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Electromagnetic Emissions Test Report and Application for Grant of Equipment Authorization pursuant to FCC Part 27, Subpart E (Miscellaneous Wireless Communication Services) on the Soma Networks Model: AU-100-130

FCC ID:	POZWAU0403110002
GRANTEE:	Soma Networks 185 Berry Street, Suite 2000 San Francisco, CA. 94107
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	March 21, 2003
FINAL TEST DATE: REVISED:	March 19, 2003 April 14, 2003

AUTHORIZED SIGNATORY:

Juan Martinez
Sr. EMC Engineer

ACCREDITED

DECLARATIONS OF COMPLIANCE

Equipment Name and Model:
AU-100-130

Manufacturer:
Soma Networks
185 Berry Street, Suite 2000
San Francisco, CA. 94107

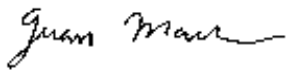
Tested to applicable standards:

FCC Part 27 Subpart C (Miscellaneous Wireless Communications Services)

Measurement Facility Description Filed With Department of Industry:

Departmental Acknowledgement Number: IC2845 **SV4,** Dated July 19, 2001

I declare that the testing was performed or supervised by me; that the test measurements were made in accordance with the above mentioned departmental standards (through the use of ANSI C63.4 as detailed in section 5.3 of RSS-210, Issue 5); and that the equipment performed in accordance with the data submitted in this report.



Signature	_____
Name	Juan Martinez
Title	Sr. EMC Engineer
Company	Elliott Laboratories Inc.
Address	684 W. Maude Ave Sunnyvale, CA 94086 USA
Date:	March 21, 2003

Maintenance of compliance with the above standards is the responsibility of the manufacturer. Any modification of the product, which 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.).

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Soma Networks model AU-100-130 pursuant to Subpart E of Part 27 of FCC Rules for transmitters used for wireless communications services. Conducted and radiated emissions data has been collected, reduced, and analyzed within this report in accordance with measurement guidelines set forth in ANSI C63.4-1992 as outlined in Elliott Laboratories test procedures.

The intentional radiator above has been 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.

The test results recorded herein are based on a single type test of the Soma Networks model AU-100-130 and therefore apply only to the tested sample. The sample was selected and prepared by Dale Kluesing of Soma Networks.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart E of Part 27 of FCC Rules for the radiated and conducted emissions of intentional radiators. Certification of these devices is required as a prerequisite to marketing as defined in Part 2 the FCC Rules.

Certification is a procedure where the manufacturer or a contracted laboratory makes measurements and submits the test data and technical information to the FCC. The FCC issues a grant of equipment authorization 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 which are subsequently manufactured.

FCC CERTIFICATION INFORMATION

The following information is in accordance with FCC Rules, 47CFR Part 2, Subpart J, Section 2.1033(C) & to Industry Canada RSP-100.

2.1033(c)(1) Applicant:

Soma Networks
185 Berry Street, Suite 2000
San Francisco, CA 94107

2.1033(c)(2) & RSP-100 (4)

FCC ID: POZWAU0403110002

2.1033(c)(3) & RSP-100 (7.2(a)) Instructions/Installation Manual

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

2.1033(c)(4) & RSP-100 (7.2(b)(iii)) Type of emissions

W-CDMA: 4M18FXW

2.1033(c)(5) & RSP-100 (7.2(a)) Frequency Range

Transmitter: 2307.5 MHz
Receiver: 2307.5 MHz

2.1033(c)(6) & RSP-100 (7.2(a)) Range of Operation Power

27dBm : .501 watts
–44dBm: .000000039 watts

2.1033(c)(6) & RSP-100 (7.2(a)) Range of Operation Power

Section 27.50 (a)(1): Fixed, land, and radiolocation land stations transmitting are limited to 2000 watts EIRP.

2.1033(c)(8) & RSP-100 (7.2(a)) Applied voltage and currents into the final transistor elements

5.5V @ 120mA

2.1033(c)(9) & RSP-100 (7.2(a)) Tune-up Procedure

The Tune-Up procedure is located in the Theory of Operations. Refer to Exhibit 7: User Manual, Theory of Operation, and Tune-up Procedure.

