

*Electromagnetic Emissions Test Report  
In Accordance With  
FCC Part 27  
on the  
Soma Networks  
Model: WCS SomaPort 2*

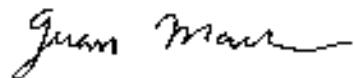
FCC ID: POZSPW0402420004

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

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

REPORT DATE: November 27, 2002

FINAL TEST DATE: November 22, 2002



AUTHORIZED SIGNATORY:

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Juan Martinez  
Sr. EMC Engineer



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## **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: POZSPW0402420004

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

Refer to Exhibit 7: User Manual, Theory of Operation, and Tune-up Procedure.

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

W-CDMA: 4M17FXW

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

Transmitter: 2306 MHz  
Receiver: 2306 MHz

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

Maximum 27 dBm  
Minimum -43 dBm

### **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**

5V@330mA

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

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**

16 MHz TXCO (Location Y1)

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

Bandpass filter to attenuate any spurious components (F6 location)

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

Modulation is controlled by U2 chip (MAX2362ECM)

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

Refer to Exhibit 7: Theory of Operation.

**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 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) & 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

## SCOPE

FCC Part 27 Subpart D 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 was also used as a test procedure guideline to perform 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 Rules part 27 Subpart D. Certification of these devices is required as a prerequisite to marketing as defined in Section 2.1033 & RSP-100.

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 27.50 (a)(1)

The following modulations were tested: W-CDMA

Procedure used: **A & B**

Result: 29.4 dBm (Conducted)

Result: 31.7 dBm EIRP (Radiated)

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 (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: 4.17 MHz

Refer to Setup Photo# 1 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: -53.48dBm @ 2.32 GHz

Result: -47.33dBm @ 999 MHz

Refer to Setup Photo# 1 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: -0.8 dB @ 6922 MHz

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

**SECTION 2.1055: FREQUENCY STABILITY**

The Repeater contains a 16 MHz stability clock

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 2306 MHz with a bandwidth of 4.17 MHz. This provides a guard band of 4.0MHz in the 2300 MHz - 2320 MHz frequency band.

Is a single channel transmitter, so based on the tolerance of the TXCO and the, bottom and top, 40 MHz guard band for the 2306 MHz, bandages, the device will maintain its emissions within the WCS bands under normal operating conditions.

**TEST SITE****GENERAL INFORMATION**

Final test measurements were taken on November 21, 2002 at the Elliott Laboratories Open Area Test Site # 3 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.

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**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 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 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 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 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 than the calculate 1% is used, for the Bandedge measurement, then the following formula is to be used to correct the measured value  $(10 \log (1\% \text{ RB} / \text{RB used}))$ .
- 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 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 (dB<sub>UV</sub>/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 dB<sub>UV</sub>/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  $43 + 10\log_{10}$  (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

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

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

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:

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

**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, 1000 - 25,000 MHz, 24-Nov-02****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	12	3/2/2002	3/2/2003
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	868	12	3/11/2002	3/11/2003
Hewlett Packard	High Pass filter, 3.5GHz	P/N 84300-80038	1157	12	3/1/2002	3/1/2003
Hewlett Packard	Microwave Preamplifier, 1-26.5GHz	8449B	263	12	8/14/2002	8/14/2003
Hewlett Packard	Spectrum Analyzer, 26GHz	8563E	F1202LB	12	9/27/2002	9/27/2003

**Substitution Method, 24-Nov-02****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
EMCO	Horn Antenna, D. Ridge 1-18GHz	3115	786	12	3/2/2002	3/2/2003
Hewlett Packard	Signal Generator (sweep) 0.01 - 26.5 GHz	8340A	1244	N/A		

**Peak Power Measurement, 19-Dec-02****Engineer: jmartinez**

<u>Manufacturer</u>	<u>Description</u>	<u>Model #</u>	<u>Assett #</u>	<u>Cal interval</u>	<u>Last Calibrated</u>	<u>Cal Due</u>
Rohde & Schwarz	Power Meter	NRVS	1422	12	9/6/2002	9/6/2003
Rohde & Schwarz	Power Sensor 100uW - 2 Watts	NRV-Z32	1423	12	9/6/2002	9/6/2003

***EXHIBIT 2: Test Measurement Data***

The following data includes conducted and radiated emission measurements of the Soma Networks., model: WCS SomaPort 2.

