



Elliott Laboratories Inc.
www.elliottlabs.com

684 West Maude Avenue
Sunnyvale, CA 94086-3518

408-245-7800 Phone
408-245-3499 Fax

***Electromagnetic Emissions Test Report
In Accordance With
FCC Part 24 Subpart E
on the
External Radio Unit
Model: BA-100-000***

GRANTEE: SOMA Networks, Inc.
185 Berry Street, Suite 2000
San Francisco, CA. 94107

TEST SITE: Elliott Laboratories, Inc.
684 W. Maude Ave
Sunnyvale, CA 94086

REPORT DATE: April 9, 2002

FINAL TEST DATE: April 3, 2002

A handwritten signature in black ink that appears to read "Juan Martinez".

AUTHORIZED SIGNATORY:

Juan Martinez
Senior EMC Engineer

This report shall not be reproduced, except in its entirety, without the written approval of Elliott Laboratories, Inc.

TABLE OF CONTENTS

COVER PAGE	1
TABLE OF CONTENTS	2
FCC CERTIFICATION INFORMATION	3
SCOPE	5
OBJECTIVE	5
EMISSION TEST RESULTS	6
SECTION 2.1046: RF POWER OUTPUT	6
SECTION 2.1047: MODULATION CHARACTERISTICS	6
<i>Section 2.1047(a): Voice Modulated Communication Equipment</i>	6
<i>Section 2.1047(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power.</i>	6
<i>Section 2.1047(b): Equipment which employs modulation limiting</i>	6
<i>Section 2.1047(d) Other types of equipment.</i>	6
SECTION 2.1049: OCCUPIED BANDWIDTH	7
SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL	7
SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION.	8
SECTION 2.1055: FREQUENCY STABILITY	8
EQUIPMENT UNDER TEST (EUT) DETAILS	9
GENERAL	9
ENCLOSURE	9
MODIFICATIONS	9
SUPPORT EQUIPMENT	10
EUT INTERFACE PORTS.....	10
EUT OPERATION	10
TEST SITE	11
GENERAL INFORMATION	11
CONDUCTED EMISSIONS CONSIDERATIONS	11
RADIATED EMISSIONS CONSIDERATIONS	11
MEASUREMENT INSTRUMENTATION	12
RECEIVER SYSTEM	12
INSTRUMENT CONTROL COMPUTER.....	12
POWER METER	12
FILTERS/ATTENUATORS	12
ANTENNAS	13
ANTENNA MAST AND EQUIPMENT TURNTABLE	13
INSTRUMENT CALIBRATION	13
TEST PROCEDURES	14
SPECIFICATION LIMITS AND SAMPLE CALCULATIONS	18
RADIATED EMISSIONS SPECIFICATION LIMITS	18
CALCULATIONS – EFFECTIVE RADIATED POWER	18
<i>EXHIBIT 1: Test Equipment Calibration Data</i>	1
<i>EXHIBIT 2: Test Measurement Data</i>	2
<i>EXHIBIT 3: Photographs of Test Configuration.</i>	3

FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part 2, Subpart J, Section 2.1033(C).

2.1033(c)(1) Applicant:

SOMA Networks, Inc.
400 Industrial Street, Suite 100
Richardson, Tx 75081

2.1033(c)(2) FCC ID: POZ-ERU-0202001

2.1033(c)(3) Instructions/Installation Manual

Please refer to Exhibit 7: User Manual, Theory of Operation

2.1033(c)(4) Type of emissions

4M20FXW (W-CDMA)

2.1033(c)(5) Frequency Range

Transmit: 1852.5 – 1907.5 MHz
Receives: 1932.5 – 1987.5 MHz

2.1033(c)(6) Range of Operation Power

Maximum = 38.2 dBm
Minimum = -42 dBm

2.1033(c)(7) Maximum FCC Allowed Power Level

Section 24.232(a): Base Stations are limited to 100 Watts (E.I.R.P).

2.1033(c)(8) Applied voltage and currents into the final transistor elements

6Vdc, 1 amp

2.1033(c)(9) Tune-up Procedure

Not applicable EUT is an amplifier

2.1033(c)(10) Schematic Diagram of the Transmitter

Refer to Exhibit 6. Schematic diagram

2.1033(c)(10) Means for Frequency Stabilization

Not applicable the EUT is an amplifier

2.1033(c)(10) Means for Suppression of Spurious radiation

A 2.5 GHz low pass filter (X17 part location) Refer to Exhibit 6: Schematics page 6 of 9.

2.1033(c)(10) Means for Limiting Modulation

Part location F1 (Refer to Exhibit 6: Schematics 6 of 9)

2.1033(c)(10) Means for Limiting Power

The maximum transmit power is limited by a foldback loop that monitors the final PA output power and attenuates the Tx path drive level as it begins to exceed the factory set value.

2.1033(c)(11) Photographs or Drawing of the Equipment Identification Plate or Label

Refer to Exhibit 4

2.1033(c)(12) Photographs of equipment

Refer to Exhibit 5

2.1033(c)(13) Equipment Employing Digital Modulation

W-CDMA is a "direct-sequence spread spectrum" technique. It is similar to IS-95, but with a wider (5 MHz) carrier. SOMA's air interface is a variant of W-CDMA (aka 3GPP), and uses the same chip rate of 3.84 Mcps. In addition to the standard QPSK modulation scheme contained in W-CDMA, SOMA's radio system utilizes higher-order modulation: 16- and 64-QAM.

2.1033(c)(14) Data taken per Section 2.1046 to 2.1057

Refer to Exhibit 2

SCOPE

FCC Part 24, Subpart E testing was performed for the equipment mentioned in this report. The equipment was tested in accordance with the procedures specified in Sections 2.1046 to 2.1057 of the FCC Rules. TIA-603 is used as a test procedure guideline to perform the some of the required tests.

The intentional radiator above was tested in a simulated typical installation to demonstrate compliance with the relevant FCC performance and procedural standards.

Final system data was gathered in a mode that tended to maximize emissions by varying orientation of EUT, orientation of power and I/O cabling, antenna search height, and antenna polarization.

Every practical effort was made to perform an impartial test using appropriate test equipment of known calibration. All pertinent factors have been applied to reach the determination of compliance.