2.1033(c)(10) & RSP 100 (7.2(a)) Schematic Diagram of the Transmitter

Refer to Exhibit 6. The schematic diagram

2.1033(c)(10) & RSP-100 (7.2(a)) Means for Frequency Stabilization

The AU receives a 16 MHz reference signal from the Soma Port radio, the AU internally phase locks to this signal. The 16MHz signal is used as the reference frequency for the RF LO, which is used for frequency determination and stabilization.

2.1033(c)(10) & RSP-100 (7.2(a)) Means for Suppression of Spurious radiation

Spurious suppression is accomplished by band pass filters after the final up conversion. A harmonic roofing filter is used after the final PA to limit undesired harmonic outputs.

2.1033(c)(10) & RSP-100 (7.2(a)) Means for Limiting Modulation

Refer to Exhibit 8: Schematic Diagrams

2.1033(c)(10) & RSP-100 (7.2(a)) 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) & RSP-100 (7.2(g)) Photographs or Drawing of the Equipment Identification Plate or Label

Refer to Exhibit 4

2.1033(c)(12) & RSP-100 (7.2(c)) Photographs of equipment

Refer to Exhibit 5

2.1033(c)(13) & RSP-100 (7.2(a)) 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 Mbps. 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) & RSP-100 (7.2(b)(ii)) Data taken per Section 2.1046 to 2.1057 and RSS-133 issue 2, Rev. 1.

Refer to Exhibit 2

SUMMARY OF RESULTS

EMISSION TEST RESULTS

SECTION 2.1046: RF POWER OUTPUT

The RF Power Output was tested to Section 27.50 (a)(1)

The following modulations were tested: W-CDMA

Procedure used: **A & B**

Result: 27 dBm (Conducted)
Result: 38.8 dBm EIRP (Radiated)

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

SECTION 2.1047: MODULATION CHARACTERISTICS

Section 2.1047 (d) Other types of equipment.

N/A

SECTION 2.1049: OCCUPIED BANDWIDTH

The Occupied Bandwidth was tested to Section 27.53 (a)(4)

The following modulations were tested: W-CDMA

Procedure used: **D**

Result: 4.18 MHz

Refer to Setup Photo# 3 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 27.53 (a)(1)(3)

The following modulations were tested: W-CDMA

Procedure used: **I & J**

Result: -52dBm @ 370.5 MHz

Refer to Setup Photo# 3 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 FCC 27.53 (a)(3)

Procedure used: **N**

Result: -1.3 dB @ 4615 MHz

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

SECTION 2.1055: FREQUENCY STABILITY

A 16 MHz stability clock is contain on the device

FCC 27.54: "The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block."

The carrier is 4.17 MHz wide centered at these frequencies. The f_c centered at 2307.5 MHz with a bandwidth of 4.17 MHz. This provides a guard band of 5.4 MHz in the 2300 MHz and 12.5 MHz in the 2320 MHz frequency band.

The EUR is a single channel transmitter, so based on the tolerance of the TXCO, there will be a 5.4 MHz low guard band and a 12.5MHz top guard band for the 2307.5 MHz, bandages, the device will maintain its emissions within the WCS bands under normal operating conditions.

MEASUREMENT UNCERTAINTIES

ISO Guide 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level and were calculated in accordance with NAMAS document NIS 81.

Measurement Type	Frequency Range (MHz)	Calculated Uncertainty (dB)
Conducted Emissions	0.15 to 30	± 2.4
Radiated Emissions	30 to 1000	± 3.6

EQUIPMENT UNDER TEST (EUT) DETAILS

GENERAL

The Soma Networks model AU-100-130 is an amplifier with a multi-antenna array that is designed to work with the SomaPort wireless terminal. Normally, the EUT would be mounted on a building or a rooftop during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The EUT receives its power from the SomaPort unit.

The sample was received on March 19, 2003 and tested on March 19, 2003. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number
Soma Networks AU-100-130 Amplifier booster	-

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

No local support equipment was used during emissions testing.

