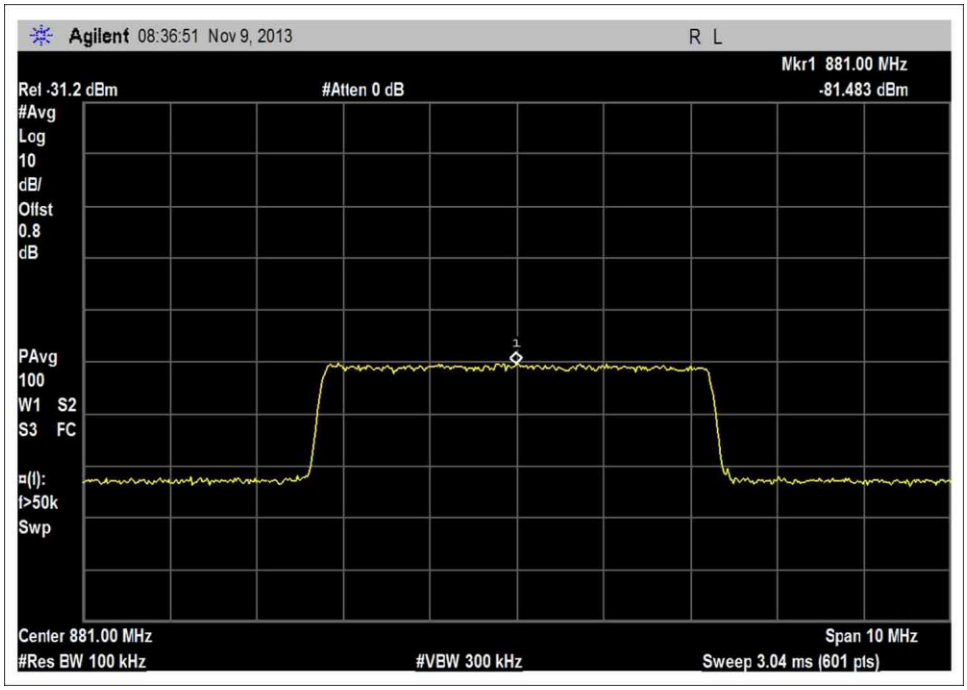
DL 869-894MHz, CDMA Output



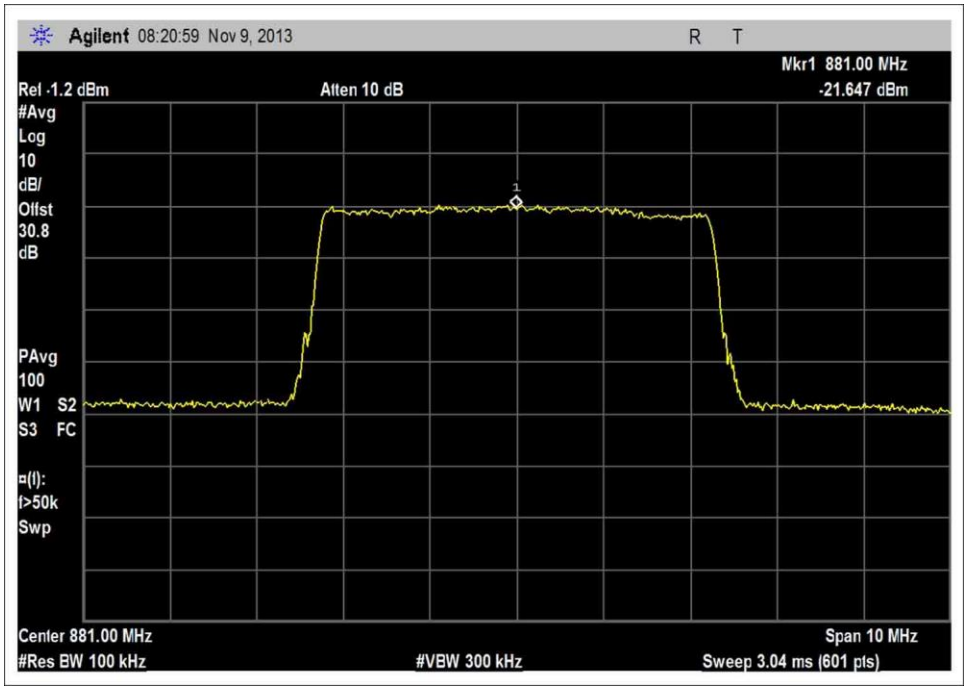
DL 869-894MHz, GSM Input



DL 869-894MHz, GSM Output

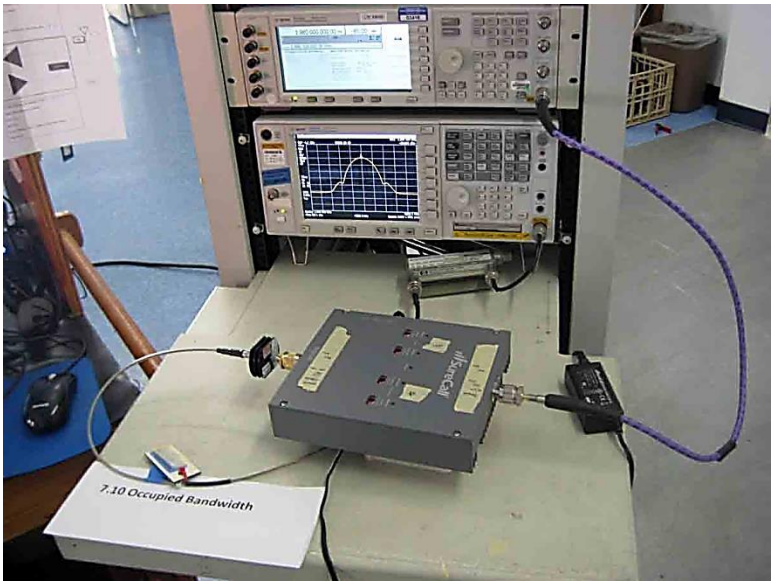


DL 869-894MHz, LTE Input



DL 869-894MHz, LTE Input

Test Setup Photos



2.1051 / 22.917(a) Spurious Emissions at Antenna Terminals

Test Data Sheets

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

Customer:	**Cellphone-Mate, Inc.**		
Specification:	**47 CFR Â§22.917 Spurious Emissions**		
Work Order #:	**94297**	Date:	11/9/2013
Test Type:	**Conducted Emissions**	Time:	10:07:44
Equipment:	**Dual Band Cellphone Signal Booster**	Sequence#:	1
Manufacturer:	Cellphone-Mate, Inc.	Tested By:	E. Wong
Model:	Dual Force		110V 60Hz
S/N:	2		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
T2	AN03430	Attenuator	75A-10-12	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
Dual Band Cellphone Signal Booster*	Cellphone-Mate, Inc.	Dual Force	2

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4438C	MY42082260
Power Supply	SureCall	GFP451DA-0945-1	1211-0000323

Test Conditions / Notes:

