ELECTRONICS TEST CENTRE
MPB TECHNOLOGIES INC.

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MPBT Report No.: c05e2473 Rev: 4 Date: 26 January 2002

Report for Emissions Testing of: AL200 (NJIAL200)

In accordance with: FCC Part 15, Subpart C (2000)
FCC Part 22, Subpart H (2000)

Test Personnel: Steven Tarkowski

Prepared for: CSI Wireless Inc.
4410-9th Street SE
Calgary, AB
T2G 3C4

_____
Client Acceptance
Authorized Signatory

Digitally signed by David G. Raynes
cn=David G. Raynes, ou=Electronics Test Centre, o=MPB Technologies Inc., c=CA
Date: 2002.01.29 14:59:59 -07'00'
Reason: I have reviewed this document
Airdrie, Alberta

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David Raynes
Laboratory Supervisor
Electronics Test Centre (Airdrie)
Authorized Signatory

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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 CSI Wireless Inc., located in Calgary, Alberta, Canada.

1.3 APPLICABILITY

All test procedures, limits, and results defined in this document apply to the CSI Wireless Inc. AL200 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 NVLAP or the Canadian or US governments.

1.4 TEST SAMPLE DESCRIPTION

The test sample provided for testing was a AL200:

Product Type:	Commercial Telecommunication
Model Number:	AL200
Serial Number:	49
Cables:	2x DC and 3x digital communications
Power Requirements:	8.0 V to 18 V dc (16 to 36 V dc)
Peripheral Equipment:	Cellcom CVDM program, Serial Ad.

The AL200 was tested with the GAP2 antenna from CSI Wireless Inc. More detailed information is provided by CSI Wireless 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 (1992).

1.6.1 VARIATIONS IN TEST METHODS

The following variations in test methodology were noted during testing: for Frequency Stability versus temperature, the data collected from previous test were used.

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 MODIFICATIONS

There were no equipment modifications during test performance.

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 indicated as **PASS** or **FAIL**.

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	FCC Part 15.207	AL200	nil	Simulated Installation	**N/A**
§4.2	Radiated Emissions including Restricted Bands of Operation	FCC Part 15.209 and 15.205 and 22.907	AL200	nil	Simulated Installation	**PASS**
§4.3	Occupied Bandwidth with modulationn	FCC Part 22.917 (b)(d)	AL200	nil	Simulated Installation	**PASS**
§4.4	Frequency Stability versus Temperature	FCC Part 22.355	AL200	nil	Simulated Installation	**PASS**
§4.5	Frequency Stability versus Voltage	FCC Part 22.355	AL200	nil	Simulated Installation	**PASS**
§4.6	Effective Radiated Power	FCC Part 22.913	AL200	nil	Simulated Installation	**PASS**
§4.7	Audio Filter Characteristics	FCC Part 22.915 (d)	AL200	nil	Simulated Installation	**PASS**
§4.8	Modulation Characteristics	FCC Part 22.915 (c)	AL200	nil	Simulated Installation	**PASS**
§4.9	Conducted Emissions at Antenna Port	FCC Part 22.917	AL200	nil	Simulated Installation	**PASS**
§4.10	Receive Band Emissions	FCC Part 22.917 (f)	AL200	nil	Simulated Installation	**PASS**
§4.11	Effective Radiated Power of Spurrious Emissions	FCC Part 22.913	AL200	nil	Simulated Installation	**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: Test Date: N/A	Product: AL200

Test Result, AL200: N/A

Objectives/Criteria	Specifications
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**. The EUT was not assessed for Conducted Emissions because there is no direct connection to the AC mains.	FCC Part 15 Subpart B Frequency [MHz] — Limit (QP) [dBµV] 0.45 – 30 — 47.96

Line 1:			Line 2:		
Frequency [MHz]	RF Voltage [dBµV]	Delta [dB from limit]	Frequency [MHz]	RF Voltage [dBµV]	Delta [dB from limit]

N/A.

4.2 RADIATED EMISSIONS INCLUDING RESTRICTED BANDS OF OPERATION

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Steven Tarkowski Test Date: 24, 27 & 29 November 2001	Product: AL200

Test Result, AL200: **PASS**

Objectives/Criteria	Specifications
The Radiated E-Field emissions produced by a system or sub-system, measured at a distance of 3m from the EUT, shall not exceed these limits *within the restricted bands of operation (RBOs)*. Any emissions lying outside the RBOs shall not exceed the level of the fundamental. **Emission levels should meet the requirements with a margin of 6dB.** Note: See the table on the next page for the RBOs of Part 15.205. 24 Nov 2001: Temperature = 21.0 °C Humidity = 28 % 27 Nov 2001: Temperature = 22.0 °C Humidity = 28 % 29 Nov 2001: Temperature = 21.0 °C Humidity = 28 %	FCC Part 15.209 Frequency [MHz] / Limit (QP @ 3m) [dBµV/m] 30 – 88 : 40.00 88 – 216 : 43.52 216 – 960 : 46.02 Above 960 : 53.98

Transmit Mode (excluding the fundamentals and its harmonics) for all channels :

Vertical:			**Horizontal:**		
f (MHz)	Field Strength (dBµV/m)	Delta (dB from limit)	f (MHz)	Field Strength (dBµV/m)	Delta (dB from limit)
3704.50856	47.3	-6.68	840.0688	43.34	-2.66
3755.46397	47.7	-6.28	825.3321	44.97	-1.03
4727.61334	49.0	-4.98	926.01832	39.4	-6.62
2814.2875	46.5	-7.48	2814.78706	45.0	-8.98
3564.63095	49.8	-4.18	396.03164	36.5	-9.52
3562.6327	48.6	-5.38	3755.46397	46.8	-7.18

There were more emissions measured within -10 dB of the specified limit. Refer to the test data and plots for more detail.

Receive Mode:

Vertical:			**Horizontal:**		
f (MHz)	Field Strength (dBμV/m)	Delta (dB from limit)	f (MHz)	Field Strength (dBμV/m)	Delta (dB from limit)
1687.98401	47.5	-6.48	915.19567	38.3	-7.72
876.58951	38.9	-7.12	2258.77357	45.3	-8.68
2814.2875	46.4	-7.58	694.70441	38.8	-7.22
3755.46397	46.9	-7.08	926.01832	38.9	-7.12
1034.22433	45.8	-8.18	271.81349	37.6	-8.42
1878.09143	45.8	-8.18	868.67444	37.6	-8.42

There were more emissions measured within -10 dB of the specified limit. Refer to the test data and plots for more detail.