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

Manufacturer	Model	Description	Serial Number	FCC ID
Soma Networks	Soma Port			
IBM	Thinkpad	Laptop	78-AF016	DoC

EXTERNAL I/O CABLING

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

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
RF / PowerDC	SomaPort	Coax	Shielded	10

TEST SOFTWARE

The EUT was operating at full power continuously based on a signal from the SomaPort unit.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on March 19, 2003 at the Elliott Laboratories Open Area Test Site #4 located at 684 West Maude Avenue, Sunnyvale, California. The test site contains separate areas for radiated and conducted emissions testing. Pursuant to section 2.948 of the Rules, construction, calibration, and equipment data has been filed with the Federal Communications Commission. In accordance with Industry Canada rules detailed in RSS 210 Issue 5 and RSS-212, construction, calibration, and equipment data for the test sites have been filed with Industry Canada.

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 used can measure 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 CISPR 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. Average measurements above 1000MHz are performed on the spectrum analyzer using the linear-average method with a resolution bandwidth of 1 MHz and a video bandwidth of 10 Hz.

INSTRUMENT CONTROL COMPUTER

The receivers utilize either a Rohde & Schwarz EZM Spectrum Monitor/Controller or contain an internal Spectrum Monitor/Controller to view and convert the receiver measurements to the field strength at an antenna or voltage developed at the LISN measurement port, which is then compared directly with the appropriate specification limit. This provides faster, more accurate readings by performing the conversions described under Sample Calculations within the Test Procedures section of this report. Results are printed in a graphic and/or tabular format, as appropriate. A personal computer is used to record all measurements made with the receivers.

The Spectrum Monitor provides a visual display of the signal being measured. In addition, the controller or a personal computer run automated data collection programs which control the receivers. This provides added accuracy since all site correction factors, such as cable loss and antenna factors are added automatically.

LINE IMPEDANCE STABILIZATION NETWORK (LISN)

Line conducted measurements utilize a fifty microhenry Line Impedance Stabilization Network as the monitoring point. The LISN used also contains a 250 uH CISPR adapter. This network provides for calibrated radio frequency noise measurements by the design of the internal low pass and high pass filters on the EUT and measurement ports, respectively.

POWER METER

A power meter and **peak** power sensor are used for all direct 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 LISN and the receiver. This eliminates saturation effects and non-linear operation due to high amplitude 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 entire 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.

ANSI C63.4 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 exhibit 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.

For Transmitter with non-detachable antennas field strength measurements are performed. The substitution method is also performed for the appropriate test requirement.

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 use 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 5 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 than 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 transmitters that do use external antennas.

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 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 1 kHz was used to measure the emission's bandwidth.

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 27.5 (a)(3). 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*log (1% RB / 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 27.5 (a)(3). Power is set to maximum
2) Set the spectrum analyzer display line function to –40-dBm.
3) Set the spectrum analyzer bandwidth to 1MHz.
4) For the spectrum analyzer, the start frequency was set to 2290 and the stop frequency set to 2321 MHz. All spurious or intermodulation emission must not exceed the –40-dBm limit.
5) Steps 1 to 3 were repeated for all modulations and output ports that will be used for transmission.

For Section 27.5 (a)(1) the start and stop was set to 2320 to 2345 MHz. Spurious emission within this band must not exceed –50 dBm.

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 pre-liminary 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.

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 $43+10\text{Log}_{10}$(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 V/m * 1,000,000) = 132.14 dBuV/m @ 3 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 dBuV/m – 47.8 dB = 84.3 dBuV/m @ 3 meter.

