Elliott Laboratories Inc.
www.elliottlabs.com
684 West Maude Avenue
Sunnyvale, CA 94086-3518
408-245-7800 Phone
408-245-3499 Fax

June 21,2000

Chief, Equipment Authorization Branch,
Authorization and Evaluation Division,
Office of Engineering and Technology
FEDERAL COMMUNICATIONS COMMISSION
P.O. Box 358315
Pittsburgh, PA 15251-5315

Gentlemen:

The enclosed documents constitute a formal submittal and application for a Grant of Equipment Authorization pursuant to Subpart E of Part 24 of FCC Rules (CFR 47) regarding broadband PCS. Data within this report demonstrates that the equipment tested complies with the FCC limits for broadband PCS devices.

Elliott Laboratories, as duly authorized agent prepared this submittal. A copy of the letter of our appointment as agent is enclosed.

If there are any questions or if further information is needed, please contact Elliott Laboratories for assistance.

Sincerely,

David W. Bare
Principal Engineer

DWB/bab
Enclosures: Agent Authorization Letter
Emissions Test Report with Exhibits

File: R38114

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 and Application for Grant of Equipment Authorization pursuant to FCC Part 24, Subpart E Specifications for a Broadband PCS Device on the Cisco Systems, Inc. Model: VP1900BX

FCC ID:	LDKVP1900XX
GRANTEE:	Cisco Systems, Inc. 170 West Tasman Drive San Jose, CA. 95134-1706
TEST SITE:	Elliott Laboratories, Inc. 684 W. Maude Avenue Sunnyvale, CA 94086
REPORT DATE:	June 21,2000
FINAL TEST DATE:	June 16, 2000

AUTHORIZED SIGNATORY: _____

David W. Bare
Principal Engineer

TABLE OF CONTENTS

SCOPE

An electromagnetic emissions test has been performed on the Cisco Systems, Inc. model VP1900BX pursuant to Subpart E of Part 24 of FCC Rules for broadband PCS. 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 insofar as they apply as outlined in Elliott Laboratories test procedures.

The broadband PCS device 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 Cisco Systems, Inc. model VP1900BX and therefore apply only to the tested sample. The sample was selected and prepared by Semyon Grozman of Cisco Systems, Inc.

OBJECTIVE

The primary objective of the manufacturer is compliance with Subpart E of Part 24 of FCC Rules for the radiated and conducted emissions of broadband PCS devices. 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.

STATEMENT OF COMPLIANCE

The tested sample of Cisco Systems, Inc. model VP1900BX complied with the requirements of Subpart E of Part 24 of the FCC Rules for low power broadband PCS.

Maintenance of FCC compliance 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.).

EMISSION TEST RESULTS

The following emissions tests were performed on the Cisco Systems, Inc. model VP1900BX. The actual test results are contained in an exhibit of this report.

LIMITS OF POWER AND BANDWIDTH

The EUT tested complied with the limits detailed in FCC Rules Part 24 Sections 24.229 and 24.232

The maximum power output was 0.219 watts on channel 810. The 99% power bandwidth was 236 kilohertz with the normal GSMK modulation. The actual test data and any correction factors are contained in an exhibit of this report.

LIMITS OF RADIATED SPURIOUS EMISSIONS

The EUT tested complied with the limits detailed in FCC Rules Part 24 Section 24.238.

The following measurement was extracted from the data recorded during the radiated electric field emissions scan and represents the highest amplitude equivalent radiated power relative to the specification limit. The actual test data and any correction factors are contained in an exhibit of this report.

Frequency MHz	Level dBm	Pol v/h	FCC 24.238 Limit	FCC 24.238 Margin	Detector Pk/QP/Avg	Comments
7959.200	-21.1	v	-12.4	-8.7	Pk	

LIMITS OF FREQUENCY TOLERANCE

The EUT tested complied with the limits detailed in FCC Rules Part 24 Section 24.235.

The frequency of the transmitter varied by less than 0.00004 % over the temperature range of –30 to +50 degrees Celsius. The frequency varied by less than 0.00005 % over the mains voltage range of 85 to 138 volts. The actual test data and any correction factors are contained in an exhibit of this report.

MEASUREMENT UNCERTAINTIES

ISO Guide 25 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)
Radiated Emissions	30 to 1000	± 3.2

EQUIPMENT UNDER TEST (EUT) DETAILS

The Cisco Systems, Inc. is a 1900 MHz dual transceiver designed to send packet data over the link. The sample was received on June 7, 2000 and tested through June 16, 2000. The EUT consisted of the following component(s):

Manufacturer/Model/Description	Serial Number
Cisco Systems, VP1900BX, Transceiver	168
Cincon Electronics, TR70A12, Power supply	A-70-0000122

ENCLOSURE

The EUT enclosure is primarily constructed of fabricated sheet steel.

SUPPORT EQUIPMENT

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

Manufacturer/Model/Description	Serial Number	FCC ID Number
Toshiba, Tecra 8100, laptop	40552164U	DoC

EXTERNAL I/O CABLING

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

Cable Description	Length (m)	From Unit/Port	To Unit/Port
Unshielded	30	EUT Ethernet	Laptop ethernet

TEST SOFTWARE

The EUT was configured using the ethernet port for continuous transmission of GSMK modulated data. A Rhode & Schwarz CMD 57 was connected to the transmitter during setup only to verify transmission parameters.

TEST SITE

GENERAL INFORMATION

Final test measurements were taken on June 16, 2000 at the Elliott Laboratories Open Area Test Site #3 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 Commission.

The FCC recommends that ambient noise at the test site be at least 6 dB below the allowable limits. Ambient levels are below this requirement with the exception of predictable local TV, radio, and mobile communications traffic. The test site contains separate areas for radiated and conducted emissions testing. Considerable engineering effort has been expended to ensure that the facilities conform to all pertinent FCC requirements.

CONDUCTED EMISSIONS CONSIDERATIONS

Conducted emissions testing is performed in conformance with ANSI C63.4-1992. Measurements are made with the EUT connected to the public power network through a nominal, standardized RF impedance, which is provided by a line impedance stabilization network, known as a LISN. A LISN is inserted in series with each current-carrying conductor in the EUT power cord.

RADIATED EMISSIONS CONSIDERATIONS

The FCC has determined that radiation measurements made in a shielded enclosure are not suitable for determining levels of radiated emissions. Radiated measurements are performed in an open field environment. The test site is maintained free of conductive objects within the CISPR defined elliptical area incorporated in ANSI C63.4 guidelines.

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 and 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.

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

EUT AND CABLE PLACEMENT

The FCC requires that interconnecting cables be connected to the available ports of the unit and that the placement of the unit and the attached cables simulate the worst case orientation that can be expected from a typical installation, so far as practicable. To this end, the position of the unit and associated cabling is varied within the guidelines of ANSI C63.4, and the worst case orientation is used for final measurements.