Restricted Frequency Bands [MHz]					
Start	**End**	**Start**	**End**	**Start**	**End**
4.17725	4.17775	123	138	3345.8	3358
4.20725	4.20775	149.9	150.05	3600	4400
6.215	6.218	156.52	156.53	4500	5150
6.26775	6.26825	156.7	156.9	5350	5460
6.31175	6.31225	162.01	167.17	7250	7750
8.291	8.294	167.72	173.2	8025	8500
8.362	8.366	240	285	9000	9200
8.37625	8.38675	322	335.4	9300	9500
8.41425	8.41475	399.9	410	10600	12700
12.29	12.293	608	614	13250	13400
12.51975	12.52025	960	1240	14470	14500
12.57675	12.57725	1300	1427	15350	16200
13.36	13.41	1435	1626.5	17700	21400
16.42	16.423	1645.5	1646.5	22010	23120
16.69475	16.69525	1660	1710	23600	24000
16.80425	16.80475	1718.8	1722.2	31200	31800
25.5	25.67	2200	2300	36430	36500
37.5	38.25	2310	2390		

Quasi-peak (OATS), Average and Peak Data Measurements from Radiated Emissions:

Transmit - Channel 001: 30-1000 MHz:

CSI wireless
Calgary,AB
TX mode channel 001
AL200
Project: c05e2473

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
825.018	88.48 qp	6.2	21.9	116.58	56.9	46	57.5	47.5
Azimuth: 5	Height:103 Horz		Margin [dB]		59.68	70.58	59.08	69.08
840.0688	15.04 qp	6.2	22.1	43.34	56.9	46	57.5	47.5
Azimuth: 188	Height:103 Horz		Margin [dB]		-13.56	-2.66	-14.16	-4.16
825.0694	84.6 qp	6.2	21.2	112	56.9	46	57.5	47.5
Azimuth: 80	Height:268 Vert		Margin [dB]		55.1	66	54.5	64.5

LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: FCC Part 15 Class B 3m
LIMIT 3: CISPR11/22 ICES-003 Class A 3m
LIMIT 4: CISPR11/22 ICES-003 Class B 3m
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI wireless
Calgary,AB
TX mode channel 001
AL200
Project: c05e2473
28 Nov 2001 08:02:20

10 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-30 to 1000 MHz
Range number:2-30 to 1000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .22153 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	30.4846	24.7	40	-15.3	228	400 H
2	814.39967	43.3	46.02	-2.72	228	99 H
3	825.14155	107.4	46.02	61.38	272	99 H
4	840.2448	45.2	46.02	-.82	52	99 H
5	999.67694	36.1	53.98	-17.88	316	99 H
Vertical						
1	30.32306	24	40	-16	338	100 V
2	40.01499	29.9	40	-10.1	75	100 V
3	825.14155	106.6	46.02	60.58	118	100 V
4	840.2448	36.7	46.02	-9.32	140	100 V
5	999.67694	35.5	53.98	-18.48	316	100 V

```
1-2 GHz:
 CSI wireless
 Calgary,AB
 TX  mode channel 001
 AL200
 Project: c05e2473

  Test    Meter  Gain/Loss Transducer Level Limit:1     2     3     4
Frequency Reading  Factor    Factor    [dB(uVolts)]
  [MHz]   [dB(uV)]  [dB]      [dB]
================================================================================
1649.96    84.4 pk   -49.7    27.9     62.6   60      54      N/A    N/A
Azimuth: 4    Height:182 Horz    Margin [dB]  2.6     8.6     N/A    N/A

1650.014   84.7 pk   -49.7    27       62     60      54      N/A    N/A
Azimuth: 83   Height:311 Vert    Margin [dB]  2       8       N/A    N/A

LIMIT 1: FCC CLASS A
LIMIT 2: FCC CLASS B
LIMIT 3: NONE
LIMIT 4: NONE
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI wireless
 Calgary,AB
 TX  mode channel 001
 AL200
 Project: c05e2473

29 Nov 2001  09:02:02

6 PEAKS within -20 dB of the: FCC CLASS B limit
Range number:1-1000 to 2000 MHz
Range number:2-1000 to 2000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .74981 MHz  Minimum Separation: 0 MHz
--------------------------------------------------------------------------------

Peak   Frequency   Level   Limit Value   Delta    TABLE       ANTENNA
[No.]    [MHz]                           [dB]  AZIMUTH[deg] HEIGHT[cm]
--------------------------------------------------------------------------------
Horizontal
1      1650.76193   57.6       53.98      3.62    N/A         99 H
2      1762.42818   34.7       53.98      -19.28  N/A         400 H
3      1927.05471   35.4       53.98      -18.58  N/A         400 H

Vertical
1      1650.76193   56.7       53.98      2.72    N/A         99 V
2      1890.58206   37.4       53.98      -16.58  N/A         99 V
3      1908.06895   36.4       53.98      -17.58  N/A         99 V
```

2-10 GHz:

CSI Wireless
Calgary, AB
TX Ch. 001
AL200 with GAP2
Project: c05e2473

24 Nov 2001 15:25:17

16 PEAKS within -10 dB of the: FCC Part 15 Class B 3m limit
Range number:1-2000 to 10000 MHz
Range number:2-2000 to 10000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: 1.49913 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Hor						
1	2473.58561	62.1	53.98	8.12	N/A	99 H
2	3299.36306	73.6	53.98	19.62	N/A	99 H
3	4124.14138	53.4	53.98	-.58	N/A	99 H
4	4948.42013	52.3	53.98	-1.68	N/A	99 H
5	5773.69801	54.8	53.98	.82	N/A	99 H
6	9995.00437	56.1	53.98	2.12	N/A	99 H
Ver						
1	2473.58561	59.2	53.98	5.22	N/A	99 V
2	2832.27176	46.3	53.98	-7.68	N/A	99 V
3	3299.86262	68	53.98	14.02	N/A	99 V
4	4124.14138	56.8	53.98	2.82	N/A	99 V
5	4727.61334	49	53.98	-4.98	N/A	99 V
6	4948.42013	58.9	53.98	4.92	N/A	99 V
7	5773.69801	58.9	53.98	4.92	N/A	99 V
8	6598.9759	51.5	53.98	-2.48	N/A	99 V
9	8065.69252	56.7	53.98	2.72	N/A	400 V
10	9994.00525	56.5	53.98	2.52	N/A	400 V

Transmit - Channel 367: 30-1000 MHz:

CSI Wireless
 Calgary, AB
 TX Ch. 367
 AL200 with GAP2
 Project: c05e2473

Test Frequency [MHz]	Meter Reading [dB(uV)]		Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
475.728	.32	qp	4.6	18.2	23.12	56.9	46	57.5	47.5
Azimuth: 229	Height:202	Horz		Margin [dB]	-33.78	-22.88	-34.38	-24.38	
825.3321	16.87	qp	6.2	21.9	44.97	56.9	46	57.5	47.5
Azimuth: 188	Height:179	Horz		Margin [dB]	-11.93	-1.03	-12.53	-2.53	
835.9865	88.88	qp	6.2	22	117.08	56.9	46	57.5	47.5
Azimuth: 53	Height:169	Horz		Margin [dB]	60.18	71.08	59.58	69.58	
835.9848	87.53	qp	6.2	21.3	115.03	56.9	46	57.5	47.5
Azimuth: 299	Height:120	Vert		Margin [dB]	58.13	69.03	57.53	67.53	

LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: FCC Part 15 Class B 3m
LIMIT 3: CISPR11/22 ICES-003 Class A 3m
LIMIT 4: CISPR11/22 ICES-003 Class B 3m

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI Wireless
Calgary, AB
TX Ch. 367
AL200 with GAP2
Project: c05e2473

24 Nov 2001 12:55:32

6 PEAKS within -10 dB of the: FCC Part 15 Class B 3m limit
Range number:1-30 to 1000 MHz
Range number:2-30 to 1000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .22153 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Hor:						
1	475.66694	51.7	46.02	5.68	184	99 H
2	825.38385	45.5	46.02	-.52	184	99 H
3	836.12573	107.5	46.02	61.48	250	99 H
4	926.01832	39.4	46.02	-6.62	272	99 H
Ver:						
1	825.38385	36.8	46.02	-9.22	118	101 V
2	836.12573	106.8	46.02	60.78	96	101 V

