



Test Report: 3W07684

Applicant: DragonWave Inc.

**Equipment Under Test:
(EUT)** 24GHz AirPair, P-P Radio Unit

FCC ID: QB8-DWR24-000002

In Accordance With: **FCC Part 15, Subpart C, 15.249**

Tested By: Nemko Canada Inc.
303 River Road, R.R. 5
Ottawa, Ontario K1V 1H2



Authorized By: Kevin Carr, EMC Specialist.

Date: 11 December 2003

Total Number of Pages: 22

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EQUIPMENT: 24GHz AirPair

Section 1. Summary Of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15.249. All tests were conducted using measurement procedure ANSI C63.4-2000. Radiated Emissions were made on an open area test site. A description of the test facility is on file with the FCC.

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST SPECIFICATIONS HAVE BEEN MADE.

See " Summary of Test Data".



TESTED BY: _____
Glen Westwell, Wireless Technologist

DATE: 11 December 2003

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This report applies only to the items tested.

EQUIPMENT: 24GHz AirPair

Summary Of Test Data

Name Of Test	Para. No.	Result
Conducted Emissions	15.207	Complies
Radiated Emissions	15.249	Complies
Frequency Tolerance	15.249(b)(3)	Complies

Test Conditions:**Indoor**

Temperature: 22°C

Humidity: 50%

Outdoor

Temperature: 0°C

Humidity: 53%

EQUIPMENT: 24GHz AirPair

Section 2. General Equipment Specification

Manufacturer: DragonWave Inc.

Model No.: 24GHz AirPair

Serial No.: AP100 Modem #APO140005
AP CP Radio - #20

Date Received In Laboratory: 24 Nov. 2003

Nemko Identification No.: #3 & #2

Transmit Frequency: 24.05-24.25GHz

Antenna Gain(s): 35dBi, 35.3dBi, 40.7dBi & 44.2dBi

Modulation: 16 QAM @ 100Mb/s
QPSK @ 50Mb/s

Maximum Data Rate: 100Mb/S

Antenna Data

Radiowaves (DWI 64001012-01-01)	HPCPE-24DW2	12" = 35.3dBi
Radiowaves (DWI 64001012-03-01)	HP2-24DW2	24" = 40.7dBi
Radiowaves (DWI 64001012-01-01)	HP3-24DW2	36" = 44.2dBi
Nurad (DWI 64001022-00-00)	WV12-249	12" = 35.0dBi

