SolidRF Communication Co., Ltd

TEST REPORT FOR

Signal Booster
Model: SR25652001

Tested To The Following Standards:

FCC Part 22H

Report No.: 95763-14

Date of issue: October 28, 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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REPORT PREPARED BY:

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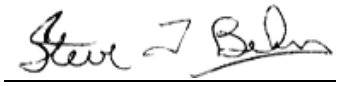
Project Number: 95763

DATE OF EQUIPMENT RECEIPT: September 16, 2014
DATE(S) OF TESTING: September 16 - October 1, 2014

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 A	US0060	SL2-IN-E-1146R	3082D-1	90473	A-0147
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	Modifications*	Results
2.1046 / 22.913(a)	RF Power Output	NA	NA[1]
2.1047	Modulation Characteristics	NA	NA[1]
2.1049(I)	Occupied Bandwidth	NA	Pass
2.1051 / 22.917(a)	Spurious Emissions at Antenna Terminals	NA	Pass
2.1053 / 22.917(a)	Field Strength of Spurious Radiation	NA	Pass
2.1055 / 22.355	Frequency Stability	NA	NA[2]

NA = Not Applicable
NA[1] = A different standard applies; see applicable test report.
NA[2] = Not applicable. See the section in the report for the reason.

Modifications*/Conditions During Testing

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

Summary of Conditions
No modifications were made during testing.

EQUIPMENT UNDER TEST (EUT)

EQUIPMENT UNDER TEST

Signal Booster
Manuf: SolidRF Communication Co., Ltd
Model: SR25652001
Serial: NA

PERIPHERAL DEVICES

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

Power Supply
Manuf: Generic
Model: MX18W1
Serial: NA

Signal Generator
Manuf: Agillent
Model: E4433B
Serial: US40052164

50 ohm Load
Manuf: Generic
Model: Generic
Serial: NA

Signal Generator
Manuf: Agillent
Model: E4438C
Serial: MY42081492

Power Supply
Manuf: China LTD
Model: MX18W1-0602500C
Serial: NA

FCC PART(S) 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 Occupied Bandwidth

Test Conditions / Setup

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714 993 6112

Customer:	**SolidRF Communication Co., Ltd**		
Specification:	**Occupied Band width.**		
Work Order #:	**95763**	Date:	9/16/2014
Test Type:	**Conducted Emissions**	Time:	08:40:44
Equipment:	**Signal Booster**	Sequence#:	1
Manufacturer:	SolidRF Communication Co., Ltd	Tested By:	E. Wong
Model:	SR25652001		110V 60Hz
S/N:	NA		

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	8/14/2013	8/14/2015
	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

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

Function	Manufacturer	Model #	S/N
Signal Booster*	SolidRF Communication Co., Ltd	SR25652001	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Generic	MX18W1	NA
Signal Generator	Agillent	E4438C	MY42081492
Signal Generator	Agillent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.

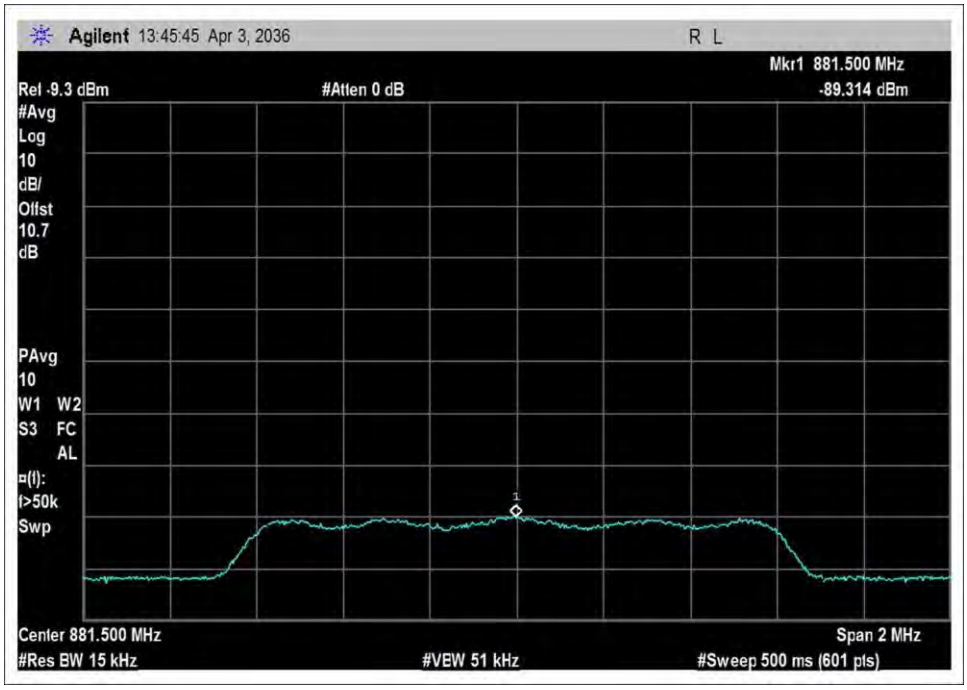
UL: 824-849, 1850-1915 MHz, 1710-1755MHz, 698-716MHz, 776-787MHz
DL: 869-894, 1930-1995 MHz, 2110-2155MHz, 728-746MHz, 746-757MHz

All adjustable settings on the test sample are set at max.
Test environment conditions: Temperature: 23.9°C, Relative Humidity: 40%, Atmospheric Pressure: 100kPa