OBJECTIVE

The primary objective of the manufacturer is compliance with the FCC Part 24 Subpart E. Certification of these devices is required as a prerequisite to marketing as defined in Section 2.1033.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to FCC. FCC issues a grant of equipment authorization and a certification number upon successful completion of their review of the submitted documents. Once the equipment authorization has been obtained, the label indicating compliance must be attached to all identical units subsequently manufactured.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product that may result in increased emissions should be checked to ensure compliance has been maintained (i.e., printed circuit board layout changes, different line filter, different power supply, harnessing or I/O cable changes, etc.).

EMISSION TEST RESULTS

SECTION 2.1046: RF POWER OUTPUT

The RF Power Output was tested to Section 24.232 (b)

The following modulations were tested: W-CDMA

Procedure used: **A & B**

Result: 38.2 dBm

Refer to Setup Photo# 1 & 2 in Exhibit 3 and the test data in Exhibit 2: Test Measurement Data for full details.

SECTION 2.1047: MODULATION CHARACTERISTICS

Section 2.1047(a): Voice Modulated Communication Equipment

Not Applicable EUT is an Amplifier.

Section 2.1047(c) Single sideband and independent sideband radiotelephone transmitters which employ a device or circuit to limit peak envelope power.

Not Applicable EUT is an Amplifier.

Section 2.1047(b): Equipment which employs modulation limiting

Not Applicable EUT is an Amplifier.

Section 2.1047(d) Other types of equipment.

Other types of modulations were tested to Section 24.238 (b).

The following modulations were tested: W-CDMA

Procedure used: **D** (for this test the built-in 99% power bandwidth function of a spectrum analyzer was used)

Result: 4.208 MHz

Refer to Setup Photo# 2 in Exhibit 3 and the test data in Exhibit 2: Test Measurement Data for full details.

SECTION 2.1049: OCCUPIED BANDWIDTH

Other types of modulations were tested to Section 24.238 (b).

The following modulations were tested: W-CDMA

Procedure used: **D** (for this test the built-in 99% power bandwidth function of a spectrum analyzer was used)

Result: 4.208 MHz

Refer to Setup Photo# 2 in Exhibit 3 and the test data in Exhibit 2: Test Measurement Data for full details.

SECTION 2.1051: SPURIOUS EMISSION AT ANTENNA TERMINAL.

The Spurious Emission at the Antenna terminal was tested to Section 24.238(a).

The following modulations were tested: W-CDMA

Procedure used: **I and J**

Result: -17 dBm @ 1852 MHz (Bandedge), No harmonic emissions detected, please refer plots in Exhibit 2.

Refer to Setup Photo# 2 in Exhibit 3 and the test data in Exhibit 2: Test Measurement Data for full details.

SECTION 2.1053: FIELD STRENGTH OF SPURIOUS RADIATION.

The Field Strength was tested to Section 24.238(a).

Procedure used: **N**

Result: -24.2dB @ 3766 MHz

Refer to Setup Photo# 1 in Exhibit 3 and the test data in Exhibit 2: Test Measurement Data for full details.

SECTION 2.1055: FREQUENCY STABILITY

Not Applicable the EUT is a Booster Amplifier.

EQUIPMENT UNDER TEST (EUT) DETAILS**GENERAL**

The Soma Networks model BA-100-000 is a wireless terminal that is designed to provide wireless network access in homes. Normally, the EUT would be placed on a table during operation. During emissions testing the EUT was placed on a table such that it was at a height of 0.8 m above the ground plane.

The sample was received on April 25, 2001 and tested on April 25 and 26, 2001. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number
Soma Networks/ BA-100-000/ External Antenna	N/A

ENCLOSURE

The EUT enclosure is primarily constructed of a plastic housing. It measures approximately 26 cm wide by 26 cm deep by 40 cm high.

MODIFICATIONS

The EUT did not require modifications during testing in order to comply with the emission specifications.

SUPPORT EQUIPMENT

The following equipment was used as local support equipment for emissions testing:

Manufacturer	Model	Description	Serial Number	FCC ID
HP	Pavilion 7840	PC	KR10504395	DoC
Mitsubishi	Diamond Plus 91	Monitor	011A34108	DoC
HP	5181	Keyboard	BD05106245	DoC
HP	M-S34	Mouse	LZS04915643	DoC
SOMA Networks	SOMAport 100	Wireless Terminal	0202-001	POZ-CPE-0140A-000

EUT INTERFACE PORTS

The I/O cabling configuration during emissions testing was as follows:

EUT Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
F-Type	SOMAport	Coaxial	Shielded	5

EUT OPERATION

The EUT was set to transmit continuously at the low and high Bandedge.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on April 3, 2002 at the Elliott Laboratories Open Area Test Site #4 located at 684 West Maude Avenue, Sunnyvale, California. Pursuant to Section 2.948 of the FCC Rules, construction, calibration, and equipment data has been filed with the Commission.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing are performed in conformance with Section 2 of FCC Rules. Measurements are made with the EUT connected to a spectrum analyzer through an attenuator to prevent overloading the analyzer.

RADIATED EMISSIONS CONSIDERATIONS

Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR 16-1 defined elliptical area.

MEASUREMENT INSTRUMENTATION

RECEIVER SYSTEM

An EMI receiver as specified in CISPR 16-1 is used for emissions measurements. The receivers are capable of measuring over the frequency range of 9 kHz up to 2000 MHz. These receivers allow both ease of measurement and high accuracy to be achieved. The receivers have Peak, Average, and CISPR (Quasi-peak) detectors built into their design so no external adapters are necessary. The receiver automatically sets the required bandwidth for the particular detector used during measurements.

For measurements above the frequency range of the receivers, a spectrum analyzer is utilized because it provides visibility of the entire spectrum along with the precision and versatility required to support engineering analysis. If average measurements above 1000MHz are performed, the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz is used.

INSTRUMENT CONTROL COMPUTER

A personal computer is utilized to record the receiver measurements of the field strength at the antenna, which is then compared directly with the appropriate specification limit. The receiver is programmed with appropriate factors to convert the received voltage into field strength at the antenna. Results are printed in a graphic and/or tabular format, as appropriate.

The test receiver also provides a visual display of the signal being measured.

POWER METER

A power meter and thermister mount may be used for output power measurements from transmitters as they provide a broadband indication of the power output.

