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Date: 9 October 2003

**Report for Emissions Testing of EUM3004 Wireless Modem
In accordance with FCC Part 15, Subpart C (2000)**

Test Personnel: James MacKay, Jacky Wong, David Raynes

Prepared for: WaveRider Communications Inc.
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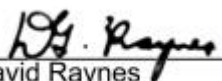

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APPENDIX A: Test Sample Description: EUM3004 Wireless Modem

1.0 INTRODUCTION

1.1 SCOPE

The purpose of this report is to present the findings and results of compliance testing performed in accordance with CFR Title 47 FCC Part 15, Subpart C, Intentional Radiators.

1.2 APPLICANT

This test report has been prepared for WaveRider Communications Inc., located in Toronto, Ontario, Canada.

1.3 APPLICABILITY

All test procedures, limits, and results defined in this document apply to the WaveRider Communications Inc. EUM3004 Wireless Modem unit, referred to herein as the Equipment Under Test (EUT).

The results contained in this report relate only to the item tested.

This report does not imply product endorsement by A2LA, NVLAP or the Canadian or US governments.

1.4 TEST SAMPLE DESCRIPTION

The test sample provided for testing was an EUM3004 Wireless Modem:

Product Type:	Wireless modem
Model Number:	EUM3004
Serial Number:	n/a
Cables:	ethernet, power, RF to antenna
Power	120 VAC 60 Hz to AC-DC power adapter
Requirements:	
Peripheral Equipment:	Personal Computer

More detailed information is provided by WaveRider Communications Inc. in Appendix A.

1.5 GENERAL TEST CONDITIONS AND ASSUMPTIONS

The EUT was set up and exercised using the configurations, modes of operation and arrangements defined in this report only. All inputs and outputs to and from other equipment associated with the EUT were adequately simulated.

Where relevant, the EUT was only tested using the monitoring methods and test criteria defined in this report.

Environmental conditions are recorded for each test.

1.6 SCOPE OF TESTING

Testing was performed in accordance with FCC Part 15 Subpart C (2000), and ANSI C63.4 (2000).

1.6.1 VARIATIONS IN TEST METHODS

There were no variations from the test procedures outlined above.

1.6.2 MARGINAL EMISSIONS MEASUREMENTS

As noted in Section 4, some emissions were measured to be within -6 dB of the specified limit:

1.6.3 TEST SAMPLE CONFIGURATION & MODIFICATIONS

The EUM3004 was set up as shown in the photographs. Special test firmware permitted the EUT to be configured to transmit continuously on a selected channel. Configuration commands were issued by a support computer located outside the test chamber.

The EUM3004 was positioned on a wooden table in the center of the turntable, when connected to the diversity antenna. This configuration was also used for measuring emissions in the Receive mode of operation.

For characterization of all other antennas, the EUM3004 was placed below the turntable groundplane.

The EUT met the requirements without modification.

2.0 ABBREVIATIONS

AP	-Average Peak
CE	-Conducted Emissions
E	-Field - Electric Field
H	-Field - Magnetic Field
N/T	-Not Tested
N/A	-Not Applicable
PK	-Peak
QP	-Quasi Peak
RE	-Radiated Emissions

3.0 MEASUREMENT UNCERTAINTY

For Radiated E-Field Emissions and Conducted Emissions, the uncertainties in the measurements were calculated using the methods outlined in the NAMAS document, NIS81: May 1984.

Frequency	= ± 1 kHz
Amplitude (RE)	= ± 4.01 dB
Amplitude (CE)	= ± 3.25 dB

4.0 TEST CONCLUSION

The EUT was subjected to the following tests. Compliance status is reported as **PASS** or **FAIL**. Test conditions that are not applicable to the EUT are marked **n/a**. If testing was not performed at this time, the appropriate field is marked **n/t**.

The following table summarizes the test results in terms of the specification and class or level applied, the unique test sample identification, the EUT modification state, and configuration as applicable.

TEST CASE	TEST TYPE	SPECIFICATION	TEST SAMPLE	MOD. STATE	CONFIGURATION	RESULT
§4.1	Conducted Emissions at AC lines	FCC Part 15.107 and 15.207	EUM3004 Wireless Modem	nil	See § 1.6.3	PASS
§4.2	Conducted Emissions at Antenna Port	FCC Part 15.247	EUM3004 Wireless Modem	nil	See § 1.6.3	PASS
§4.3a	Radiated Emissions (Rx Mode)	FCC Part 15.109	EUM3004 Wireless Modem	nil	See § 1.6.3	PASS
§4.3b	Radiated Emissions (Tx Mode)	FCC Parts 15.205, 15.209 and 15.247	EUM3004 Wireless Modem	nil	See § 1.6.3	PASS
§4.3c	Radiated Emissions (Field Strength of Spurious)	FCC Part 2.1053	EUM3004 Wireless Modem	nil	See § 1.6.3	PASS

STATEMENT OF COMPLIANCE

The client equipment referred to in this report was found to comply with the requirements as stated above.

4.1 CONDUCTED EMISSIONS ON AC POWER LINES

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: David Raynes Test Date: 7 October 2003			Product: EUM3004		
Test Result, EUM3004 Wireless Modem: PASS					
Objectives/Criteria The Conducted emissions produced by a system or sub-system shall not exceed the limits for the specifications as stated. Emission levels should meet the requirements with a margin of 6dB. Temperature = 19 °C Humidity = 37 %			Specification: Frequency (MHz) QP Avg 0.150 - 0.50 66 – 56 56 - 46 0.50 – 5.0 56 46 5 – 30 60 50 Units of measurement are dBµV.		
Line 1 Rx mode:			Line 2 Rx mode:		
Frequency [MHz]	RF Voltage [dBµV]	Delta [dB from limit]	Frequency [MHz]	RF Voltage [dBµV]	Delta [dB from limit]
0.15037	53.4	-2.58	0.15023	53.6	-2.40
0.20094	46.7	-6.87	0.22483	46.2	-6.44
0.22439	45.1	-7.55			
Line 1 Tx mode:			Line 2 Tx mode:		
Frequency [MHz]	RF Voltage [dBµV]	Delta [dB from limit]	Frequency [MHz]	RF Voltage [dBµV]	Delta [dB from limit]
0.15007	53.9	-2.08	0.15005	55.0	-1.00
0.20090	46.8	-6.77	0.22486	46.3	-6.34
0.22439	45.1	-7.55			
There were no more emissions measured within -6 dB of the specified limit. Refer to the test data and plots for more detail.					

Conducted Emissions Data:

The emissions data is presented in tabular form, showing the uncorrected spectrum analyzer reading, the type of detector, the correction factors applied, the net result, the value(s) of up to 4 limits at the frequency measured, and the margin between the result and the limit(s).

For example:

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
=====								
L1 .3052	35.6 pk	10	1.1	46.7	66	79	50.1	60.1
			Margin	[dB]	-19.3	-32.3	-3.4	-13.4

L1	This reading was taken on Line 1		
Test Frequency [MHz]	.3052	Test Frequency f = 0.3052 MHz (305.2 kHz)	
Meter Reading [dB (uV)]	35.6 pk	The reading with Peak detector	
Gain/Loss Factor [dB]	10	Net correction for preamp gain & cable loss	
Transducer Factor [dB]	1.1	Correction for LISN loss	
Level [dB (uVolts)]	46.7	Corrected value for voltage measurement	
Limit: 1	66	The value of Limit 1 at 0.3052 MHz	
Margin [dB]	-19.3	The measured voltage is 19.3 dB below Limit 1	
Limit: 2	79	The value of Limit 2 at 0.3052 MHz	
Margin [dB]	-32.3	The measured voltage is 32.3 dB below Limit 2	
Limit: 3	50.1	The value of Limit 3 at 0.3052 MHz	
Margin [dB]	- 3.4	The measured voltage is 3.4 dB below Limit 3	
Limit: 4	60.4	The value of Limit 4 at 0.3052 MHz	
Margin [dB]	-13.4	The measured voltage is 13.4 dB below Limit 4	

Meter Reading in dBuV + Gain/Loss Factor in dB + Transducer Factor in dB = Corrected Voltage

Note: When a preamp is used, the resulting gain is compensated.

WaveRider Communications Inc.

EUM3004

Receive Mode (905 MHz)

Project Number m01e2860

							§		§
Test	Meter	Gain/Loss	Transducer	Level	Limit:3	4	5	6	
No. Frequency	Reading	Factor	Factor	[dB(uVolts)]					
[MHz]	[dB(uV)]	[dB]	[dB]						
=====									
Line 1									
1	.15037	41.11 qp	10	2.29	53.4	79	65.98	69	55.98
				Margin [dB]		-25.6	-12.58	-15.6	-2.58
2	.20094	35.6 qp	10	1.1	46.7	79	63.57	69	53.57
				Margin [dB]		-32.3	-16.87	-22.3	-6.87
3	.22439	34.1 qp	10	1	45.1	79	62.65	69	52.65
				Margin [dB]		-33.9	-17.55	-23.9	-7.55
Line 2									
1	.15023	40.95 qp	10	2.65	53.6	79	66	69	56
				Margin [dB]		-25.4	-12.4	-15.4	-2.4
2	.22483	35.07 qp	10	1.13	46.2	79	62.64	69	52.64
				Margin [dB]		-32.8	-16.44	-22.8	-6.44

LIMIT 3: CISPR Class A QP

§ LIMIT 4: CISPR Class B QP

LIMIT 5: CISPR Class A Average

§ LIMIT 6: CISPR Class B Average

qp = Quasi-Peak detector

WaveRider Communications Inc.

EUM3004

Tx Mode (905 MHz)

Project Number m01e2860

							§		§
Test	Meter	Gain/Loss	Transducer	Level	Limit:3	4	5	6	
No. Frequency	Reading	Factor	Factor	[dB(uVolts)]					
[MHz]	[dB(uV)]	[dB]	[dB]						
=====									
Line 1									
1	.15007	41.61 qp	10	2.29	53.9	79	65.98	69	55.98
				Margin [dB]		-25.1	-12.08	-15.1	-2.08
2	.2009	35.7 qp	10	1.1	46.8	79	63.57	69	53.57
				Margin [dB]		-32.2	-16.77	-22.2	-6.77
3	.22439	34.1 qp	10	1	45.1	79	62.65	69	52.65
				Margin [dB]		-33.9	-17.55	-23.9	-7.55
Line 2									
1	.15005	42.35 qp	10	2.65	55	79	66	69	56
				Margin [dB]		-24	-11	-14	-1
2	.22486	35.17 qp	10	1.13	46.3	79	62.64	69	52.64
				Margin [dB]		-32.7	-16.34	-22.7	-6.34

LIMIT 3: CISPR Class A QP

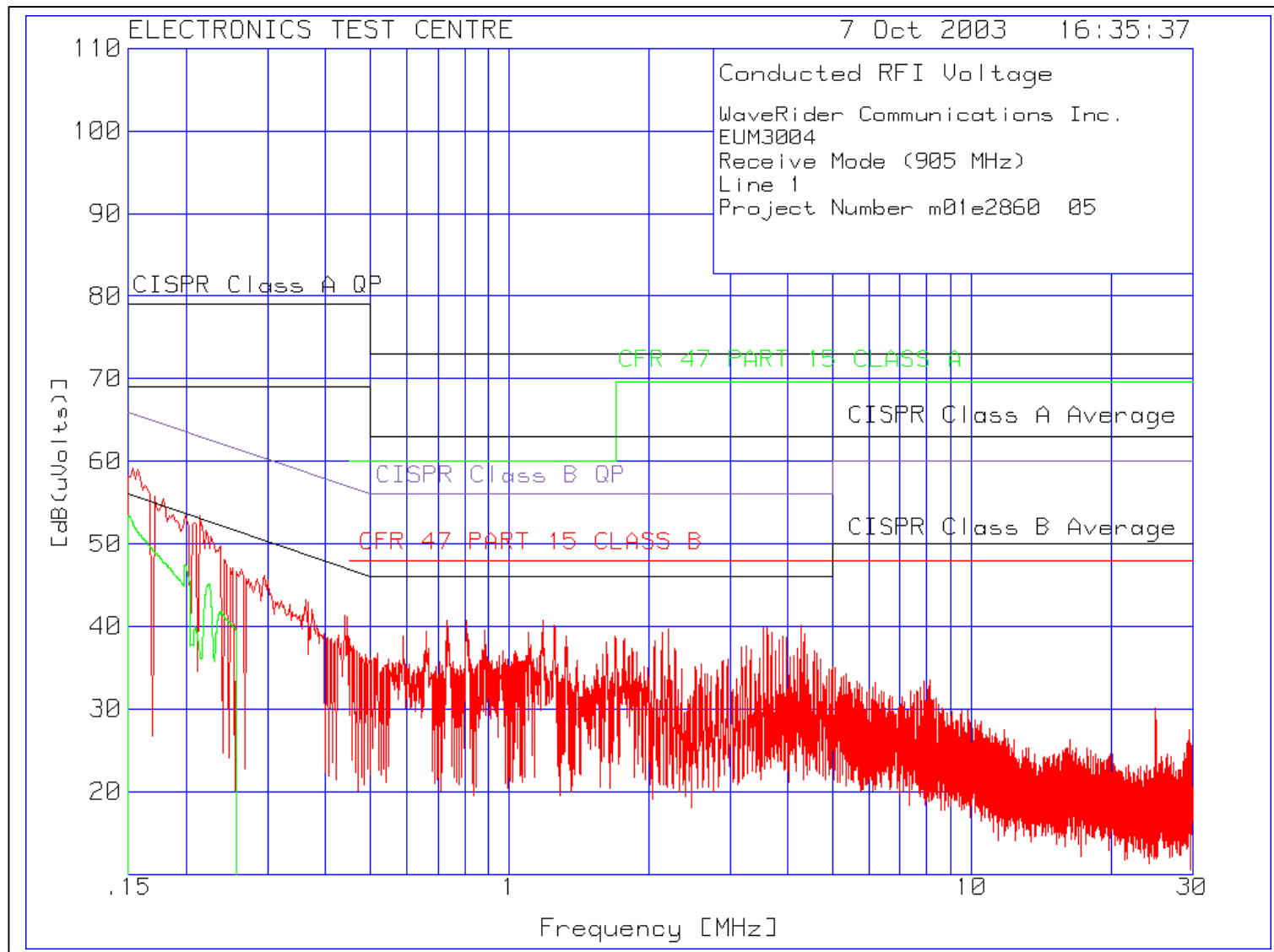
§ LIMIT 4: CISPR Class B QP

LIMIT 5: CISPR Class A Average

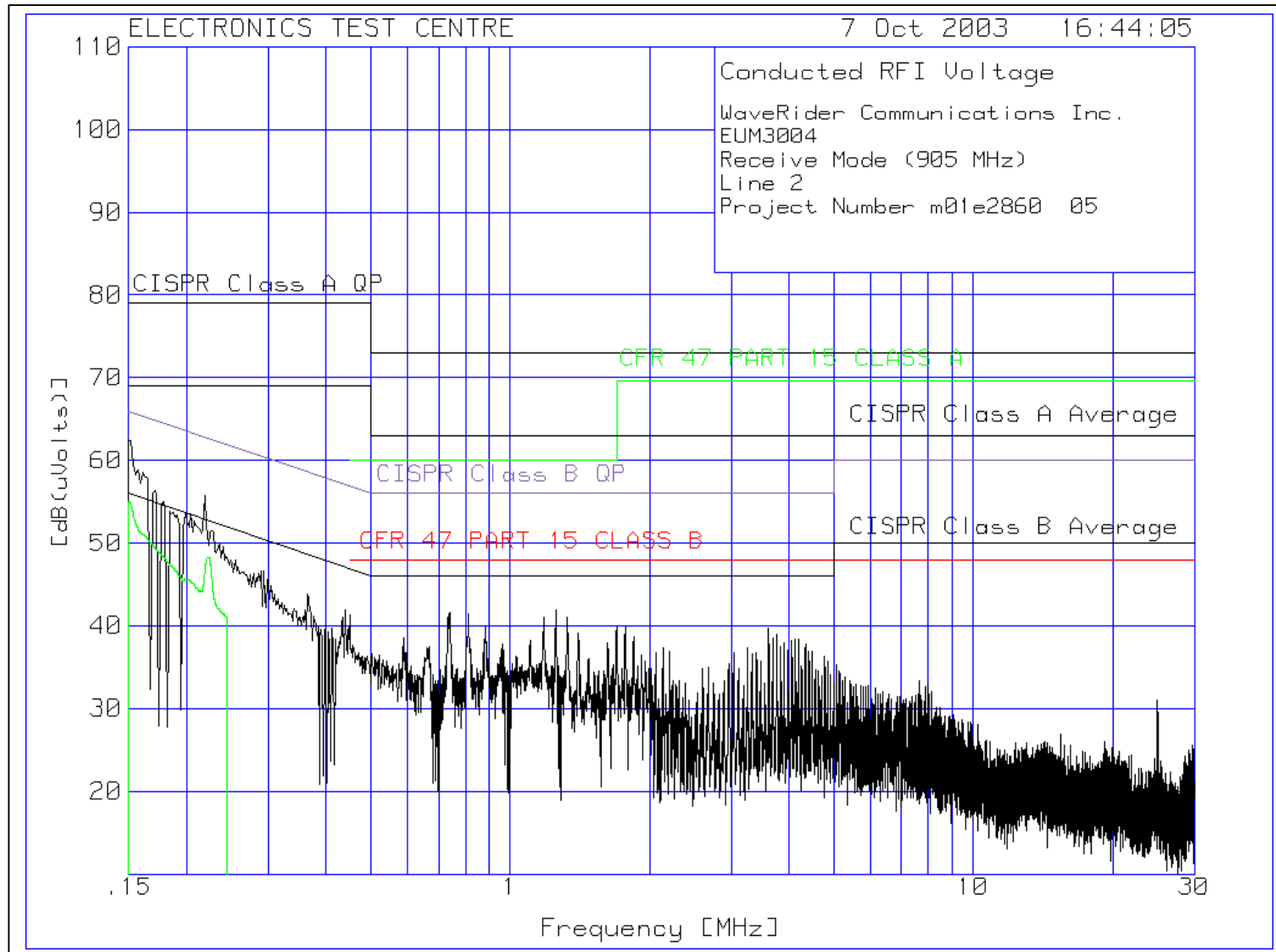
§ LIMIT 6: CISPR Class B Average

qp = Quasi-Peak detector

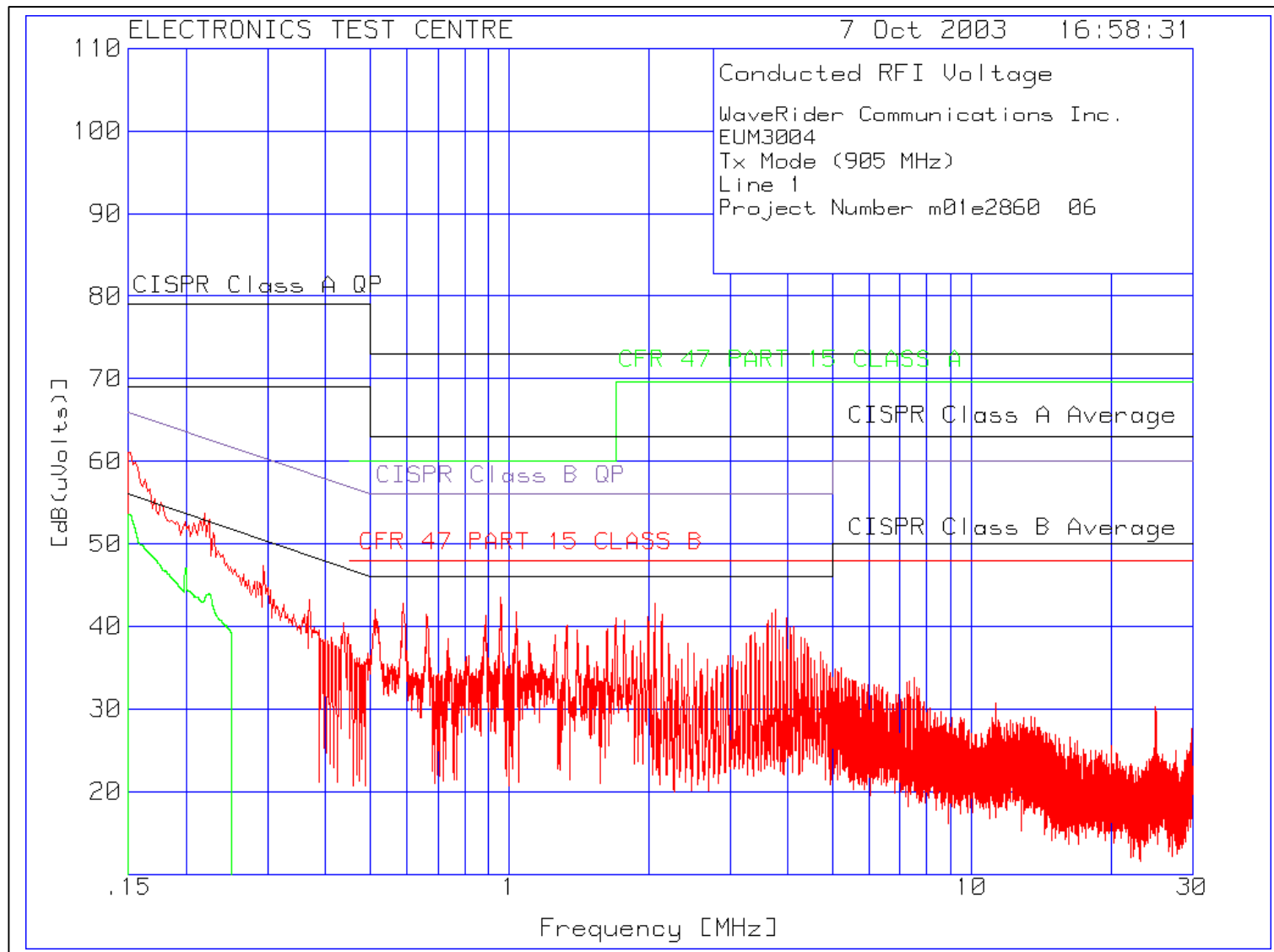
Plot of Conducted Emissions on AC Power Lines: Receive mode (green trace = QuasiPeak)



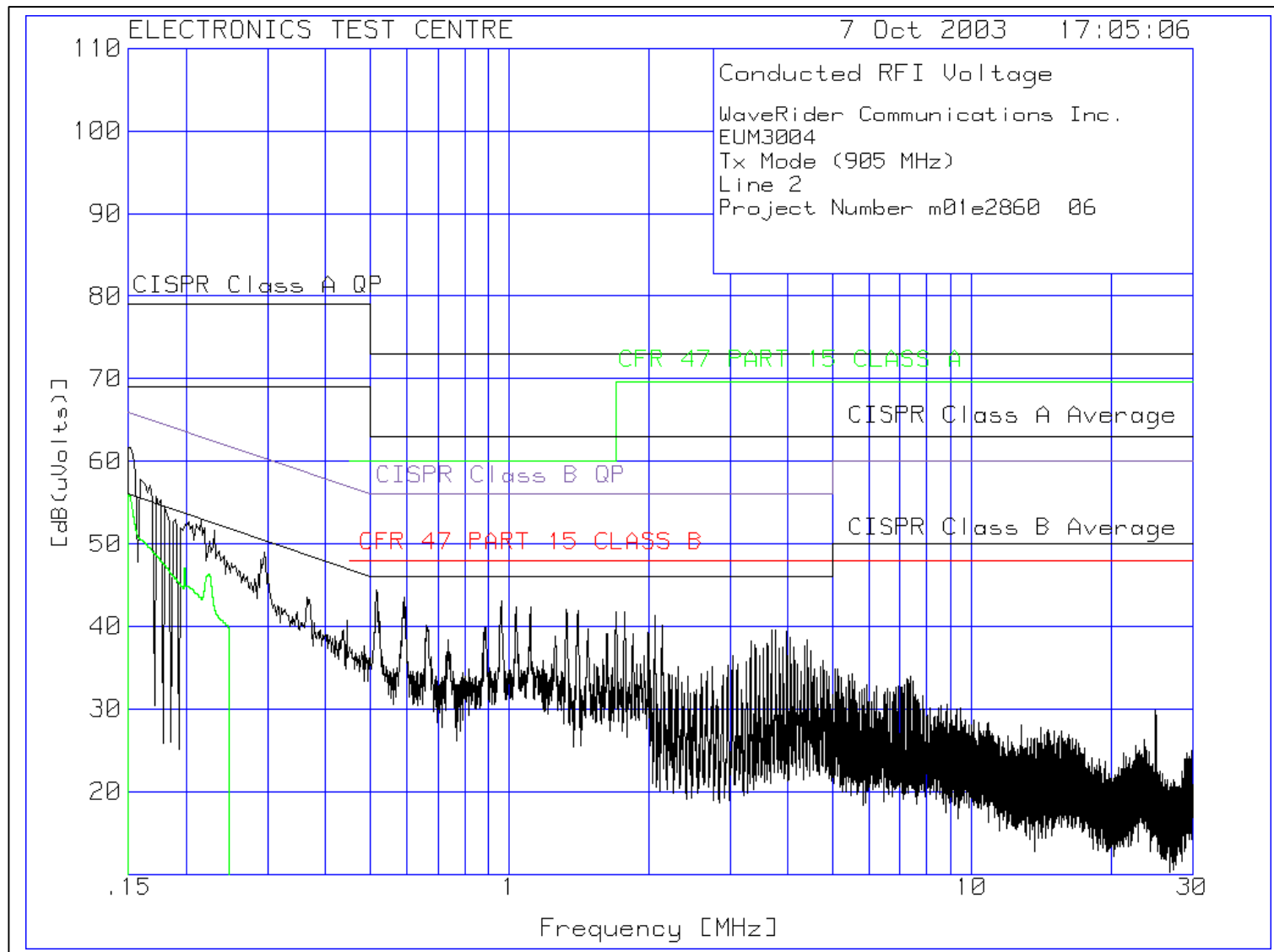
Plot of Conducted Emissions on AC Power Lines: Receive mode (green trace = QuasiPeak)



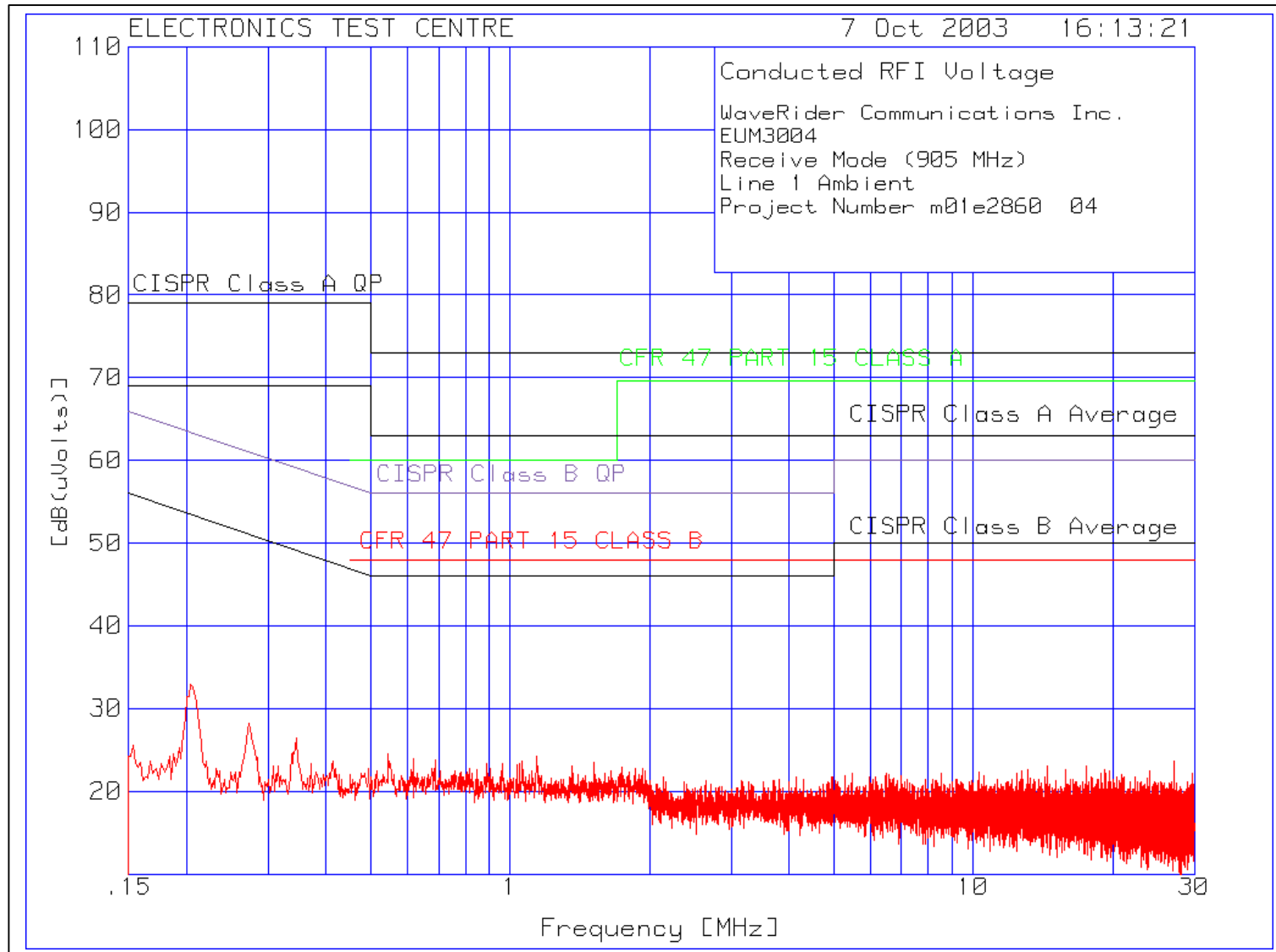
Plot of Conducted Emissions on AC Power Lines: Transmit mode (green trace = QuasiPeak)



