



EMISSIONS TEST REPORT

Report Number: 3160793BOX-001

Project Number: 3160793

Testing performed on the

1900 SDR Basestation

Model: 1900-2

to

FCC Part 24 and RSS 133

For

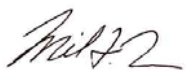
Vanu, Inc.

Test Performed by:
Intertek – ETL SEMKO
70 Codman Hill Road
Boxborough, MA 01719

Test Authorized by:
Vanu, Inc.
One Cambridge Center
Cambridge, MA 02142

Prepared by: 
Vathana F. Ven

Date: 09/19/2008

Reviewed by: 
Michael F. Murphy

Date: 09/23/2008

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1.0 Job Description

1.1 Client Information

This EUT has been tested at the request of:

Company: Vanu, Inc.
One Cambridge Center
Cambridge, MA 02142
Contact: Byron Kubert
Telephone: 617-864-1711
Fax: 617-864-1697
Email: bkubert@vanu.com

1.2 Equipment Under Test

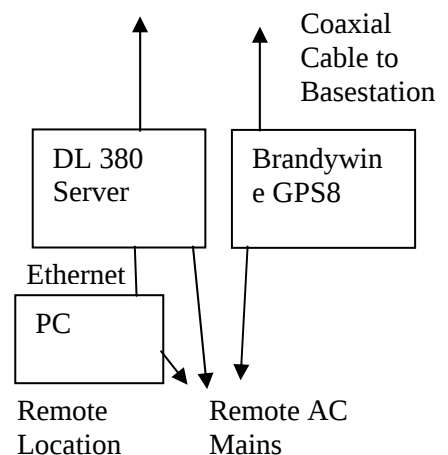
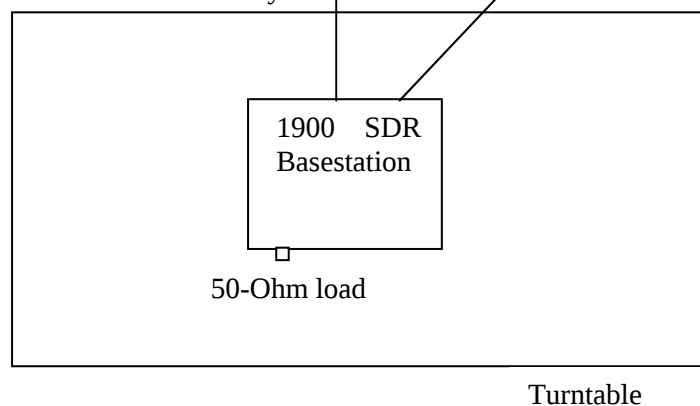
Equipment Type: 1900 SDR Basestation
Model Number(s): 1900-2
Serial number(s): 1587
Manufacturer: Vanu Inc.
EUT receive date: 09/15/2008
EUT received condition: Working Production Sample
Test start date: 09/15/2008
Test end date: 09/18/2008

1.3 Test Plan Reference: Tested according to the standards listed.

1.4 Test Configuration

1.4.1 Block Diagram

Ethernet, Serial Cables to DL 380 Server
Coaxial Cable to Brandywine GPS8





1.4.2. Cables:

Cable	Shielding	Connector	Length (m)	Qty.
Server power cable	None	Plastic	1.5	1
Ethernet cable	None	Plastic	>3	3
Monitor Power cable	None	Plastic	<3	1
Brandywine Power cable	None	Plastic	<3	1
Coaxial cable	Braid	Metal/360 (BNC)	>3	1
Keyboard cable	Braid	Metal/360 (BNC)	<3	1

1.4.3. Support Equipment:

Name: Dell Monitor
Model No.: 1707FPT
Serial No.: Not labeled

Name: Brandywine Communications
Model No.: GPS8
Serial No.: Not labeled

Name: Server
Model No.: NSC2U
Serial No.: Not labeled

1.5 Mode(s) of Operation:

The EUT was activated from 120V/60Hz power and transmitted on low, mid, and high channels across the EUT passband. Various types of data were fed to the modulator.
EUT passband: 1930 – 1990 MHz