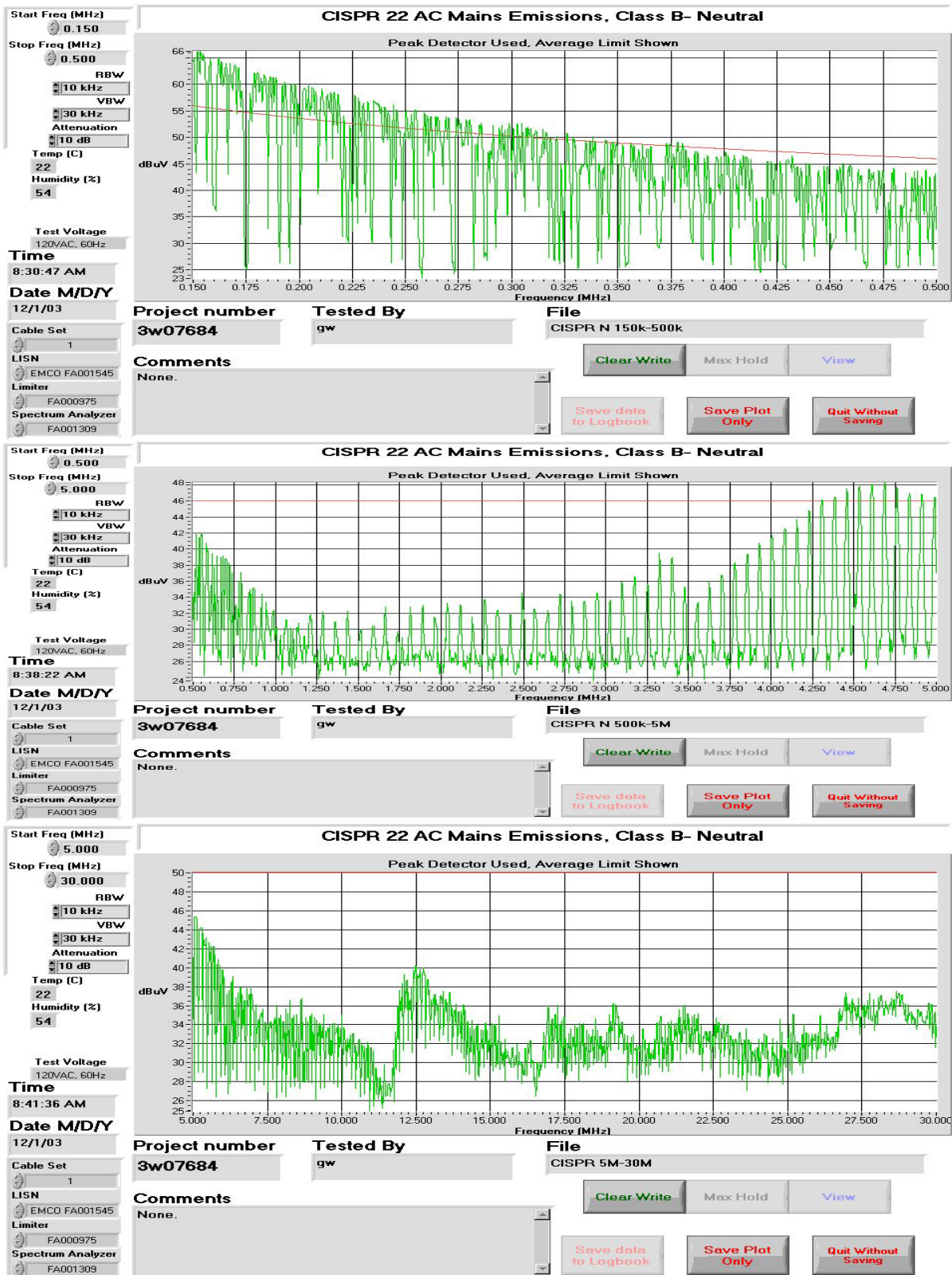
EQUIPMENT: 24GHz AirPair

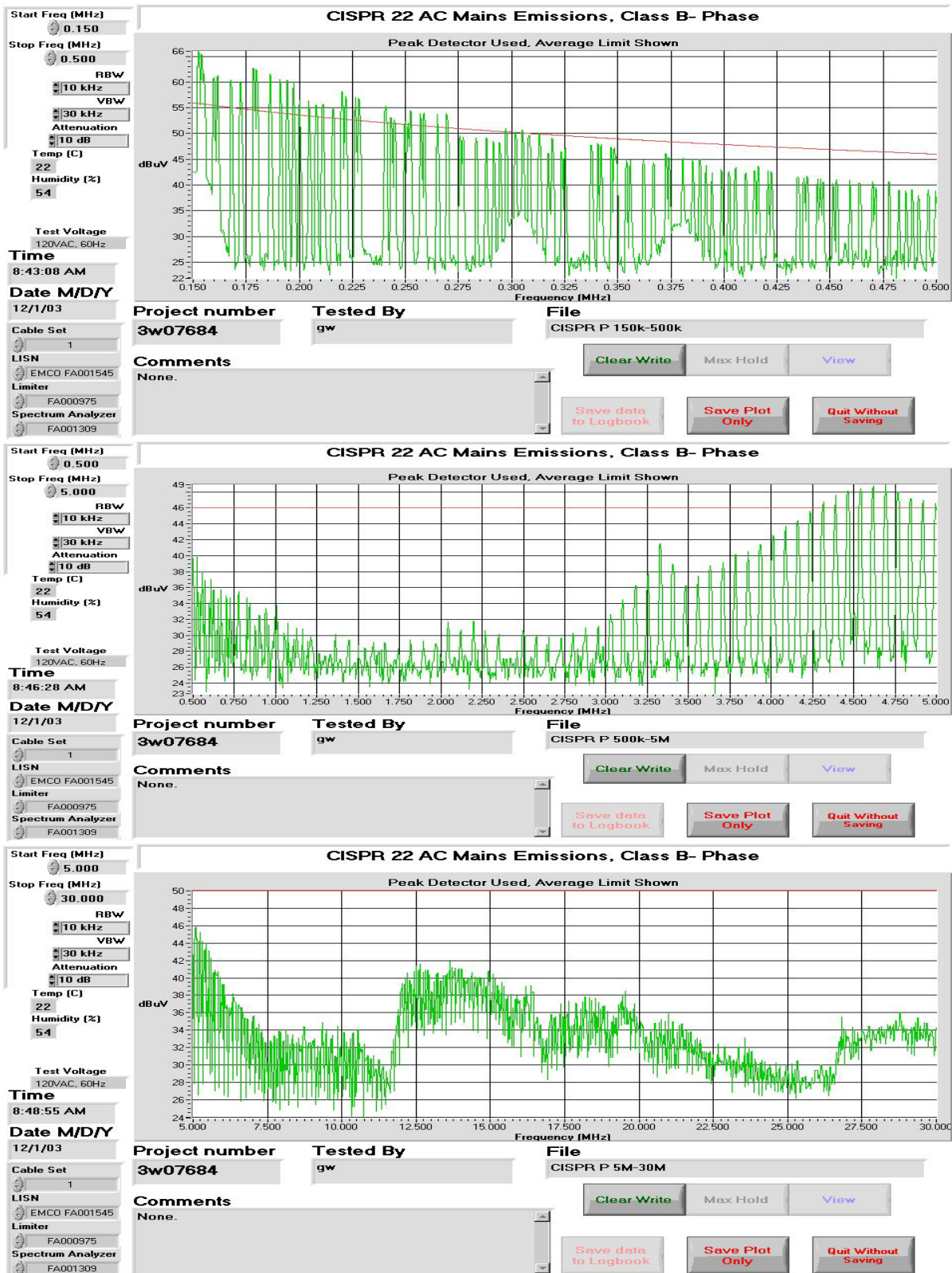
Section 3. Powerline Conducted Emissions**Para. No.: 15.207****Test Performed By: Glen Westwell****Date of Test: 1 Dec. 2003****Minimum Standard:**

Frequency of Emission (MHz)	Maximum Powerline Conducted RF Voltage	
	Quasi-peak (dBuV)	Average(dBμV)
0.15 – 0.5	66 to 56*	56 to 46*
0.5 - 5	56	46
5 - 30	60	50

* Decreases with the logarithm of the frequency

*Note: The LISN used was a 50ohm/50uH LISN***Test Results:** Complies**Measurement Data:** See attached graphs and table..

EQUIPMENT: 24GHz AirPair

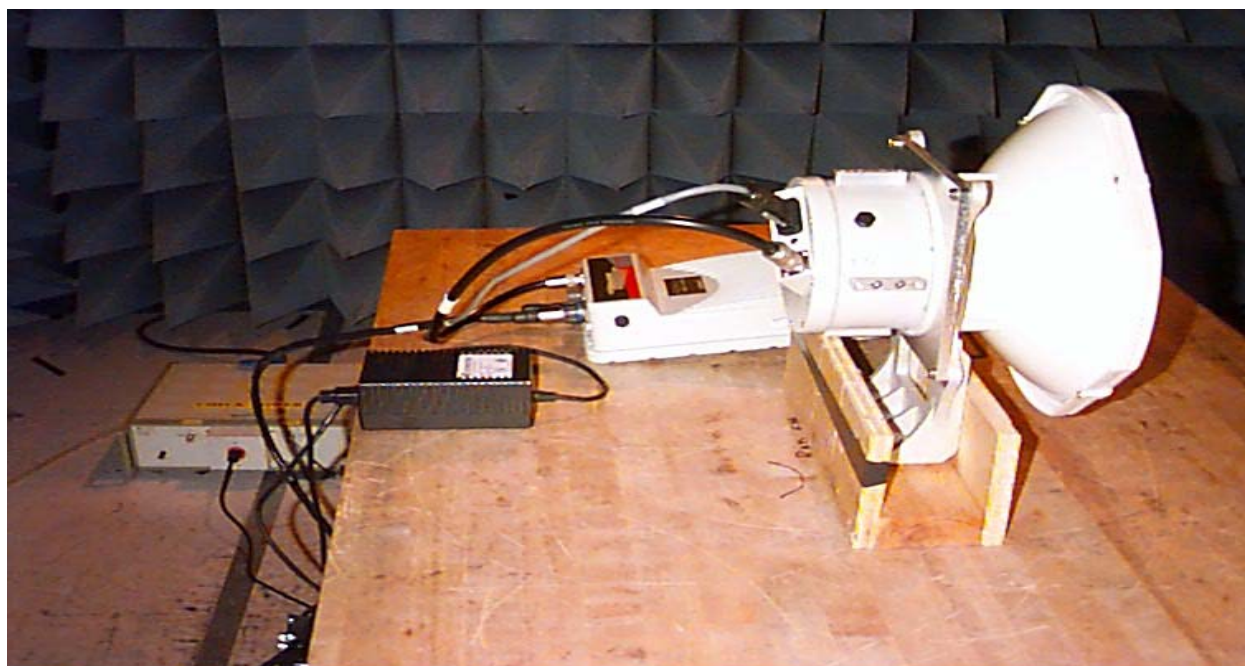
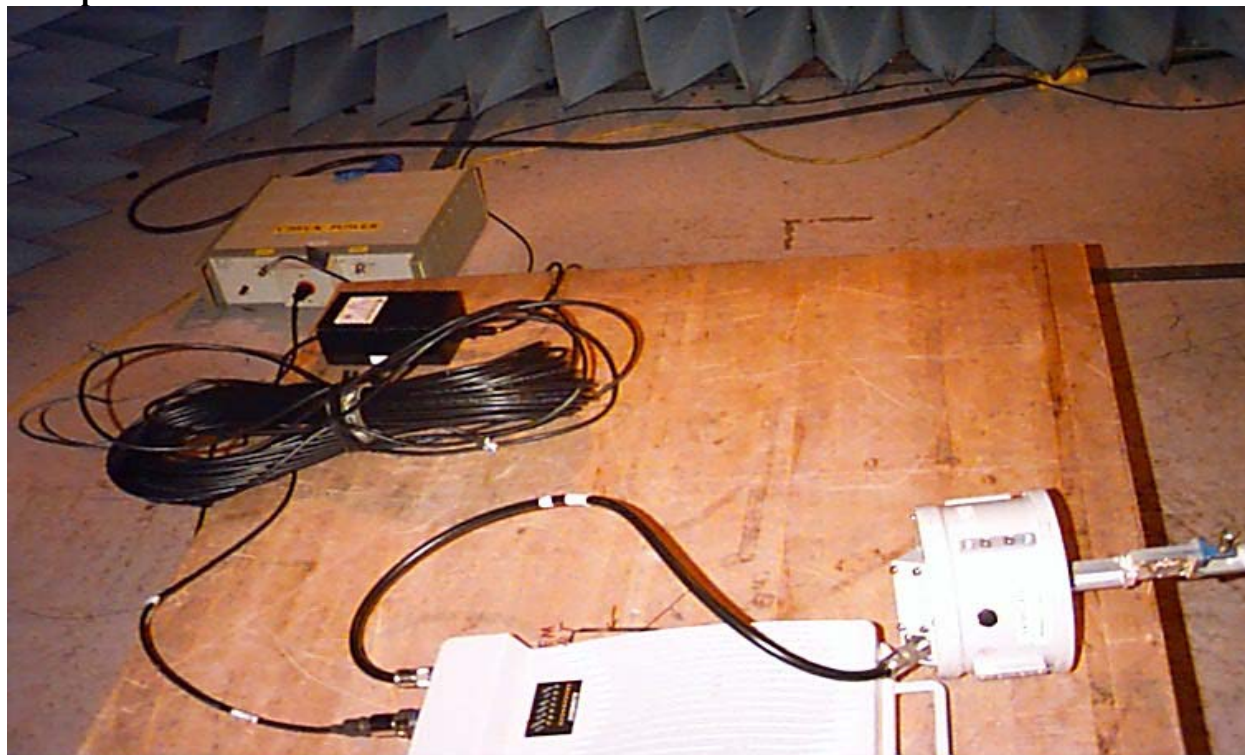
EQUIPMENT: 24GHz AirPair