RADIATED EMISSIONS

Radiated emissions measurements are performed in two phases. A preliminary scan of emissions is conducted in which all significant EUT frequencies are identified with the system in a nominal configuration. At least two scans are performed from the lowest frequency generated in the device up to the frequency required by the regulation specified on page 1. 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.

A speaker is provided in the receiver to aid in discriminating between EUT and ambient emissions. Other methods used during the preliminary scan for EUT emissions involve scanning with near field magnetic loops, monitoring I/O cables with RF current clamps, and cycling power to the EUT.

Final maximization is a phase in which the highest amplitude emissions identified in the spectral search are viewed while the EUT azimuth angle is varied from 0 to 360 degrees relative to the receiving antenna. The azimuth that results in the highest emission is then maintained while varying the antenna height from one to four meters. The result is the identification of the highest amplitude for each of the highest peaks. Each recorded level is corrected in the receiver using appropriate factors for cables, connectors, antennas, and preamplifier gain. Emissions that have values close to the specification limit may also be measured with a tuned dipole antenna to determine compliance.

The recorded level is then reproduced using a signal generator and antenna located where the device was on the test table. The power necessary to reproduce the amplitude of the measured emissions from the device was recorded. The effective radiated power (ERP) is then calculated based on the signal generator level and the gain of the substitution antenna relative to a dipole antenna.

CONDUCTED EMISSIONS FROM ANTENNA PORT

Direct measurements are performed with the antenna port of the EUT connected to either the power meter or spectrum analyzer via a suitable attenuator and/or filter. These are used to ensure that the front end of the measurement instrument is not overloaded by the fundamental transmission.

SPECIFICATION LIMITS AND SAMPLE CALCULATIONS

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, or dB milliwatts (dBm). For radiated emissions, the measured data is obtained by the substitution method. The field strength of the emissions from the EUT are measured on a test site with a receiver. A signal generator and antenna are then substituted for the EUT. The output of the signal generator is adjusted to a level such that the same field strength as was measured from the EUT is observed. The power level is corrected by the difference between the gain of the antenna and the gain of a dipole antenna. This level is recorded as the equivalent radiated power (ERP) of the EUT.

RADIATED EMISSIONS SPECIFICATION LIMITS, SECTION 24.238)

Frequency Range (MHz)	Limit
Operating frequency	2 watts
Outside of the assigned frequency block	$43+10\log_{10}$ (mean output power in watts) dB below the measured amplitude at the operating frequency

EXHIBIT 1:Test Equipment Calibration Data

Conducted and Radiated Emissions, 16-Jun-00 05:38 PM
Engineer: Vishal

Manufacturer	Description	Model #	Assett #	Cal interval	Last Calibrated	Cal Due
Elliott Laboratories	300-1000 MHz Log Periodic Antenna	EL300.1000	55	11	11/03/1999	10/03/2000
Elliott Laboratories	Biconical Antenna, 30-300 MHz	EL30.300	54	12	12/21/1999	12/21/2000
Fischer Custom Comm.	LISN, 50A	FCC-LISN-50/250-50-2	810	12	02/28/2000	02/28/2001
Rohde& Schwarz	Pulse Limiter	ESH3 Z2	812	12	12/06/1999	12/06/2000
Rohde & Schwarz	Test Receiver, 0.009-30 MHz	ESH3	215, (F197)	12	02/17/2000	02/17/2001
Rohde & Schwarz	Test Receiver, 20-1300MHz	ESVP	273	12	09/09/1999	09/09/2000

EXHIBIT 2:Test Data Log Sheets

ELECTROMAGNETIC EMISSIONS

TEST LOG SHEETS

AND

MEASUREMENT DATA

T 37895 18 Pages

Elliott

EMC Test Data

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Emissions Spec:	FCC Part 24 E	Class:	-
Immunity Spec:	-	Environment:	-

EMC Test Data

For The

Cisco Systems

Model

VP1900BX

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX and VP1800BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Emissions Spec:	FCC Part 24 E	Class:	-
Immunity Spec:	-	Environment:	-

EUT INFORMATION

General Description

The EUT is a 1900 MHz dual transceiver which is designed to send packet data over the link. It employs GSMK modulation. Normally, the EUT would be placed on a table top during operation. The EUT was, therefore, placed in this position during emissions testing to simulate the end user environment.

Equipment Under Test

Manufacturer	Model	Description	Serial Number	FCC ID
Cisco Systems	VP1900BX	Transceiver	168	-
Cisco Systems	VP1800BX	Transceiver	170	-
Cincon Electronics	TR70A12	Power supply input 100 ~240 V 1.5A 50/50Hz output 12VDC	A-70-0000122	-

Other EUT Details

EUT Enclosure

The EUT enclosure is primarily constructed of fabricated sheet steel.

Modification History

Mod. #	Test	Date	Modificaiton
1			
2			
3			

Elliott

EMC Test Data

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Emissions Spec:	FCC Part 24 E	Class:	-
Immunity Spec:	-	Environment:	-

Test Configuration Information (1)

Local Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID

Remote Support Equipment

Manufacturer	Model	Description	Serial Number	FCC ID
Toshiba	Tecra 8100	Laptop	40552164U	DoC

EUT Interface Ports

		Cable(s)		
EUT Port	Connected To	Description	Shielded or Unshielded	Length(m)
Tx	Load	Direct	-	-
Rx	Load	Direct	-	-
Ethernet	Laptop	Twisted pair	Unshielded	30

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Emissions Spec:	FCC Part 24 E	Class:	-
Immunity Spec:	-	Environment:	-

EUT Operation During Emissions

The EUT was configured using the ethernet port for continuous transmssion of GSMK modulated data. A R&S CMD 57 was connected to the transmitter during setup only.

EUT Operation During Immunity

Performance Criteria for Immunity

Criterion A:

Criterion B:

Criterion C:

Elliott

EMC Test Data

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Spec:	FCC Part 24 E	Class:	N/A

Frequency Stability

Test Specifics

Objective: The objective of this test session is to perform final qualification testing the EUT relative to the specification(s) defined above.

Date of Test: 6.12.00
Test Engineer: David W. Bare
Test Location: Temp. Chamber

Config. Used: 1
Config Change:
EUT Voltage: 120V, 60Hz

General Test Configuration

The EUT and all local support equipment were located in a thermal chamber for frequency stability testing. All remote support equipment was located outside the chamber.

When measuring the stability, a probe was placed near the antenna of the EUT and was connected to the spectrum analyzer.

Ambient Conditions:

Temperature: 21°C
Rel. Humidity: 47%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	Frequency Stability	FCC Part 2.1055	Pass	less than 100 Hz

Modifications Made During Testing: None

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Spec:	FCC Part 24 E	Class:	N/A

Run #1: Frequency Stability

Measured frequency 30 minutes after stabilization at each temperature point.