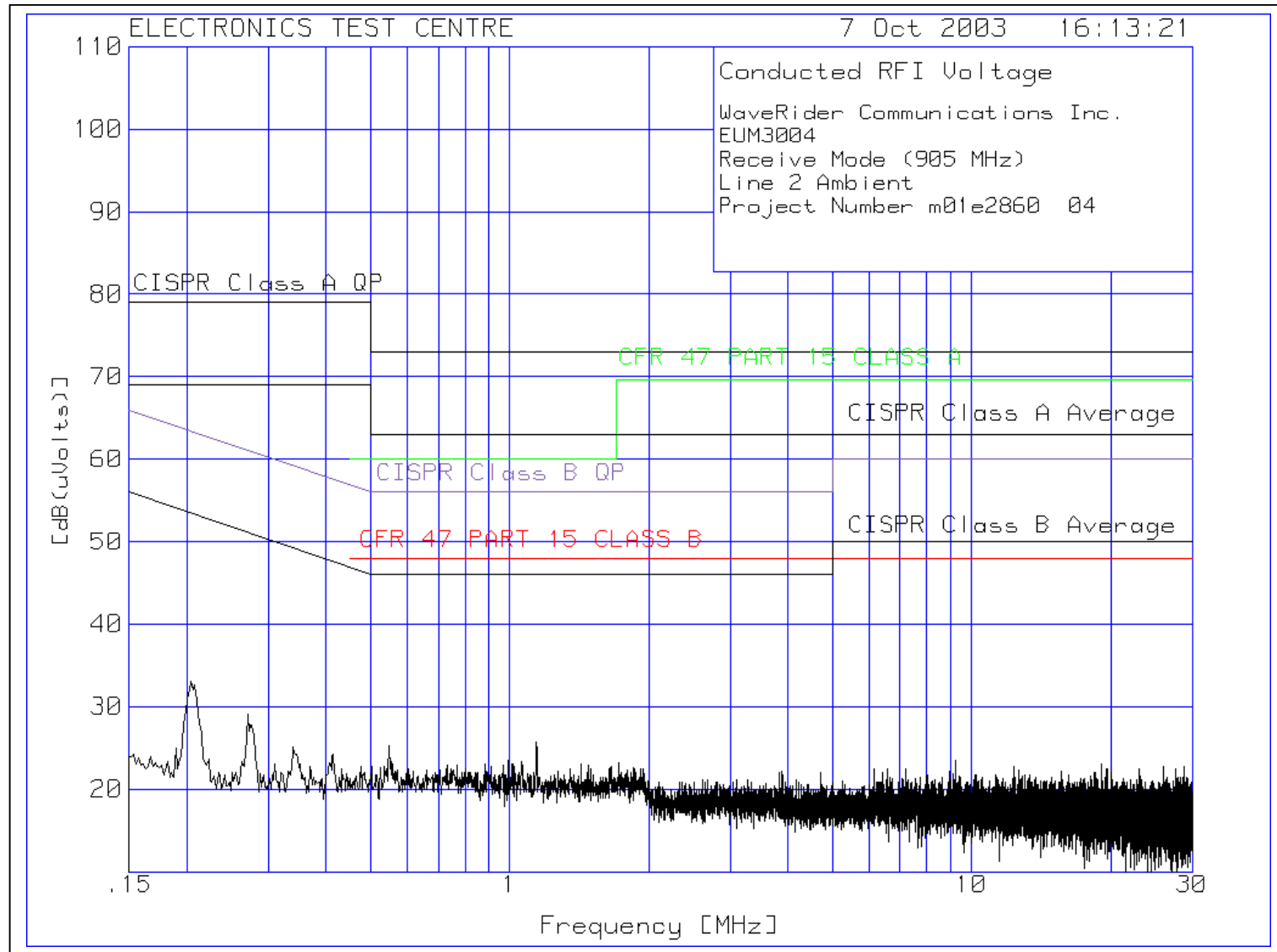
Plot of Conducted Emissions on AC Power Lines: Transmit mode (green trace = QuasiPeak)



Plot of Conducted Emissions on AC Power Lines Test Chamber Ambient:



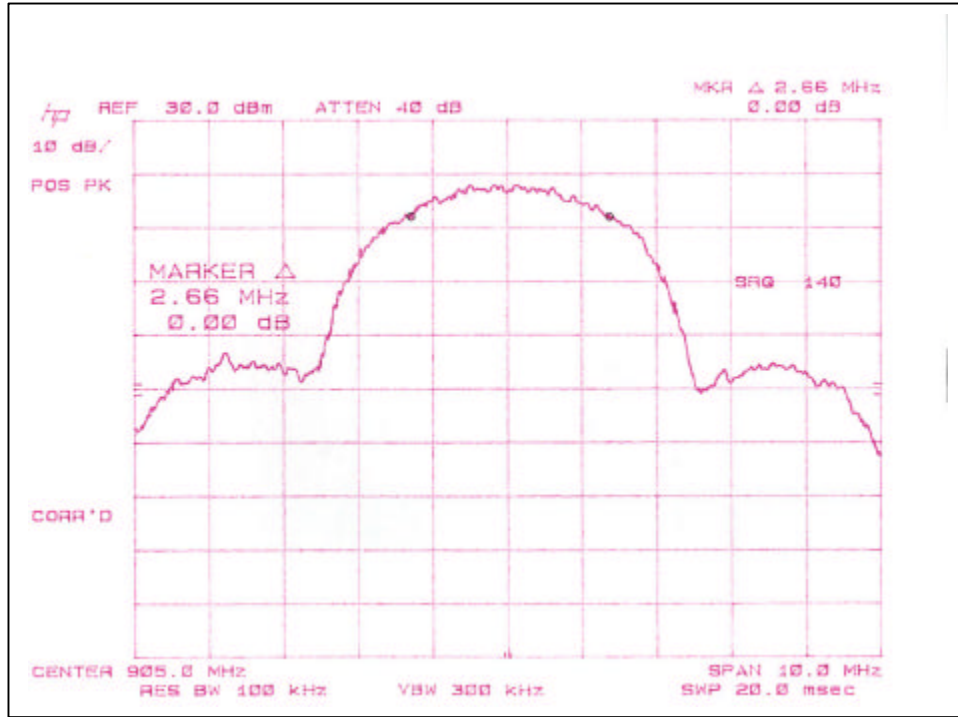
Plot of Conducted Emissions on AC Power Lines Test Chamber Ambient:



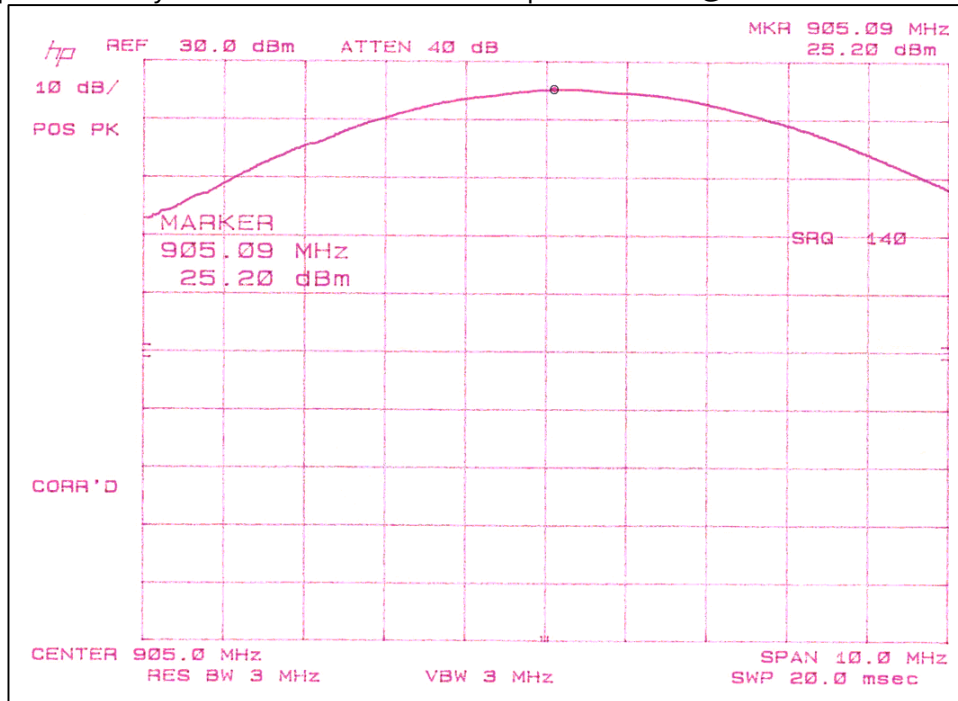
4.2 CONDUCTED EMISSIONS MEASURED AT ANTENNA PORT

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: David Raynes Test Date: 29 September 2003			Product: EUM3004 Wireless Modem		
Test Result, EUM3004: PASS					
Objectives/Criteria The Conducted emissions measured at the antenna port shall not exceed the limits for the specifications as stated.			Specifications: FCC Part 15.247c Temperature = 19 °C Humidity = 27%		
15.247(a): BW ≥ 500 kHz			15.247(b): 1 Watt (30 dBm) AC line = 120 Vrms, 60 Hz		
Carrier Frequency [MHz]	Bandwidth [MHz]	Delta from limit [MHz]	Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from limit]
905	2.66	2.16	905	25.2	-4.8
915	2.72	2.22	915	25.6	-4.4
925	2.69	2.19	925	26.1	-3.9
15.31(e) RF output @ 85% AC supply voltage			15.31(e) RF output @ 115% AC supply voltage		
Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from 100% supply]	Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from 100% supply]
905	25.2	0.0	905	25.3	+ 0.1
915	25.5	- 0.1	915	25.5	- 0.1
925	25.9	- 0.2	925	25.9	- 0.2
15.247(c): -20 dB fc			15.247(d): 8 dBm (115 dBμV)		
Carrier Frequency [MHz]	RF Voltage [dBμV]	Limit [dBμV]	Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from limit]
905	121.7	101.7	905	4.6	-3.4
915	122.1	102.1	915	4.6	-3.4
925	122.6	102.6	925	4.8	-3.2
There were no other emissions measured within -10 dB of the specified limits. Measurements were performed while the EUM3004 was transmitting continuously. Refer to the test data and plots for more detail.					

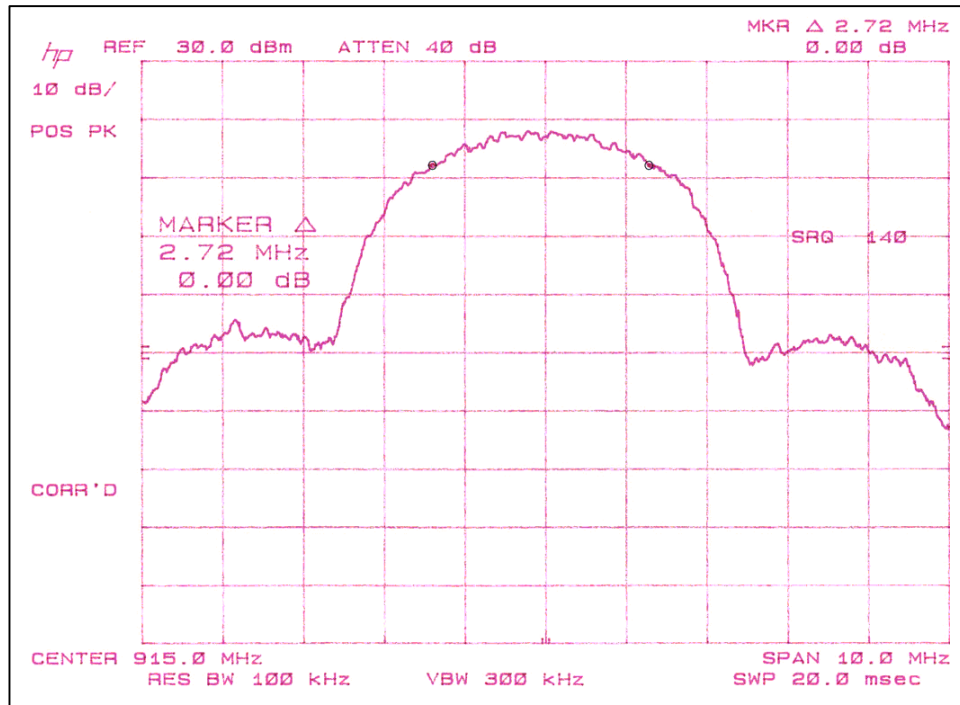
Spectrum Analyzer Plot of 6 dB Bandwidth: Tx @ 905 MHz



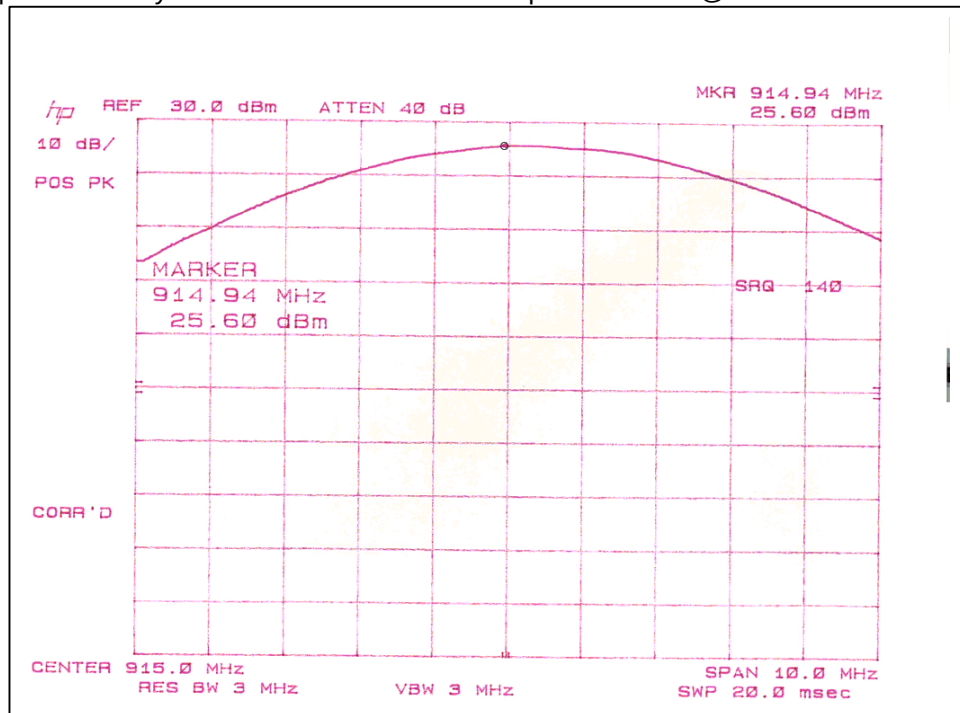
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 905 MHz



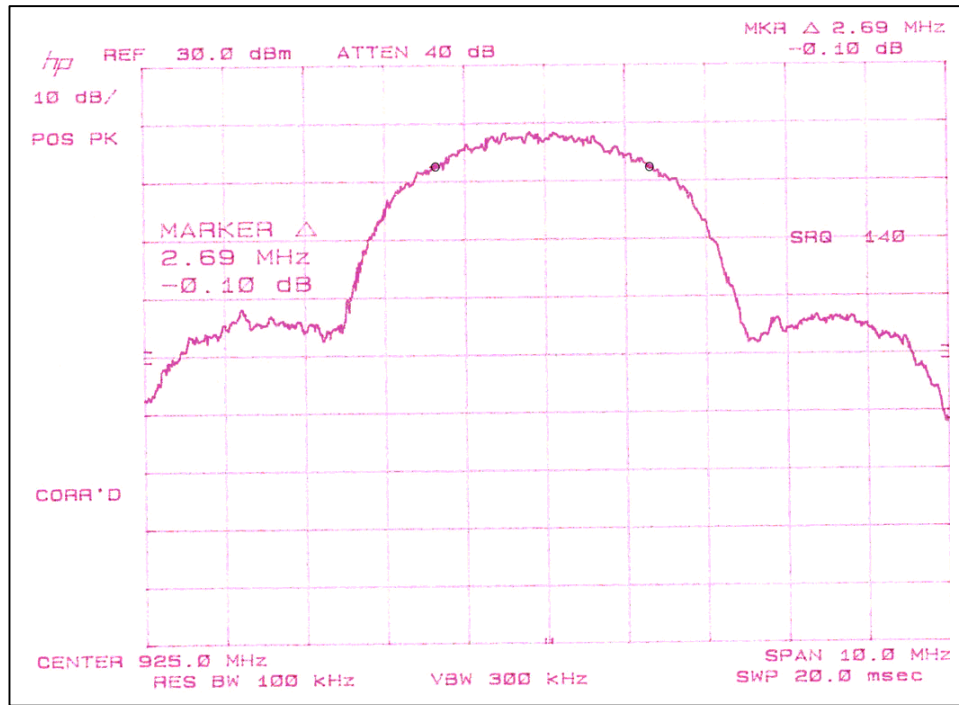
Spectrum Analyzer Plot of 6 dB Bandwidth: Tx @ 915 MHz



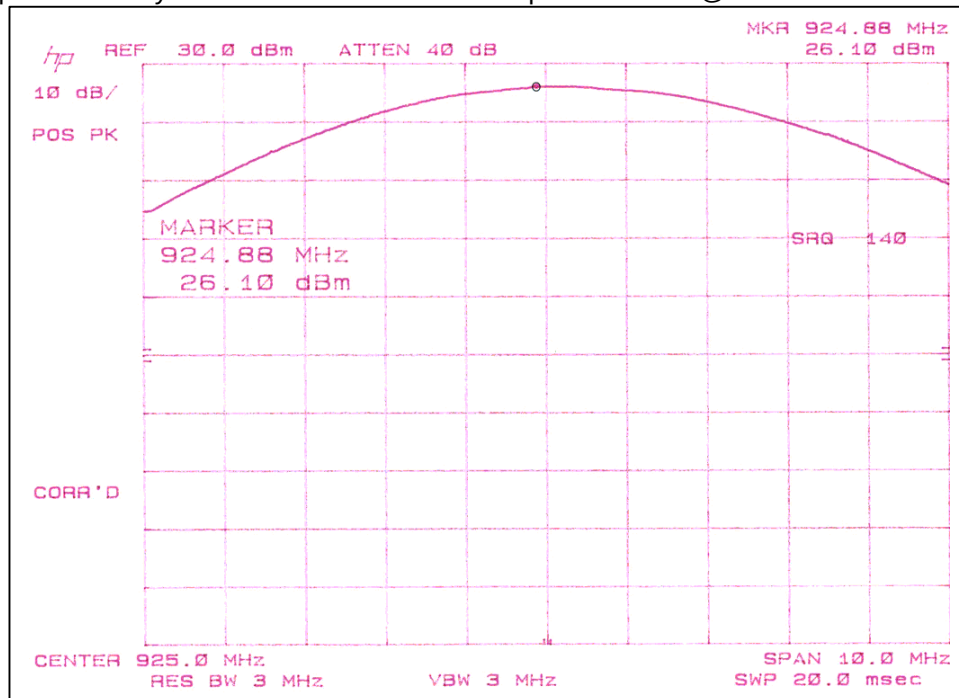
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 915 MHz



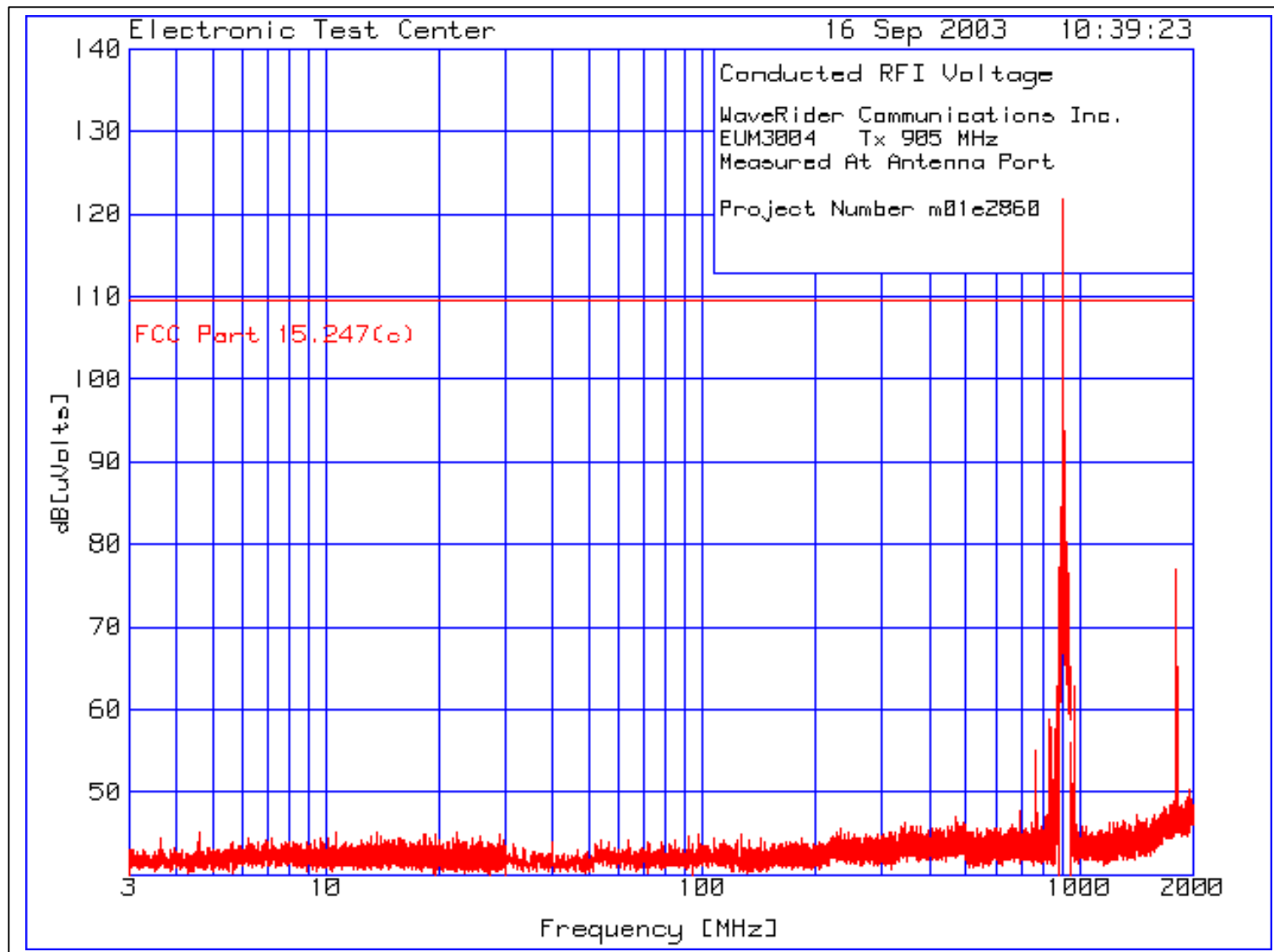
Spectrum Analyzer Plot of 6 dB Bandwidth: Tx @ 925 MHz



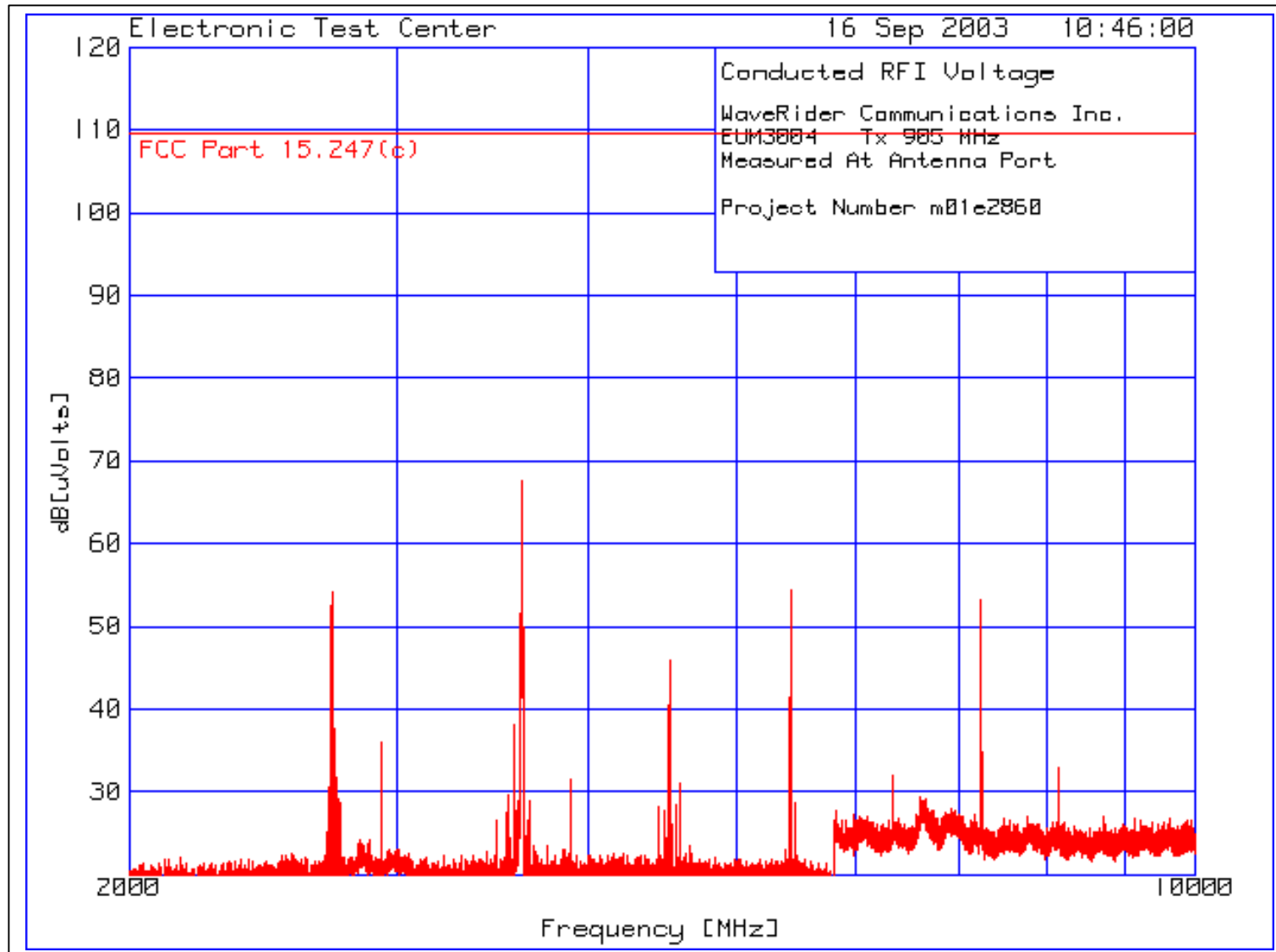
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 925 MHz



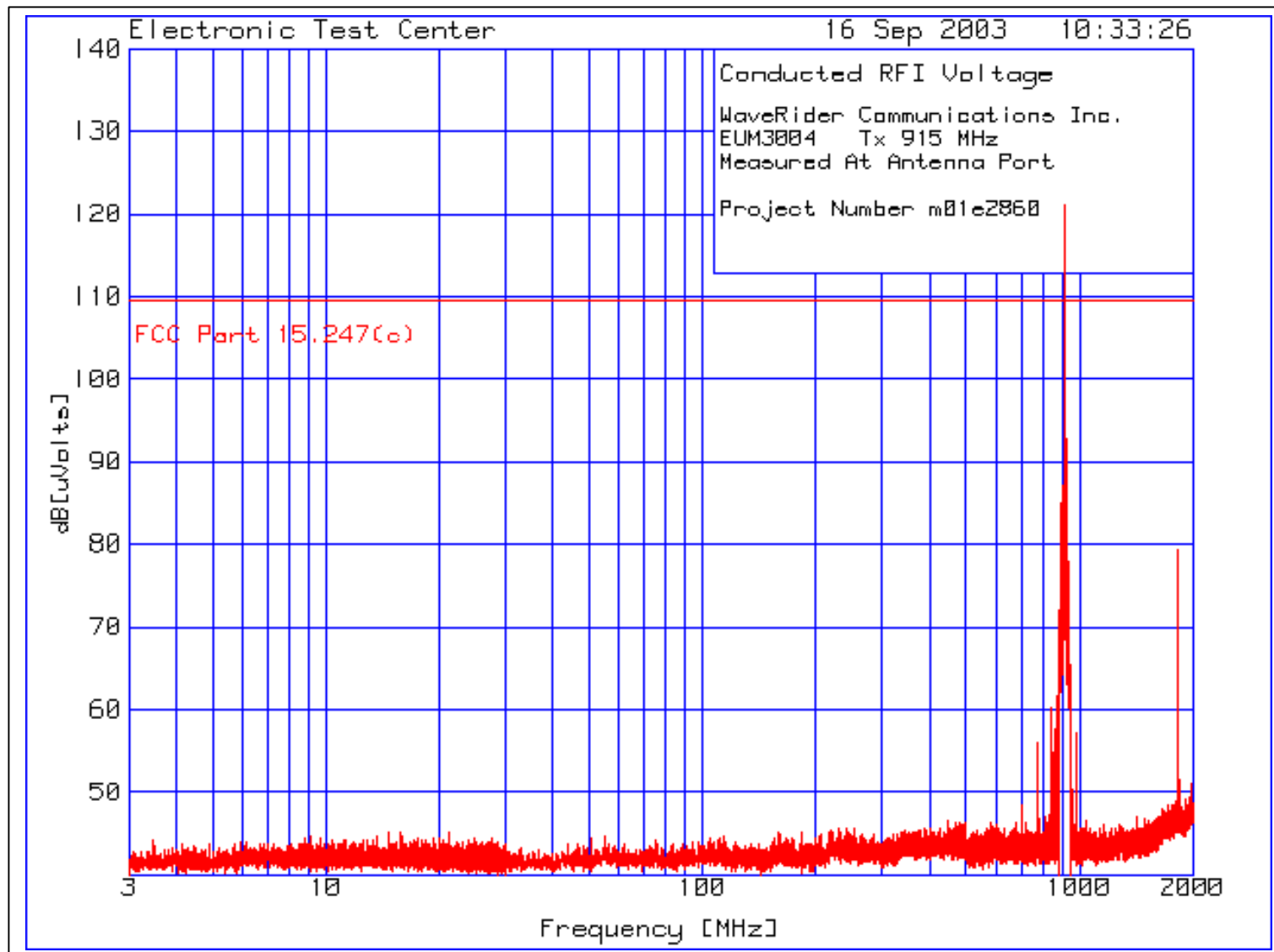
Plot of Conducted Emissions:



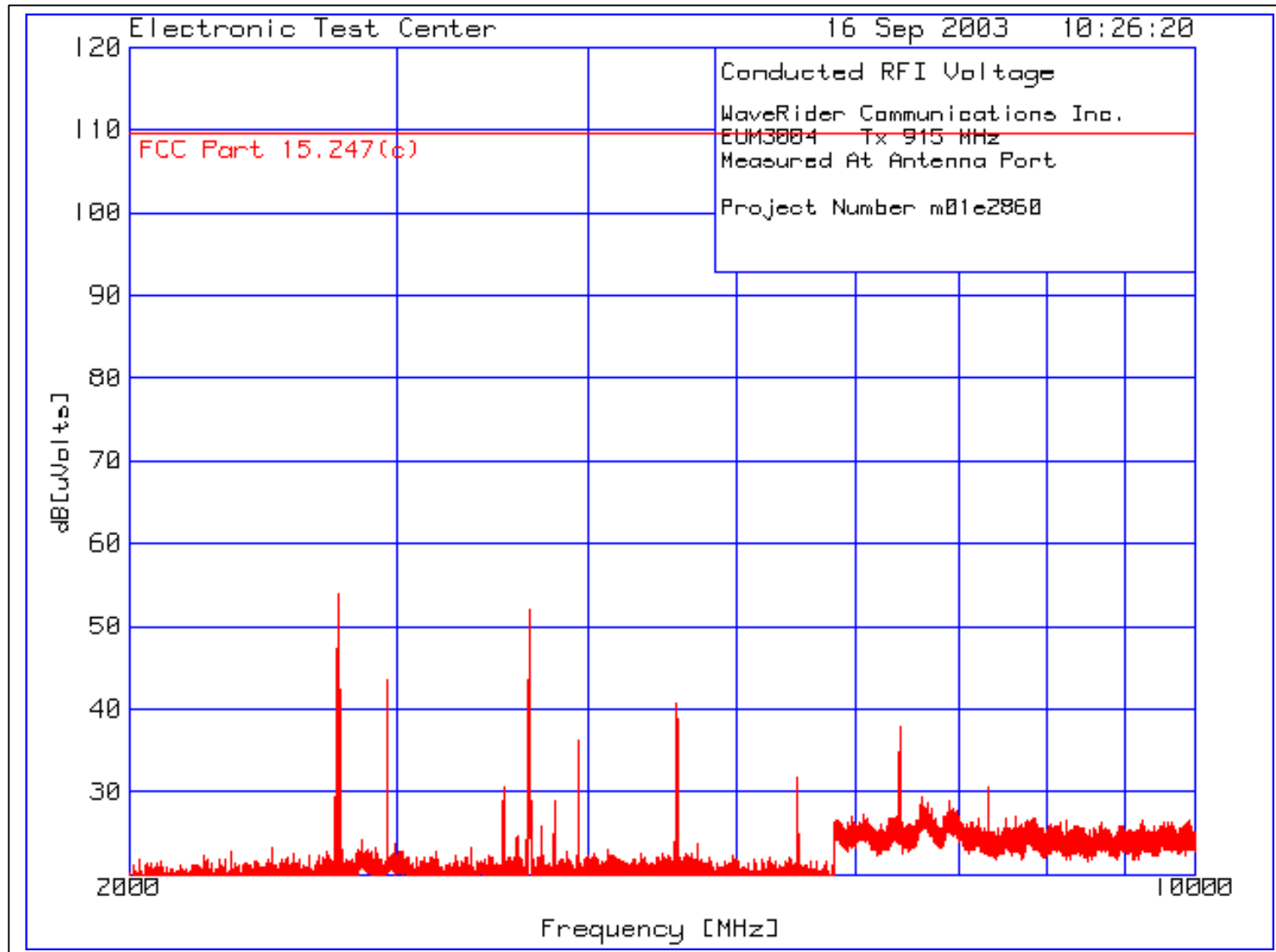
Plot of Conducted Emissions:



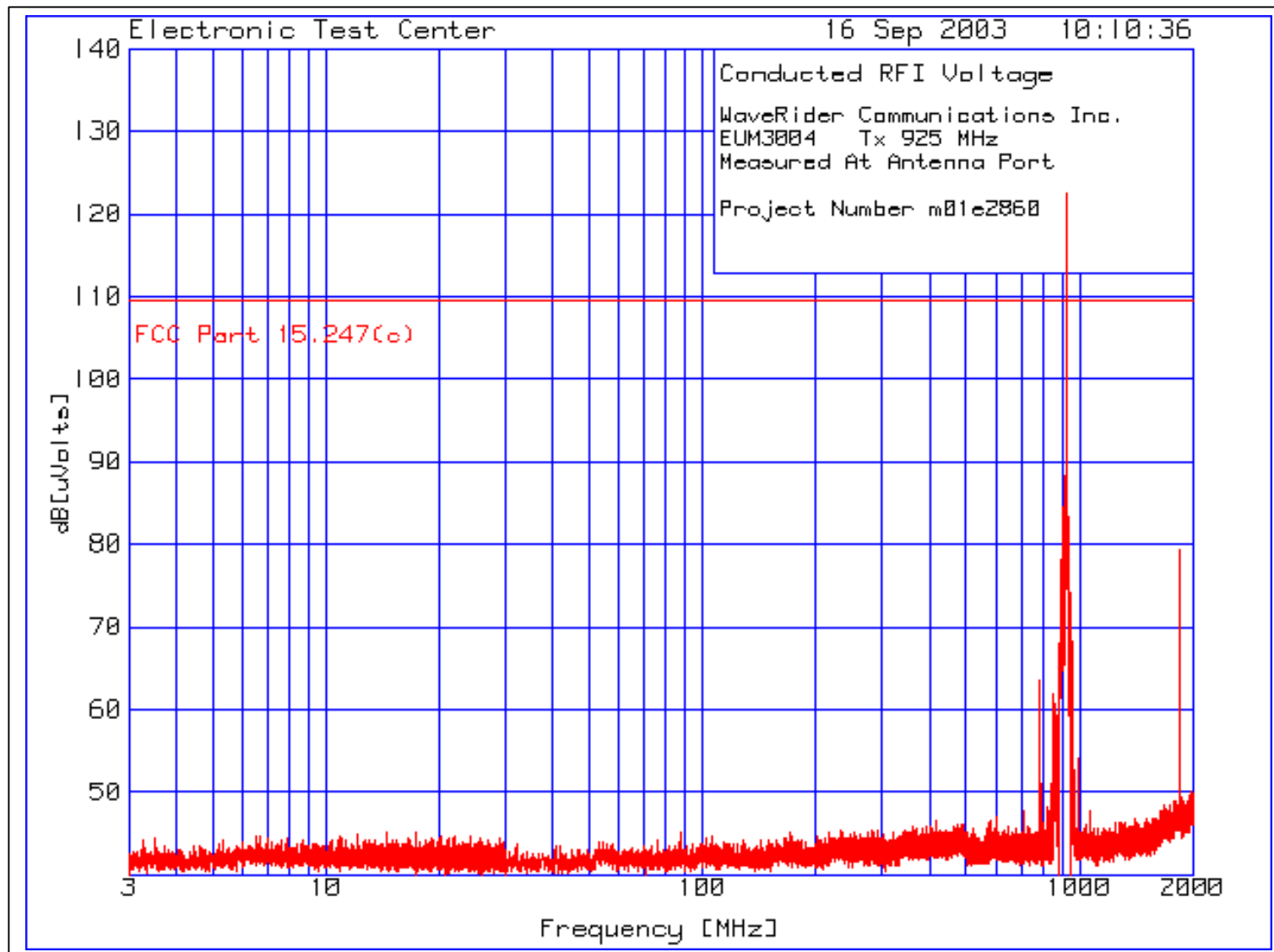
Plot of Conducted Emissions:



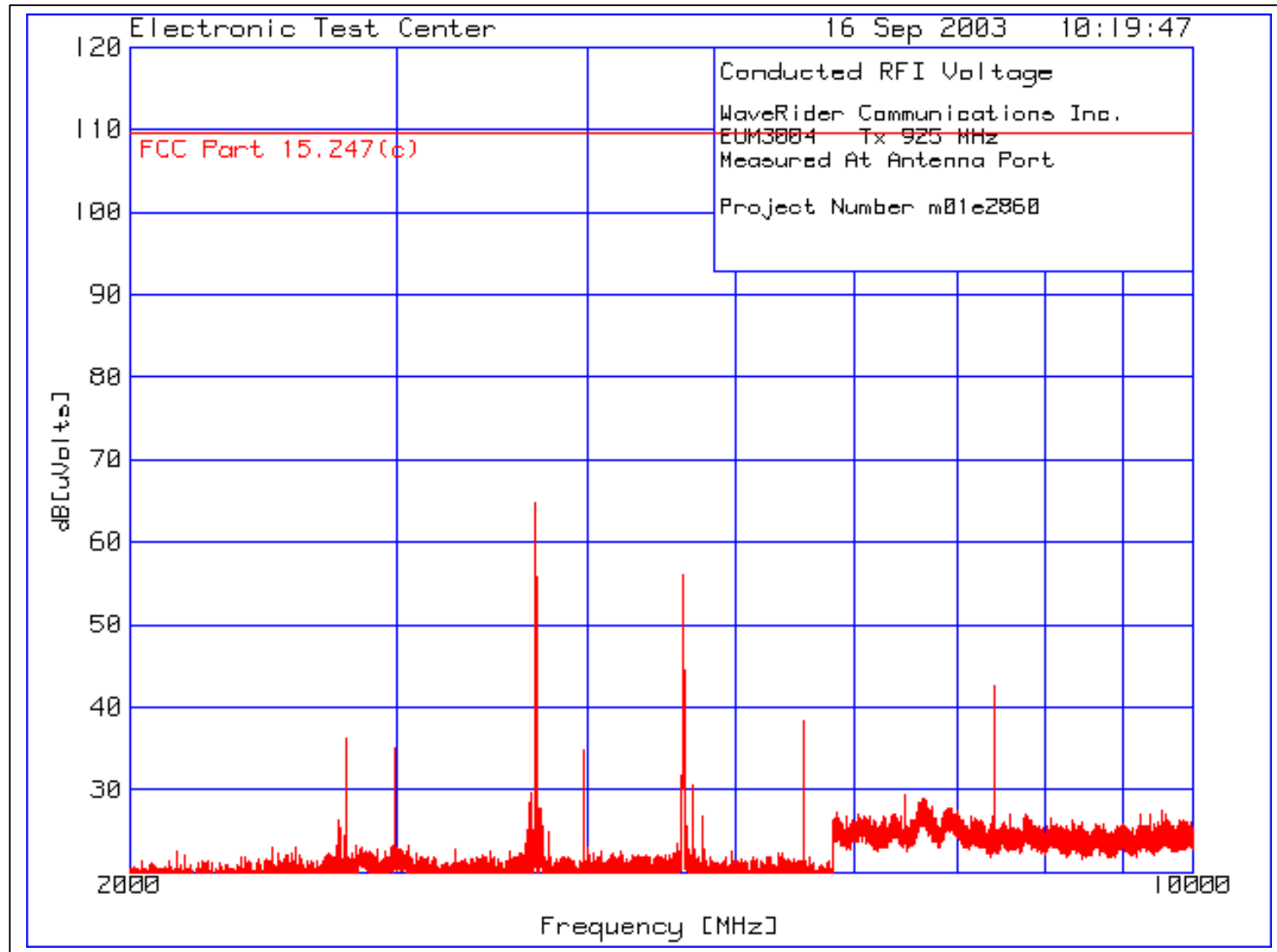
Plot of Conducted Emissions:



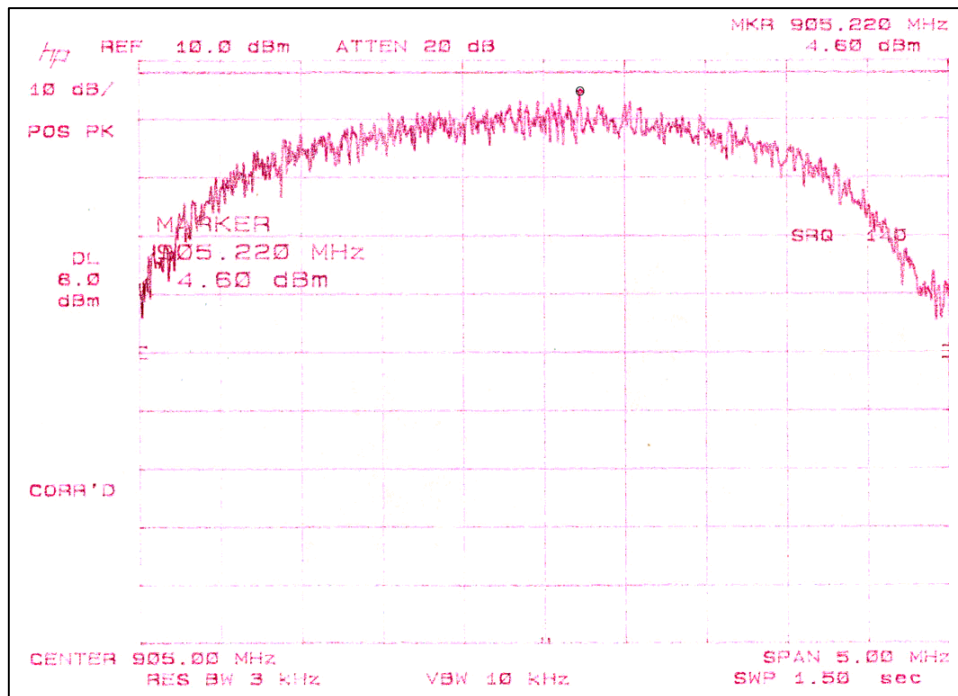
Plot of Conducted Emissions:



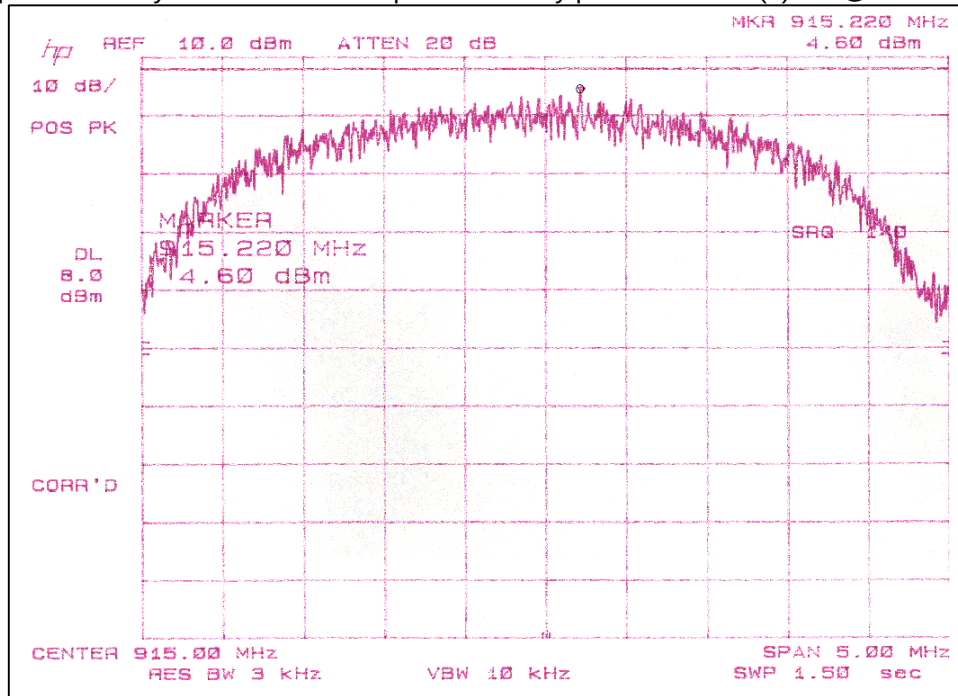
Plot of Conducted Emissions:



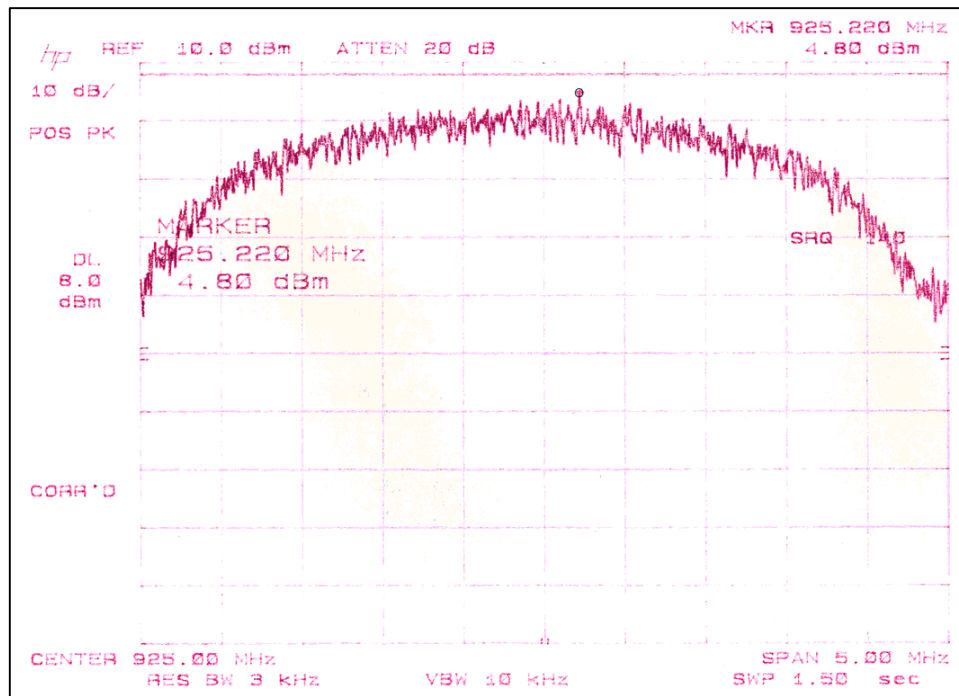
Spectrum Analyzer Plot of Power Spectral Density per Part 15.247(d): Tx @ 905 MHz



Spectrum Analyzer Plot of Power Spectral Density per Part 15.247(d): Tx @ 915 MHz:



Spectrum Analyzer Plot of Power Spectral Density per Part 15.247(d): Tx @ 925 MHz



4.3 RADIATED EMISSIONS INCLUDING RESTRICTED BANDS OF OPERATION

4.3a Receive Mode

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: D. Raynes. J. Wong Test Date: 14 September 2003 7, 8 October 2003			Product: EUM3004 Wireless Modem		
Test Result, EUM3004 Wireless Modem: PASS					
Objectives/Criteria The Radiated E-Field emissions produced by a system or sub-system, measured at a distance of 3m from the EUT, shall not exceed the limits for the specifications as stated. Emission levels should meet the requirements with a margin of 6dB. The EUT was assessed against the requirements of Class B . Temperature = 19 °C Humidity = 37 %			Specification: FCC Part 15 Subpart C		
			Frequency	Class A	Class B
			[MHz]	QP @ 3m	QP @ 3m
			30 – 88	49.54	40.00
			88 – 216	53.98	43.52
			216 – 960	56.90	46.02
			above 960	60.00	53.98
Horizontal:			Vertical:		
Frequency [MHz]	Field Strength [dBµV/m]	Delta [dB from limit]	Frequency [MHz]	Field Strength [dBµV/m]	Delta [dB from limit]
484.0061	44.07	-1.95	124.9953	40.53	-2.99
396.0082	42.14	-3.88			
352.0040	38.85	-7.17			
462.0061	38.61	-7.41			
440.0045	38.50	-7.52			
There were no more emissions measured within -6 dB of the specified limit. Refer to the test data and plots for more detail.					

Radiated Emissions Data:

The emissions data is presented in tabular form, showing the uncorrected spectrum analyzer reading, the correction factors applied, the net result, the value(s) of up to 4 limits at the frequency measured, and the margin between the result and the limit(s).

For example:

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB (uVolts)]	Limit: 1 [dB(uVolts)]	Limit: 2 [dB(uVolts)]	Limit: 3 [dB(uVolts)]	Limit: 4 [dB(uVolts)]
94.0036	37.1 qp	2.2	8.5	47.8	54	43.5	50.5	40.5
Azimuth: 156	Height: 113	Vert	Margin [dB]	-6.2	4.3	-2.7	7.3	

Test Frequency [MHz]	94.0036	Test Frequency f = 94.0036 MHz
Meter Reading [dB (uV)]	37.1 qp	The reading with Quasi-Peak detector
Gain/Loss Factor [dB]	2.2	Net correction for preamp gain & cable loss
Transducer Factor [dB]	8.5	Correction for antenna loss
Level [dB (uVolts)]	47.8	Corrected value for field strength
Limit: 1	54	The value of Limit 1 at 94.0036 MHz
Margin [dB]	-6.2	The field strength is 6.2 dB below Limit 1
Limit: 2	43.5	The value of Limit 2 at 94.0036 MHz
Margin [dB]	4.3	The field strength is 4.3 dB above Limit 2
Limit: 3	50.5	The value of Limit 3 at 94.0036 MHz
Margin [dB]	-2.7	The field strength is 2.7 dB below Limit 3
Limit: 4	40.5	The value of Limit 4 at 94.0036 MHz
Margin [dB]	7.3	The field strength is 7.3 dB above Limit 4

Meter Reading in dBuV + Gain/Loss Factor in dB + Transducer Factor in dB = Corrected Field Strength

Note: When a preamp is used, the resulting gain is compensated.

WaveRider Communications Inc.
EUM3004
Receive Mode (905 MHz)
Project Number m01e2860 01 H

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
Range: 1 30 - 1000MHz								
40.3437	12.5 qp	1.61	15.6	29.71	49.54	50	40	40.46
Azimuth: 35	Height:101	Horz	Margin	[dB]:	-19.83	-20.29	-10.29	-10.75
352.1718	.6 qp	5.12	13.7	19.42	56.9	57	46.02	47.46
Azimuth: 0	Height:101	Horz	Margin	[dB]:	-37.48	-37.58	-26.6	-28.04
395.9492	17.26 qp	5.51	14.62	37.39	56.9	57	46.02	47.46
Azimuth: 230	Height:99	Horz	Margin	[dB]:	-19.51	-19.61	-8.63	-10.07
417.9717	16.5 qp	5.58	15.53	37.61	56.9	57	46.02	47.46
Azimuth: 97	Height:248	Horz	Margin	[dB]:	-19.29	-19.39	-8.41	-9.85
39.3997	5.73 qp	1.54	15.71	22.98	49.54	50	40	40.46
Azimuth: 42	Height:101	Horz	Margin	[dB]:	-26.56	-27.02	-17.02	-17.48
352.004	20.04 qp	5.11	13.7	38.85	56.9	57	46.02	47.46
Azimuth: 284	Height:102	Horz	Margin	[dB]:	-18.05	-18.15	-7.17	-8.61
396.0082	22.01 qp	5.51	14.62	42.14	56.9	57	46.02	47.46
Azimuth: 187	Height:102	Horz	Margin	[dB]:	-14.76	-14.86	-3.88	-5.32
418.0023	13.47 qp	5.58	15.53	34.58	56.9	57	46.02	47.46
Azimuth: 19	Height:229	Horz	Margin	[dB]:	-22.32	-22.42	-11.44	-12.88
440.0045	17.66 qp	5.72	15.12	38.5	56.9	57	46.02	47.46
Azimuth: 84	Height:200	Horz	Margin	[dB]:	-18.4	-18.5	-7.52	-8.96
462.0061	16.86 qp	5.95	15.8	38.61	56.9	57	46.02	47.46
Azimuth: 98	Height:195	Horz	Margin	[dB]:	-18.29	-18.39	-7.41	-8.85
484.0061	21.49 qp	5.89	16.69	44.07	56.9	57	46.02	47.46
Azimuth: 110	Height:196	Horz	Margin	[dB]:	-12.83	-12.93	-1.95	-3.39
499.9787	10.34 qp	6.15	16.58	33.07	56.9	57	46.02	47.46
Azimuth: 289	Height:187	Horz	Margin	[dB]:	-23.83	-23.93	-12.95	-14.39
528.0081	6.53 qp	6.51	17.19	30.23	56.9	57	46.02	47.46
Azimuth: 1	Height:170	Horz	Margin	[dB]:	-26.67	-26.77	-15.79	-17.23
910.2019	.34 qp	8.25	22.18	30.77	56.9	57	46.02	47.46
Azimuth: 59	Height:155	Horz	Margin	[dB]:	-26.13	-26.23	-15.25	-16.69
Range: 2 30 - 1000MHz								
92.1165	12.14 qp	2.67	6.84	21.65	53.98	50	43.52	40.46
Azimuth: 81	Height:103	Vert	Margin	[dB]:	-32.33	-28.35	-21.87	-18.81
124.9953	26.39 qp	3.18	10.96	40.53	53.98	50	43.52	40.46
Azimuth: 250	Height:100	Vert	Margin	[dB]:	-13.45	-9.47	-2.99	.07
LIMIT 1: FCC Part 15 Class A 3m								
LIMIT 2: CISPR Class A 3m								
LIMIT 3: FCC Class B 3m								
LIMIT 4: CISPR Class B 3m								

WaveRider Communications Inc.
EUM3004
Receive Mode (905 MHz)
Project Number m01e2860 01 H

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
=====								
Range: 2 30 - 1000MHz								
132.7256	11.37 qp	3.16	10.02	24.55	53.98	50	43.52	40.46
Azimuth: 236	Height:101	Vert	Margin	[dB]:	-29.43	-25.45	-18.97	-15.91
199.9952	21.38 qp	3.86	8.99	34.23	53.98	50	43.52	40.46
Azimuth: 139	Height:99	Vert	Margin	[dB]:	-19.75	-15.77	-9.29	-6.23
352.0118	14.97 qp	5.11	13.68	33.76	56.9	57	46.02	47.46
Azimuth: 148	Height:173	Vert	Margin	[dB]:	-23.14	-23.24	-12.26	-13.7
462.005	13.03 qp	5.95	15.6	34.58	56.9	57	46.02	47.46
Azimuth: 158	Height:132	Vert	Margin	[dB]:	-22.32	-22.42	-11.44	-12.88
LIMIT 1: FCC Part 15 Class A 3m								
LIMIT 2: CISPR Class A 3m								
D LIMIT 3: FCC Class B 3m								
LIMIT 4: CISPR Class B 3m								

qp = Quasi-Peak detector

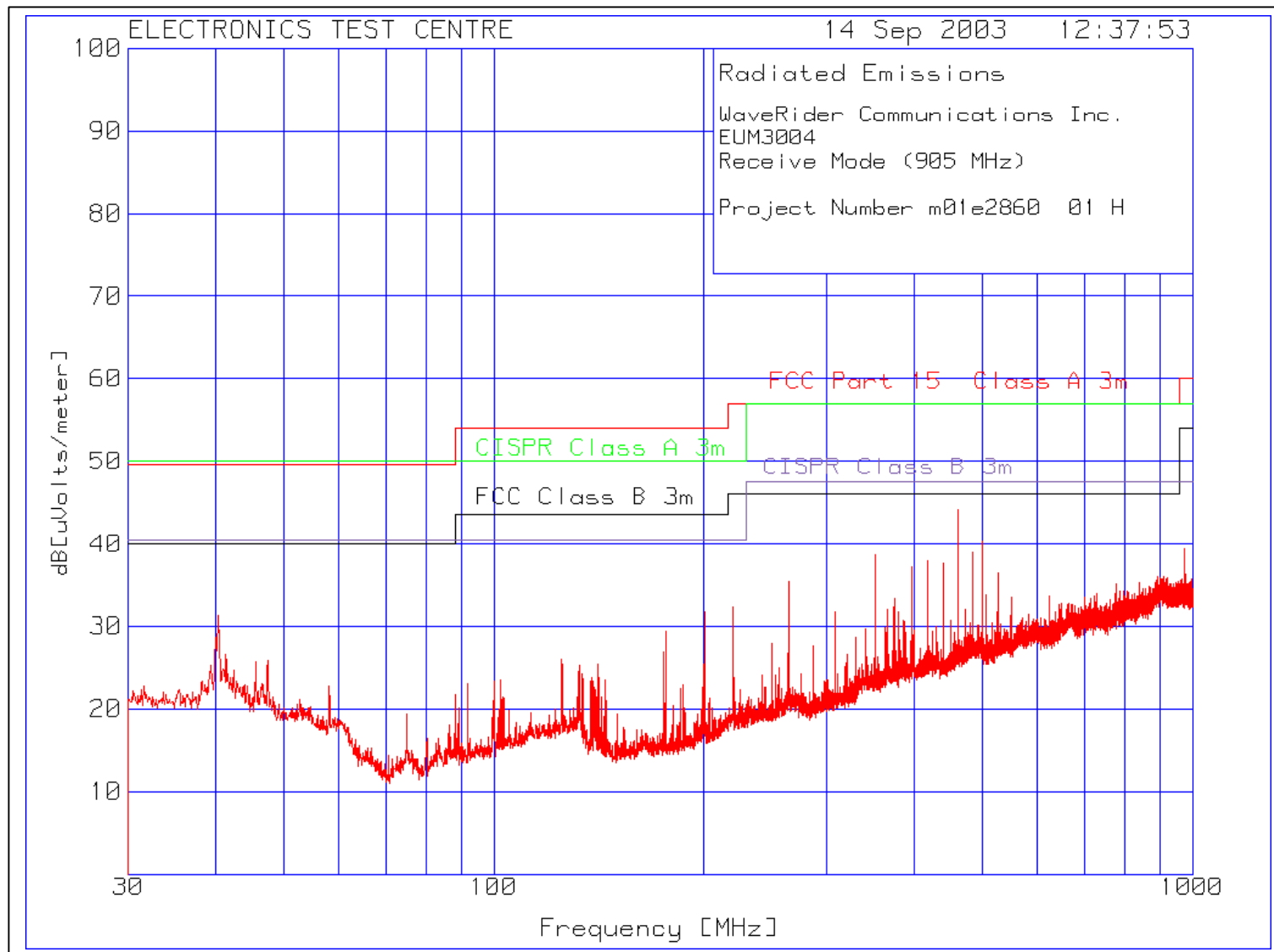
Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2
=====						
Range: 3 1000 - 5000MHz						
2985.0151	47.2 av	-31.38	31.48	47.3	60	53.98
Azimuth: 32	Height:99	Horz	Margin	[dB]:	-12.7	-6.68
3979.9477	31.6 av	-31.76	34.14	33.98	60	53.98
Azimuth: 347	Height:287	Horz	Margin	[dB]:	-26.02	-20
Range: 2 1000 - 5000MHz						
3980.1152	29.95 av	-31.76	34.15	32.34	60	53.98
Azimuth: 105	Height:277	Vert	Margin	[dB]:	-27.66	-21.64