*EQUIPMENT: 24GHz AirPair***Conducted Disturbance at Mains Port Test Data:**

Port under test: AC Mains					Test Voltage: 120Vac			
Conductor	Frequency (MHz)	Detector	Level (dBμV)	LISN Loss (dB)	Cable Loss (dB)	Result (dBμV)	Limit (dBμV)	Margin (dB)
Phase	0.1535	Quasi-Peak	55.6	0.1	0.2	55.9	65.8	9.9
		Average	38.1	0.1	0.2	38.4	55.8	17.4
	0.1546	Quasi-Peak	55.5	0.1	0.2	55.8	65.7	9.9
		Average	36.4	0.1	0.2	36.7	55.7	19.0
	0.2057	Quasi-Peak	46.9	0.1	0.2	47.2	63.4	16.2
		Average	13.4	0.1	0.2	13.7	53.4	39.7
	0.3030	Quasi-Peak	41	0.1	0.2	41.3	60.2	18.9
		Average	33	0.1	0.2	33.3	50.2	16.9
	4.6850	Quasi-Peak	19.1	0.1	0.2	19.4	56.0	36.6
		Average	12.1	0.1	0.2	12.4	46.0	33.6
	4.6090	Quasi-Peak	19.1	0.1	0.2	19.4	56.0	36.6
		Average	11.9	0.1	0.2	12.2	46.0	33.8
Neutral	0.1525	Quasi-Peak	55.8	0.1	0.2	56.1	65.9	9.8
		Average	39.5	0.1	0.2	39.8	55.9	16.1
	0.1539	Quasi-Peak	55.3	0.1	0.2	55.6	65.8	10.2
		Average	38.5	0.1	0.2	38.8	55.8	17.0
	0.1784	Quasi-Peak	51.9	0.1	0	52	64.6	12.6
		Average	0.5	0.1	0	0.6	54.6	54.0
	4.6900	Quasi-Peak	30.4	0.1	0.2	30.7	56.0	25.3
		Average	29.4	0.1	0.2	29.7	46.0	16.3
	4.6180	Quasi-Peak	23.5	0.1	0.2	23.8	56.0	32.2
		Average	16.2	0.1	0.2	16.5	46.0	29.5
	4.5410	Quasi-Peak	21.9	0.1	0	22	56.0	34.0
		Average	14.5	0.1	0	14.6	46.0	31.4
Observations: Complies.								

EQUIPMENT: 24GHz AirPair

Set Up Photo



EQUIPMENT: 24GHz AirPair

Section 4. Radiated Emissions**Para. No.: 15.249****Test Performed By: Glen Westwell****Date of Test: 4 Dec. 2003****Minimum Standard:**

Fundamental (GHz)	Field Strength (mV/m)	Field Strength (dBμV)	Harmonic (mV/m)	Harmonic (dBμV)
24.05-24.25	2500	128	0.5	54

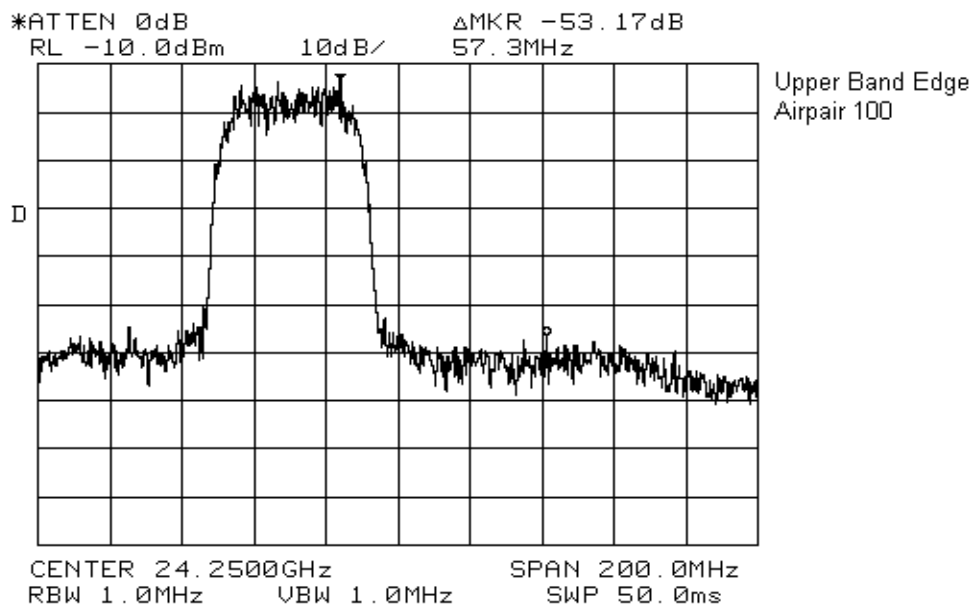
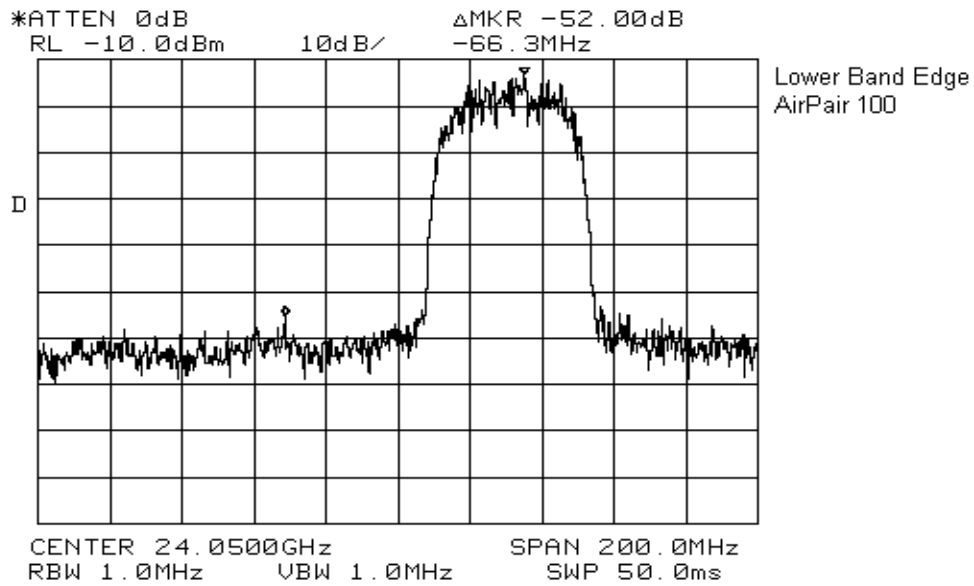
Test Results: Complies.**Measurement Data:** See attached tabulated data.