Temperature (°C)	Freqency (MHz)	Deviation from 20°C
-30	1930.200180	0.000005%
-20	1930.200180	0.000005%
-10	1930.200180	0.000005%
0	1930.200180	0.000005%
10	1930.200800	0.000037%
20	1930.200088	0.000000%
30	1930.200780	0.000036%
40	1930.200780	0.000036%
50	1930.200780	0.000036%

The stabilty was 0.000037% over the range of -30 to +50°C thereby complying with the requirement to remain within the block

At 20°C, the voltage to the EUT was set to 85 volts and 138 volts (85% of 100v and 115% of 120v)
The frequency was measured at 1930.20108 and 1930.20098 MHz or 0.00005% from the frequency at nominal 120v

Temperature (°C)	Freqency (MHz)	Deviation from 20°C
-30	1989.800100	0.000000%
-20	1989.800080	-0.000001%
-10	1989.800080	-0.000001%
0	1989.800180	0.000004%
10	1989.800080	-0.000001%
20	1989.800098	0.000000%
30	1989.800088	-0.000001%
40	1989.800068	-0.000002%
50	1989.800068	-0.000002%

The stabilty was 0.000004% over the range of -30 to +50°C thereby complying with the requirement to remain within the block

At 20°C, the voltage to the EUT was set to 85 volts and 138 volts (85% of 100v and 115% of 120v)
The frequency was measured at 1989.800098 and 1989.800098 MHz or 0% from the frequency at nominal 120v

Elliott

EMC Test Data

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Spec:	FCC Part 24 E	Class:	-

Radiated and Conducted Emissions

Test Specifics

Objective: The objective of this test session is to perform engineering evaluation testing of the EUT relative to the specification(s) defined above. The objective of this test session is to perform final qualification testing the EUT relative to the specification(s) defined above.

Date of Test: 6.7.00
Test Engineer: David W. Bare
Test Location: Chamber #2

Config. Used: 1
Config Change:
EUT Voltage: 120V, 60Hz

General Test Configuration

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

For radiated emissions testing between 1800 and 18900 MHz, the measurement antenna was located at 3 meters distance from the EUT, unless otherwise noted.

Ambient Conditions:

Temperature: 21°C
Rel. Humidity: 72%

Summary of Results

Run #	Test Performed	Limit	Result	Level
1	RE, Preliminary Scan 1900 - 19900 MHz	FCC Part 24 E		-
2	Output Power	FCC Part 24 E	Pass	0.219 W on Ch 810
3	RE, Spurious Emissions	FCC Part 24 E	Pass	-6.5 dB @ 1990.0 MHz
4	99% Power Bandwidth	FCC Part 24 E	Pass	236 kHz

Modifications Made During Testing: None

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Spec:	FCC Part 24 E	Class:	-

Run #1: Preliminary radiated emissions, 1900-19900 MHz
Center frequency 1945.2 MHz and 1968.2 MHz

Frequency	Level	Pol	FCC Part 24		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1945.200	76.2	h	N/A	N/A	Pk	0-360	1.7	Fc
1968.200	78.9	h	N/A	N/A	Pk	0-360	1.7	Fc
3890.400	54.0	h	N/A	N/A	Pk	0-360	1.7	2nd
3936.400	60.2	h	N/A	N/A	Pk	0-360	1.7	2nd
7780.800	56.9	h	N/A	N/A	Pk	0-360	1.7	4th
7872.750	62.6	h	N/A	N/A	Pk	0-360	1.7	4th
9726.000	53.7	h	N/A	N/A	Pk	0-360	1.7	5th
9841.000	50.4	h	N/A	N/A	Pk	0-360	1.7	5th

Note 1:	Only these harmonics were observed

Run #2: Output Power

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Graph reference #
587	1945.2	1 M	22.8	-
702	1968.2	1 M	23.4	-
Spur	1991.2	1M	-26.2	-
512	1930.2	1 M	22.6	T37895 1
810	1989.8	1 M	23.4	T37895 1
512	1930.2	3 kHz	6.9	T37895 5
810	1989.8	3 kHz	4.1	T37895 6

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Spec:	FCC Part 24 E	Class:	-

Run #3: Spurious Emissions (Channels 512 and 810)

Channel	Frequency (MHz)	Res BW	Output Power (dBm)	Limit	Margin
Spur	2049	1 M	-23.9	-13.0	-10.9
Spur	1870.5	1 M	-30.6	-13.0	-17.6
Spur	1930.0	3 kHz	-37.0	-29.5	-7.5
Spur	1990.0	3 kHz	-38.8	-32.3	-6.5
Spur	7900	1 M	-61.1	-13.0	-48.1
Spur	19900	1 M	-50.3	-13.0	-37.3
Spur	3860	1 M	-64.0	-13.0	-51.0
Spur	63	1 M	-39.2	-13.0	-26.2
Spur	2049.4	1 M	-23.9	-13.0	-10.9
Spur	1870.4	1 M	-30.6	-13.0	-17.6

Run #4: Signal Bandwidth

Channel	Frequency (MHz)	Resolution Bandwidth	99% power bandwidth	Graph reference #
512	1930.2	3 kHz	227.5 kHz	T37895 -3
810	1989.8	3 kHz	236.3 kHz	T37895 -4

Emissions Designator 236KX7D

Elliott

EMC Test Data

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Spec:	FCC Part 24 E	Class:	-

Radiated Emissions

Test Specifics

Objective: The objective of this test session is to perform final qualification testing the EUT relative to the specification(s) defined above.

Date of Test: 06/07/2000
Test Engineer: Rafael Varelas
Test Location: SVOATS #3

Config. Used: 1
Config Change:
EUT Voltage: 120V/60Hz

General Test Configuration

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

For radiated emissions testing between 1800 and 9950 MHz, the measurement antenna was located at 3 meters distance from the EUT, unless otherwise noted.

Ambient Conditions:

Temperature: 16°C
Rel. Humidity: 93%

Summary of Results

Run #	Test Performed	Limit	Result	Margin
1	RE, Maximized Emissions, 1900-9950 MHz	FCC Part 24 E		-
2	Signal Substitutions	FCC Part 24 E	Pass	-8.7 dB @ 7959.2 MHz

Modifications Made During Testing: None

Elliott

EMC Test Data

Client:	Cisco Systems	Job Number:	J37867
Model:	VP1900BX	T-Log Number:	T37895
		Proj Eng:	David W. Bare
Contact:	Phillip Carranco		
Spec:	FCC Part 24 E	Class:	-

Run #1: Radiated emissions, 1900-9950 MHz based on prescan in a chamber
Output terminated into load