LIMIT 1: FCC Part 15 Class A 3m

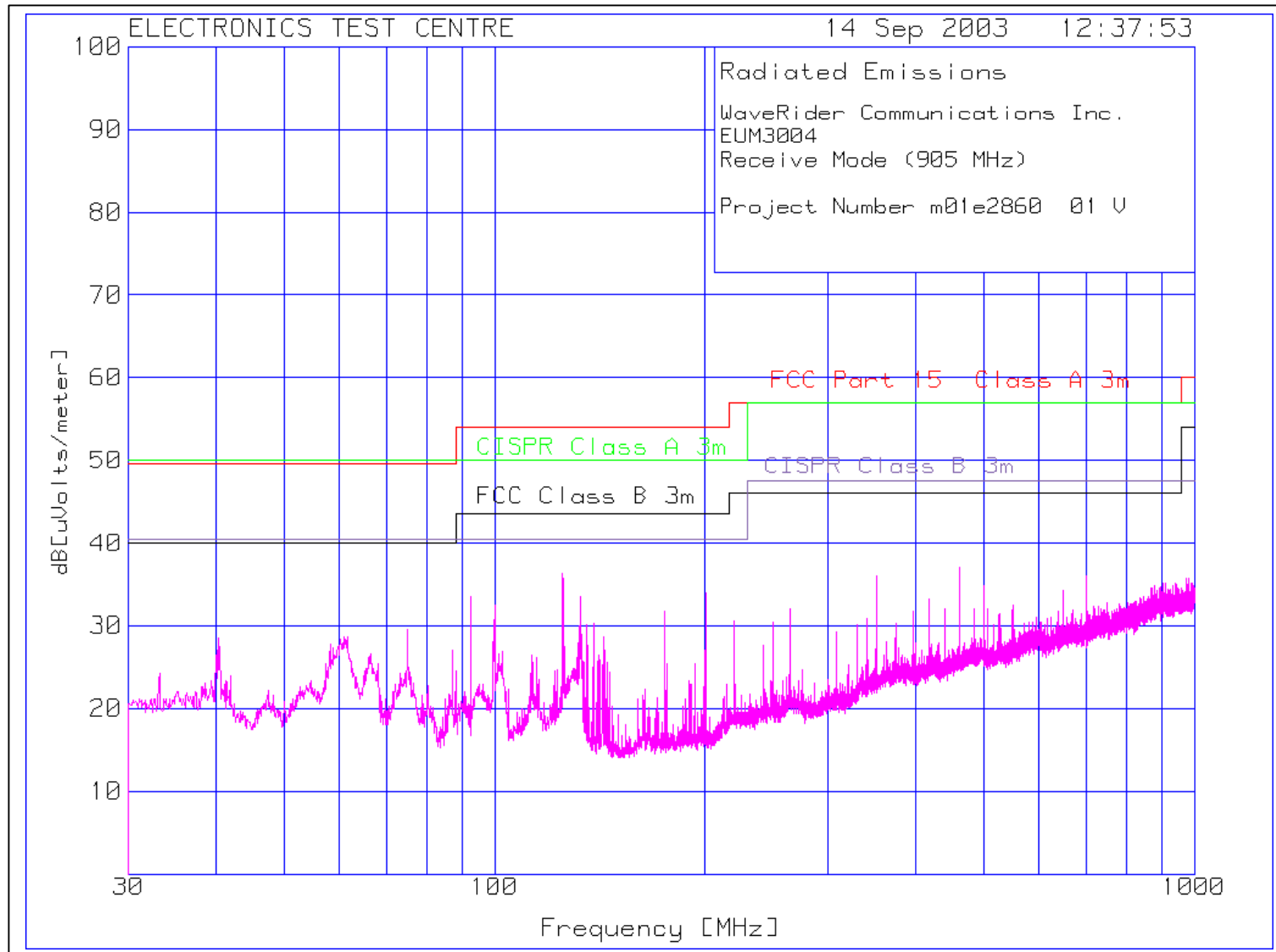
D LIMIT 2: FCC Part 15 Class B 3m

av - Average detector

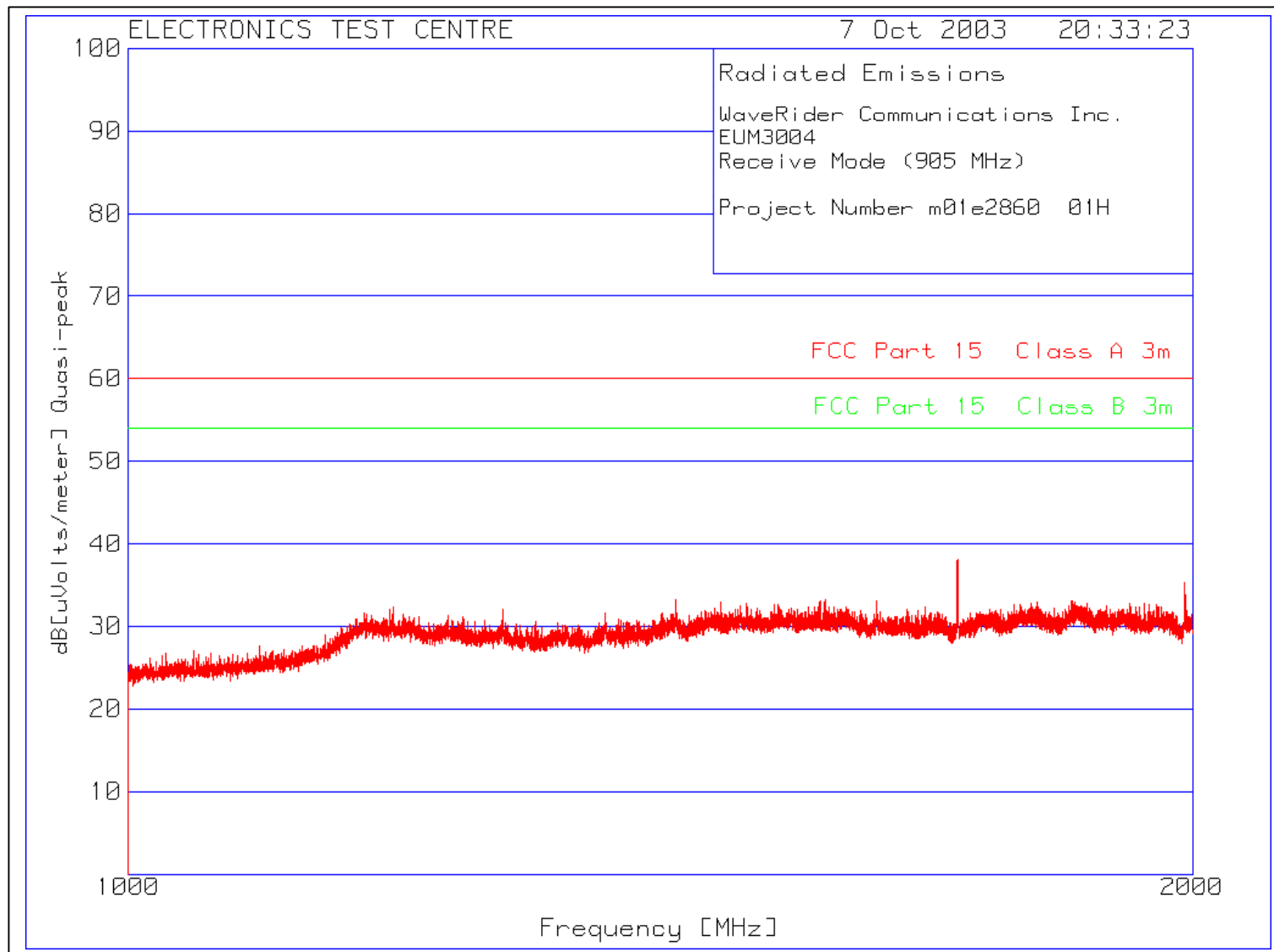
Plot of Radiated Emissions:



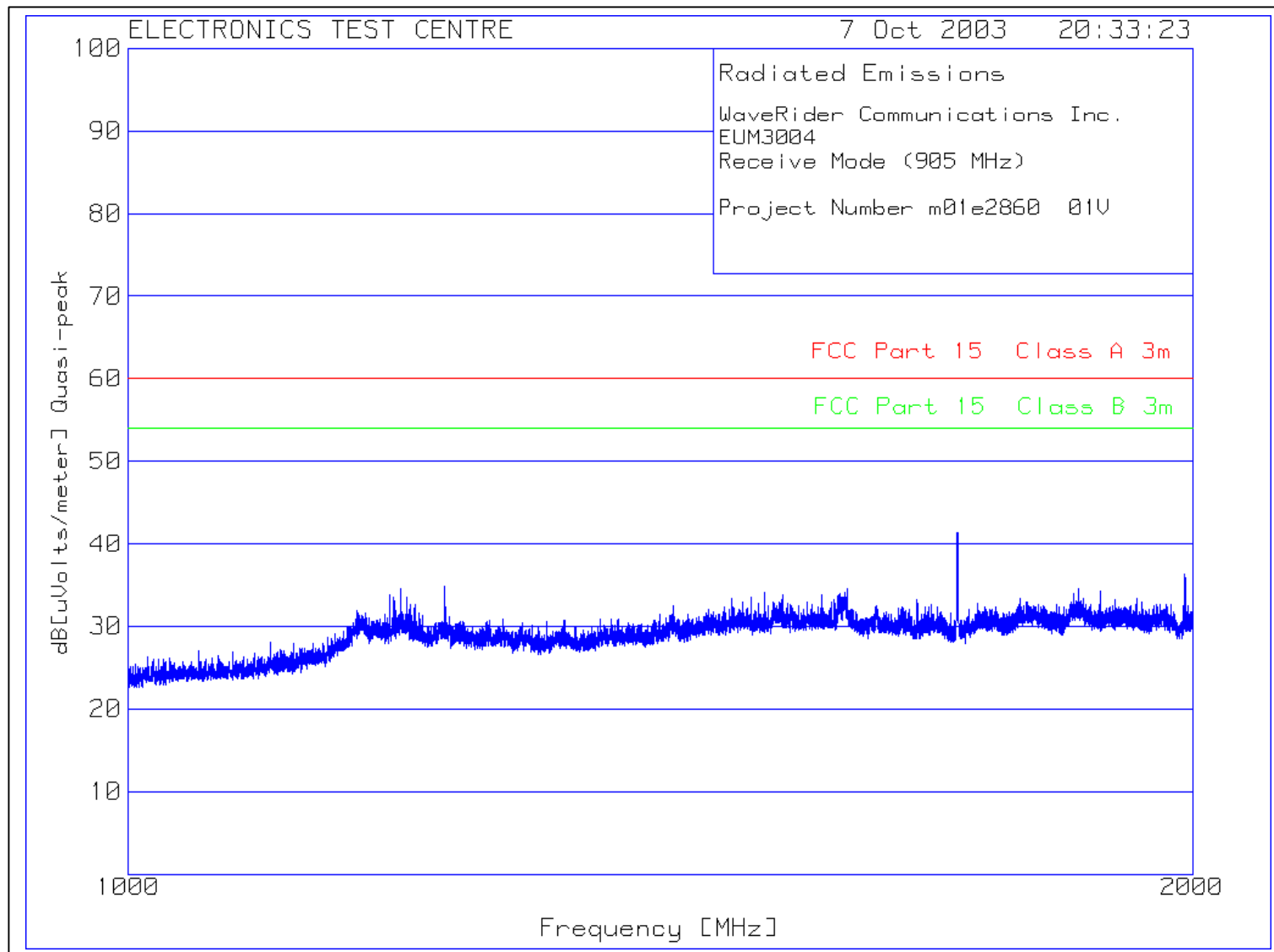
Plot of Radiated Emissions:



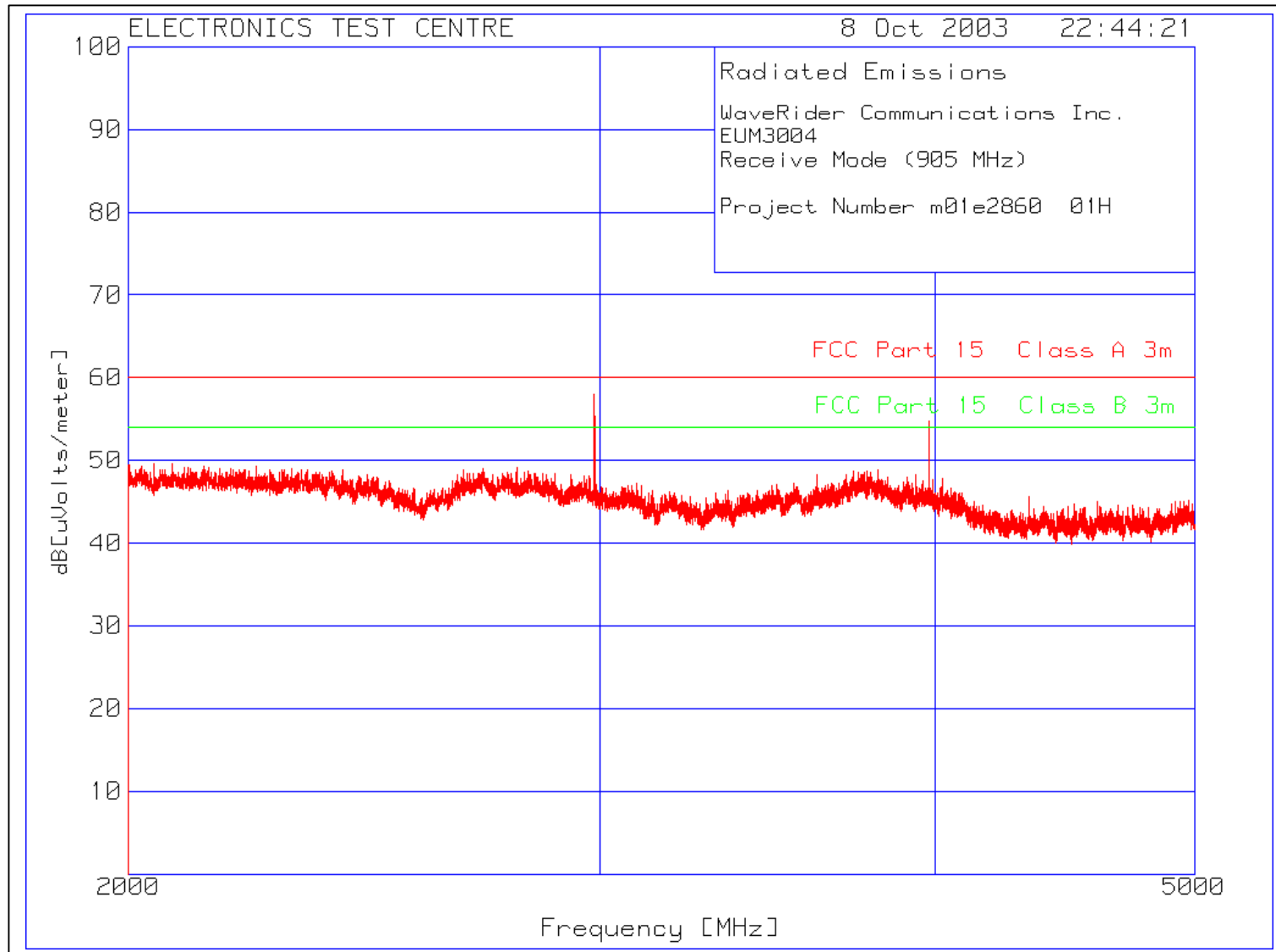
Plot of Radiated Emissions:



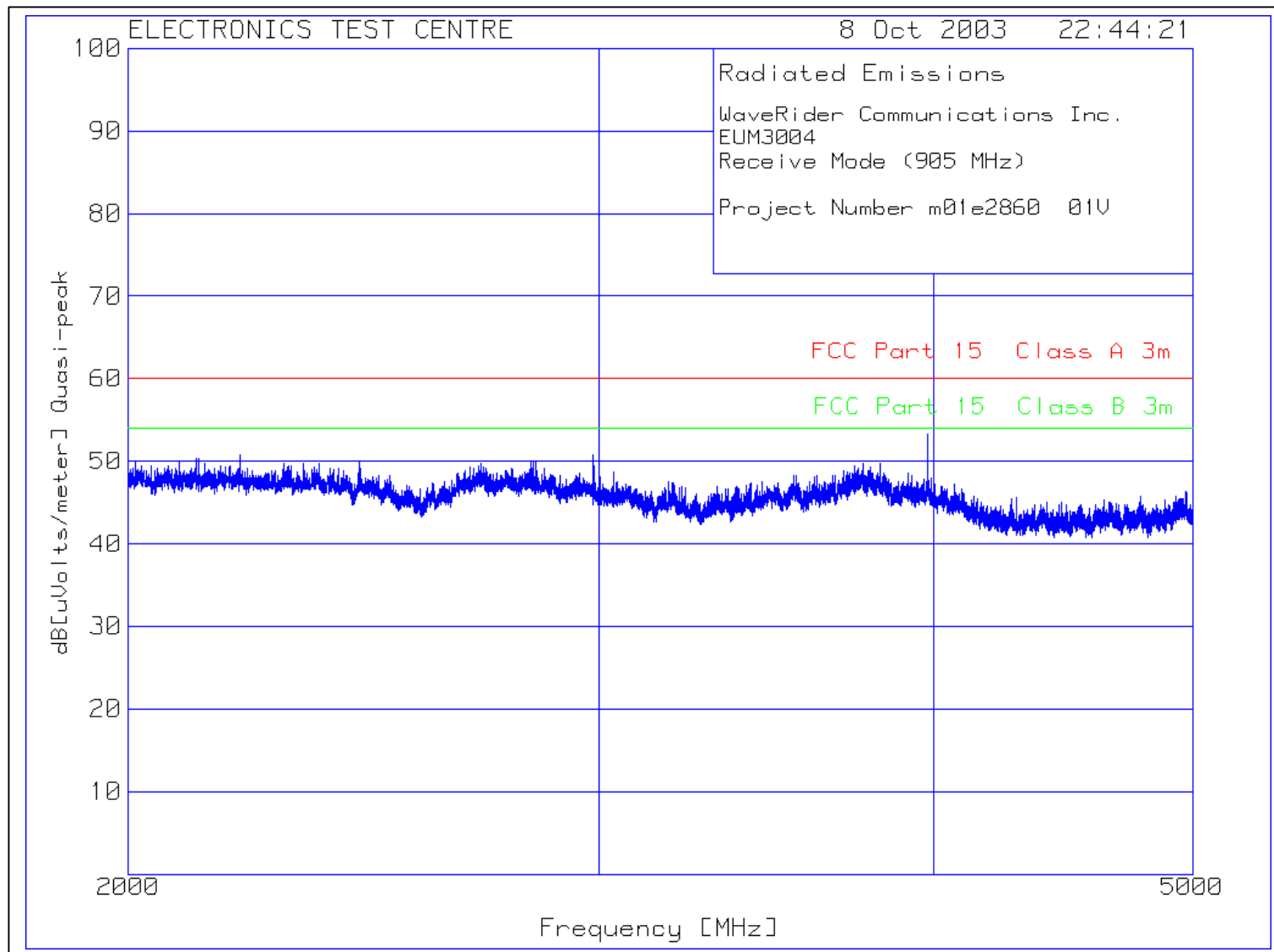
Plot of Radiated Emissions:



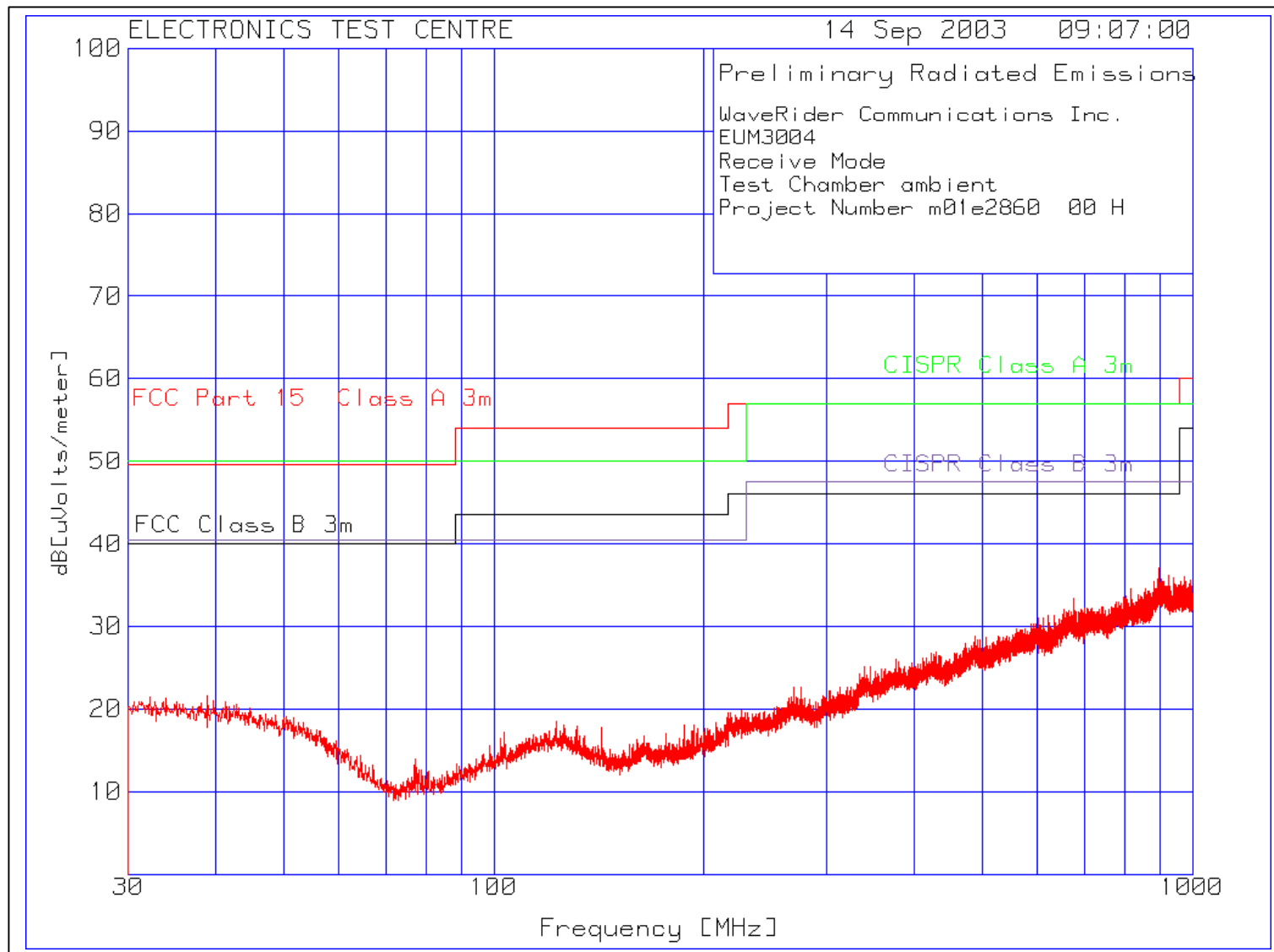
Plot of Radiated Emissions:



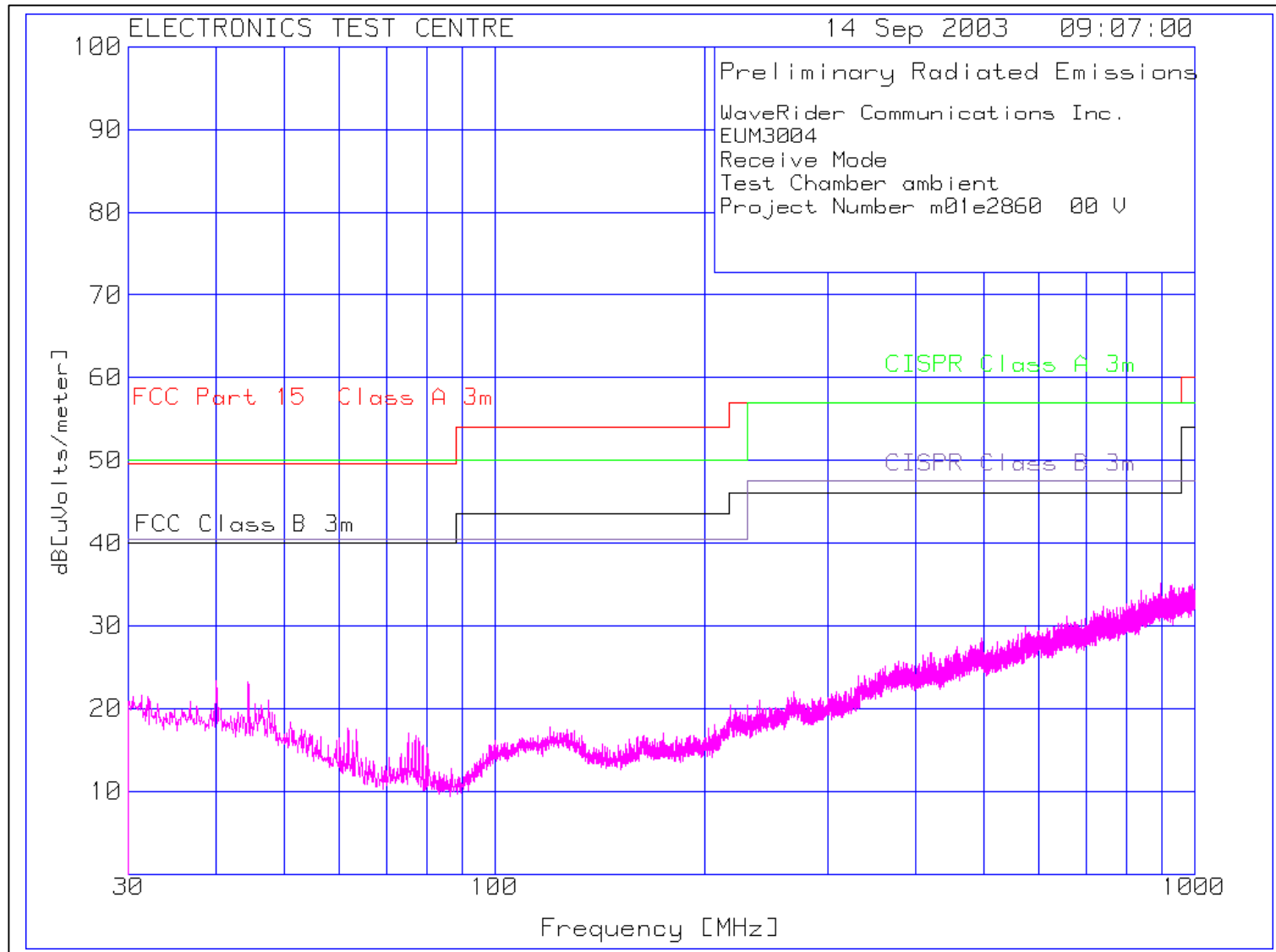
Plot of Radiated Emissions:



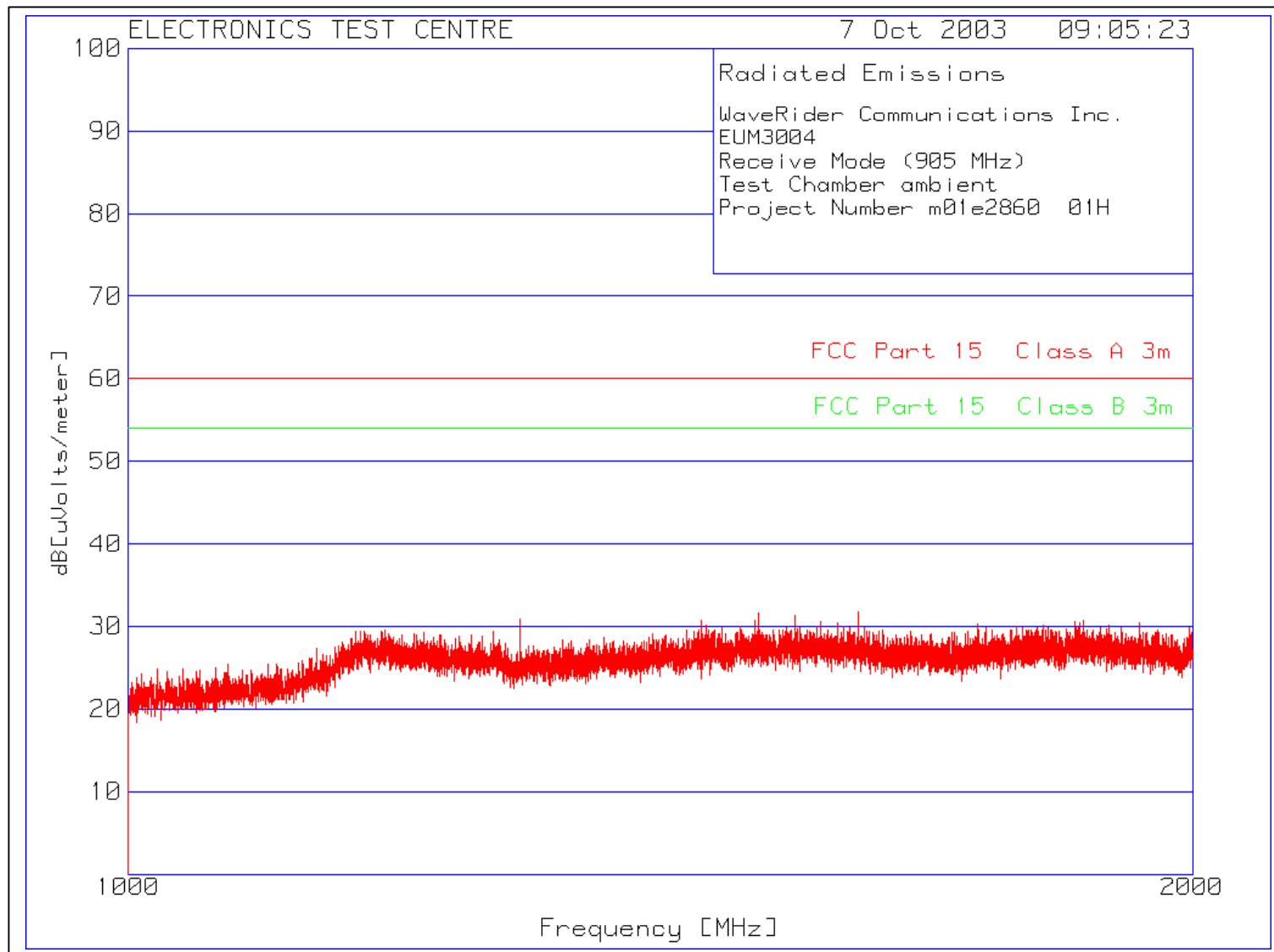
Plot of Radiated Emissions Test Chamber Ambient:



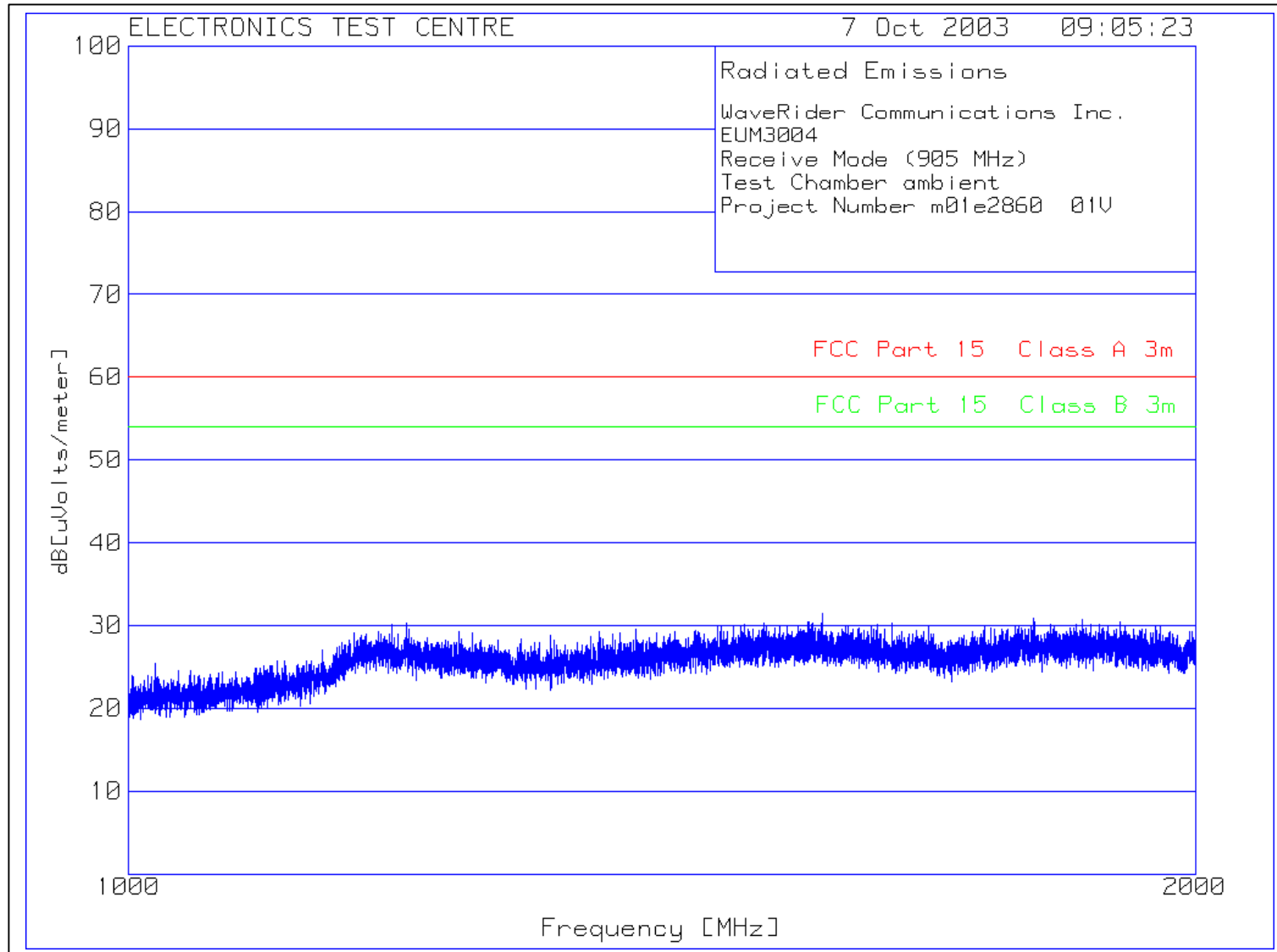
Plot of Radiated Emissions Test Chamber Ambient:



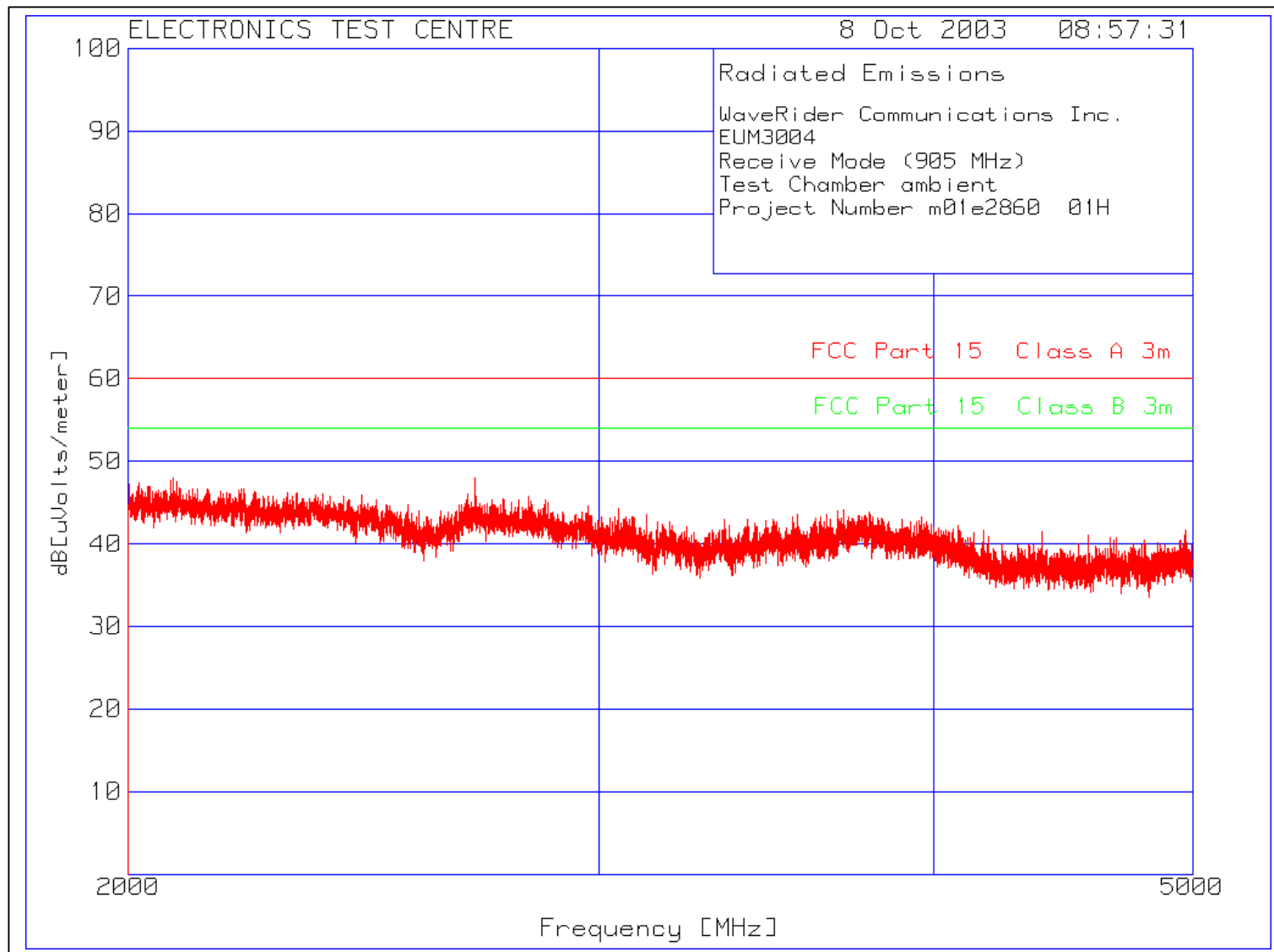
Plot of Radiated Emissions Test Chamber Ambient:



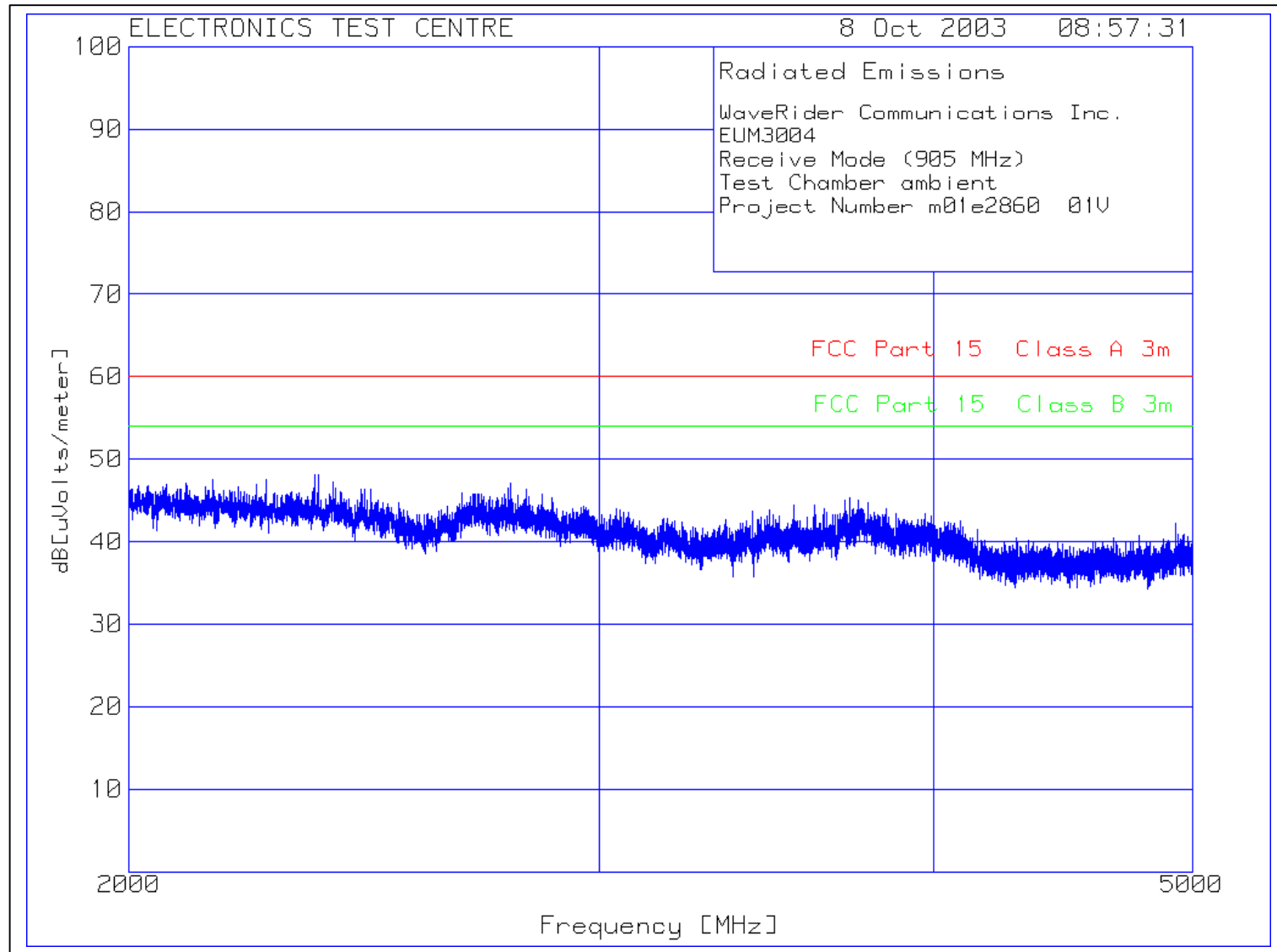
Plot of Radiated Emissions Test Chamber Ambient:



Plot of Radiated Emissions Test Chamber Ambient:



Plot of Radiated Emissions Test Chamber Ambient:



4.3b Transmit Mode

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: J. MacKay, J. Wong, D. Raynes Dates: 16 September to 3 October 2003	Product: EUM3004 Wireless Modem																
Test Result, EUM3004: PASS																	
The Radiated E-Field emissions produced by EUT, measured at a distance of 3m, shall not exceed these limits within the restricted bands of operation. Any emissions lying outside these bands shall be at least 20 dB down from the level of the fundamental. Attenuation below the limits of 15.209 is not required. Emission levels should meet the requirements with a margin of 6dB.	<table> <tr> <th>Frequency [MHz]</th><th>Limit (QP @ 3m) [dBμV/m]</th></tr> <tr> <td>.009 – 0.490</td><td>88.5 – 53.8</td></tr> <tr> <td>.490 – 1.7</td><td>53.8 – 43</td></tr> <tr> <td>1.7 – 30</td><td>49.50</td></tr> <tr> <td>30 – 88</td><td>40.00</td></tr> <tr> <td>88 – 216</td><td>43.52</td></tr> <tr> <td>216 – 960</td><td>46.02</td></tr> <tr> <td>above 960</td><td>53.98</td></tr> </table>	Frequency [MHz]	Limit (QP @ 3m) [dBμV/m]	.009 – 0.490	88.5 – 53.8	.490 – 1.7	53.8 – 43	1.7 – 30	49.50	30 – 88	40.00	88 – 216	43.52	216 – 960	46.02	above 960	53.98
Frequency [MHz]	Limit (QP @ 3m) [dBμV/m]																
.009 – 0.490	88.5 – 53.8																
.490 – 1.7	53.8 – 43																
1.7 – 30	49.50																
30 – 88	40.00																
88 – 216	43.52																
216 – 960	46.02																
above 960	53.98																

Restricted Bands of Operation per Part 15.205:

MHz	MHz	MHz	MHz	MHz	GHz	GHz
0.0900000 – 0.1100000	8.2910000 - 8.2940000	16.804250 - 16.804750	162.01250 - 167.17000 	1660.0000 – 1710.0000	3.6000000 – 4.4000000	14.470000 – 14.500000
0.4950000 - 0.5050000 	8.3620000 - 8.3660000	25.500000 - 25.670000	167.72000 - 173.20000 	1718.8000 – 1722.2000	4.5000000 – 5.1500000	15.350000 – 16.200000
2.1735000 - 2.1905000	8.3762500 - 8.3867500	37.500000 - 38.250000	240.00000 – 285.00000	2200.0000 – 2300.0000	5.3500000 – 5.4600000	17.700000 – 21.400000
4.1250000 - 4.1280000	8.4142500 - 8.4147500	73.000000 - 74.600000	322.00000 - 335.40000	2310.0000 – 2390.0000	7.2500000 – 7.7500000	22.010000 – 23.120000
4.1772500 - 4.1777500	12.290000 - 12.293000	74.800000 - 75.200000	399.90000 – 410.00000	2483.5000 – 2500.0000 	8.0250000 – 8.5000000	23.600000 – 24.000000
4.2072500 - 4.2077500	12.519750 - 12.520250	108.00000 - 121.94000 	608.00000 – 614.00000	2655.0000 – 2900.0000	9.0000000 – 9.2000000	31.200000 – 31.800000
5.6770000 - 5.6830000	12.576750 - 12.577250	123.00000 - 138.00000 	960.00000 – 1240.0000 	3260.0000 – 3267.0000	9.3000000 – 9.5000000	36.430000 – 36.500000
6.2150000 - 6.2180000	13.360000 - 13.410000	149.90000 - 150.05000 	1300.0000 – 1427.0000 	3332.0000 – 3339.0000	10.600000 – 12.700000	Above 38.600000
6.2677500 - 6.2682500	16.420000 - 16.423000	156.52475- 156.52525	1435.0000 – 1626.5000	3345.8000 – 3358.0000	13.250000 – 13.400000	
6.3117500 - 6.3122500	16.694750 - 16.695250	156.70000 - 156.90000	1645.5000 – 1646.5000	3500.0000 – 3600.0000 		

 US only

 Canada 108 – 138 MHz

 Canada 960 – 1427 MHz

 Canada only

Radiated Emissions Data:

Super Pass Antenna:

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	905.15370	112.70 (qp)			H	100	164
905	905.14910	93.01 (qp)			V	100	188
	1810.0001	49.95	92.70	- 42.75	H	154	352
	1810.0000	52.03	92.70	- 40.67	V	154	192
	2715.0000	38.17	53.98	- 15.81	H	133	186
	2715.0000	41.31	53.98	- 12.67	V	99	1
	2924.9980	50.3	92.70	- 42.40	H	99	93
	2924.9990	50.88	92.70	- 41.82	V	99	19
	3619.9950	45.8	53.98	- 8.18	H	99	25
	3619.9990	49.1	53.98	- 4.88	V	99	125
	3899.9990	47.87	53.98	- 6.11	H	171	257
	3899.9990	49.07	53.98	- 4.91	V	174	236
nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
915	914.8382	111.66 (qp)			H	100	200
915	915.1502	96.22 (qp)			V	100	85
	1830.0001	54.94	91.66	- 36.72	H	128	344
	1830.0000	54.74	91.66	- 36.92	V	145	119
	2745.0000	40.87	53.98	- 13.11	H	128	219
	2745.0000	44.82	53.98	- 9.16	V	99	7
	2955.0000	29.50	91.66	- 62.16	H	318	161
	2954.9980	50.59	91.66	- 41.07	V	153	179
	3521.0000	22.35	91.66	- 69.31	H	99	317
	3521.0000	25.15	91.66	- 66.51	V	332	231
	3660.0000	48.62	53.98	- 5.36	H	160	139
	3660.0000	47.62	53.98	- 6.36	V	99	11
All other emissions ≤ 40 dB μ V/m Emissions at these frequencies were at, or below the measurement system noise floor.							

Super Pass Antenna:

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
925	925.14920	111.99 (qp)			H	101	176
925	925.14810	96.99 (qp)			V	100	82
	1850.0000	57.25	91.99	- 34.74	H	99	332
	1850.0000	56.26	91.99	- 35.73	V	124	10
	2774.8990	39.89	53.98	- 14.09	H	121	34
	2775.0000	42.04	53.98	- 11.94	V	99	360
	2985.0000	50.64	91.99	- 41.35	H	126	43
	2984.9980	53.44	91.99	- 38.55	V	116	302
	3699.9980	44.74	53.98	- 9.24	H	99	138
	3699.9980	47.34	53.98	- 6.64	V	117	128
	3979.9890	46.26	53.98	- 7.72	H	132	34
	3979.9450	47.16	53.98	- 6.82	V	140	120
	4624.8990	50.69	53.98	- 3.29	H	119	25
	4625.0000	53.29	53.98	- 0.69	V	99	128
All other emissions ≤ 40 dBμV/m Emissions at these frequencies were at, or below the measurement system noise floor.							

Patch Antenna:

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	905.15370	96.59			H	100	31
905	905.14910	103.42			V	100	173
	1809.8760	24.34	83.42	- 59.08	H	105	332
	1810.0000	32.43	83.42	- 50.99	V	190	236
	2715.0000	29.47	53.98	- 24.51	H	158	23
	2715.2200	32.21	53.98	- 21.77	V	99	4
	2924.9990	24.50	83.42	- 58.92	H	327	229
	2925.0000	33.50	83.42	- 49.92	V	400	58
	3620.0000	34.50	53.98	- 19.48	H	204	232
	3620.0000	37.20	53.98	- 16.78	V	216	3
	3901.0000	24.63	53.98	- 29.35	H	308	330
	3899.9400	33.17	53.98	- 20.81	V	300	55
	4525.0000	28.12	53.98	- 25.86	H	204	324
	4525.0000	32.82	53.98	- 21.16	V	208	296
nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
915	914.83820	91.29			H	100	25
915	915.15020	102.82			V	100	170
	1830.0001	41.84	82.82	- 40.98	H	127	33
	1829.9990	39.04	82.82	- 43.78	V	131	188
	2745.0000	25.17	53.98	- 28.81	H	137	0
	2745.0000	25.32	53.98	- 28.66	V	224	47
	2955.0000	36.60	82.82	- 46.22	H	224	191
	2954.9990	38.49	82.82	- 44.33	V	218	19
	3521.0000	23.75	82.82	- 59.07	H	312	349
	3521.0000	24.15	82.82	- 58.67	V	322	109
	3660.0000	24.02	53.98	- 29.96	H	312	352
	3660.0000	24.62	53.98	- 29.36	V	305	76
	3941.0000	24.52	53.98	- 29.46	H	316	355
	3939.9600	33.44	53.98	- 20.54	V	275	59
All other emissions ≤ 40 dB μ V/m Emissions at these frequencies were at, or below the measurement system noise floor.							

Patch Antenna:

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
925	925.14920	91.99			H	100	27
925	925.14810	102.98			V	100	172
	1849.9990	44.45	82.98	- 38.53	H	133	25
	1850.0001	43.46	82.98	- 39.52	V	139	237
	2775.0000	25.98	53.98	-28.00	H	107	323
	2775.0002	24.64	53.98	-29.34	V	119	237
	2985.0001	30.17	82.98	-56.24	H	279	4
	2984.9999	30.07	82.98	-57.64	V	281	320
	3699.9999	34.34	53.98	-19.64	H	237	322
	3700.0001	36.44	53.98	-17.54	V	245	52
	4624.9198	33.39	53.98	-20.59	H	200	44
	4624.9998	34.59	53.98	-19.39	V	206	332
All other emissions ≤ 40 dBμV/m Emissions at these frequencies were at, or below the measurement system noise floor.							

Yagi Antenna:

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	904.8716	97.47 (qp)			H	100	94
905	904.8704	110.40 (qp)			V	123	22
	1809.9998	39.75	90.40	-50.65	H	124	301
	1809.9998	45.83	90.40	-45.57	V	121	171
	2714.9000	26.46	53.98	-27.52	H	100	200
	2715.4600	32.31	53.98	-21.67	V	106	126
	2925.0002	25.80	90.40	-64.6	H	110	336
	2924.9999	26.98	90.40	-63.42	V	305	266
	3620.0000	43.10	53.98	-10.88	H	112	218
	3620.0001	48.30	53.98	-5.68	V	113	244
	3899.9999	25.17	53.98	-28.81	H	313	26
	3899.9999	31.07	53.98	-22.91	V	246	224
	4524.9998	29.32	53.98	-24.66	H	123	64
	4524.9999	31.42	53.98	-22.56	V	125	148
nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
915	914.8697	97.23 (qp)			H	105	307
915	914.8702	110.50 (qp)			V	100	20
	1830.0001	39.24	90.50	-51.26	H	101	324
	1829.9000	43.94	90.50	-45.56	V	101	101
	2714.9000	26.46	53.98	-27.52	H	100	200
	2715.4600	32.31	53.98	-21.67	V	106	126
	3620.0000	43.10	53.98	-10.88	H	112	218
	3620.0001	48.30	53.98	-5.68	V	113	234
	3899.9999	25.17	53.98	-28.81	H	313	26
	3899.9999	31.07	53.98	-22.91	V	246	244
	4524.9998	29.32	53.98	-24.66	H	123	64
	4524.9999	31.42	53.98	-22.56	V	125	148
All other emissions ≤ 40 dB μ V/m Emissions at these frequencies were at, or below the measurement system noise floor.							

Yagi Antenna:

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
925	924.8704	94.97 (qp)			H	100	0
925	924.8828	110.51 (qp)			V	100	27
	1850.0000	42.05	90.51	-48.46	H	242	319
	1850.0000	46.86	90.51	-43.65	V	120	101
	2774.9998	23.48	53.98	-30.50	H	335	44
	2774.9999	24.13	53.98	-29.85	V	131	111
	3700.0000	36.54	53.98	-17.44	H	146	59
	3700.0002	39.44	53.98	-14.54	V	152	256
	4625.0000	32.79	53.98	-21.19	H	222	257
	4625.0495	36.49	53.98	-17.49	V	196	148
All other emissions ≤ 40 dBμV/m Emissions at these frequencies were at, or below the measurement system noise floor.							

Diversity Antenna (Low Channel @ 905 MHz):

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	904.8913	100.63			H	100	244
905	904.8995	110.78			V	122	180
	1810.0001	66.05	90.78	- 24.73	H	132	274
	1810.0002	68.23	90.78	- 22.55	V	100	127
	2714.9998	23.27	53.98	- 30.71	H	100	35
	2715	22.91	53.98	- 31.07	V	100	110
	2925.0001	29.60	90.78	- 62.07	H	100	349
	2924.9999	29.68	90.78	- 61.99	V	100	175
	3550	25.09	90.78	- 66.58	H	284	348
	3550.0003	27.89	90.78	- 63.78	V	275	26
	3620	31.84	53.98	- 22.14	H	307	119
	3620	34.36	53.98	- 19.62	V	167	120
	4525.0002	33.19	53.98	- 20.79	H	140	127
	4524.9999	29.92	53.98	- 24.06	V	151	175
nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
915	914.8918	97.18			H	150	61
915	915.2037	111.58			V	116	183
	1829.9998	62.84	91.58	- 28.74	H	108	18
	1830.0000	68.04	91.58	- 23.54	V	129	184
	2745.0000	29.37	53.98	- 24.61	H	196	240
	2745.0000	29.12	53.98	- 24.86	V	196	239
	2954.9999	31.10	91.58	- 60.48	H	101	173
	2955.0000	32.69	91.58	- 58.89	V	101	176
	3660.0000	27.62	53.98	- 26.36	H	167	133
	3659.9998	29.82	53.98	- 24.16	V	170	126
	4575.0000	32.50	53.98	- 21.48	H	141	231
	4575.0000	34.60	53.98	- 19.38	V	144	232
All other emissions ≤ 40 dBμV/m Emissions at these frequencies were at, or below the measurement system noise floor.							

Diversity Antenna:

nominal f_c (MHz)	f (MHz)	Field Strength (dB μ V/m) Average	Limit (dB μ V/m) Average	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
925	925.2026	99.48			H	147	62
925	925.2033	111.67			V	113	183
	1849.9999	64.85	91.67	- 26.82	H	107	339
	1850.0000	67.66	91.67	- 24.01	V	113	255
	2774.9999	24.08	53.98	- 29.90	H	395	70
	2775.0001	27.89	53.98	- 26.09	V	400	347
	3700.0000	29.54	53.98	- 24.44	H	264	134
	3700.0001	30.74	53.98	- 23.24	V	256	132
	4625.0000	33.39	53.98	- 20.59	H	245	126
	4625.0000	35.19	53.98	- 18.79	V	245	126
	5549.9999	28.41	91.67	- 63.26	H	381	348
	5550.0000	32.23	91.67	- 59.44	V	391	10
	7399.9998	38.56	53.98	- 15.42	H	398	339
	7399.9996	38.46	53.98	- 15.52	V	398	39
All other emissions ≤ 40 dBμV/m Emissions at these frequencies were at, or below, the measurement system noise floor.							

4.3c Field Strength of Spurious Radiation

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: J. Wong Dates: 23 October to 24 October 2003	Product: EUM3003 Wireless Modem																
Test Result, EUM3003: PASS																	
Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuit, power leads or intermediate circuit elements under normal conditions of installation or operation. Emission levels should meet the requirements with a margin of 6dB. FCC Part 2 Section 2.1053	<table> <tr> <th>Frequency [MHz]</th><th>Limit (QP @ 3m) [dBμV/m]</th></tr> <tr> <td>.009 – 0.490</td><td>88.5 – 53.8</td></tr> <tr> <td>.490 – 1.7</td><td>53.8 – 43</td></tr> <tr> <td>1.7 – 30</td><td>49.50</td></tr> <tr> <td>30 – 88</td><td>40.00</td></tr> <tr> <td>88 – 216</td><td>43.52</td></tr> <tr> <td>216 – 960</td><td>46.02</td></tr> <tr> <td>above 960</td><td>53.98</td></tr> </table>	Frequency [MHz]	Limit (QP @ 3m) [dBμV/m]	.009 – 0.490	88.5 – 53.8	.490 – 1.7	53.8 – 43	1.7 – 30	49.50	30 – 88	40.00	88 – 216	43.52	216 – 960	46.02	above 960	53.98
Frequency [MHz]	Limit (QP @ 3m) [dBμV/m]																
.009 – 0.490	88.5 – 53.8																
.490 – 1.7	53.8 – 43																
1.7 – 30	49.50																
30 – 88	40.00																
88 – 216	43.52																
216 – 960	46.02																
above 960	53.98																

Field Strength of Spurious Data from 30 to 1000 MHz

Field Strength of Spurious Data (905 MHz):

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2
=====						
Range: 1 30 - 1000MHz						
835.7415	17.11 qp	7.85	20.7	45.66	56.90	46.02
Azimuth: 105	Height:100	Horz		Margin [dB]:	-11.24	- .36
974.9856	16.4 qp	8.59	21.58	46.57	60.00	53.97
Azimuth: 109	Height:99	Horz		Margin [dB]:	-13.43	-7.4
Range: 2 30 - 1000MHz						
61.7274	25.42 qp	2.28	7.2	34.9	49.54	40.00
Azimuth: 132	Height:102	Vert		Margin [dB]:	-14.64	-5.1
74.9775	25.25 qp	2.47	6.62	34.34	49.54	40.00
Azimuth: 263	Height:101	Vert		Margin [dB]:	-15.2	-5.66
483.9829	21.65 qp	5.89	16.3	43.84	56.90	46.02
Azimuth: 94	Height:101	Vert		Margin [dB]:	-13.06	-2.18
LIMIT 1: FCC Part 15 Class A 3m						
LIMIT 2: FCC Part 15 Class B 3m						

Field Strength of Spurious Data (915 MHz):

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit: 1	2
=====						
Range: 1 30 - 1000MHz						
808.985	16.22 qp	7.82	20.4	44.44	56.9	46.02
Azimuth: 104	Height:100	Horz		Margin [dB]:	-12.46	-1.58
845.1557	14.49 qp	8.01	20.6	43.1	56.9	46.02
Azimuth: 100	Height:100	Horz		Margin [dB]:	-13.8	-2.92
Range: 2 30 - 1000MHz						
61.7285	26.59 qp	2.28	7.2	36.07	49.54	40.00
Azimuth: 132	Height:102	Vert		Margin [dB]:	-13.47	-3.93
74.9769	25.82 qp	2.47	6.62	34.91	49.54	40.00
Azimuth: 259	Height:124	Vert		Margin [dB]:	-14.63	-5.09
483.9828	22 qp	5.89	16.3	44.19	56.9	46.02
Azimuth: 96	Height:101	Vert		Margin [dB]:	-12.71	-1.83
LIMIT 1: FCC Part 15 Class A 3m						
LIMIT 2: FCC Part 15 Class B 3m						

Field Strength of Spurious Data (925 MHz):

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit: 1	2
----------------------------	------------------------------	-----------------------------	------------------------------	---------------------------	----------	---

Range: 1 30 - 1000MHz

818.9843	13.04 qp	7.71	20.5	41.25	56.9	46.02
Azimuth: 105 Height:103 Horz				Margin [dB]:	-15.65	-4.77

Range: 2 30 - 1000MHz

61.7321	25.75 qp	2.28	7.2	35.23	49.54	40.00
Azimuth: 24 Height:101 Vert				Margin [dB]:	-14.31	-4.77
74.9797	25.98 qp	2.47	6.61	35.06	49.54	40.00
Azimuth: 259 Height:131 Vert				Margin [dB]:	-14.48	-4.94
483.9815	22.03 qp	5.89	16.3	44.22	56.90	46.02
Azimuth: 95 Height:101 Vert				Margin [dB]:	-12.68	-1.8
994.986	12.8 qp	8.61	21.4	42.81	60.00	53.97
Azimuth: 270 Height:99 Vert				Margin [dB]:	-17.19	-11.16

LIMIT 1: FCC Part 15 Class A 3m

LIMIT 2: FCC Part 15 Class B 3m

pk - Peak detector

qp - Quasi-Peak detector

av - Average detector

avlg - Average log detector

Field Strength of Spurious Data from 1 to 10 GHz

Field Strength of Spurious Data (905 MHz):