FILTERS/ATTENUATORS

External filters and precision attenuators are often connected between the receiving antenna or EUT and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude transmitters and transient events.

ANTENNAS

A biconical antenna is used to cover the range from 30 MHz to 300 MHz and a log periodic antenna is utilized from 300 MHz to 1000 MHz. Narrowband tuned dipole antennas are used over the 30 to 1000 MHz range for precision measurements of field strength. Above 1000 MHz, a horn antenna is used. The antenna calibration factors are included in site factors programmed into the test receivers

ANTENNA MAST AND EQUIPMENT TURNTABLE

The antennas used to measure the radiated electric field strength are mounted on a non-conductive antenna mast equipped with a motor drive to vary the antenna height.

The requirements of ANSI C63.4 were used for configuration of the equipment turntable. It specifies that the test height above ground for table-mounted devices shall be 80 centimeters. Floor mounted equipment shall be placed on the ground plane if the device is normally used on a conductive floor or separated from the ground plane by insulating material from 3 to 12 mm if the device is normally used on a non-conductive floor. During radiated measurements, the EUT is positioned on a motorized turntable in conformance with this requirement.

INSTRUMENT CALIBRATION

All test equipment is regularly checked to ensure that performance is maintained in accordance with the manufacturer's specifications. All antennas are calibrated at regular intervals with respect to tuned half-wave dipoles. An appendix of this report contains the list of test equipment used and calibration information.

TEST PROCEDURES

General: For Transmitters with detachable antenna, direct measurements for output power, modulation characterization, occupied bandwidth, and frequency stability are performed with the antenna port of the EUT connected to either the power meter, modulation analyzer, or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the transmitter fundamental will not overload the front end of the measurement instrument.

Procedure A – Power Measurement (Radiated Method): The following procedure was used for transmitters that do not use external antennas.

- 1) Set the EUT to maximum power and to the lowest channel.
- 2) A spectrum analyzer was used to measure the power output. The search antenna was located 3 meter from the EUT.
- 3) The spectrum analyzer resolution and video bandwidth was set to 1 MHz to measure the power output. No amplifier was used since the fundamental will cause the amplifier to saturate.
- 4) The EUT was then rotated for a complete 360 degrees and the search antenna was raised and lowered to maximize the fundamental. Both vertical and horizontal polarizations were performed. All correction factors are applied to the fundamental.
- 5) Substitution is then performed. Substitution method is performed by replacing the EUT with a horn antenna, which factors can be reference to a half-wave dipole, and with a signal generator. The signal generator power level is adjusted until a similar level, which was measured, in step 4, is achieved on the spectrum analyzer. The level on the signal generator is then added to the antenna factor, in dBi, which will give the corrected value.
- 6) Steps 1 to 5 are repeated for the middle and the highest channel.

Procedure B – Power Measurement (Conducted Method): The following procedure was used for this particular transmitter.

- 1) Set the EUT to maximum power and to the lowest channel.
- 2) Either a power meter or a spectrum analyzer was used to measure the power output.
- 3) If a power meter was used, correct for any external attenuation used for the protection of the input of the sensor head. Also set the power sensor correction by setting up the frequency range that will be measured.
- 4) Repeat this for the middle and high channel and all modulations that will be used and all output ports used for transmission

Procedure C – Amplifier Bandwidth (Conducted Method): If the EUT is an amplification device the following procedure was performed:

- 1) Set the EUT to maximum power and to the lowest channel. Set the Resolution and Video Bandwidth to 30 kHz, with no averaging. These settings were used to show the true representation of the signal bandwidth.
- 2) Made a plot of the EUT output port and label it “Output”
- 3) With the same setting on the spectrum analyzer connect the cable that was connected to the input port of the amplifier to the analyzer. Made a plot and label it “Input”
- 4) Repeat this for the high channel and all modulations that will be used and all output ports used for transmission

Procedure D - Occupied Bandwidth (Conducted Method): Either for analog, digital, or data modulations, occupied bandwidth was performed. The EUT was set to transmit the appropriate modulation at maximum power. The bandwidth was measured using following methods:

- 1) The built-in 99% function of the spectrum analyzer was used.
- 2) If the built-in 99% is not available then the following method is used:

26-dB was subtracted to the maximum peak of the emission. Then the display line function was used to, in conjunction with the marker delta function, to measure the emissions bandwidth.

- 3) For the above two methods a resolution and video bandwidth of 100 kHz was used to measure the emission’s bandwidth.

Procedure H - Other Types of Equipment: Either digital or data modulated signals were simulated, by software or external sources, to performed the required tests. The EUT was set to transmit the appropriate digital modulation.

Procedure I – Bandedge: Where Bandedge measurements are specified the following procedure was performed:

- 1) Set the transmitting signal as close as possible to the edge of the frequency band/block per Section 24.238(a). Power is set to maximum
- 2) Set the spectrum analyzer display line function to -13-dBm.
- 3) Set the spectrum analyzer bandwidth to 100 kHz. Which is 1 % of the emission bandwidth. Per FCC if a resolution less then the calculate 1% is used, for the Bandedge measurement, then the following formula is to be used to correct the measured value $(10 \cdot \log(1\% \text{ RB} / \text{ RB used}))$.
- 4) Set the marker function to the FCC specified frequency band/block.
- 5) Set the spectrum analyzer span to show any emission within 2 MHz above or below the frequency band/block. All spurious or intermodulation emission must not exceed the -13-dBm limit.
- 6) Steps 1 to 3 were repeated for all modulations and output ports that will be used for transmission..

Procedure J – Antenna Conducted Emissions: For spurious emission measurements at the antenna terminal the following procedure was performed:

- 1) Set the transmitting signal as close as possible to the edge of the frequency band/block per Section 24.238(a). Power is set to maximum
- 2) Set the spectrum analyzer display line function to -13-dBm.
- 3) Set the spectrum analyzer bandwidth to 1 MHz.
- 4) For the spectrum analyzer, the start frequency was set to 30 MHz and the stop frequency set to 20 GHz. All spurious or intermodulation emission must not exceed the -13-dBm limit.
- 5) Steps 1 to 3 were repeated for all modulations and output ports that will be used for transmission.