2.0 Test Summary

TEST STANDARD	RESULTS	
Basic Standards from FCC Part 24		
SUB-TEST	TEST PARAMETER	COMMENT
RF Output Power FCC 2.1046, 24.232	RF Output Power must not exceed 100 Watts (50 dBm)	N/A*
Occupied Bandwidth FCC 2.1049	Emission must stay within assigned band of operation.	N/A*
Spurious Radiated Emissions FCC 2.1053, 24.238 and RSS 133	Emissions outside the passband must not exceed –13 dBm.	Pass
Frequency Stability FCC 2.1055, 24.235 and RSS 133	Emission must stay within assigned band of operation.	Pass

Notes: N/A* - Not performed per client.

REVISION SUMMARY – The following changes have been made to this Report:

<u>Date</u>	<u>Project</u>	<u>Project</u>	<u>Page(s)</u>	<u>Item</u>	<u>Description of Change</u>
	<u>No.</u>	<u>Handler</u>			

3.0 Sample Calculations

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - AG$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB

In the following table(s), the reading shown on the data table reflects the preamplifier gain. An example for the calculations in the following table is as follows.

Assume a receiver reading of 52.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted, giving a field strength of 32 dB μ V/m. This value in dB μ V/m was converted to its corresponding level in μ V/m.

RA = 52.0 dB μ V
 AF = 7.4 dB/m
 CF = 1.6 dB
 AG = 29.0 dB
 FS = 32 dB μ V/m

$$\text{Level in } \mu\text{V/m} = [10(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

The following is how net line-conducted readings were determined:

$$NF = RF + LF + CF + AF$$

Where NF = Net Reading in dB μ V

- RF = Reading from receiver in dB μ V
- LF = LISN Correction Factor in dB
- CF = Cable Correction Factor in dB
- AF = Attenuator Loss Factor in dB

To convert from dB μ V to μ V or mV the following was used:

$$UF = 10^{(NF / 20)} \text{ where UF = Net Reading in } \mu\text{V}$$

Example:

$$NF = RF + LF + CF + AF = 28.5 + 0.2 + 0.4 + 20.0 = 49.1 \text{ dB}\mu\text{V}$$

$$UF = 10^{(49.1 \text{ dB}\mu\text{V} / 20)} = 254 \mu\text{V/m}$$



3.1 Measurement Uncertainty

Compliance of the product is based on the measured value. However, the measurement uncertainty is included for informational purposes.

The expanded uncertainty ($k = 2$) for radiated emissions from 30 to 1000 MHz has been determined to be:

± 3.5 dB at 10m, ± 3.8 dB at 3m

The expanded uncertainty ($k = 2$) for mains conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 2.6 dB

The expanded uncertainty ($k = 2$) for telecom port conducted emissions from 150 kHz to 30 MHz has been determined to be:

± 3.2 for ISN and voltage probe measurements

± 3.1 for current probe measurements

3.2 Site Description

Test Site(s): 1 and Littleton

Our OATS are 3m and 10m sheltered emissions measurement ranges located in a light commercial environment in Boxborough, Massachusetts. They meet the technical requirements of ANSI C63.4-2003 and CISPR 22:1993/EN 55022:1994 for radiated and conducted emission measurements. The shelter structure is entirely fiberglass and plastic, with outside dimensions of 33 ft x 57 ft. The structure resembles a quonset hut with a center ceiling height of 16.5 ft.

The testing floor is covered by a galvanized sheet metal groundplane that is earth-grounded via copper rods around the perimeter of the site. The joints between individual metal sheets are bridged with a 2 inch wide metal strips to provide low RF impedance contact throughout. The sheets are screwed in place with stainless steel, round-head screws every three inches. Site illumination and HVAC are provided from beneath the ground reference plane through flush entry ports, the port covers are electrically bonded to the ground plane.