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

EXHIBIT 1: Test Equipment Calibration Data

1 Page

Radiated Emissions, 1 - 25GHz, 19-Mar-03
Engineer: Chris

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Hewlett Packard	High Pass filter, 3.5GHz	84300-80038	1157	18	3/1/2002	9/1/2003
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	487	12	4/22/2002	4/22/2003
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	12	2/28/2003	2/28/2004
EMCO	Horn antenna, D. Ridge 1-18GHz (SA40 system antenna)	3115	1142	12	4/20/2002	4/20/2003
Rohde & Schwarz	Peak Power Sensor 100uW - 2 Watts	NRV-Z32	1423	12	9/6/2002	9/6/2003
Rohde & Schwarz	Power Meter, Single Channel	NRVS	1422	12	9/6/2002	9/6/2003
Hewlett Packard	Spectrum Analyzer 30Hz - 40 GHz	8564E (84125C)	1148	12	4/2/2002	4/2/2003
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	N/A		
Hewlett Packard	EMC Spectrum Analyzer 9kHz - 6.5GHz	8595E-041-103-140	Rentelco, 818997	12	2/10/2003	2/10/2004

Radiated Emissions, 4916 MHz, 24-Mar-03
Engineer: Chris

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Hewlett Packard	High Pass filter, 3.5GHz	84300-80038	1157	18	3/1/2002	9/1/2003
EMCO	Horn Antenna D. Ridge 1-18 GHz (SA40 horn)	3115	1386	12	3/12/2003	3/12/2004
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	487	12	4/22/2002	4/22/2003
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	N/A		
Hewlett Packard	Spectrum Analyzer 9kHz - 40 GHz	8564E (84125C)	1393	12	3/12/2003	3/12/2004

EXHIBIT 2: Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T50532 11 pages

Elliott

EMC Test Data

Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Emissions Spec:	FCC Part 27, Subpart E	Class:	Radio
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Soma Networks

Model

AU-100-130

Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Emissions Spec:	FCC Part 27, Subpart E	Class:	Radio
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is an amplifier with a multi-antenna array that is designed to work with the SomaPort wireless terminal. Normally, the EUT would be mounted on a building or a rooftop during operation. The EUT was, therefore, treated as table-top equipment during testing to simulate the end user environment. The EUT receives its power from the SomaPort unit.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Soma Networks	ERU	amplifer booster	-	TBD

Other EUT Details

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	-	-	-

Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Emissions Spec:	FCC Part 27, Subpart E	Class:	Radio
Immunity Spec:	-	Environment:	-

Test Configuration #1

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
None				

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Soma Networks	Soma Port	Wireless Terminal	-	POZ-CPE-0140A-000
IBM	Thinkpad	Laptop	78-AF016	DoC

Interface Cabling and Ports

		Cable(s)		
Port	Connected To	Description	Shielded or Unshielded	Length(m)
RF / PowerDC	SomaPort	Coax	Shielded	10

EUT Operation During Emissions

Operating at full power continuously based on a signal from the SomaPort unit.

Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Spec:	FCC Part 27, Subpart E	Class:	Radio

Radiated 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:	3/19/2003	Config. Used:	1
Test Engineer:	Chris Byleckie	Config Change:	None
Test Location:	SVOATS #4	EUT Voltage:	120V/60Hz

General Test Configuration

The EUT and all local support equipment were 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 - 22 GHz.

Ambient Conditions:

Temperature: 18°C

Rel. Humidity: 57%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Final Scan 1000 - 25,000 MHz, EIRP	FCC 27	Pass	-1.3dB @ 4615 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.

Elliott

EMC Test Data

Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Spec:	FCC Part 27, Subpart E	Class:	Radio

Run #1: Radiated Emissions, 1000-22,000 MHz

Frequency	Level	Pol	FCC Part 27		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
4615.00	55.3	h	55.0	0.3	Avg	148	1.0	
6992.50	40.2	h	55.0	-14.8	Avg	283	1.0	
9230.00	40.4	h	55.0	-14.6	Avg	0	1.0	Noise floor
11537.50	41.9	h	55.0	-13.1	Avg	0	1.0	Noise floor
13845.00	45.9	h	55.0	-9.1	Avg	0	1.0	Noise floor
16152.50	44.8	h	55.0	-10.2	Avg	0	1.0	Noise floor
4615.00	62.1	v	55.0	7.1	Avg	41	1.1	
6992.50	40.0	v	55.0	-15.1	Avg	297	1.1	
9230.00	40.2	v	55.0	-14.8	Avg	0	1.0	Noise floor
11537.50	41.7	v	55.0	-13.3	Avg	0	1.0	Noise floor
13845.00	44.5	v	55.0	-10.5	Avg	0	1.0	Noise floor
16152.50	44.5	v	55.0	-10.5	Avg	0	1.0	Noise floor