Frequency	Level	Pol	FCC Part 24		Detector	Azimuth	Height	Comments
MHz	dBµV/m	v/h	Limit	Margin	Pk/QP/Avg	degrees	meters	
1930.200	87.89	v	N/A	N/A	PK	0	1.1	Fc
1989.800	90.50	v	N/A	N/A	PK	80	1.5	Fc
3860.400	74.61	v	N/A	N/A	PK	353	1.1	2nd
3979.600	76.60	v	N/A	N/A	PK	320	1.1	2nd
7720.800	80.09	v	N/A	N/A	PK	0	1.8	4th
7959.200	88.81	v	N/A	N/A	PK	100	1.5	4th
9651.000	81.10	v	N/A	N/A	PK	70	1.4	5th
9949.000	71.15	v	N/A	N/A	PK	350	1.4	5th
1930.200	80.17	h	N/A	N/A	PK	145	1.3	Fc
1989.800	88.27	h	N/A	N/A	PK	15	1.8	Fc
3860.400	66.50	h	N/A	N/A	PK	50	1.8	2nd
3979.600	70.74	h	N/A	N/A	PK	310	1.4	2nd
7720.800	73.44	h	N/A	N/A	PK	100	1.5	4th
7959.200	81.94	h	N/A	N/A	PK	310	1.4	4th
9651.000	73.48	h	N/A	N/A	PK	120	1.3	5th
9949.000	73.37	h	N/A	N/A	PK	85	1.3	5th

Run #2: Signal Substitution of Fc and highest amplitude harmonic
Limit based on 6 dB antenna gain plus 23.4 dBm output power
Horn 868, Preamp 785, Analyzer 1141, Sigal Gen. 1002

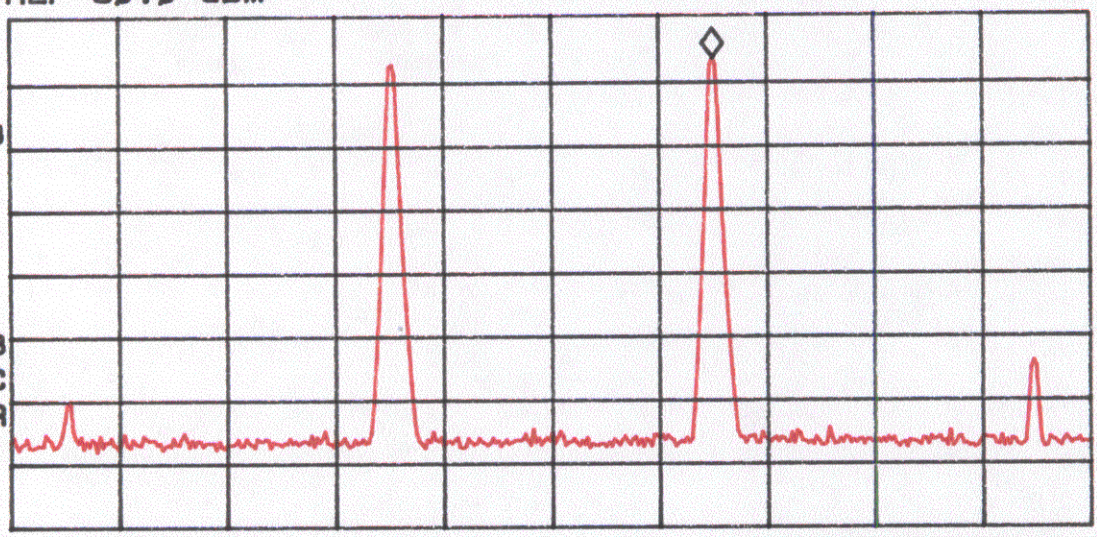
Frequency	Sig Gen	nt. Gain	ERP	FCC Part 24		Detector	Azimuth	Height	Comments
MHz	dBm	dBd		Limit	Margin	Pk/QP/Avg	degrees	meters	
1930.200	-24.1	5.7	-18.4	N/A	N/A	PK	0	1.1	Fc
9651.000	-38.80	10.0	-28.8	-12.4	-16.4	PK	70	1.4	5th
1989.800	-19.60	5.7	-13.9	N/A	N/A	PK	80	1.5	Fc
7959.200	-30.40	9.3	-21.1	-12.4	-8.7	PK	100	1.5	4th

19: Ø4: 12 JUN Ø7, 2ØØØ
T37895, Run #3 , Output Power

-1

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 1.9895 GHz
23.37 dBm

REF OFFST 2Ø.Ø dB
LOG REF 3Ø.Ø dBm
1Ø
dB/
ATN
2Ø dB



VA SB
SC FC
CORR

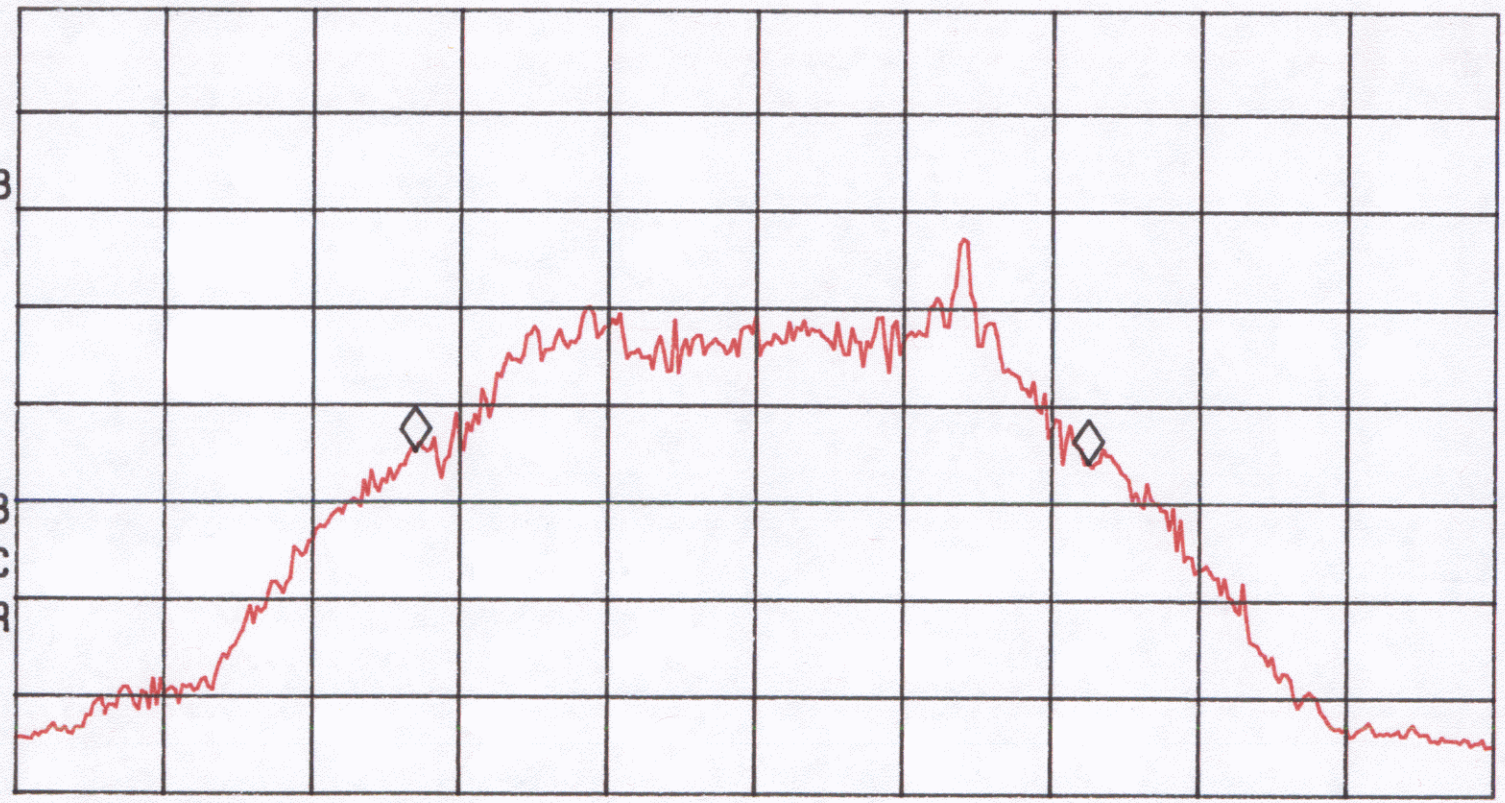
CENTER 1.9595 GHz
SPAN 2ØØ.Ø MHz
#IF BW 1.Ø MHz #AVG BW 1 MHz
SWP 2Ø.Ø msec