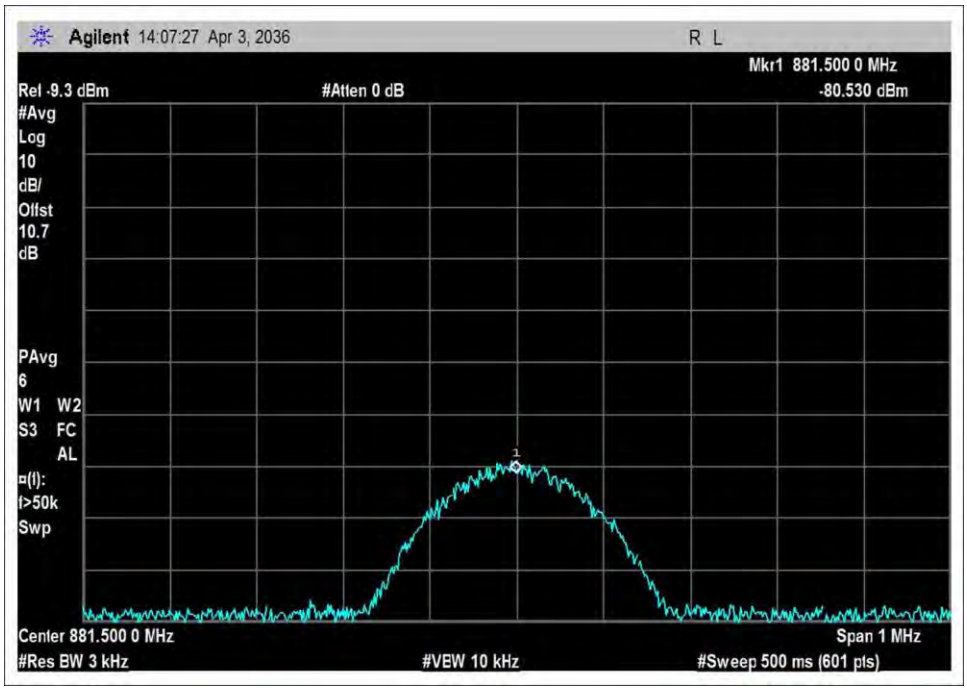
Test procedure: The test was performed IAW section 7.10 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v02r01 Dated July 24, 2014

Firmware: Original

Test Data



DL_869-894_input_CDMA



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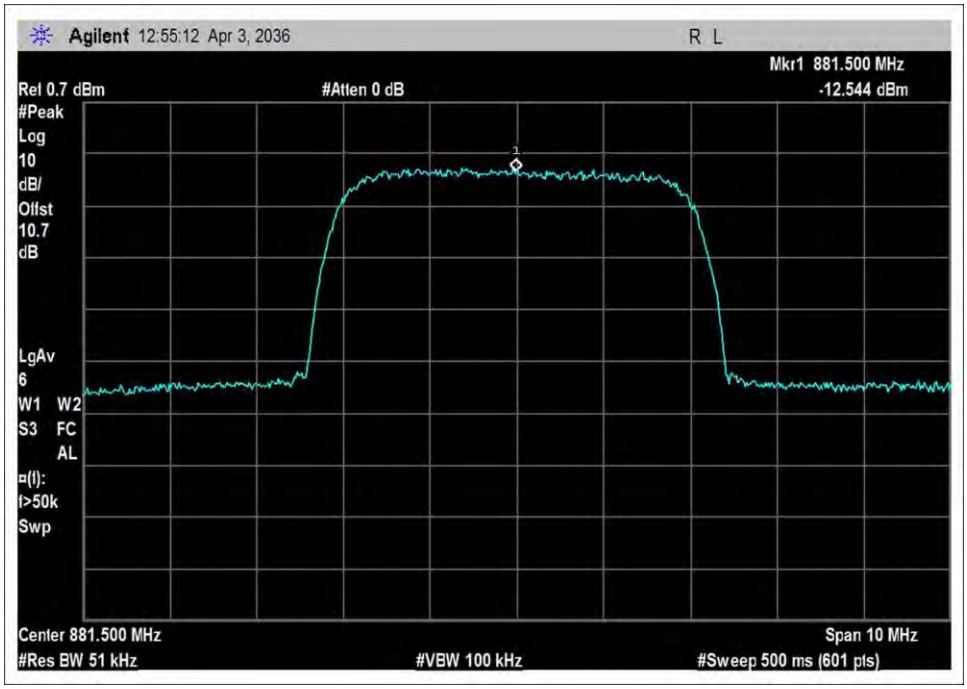

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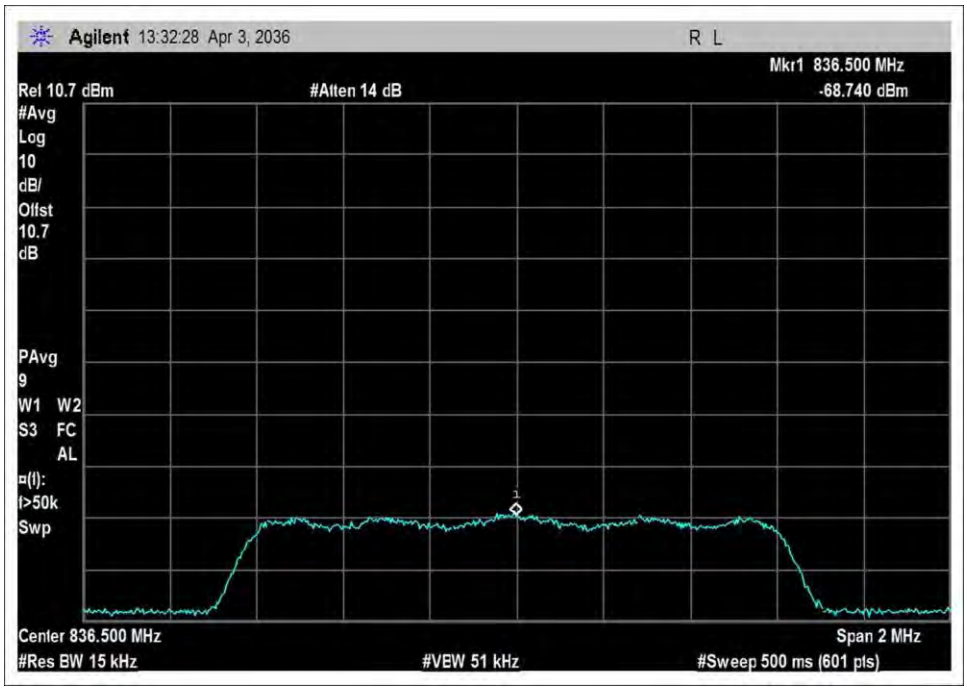