- All spurious and harmonic emissions were searched from 30MHz to 100GHz.
- All emissions were searched on the horizontal and verticle axis. Worst case emissions have been presented.
- Fundimental emissions were measured at 10m and extrapolated to 3m due to the focus of the high gain antenna.
- Spurious and harmonic emissions were searched at 3m, 1m, 0.5 m & 0.3m. None were detected within 20dB of the limits.
- Maximized emissions were verified with the input power varied at +/-15%.
- Where available, the emissions have been searched on 3 orthogonal axis.

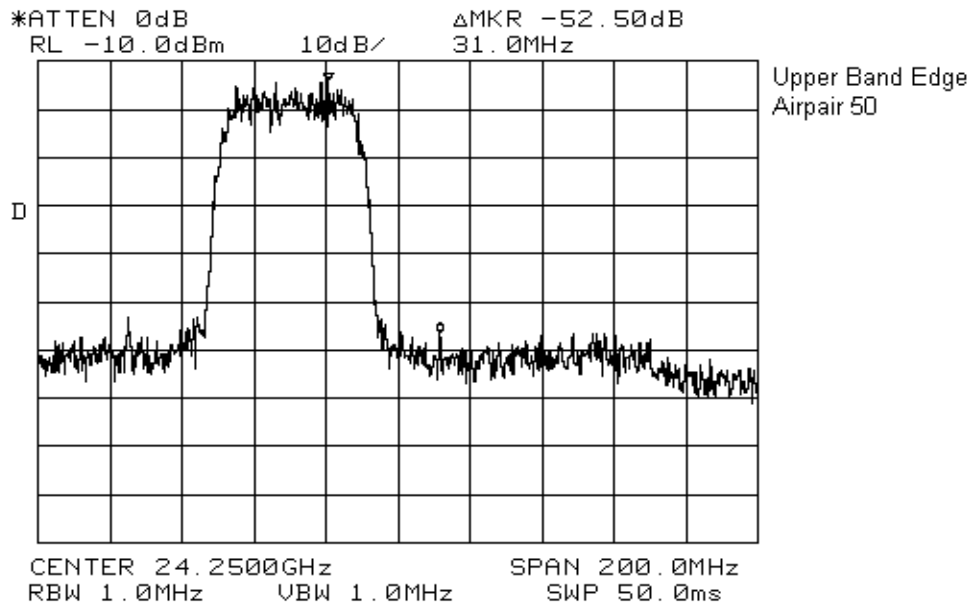
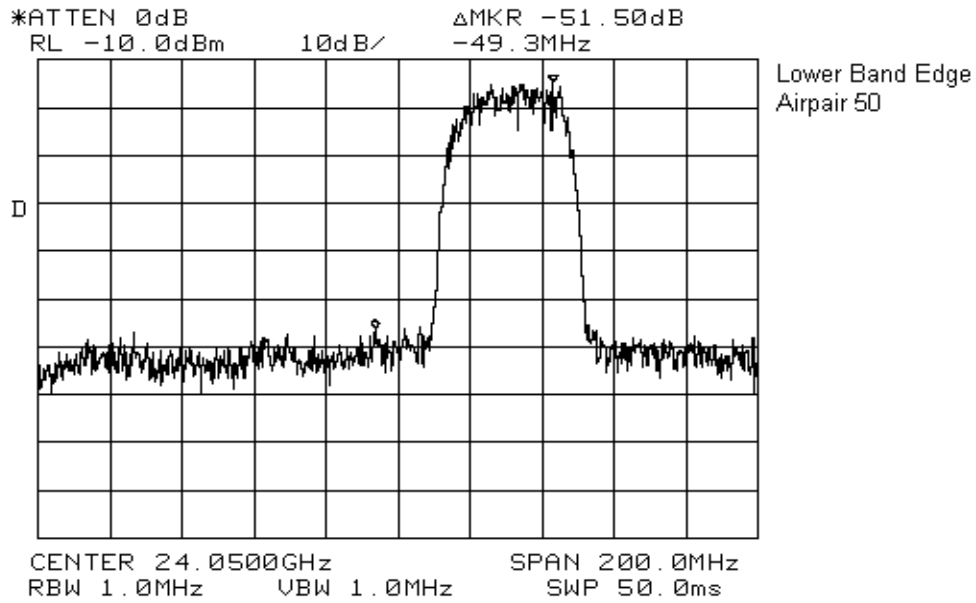
*EQUIPMENT: 24GHz AirPair***Test Data - Radiated Emissions**

Test Distance (meters) : 10		Range: C		Receiver: HP 8565E		RBW(kHz): 1000		Detector: Ave/Peak.	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
Small Antenna – 36dBi, Peak Field Strength									
24080.00	Horn	H	66.2	47.0		10.5	123.7	128.0	4.3
24150.00	Horn	H	66.7	47.0		10.5	124.2	128.0	3.8
24220.00	Horn	H	66.0	47.0		10.5	123.5	128.0	4.5
Large Antenna – 41.5dBi, Peak Field Strength									
24080.00	Horn	H	65.5	47.0		10.5	123.0	128.0	5.0
24150.00	Horn	H	66.1	47.0		10.5	123.6	128.0	4.4
24220.00	Horn	H	65.2	47.0		10.5	122.7	128.0	5.3
Large Antenna – 44.5dBi, Peak Field Strength									
24080.00	Horn	H	66.0	47.0		10.5	123.5	128.0	4.5
24150.00	Horn	H	66.3	47.0		10.5	123.8	128.0	4.2
24220.00	Horn	H	69.5	47.0		10.5	127.0	128.0	1.0
Notes: B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole * Re-measured using dipole antenna. ** Includes cable loss when amplifier is not used. *** Includes cable loss. () Denotes failing emission level. N.D. = Not Detected									