A flush metal turntable with 12 ft. diameter and 5000 lb. load capacity (12,000 lb. in Site 3) is provided for floor-standing equipment. A wooden table 80 cm high is used for table-top equipment. The turntable is electrically connected to the ground plane with three copper straps. The straps are connected to the turntable at the center of it with ground braid. The copper strap is directly connected to the groundplane at the edges of the turntable. The turntable is located on the south end of the structure and the antennas are mounted 3 and 10 meters away to the north. The antenna mast is a non-conductive with remote control of antenna height and polarization. The antenna height is adjustable from 1 to 4 meters.

All final radiated emission measurements are performed with the testing personnel and measurement equipment located below the ground reference plane. The site has a full basement underneath the turntable where support equipment may be remotely located. Operation of the antenna, turntable and equipment under test is controlled by remote controls that manipulate the antenna height and polarization and with a turntable control. Test personnel are located below the ellipse when measurements are performed, however the site maintains the ability of having personnel manipulate cables while monitoring test equipment. Ambient radiated emissions are 6 dB or more below the relevant FCC emission limits.

AC mains power is brought to the equipment under test through a power line filter, to remove ambient conducted noise. 50 Hz (240 VAC single phase), 60 Hz power (120 VAC single phase, 208 VAC three phase), and 60 Hz (480 VAC three phase) are available. Conducted emission measurements are performed with a Line Impedance Stabilization Network (LISN) or Artificial Mains Network (AMN) bonded to the ground reference plane. A removable vertical groundplane (2 meter X 2 meter area) is used for line-conducted measurements for table top equipment. The vertical groundplane is electrically connected to the reference groundplane.



Test Results: Pass

Test Standard: FCC 2.1053, 24.238 and RSS 133

Test: Spurious Radiated Emissions

Performance Criterion: Emissions outside the passband must not exceed –13 dBm

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	20	Humidity (%):	36	Pressure (hPa):	1015
Pretest Verification Performed	Yes		Equipment under Test:	1900-2		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	1587		

Maximum Test Disturbance Parameters: Emissions outside the passband must not exceed –13 dBm

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	11/26/2008
2	ANTENNA	EMCO	3142	9711-1224	12/05/2008
3	ANTENNA, RIDGED GUIDE, 1-18 GHZ	EMCO	3115	2784	10/04/2008
4	40GHz Cable	Megaphase	TM40-K1K1- 197	7030801 001	06/05/2009
5	40 GHz Cable	Megaphase	TM40-K1K1- 197	7030801 002	06/05/2009
6	10 Meter in floor cable for site 1	ITS	RG214B/U	S1 10M FLR	09/08/2009
7	100MHz-40GHz Preamp	MITEQ	NSP4000-NFG	1260417	03/25/2009
8	HORN ANTENNA	EMCO	3115	9602-4675	09/24/2008
9	BROADBAND ANTENNA	Compliance Design	B100	00523	11/29/2008
10	BROADBAND ANTENNA	Compliance Design	B200	00533	11/29/2008
11	BROADBAND ANTENNA	Compliance Design	B300 (Switched with	1651	11/29/2008
12	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 80	CBL029	12/06/2008
13	Synthesized Sweep	Hewlett Packard	83620A	3213A01244	02/06/2009



	Generator				
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Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision



Test Results:

Radiated Emissions, Substitution

Company: Vanu, Inc. Rx Antenna: EMC02 LOG3
 Model #: 1900-2 Rx Cable(s): MEG001 MEG002 S1 10M FLR
 Serial #: 1587 Rx Preamp: PRE9 Receiver: ROS001
 Engineer(s): Vathana Ven Location: Site 1 Tx Antenna: HORN2 ANT3
 Project #: 3160793 Date(s): 09/15/08 09/16/08 9/18/2008 Tx Cable(s): CBL029
 Standard: FCC Part 24 and RSS 133 Tx Signal Generator: HEW62
 Barometer: BAR1 Temp/Humidity/Pressure: 20c 36% 1015mB ERP or EIRP?: ERP
 Test Distance (m): 3 and 10 Voltage/Frequency: 120V/60Hz Frequency Range: 30 MHz - 20 GHz
 Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	EUT Reading dB(uV)	Generator Reading dB(uV)	Transmit Cable Loss dB	Transmit Antenna dBi	Generator Level dBm	Net dBm	Limit dBm	Margin dB	Bandwidth
Note: 8GSM											
PK	V	34.400	15.0	41.3	0.1	-9.4	-20.0	-58.0	-13.0	-45.0	120/300 kHz
PK	V	47.720	15.6	51.8	0.2	-7.0	-20.0	-65.5	-13.0	-52.5	120/300 kHz
PK	V	62.920	16.4	57.2	0.2	-1.4	-20.0	-64.6	-13.0	-51.6	120/300 kHz
PK	V	74.100	17.0	63.6	0.2	1.5	-20.0	-67.5	-13.0	-54.5	120/300 kHz
PK	V	108.800	11.4	57.0	0.3	-1.3	-20.0	-69.3	-13.0	-56.3	120/300 kHz
PK	V	131.150	11.0	61.0	0.3	1.7	-20.0	-70.7	-13.0	-57.7	120/300 kHz
PK	V	202.110	15.0	55.6	0.3	1.2	-20.0	-61.8	-13.0	-48.8	120/300 kHz
PK	V	212.650	14.7	57.3	0.3	0.0	-20.0	-65.0	-13.0	-52.0	120/300 kHz
PK	V	225.000	21.3	55.6	0.3	-0.2	-20.0	-56.9	-13.0	-43.9	120/300 kHz
PK	H	240.000	40.6	52.4	0.4	0.2	-20.0	-34.2	-13.0	-21.2	120/300 kHz
PK	H	250.000	30.0	53.2	0.4	-0.4	-20.0	-46.1	-13.0	-33.1	120/300 kHz
PK	H	255.200	17.2	52.7	0.4	-0.8	-20.0	-58.8	-13.0	-45.8	120/300 kHz
PK	H	267.330	24.9	52.0	0.4	-0.8	-20.0	-50.4	-13.0	-37.4	120/300 kHz
PK	H	279.870	24.8	51.3	0.4	-0.9	-20.0	-49.9	-13.0	-36.9	120/300 kHz
PK	H	285.458	25.2	51.3	0.4	-0.6	-20.0	-49.3	-13.0	-36.3	120/300 kHz
PK	H	292.670	20.0	52.9	0.4	-0.1	-20.0	-55.6	-13.0	-42.6	120/300 kHz
PK	H	320.000	21.0	51.0	0.4	-0.9	-20.0	-53.5	-13.0	-40.5	120/300 kHz
PK	H	350.000	14.0	44.6	0.4	-1.4	-20.0	-54.6	-13.0	-41.6	120/300 kHz
PK	V	375.000	19.8	48.3	0.5	-0.9	-20.0	-52.0	-13.0	-39.0	120/300 kHz
PK	H	400.000	16.8	50.5	0.5	0.5	-20.0	-55.8	-13.0	-42.8	120/300 kHz
PK	H	480.000	14.0	42.5	0.5	0.4	-20.0	-50.8	-13.0	-37.8	120/300 kHz
PK	H	720.000	13.0	40.1	0.6	2.3	-20.0	-47.6	-13.0	-34.6	120/300 kHz
PK	H	999.995	11.3	30.0	0.7	0.7	-20.0	-40.9	-13.0	-27.9	120/300 kHz
PK	V	1006.615	44.5	77.0	0.7	4.6	-20.0	-50.8	-13.0	-37.8	1/3 MHz
PK	V	1023.635	39.0	77.8	0.7	4.6	-20.0	-57.1	-13.0	-44.1	1/3 MHz
PK	V	1125.035	37.7	72.8	0.7	8.3	-20.0	-49.7	-13.0	-36.7	1/3 MHz
PK	H	1200.000	38.7	75.8	0.7	8.3	-20.0	-51.7	-13.0	-38.7	1/3 MHz
PK	H	1250.000	35.8	76.2	0.9	8.3	-20.0	-55.2	-13.0	-42.2	1/3 MHz
PK	H	1374.975	39.3	71.3	0.9	8.3	-20.0	-46.8	-13.0	-33.8	1/3 MHz
PK	H	1500.000	36.8	75.0	0.9	8.3	-20.0	-53.0	-13.0	-40.0	1/3 MHz
PK	H	1520.000	35.3	76.0	0.9	8.3	-20.0	-55.5	-13.0	-42.5	1/3 MHz
PK	H	1624.935	36.9	73.8	0.9	8.3	-20.0	-51.7	-13.0	-38.7	1/3 MHz
PK	H	1880.385	32.5	72.0	0.3	8.2	-20.0	-53.8	-13.0	-40.8	1/3 MHz
PK	H	2000.000	38.4	73.8	1.1	8.2	-20.0	-50.5	-13.0	-37.5	1/3 MHz
PK	H	2320.000	38.0	73.5	1.2	9.4	-20.0	-49.5	-13.0	-36.5	1/3 MHz
PK	H	2400.000	33.3	70.6	1.2	9.4	-20.0	-51.3	-13.0	-38.3	1/3 MHz