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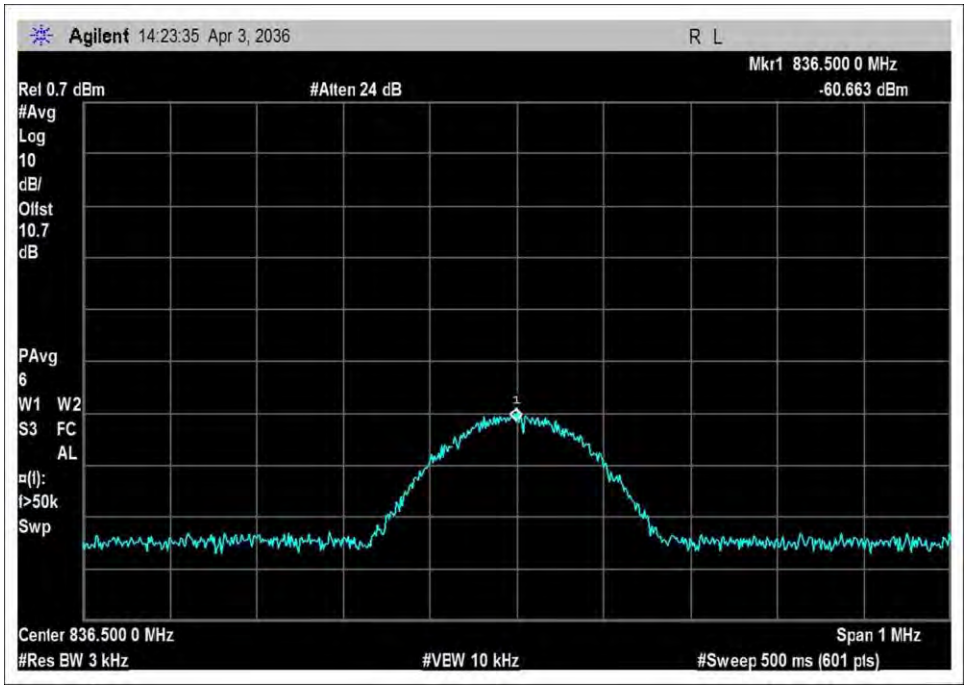

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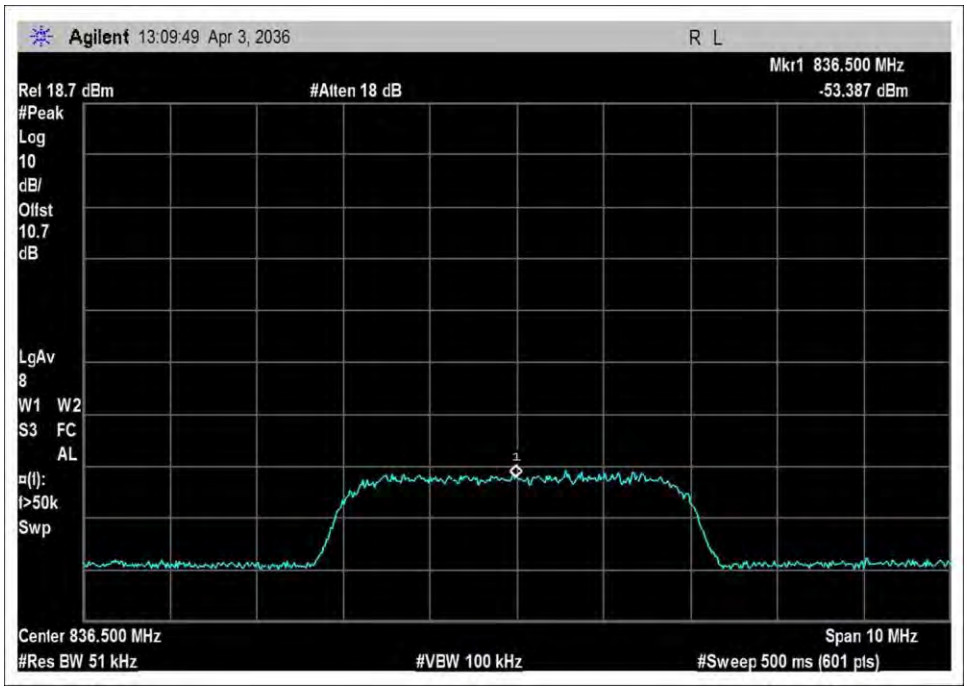