EQUIPMENT: 24GHz AirPair

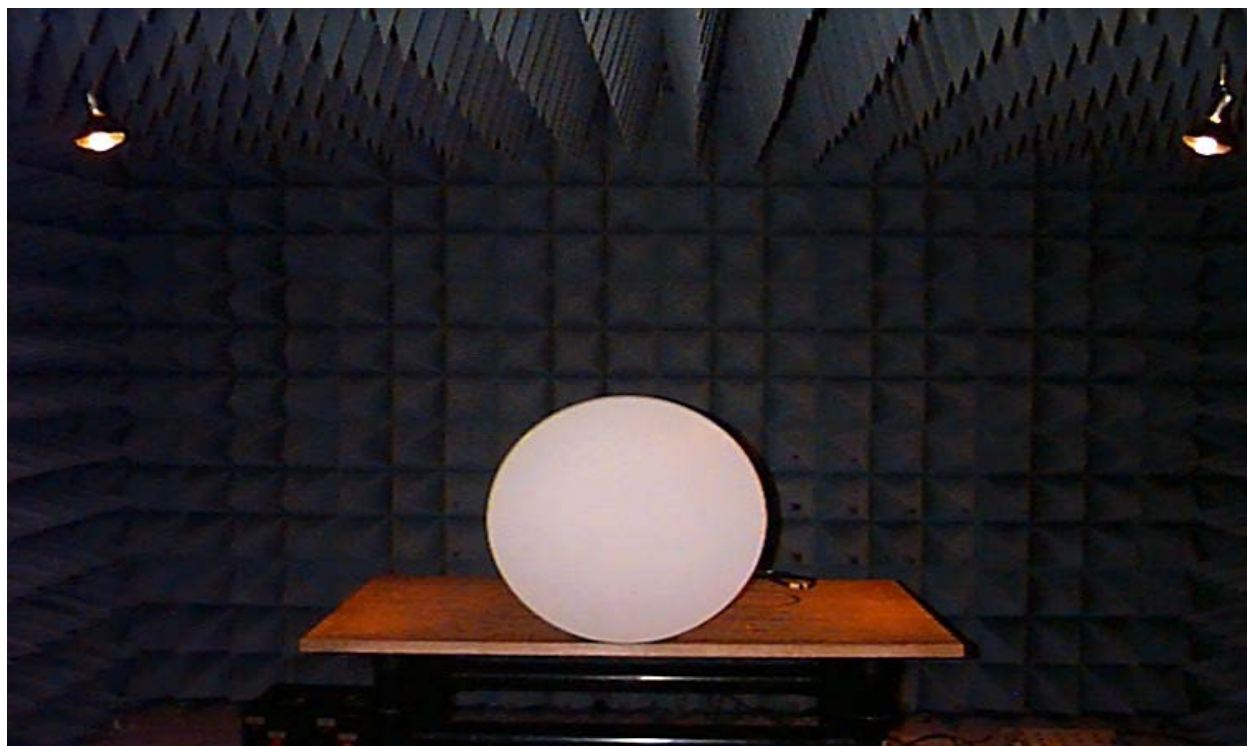
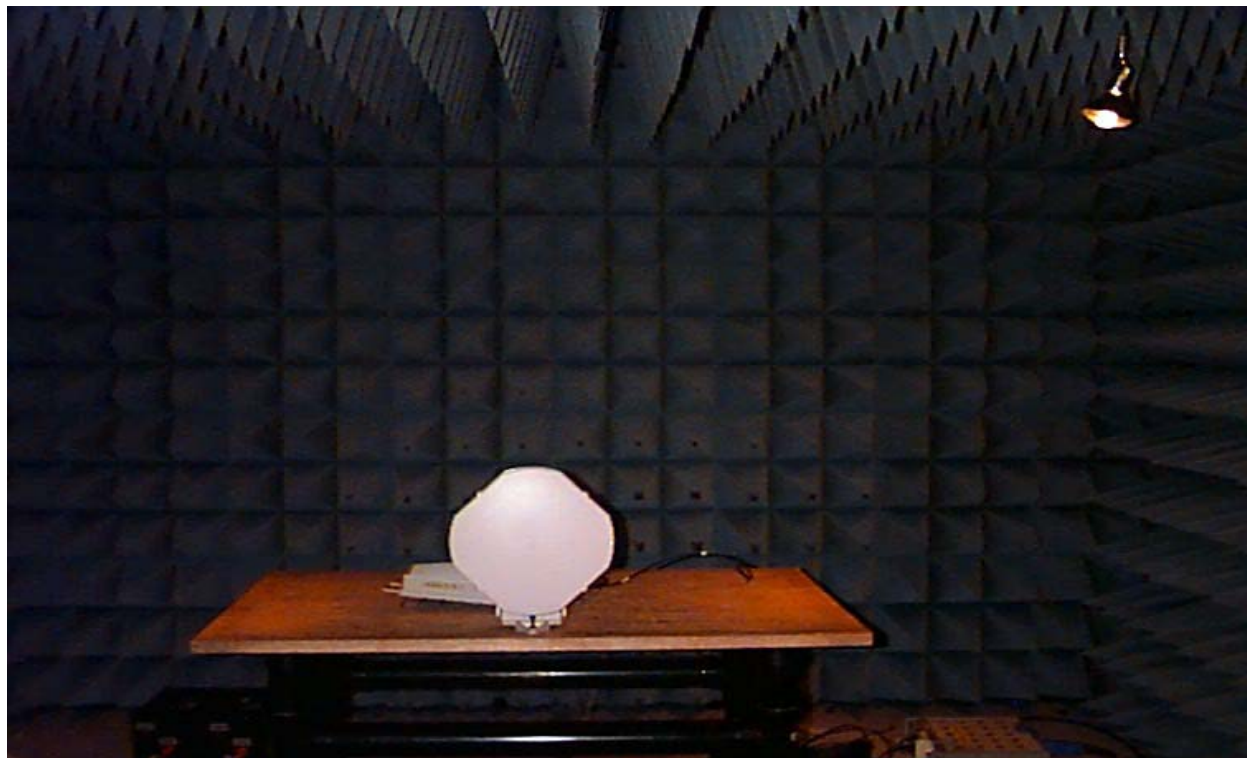