19: 34: 5Ø JUN Ø7, 2ØØØ
T37895 - 3, Bandwidth

99% power

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 227.5 kHz
-1.14 dB

REF OFFST 2Ø.Ø dB
LOG REF 3Ø.Ø dBm
1Ø
dB/
ATN
2Ø dB



VA SB
SC FC
CORR

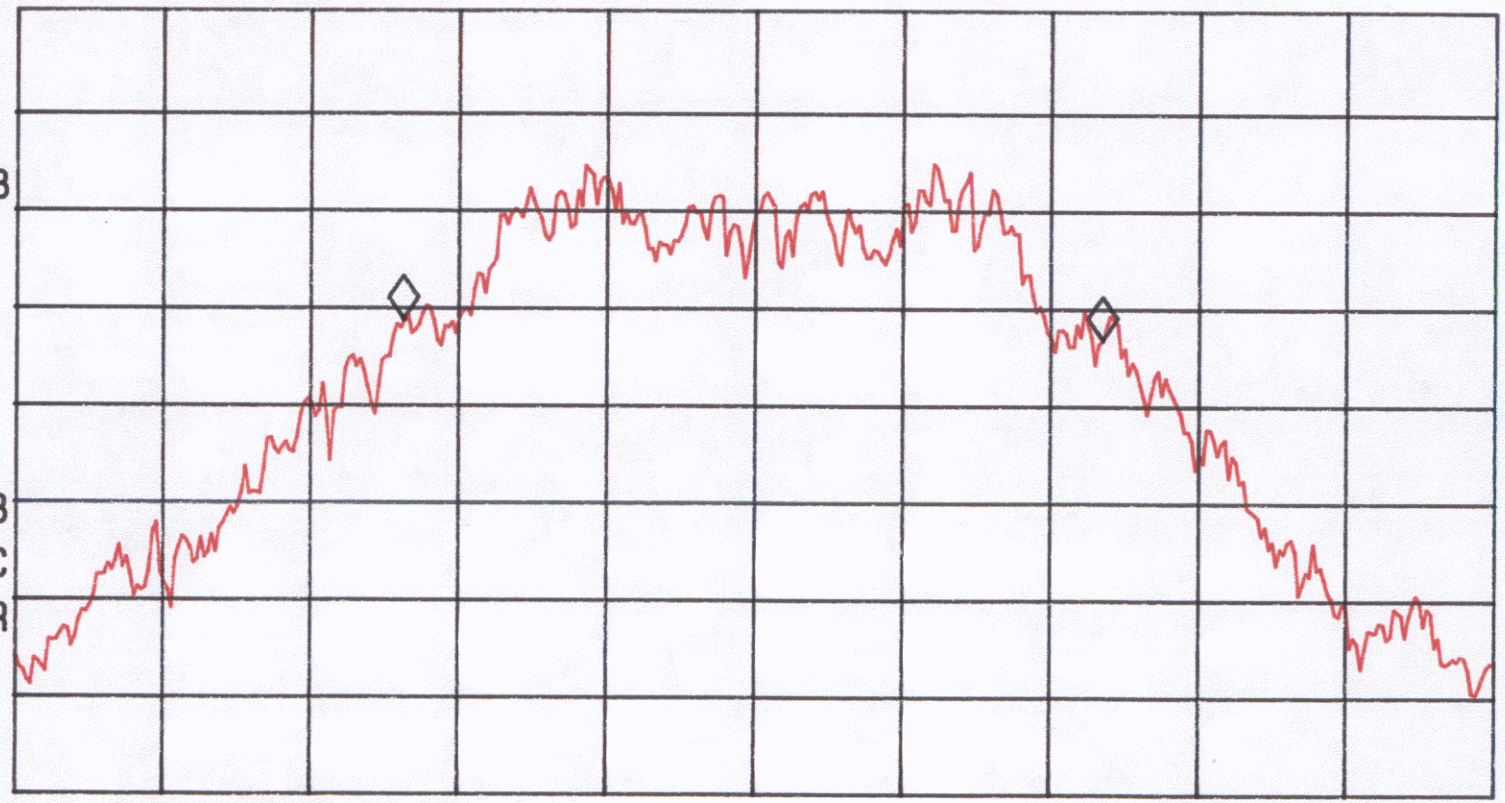
CENTER 1.93Ø2ØØØ GHz
SPAN 5ØØ.Ø kHz
#IF BW 3.Ø kHz #AVG BW 1 MHz
SWP 167 msec