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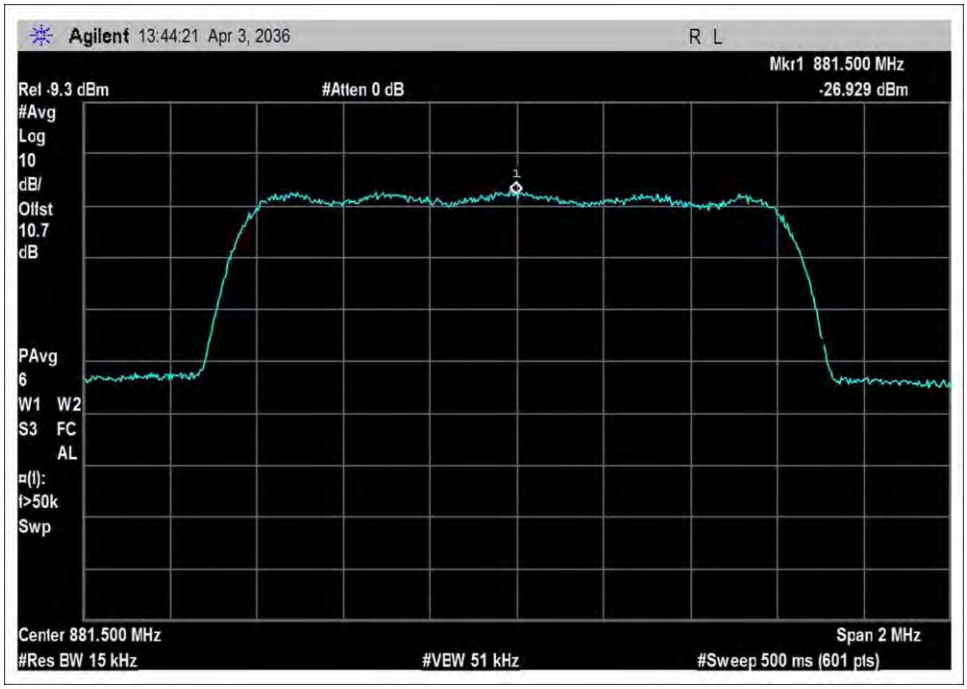

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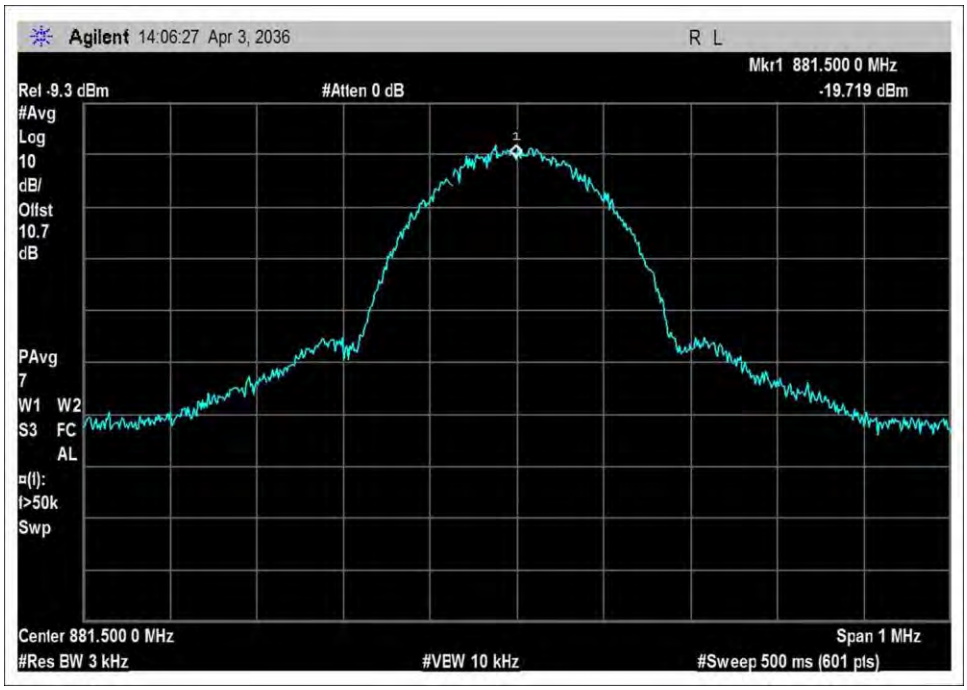

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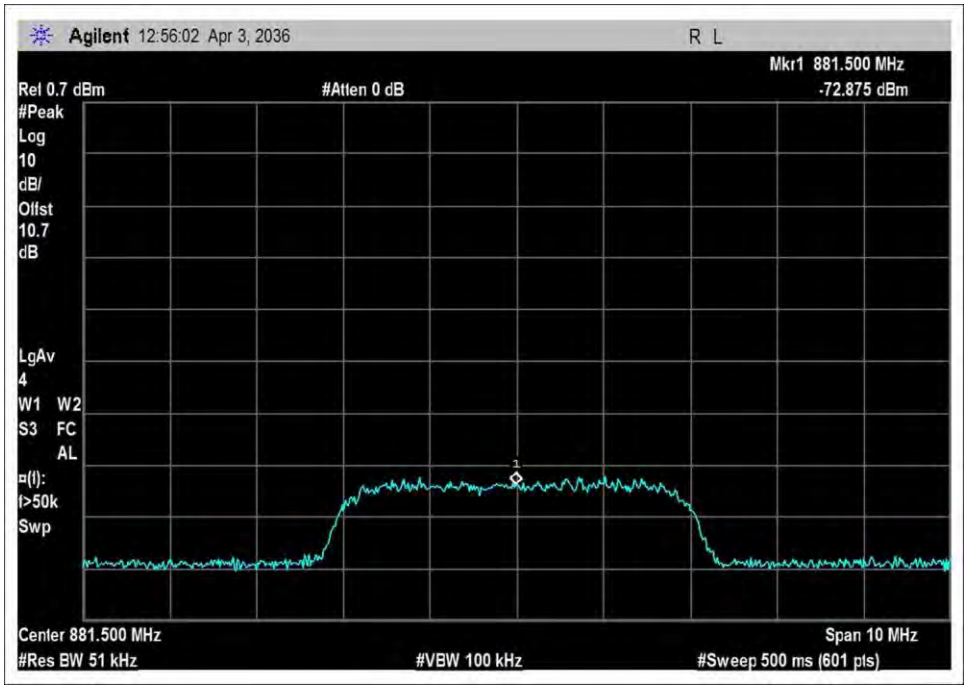