Notes:



Test Results continue:

Radiated Emissions, Substitution

Company: Vanu, Inc. Rx Antenna: EMC02 LOG3
 Model #: 1900-2 Rx Cable(s): MEG001 MEG002 S1 10M FLR
 Serial #: 1587 Rx Preamp: PRE9 Receiver: ROS001
 Engineer(s): Vathana Ven Location: Site 1 Tx Antenna: HORN2 ANT3
 Project #: 3160793 Date(s): 09/15/08 09/16/08 9/18/2008 Tx Cable(s): CBL029
 Standard: FCC Part 24 and RSS 133 Tx Signal Generator: HEW62
 Barometer: BAR1 Temp/Humidity/Pressure: 20c 36% 1015mB ERP or EIRP?: ERP
 Test Distance (m): 3 and 10 Voltage/Frequency: 120V/60Hz Frequency Range: 30 MHz - 20 GHz
 Net = Generator Level (0.00 dBm) + (EUT reading - Generator reading) - Cable Loss + Antenna Gain (dBi or dBd)
 Peak: PK Quasi-Peak: QP Average: AVG RMS: RMS; NF = Noise Floor RB = Restricted Band; Bandwidth denoted as RBW/VBW

Detector Type	Ant. Pol. (V/H)	Frequency MHz	EUT Reading dB(uV)	Generator Reading dB(uV)	Transmit Cable Loss dB	Transmit Antenna dBi	Generator Level dBm	Net dBm	Limit dBm	Margin dB	Bandwidth
Note: 4GSM/8CDMA											
PK	V	35.460	12.0	43.8	0.1	-9.4	-20.0	-63.5	-13.0	-50.5	120/300 kHz
PK	V	49.580	18.4	52.5	0.2	-7.0	-20.0	-63.4	-13.0	-50.4	120/300 kHz
PK	V	64.360	17.4	58.7	0.2	-1.4	-20.0	-65.0	-13.0	-52.0	120/300 kHz
PK	V	74.320	18.0	63.6	0.2	1.5	-20.0	-66.5	-13.0	-53.5	120/300 kHz
PK	V	109.100	9.0	55.4	0.3	-1.3	-20.0	-70.1	-13.0	-57.1	120/300 kHz
PK	V	131.130	10.0	61.0	0.3	1.7	-20.0	-71.7	-13.0	-58.7	120/300 kHz
PK	V	201.930	12.0	55.8	0.3	0.6	-20.0	-65.6	-13.0	-52.6	120/300 kHz
PK	V	214.090	16.0	57.3	0.3	-0.3	-20.0	-64.1	-13.0	-51.1	120/300 kHz
PK	V	223.082	21.8	56.3	0.3	-0.2	-20.0	-57.2	-13.0	-44.2	120/300 kHz
PK	V	240.286	19.6	51.0	0.4	-0.1	-20.0	-54.0	-13.0	-41.0	120/300 kHz
PK	V	243.000	17.6	50.4	0.4	-0.5	-20.0	-55.8	-13.0	-42.8	120/300 kHz
PK	H	249.998	32.9	53.2	0.4	-0.4	-20.0	-43.2	-13.0	-30.2	120/300 kHz