11 Pages



## ***EMC Test Data***

Client: Soma Networks	Job Number: J49138
Model: WCS SP 2 (Rev. D)	T-Log Number: T49364
	Proj Eng: Juan Martinez
Contact: Moataz Drebika	
Emissions Spec: FCC 27	Class:
Immunity Spec:	Environment:

## **EMC Test Data**

For The

### **Soma Networks**

Model

**WCS SP 2 (Rev. D)**



## EMC Test Data

Client: Soma Networks	Job Number: J49138
Model: WCS SP 2 (Rev. D)	T-Log Number: T49364
	Proj Eng: Juan Martinez
Contact: Moataz Drebika	
Emissions Spec: FCC 27	Class:
Immunity Spec: Enter immunity spec on cover	Environment:

## EUT INFORMATION

### General Description

The EUT is a wireless terminal which is designed to provide wireless network access in a residence. 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 120/240 V, 50/60 Hz, 2Amps.

### Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Soma Networks	WCS SP2	Wireless Terminal	402420004	TBD

### Other EUT Details

### EUT Enclosure

The EUT enclosure is primarily constructed of fabricated sheet steel. It measures approximately 12 cm wide by 22 cm deep by 28 cm high.

### Modification History

Mod. #	Test	Date	Modification
1			
2			
3			



## EMC Test Data

Client: Soma Networks	Job Number: J49138
Model: WCS SP 2 (Rev. D)	T-Log Number: T49364
	Proj Eng: Juan Martinez
Contact: Moataz Drebika	
Emissions Spec: FCC 27	Class:
Immunity Spec: Enter immunity spec on cover	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
None				

#### Interface Cabling and Ports

Port	Connected To	Cable(s)		
		Description	Shielded or Unshielded	Length(m)
DC	AC outlet	2 wire	Unshielded	2

Note: The USB, J11, and J45 ports were not connected since they're not required during the Radio test portion.

#### EUT Operation During Emissions

Operating at Full power continuously.



## *EMC Test Data*

Client:	Soma Networks	Job Number:	J49138
Model:	WCS SP 2 (Rev. D)	T-Log Number:	T49364
		Proj Eng:	Juan Martinez
Contact:	Moataz Drebika		
Spec:	FCC 27	Class:	Enter on cover sheet

## Radiated Emissions

## Test Specifics

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

Date of Test: 11/14/2002  
Test Engineer: jmartinez  
Test Location: SVOATS #3

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.

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, Preliminary Scan 1000 - 25,000 MHz	FCC 27	Eval	Refer to individual runs

### 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:	J49138
Model:	WCS SP 2 (Rev. D)	T-Log Number:	T49364
		Proj Eng:	Juan Martinez
Contact:	Moataz Drebika		
Spec:	FCC 27	Class:	Enter on cover sheet

### Run #1: Radiated Emissions, 1000-22,000 MHz (11/21/02)

#### EIRP and ERP measurements

Frequency	Level	Pol	Substitution <small>Note 2</small>				
			Pin	Gain	EIRP	Limit	Margin
MHz	dB $\mu$ V/m	v/h	(dBm)	(dBi)	(dBm)	(dBm)	(dB)
4615.000	54.3	v	-56.6	8.7	-47.9	-40	-7.9
6922.000	62.1	v	-50.7	9.9	-40.8	-40	-0.8
9230.000	45.2	v	-61.7	13.4	-48.2	-40	-8.2
11,538	42.6	v	-65.0	12.6	-52.4	-40	-12.4
4615.000	49.0	h	-60.1	8.7	-51.4	-40	-11.4
6922.000	55.3	h	-53.7	9.9	-43.8	-40	-3.8
9230.000	44.2	h	-60.2	13.4	-46.8	-40	-6.8
11,538	45.9	h	-64.2	12.6	-51.6	-40	-11.6

Note 1:



## *EMC Test Data*

Client:	Soma Networks	Job Number:	J49138
Model:	WCS SP 2 (Rev. D)	T-Log Number:	T49364
		Proj Eng:	Juan Martinez
Contact:	Moataz Drebika		
Spec:	FCC 27	Class:	Enter on cover sheet

## Radiated Emissions

## Test Specifics

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

Date of Test: 11/21/2002 Config. Used: 1  
Test Engineer: jmartinez Config Change: None  
Test Location: SVOATS #3 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	Power Output (Radiated Measurement)	FCC 27	Eval	Refer to individual runs
2	Power Output (Subsitution Method)	FCC 27	Eval	Refer to individual runs
3	Power Output (Peak Power Meter)	FCC 27	Eval	Refer to individual runs
4	Occupied Bandwidth	FCC 27	Eval	Refer to individual runs
5	Emission Mask	FCC 27	Eval	Refer to individual runs
6	Antenna Conducted	FCC 27	Eval	Refer to individual runs