Procedure N - Field Strength Measurement: The EUT was set on the turntable and the search antenna position 3 meters away. The output antenna terminal was terminated with a 50-ohm terminator. The EUT was set at the middle of the frequency band and set at maximum output power.

For the first scan, a preliminary measurement is performed. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. One or more of these is with the antenna polarized vertically while the one or more of these are with the antenna polarized horizontally. During the preliminary scans, the EUT is rotated through 360°, the antenna height is varied and cable positions are varied to determine the highest emission relative to the limit.

For the final measurement, Substitution method is performed on spurious emissions not being 20-dB below the calculated radiated limit. Substitution method is performed by replacing the EUT with a horn antenna, which factors can be reference to a half-wave dipole, and with a signal generator. The signal generator power level was adjusted until a similar level, which was measured on the first scan, is achieved on the spectrum analyzer. The level on the signal generator is than added to the antenna factor, in dBi, which will give the corrected value.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS**RADIATED EMISSIONS SPECIFICATION LIMITS**

The limits for radiated emissions are based on the power of the transmitter at the operating frequency. Data is measured in the logarithmic form of decibels relative to one milliwatt (dBm) or one microvolt/meter (dBuV/m,). The field strength of the emissions from the EUT is measured on a test site with a receiver.

Below is a formula example used to calculate the attenuation requirement, relative to the transmitters power output, in dBuV/m. For this example an operating power range of 3 watts is used. The radiated emissions limit for spurious signals outside of the assigned frequency block is $43 + 10\log_{10}(\text{mean output power in watts})$ dB below the measured amplitude at the operating power.

CALCULATIONS – EFFECTIVE RADIATED POWER

$$E(V/m) = \frac{\sqrt{30 * P * G}}{d}$$

E= Field Strength in V/m

P= Power in Watts (for this example we use 3 watts)

G= Gain of antenna in numeric gain (Assume 1.64 for ERP)

d= distance in meters

$$E(V/m) = \frac{\sqrt{30 * 3 \text{ watts} * 1.64 \text{ dB}}}{3 \text{ meters}}$$

$$20 * \log (4.049 \text{ V/m} * 1,000,000) = 132.14 \text{ dBuV/m} @ 3 \text{ meters}$$

FCC Rules request an attenuation of $43 + 10 \log (3)$ or 47.8 dB for all emissions outside the assigned block, the limit for spurious and harmonic emissions is:

$$132.1 \text{ dBuV/m} - 47.8 \text{ dB} = 84.3 \text{ dBuV/m} @ 3 \text{ meter.}$$

Note: Substitution Method is performed for spurious emission not being 20-dB below the calculated field strength.

EXHIBIT 1: Test Equipment Calibration Data

Radiated Emissions, 1 - 19 GHz, 04-Apr-02**Engineer: jmartinez**

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Hewlett Packard	High Pass filter, 3.5GHz	P/N 84300-80038	1157	12	3/1/2002	3/1/2003
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	1242	12	10/9/2001	10/9/2002
Miteq	Pre-amp, 1-18GHz	AFS44	1346	12	1/7/2002	1/7/2003
Hewlett Packard	Spectrum Analyzer 9KHz - 26.5GHz	8563E	59030	12	2/2/2002	2/2/2003
Narda	20dB Attenuator (50 Watts)	776B-20	1394	12	1/15/2002	1/15/2003

Power Output, 04-Apr-02**Engineer: jmartinez**

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Rohde & Schwarz	Power Meter	NRVS	1290	12	4/3/2002	4/3/2003
Rohde & Schwarz	Power Sensor 100uW - 10 Watts	NRV-Z53	1236	12	8/2/2001	8/2/2002

EXHIBIT 2: Test Measurement Data

The following data includes conducted and radiated emission measurements of the Soma Networks model External Radio Unit

21 Pages



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Emissions Spec:	Part 24 Subpart E	Class:	N/A
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Soma Networks

Model

BA-100-000



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Emissions Spec:	Part 24 Subpart E	Class:	N/A
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is an amplifier with a permanent internal antenna which is designed for low coverage areas where the signal is weak. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The electrical rating of the EUT is 28Vdc.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Soma Networks	ERU	External Antenna & Amplifier	N/A	POZ-ERU-0202001

EUT Enclosure

The EUT enclosure is primarily constructed of a plastic housing. It measures approximately 26 cm wide by 26 cm deep by 40 cm high.

Modification History

Mod. #	Test	Date	Modification
1	None	-	-



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Emissions Spec:	Part 24 Subpart E	Class:	N/A
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
HP	Pavilion 7840	PC	KR10504395	DoC
Mitsubishi	Diamond Plus 91	Monitor	011A34108	DoC
HP	5181	Keyboard	BD05106245	DoC
HP	M-S34	Mouse	LZS04915643	DoC
SOMA Networks	SOMAport 100	Wireless terminal	0202-001	POZ-CPE-0140A-000

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

EUT Interface Ports

EUT Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
F-Type	SOMAport	coaxial	Shielded	5

EUT Operation During Emissions

EUT was set to transmit continuously at the low, middle, and high bandedges.



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Section 2.1046 & RSS-133 (6.2): RF Power

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/3/2002 Config. Used: 1
Test Engineer: jmartinez Config Change: None
Test Location: SVOATS #4 EUT Voltage: 28Vdc

General Test Configuration

The EUT was located on the turntable for radiated field strength measurements and the local support equipment was located underneath the table.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT.

Ambient Conditions: Temperature: 15°C
Rel. Humidity: 55%

Summary of Results

Run #	Test Performed	Limit	Result	Measurement
1	Radiated Output Power	24.232(a) & RSS-133(6.2)	Pass	38.2 dBm (EIRP)

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run #1: Radiated Output Power (EIRP)

ERU with Antenna

Channel	Frequency (MHz)	Field Strength at 3m	Antenna Pol. (H/V)	Res BW
Low	1852.7	132.2	V	1 MHz
Low	1852.7	117.4	H	1 MHz
Middle	1883.0	133.5	V	1 MHz
Middle	1883.0	121.7	H	1 MHz
High	1907.4	131.4	V	1 MHz
High	1907.4	119.9	H	1 MHz

Note 1: Add note here

Note 2:

Run #2: Output Power (Substitution Method)

Frequency	Level	Pol	Substitution ^{Note 1}			Comments
			Pin	Gain	EIRP	
MHz	dB μ V/m	v/h	(dBm)	(dBi)	(dBm)	(dBm)
1852.70	132.2	v	30.8	6.4	37.2	50.0
1883.00	133.5	v	31.5	6.3	37.8	50.0
1907.40	131.4	v	29.9	6.3	36.2	50.0



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Section 2.1049 & RSS-133 (5.6): Occupied Bandwidth

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/3/2002 Config. Used: 1
Test Engineer: jmartinez Config Change: None
Test Location: SVOATS #4 EUT Voltage: 28Vdc

General Test Configuration

When performing conducted measurements from the EUT's antenna port, the antenna port of the EUT was connected to the spectrum analyzer or power meter via a suitable attenuator to prevent overloading the measurement system. All measurements are corrected. Modulation must not exceed manufacturers stated bandwidth.