EIRP measurements

Frequency	Level	Pol	Substitution Note 2					
MHz	dBµV/m	v/h	Pin	Gain	EIRP	Limit	Margin	
			(dBm)	(dBi)	(dBm)	(dBm)	(dB)	
4615.00	55.3	h	-59.3	9.4	-49.9	-40	-9.9	
6992.50	40.2	h	-64.7	9.9	-54.8	-40	-14.8	
9230.00	40.4	h	-65.0	9.8	-55.2	-40	-15.2	
11537.50	41.9	h	-64.4	11.0	-53.4	-40	-13.4	
13845.00	45.9	v	-61.5	12.9	-48.6	-40	-8.6	
4615.00	62.1	v	-50.7	9.4	-41.3	-40	-1.3	
6992.50	40.0	v	-64.8	9.9	-54.9	-40	-14.9	
9230.00	40.2	v	-65.9	9.8	-56.1	-40	-16.1	
11537.50	41.7	v	-63.5	11.0	-52.5	-40	-12.5	
13845.00	44.5	v	-60.5	12.9	-47.6	-40	-7.6	

Note 1: The limit was derived from 70+10log(P) from FCC part 27.53(a)(3). The output power used for the calculation was .501W or 27 dBm.

Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Spec:	FCC Part 27, Subpart E	Class:	Radio

Antenna Conducted 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: 3/19/2003
Test Engineer: Chris Byleckie
Test Location: SVOATS #4

Config. Used: 1
Config Change: None
EUT Voltage: 120V/60Hz

General Test Configuration

The EUT and all local support equipment were located on the turntable for radiated emissions testing.

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 manufactures 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 27.53 (a)(4).
Because the EUT is an amplifer, 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: 18°C
Rel. Humidity: 57%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Power Output (Radiated Measurement)	FCC 27	Pass	See table below
2	Power Output (Subsitution Method)	FCC 27	Pass	See table below
3	Power Output (Peak Power Meter)	FCC 27	Pass	See table below
4	Occupied Bandwidth	FCC 27	Pass	See plots below
5	Emission Mask	FCC 27	Pass	See plots below
6	Antenna Conducted	FCC 27	Pass	See plots below

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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.

Run #1: Radiated Output Power (EIRP)

Channel	Frequency (MHz)	Measured Value (dBuV)	Antenna Pol. (H/V)	Res BW
Middle	2307.5	135.1	V	5 MHz

Run #2: Output Power (Substitution Method)

			Substitution Note 1				Comments
Frequency	Level	Pol	Pin	Gain	EIRP		
MHz	dBµV	v/h	(dBm)	(dBi)	(dBm)		
2307.50	135.1	v	30.8	8.0	38.8		

Run #3: Output Power (Peak Power Meter)

Channel	Frequency (MHz)	Peak Power (dBm)	Antenna Gain	EIRP
Middle	2307.5	27.0	10	37.0