## 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:	J49138
Model:	WCS SP 2 (Rev. D)	T-Log Number:	T49364
Contact:	Moataz Drebika	Proj Eng:	Juan Martinez
Spec:	FCC 27	Class:	Enter on cover sheet

### Run #1: Radiated Output Power (EIRP)

Channel	Frequency (MHz)	Measured Value (dBuV)	Antenna Pol. (H/V)	Res BW
Middle	2306.0	101.4	V	5 MHz

### Run #2: Output Power (Substitution Method)

Frequency	Level	Pol	Substitution <sup>Note 1</sup>			Comments
			Pin	Gain	EIRP	
MHz	dB $\mu$ V	v/h	(dBm)	(dBi)	(dBm)	
2306.00	101.4	v	19.7	7.6	31.7	

### Run #3: Output Power (Peak Power Meter)

Channel	Frequency (MHz)	Peak Power (dBm)	Antenna Gain	
Middle	2306.0	29.4	3	



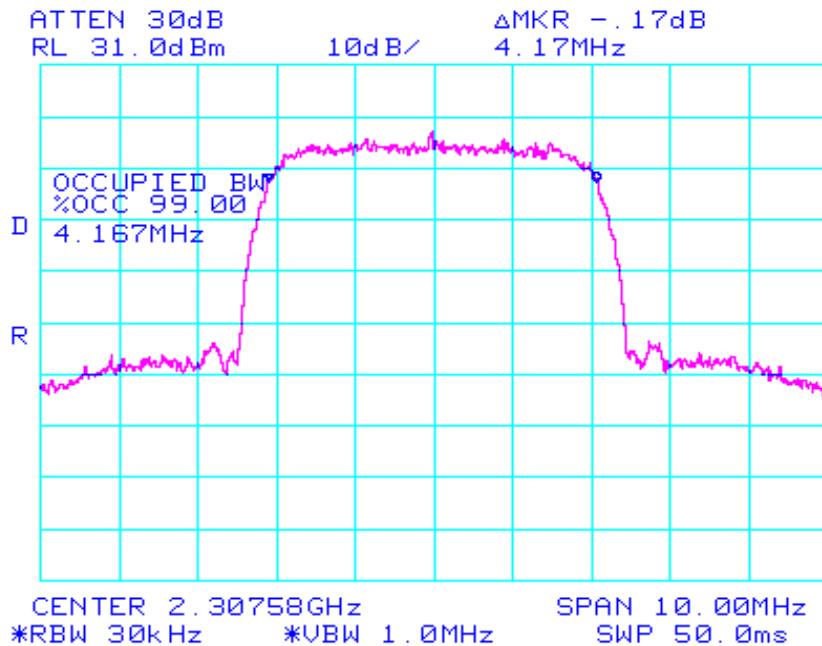
## EMC Test Data

Client: Soma Networks  
Model: WCS SP 2 (Rev. D)  
Contact: Moataz Drebika  
Spec: FCC 27

Job Number: J49138  
T-Log Number: T49364  
Proj Eng: Juan Martinez

Class: Enter on cover sheet

### Run #4: Occupied Bandwidth





## EMC Test Data

Client: Soma Networks

Job Number: J49138

Model: WCS SP 2 (Rev. D)

T-Log Number: T49364

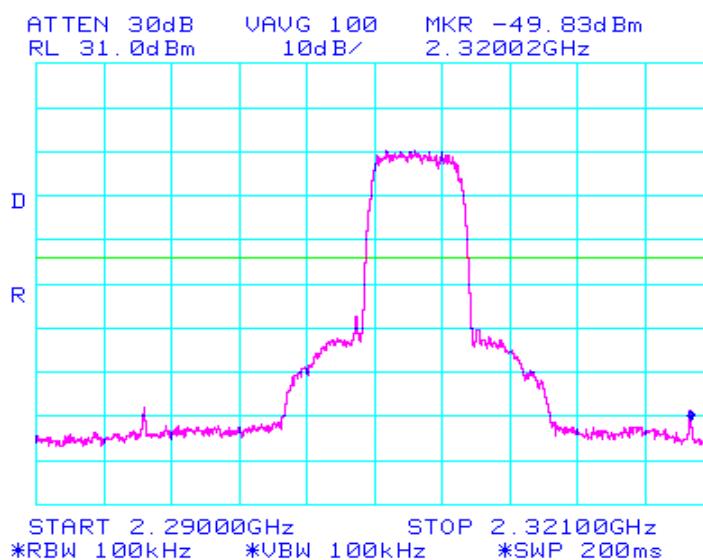
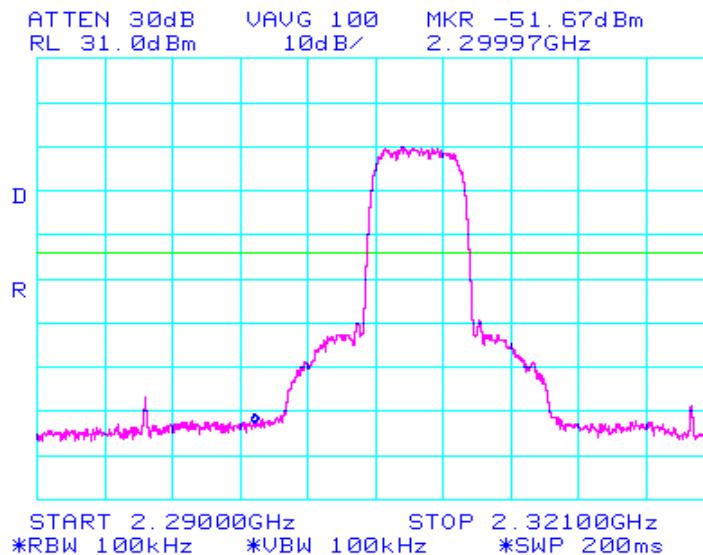
Proj Eng: Juan Martinez