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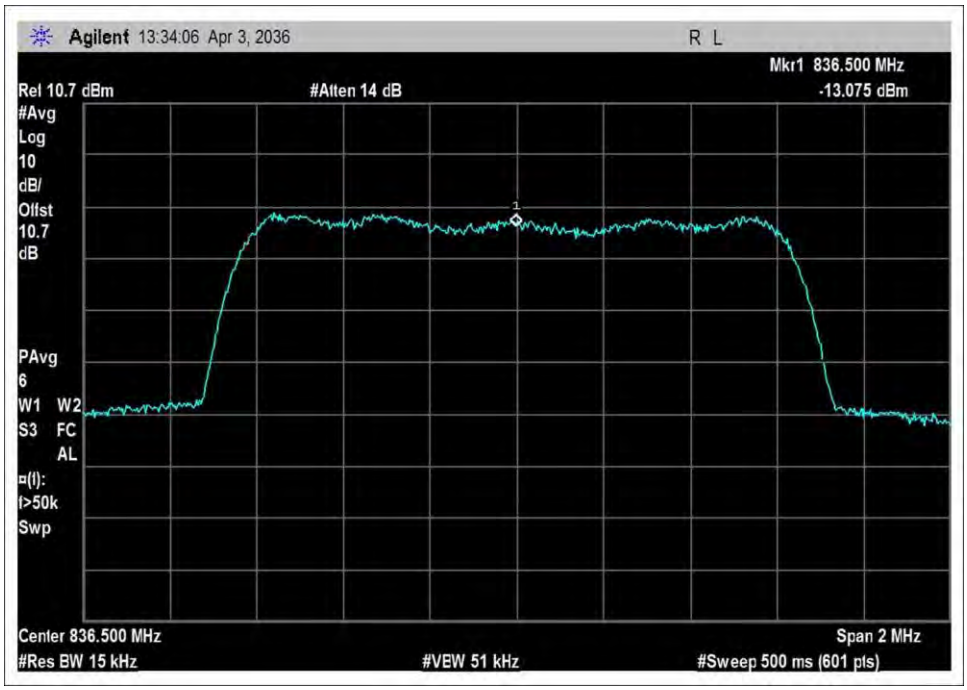

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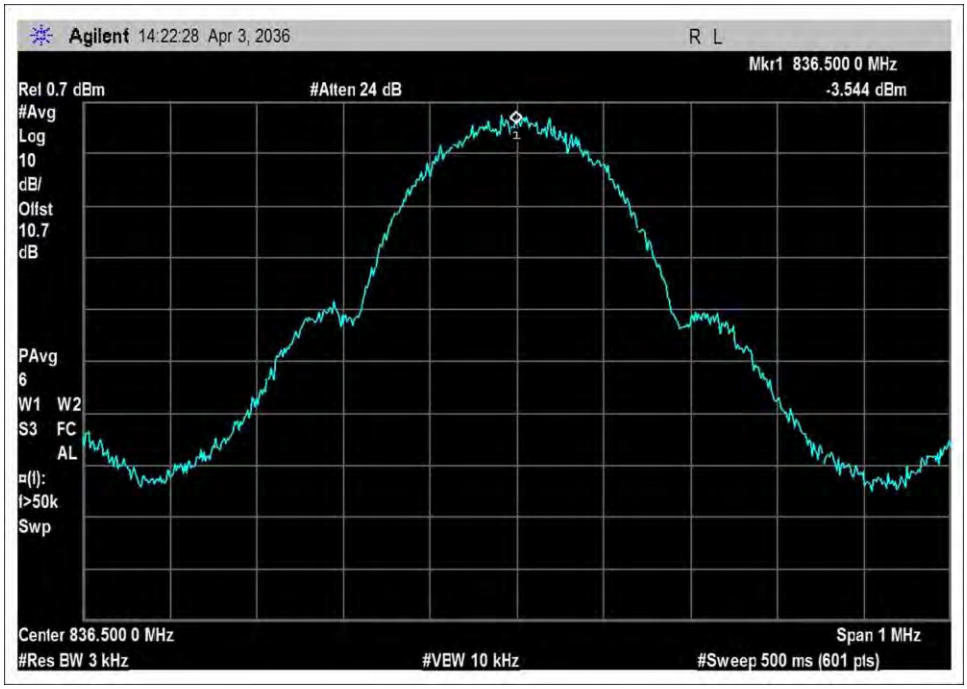