EQUIPMENT: 24GHz AirPair

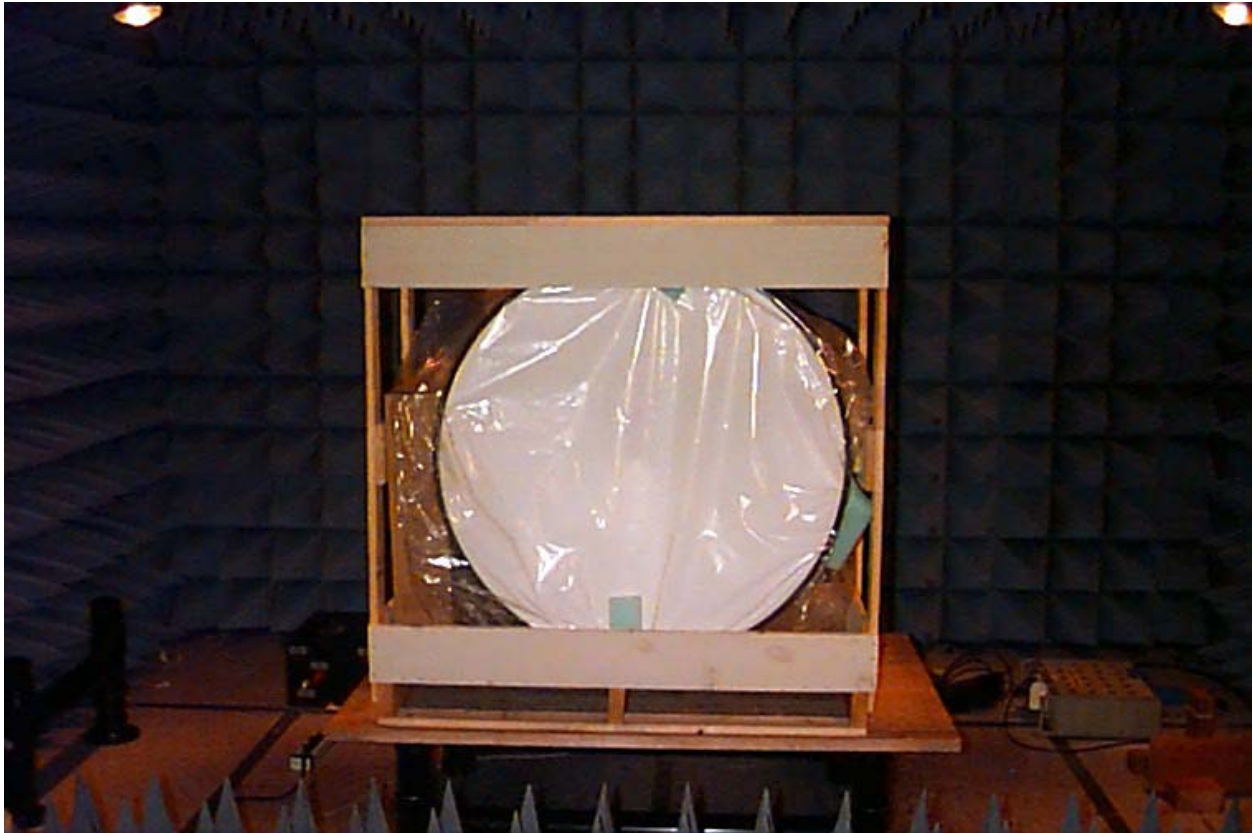


EQUIPMENT: 24GHz AirPair

Radiated Pre-Scan Photo

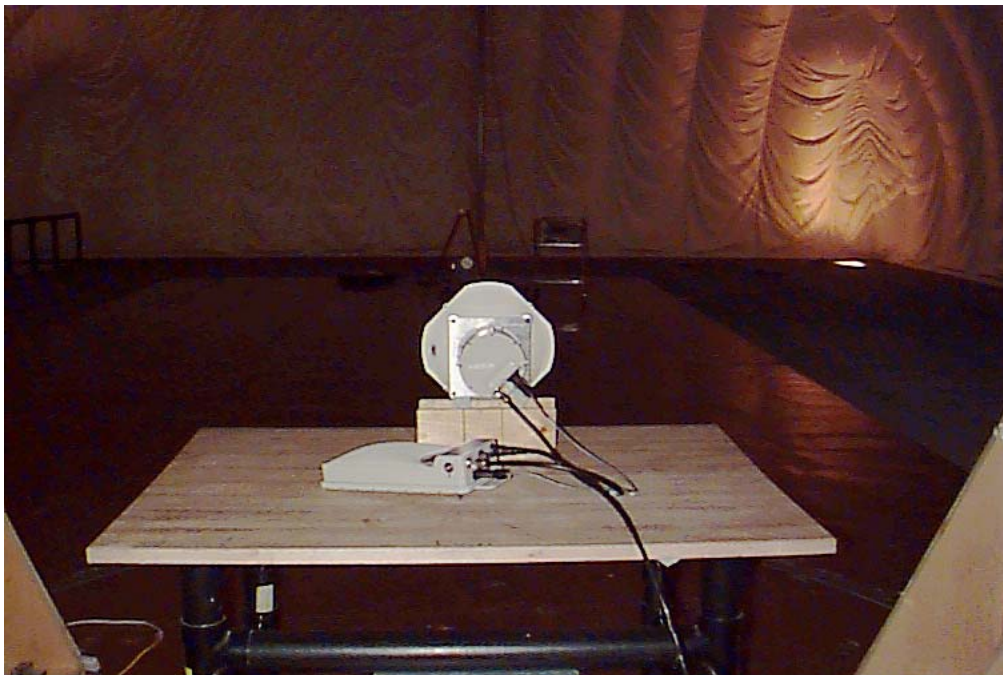
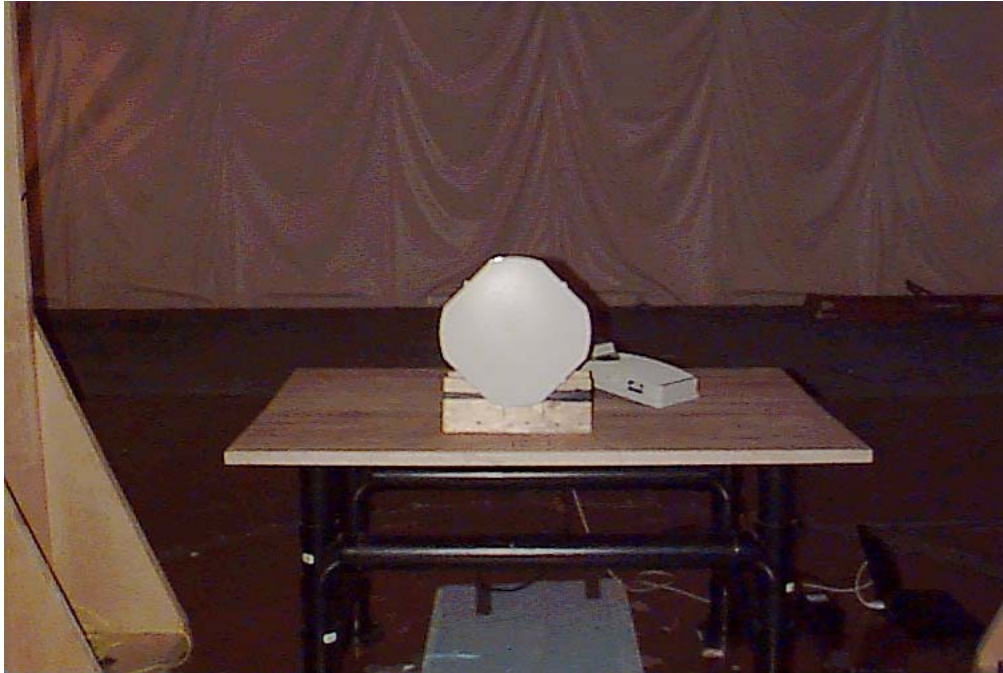