19: 27: 31 JUN Ø7, 2ØØØ
T37895 - 4, Bandwidth

99% Power

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 236.3 kHz
-1.98 dB

REF OFFST 2Ø.Ø dB
LOG REF 3Ø.Ø dBm
1Ø
dB/
ATN
2Ø dB



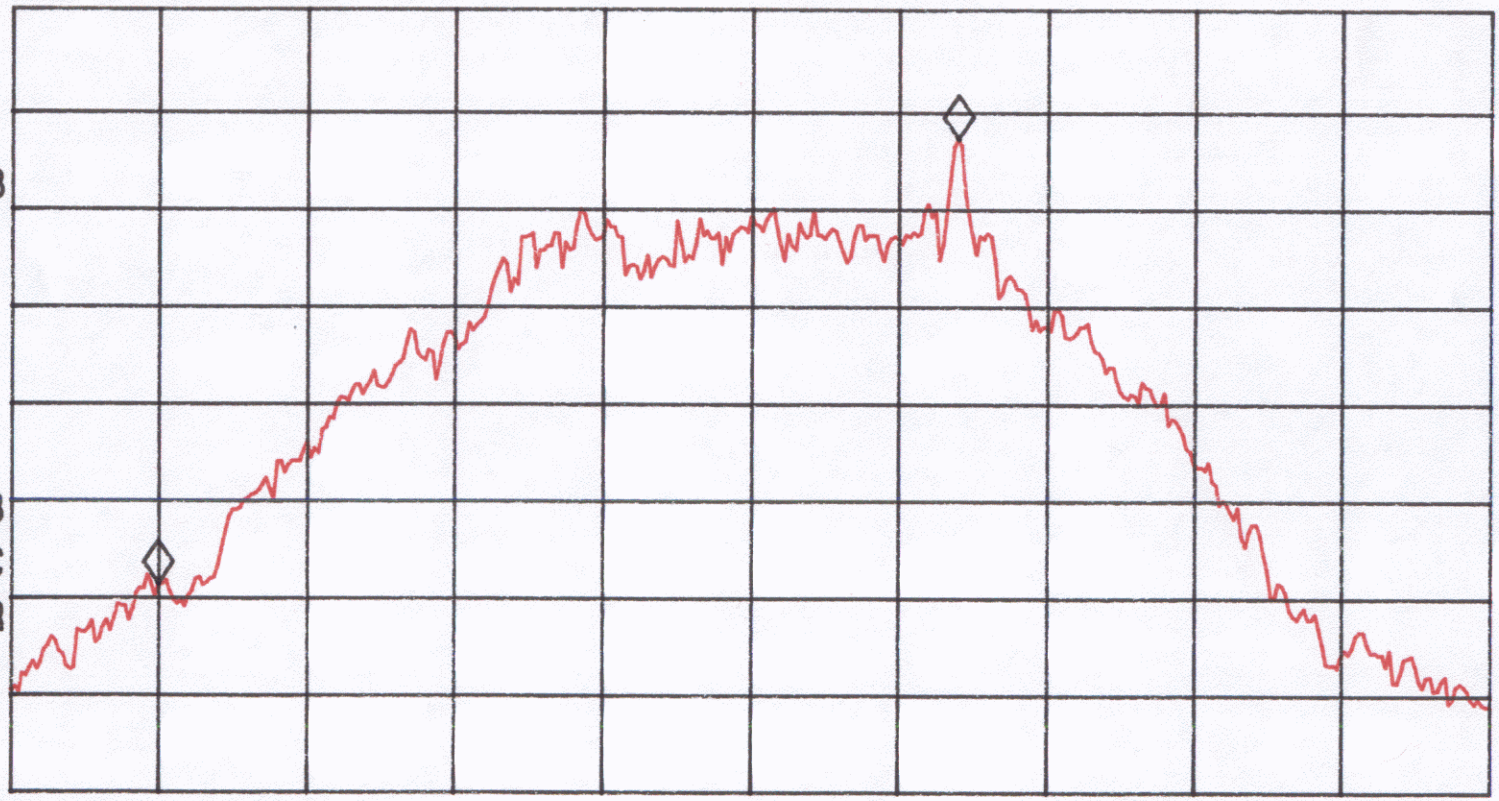
VA SB
SC FC
CORR

CENTER 1.9898ØØØ GHz
SPAN 5ØØ.Ø kHz
#IF BW 3.Ø kHz #AVG BW 1 MHz
SWP 167 msec

2Ø: 4Ø: 14 JUN Ø7, 2ØØØ
T37895 - 5, Bandedge

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR -27Ø.Ø kHz