1-2 GHz:

CSI wireless
Calgary,AB
TX mode channel 367
AL200
Project: c05e2473

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
1672.08	84.4 pk	-49.5	28.5	63.4	60	54	N/A	N/A
Azimuth: 64	Height:306 Horz		Margin [dB]	3.4		9.4	N/A	N/A
1672.05	84.6 pk	-49.5	27.2	62.3	60	54	N/A	N/A
Azimuth: 61	Height:297 Vert		Margin [dB]	2.3		8.3	N/A	N/A

LIMIT 1: FCC CLASS A
LIMIT 2: FCC CLASS B
LIMIT 3: NONE
LIMIT 4: NONE

CSI wireless
Calgary,AB
TX mode channel 367
AL200
Project: c05e2473

27 Nov 2001 21:41:41

3 PEAKS within -20 dB of the: FCC CLASS B limit
Range number:1-1000 to 2000 MHz
Range number:2-1000 to 2000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .74981 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	1672.49563	58.3	53.98	4.32	N/A	99 H
2	1735.94804	35.4	53.98	-18.58	N/A	400 H
Vertical						
1	1672.49563	57	53.98	3.02	N/A	99 V

2-10 GHz:

CSI Wireless
Calgary, AB
TX Ch. 367
AL200 with GAP2
Project: c05e2473

24 Nov 2001 14:15:10

17 PEAKS within -10 dB of the: FCC Part 15 Class B 3m limit
Range number:1-2000 to 10000 MHz
Range number:2-2000 to 10000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: 1.49913 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Hor						
1	2506.55676	70	53.98	16.02	N/A	99 H
2	2545.52267	44	53.98	-9.98	N/A	99 H
3	3343.82415	78.9	53.98	24.92	N/A	99 H
4	4179.09329	61	53.98	7.02	N/A	99 H
5	5015.36156	62.4	53.98	8.42	N/A	99 H
6	5850.6307	58.1	53.98	4.12	N/A	99 H
7	9998.00175	56	53.98	2.02	N/A	400 H
Ver						
1	2506.55676	60.5	53.98	6.52	N/A	99 V
2	3343.82415	74.1	53.98	20.12	N/A	99 V
3	3564.63095	49.8	53.98	-4.18	N/A	99 V
4	3704.50856	47.3	53.98	-6.68	N/A	99 V
5	4179.09329	59.9	53.98	5.92	N/A	99 V
6	5015.36156	68.1	53.98	14.12	N/A	99 V
7	5850.6307	63.4	53.98	9.42	N/A	99 V
8	6685.89984	51.9	53.98	-2.08	N/A	99 V
9	8360.43462	53.5	53.98	-.48	N/A	99 V
10	9998.00175	56.8	53.98	2.82	N/A	400 V

Transmit - Channel 800: 30-1000 MHz:
CSI wireless
Calgary,AB
TX mode channel 800
AL200
Project: c05e2473

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
849.0269	89.06 qp	6.2	21.9	117.16	56.9	46	57.5	47.5
Azimuth: 197	Height:107 Horz		Margin [dB]		60.26	71.16	59.66	69.66
849.02	85.29 qp	6.2	21.4	112.89	56.9	46	57.5	47.5
Azimuth: 270	Height:188 Vert		Margin [dB]		55.99	66.89	55.39	65.39
849.02	86.6 qp	6.2	21.4	114.2	56.9	46	57.5	47.5
Azimuth: 280	Height:189 Vert		Margin [dB]		57.3	68.2	56.7	66.7
63.2909	.29 qp	1.8	9.1	11.19	49.5	40	50.5	40.5
Azimuth: 143	Height:212 Vert		Margin [dB]		-38.31	-28.81	-39.31	-29.31
64.4094	2.7 pk	1.8	9	13.5	49.5	40	50.5	40.5
Azimuth: 206	Height:249 Vert		Margin [dB]		-36	-26.5	-37	-27
130.0541	-.92 qp	2.5	12	13.58	54	43.5	50.5	40.5
Azimuth: 359	Height:104 Vert		Margin [dB]		-40.42	-29.92	-36.92	-26.92

LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: FCC Part 15 Class B 3m
LIMIT 3: CISPR11/22 ICES-003 Class A 3m
LIMIT 4: CISPR11/22 ICES-003 Class B 3m

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI wireless
Calgary,AB
TX mode channel 800
AL200
Project: c05e2473
29 Nov 2001 12:17:58

17 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-30 to 1000 MHz
Range number:2-30 to 1000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .22153 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
1	30.32306	25.8	40	-14.2	118	400 H
2	64.56786	35	40	-5	355	99 H
3	107.37386	25	43.52	-18.52	294	400 H
4	130.14988	42.4	43.52	-1.12	338	400 H
5	396.03164	36.5	46.02	-9.52	338	99 H
6	544.4796	34.7	46.02	-11.32	272	99 H
7	849.20983	107.4	46.02	61.38	74	99 H
8	999.83847	36.2	53.98	-17.78	228	400 H
Vertical						
1	30.16153	28.2	40	-11.8	228	101 V
2	98.48959	24.3	43.52	-19.22	360	101 V
3	105.19317	23.8	43.52	-19.72	360	101 V
4	107.37386	29.3	43.52	-14.22	206	101 V
5	133.54205	23.8	43.52	-19.72	206	101 V
6	187.49376	26.7	43.52	-16.82	228	101 V
7	757.70192	38.2	46.02	-7.82	228	400 V
8	849.12906	106.9	46.02	60.88	74	101 V
9	999.83847	35.1	53.98	-18.88	30	101 V

1-2 GHz:

CSI wireless
Calgary,AB
TX mode channel 800
AL200
Project: c05e2473

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
1697.952	84.3 pk	-49.4	28.2	63.1	60	54	N/A	N/A
Azimuth: 0	Height:207 Horz		Margin [dB]	3.1		9.1	N/A	N/A
1697.975	84.6 pk	-49.4	27.6	62.8	60	54	N/A	N/A
Azimuth: 110	Height:157 Vert		Margin [dB]	2.8		8.8	N/A	N/A

LIMIT 1: FCC CLASS A
LIMIT 2: FCC CLASS B
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI wireless
Calgary,AB
TX mode channel 800
AL200
Project: c05e2473

27 Nov 2001 21:05:08

3 PEAKS within -20 dB of the: FCC CLASS B limit
Range number:1-1000 to 2000 MHz
Range number:2-1000 to 2000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .74981 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal:						
1	1697.97652	58.1	53.98	4.12	N/A	99 H
2	1878.34124	37.5	53.98	-16.48	N/A	400 H
Vertical:						
1	1697.97652	57.5	53.98	3.52	N/A	99 V

2-10 GHz:

CSI Wireless
Calgary, AB
TX Ch. 800
AL200
Project: c05e2473

27 Nov 2001 16:18:08

10 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-2000 to 10000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: 1.49913 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal:						
1	2002.99738	37.4	53.98	-16.58	N/A	400 H
2	2088.92219	39.7	53.98	-14.28	N/A	99 H
3	2545.52267	61.5	53.98	7.52	N/A	99 H
4	2814.78706	45	53.98	-8.98	N/A	99 H
5	3395.77869	62.4	53.98	8.42	N/A	99 H
6	3755.46397	46.8	53.98	-7.18	N/A	99 H
7	4244.03647	57.3	53.98	3.32	N/A	99 H
8	5093.29337	55.6	53.98	1.62	N/A	99 H
9	5942.55027	52.4	53.98	-1.58	N/A	99 H
10	9999.00087	55.3	53.98	1.32	N/A	400 H
Vertical:						
1	2000.99913	37.6	53.98	-16.38	N/A	400 V
2	2396.65293	44	53.98	-9.98	N/A	99 V
3	2517.54715	41.2	53.98	-12.78	N/A	400 V
4	2545.52267	56.5	53.98	2.52	N/A	99 V
5	2814.2875	46.5	53.98	-7.48	N/A	99 V
6	3395.77869	56.1	53.98	2.12	N/A	99 V
7	3562.6327	48.6	53.98	-5.38	N/A	99 V
8	3755.46397	47.7	53.98	-6.28	N/A	99 V
9	4244.03647	62.8	53.98	8.82	N/A	99 V
10	5093.29337	58.3	53.98	4.32	N/A	99 V
11	5941.55114	54.7	53.98	.72	N/A	99 V
12	6789.80892	52.2	53.98	-1.78	N/A	99 V
13	9998.00175	56.1	53.98	2.12	N/A	400 V

Receive - Channel 001: 30-1000 MHz:

CSI wireless
Calgary,AB
RX mode channel 001
AL200
Project: c05e2473

30 Nov 2001 08:11:25

6 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-30 to 1000 MHz
Range number:2-30 to 1000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .22153 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	30.4846	24.8	40	-15.2	30	400 H
2	89.76686	29.6	43.52	-13.92	162	99 H
3	915.19567	38.3	46.02	-7.72	184	99 H
4	999.5154	36	53.98	-17.98	206	400 H
Vertical						
1	30.16153	28	40	-12	294	101 V
2	999.83847	35.2	53.98	-18.78	294	101 V

1-2 GHz:

CSI wireless
Calgary,AB
RX mode channel 001
AL200
Project: c05e2473

29 Nov 2001 09:43:11

28 PEAKS within -20 dB of the: FCC CLASS B limit
Range number:1-1000 to 2000 MHz
Range number:2-1000 to 2000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .74981 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
1	1149.88758	36.7	53.98	-17.28	N/A	99 H
2	1284.5366	34.8	53.98	-19.18	N/A	400 H
3	1291.78116	43.8	53.98	-10.18	N/A	99 H
4	1299.52536	44	53.98	-9.98	N/A	99 H
5	1300.52461	34.6	53.98	-19.38	N/A	99 H
6	1557.58181	39.8	53.98	-14.18	N/A	99 H
7	1564.57657	44.7	53.98	-9.28	N/A	99 H
8	1650.51212	37.6	53.98	-16.38	N/A	400 H
9	1657.75668	44	53.98	-9.98	N/A	99 H
10	1674.24432	40.4	53.98	-13.58	N/A	400 H
11	1675.49338	40.4	53.98	-13.58	N/A	99 H
12	1819.13565	35.9	53.98	-18.08	N/A	400 H
13	1830.37722	40.2	53.98	-13.78	N/A	99 H
1	1027.22958	39.2	53.98	-14.78	N/A	99 V
2	1033.22508	45.5	53.98	-8.48	N/A	99 V
3	1034.22433	45.8	53.98	-8.18	N/A	99 V
4	1297.52685	41.3	53.98	-12.68	N/A	99 V
5	1306.02048	44.3	53.98	-9.68	N/A	99 V
6	1307.01974	37.8	53.98	-16.18	N/A	99 V
7	1311.26655	40.1	53.98	-13.88	N/A	99 V
8	1587.30952	38.6	53.98	-15.38	N/A	99 V
9	1652.2608	40.2	53.98	-13.78	N/A	99 V
10	1660.50462	39.3	53.98	-14.68	N/A	99 V
11	1687.98401	47.5	53.98	-6.48	N/A	400 V
12	1710.46715	39.7	53.98	-14.28	N/A	99 V
13	1830.37722	43.5	53.98	-10.48	N/A	99 V
14	1887.58431	38.5	53.98	-15.48	N/A	99 V
15	1984.76143	38.3	53.98	-15.68	N/A	400 V

2-10 GHz:

CSI Wireless
Calgary, AB
RX Ch. 001
AL200
Project: c05e2473

Frequency [MHz]	Test Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
6778.057	44.8 pk	-36.8	37.1	45.1	60	54	N/A	N/A
Azimuth: 360	Height:100 Horz		Margin [dB]	-14.9	-8.9	N/A	N/A	
6777	33.7 pk	-36.8	37.1	34	60	54	N/A	N/A
Azimuth: 123	Height:213 Horz		Margin [dB]	-26	-20	N/A	N/A	

LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: FCC Part 15 Class B 3m
LIMIT 3: NONE
LIMIT 4: NONE
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI Wireless
Calgary, AB
RX Ch. 001
AL200
Project: c05e2473

27 Nov 2001 17:11:05

11 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-2000 to 10000 MHz
Range number:2-2000 to 10000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: 1.49913 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	2001.99825	37	53.98	-16.98	N/A	400 H
2	2258.77357	45.3	53.98	-8.68	N/A	400 H
3	2638.44136	41.3	53.98	-12.68	N/A	400 H
4	6777.81941	53.5	53.98	-.48	N/A	400 H
5	8648.18284	56	53.98	2.02	N/A	400 H
6	8932.93368	57.1	53.98	3.12	N/A	400 H
7	9999.00087	56	53.98	2.02	N/A	400 H
Vertical						
1	2001.99825	37.5	53.98	-16.48	N/A	99 V
2	2492.569	43.6	53.98	-10.38	N/A	99 V
3	3659.5479	45.1	53.98	-8.88	N/A	99 V
4	9998.00175	56.5	53.98	2.52	N/A	99 V

Receive - Channel 367: 30-1000 MHz:

CSI wireless
Calgary,AB
RX mode channel 367
AL200
Project: c05e2473

Frequency [MHz]	Test Reading [dB(uV)]	Meter Factor [dB]	Gain/Loss Factor [dB]	Transducer Level [dB(uVolts)]	Limit:1	2	3	4
63.2909	.29 qp	1.8	9.1	11.19	49.5	40	50.5	40.5
Azimuth: 143	Height:212 Vert		Margin [dB]		-38.31	-28.81	-39.31	-29.31

LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: FCC Part 15 Class B 3m
LIMIT 3: CISPR11/22 ICES-003 Class A 3m
LIMIT 4: CISPR11/22 ICES-003 Class B 3m

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI wireless
Calgary,AB
RX mode channel 367
AL200
Project: c05e2473

29 Nov 2001 16:23:51

10 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-30 to 1000 MHz
Range number:2-30 to 1000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .22153 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	30.16153	25	40	-15	140	399 H
2	49.06078	26.2	40	-13.8	96	399 H
3	307.99667	30.8	46.02	-15.22	250	99 H
4	694.70441	38.8	46.02	-7.22	315	399 H
5	926.01832	38.9	46.02	-7.12	96	99 H
6	999.19234	35.6	53.98	-18.38	30	399 H
Vertical						
1	30.4846	28.8	40	-11.2	30	100 V
2	63.43714	40	40	0	184	100 V
3	107.37386	27.8	43.52	-15.72	294	100 V
4	999.59617	34.7	53.98	-19.28	184	400 V