PK	H	264.972	19.0	51.8	0.4	-0.8	-20.0	-56.1	-13.0	-43.1	120/300 kHz
PK	H	267.700	16.0	62.8	0.4	-0.8	-20.0	-70.2	-13.0	-57.2	120/300 kHz
PK	H	275.000	19.5	62.1	0.4	-1.0	-20.0	-66.2	-13.0	-53.2	120/300 kHz
PK	H	279.990	26.4	51.3	0.4	-0.9	-20.0	-48.3	-13.0	-35.3	120/300 kHz
PK	H	300.000	20.0	51.7	0.4	0.2	-20.0	-54.1	-13.0	-41.1	120/300 kHz
PK	V	320.000	22.8	47.7	0.4	-1.5	-20.0	-49.0	-13.0	-36.0	120/300 kHz
PK	V	325.000	13.0	47.7	0.5	-1.9	-20.0	-59.2	-13.0	-46.2	120/300 kHz
PK	V	333.080	9.0	46.5	0.5	-1.5	-20.0	-61.6	-13.0	-48.6	120/300 kHz
PK	V	350.000	13.0	51.0	0.5	-1.3	-20.0	-62.0	-13.0	-49.0	120/300 kHz
PK	H	375.000	21.0	48.3	0.5	-0.3	-20.0	-50.2	-13.0	-37.2	120/300 kHz
PK	H	400.000	19.0	50.5	0.5	0.5	-20.0	-53.6	-13.0	-40.6	120/300 kHz
PK	H	480.000	19.3	42.5	0.5	0.4	-20.0	-45.5	-13.0	-32.5	120/300 kHz
PK	H	720.000	16.0	40.1	0.6	2.3	-20.0	-44.6	-13.0	-31.6	120/300 kHz
PK	H	999.981	9.0	30.0	0.7	0.7	-20.0	-43.2	-13.0	-30.2	120/300 kHz
PK	V	1006.680	44.8	77.0	0.7	4.6	-20.0	-50.5	-13.0	-37.5	1/3 MHz
PK	V	1023.400	39.4	77.8	0.7	4.6	-20.0	-56.7	-13.0	-43.7	1/3 MHz
PK	V	1125.000	36.5	72.8	0.7	8.3	-20.0	-50.9	-13.0	-37.9	1/3 MHz
PK	V	1200.000	42.2	70.6	0.7	8.3	-20.0	-43.0	-13.0	-30.0	1/3 MHz
PK	V	1250.000	33.7	73.0	0.9	8.3	-20.0	-54.1	-13.0	-41.1	1/3 MHz
PK	H	1374.940	41.0	71.3	0.9	8.3	-20.0	-45.1	-13.0	-32.1	1/3 MHz
PK	H	1500.000	34.5	75.0	0.9	8.3	-20.0	-55.3	-13.0	-42.3	1/3 MHz
PK	H	1520.000	31.0	76.0	0.9	8.3	-20.0	-59.8	-13.0	-46.8	1/3 MHz
PK	H	1624.935	37.0	73.8	0.9	8.3	-20.0	-51.6	-13.0	-38.6	1/3 MHz
PK	H	1874.980	35.0	72.7	0.9	8.2	-20.0	-52.6	-13.0	-39.6	1/3 MHz
PK	H	2000.000	40.0	73.8	1.1	8.2	-20.0	-48.9	-13.0	-35.9	1/3 MHz
PK	H	2240.000	37.0	74.6	1.2	9.4	-20.0	-51.6	-13.0	-38.6	1/3 MHz
PK	H	2333.500	37.0	72.8	1.2	9.4	-20.0	-49.8	-13.0	-36.8	1/3 MHz