The EUT is placed on the test bench. Cellular -800 gain is set at Max gain and PCS-1900 Gain is set at max 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.
CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz
The EUT operates in the following band
UL: 824-849
DL: 869-894
TX Freq =UL 832 MHz, DL881 MHz
Modulation: 4.1 MHz AWG
Frequency range of measurement = 9 kHz- 10 GHz.
9kHz -150 kHz; RBW=200 Hz, VBW=200 Hz; 150 kHz-30 MHz; RBW=9 kHz, VBW=9 kHz; 30MHz-1000 MHz; RBW=120 kHz, VBW=120 kHz, 1000 MHz-10000 MHz; RBW=1 MHz, VBW=1 MHz.
Test environment conditions: 23.9°C, 7% Relative Humidity, 100kPa

Ext Attn: 0 dB

Measurement Data: Reading listed by margin. Test Lead: Ant Port

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	T3 dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1663.700M	63.7	+0.0	+10.0	+0.5		+0.0	74.2	94.0 UL_832MHz	-19.8	Ant P
2	1762.270M	59.8	+0.0	+10.1	+0.5		+0.0	70.4	94.0 DL_881MHz	-23.6	Ant P
3	3753.300M	51.0	+0.0	+9.7	+0.8		+0.0	61.5	94.0 UL_1877MHz	-32.5	Ant P
4	3960.000M	38.2	+0.0	+9.8	+1.0		+0.0	49.0	94.0 DL_1980MHz	-45.0	Ant P

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

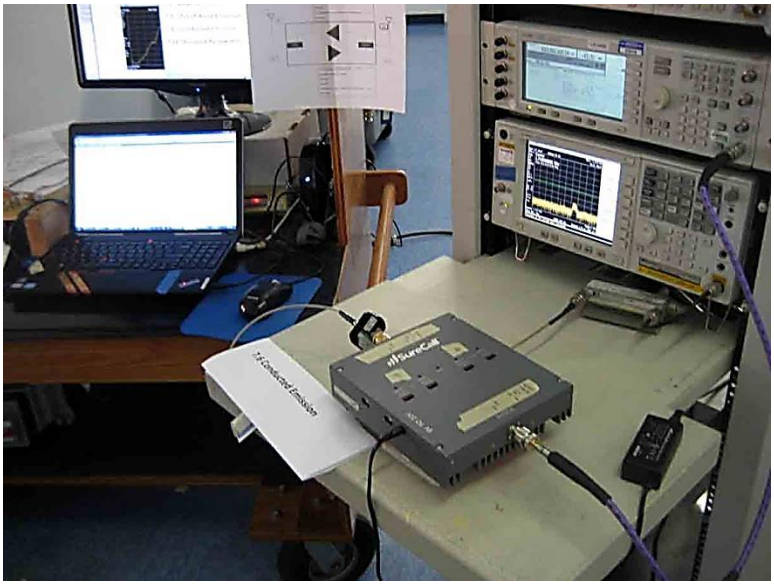
= 20 Log V + 120 – 43 – 20 Log V + 10Log R