For this specific test the occupied bandwidth was measured to provide the correct Resolution bandwidth that will be used for the bandedge measurements. This requirement is specified in 24.238(b) and RSS-133 (5.9) & (6.3)(a).

Because the EUT is an amplifier, input and output plots were made to show that the bandwidth was not altered. By altered we refer to the bandwidth increasing in width.

Ambient Conditions: Temperature: 15°C
Rel. Humidity: 55%

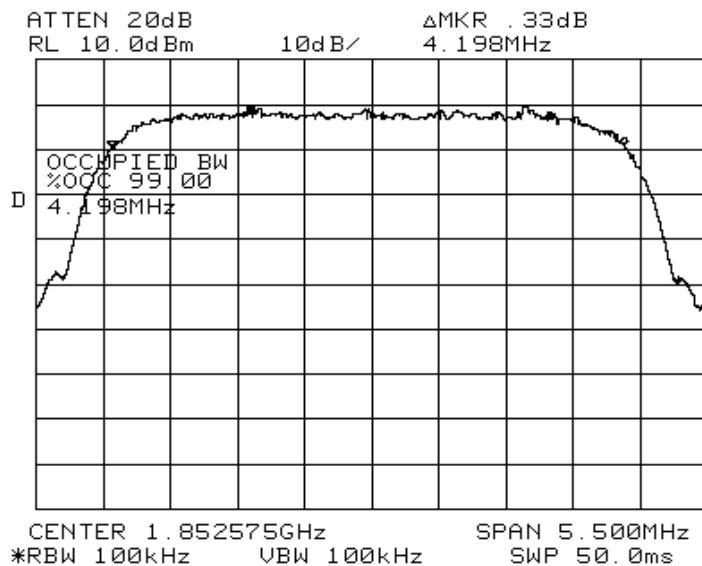
Summary of Results

Run	Test Performed	Limit	Result	Comment
1	Occupied Bandwidth & Input - output plots	24.238(b) & RSS-133(5.6)	Pass	
2	Occupied Bandwidth & Input - output plots	24.238(b) & RSS-133(5.6)	Pass	

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run #1: Occupied Bandwidth; Low Block A

Measured Value	Specified Bandwidth	Resolution	Comments
(MHz)	(MHz)	(kHz)	
4.198	5	100	

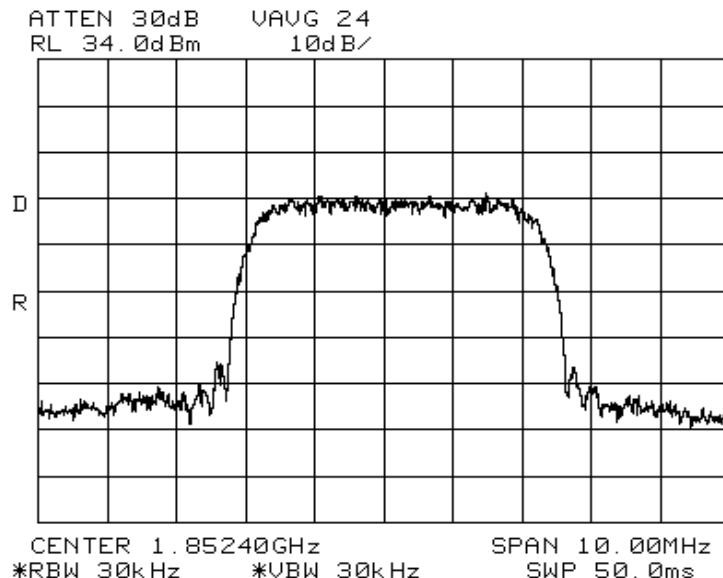




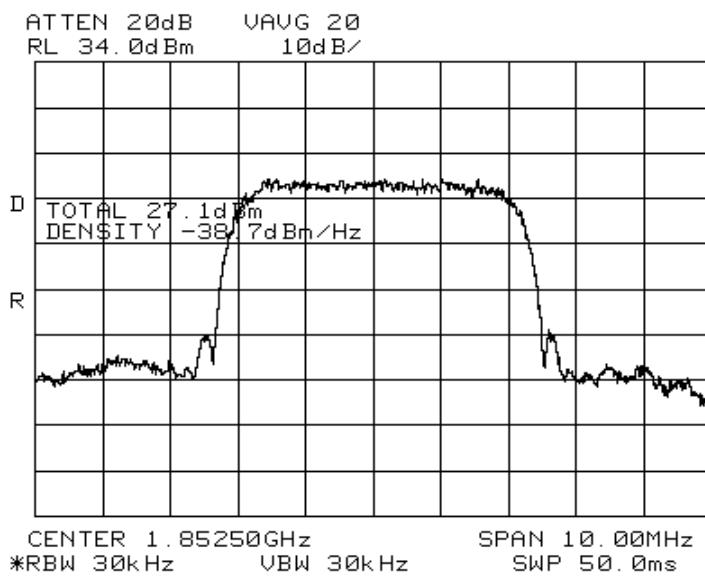
EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
Contact:	Moataz	Proj Eng:	David Bare
Spec:	Part 24 Subpart E	Class:	N/A