EQUIPMENT: 24GHz AirPair



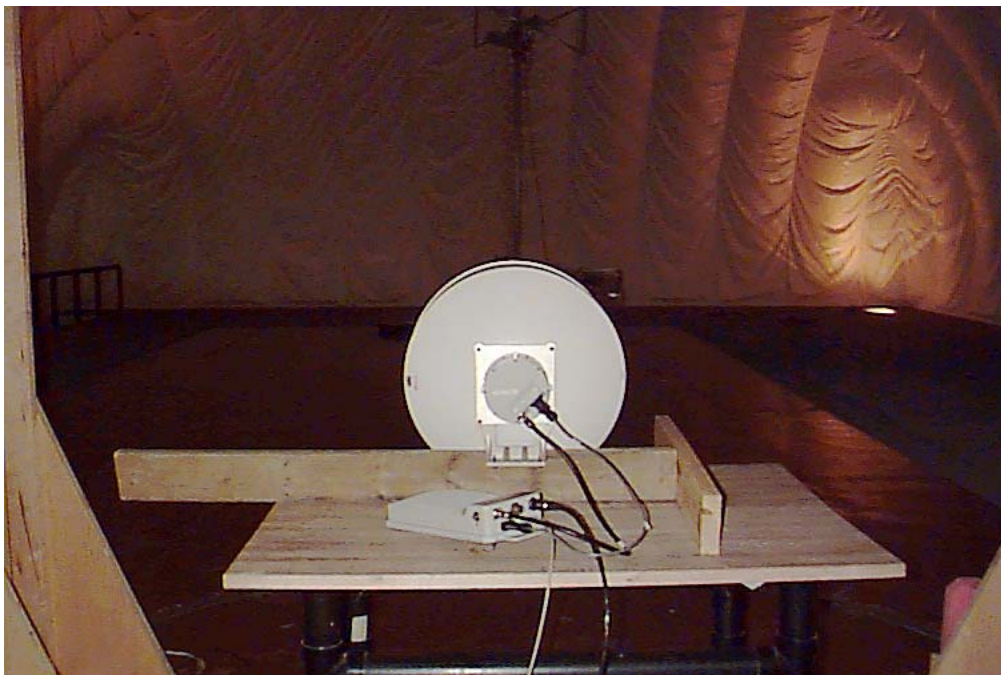
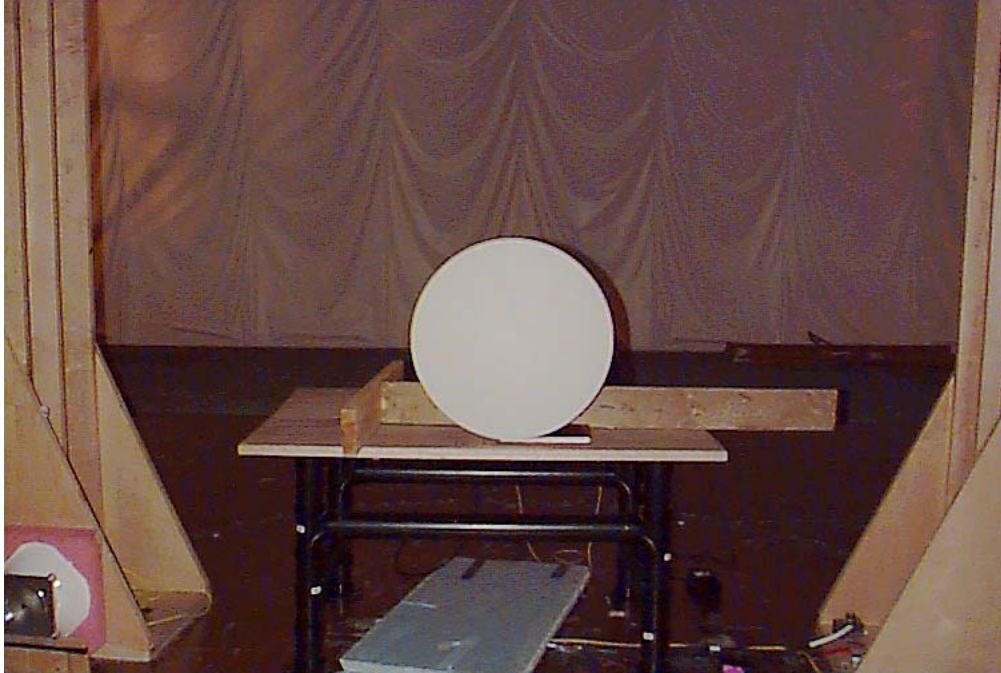
EQUIPMENT: 24GHz AirPair

Radiated Photo's
Small Antenna, 35.3dBi



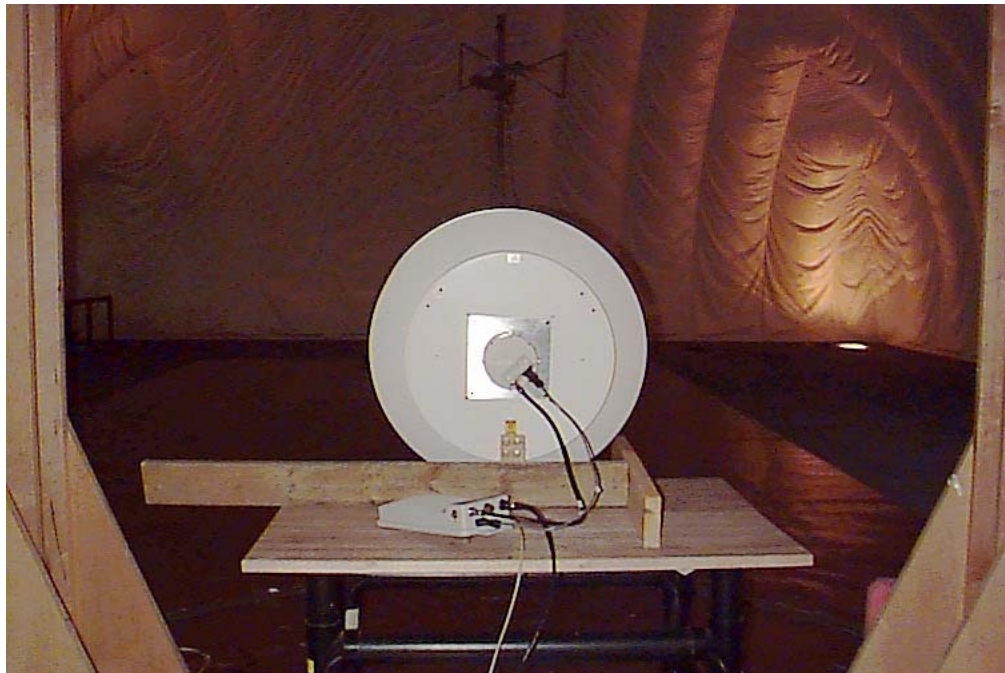
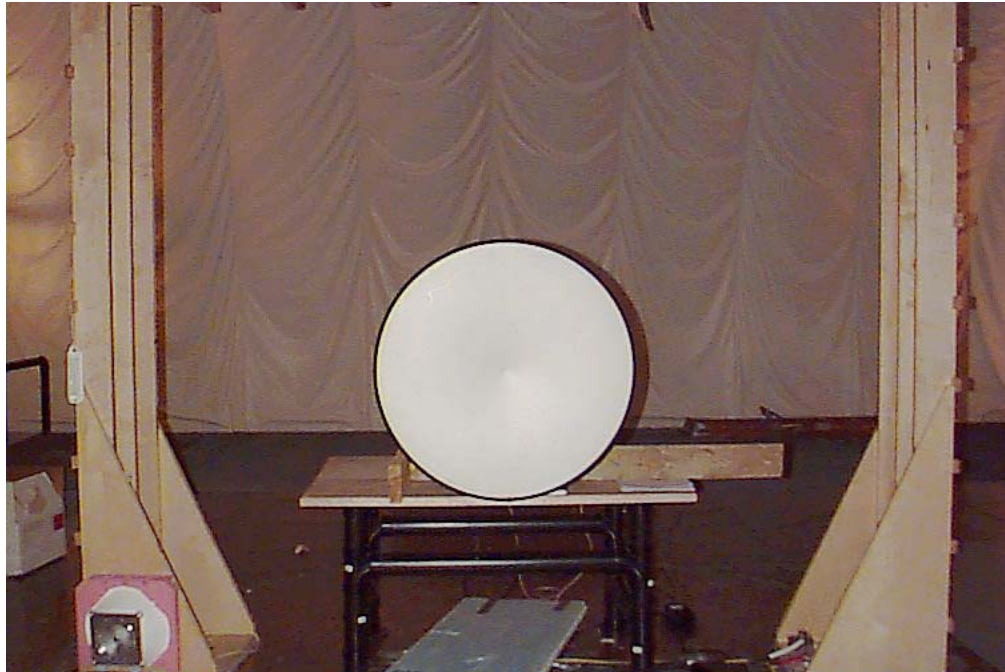
EQUIPMENT: 24GHz AirPair