-45.58 dB

REF OFFST 2Ø.Ø dB
LOG REF 2Ø.Ø dBm
1Ø
dB/
ATN
1Ø dB



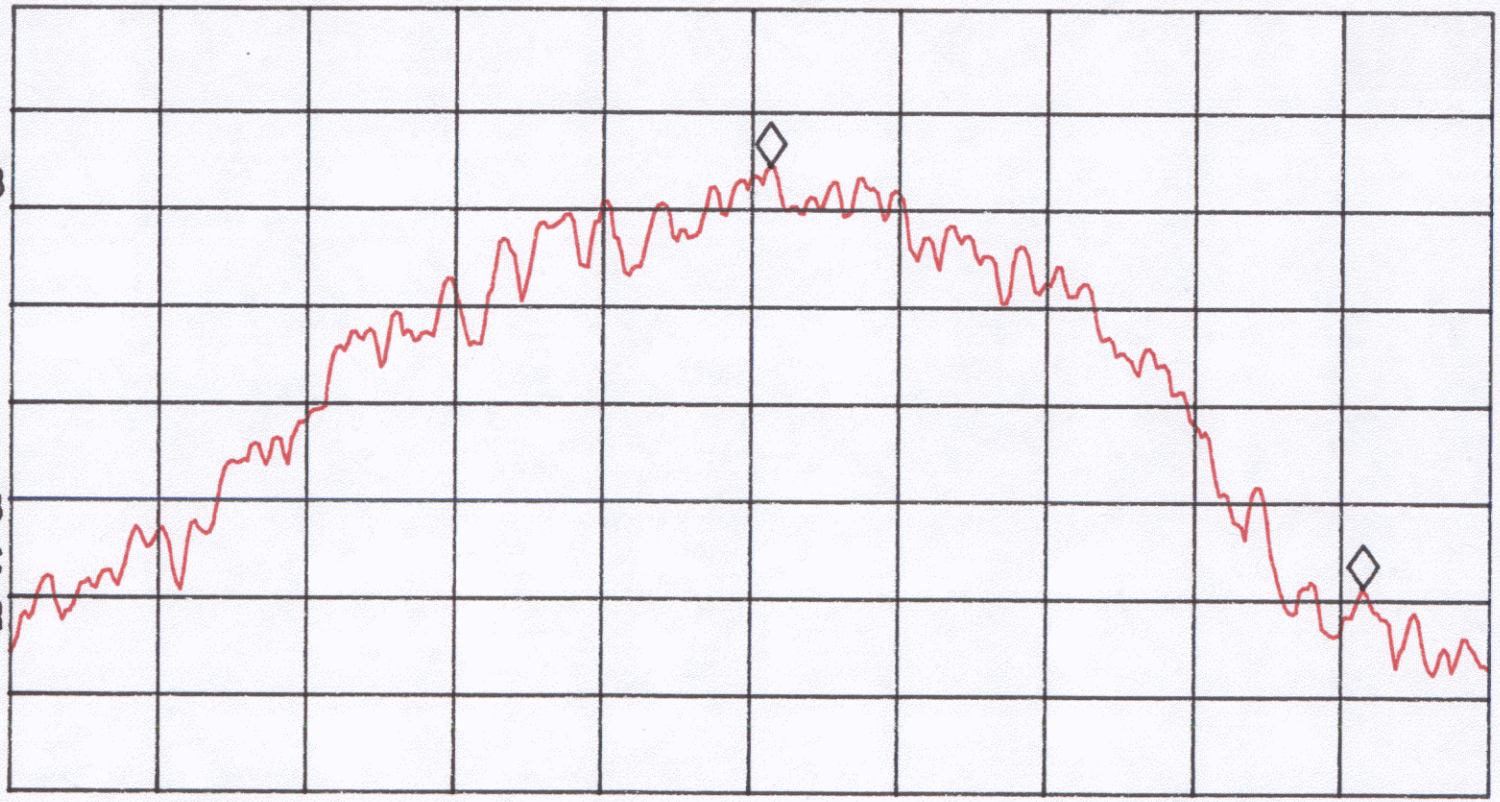
VA SB
SC FC
CORR

CENTER 1.93Ø2ØØØ GHz
SPAN 5ØØ.Ø kHz
#IF BW 3.Ø kHz #AVG BW 1 MHz
SWP 167 msec

20: 45: 11 JUN 07, 2000
T37895 - 6, Bandedge

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 201.3 kHz
-42.93 dB

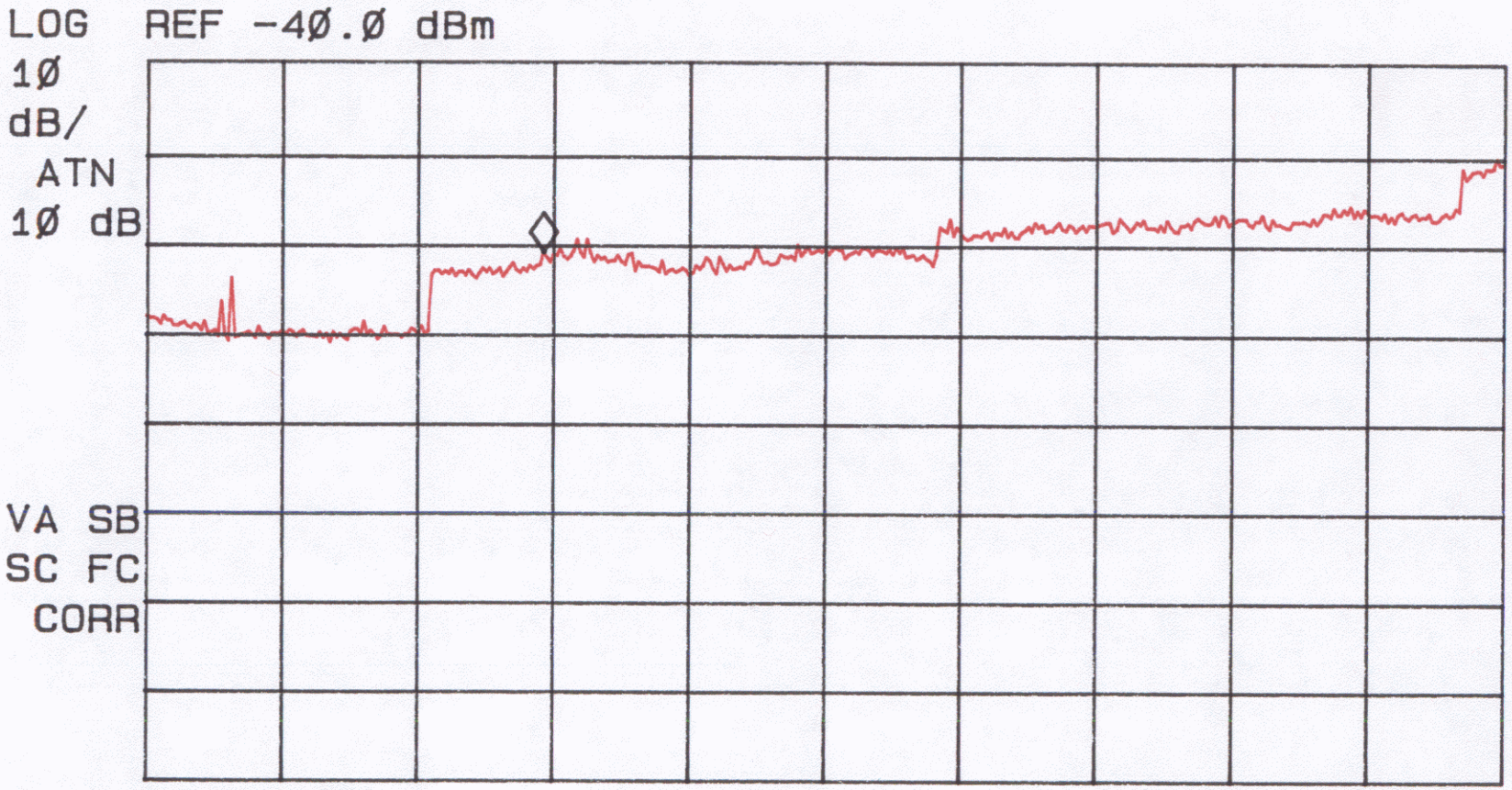
REF OFFST 20.0 dB
LOG REF 20.0 dBm
10 dB/
ATN 10 dB
VA SB
SC FC
CORR