Output Plot



Input Plot



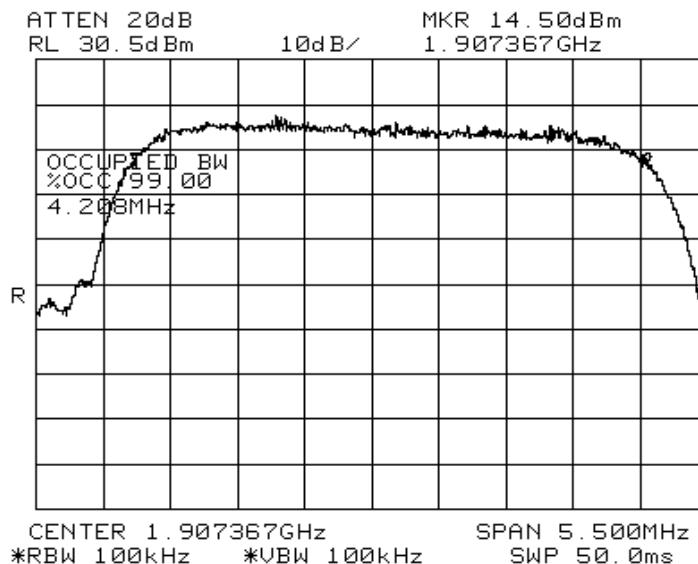


EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run #2: Occupied Bandwidth; High Block C

Measured Value	Specified Bandwidth	Resolution	Comments
(MHz)	(MHz)	(kHz)	
4.208	5	100	





EMC Test Data

Client: Soma Networks

Job Number: J46118

Model: BA-100-000

T-Log Number: T46550

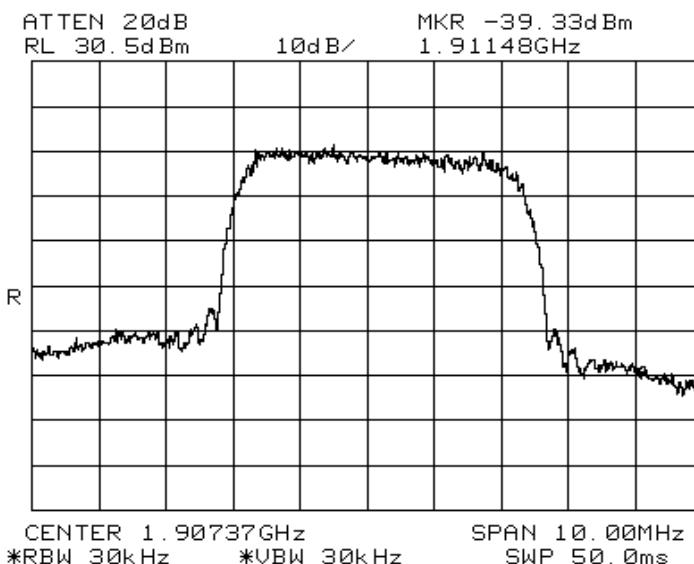
Contact: Moataz

Proj Eng: David Bare

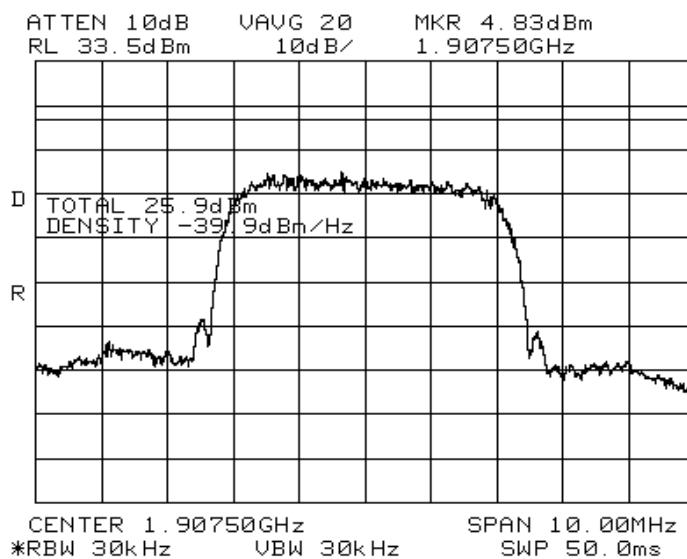
Spec: Part 24 Subpart E

Class: N/A

Output Plot



Input Plot





EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Section 2.1051, RSS-133 (6.3): Spurious emission at the Antenna Terminal

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/3/2002 Config. Used: 1
Test Engineer: jmartinez Config Change: None
Test Location: SVOATS #4 EUT Voltage: 28Vdc

General Test Configuration

The EUT and all local support equipment were located on the table for testing. The Eut was connected directly to Test Receiver. A 20-dB attenuator was used between the EUT and Test Receiver.

Ambient Conditions: Temperature: 15°C
Rel. Humidity: 55%

Summary of Results

Runst #	Test Performed	Limit	Result	Level (dBm)
1	Low Bandedge	24.238(a) & RSS-133 (6.3)	Pass	-17
1	Out-Of-Band	24.238(a) & RSS-133 (6.3)	Pass	< -13 dBm
2	High Bandedge	24.238(a) & RSS-133 (6.3)	Pass	-18.5
2	Out-Of-Band	24.238(a) & RSS-133 (6.3)	Pass	< -13 dBm

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

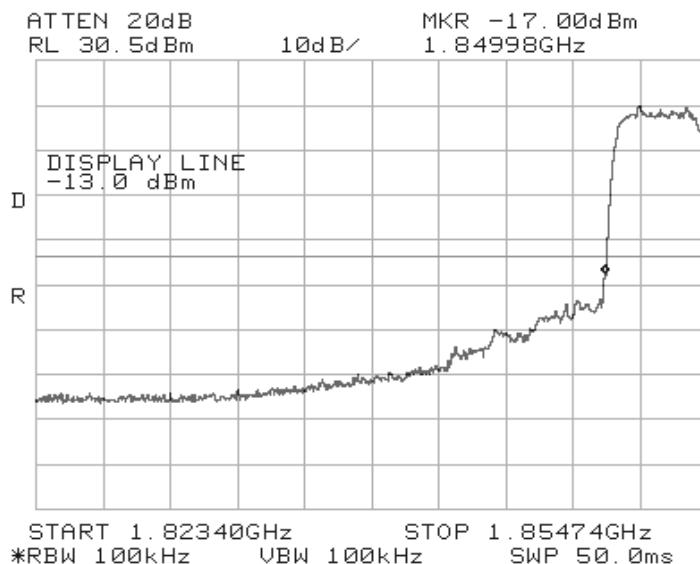
No deviations were made from the requirements of the standard.