Large Antenna, 40.7dBi



EQUIPMENT: 24GHz AirPair

Large Antenna, 44.2dBi



EQUIPMENT: 24GHz AirPair

Section 5. Frequency Stability**Para. No.: 15.249(a)(2)****Test Performed By: Glen Westwell****Date of Test: 10 Dec. 2003****Minimum Standard:** 0.001% (242KHz)**Test Results:** Complies.

The maximum frequency drift is 90 kHz.
This is 0.0004 %.

Measurement Data: Standard Test Voltage (STV): 120Vac
Standard Test Freq.(STF): 24 220.000MHz

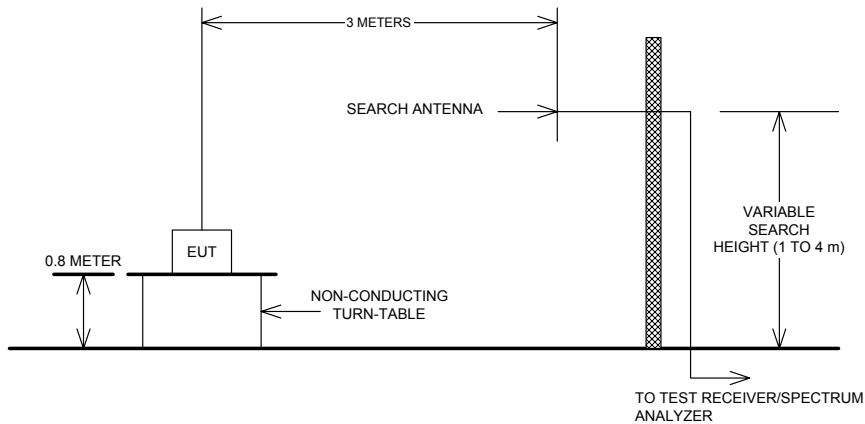
Test Condition	Frequency (MHz)	Frequency Drift (kHz)
STV	24 220. 078	78
115% STV	24 220. 078	78
85% STV	24 220. 078	78
-30 °C	24 220. 090	90
-20 °C	24 220. 090	90
-10 °C	24 220. 089	89
0 °C	24 220. 088	88
+10 °C	24 220. 088	88
+30 °C	24 220. 085	85
+40 °C	24 220. 086	86
+50 °C	24 220. 086	86

Section 6. Block Diagrams

Conducted Emissions

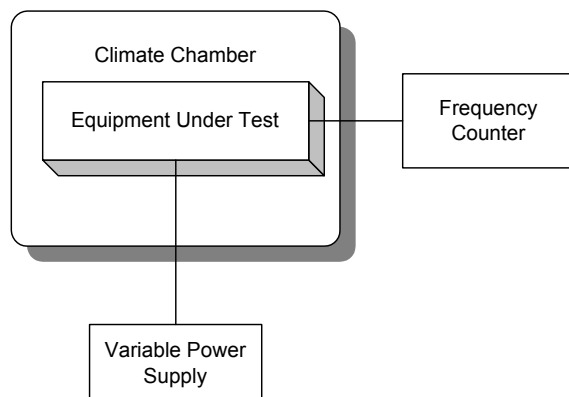


Test Site For Radiated Emissions



The spectrum was search up to the 10th harmonic of the fundamental frequency of operation.

Para. No. 7.0 - Frequency Stability



*EQUIPMENT: 24GHz AirPair***Section 7. Test Equipment List****RADIO TEST EQUIPMENT LIST**

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	Last Cal.	Next Cal.
1 Year	Spectrum Analyzer	Hewlett Packard	8564E	FA001367	13 May 03	13 May 04
1 Year	LISN	EMCO	4825/2	FA001545	Oct. 30/03	Oct. 30/04
1 Year	Climate Chamber	Thermotron	SM-16C	15649-S	16 Jan 03	16 Jan 04
1 Year	Spectrum Analyzer	Hewlett-Packard	8566B	FA001309	June. 05/03	June. 05/04
1 Year	Spectrum Analyzer Display	Hewlett-Packard	85662A	FA001309	June. 05/03	June. 05/04
NCR	Bilog	Schaffner	CBL6112B	FA001504	NCR	NCR
1 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-1	FA000479	COU	COU
1 Year	Standard Gain Horn	Electro-Metrics	SH-50/60-2	FA000485	COU	COU
1 Year	Horn Antenna #1	EMCO	3115	FA000649	Dec. 23/02	Dec. 23/03
1 Year	Horn Antenna	EMCO #5	3116	FA001847	13 Feb 03	13 Feb 04
1 Year	Diplexer	Olsen - OML	DPL.26 (H.P)		COU	COU
1 Year	Mixer/Antenna 40-60Ghz	Olsen – OML	M19HWA (H.P.)		COU	COU
1 Year	Mixer /Antenna 60-90Ghz	Olsen – OML	M12HWA (H.P.)		COU	COU
1 Year	Mixer / Antenna 90-140Ghz	Olsen – OML	M08HWA (H.P.)		COU	COU
1 Year	Power Meter	Hewlett Packard	E4418B	FA001413	08 May 03	08 May 04
1 Year	Power Sensor	Hewlett Packard	8487A	FA001419	15 May 03	15 May 04