CENTER 1.9898000 GHz
SPAN 500.0 kHz
#IF BW 3.0 kHz #AVG BW 1 MHz
SWP 167 msec

21: Ø2: 42 JUN Ø7, 2ØØØ
T37895 - 7, Spurious Conducted

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 7.9Ø GHz
-61.12 dBm

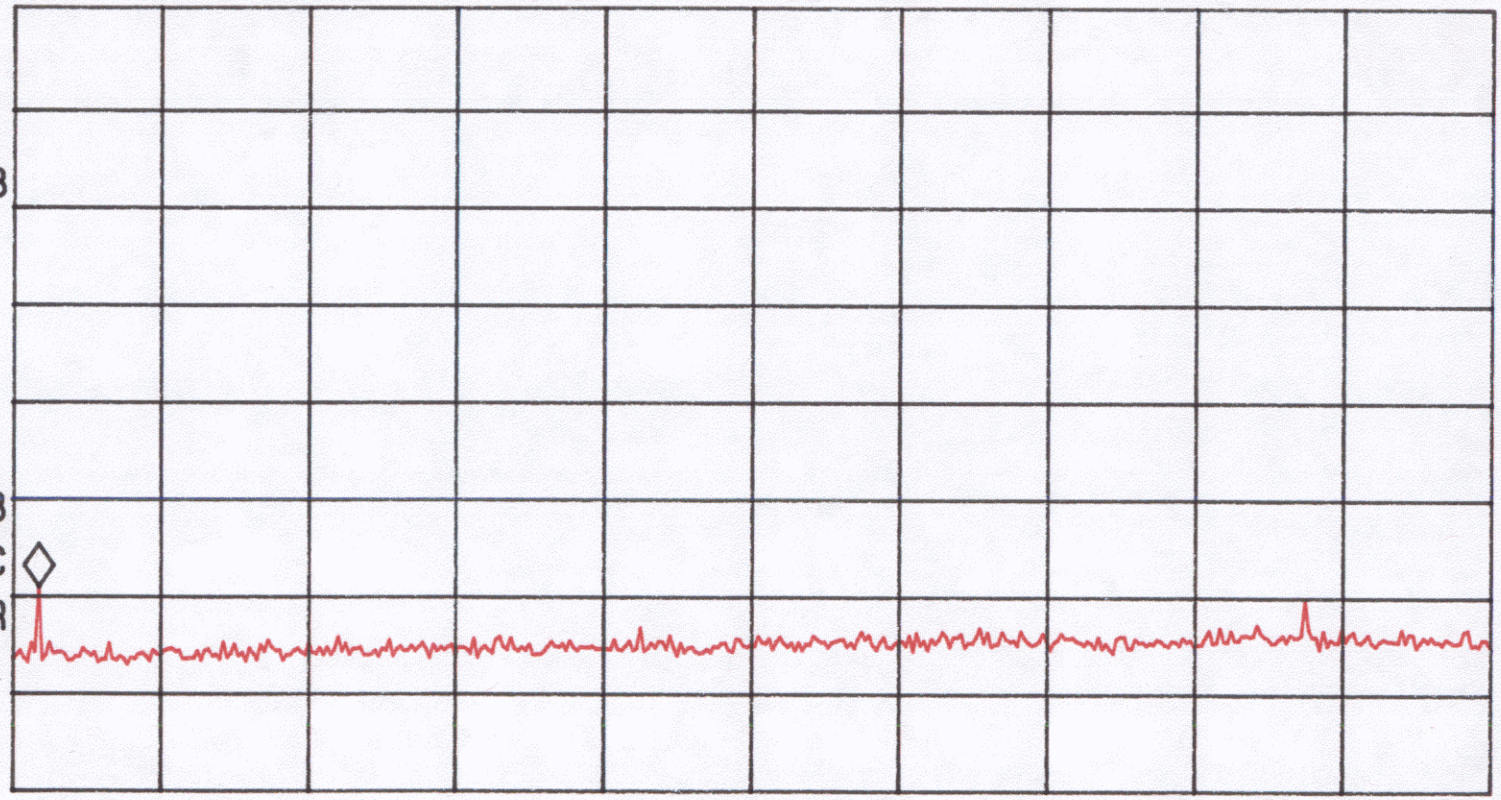


START 2.9Ø GHz
#IF BW 1.Ø MHz
#AVG BW 1 MHz
STOP 2Ø.ØØ GHz
SWP 351 msec

21: 1Ø: 1Ø JUN Ø7, 2ØØØ
T37895 - 8, Spurious Conducted

ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKR 63 MHz
-39.17 dBm

REF OFFST 2Ø.Ø dB
LOG REF 2Ø.Ø dBm
1Ø
dB/
ATN
1Ø dB



VA SB
SC FC
CORR

START 3Ø MHz
STOP 1.9ØØ GHz
#IF BW 1.Ø MHz #AVG BW 1 MHz
SWP 37.4 msec

EXHIBIT 3:Radiated Emissions Test Configuration Photographs

APPENDIX 3: Radiated Emissions Test Configuration Photographs

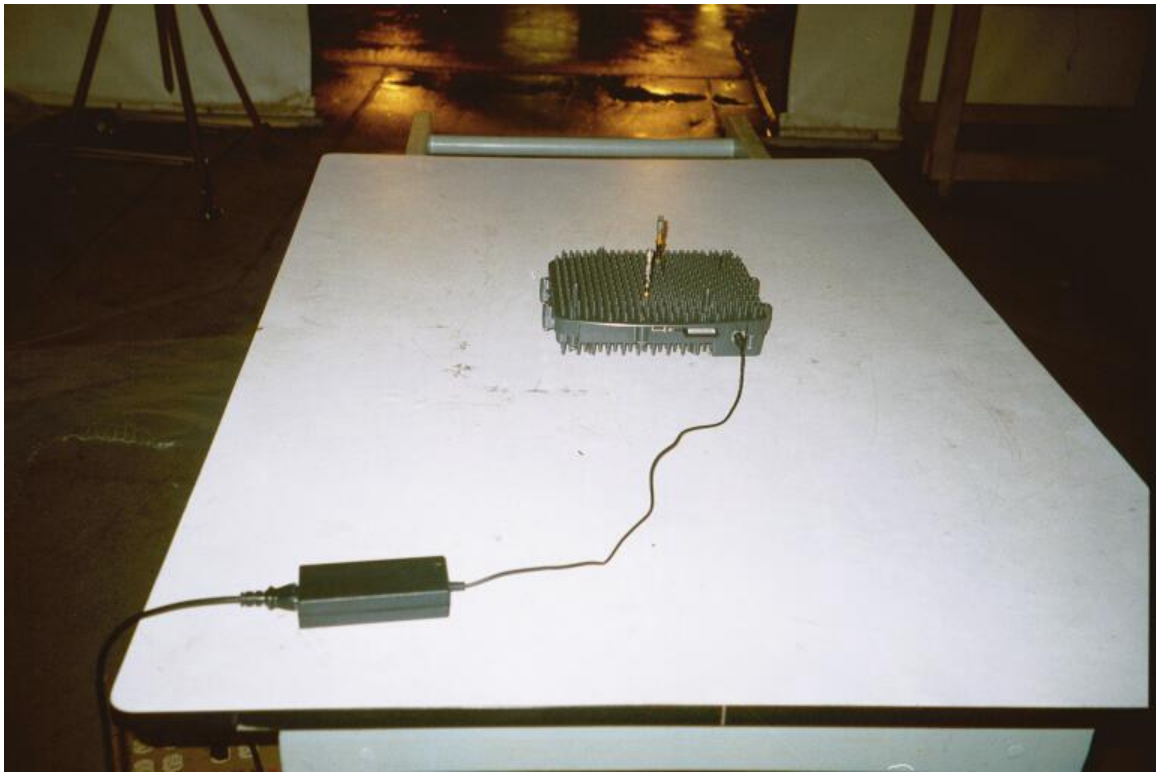


EXHIBIT 4:Proposed FCC ID Label & Label Location

EXHIBIT 5: Detailed Photographs of Cisco Systems, Inc. Model VP1900BXConstruction

Pages

EXHIBIT 6: Operator's Manual for Cisco Systems, Inc. Model VP1900BX

Pages

EXHIBIT 7: Block Diagram of Cisco Systems, Inc. Model VP1900BX

Pages

EXHIBIT 8: Schematic Diagrams for Cisco Systems, Inc. Model VP1900BX

Pages

EXHIBIT 9: Theory of Operation for Cisco Systems, Inc. Model VP1900BX

Pages