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run# 1: Bandedge Measurement and Out-of-Band Measurements. (Block A)

Test is at the Low Channel: 1852.75 MHz

Low Bandedge Plot



Note 1: Power Output was verified with a power meter before taking the Antenna conducted measurements.



EMC Test Data

Client: Soma Networks

Job Number: J46118

Model: BA-100-000

T-Log Number: T46550

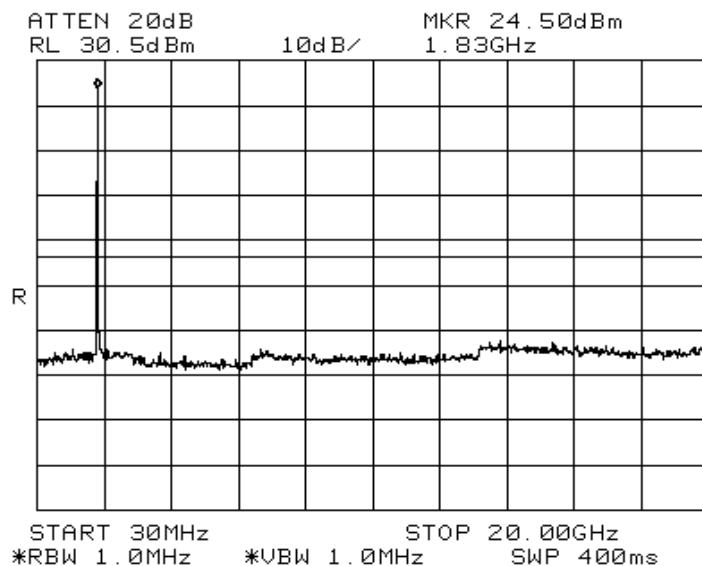
Contact: Moataz

Proj Eng: David Bare

Spec: Part 24 Subpart E

Class: N/A

Out-of-Band Plot

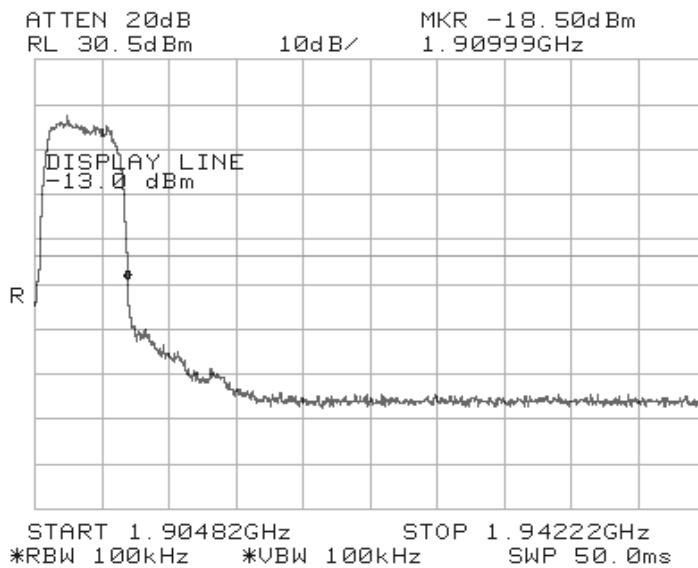


Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run# 2: Bandedge Measurement and Out-of-Band Measurements. (Block C)

Test is at the High Channel: 1902.75 MHz

High Bandedge Plot



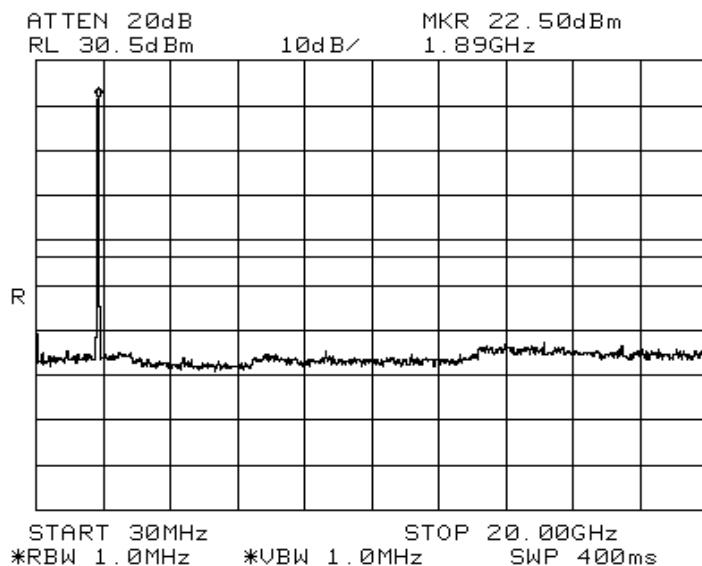
Note 1: Power Output was verified with a power meter before taking the Antenna conducted measurements.



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Out-of-Band Plot





EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Section 2.1053 & RSS-133 (6.3): Field strength of Spurious emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: 4/3/2002

Config. Used: 1

Test Engineer: jmartinez

Config Change: None

Test Location: SVOATS #4

EUT Voltage: 28Vdc

General Test Configuration

The EUT was located on the turntable for radiated emissions testing.

On the OATS, the measurement antenna was located 3m from the EUT for the frequency range 1 - 20 GHz.

For radiated emissions testing the measurement antenna was located 3 meters from the EUT. For any Spurious emission more than 20-dB of the field strength limit, substitution was performed. If the Spurious emissions are 20-dB below the field strength limit, substitution does not have to be performed.