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Model:	AU-100-130	T-Log Number:	T450532
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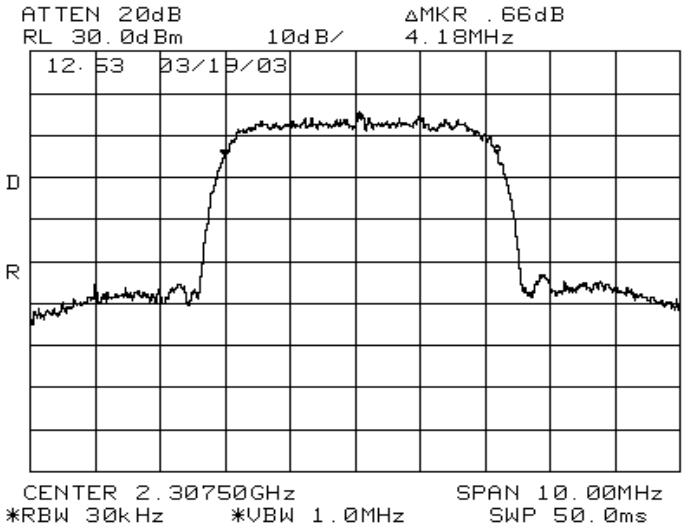
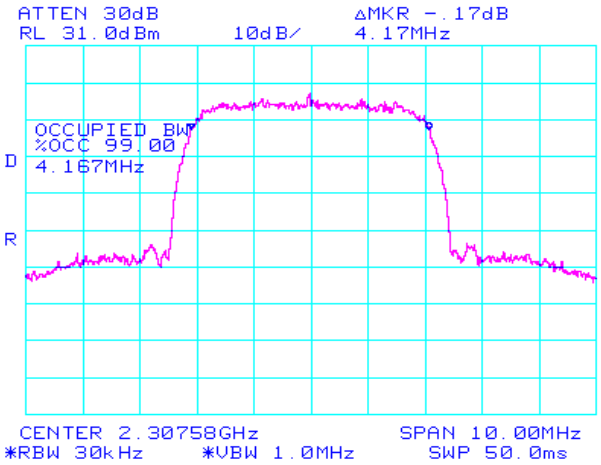
Spec:	FCC Part 27, Subpart E	Class:	Radio

Run #4: Occupied Bandwidth

Input Plot

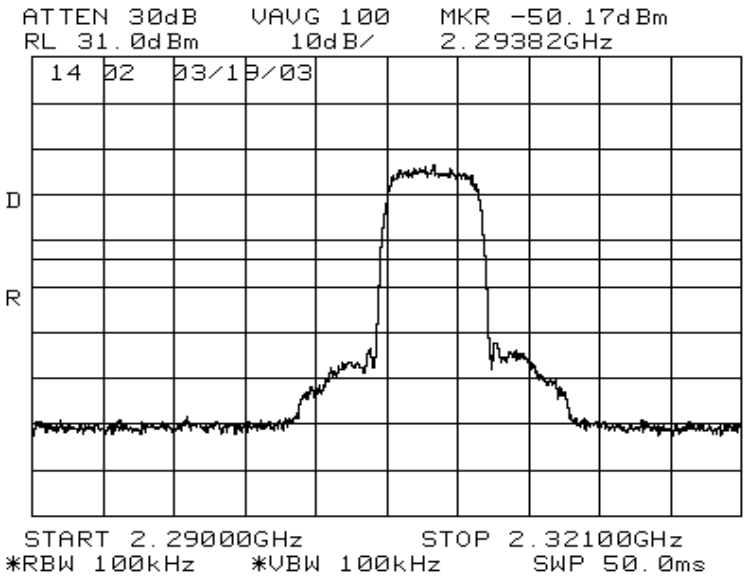


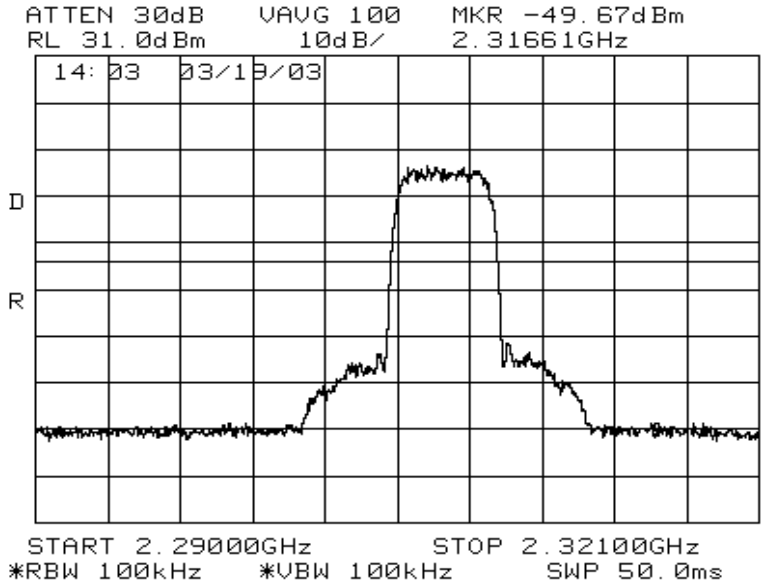
Output Plot



Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Spec:	FCC Part 27, Subpart E	Class:	Radio