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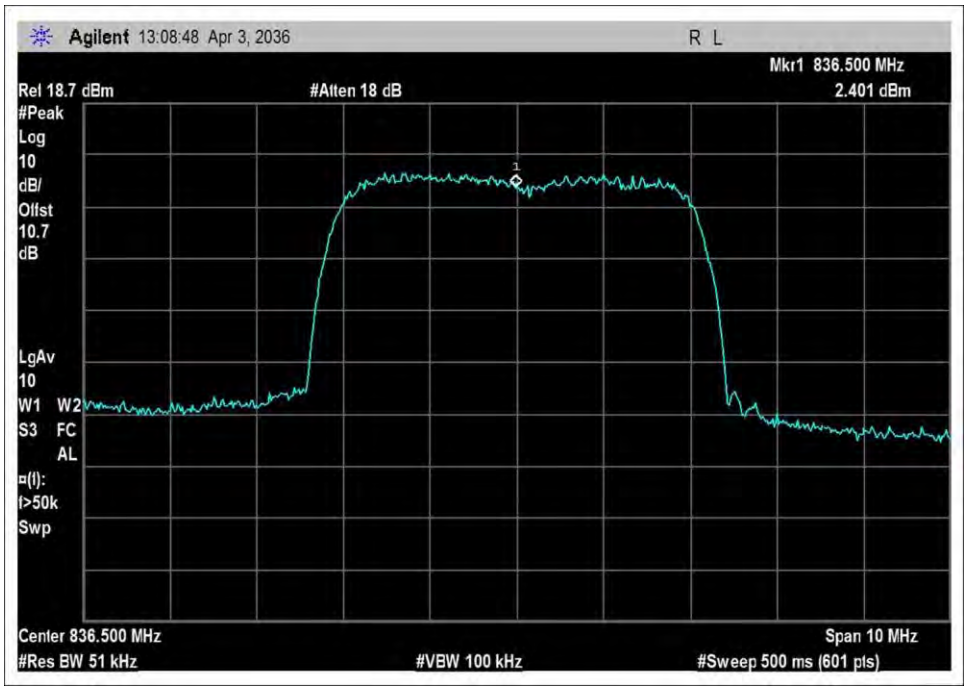
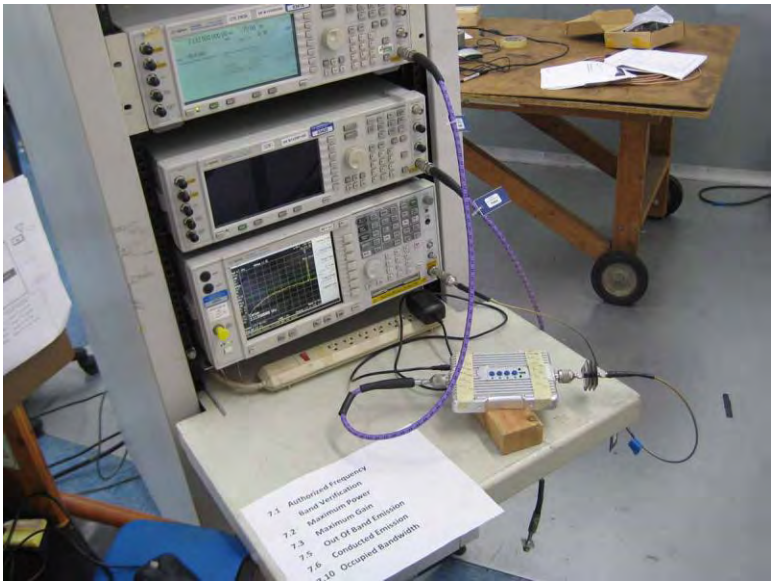


UL_824-849_output_WCDMA

Test Setup Photo



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

Test Conditions / Setup

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 Data

Test Location: CKC Laboratories, Inc • 110 N. Olinda Place • Brea, CA 92821 • 714-993-6112

Customer: **SolidRF Communication Co., Ltd**
Specification: **47 CFR §22.917 Spurious Emissions**
Work Order #: **95763** Date: 9/16/2014
Test Type: **Conducted Emissions** Time: 10:02:57
Equipment: **Signal Booster** Sequence#: 1
Manufacturer: SolidRF Communication Co., Ltd Tested By: E. Wong
Model: SR25652001 110V 60Hz
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
	AN02672	Spectrum Analyzer	E4446A	8/14/2013	8/14/2015
T1	AN03430	Attenuator	75A-10-12	9/5/2013	9/5/2015
T2	AN02946	Cable	32022-2-2909K-36TC	7/31/2013	7/31/2015

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

Function	Manufacturer	Model #	S/N
Signal Booster*	SolidRF Communication Co., Ltd	SR25652001	NA

Support Devices:

Function	Manufacturer	Model #	S/N
Power Supply	Generic	MX18W1	NA
Signal Generator	Agillent	E4438C	MY42081492
Signal Generator	Agillent	E4433B	US40052164

Test Conditions / Notes:

The EUT is placed on the test bench. Evaluation performed at the Outside (Donor) and Inside (Server) antenna port.