Ambient Conditions:

Temperature: 15°C

Rel. Humidity: 55%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, 1000 - 19000 MHz Maximized Emissions	24.238(a) & RSS-133 (6.3)(a)(ii)	Pass	-26.2dB @ 3705.4 MHz
2	RE, 1000 - 19000 MHz Maximized Emissions	24.238(a) & RSS-133 (6.3)(a)(ii)	Pass	-24.2dB @ 3766 MHz
3	RE, 1000 - 19000 MHz Maximized Emissions	24.238(a) & RSS-133 (6.3)(a)(ii)	Pass	-28.1dB @ 3815 MHz

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run #1: Maximized readings, 1000 - 19000 MHz

Harmonic measurements of the Fundamental Frequency of 1852.7MHz (S/N: 0202-001)

Frequency	Level	Pol	24.238(a)		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power set to Maximum.								
3705.40	56.0	H	82.2	-26.2	Avg	102	1.9	
5558.10	39.9	H	82.2	-42.3	Avg	178	1.7	
7410.80	40.2	H	82.2	-42.0	Avg	86	2.0	
9263.50	53.8	H	82.2	-28.4	Avg	98	1.9	
11116.20		H						Note 1
12968.90		H						Note 1
14821.60		H						Note 1
16674.30		H						Note 1
18527.00		H						Note 1
3705.40	50.5	V	82.2	-31.7	Avg	128	1.2	
5558.10	43.0	V	82.2	-39.2	Avg	131	2.0	
7410.80	46.9	V	82.2	-35.3	Avg	160	2.0	
9263.50	48.3	V	82.2	-34.0	Avg	339	2.4	
11116.20	47.3	V	83.2	-35.9	Avg	142	2.0	Note 1
12968.90		V						Note 1
14821.60		V						Note 1
16674.30		V						Note 1
18527.00		V						Note 1

Note:	Harmonic Measurements were taken with a RBW: 1MHz and VBW: 3MHz with and Average Sweep 100. Modulation is CDMA, a non-constant envelope, so average measurements were taken.
Note 1:	No other emission detected, within 20-dB of the limit.
Note 2:	Substitution was not performed since the measured field strength was 20-dB below the limit.



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run #2: Maximized readings, 1000 - 19000 MHz

Harmonic measurements of the Fundamental Frequency of 1883 MHz

Frequency	Level	Pol	24.238(a)		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power set to Maximum.								
3766.00	58.0	H	82.2	-24.2	Avg	193	1.9	
5649.00	54.7	H	82.2	-27.6	Avg	177	1.6	
7532.00	54.4	H	82.2	-27.9	Avg	87	1.8	
9415.00		H	82.2	-82.2	Avg			
11298.00		H						Note 1
13181.00		H						Note 1
15064.00		H						Note 1
16947.00		H						Note 1
18830.00		H						Note 1
3766.00	55.0	V	82.2	-27.2	Avg	143	1.9	
5649.00	46.2	V	82.2	-36.0	Avg	0	1.9	
7532.00	52.6	V	82.2	-29.6	Avg	140	1.7	
9415.00	51.9	V	82.2	-30.3	Avg	96	1.6	
11298.00		V						Note 1
13181.00		V						Note 1
15064.00		V						Note 1
16947.00		V						Note 1
18830.00		V						Note 1
Note:	Harmonic Measurements were taken with a RBW: 1MHz and VBW: 3MHz with and Average Sweep 100. Modulation is CDMA, a non-constant envelope, so average measurements were taken.							
Note 1:	No other emission detected, within 20-dB of the limit.							
Note 2:	Substitution was not performed since the measured field strength where 20-dB below the limit.							



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Run #3: Maximized readings, 1000 - 19000 MHz

Harmonic measurements of the Fundamental Frequency of 1902.75 MHz

Frequency	Level	Pol	24.238(a)		Detector	Azimuth	Height	Comments
MHz	dB μ V/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
Power set to Maximum.								
3815.00	54.0	H	82.2	-28.2	Avg	168	1.7	
5722.50	35.2	H	82.2	-47.0	Avg	32	1.6	
7630.00		H						Note 1
9537.50		H						Note 1
11445.00		H						Note 1
13352.50		H						Note 1
15260.00		H						Note 1
17167.50		H						Note 1
19075.00		H						Note 1
3815.00	54.1	V	82.2	-28.1	Avg	136	1.9	
5722.50	52.7	V	82.2	-29.6	Avg	14	2.0	
7630.00	57.6	V	82.2	-24.6	Avg	87	1.9	
9537.50	43.1	V	82.2	-39.1	Avg	165	1.9	
11445.00		V						Note 1
13352.50		V						Note 1
15260.00		V						Note 1
17167.50		V						Note 1
19075.00		V						Note 1
Note:	Harmonic Measurements were taken with a RBW: 1MHz and VBW: 3MHz with and Average Sweep 100. Modulation is CDMA, a non-constant envelope, so average measurements were taken.							
Note 1:	No other emission detected, within 20-dB of the limit.							
Note 2:	Substitution was not performed since the measured field strength where 20-dB below the limit.							



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Section 2.1055 & RSS-133 (7): Frequency Stability

Test Specifics

Objective: The objective of this test session is to perform final qualification testing of the EUT with respect to the specification listed above.

Date of Test: Config. Used:
Test Engineer: Config Change:
Test Location: Environmental Chamber EUT Voltage:

General Test Configuration

EUT was placed inside the Temperature Chamber and all local support equipment were located outside on a table for testing. The EUT was connected directly to Test Receiver. An attenuator was used between the EUT and Test Receiver.

Chamber was set to -30 to 50 degrees Celsius (60 degrees Celsius for Canada). Incremented 10 degrees per temperature and let unit stabilize for every temperature.

Voltage stability was done at 20 degrees Celsius. For battery operated units decrease DC voltage until battery end-point was found.

Voltage stability was done at 20 degrees Celsius. For AC operated units varied voltage at 85% and 115% of the nominal AC voltage.

Ambient Conditions: Temperature: N/A
Rel. Humidity: N/A

Summary of Results

Run #	Test Performed	Limit	Result	Comment
1a	Temperature Vs. Frequency	24.235 & RSS-133 (7)		EUT is an amplifier
2a	Voltage Vs. Frequency	24.235 & RSS-133 (7)		EUT is an amplifier

Modifications Made During Testing:

No modifications were made to the EUT during testing

Deviations From The Standard

No deviations were made from the requirements of the standard.



EMC Test Data

Client:	Soma Networks	Job Number:	J46118
Model:	BA-100-000	T-Log Number:	T46550
		Proj Eng:	David Bare
Contact:	Moataz		
Spec:	Part 24 Subpart E	Class:	N/A

Frequency Stability:

Test was not performed since the EUT is an amplifier.

EXHIBIT 3: Photographs of Test Configuration

2 page



Radiated Emission Test Setup Photo# 1



Antenna Conducted Test Setup Photo# 2