= 120 – 43 + 10 Log 50 Note: R = 50 Ω

= 120 –43 + 16.897

= 94 dBuV at any power level

Test Setup Photos



2.1053 / 22.917(a) Field Strength of Spurious Radiation

Test Conditions / Setup

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

Customer: **Cellphone-Mate, Inc.**
Specification: **47 CFR §22.917 Spurious Emissions**
Work Order #: **94297** Date: 11/9/2013
Test Type: **Radiated Scan** Time: 14:09:17
Equipment: **Dual Band Cellphone Signal Booster** Sequence#: 2
Manufacturer: Cellphone-Mate, Inc. Tested By: E. Wong
Model: Dual Force
S/N: 2

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02869	Spectrum Analyzer	E4440A	2/6/2013	2/6/2015
	AN00314	Loop Antenna	6502	6/29/2012	6/29/2014
	AN01995	Biconilog Antenna	CBL6111C	5/16/2012	5/16/2014
	AN00309	Preamp	8447D	3/29/2012	3/29/2014
	ANP05198	Cable-Amplitude 15 to 45degC (dB)	8268	12/11/2012	12/11/2014
	ANP05050	Cable	RG223/U	1/21/2013	1/21/2015
T1	AN00849	Horn Antenna	3115	4/13/2012	4/13/2014
T2	AN00786	Preamp	83017A	6/20/2012	6/20/2014
T3	ANP05988	Cable	LDF1-50	3/12/2012	3/12/2014
T4	AN02945	Cable	32022-2-2909K-36TC	10/30/2013	10/30/2015

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

Function	Manufacturer	Model #	S/N
Dual Band Cellphone Signal Booster	Cellphone-Mate, Inc.	Dual Force	2

Support Devices:

Function	Manufacturer	Model #	S/N
Signal Generator	Agilent	E4438C	MY42082260
Power Supply	SureCall	GFP451DA-0945-1	1211-0000323
Signal Generator	Agilent	E4433B	US40053164

Test Conditions / Notes:

The EUT is placed on the Styrofoam block. Cellular -800 gain is set at Max gain and PCS-1900 Gain is set at max gain. All DIP switches are set to Off position, i.e. 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.
Part 22 and Part 24 tested simultaneously. A combiner was used to inject signal in two frequency band into the booster.
CMRS band.
UL: 824-849MHz, 1850-1915MHz
DL: 869-894MHz, 1930-1995MHz
The booster operates in the following frequency band.
UL: 824-849, 1850-1915 MHz
DL: 869-894, 1930-1995 MHz
TX Freq = 832 MHz, 881 MHz.
Modulation: CW
Frequency range of measurement = 9 kHz- 10 GHz.
9kHz -150 kHz; RBW=200 Hz, VBW=200 Hz;150 kHz-30 MHz; RBW=9 kHz, VBW=9 kHz;30 MHz-1000 MHz; RBW=120 kHz, VBW=120 kHz,1000 MHz-10000 MHz; RBW=1 MHz, VBW=1 MHz.

Test environment conditions: 23.9°C, 7% Relative Humidity, 100kPa

Operating Frequency:	824-849MHz			
Channels:	GSM			
Highest Measured Output Power:	20.50	(dBm)=	0.11	(Watts)
Distance:	3	meters		
Limit:	43+10Log(P)=	33.41	dBc	

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
1,664.00	-62.71392685	Horiz	83.21

Operating Frequency:	869-894MHz			
Channels:	GSM			
Highest Measured Output Power:	-6.10	(dBm)=	0.00024	(Watts)
Distance:	3	meters		
Limit:	43+10Log(P)=	6.80	dBc	

Freq. (MHz)	Reference Level (dBm)	Antenna Polarity (H/V)	dBc
1,762.00	-62.40211242	Horiz	56.30

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)

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

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

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

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

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 (uV/m) –120

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

10 Log P_t = 20 Log E (uV/m) –125.23

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

= E dBuv - E dBuv + 82.23

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

Test Setup Photos

2.1055 Frequency Stability

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.