No.	Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2
=====							
Range: 1 1000 - 10000MHz							
1	1809.893	61.36 pk	-47.83	27.57	41.1	91.99	53.98
	Azimuth:192	Height:99	Horz	Margin [dB]		-50.89	-12.88
2	2924.768	54.9 pk	-43.95	30.05	41	92	53.98
	Azimuth:87	Height:250	Horz	Margin [dB]		-51	-12.98
3	3619.343	51.06 pk	-40.99	31.83	41.9	92	53.98
	Azimuth:87	Height:250	Horz	Margin [dB]		-50.1	-12.08
4	3899.091	46.6 pk	-40.82	32.62	38.4	92	53.98
	Azimuth:213	Height:250	Horz	Margin [dB]		-53.6	-15.58
5	4524.928	47.58 pk	-39.07	33.19	41.7	92	53.98
	Azimuth:87	Height:99	Horz	Margin [dB]		-50.3	-12.28
6	5429.713	38.44 pk	-36.15	34.81	37.1	92	53.98
	Azimuth:87	Height:99	Horz	Margin [dB]		-54.9	-16.88
Range: 2 1000 - 10000MHz							
7	1810.142	64.17 pk	-47.82	27.45	43.8	91.99	53.98
	Azimuth:297	Height:100	Vert	Margin [dB]		-48.19	-10.18
8	1880.34	55.82 pk	-47.61	27.69	35.9	91.99	53.98
	Azimuth:172	Height:250	Vert	Margin [dB]		-56.09	-18.08
9	1949.788	55.12 pk	-47.25	27.93	35.8	91.99	53.98
	Azimuth:255	Height:100	Vert	Margin [dB]		-56.19	-18.18
10	2924.768	51.42 pk	-43.95	29.93	37.4	92	53.98
	Azimuth:256	Height:100	Vert	Margin [dB]		-54.6	-16.58
11	3619.343	53.16 pk	-40.99	31.83	44	92	53.98
	Azimuth:87	Height:250	Vert	Margin [dB]		-48	-9.98
12	3899.091	48.1 pk	-40.82	32.62	39.9	92	53.98
	Azimuth:192	Height:250	Vert	Margin [dB]		-52.1	-14.08
13	4524.128	51.41 pk	-39.1	33.09	45.4	92	53.98
	Azimuth:192	Height:100	Vert	Margin [dB]		-46.6	-8.58
14	5429.713	41.42 pk	-36.15	34.63	39.9	92	53.98
	Azimuth:213	Height:100	Vert	Margin [dB]		-52.1	-14.08

LIMIT 1: FCC Part 15.247
LIMIT 2: FCC Part 15.209

Field Strength of Spurious Data (915 MHz):

Test	Meter	Gain/Loss	Transducer	Level	Limit:1	2
No.	Frequency	Reading	Factor	Factor	dB[uVolts/meter]	
	[MHz]	[dB(uV)]	[dB]	[dB]		

Range: 1 1000 - 10000MHz

1	1830.127	55.65 pk	-47.67	27.62	35.6	91.99	53.98
	Azimuth:339	Height:100	Horz	Margin [dB]		-56.39	-18.38
2	1969.773	52.72 pk	-47.14	28.02	33.6	91.99	53.98
	Azimuth:87	Height:250	Horz	Margin [dB]		-58.39	-20.38
3	2954.341	55.08 pk	-43.79	30.11	41.4	92	53.98
	Azimuth:214	Height:250	Horz	Margin [dB]		-50.6	-12.58
4	3659.307	46.24 pk	-41.19	31.95	37	92	53.98
	Azimuth:66	Height:250	Horz	Margin [dB]		-55	-16.98
5	3939.055	44.05 pk	-40.98	32.73	35.8	92	53.98
	Azimuth:87	Height:250	Horz	Margin [dB]		-56.2	-18.18
6	4574.483	47.18 pk	-39.15	33.37	41.4	92	53.98
	Azimuth:360	Height:100	Horz	Margin [dB]		-50.6	-12.58

Range: 2 1000 - 10000MHz

7	1829.878	57.56 pk	-47.68	27.52	37.4	91.99	53.98
	Azimuth:193	Height:100	Vert	Margin [dB]		-54.59	-16.58
8	1969.523	53.65 pk	-47.15	28	34.5	91.99	53.98
	Azimuth:150	Height:100	Vert	Margin [dB]		-57.49	-19.48
9	2954.341	50.69 pk	-43.79	30	36.9	92	53.98
	Azimuth:67	Height:100	Vert	Margin [dB]		-55.1	-17.08
10	3659.307	47.44 pk	-41.19	31.95	38.2	92	53.98
	Azimuth:46	Height:250	Vert	Margin [dB]		-53.8	-15.78
11	3939.055	46.15 pk	-40.98	32.73	37.9	92	53.98
	Azimuth:67	Height:250	Vert	Margin [dB]		-54.1	-16.08
12	4574.483	46.78 pk	-39.15	33.27	40.9	92	53.98
	Azimuth:298	Height:100	Vert	Margin [dB]		-51.1	-13.08

LIMIT 1: FCC Part 15.247

LIMIT 2: FCC Part 15.209

Field Strength of Spurious Data (925 MHz):

Test	Meter	Gain/Loss	Transducer	Level	Limit:	1	2
No.	Frequency	Reading	Factor	Factor	dB[uVolts/meter]		
	[MHz]	[dB(uV)]	[dB]	[dB]			

Range: 1 1000 - 10000MHz

1	1849.863	60.15 pk	-47.93	27.68	39.9	91.99	53.98
	Azimuth:171	Height:100	Horz	Margin [dB]		-52.09	-14.08
2	1989.883	50.72 pk	-46.89	28.07	31.9	91.99	53.98
	Azimuth:276	Height:250	Horz	Margin [dB]		-60.09	-22.08
3	2984.714	53.67 pk	-44.04	30.17	39.8	92	53.98
	Azimuth:277	Height:250	Horz	Margin [dB]		-52.2	-14.18
4	3699.271	50.63 pk	-41.39	32.06	41.3	92	53.98
	Azimuth:109	Height:250	Horz	Margin [dB]		-50.7	-12.68
5	3979.019	45.16 pk	-40.9	32.84	37.1	92	53.98
	Azimuth:255	Height:250	Horz	Margin [dB]		-54.9	-16.88
6	4624.838	51.21 pk	-38.76	33.55	46	92	53.98
	Azimuth:24	Height:100	Horz	Margin [dB]		-46	-7.98

Range: 2 1000 - 10000MHz

7	1849.613	58.74 pk	-47.93	27.59	38.4	91.99	53.98
	Azimuth:256	Height:100	Vert	Margin [dB]		-53.59	-15.58
8	1990.007	53.92 pk	-46.89	28.07	35.1	91.99	53.98
	Azimuth:318	Height:100	Vert	Margin [dB]		-56.89	-18.88
9	2984.714	49.77 pk	-44.04	30.07	35.8	92	53.98
	Azimuth:46	Height:100	Vert	Margin [dB]		-56.2	-18.18
10	3700.07	50.16 pk	-41.42	32.06	40.8	92	53.98
	Azimuth:360	Height:100	Vert	Margin [dB]		-51.2	-13.18
11	3979.019	46.16 pk	-40.9	32.84	38.1	92	53.98
	Azimuth:87	Height:250	Vert	Margin [dB]		-53.9	-15.88
12	4624.838	51.81 pk	-38.76	33.45	46.5	92	53.98
	Azimuth:298	Height:250	Vert	Margin [dB]		-45.5	-7.48

LIMIT 1: FCC Part 15.247

LIMIT 2: FCC Part 15.209

pk - Peak detector

qp - Quasi-Peak detector

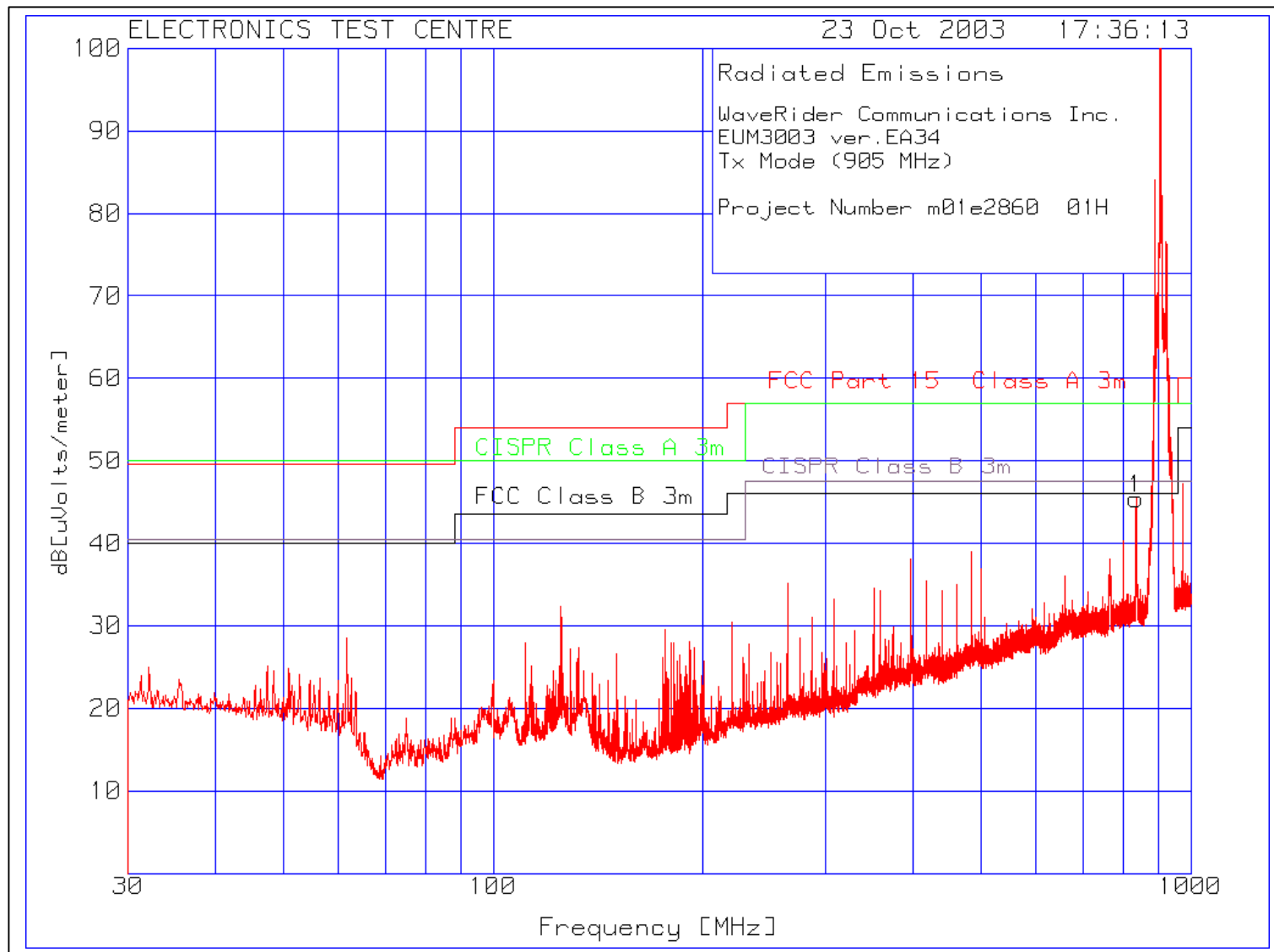
av - Average detector

avlg - denotes average log detection

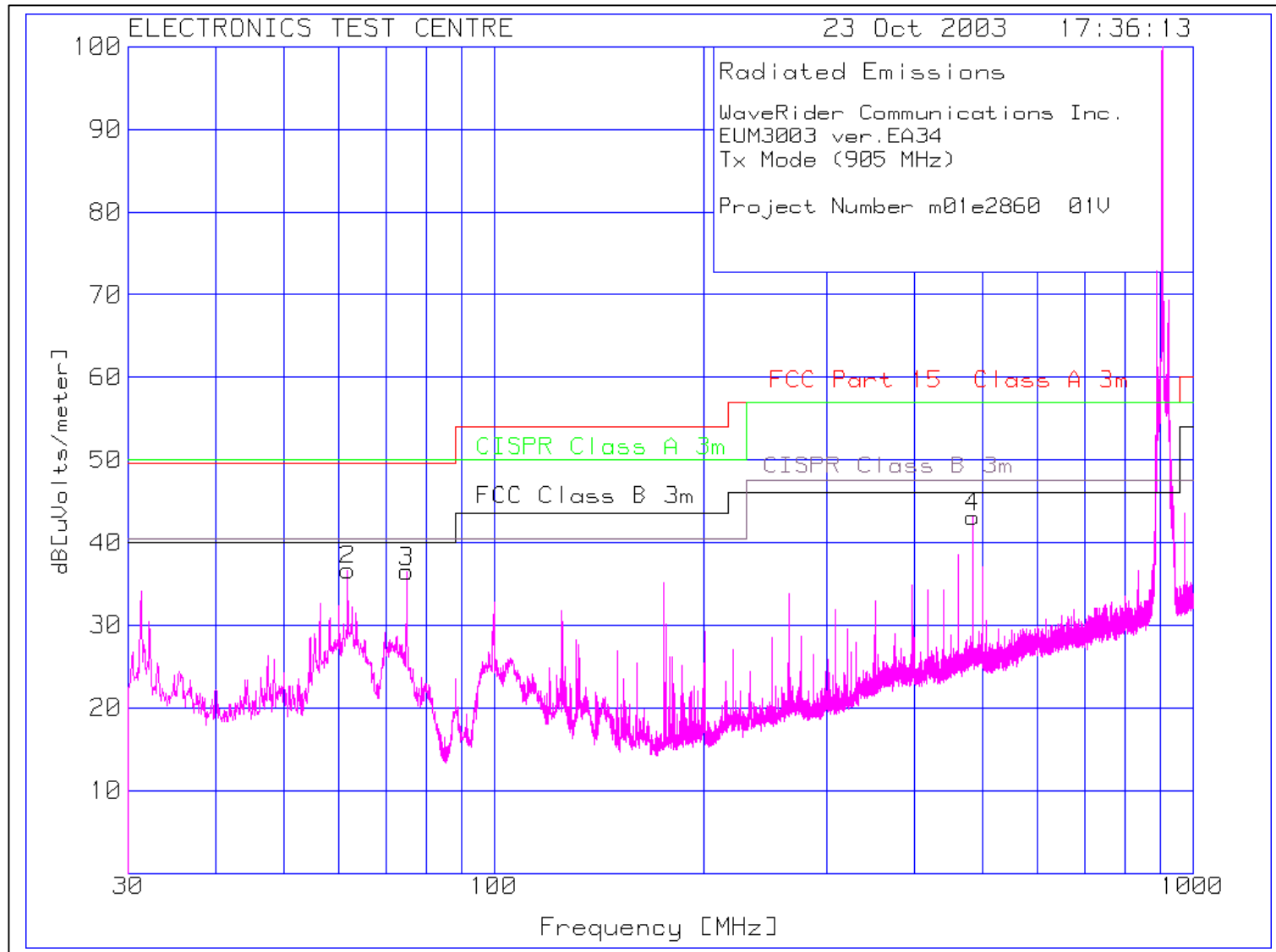
tm - Trace Math Result

NOTE: Only peak data shown. No average measurements were taken in the 1 to 10 GHz range due to the fact that there were no emissions within 6 dB of the limit.

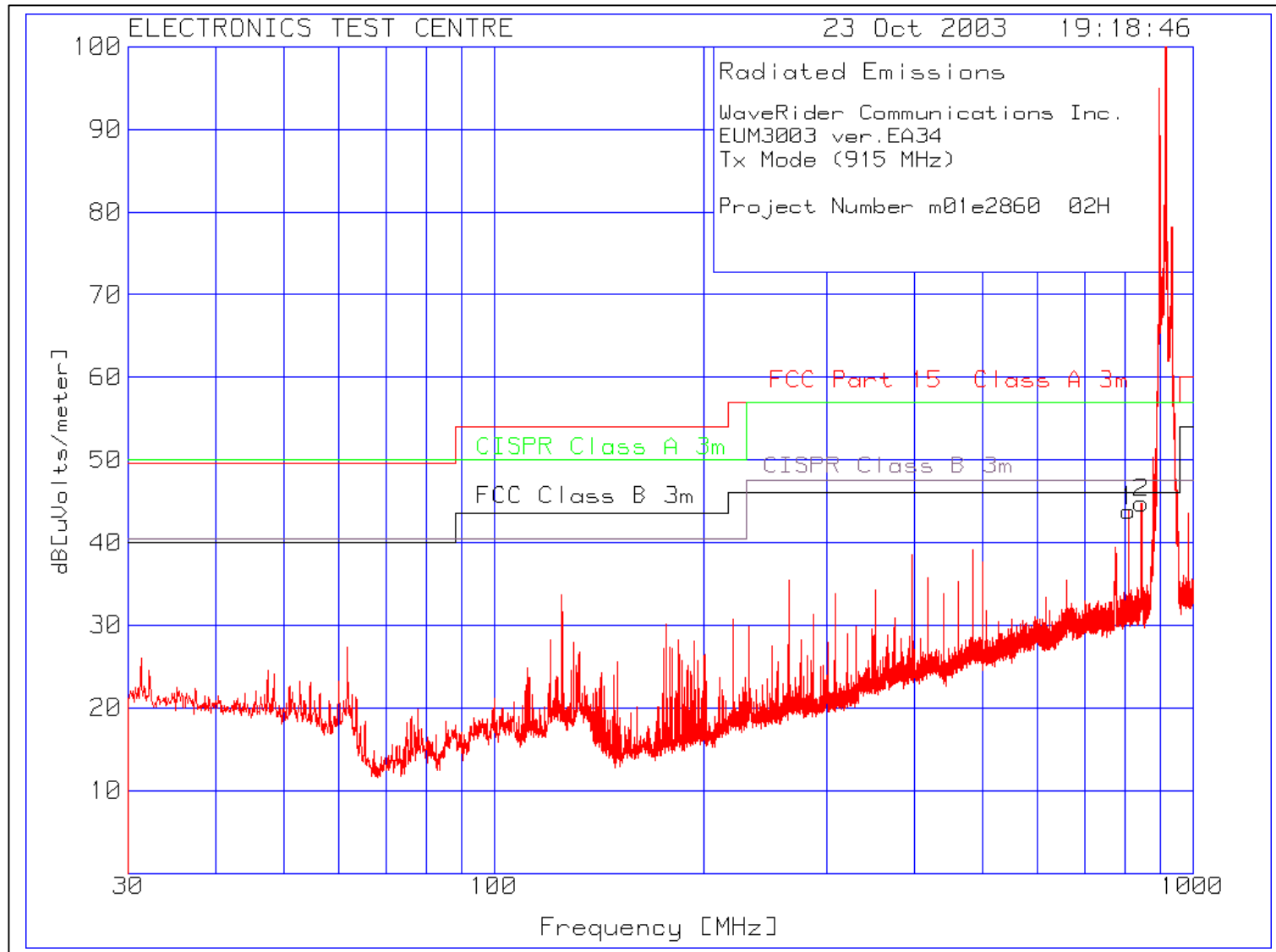
Plot of Radiated Emissions – Horizontal @ 905 MHz:



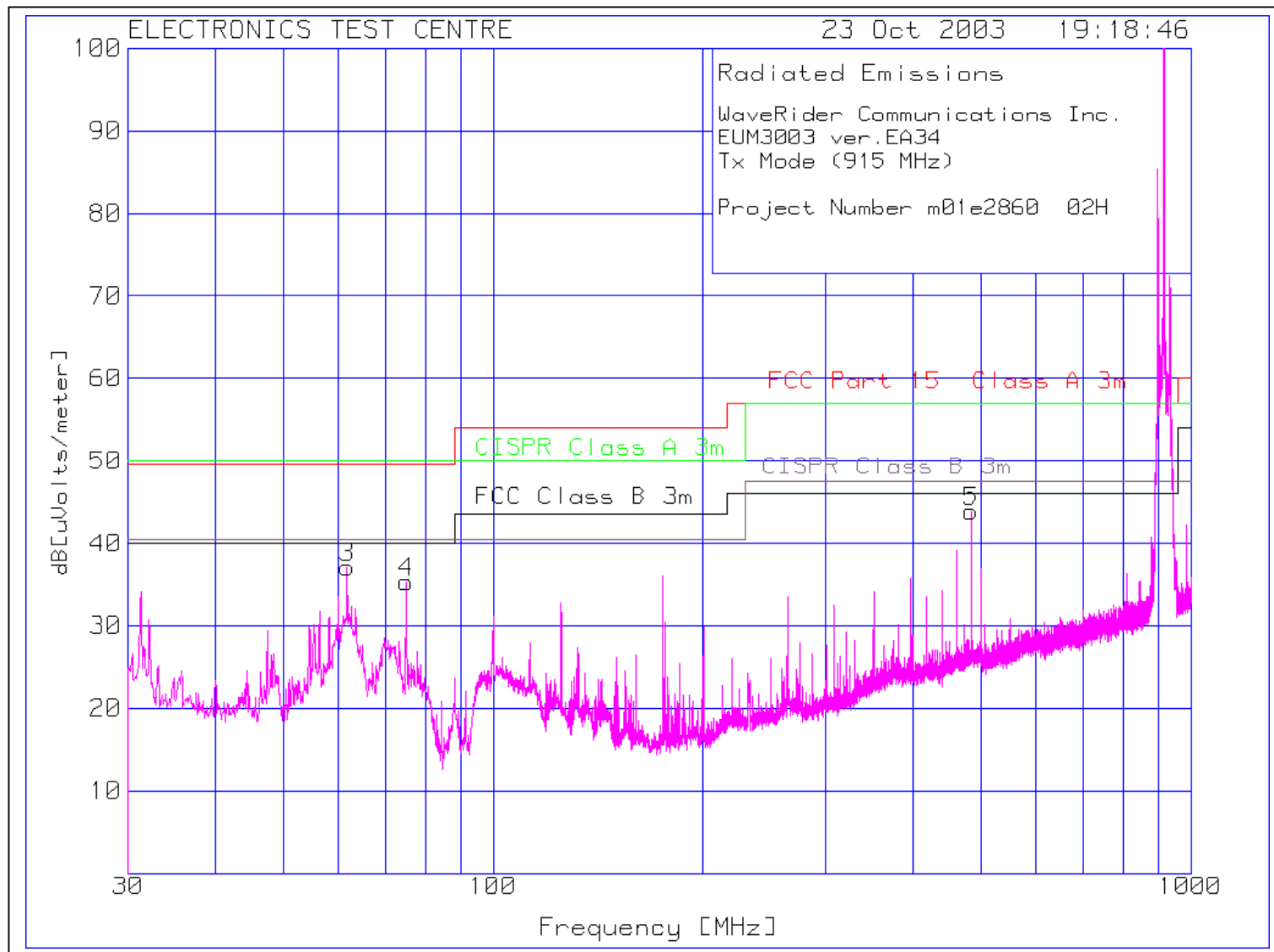
Plot of Radiated Emissions – Vertical @ 905 MHz:



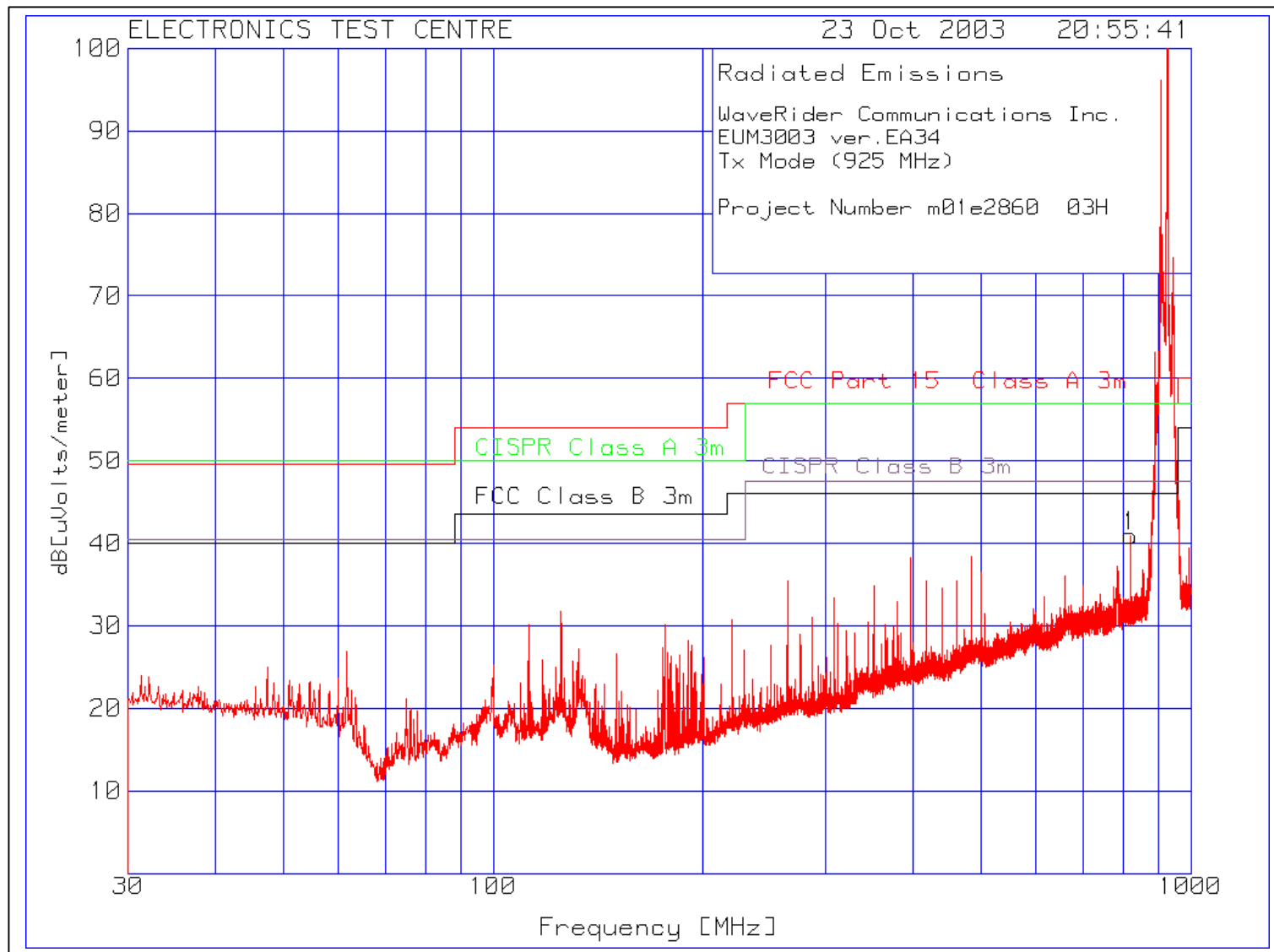
Plot of Radiated Emissions – Horizontal @ 915 MHz:



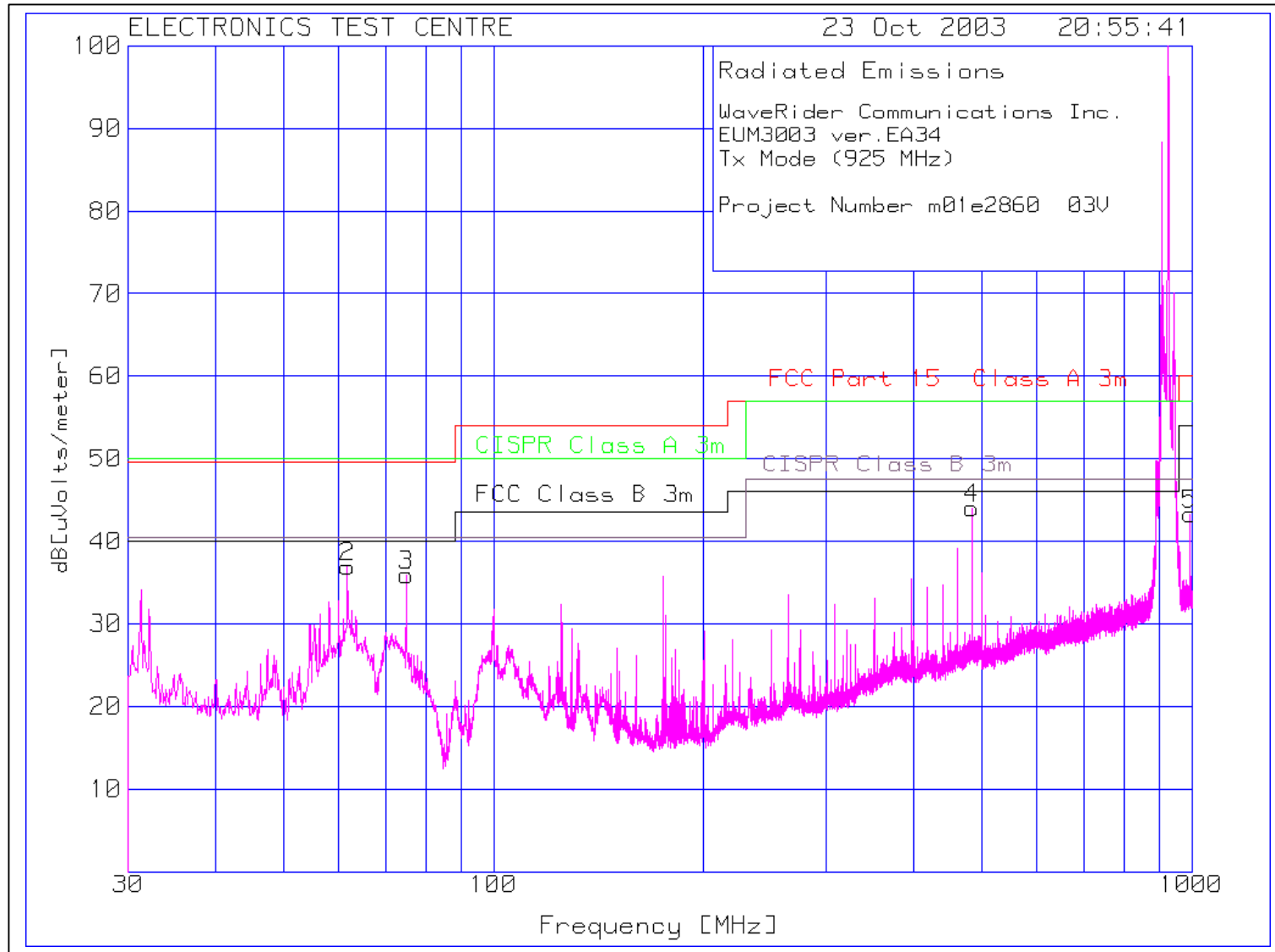
Plot of Radiated Emissions – Vertical @ 915 MHz:



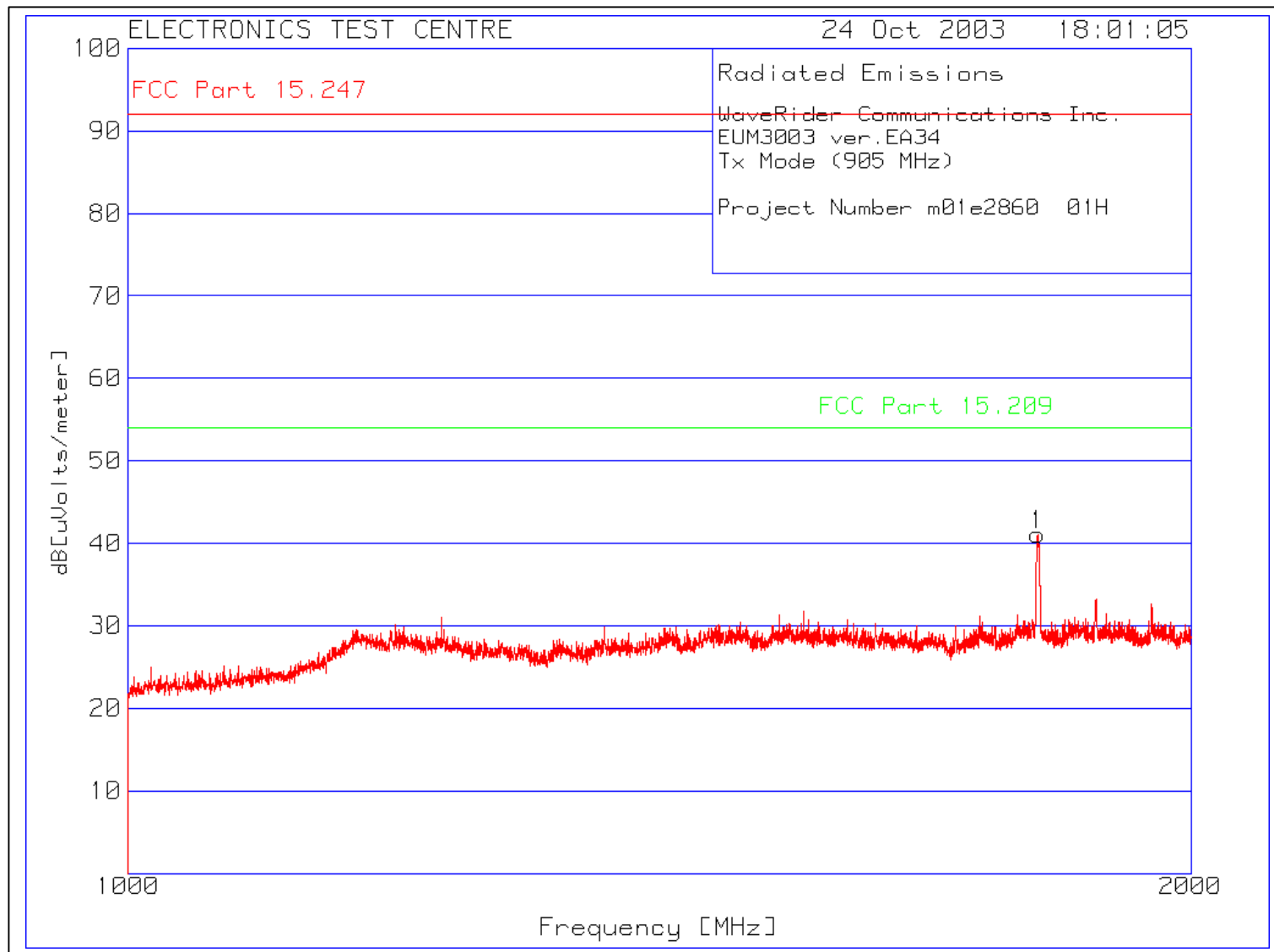
Plot of Radiated Emissions – Horizontal @ 925 MHz:



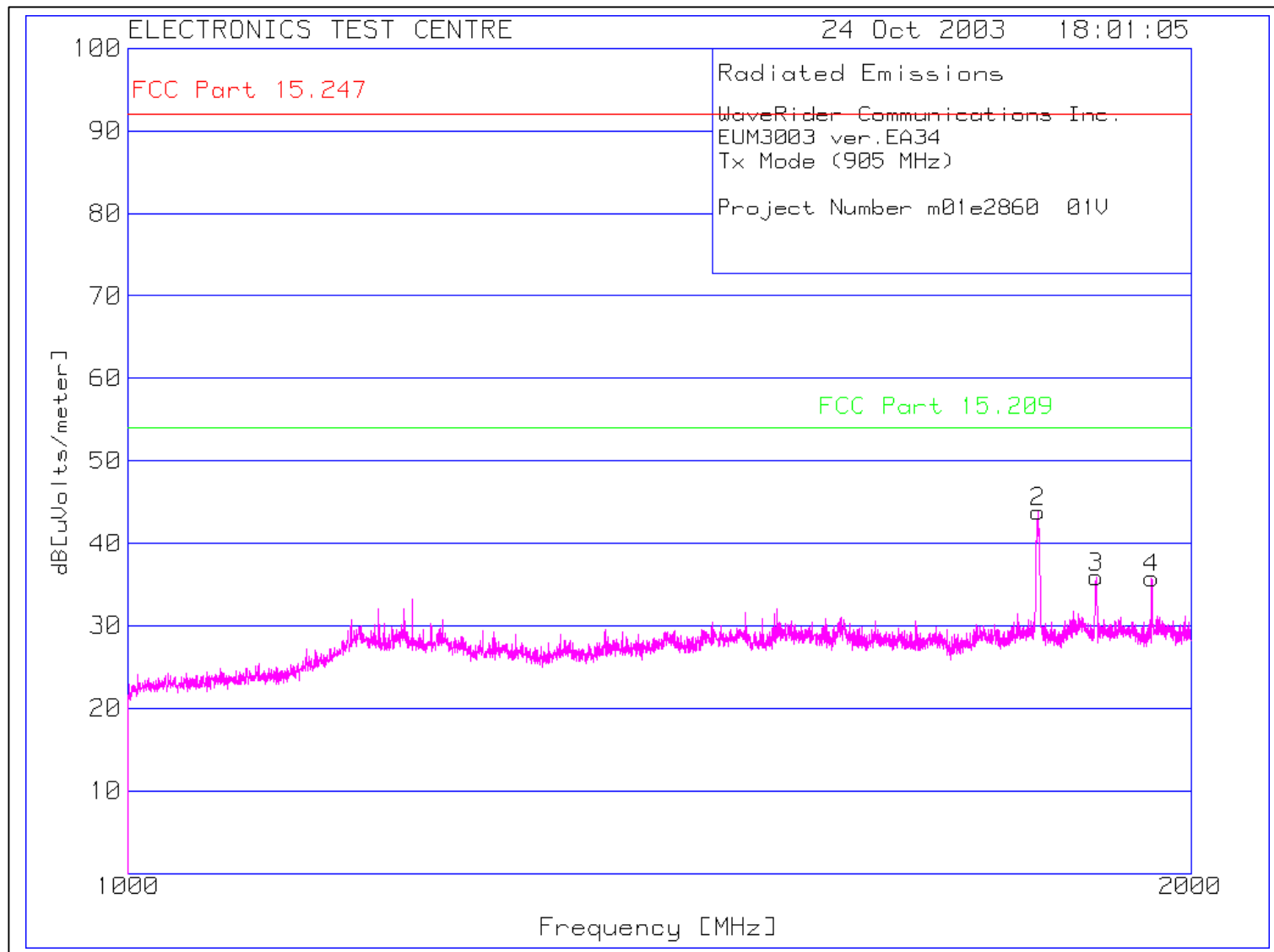
Plot of Radiated Emissions – Vertical @ 925 MHz:



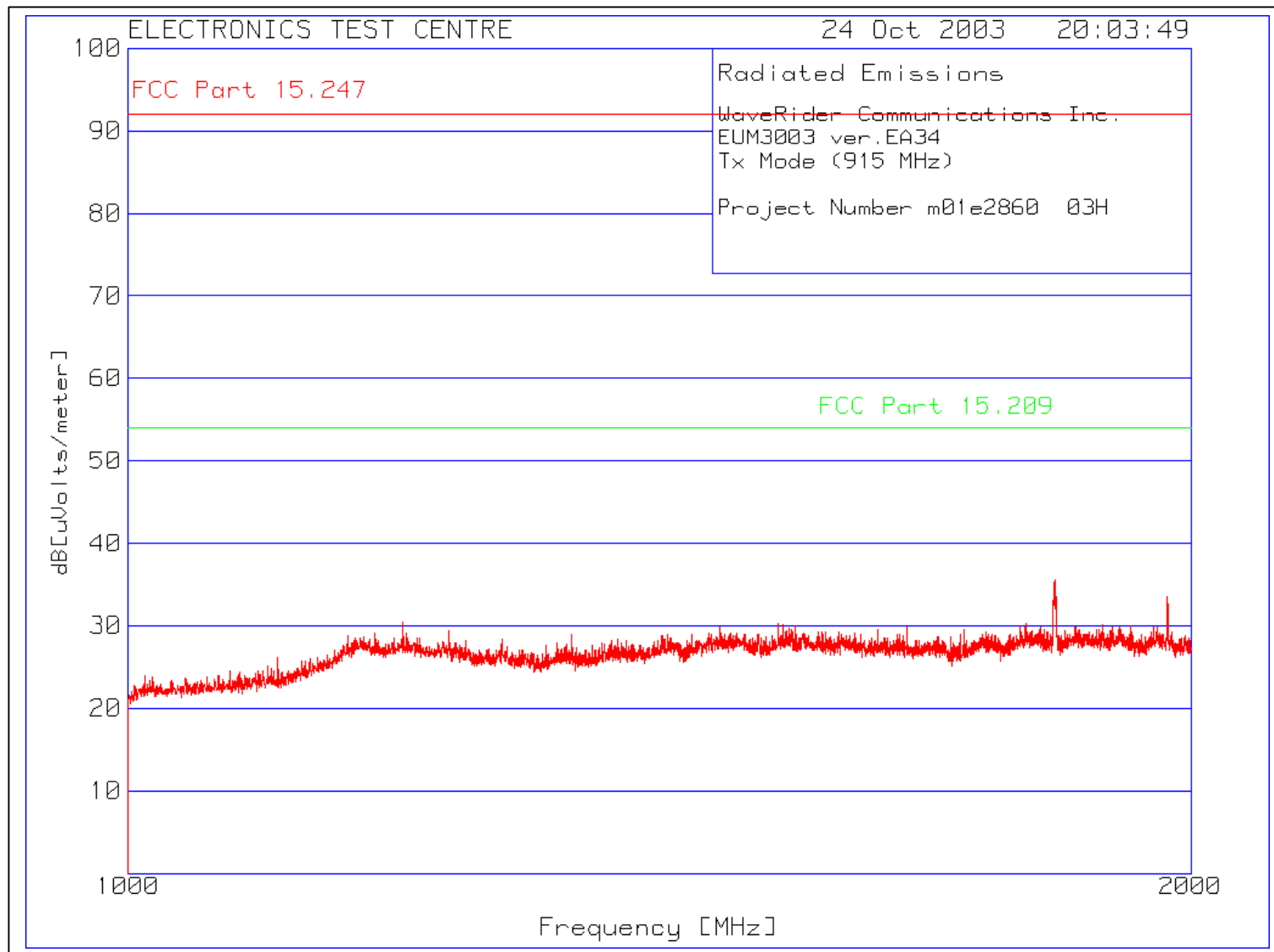
Plot of Radiated Emissions – Horizontal @ 905 MHz:



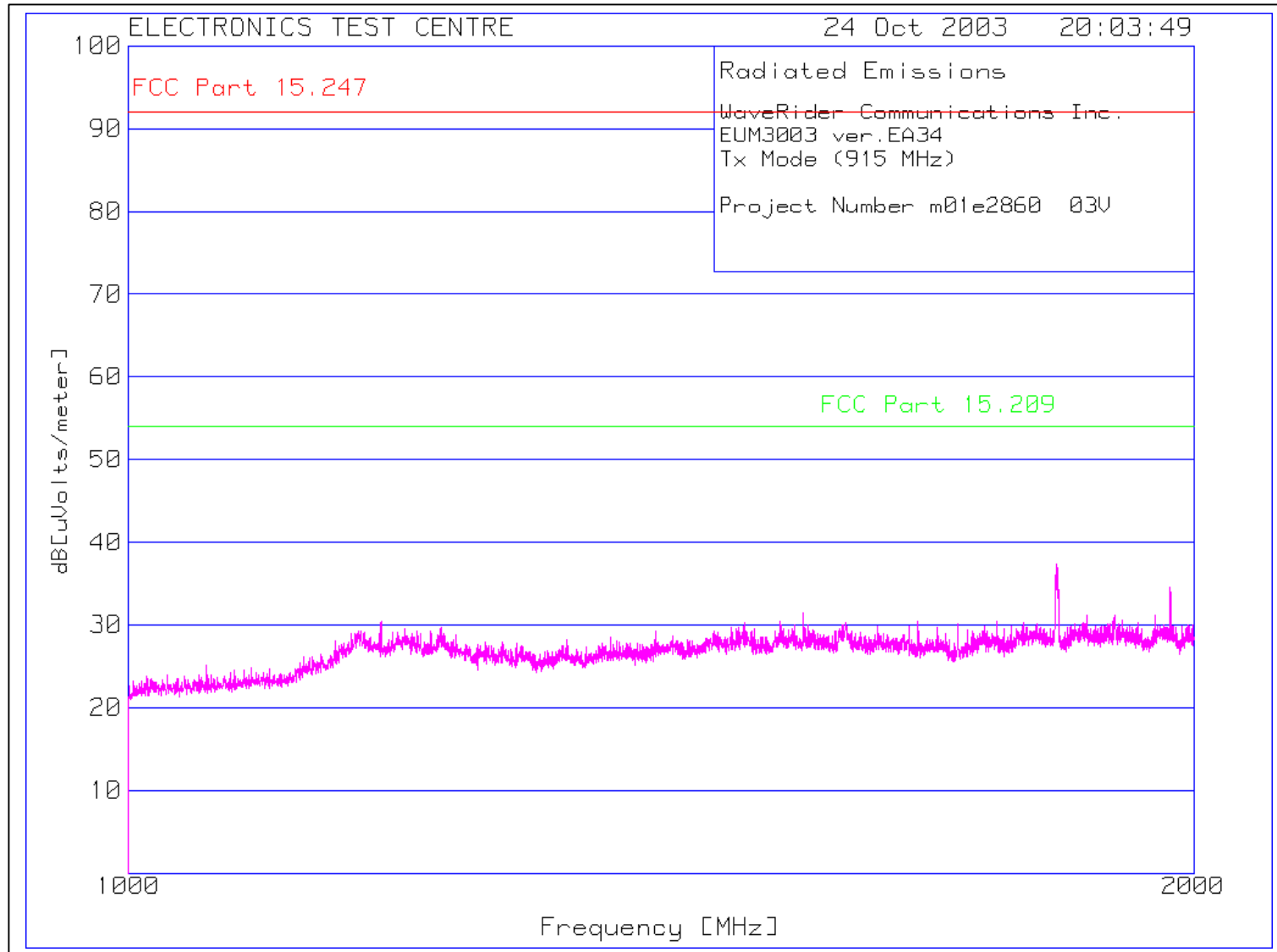
Plot of Radiated Emissions – Vertical @ 905 MHz:



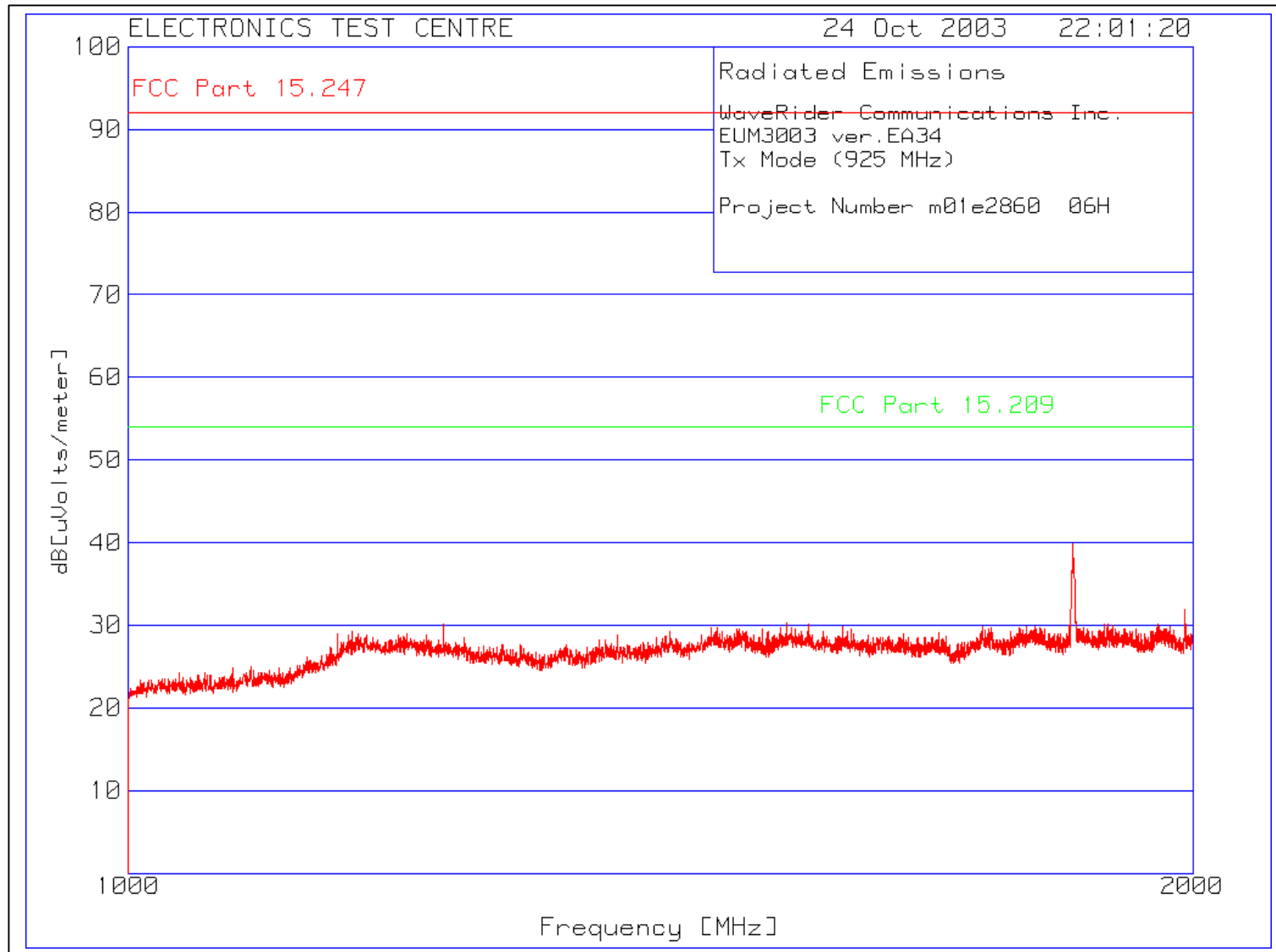
Plot of Radiated Emissions – Horizontal @ 915 MHz:



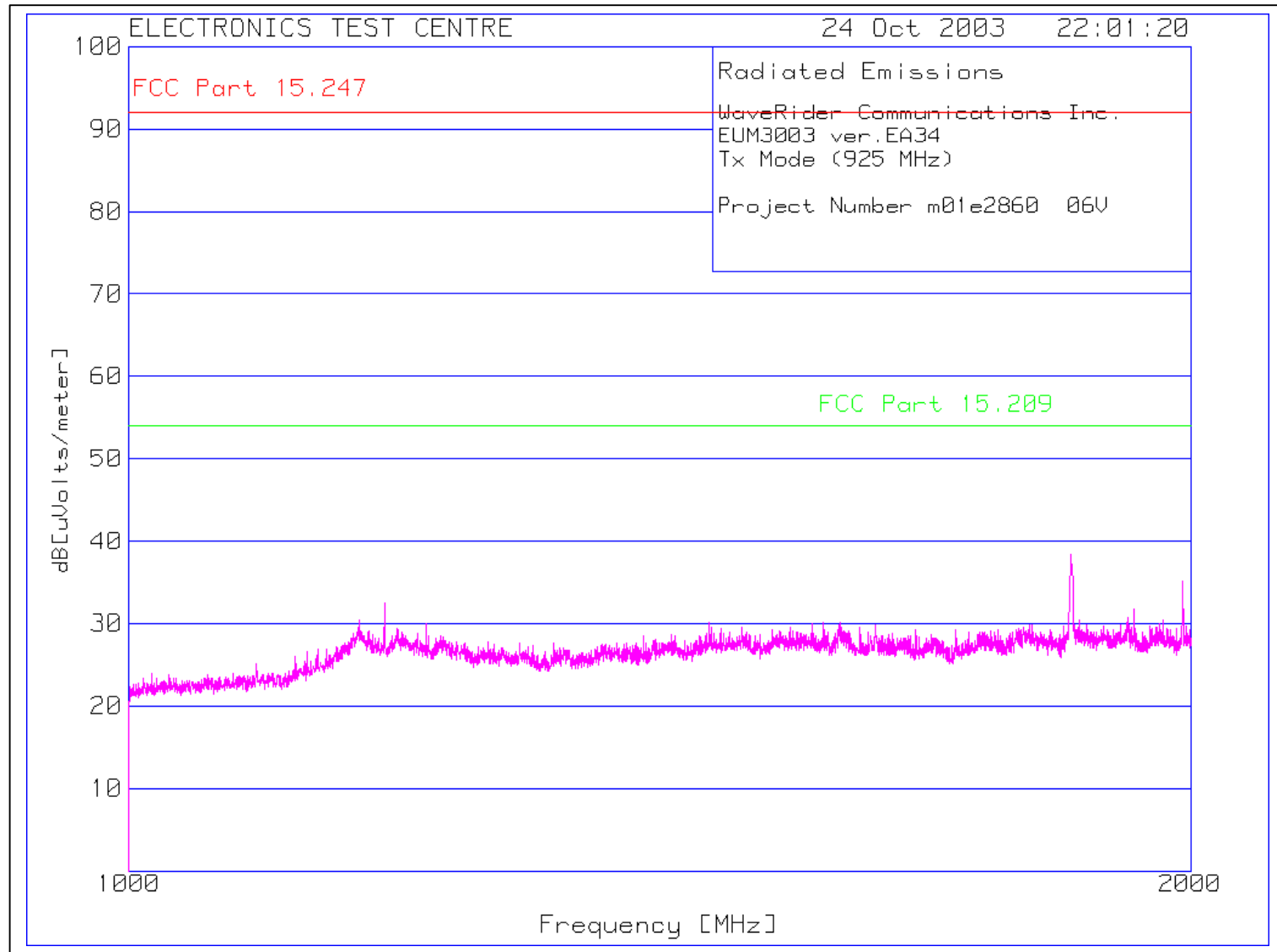
Plot of Radiated Emissions – Vertical @ 915 MHz:



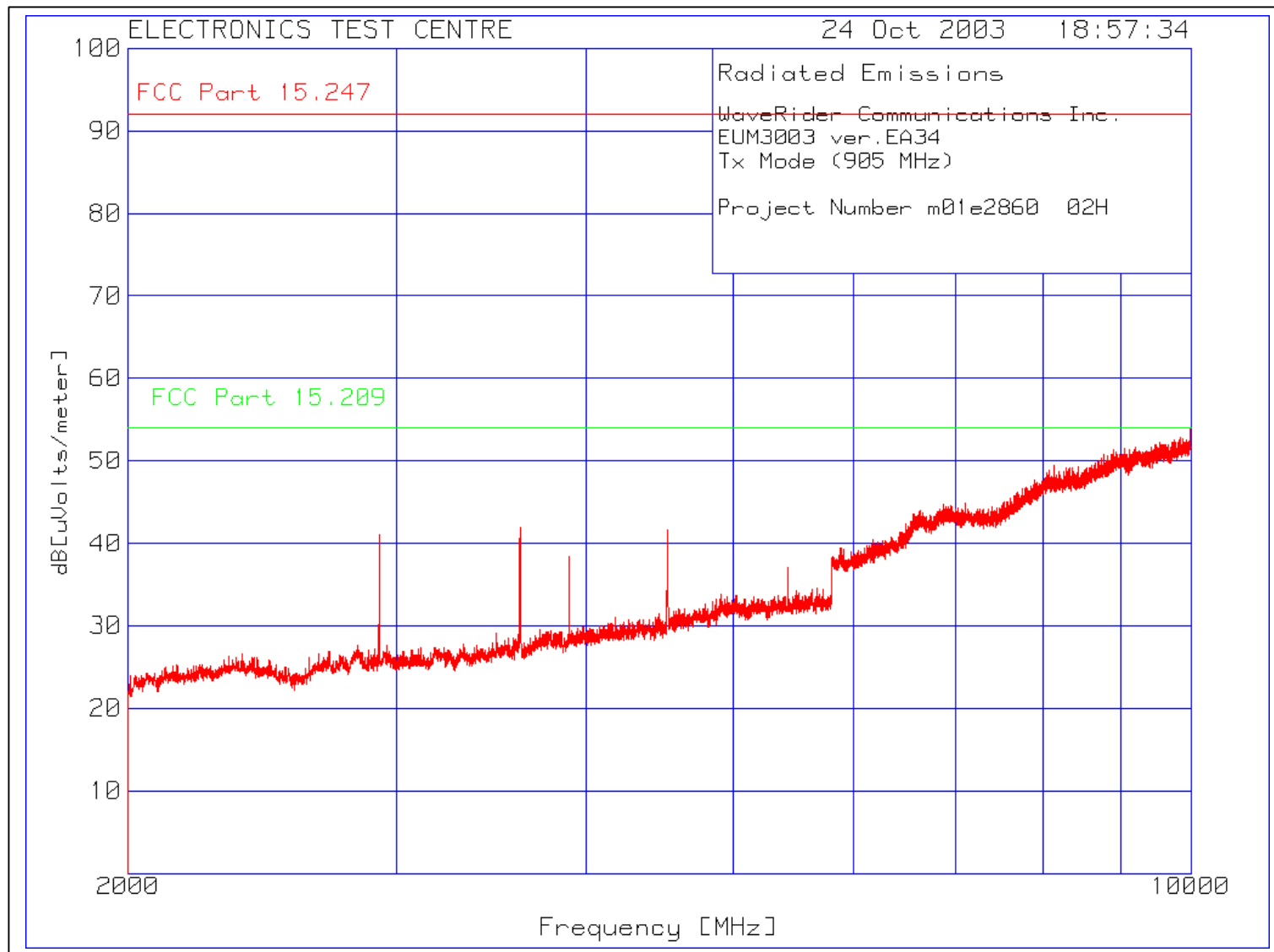
Plot of Radiated Emissions – Horizontal @ 925 MHz:



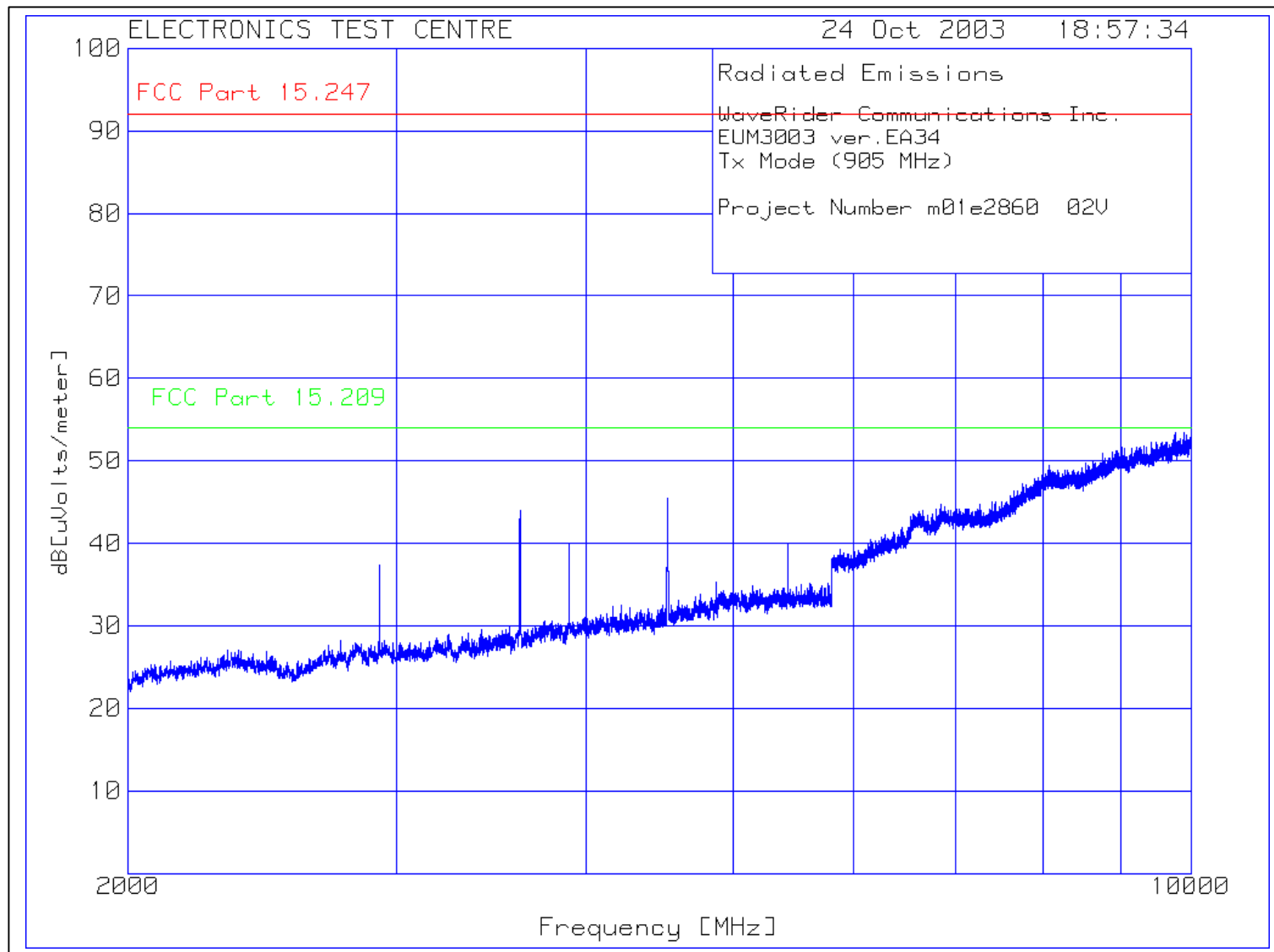
Plot of Radiated Emissions – Vertical @ 925 MHz:



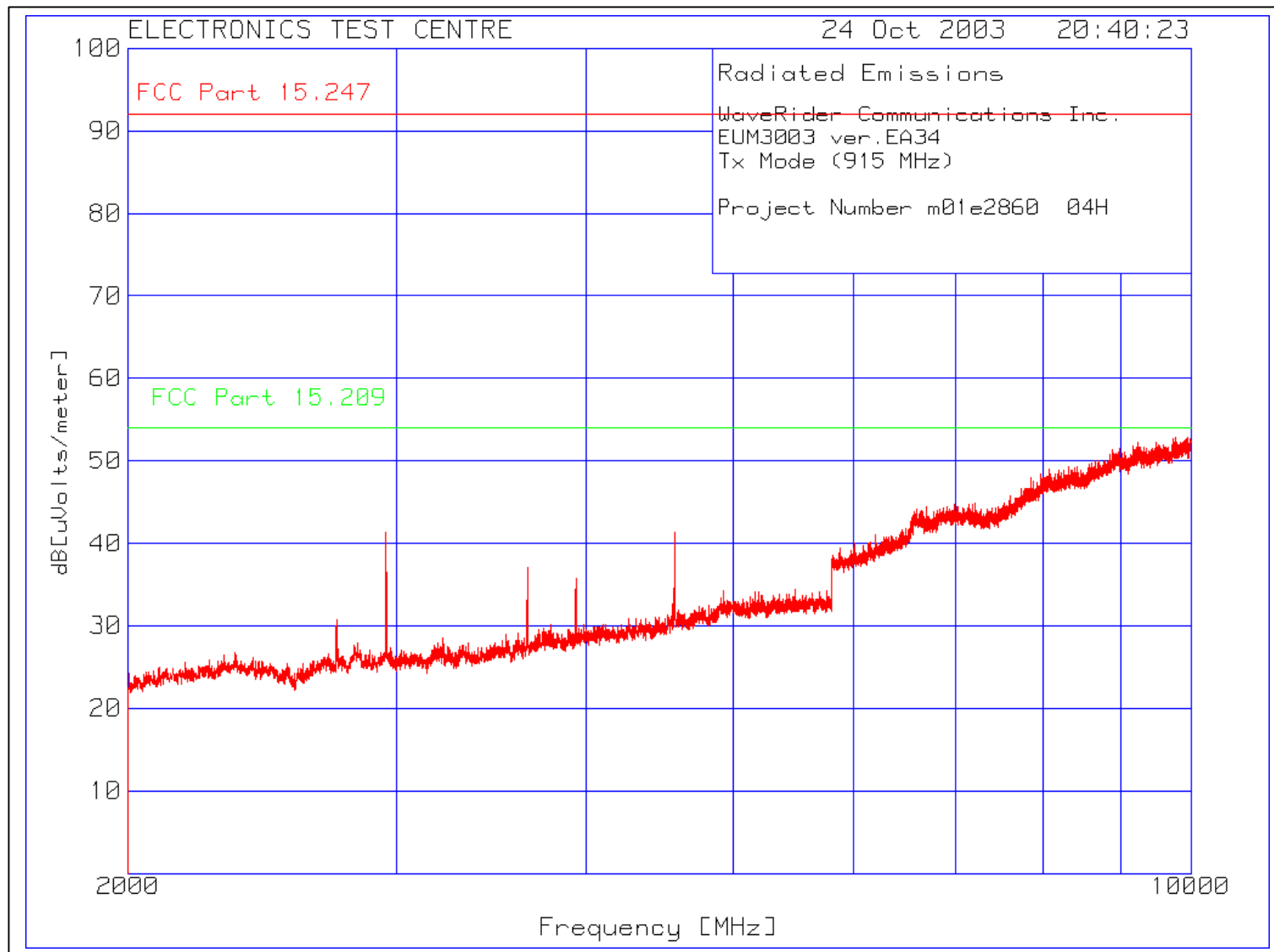
Plot of Radiated Emissions – Horizontal @ 905 MHz:



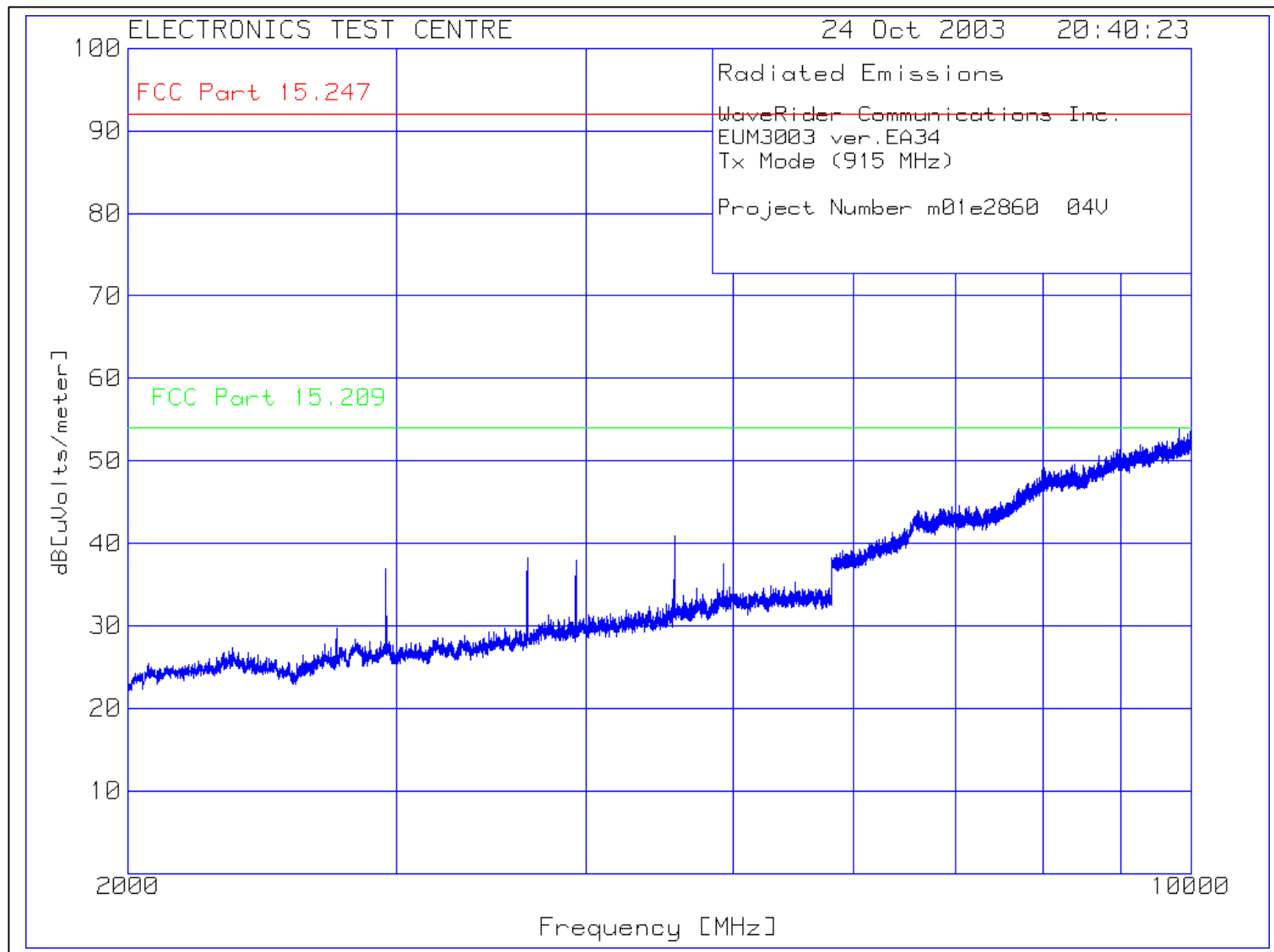
Plot of Radiated Emissions – Vertical @ 905 MHz:



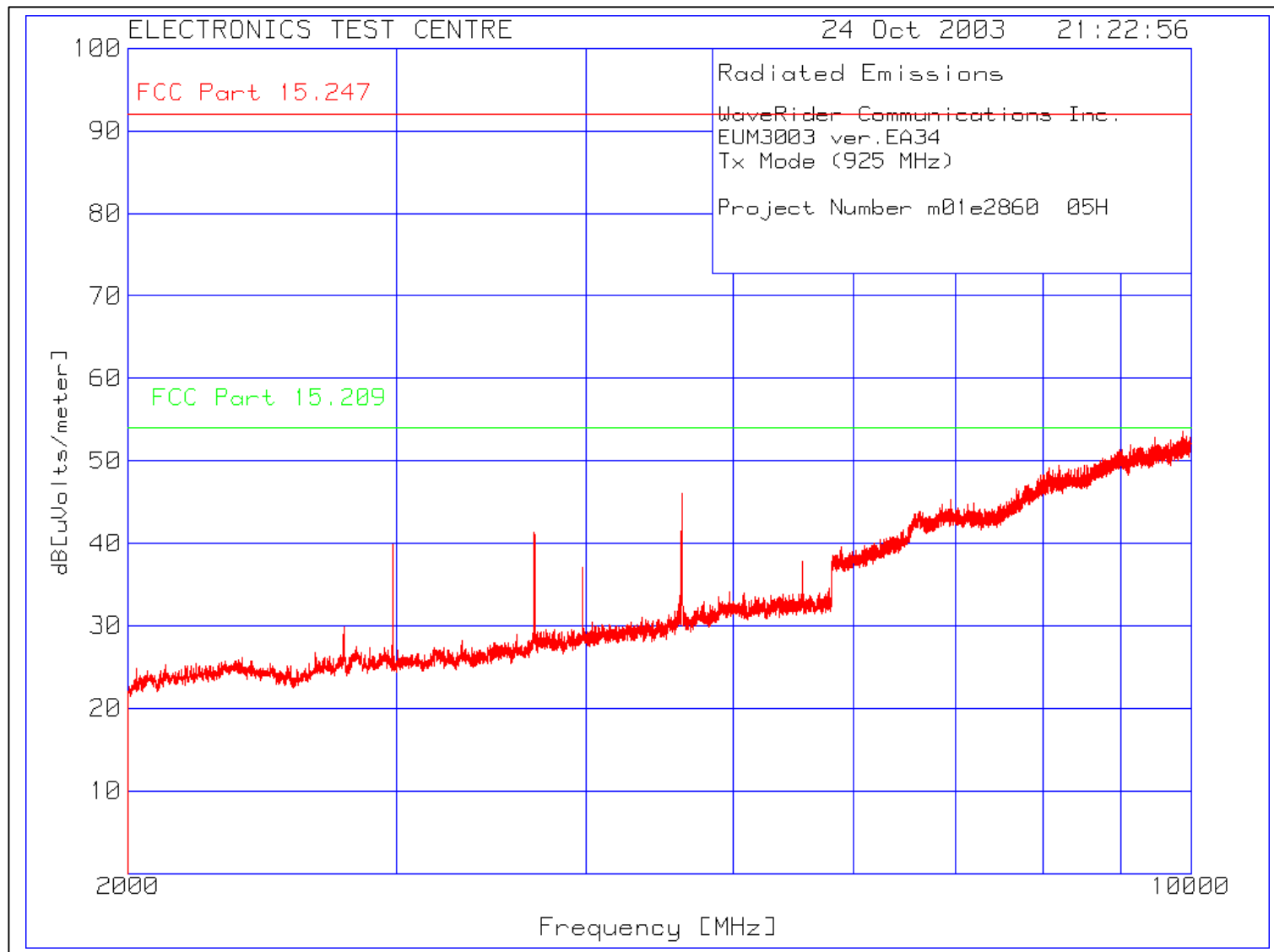
Plot of Radiated Emissions – Horizontal @ 915 MHz:



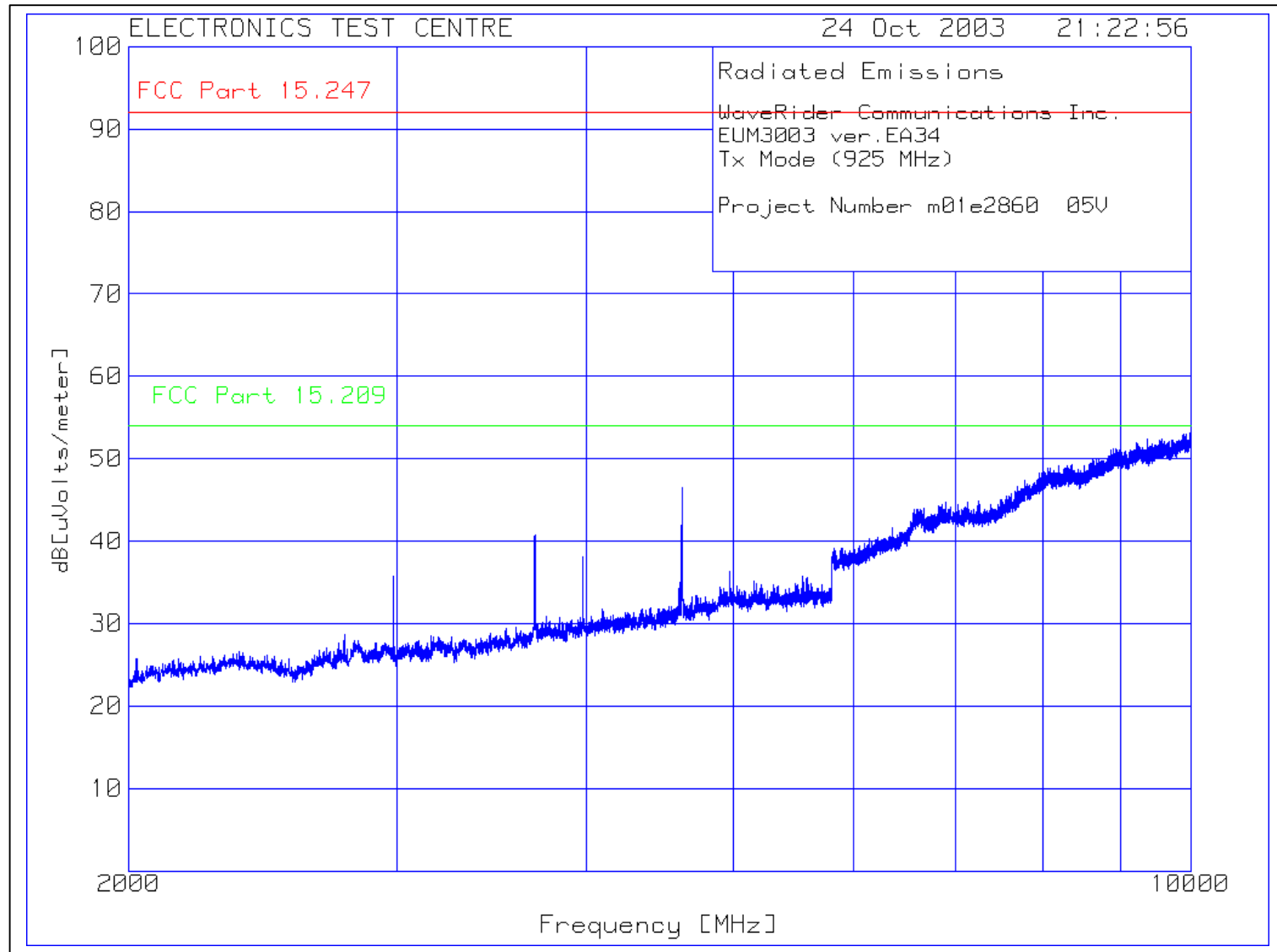
Plot of Radiated Emissions – Vertical @ 915 MHz:



Plot of Radiated Emissions – Horizontal @ 925 MHz:



Plot of Radiated Emissions – Vertical @ 925 MHz:



Test Setup for Field Strength of Spurious Radiation:



5.0 TEST FACILITY

5.1 LOCATION

The EUT was tested for Electromagnetic Compatibility at the Electronics Test Centre, located in Airdrie, Alberta, Canada.

The RF Anechoic Chamber (RFAC) is identified as Chamber 1, located in the main building complex at the Electronics Test Centre. Its usable working space measures 10.6 m long x 7.3 m wide x 6.5 m high.

This test site is listed with the FCC under Registration Number 99541. Measurements taken at this site are accepted by Industry Canada per file number IC 2046-1.

The floor, walls and ceiling consist of annealed steel panels. The walls and ceiling are covered with ferrite tile, augmented by RF absorbant foam material on the end wall nearest the turntable, and on the adjacent walls and the ceiling. The chamber floor supports a 15 cm high internal floor, constructed of annealed steel panels, that forms the ground plane, and is bonded to the chamber walls.

The 3-m diameter turntable is flush-mounted with the floor. A sub-floor cable-way is provided to route cables between the turntable pit and EUT support equipment. Cables reach the EUT through an opening in the centre of the turntable.

Test instrumentation and EUT support equipment is located in two shielded vestibules located at the side of the main room. Cables are routed through bulkhead panels between the rooms as required. Power feeds are routed into the main room and vestibules through line filters providing at least 100 dB of attenuation between 10 kHz and 10 GHz.

5.2 GROUNDING PLAN

The EUT was located <on a wooden table 80 cm above the ground plane.><in a rack provided by WaveRider Communications Inc..

The EUT was grounded in accordance with WaveRider Communications Inc. specifications.

In accordance with WaveRider Communications Inc. specifications, the EUT was not grounded.

5.3 POWER

AC power was supplied via an Underwriter's Laboratories ULW100-69, 100 dB, 100 Ampere wall mounted filter. Bonding to ground is implemented at the chamber wall.

5.4 EMISSIONS PROFILE

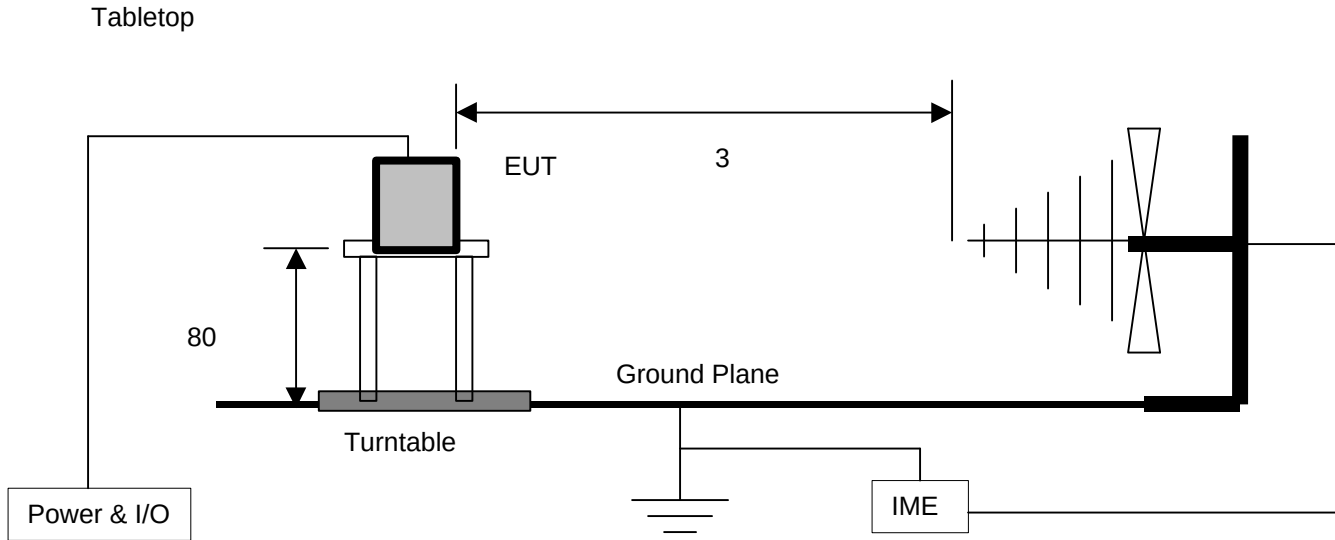
Ambient conducted and radiated electromagnetic emission profiles were generated throughout the tests and are included in the test data.

5.5 TEST CONFIGURATION

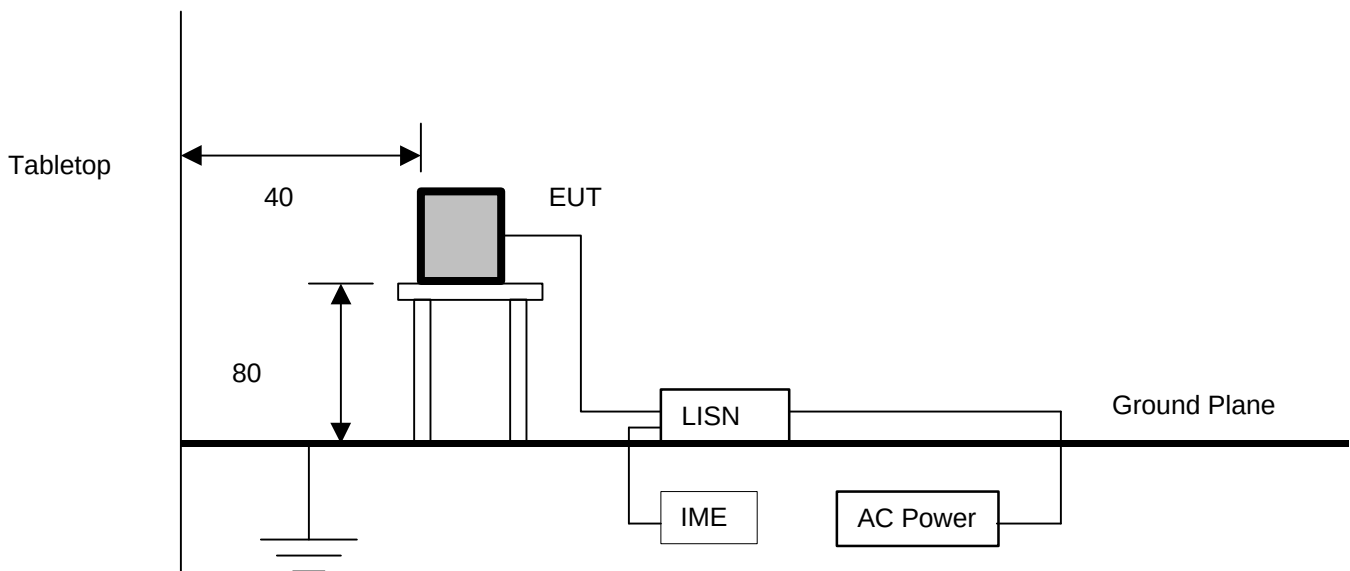
5.5.1 Tabletop Equipment

The following diagrams illustrate the configuration of the EUT test and measurement equipment for Radiated and Conducted Emissions Testing of tabletop equipment.

Radiated Emissions



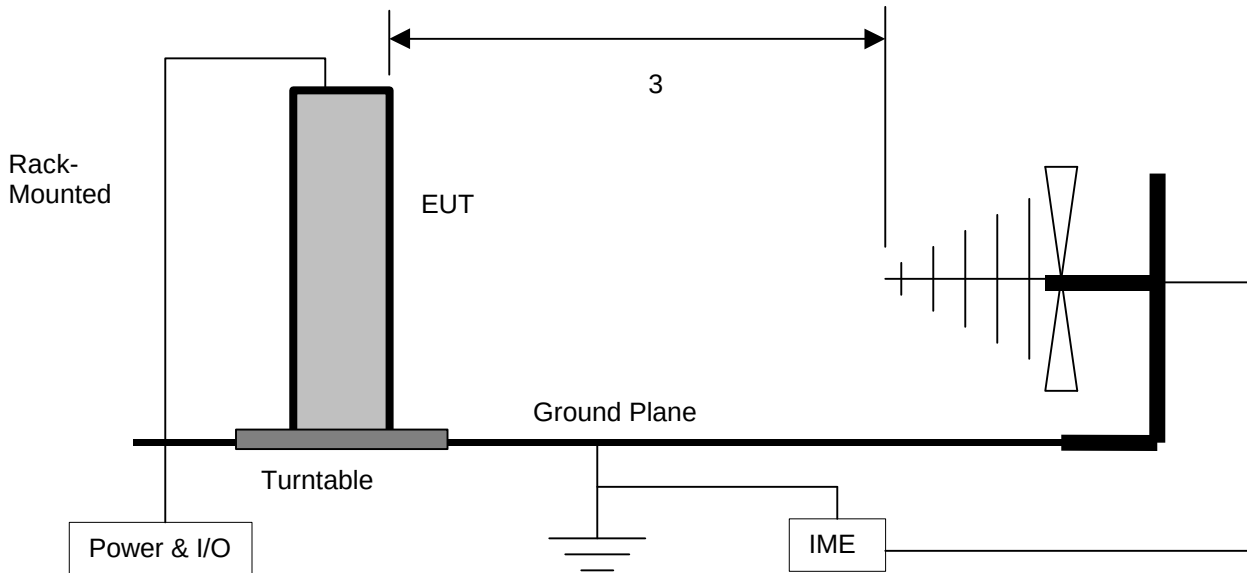
Conducted Emissions



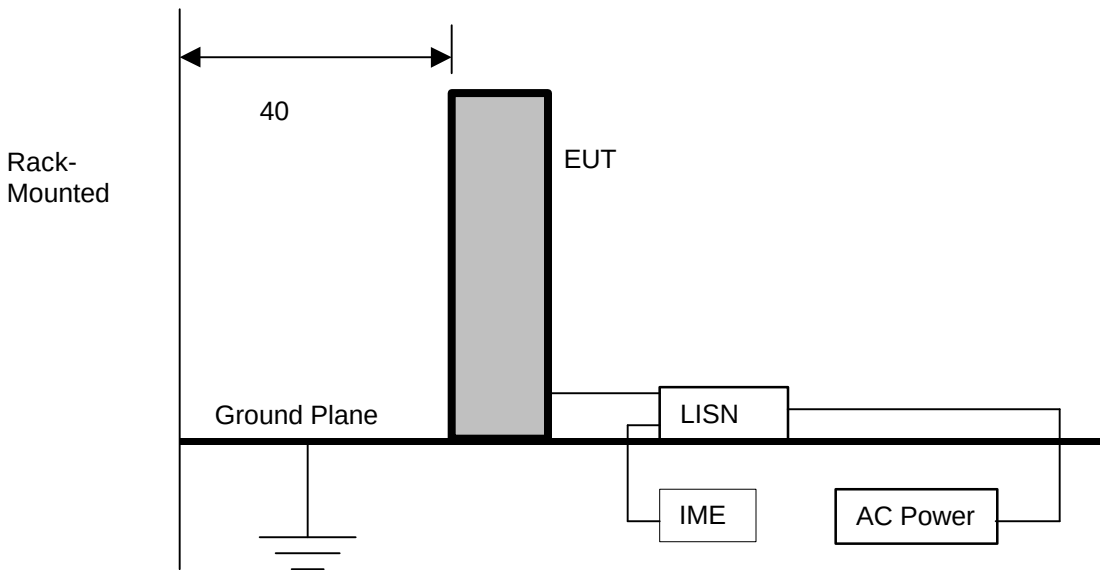
5.5.2 Rack Mount

The following diagrams illustrate the configuration of the EUT test and measurement equipment for Radiated and Conducted Emissions Testing of rack mounted equipment.

Radiated Emissions



Conducted Emissions



6.0 TEST EQUIPMENT

The following equipment was used for this procedure. All measurement devices are calibrated annually, traceable to NIST.

6.1 RADIATED EMISSIONS

- a) Spectrum Analyzer with RF Preselector
- b) CISPR Quasi-peak Adapter
- c) Power Isolation Transformers
- d) Biconilog antenna (20 MHz to 2 GHz)
- e) Antenna mast positioner, and controller
- f) Flush-mounted turntable, and controller
- g) Personal Computer and EMC software

6.2 CONDUCTED EMISSIONS

- a) Spectrum Analyzer with RF Preselector
- b) Line Impedance Stabilization Network, 50 μ H
- c) CISPR Quasi-peak Adapter
- d) Isolation Transformer
- e) Personal Computer and EMC software

6.3 CALIBRATION

All measurement instrumentation conforms to ANSI C63.2. Calibration is maintained in accordance with manufacturer recommendations. Each measurement device is labeled with its ETC asset number and calibration due date.

6.3.1 CALIBRATION ACCURACY

Test equipment used to provide quantitative measurements are calibrated with standards traceable to the National Research Council, National Institute of Standards and Technology or other national standards. Instrumentation systems for emissions measurements have the following accuracies:

Frequency = ± 1 kHz
Amplitude (RE) = ± 4.01 dB
Amplitude (CE) = ± 3.25 dB

6.3.2 TEST EQUIPMENT DESCRIPTION

The equipment used in the tests was selected from the following list.

Instrument	Manufacturer	Model No.	Asset No.	Calibration Due
Spectrum Analyzer	Hewlett Packard	8566B	9565	13 November 2003
Spectrum Analyzer	Hewlett Packard	8566B	9168	10 December 2003
RF Preselector	Hewlett Packard	85685A	9728	30 July 2004
RF Preselector	Hewlett Packard	85685A	9563	14 August 2004
Quasi-Peak Adapter	Hewlett Packard	85650A	4411	30 July 2004
Quasi-Peak Adapter	Hewlett Packard	85650A	9243	7 August 2004
Measurement System Software	Underwriters Laboratories	Version 6.0	4443	n/a
Line Impedance Stabilization Network	EMCO	3825/2r	9331	2 November 2003
Line Impedance Stabilization Network	EMCO	3825/2r	9259	2 November 2003
Biconilog Antenna	ARA	Lpb-2520/A	4318	2 August 2004
Dual Ridged Guide Antenna	EMCO	3115	9588	2 August 2004
Low Noise Amplifier	MITEQ	JS43-01001800-21-5P	4354	3 November 2003

Appendix A

EUM3004 Wireless Modem

Test Sample Description

(from data provided by WaveRider Communications Inc.)

Product Application	Product Category
Commercial ✓ Military o	Telecommunications o Information Technology ✓ Surface Transportation o Aerospace o Test & Measurement o Other o
Product Name	EUM3004
Part/Model No.	EUM3004
Serial Number	n/a
Power Requirements: (Voltage, AC/DC, Hz, Current)	120 VAC 60 Hz to AC-DC adapter Elpac 3578 (4.2VDC, 3A)
Typical Installation Instructions or Configuration	Connected via an Ethernet cable to a personal computer or an Ethernet router. Antenna fixed mounted at a minimum of 20cm from user.
Ground Connection (in addition to power cord)	Nil
Internally Generated Frequencies	32.768 kHz (microprocessor) 3.6864 MHz (microprocessor) 11 MHz (DSSS BBP) 22 MHz (synthesizer reference) 25 MHz (Ethernet reference) 44 MHz (reference oscillator) 70 MHz (Intermediate Frequency) 140 MHz (IF Oscillator) 905 – 925 MHz (RFLO – IF) 975 – 995 MHz (Radio Frequency Local Oscillator)
Peripheral Support Equipment	Personal Computer
Description and number of interconnecting Leads & Cables	One Ethernet cable One power supply cable One Antenna
Brief Functional Description	The EUM3004 is a 900MHz radio module intended to provide connectivity between an end-user's computer and an Internet Service Provider. It is a single PCB wireless solution based on the Intersil PRISM II Direct Sequence Chip Set. Data from the I/O port is spread using a defined PN code and then modulated using CCK modulation. The modulated signal is then up-converted to the 900MHz band. In receive mode, the signal from the antenna port is amplified and then down converted to an IF frequency of 70MHz before it is demodulated and despread.