Run #5: Emission Mask (Bandedge Measurement)





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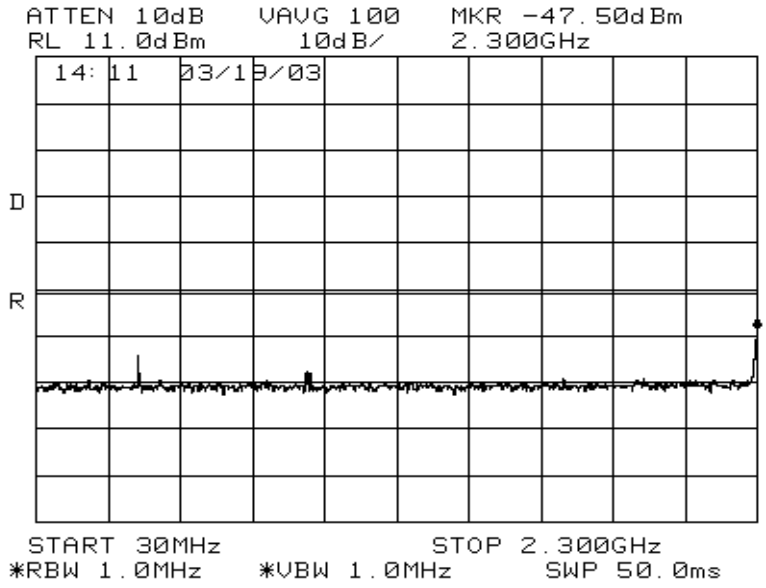
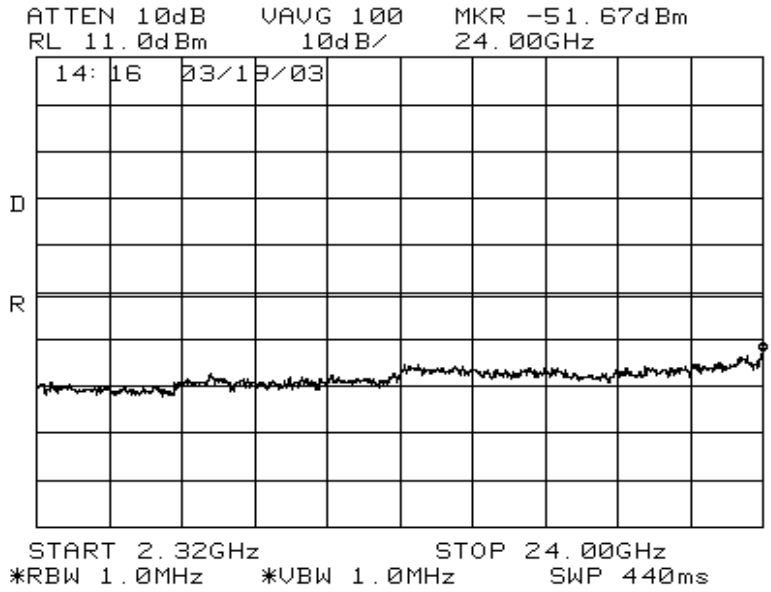
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Spec:	FCC Part 27, Subpart E	Class:	Radio

Run #6: Spurious Emission at the antenna terminal (Antenna conducted Emissions)





Client:	Soma Networks	Job Number:	J450521
Model:	AU-100-130	T-Log Number:	T450532
		Proj Eng:	Juan Martinez
Contact:	Dale Kluesing		
Spec:	FCC Part 27, Subpart E	Class:	Radio