UL: 824-849,
DL: 869-894,

All adjustable setting on the test sample are set at max.
Test environment conditions: Temperature: 23.9°C, Relative Humidity: 40%, Atmospheric Pressure: 100kPa

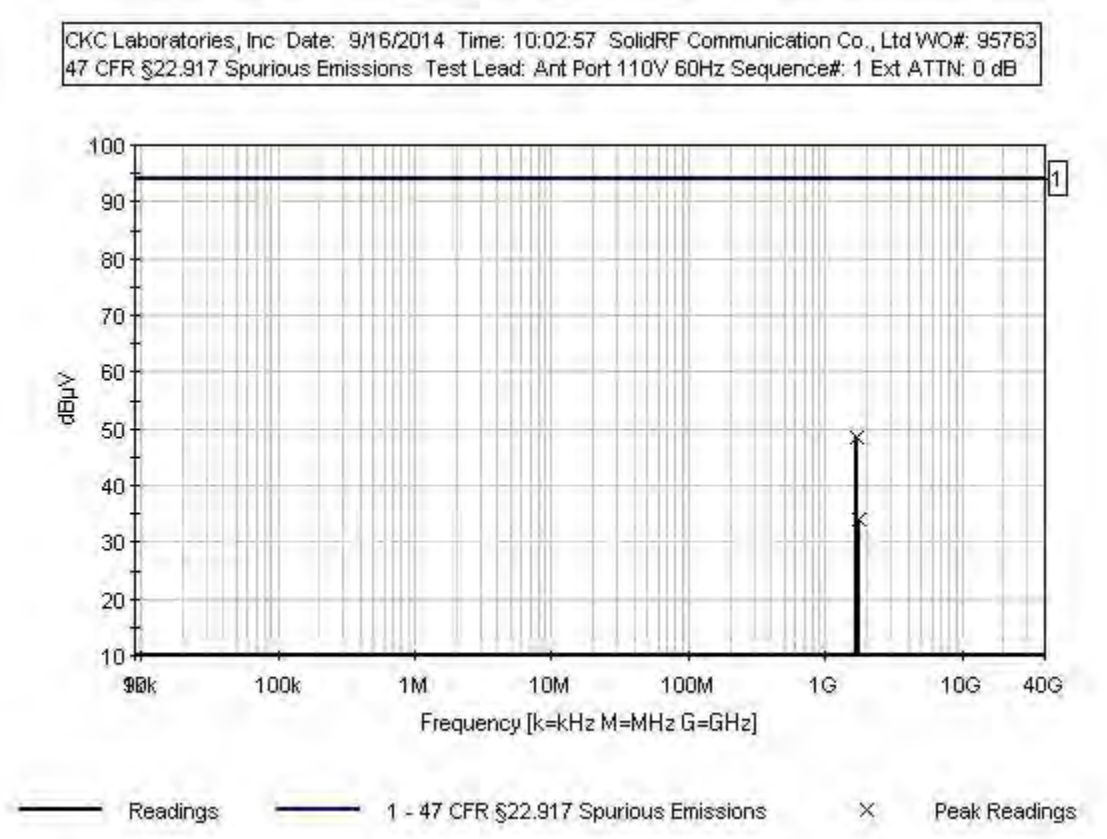
Frequency range of measurement = 9 kHz- 10 GHz.
9 kH -150 kHz;RBW=200 Hz,VBW=200 Hz;150 kHz-30 MHz;RBW=9 kHz,VBW=9 kHz;30 MHz-1000 MHz;RBW=120 kHz,VBW=120 kHz,1000 MHz-10000 MHz;RBW=1 MHz,VBW=1 MHz.

Test procedure:
The test was performed IAW section 7.6 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v02r01 Dated July 24, 2014
-13dBm=94dBuV.

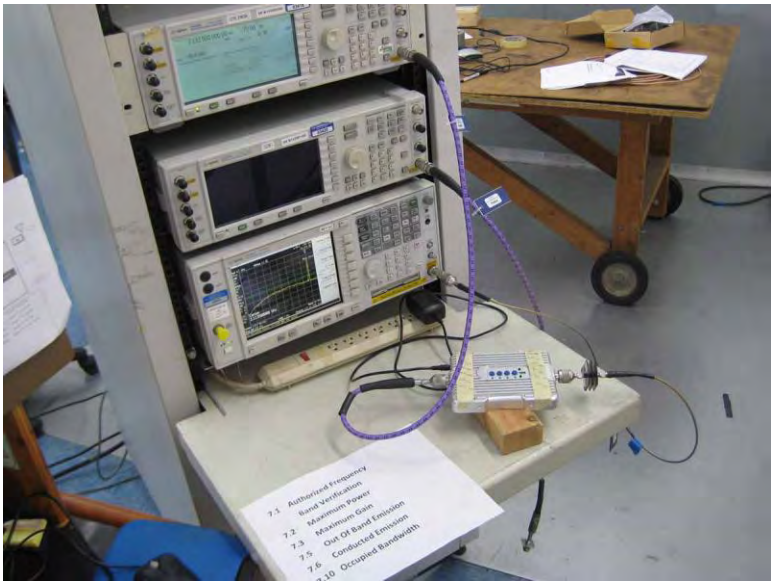
Ext Attn: 0 dB

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

#	Freq MHz	Rdng dBµV	T1 dB	T2 dB	dB	dB	Dist Table	Corr dBµV	Spec dBµV	Margin dB	Polar Ant
1	1673.000M	37.8	+10.0	+0.5			+0.0	48.3	94.0 UL pat22	-45.7	Ant P
2	1762.600M	23.3	+10.1	+0.5			+0.0	33.9	94.0 DL Part 22	-60.1	Ant P



Test Setup Photo



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

Test Data

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

Customer: **SolidRF Communication Co., Ltd**
Specification: **47 CFR §22.917(a) Spurious Emissions**
Work Order #: **95763** Date: 10/1/2014
Test Type: **Maximized Emissions** Time: 09:42:15
Equipment: **Signal Booster** Sequence#: 0
Manufacturer: SolidRF Communication Co., Ltd Tested By: Don Nguyen
Model: SR25652001
S/N: NA