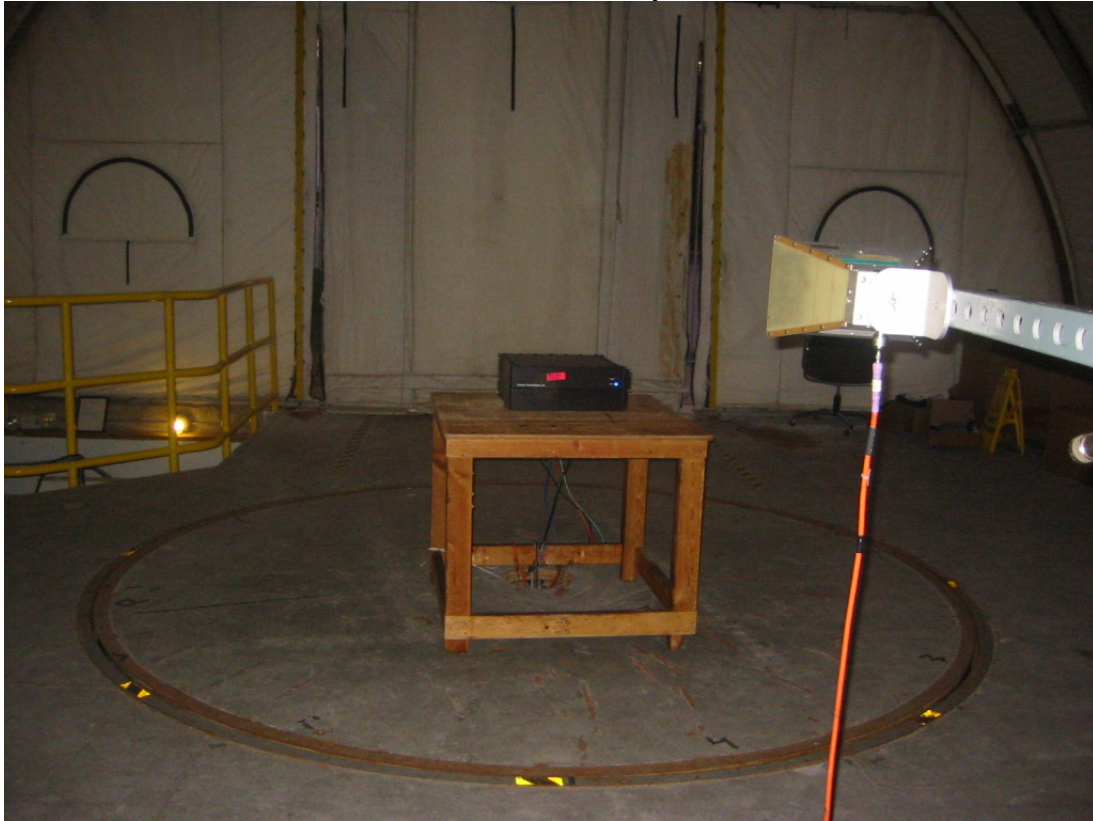
Radiated Emissions Setup Photos 1



Radiated Emissions Setup Photos 2



Radiated Emissions Setup Photos 3





Test Results: Pass

Test Standard: FCC 2.1055, 24.235 and RSS 133

Test: Frequency Stability

Performance Criterion: Emission must stay within assigned band of operation

Test Environment:

Environmental Conditions During Testing:	Ambient (°C):	21.3	Humidity (%):	35	Pressure (hPa):	1006
Pretest Verification Performed	Yes		Equipment under Test:	1900-2		
Test Engineer(s):	Vathana Ven		EUT Serial Number:	1587		

Maximum Test Disturbance Parameters: Emission must stay within assigned band of operation

Test Equipment Used:

TEST EQUIPMENT LIST					
Item	Equipment Type	Make	Model No.	Serial No.	Next Cal. Due
1	Spectrum Analyzer 20Hz - 40 GHz	Rohde & Schwartz	FSEK-30	100225	11/26/2008
2	High Frequency Cable 40GHz	Megaphase	TM40 K1K1 197	CBL028	12/06/2008
3	Barometer/Thermometer (94.5 - 104.5 mb; 27.9 - 30.9 "Hg)	Oakton	03316-80	04814	09/27/2008
4	Temp/Humidity Chamber	Envirotronics	SH27C	08015563S11 264	03/18/2009

Software Utilized:

Name	Manufacturer	Version
EXCEL 2000	Microsoft Corporation	9.0.6926 SP-3
EMI BOXBOROUGH	Intertek	3/07/07 Revision

Test Results:

FCC Part 24 and RSS-133

Channels Freq MHz
Low: 1930.1
Mid: 1960
High: 1989.8

Passband: 1930-1990 MHz
CBL028 Loss in the range from 1930-1990 MHz: 2.71 dB
Ambient

Temperature 21.3 celsius
Pressure 1006 mB
Humidity 35 %

RBW = 500 Hz

Equipment Ids:		CBL028	ROS01	148-013	147-218		
Frequency and Power Stability over Voltage and Temperature 9/17/08 performed by Vathana Ven							
Temp	Channel	Freq MHz	Deviation, Hz	Deviation, MHz	PPM	Power dBm	Deviation, dB
-30	LOW	1930.200120	40	0.000040	0.02	-15.40	1.80
-30	MID	1960.000120	-52	-0.000052	-0.03	-15.40	2.20
-30	HIGH	1989.800120	20	0.000020	0.01	-16.00	1.80
-20	LOW	1930.200100	20	0.000020	0.01	-15.80	1.40
-20	MID	1960.000080	-92	-0.000092	-0.05	-15.90	1.70
-20	HIGH	1989.800060	-40	-0.000040	-0.02	-16.40	1.40
-10	LOW	1930.200100	20	0.000020	0.01	-16.30	0.90
-10	MID	1960.000080	-92	-0.000092	-0.05	-16.40	1.20
-10	HIGH	1989.800120	20	0.000020	0.01	-16.80	1.00
0	LOW	1930.200100	20	0.000020	0.01	-16.40	0.80
0	MID	1960.000100	-72	-0.000072	-0.04	-16.60	1.00
0	HIGH	1989.800120	20	0.000020	0.01	-17.00	0.80
10	LOW	1930.200100	20	0.000020	0.01	-16.60	0.60
10	MID	1960.000100	-72	-0.000072	-0.04	-16.80	0.80
10	HIGH	1989.800100	0	0.000000	0.00	-17.40	0.40
20	LOW	1930.200080	0	0.000000	0.00	-17.20	0.00 *
20	MID	1960.000172	0	0.000000	0.00	-17.60	0.00 *
20	HIGH	1989.800100	0	0.000000	0.00	-17.80	0.00 *
30	LOW	1930.200060	-20	-0.000020	-0.01	-18.50	-1.30
30	MID	1960.000008	-164	-0.000164	-0.08	-18.80	-1.20
30	HIGH	1989.800100	0	0.000000	0.00	-18.70	-0.90
40	LOW	1930.200080	0	0.000000	0.00	-18.30	-1.10
40	MID	1960.000080	-92	-0.000092	-0.05	-18.90	-1.30
40	HIGH	1989.800100	0	0.000000	0.00	-18.90	-1.10
50	LOW	1930.200120	40	0.000040	0.02	-18.30	-1.10
50	MID	1960.000100	-72	-0.000072	-0.04	-19.00	-1.40
50	HIGH	1989.800100	0	0.000000	0.00	-19.00	-1.20
Voltage	Channel	Freq MHz	Deviation, Hz	Deviation, MHz	PPM	Power dBm	Deviation, dB
102V	LOW	1930.200080	0	0.000000	0.00	-17.10	0.10
102V	MID	1960.000120	0	0.000000	0.00	-17.40	0.00
102V	HIGH	1989.800100	0	0.000000	0.00	-17.80	0.00
120V	LOW	1930.200080	0	0.000000	0.00	-17.20	0.00 *
120V	MID	1960.000120	0	0.000000	0.00	-17.40	0.00 *
120V	HIGH	1989.800100	0	0.000000	0.00	-17.80	0.00 *
138V	LOW	1930.200080	0	0.000000	0.00	-17.10	0.10
138V	MID	1960.000120	0	0.000000	0.00	-17.40	0.00
138V	HIGH	1989.800100	0	0.000000	0.00	-17.70	0.10

Notes: A continuous wave signal was used for this test. The maximum frequency deviation measured is 164 Hertz.