Contact: Moataz Drebika

Spec: FCC 27

Class: Enter on cover sheet

### Run #5: Emission Mask (Bandedge Measurement)

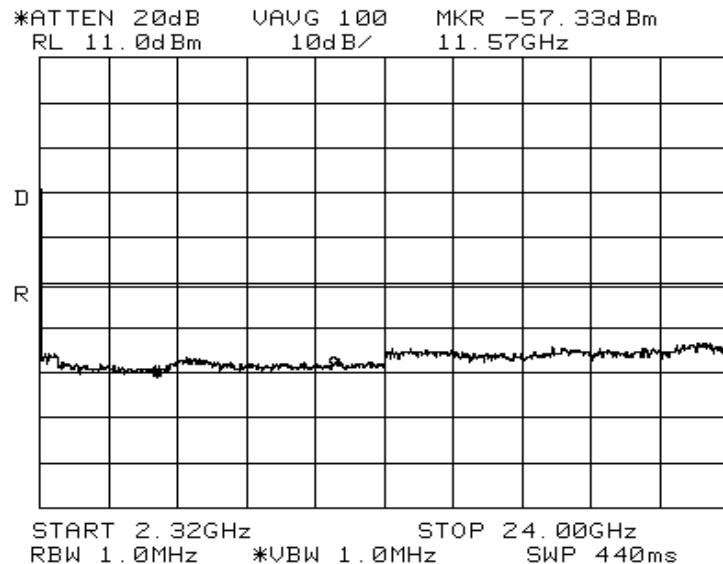
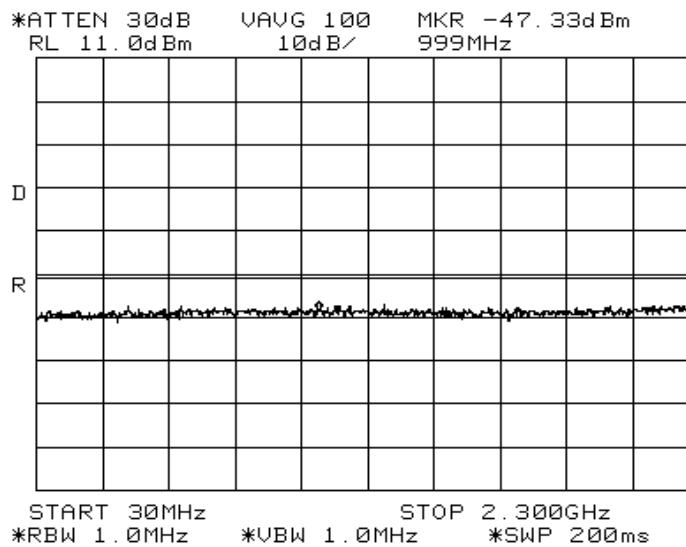




## EMC Test Data

Client: Soma Networks	Job Number: J49138
Model: WCS SP 2 (Rev. D)	T-Log Number: T49364
	Proj Eng: Juan Martinez
Contact: Moataz Drebika	
Spec: FCC 27	Class: Enter on cover sheet

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





## EMC Test Data

Client: Soma Networks	Job Number: J49138
Model: WCS SP 2 (Rev. D)	T-Log Number: T49364
	Proj Eng: Juan Martinez
Contact: Moataz Drebika	
Spec: FCC 27	Class: Enter on cover sheet