***Test Equipment*:**

ID	Asset #	Description	Model	Calibration Date	Cal Due Date
T1	AN00010	Preamp	8447D	3/12/2014	3/12/2016
T2	AN00851	Biconilog Antenna	CBL6111C	4/30/2014	4/30/2016
T3	ANP05555	Cable	RG223/U	5/7/2014	5/7/2016
T4	ANP05569	Cable	RG-214/U	5/7/2014	5/7/2016
	AN02869	Spectrum Analyzer	E4440A	7/10/2014	7/10/2015
T5	ANP04382	Cable	LDF-50	7/30/2014	7/30/2016
	ANP06360	Cable	L1-PNMNM-48	7/29/2014	7/29/2016
	AN00787	Preamp	83017A	5/31/2013	5/31/2015
	AN01646	Horn Antenna	3115	3/18/2014	3/18/2016
	ANP06544	Cable	32026-29094K-29094K-36TC	11/20/2013	11/20/2015
	AN00314	Loop Antenna	6502	7/2/2014	7/2/2016
	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
Signal Booster*	SolidRF Communication Co., Ltd	SR25652001	NA

Support Devices:

Function	Manufacturer	Model #	S/N
50 ohm Load	Generic	Generic	NA
Signal Generator	Agilent	E4438C	MY42081492
Power Supply	China LTD	MX18W1-0602500C	NA

Test Conditions / Notes:

The equipment under test (EUT) is placed on the Styrofoam table top. EUT set at maximum gain.
A remotely located signal generator is connected to input of EUT.

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 824-849MHz
DL 869-894MHz

TXFreq = Center frequency of above listed bands.
Modulation: CW
Frequency range of measurement = 9 kHz to 22 GHz.
9kHz-150 kHz, RBW=200 Hz,VBW=200Hz;150kHz-30MHz, RBW=9kHz,VBW=9kHz;30MHz-1000MHz, RBW=120kHz,VBW=120kHz;1000MHz-22000MHz, RBW=1MHz,VBW=1MHz

Temperature: 22°C, Humidity: 42%, Pressure: 100kPa

Site D

Test procedure:
The test was performed IAW section 7.12 of the FCC document: 935210 D03 Wideband Consumer Signal Booster Measurement Guidance v02r01 Dated July 24, 2014

No emission above 1GHz was found.

Operating Frequency(ies):	UL 824-849MHz, DL 869-894MHz	
Operational Mode(s):	Continuous TX	
Highest Measured Power:	17.7	dBm
Measurement Distance:	3	meters

Limit Definition:

Frequency Range	Limit (dBc)	Limit Calculation
9kHz - 22GHz	60	43+10*LOG(P)

Frequency (MHz)	Reference Level (dBm)	Measured (dBc)	Margin	Antenna Polarity
47.550	-93.2	110.9	-50.9	Vertical
65.450	-93.9	111.6	-51.6	Vertical
56.450	-93.8	111.5	-51.5	Vertical
87.350	-103.7	121.4	-61.4	Vertical

108.350	-101.8	119.5	-59.5	Vertical
120.500	-100.9	118.6	-58.6	Vertical
117.700	-99.2	116.9	-56.9	Vertical
134.700	-101.6	119.3	-59.3	Vertical
173.700	-90.2	107.9	-47.9	Vertical
180.200	-99.0	116.7	-56.7	Vertical
69.200	-101.1	118.8	-58.8	Horizontal
76.450	-101.6	119.3	-59.3	Horizontal
86.700	-107.4	125.1	-65.1	Horizontal
111.200	-100.9	118.6	-58.6	Horizontal
173.700	-82.1	99.8	-39.8	Horizontal
156.200	-89.9	107.6	-47.6	Horizontal
129.200	-95.1	112.8	-52.8	Horizontal
194.200	-97.5	115.2	-55.2	Horizontal
231.700	-105.8	123.5	-63.5	Horizontal

Test Setup Photo(s)

2.1055 / 22.355 / Frequency Stability

NA = The manufacturer declares that the booster does not contain frequency determining circuit.

APPENDIX A: CUSTOMER PROVIDED INFORMATION

Antenna Kitting Information

Component	Prod No. Description	Gain/Loss					Notes
		LTE-707	LTE-781	800MHz	1900MHz	1700MHz 2100MHz	
Outside Antenna	SR-31400100	7dBi	7dBi	8dBi	10dBi	10dBi\10dBi	Directional Antenna
Outside Antenna	SR-31300100	3dBi	3dBi	3dBi	3.5dBi	3.5dBi\3.5dBi	Omni-Directional Antenna
Outdoor Cable	SRG58-30FN	4.5dB	4.5dB	4.9dB	7.6dB	7.2dB\8dB	
Outdoor Cable	SRLMR400-	4.2dB	4.2dB	4.4dB	6.1dB	5.8dB\6.5dB	
Inside Cable	SRG58-15FN	2.35dB	2.4dB	2.56dB	3.9dB	3.7dB\ 4.1dB	
Inside Cable	SRLMR400-	1.9dB	1.9dB	1.95dB	2.8dB	2.55dB\2.9dB	
Inside Antenna	SR-21200100	7dBi	7dBi	7dBi	10dBi	10dBi\10dBi	Directional Antenna
Inside Antenna	SR-21300100	3dBi	3dBi	3dBi	3.5dBi	3.5dBi\3.5dBi	Omni-Directional Antenna
Lightning Protector	SR-LP35000090	0.1 dB	0.1 dB	0.1 dB	0.18dB	0.16dB\0.2dB	Ideal for any External Antenna
All equivalent antennas and cables are suitable for use with the SR25652001 booster.							

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.