1-2 GHz:

CSI wireless
Calgary,AB
RX mode channel 367
AL200
Project: c05e2473

29 Nov 2001 10:09:55

14 PEAKS within -20 dB of the: FCC CLASS B limit
Range number:1-1000 to 2000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .74981 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	1037.97152	36.5	53.98	-17.48	N/A	99 H
2	1054.45916	34.5	53.98	-19.48	N/A	400 H
3	1084.18686	34.9	53.98	-19.08	N/A	99 H
4	1099.17562	34.2	53.98	-19.78	N/A	400 H
5	1191.10667	37.8	53.98	-16.18	N/A	99 H
6	1320.00999	37.9	53.98	-16.08	N/A	99 H
7	1468.64851	35.9	53.98	-18.08	N/A	400 H
8	1632.52561	35.3	53.98	-18.68	N/A	400 H
9	1640.01999	34.3	53.98	-19.68	N/A	400 H
10	1709.96752	38.1	53.98	-15.88	N/A	400 H
11	1756.43268	42.1	53.98	-11.88	N/A	99 H
12	1852.11092	40.2	53.98	-13.78	N/A	99 H
13	1936.29778	36.5	53.98	-17.48	N/A	400 H
14	1951.28654	36.7	53.98	-17.28	N/A	99 H
Vertical						
1	1034.22433	40.6	53.98	-13.38	N/A	400 V
2	1296.5276	37.2	53.98	-16.78	N/A	400 V
3	1309.76767	37.5	53.98	-16.48	N/A	400 V
4	1382.46315	37.5	53.98	-16.48	N/A	99 V
5	1425.68074	35.7	53.98	-18.28	N/A	99 V
6	1547.3395	37.6	53.98	-16.38	N/A	99 V
7	1567.82413	38.2	53.98	-15.78	N/A	99 V
8	1621.03422	40.8	53.98	-13.18	N/A	99 V
9	1743.44242	43.5	53.98	-10.48	N/A	99 V
10	1748.9383	39.3	53.98	-14.68	N/A	99 V
11	1852.11092	43.8	53.98	-10.18	N/A	99 V
12	1887.83412	37	53.98	-16.98	N/A	99 V
13	1952.5356	45.7	53.98	-8.28	N/A	99 V
14	1953.78466	41.2	53.98	-12.78	N/A	99 V

2-10 GHz:

CSI Wireless
Calgary, AB
RX Ch. 367
AL200
Project: c05e2473

27 Nov 2001 18:17:48

3 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-2000 to 10000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: 1.49913 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	2000.99913	36.9	53.98	-17.08	N/A	400 H
2	2010.99038	39.6	53.98	-14.38	N/A	99 H
3	9998.00175	55.2	53.98	1.22	N/A	99 H
Vertical						
1	2000.99913	37.3	53.98	-16.68	N/A	400 V
2	2032.97115	41.3	53.98	-12.68	N/A	99 V
3	2776.32072	43.2	53.98	-10.78	N/A	99 V
4	9996.0035	55.6	53.98	1.62	N/A	400 V

Receive - Channel 800: 30-1000 MHz:

CSI wireless
Calgary,AB
RX mode channel 800
AL200
Project: c05e2473

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level [dB(uVolts)]	Limit:1	2	3	4
73.5108	-1.32 qp	1.9	6.9	7.48	49.5	40	50.5	40.5
Azimuth: 356	Height:103 Horz			Margin [dB]	-42.02	-32.52	-43.02	-33.02

LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: FCC Part 15 Class B 3m
LIMIT 3: CISPR11/22 ICES-003 Class A 3m
LIMIT 4: CISPR11/22 ICES-003 Class B 3m
pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

CSI wireless
Calgary,AB
RX mode channel 800
AL200
Project: c05e2473
29 Nov 2001 14:12:37

7 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-30 to 1000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .22153 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	30.4846	24.9	40	-15.1	30	99 H
2	73.45212	40.6	40	.6	356	99 H
3	203.97002	34	43.52	-9.52	140	99 H
4	271.81349	37.6	46.02	-8.42	118	99 H
5	336.74938	31.6	46.02	-14.42	206	99 H
6	868.67444	37.6	46.02	-8.42	272	99 H
7	999.35387	36.2	53.98	-17.78	118	400 H
Vertical						
1	30.64613	28.9	40	-11.1	162	100 V
2	107.37386	27.7	43.52	-15.82	250	100 V
3	186.2015	32.9	43.52	-10.62	30	400 V
4	876.58951	38.9	46.02	-7.12	30	400 V
5	999.67694	35.5	53.98	-18.48	360	100 V

1-2 GHz:

CSI wireless
Calgary,AB
RX mode channel 800
AL200
Project: c05e2473

29 Nov 2001 10:37:19

22 PEAKS within -20 dB of the: FCC CLASS B limit
Range number:1-1000 to 2000 MHz
Range number:2-1000 to 2000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: .74981 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	1399.45041	38.5	53.98	-15.48	N/A	99 H
2	1441.16912	38.9	53.98	-15.08	N/A	400 H
3	1553.335	37.6	53.98	-16.38	N/A	99 H
4	1595.55333	34.4	53.98	-19.58	N/A	400 H
5	1676.24282	38.7	53.98	-15.28	N/A	400 H
6	1713.96453	35.8	53.98	-18.18	N/A	400 H
7	1878.09143	42.5	53.98	-11.48	N/A	99 H
Vertical						
1	1049.4629	40.3	53.98	-13.68	N/A	99 V
2	1134.3992	37.3	53.98	-16.68	N/A	99 V
3	1218.58606	38.5	53.98	-15.48	N/A	99 V
4	1308.01899	45.3	53.98	-8.68	N/A	99 V
5	1452.16088	41.3	53.98	-12.68	N/A	99 V
6	1614.5391	39.3	53.98	-14.68	N/A	99 V
7	1626.77992	42.8	53.98	-11.18	N/A	99 V
8	1687.7342	37.2	53.98	-16.78	N/A	99 V
9	1724.70647	37.3	53.98	-16.68	N/A	99 V
10	1810.14239	37.9	53.98	-16.08	N/A	99 V
11	1878.09143	45.8	53.98	-8.18	N/A	99 V
12	1912.31576	36.9	53.98	-17.08	N/A	99 V
13	1914.56408	36.4	53.98	-17.58	N/A	400 V
14	1949.03822	36.4	53.98	-17.58	N/A	99 V
15	1984.01199	38.6	53.98	-15.38	N/A	99 V

2-10 GHz:

CSI Wireless
Calgary, AB
RX Ch. 800
AL200
Project: c05e2473

Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
6782.064	34.6 pk	-36.9	37.1	34.8	60	54	N/A	N/A
Azimuth: 249	Height:100 Horz		Margin [dB]	-25.2		-19.2	N/A	N/A
7898	34.1 pk	-35	37.9	37	60	54	N/A	N/A
Azimuth: 249	Height:100 Horz		Margin [dB]	-23		-17	N/A	N/A

LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: FCC Part 15 Class B 3m
LIMIT 3: NONE
LIMIT 4: NONE

pk - Peak detector
qp - Quasi-Peak detector
av - Average detector

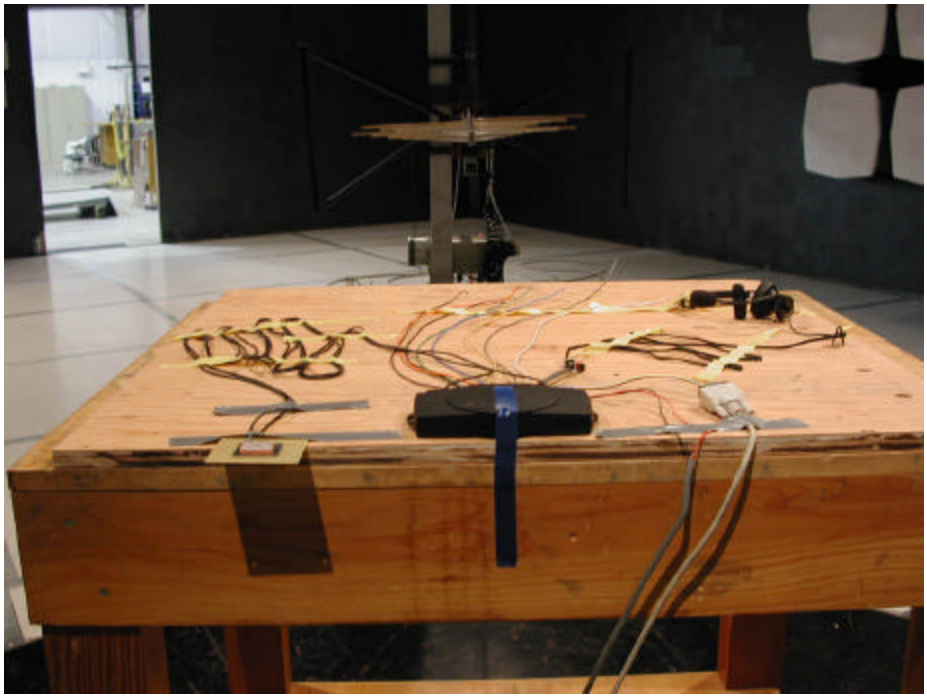
CSI Wireless
Calgary, AB
RX Ch. 800
AL200
Project: c05e2473

27 Nov 2001 19:01:21

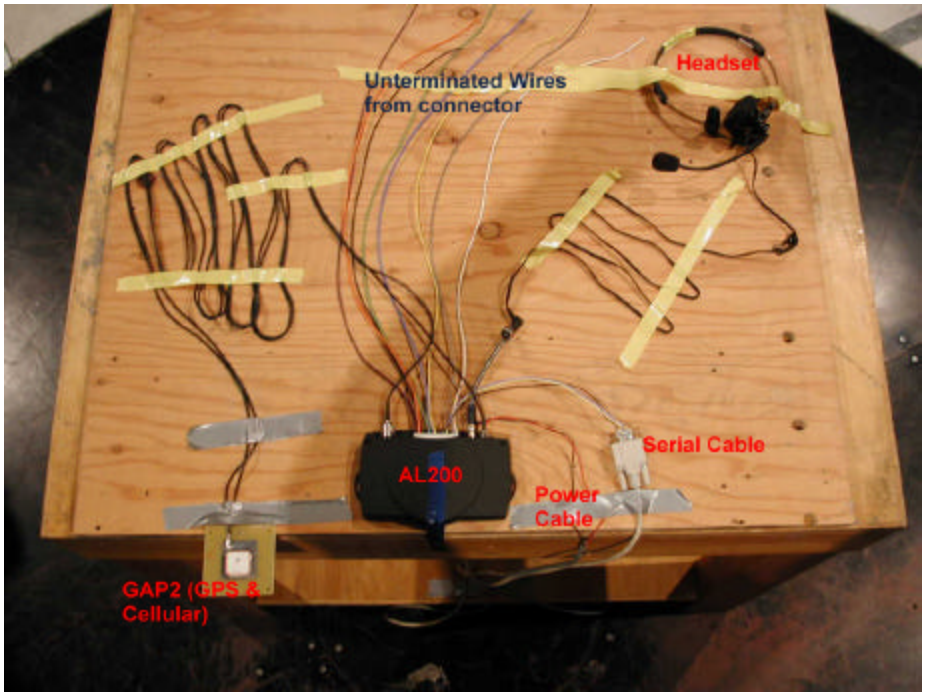
10 PEAKS within -20 dB of the: FCC Part 15 Class B 3m limit
Range number:1-2000 to 10000 MHz
Range number:2-2000 to 10000 MHz
Peak criteria: 3 dB
Frequency Uncertianty: 1.49913 MHz Minimum Separation: 0 MHz

Peak [No.]	Frequency [MHz]	Level	Limit Value	Delta [dB]	TABLE AZIMUTH[deg]	ANTENNA HEIGHT[cm]
Horizontal						
1	2000.99913	36.8	53.98	-17.18	N/A	99 H
2	2814.2875	44.8	53.98	-9.18	N/A	99 H
3	6782.81504	51.1	53.98	-2.88	N/A	99 H
4	9998.00175	55.6	53.98	1.62	N/A	400 H
Vertical						
1	2000.99913	37.1	53.98	-16.88	N/A	400 V
2	2041.96328	43.3	53.98	-10.68	N/A	99 V
3	2360.6844	41.3	53.98	-12.68	N/A	99 V
4	2814.2875	46.4	53.98	-7.58	N/A	99 V
5	3755.46397	46.9	53.98	-7.08	N/A	99 V
6	9996.0035	55.7	53.98	1.72	N/A	99 V

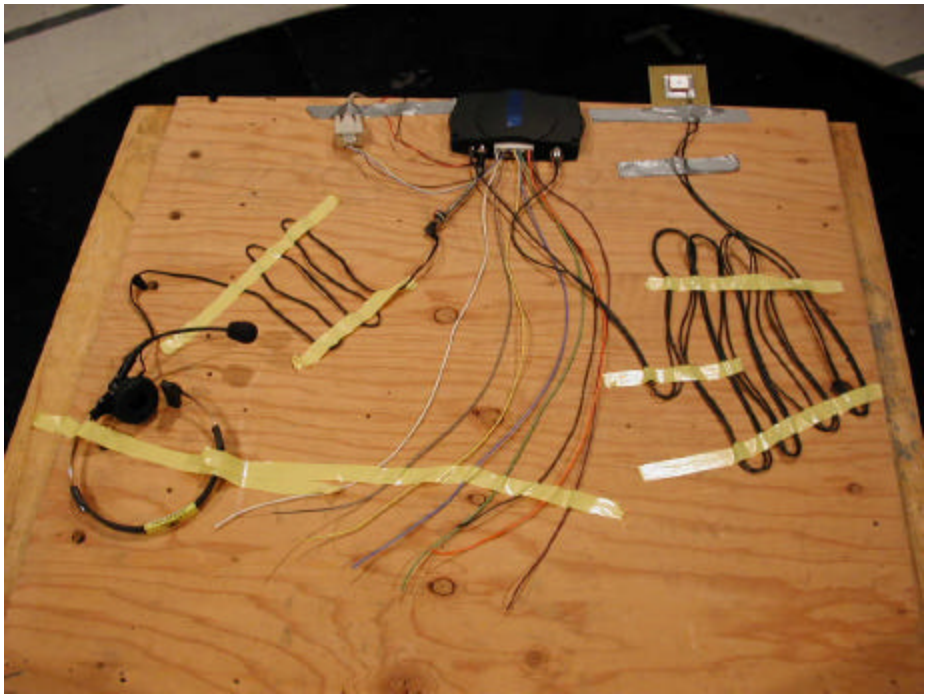
Picture of Radiated Emissions Setup:



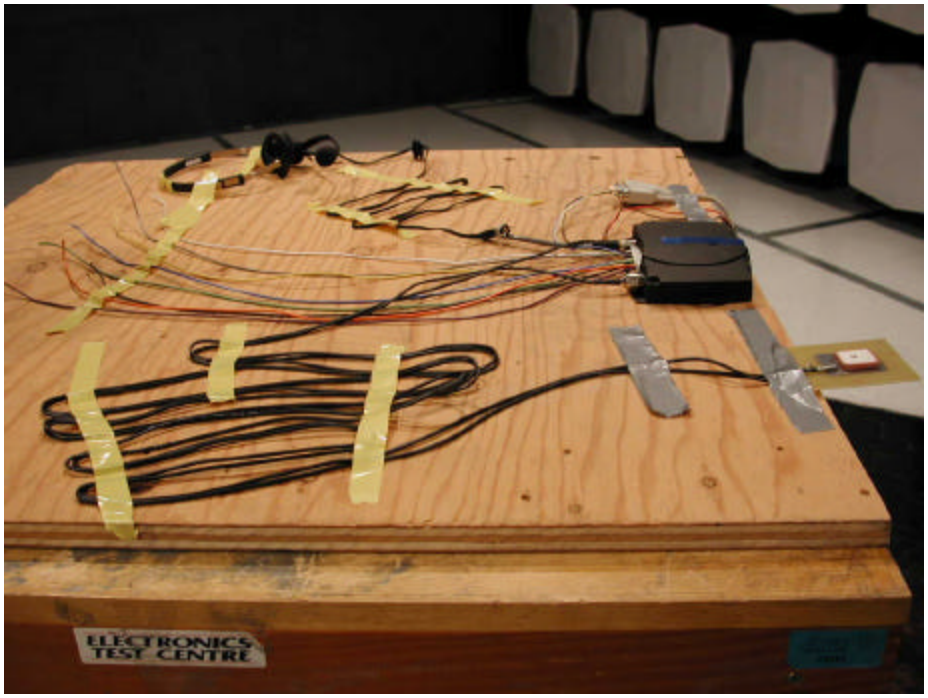
Picture of Radiated Emissions Setup:



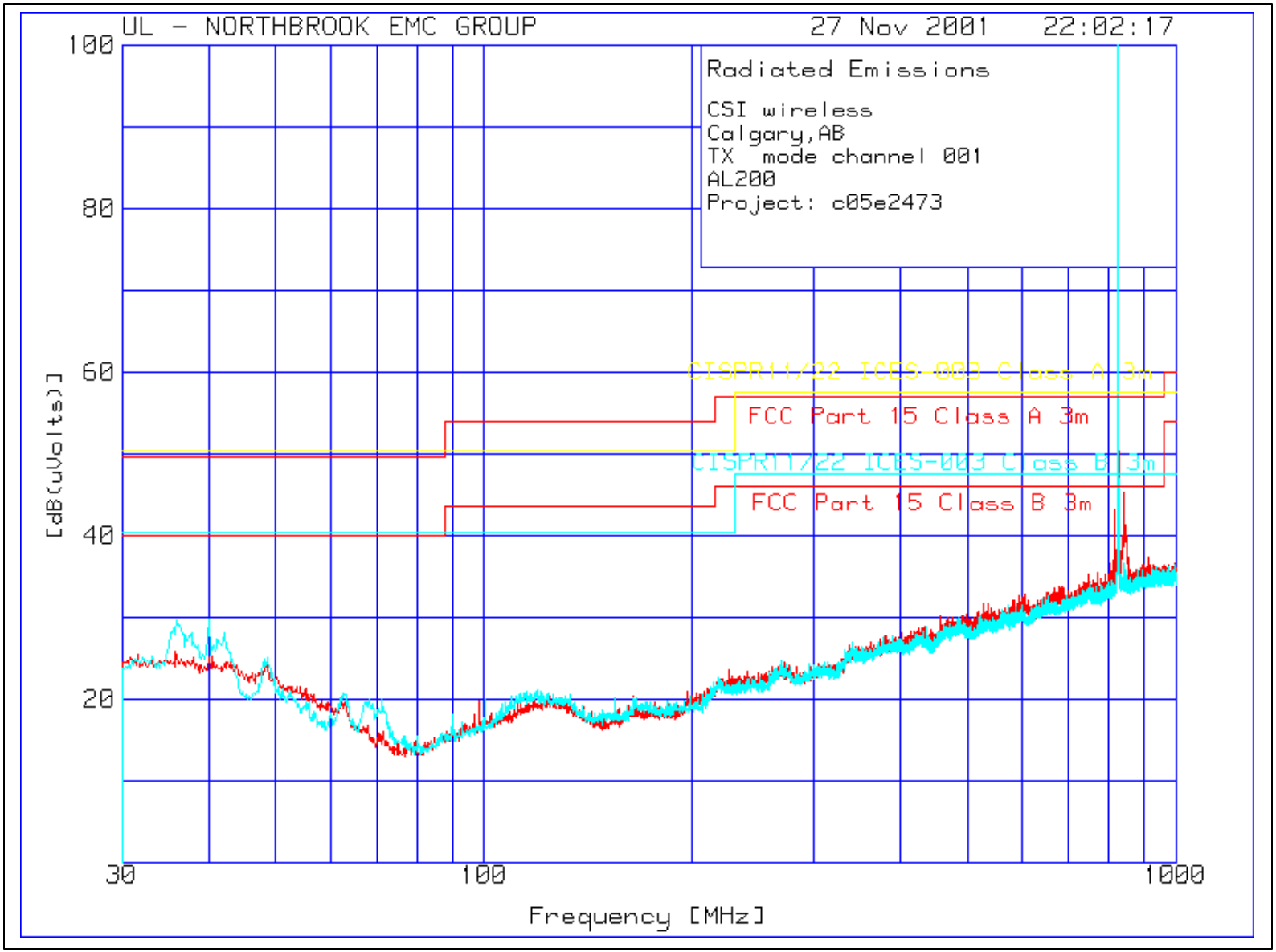
Picture of Radiated Emissions Setup:

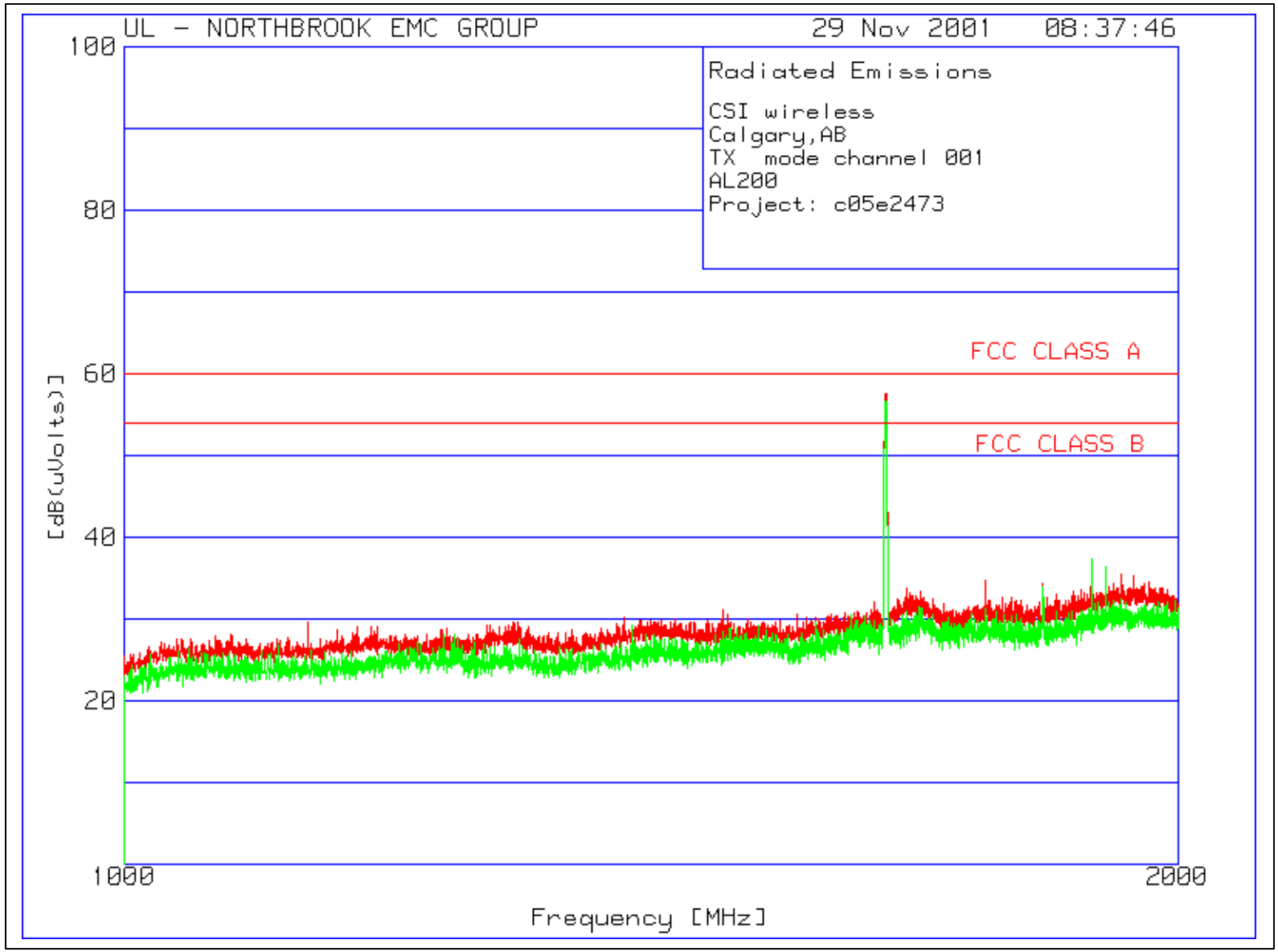


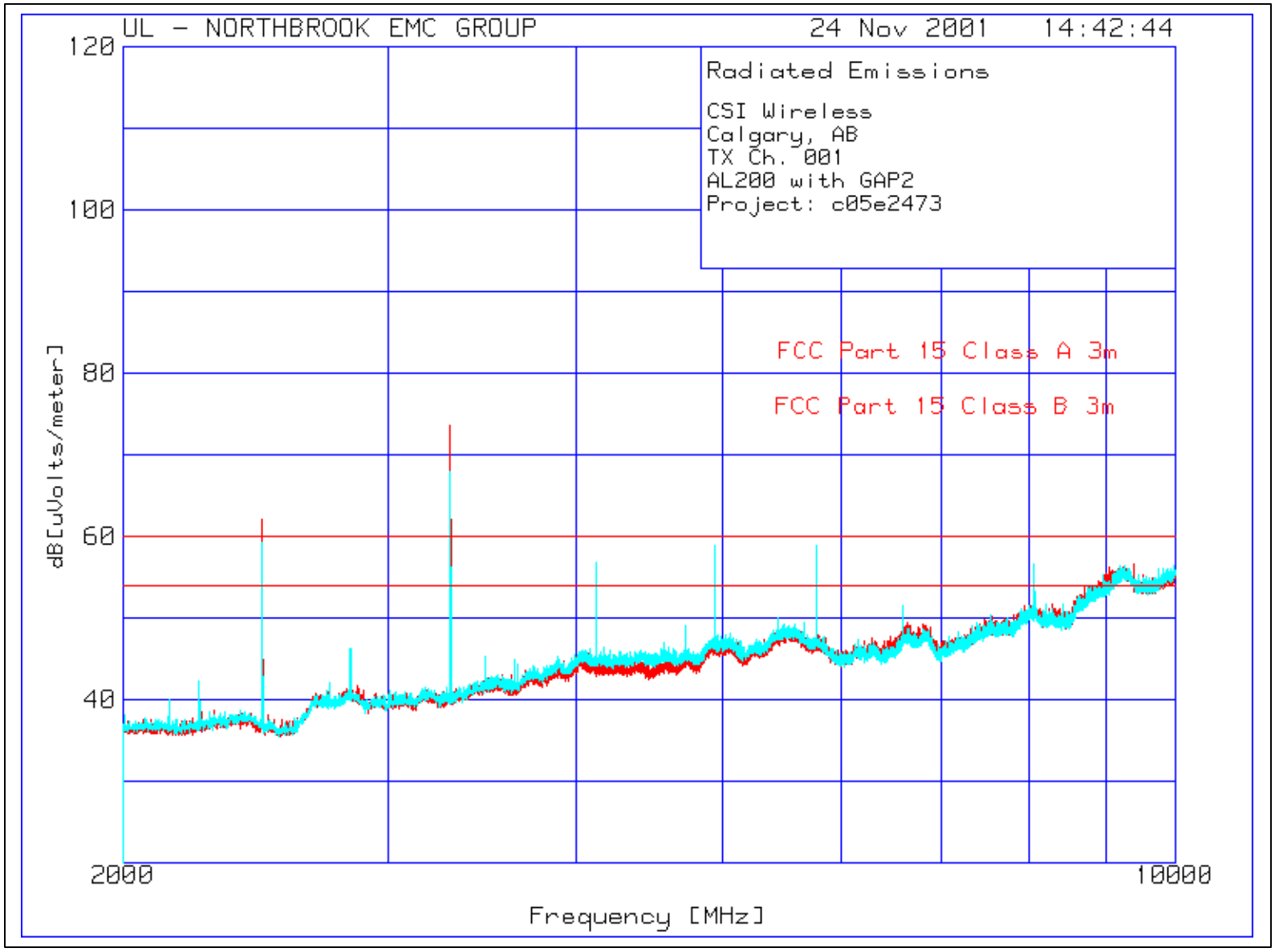
Picture of Radiated Emissions Setup:



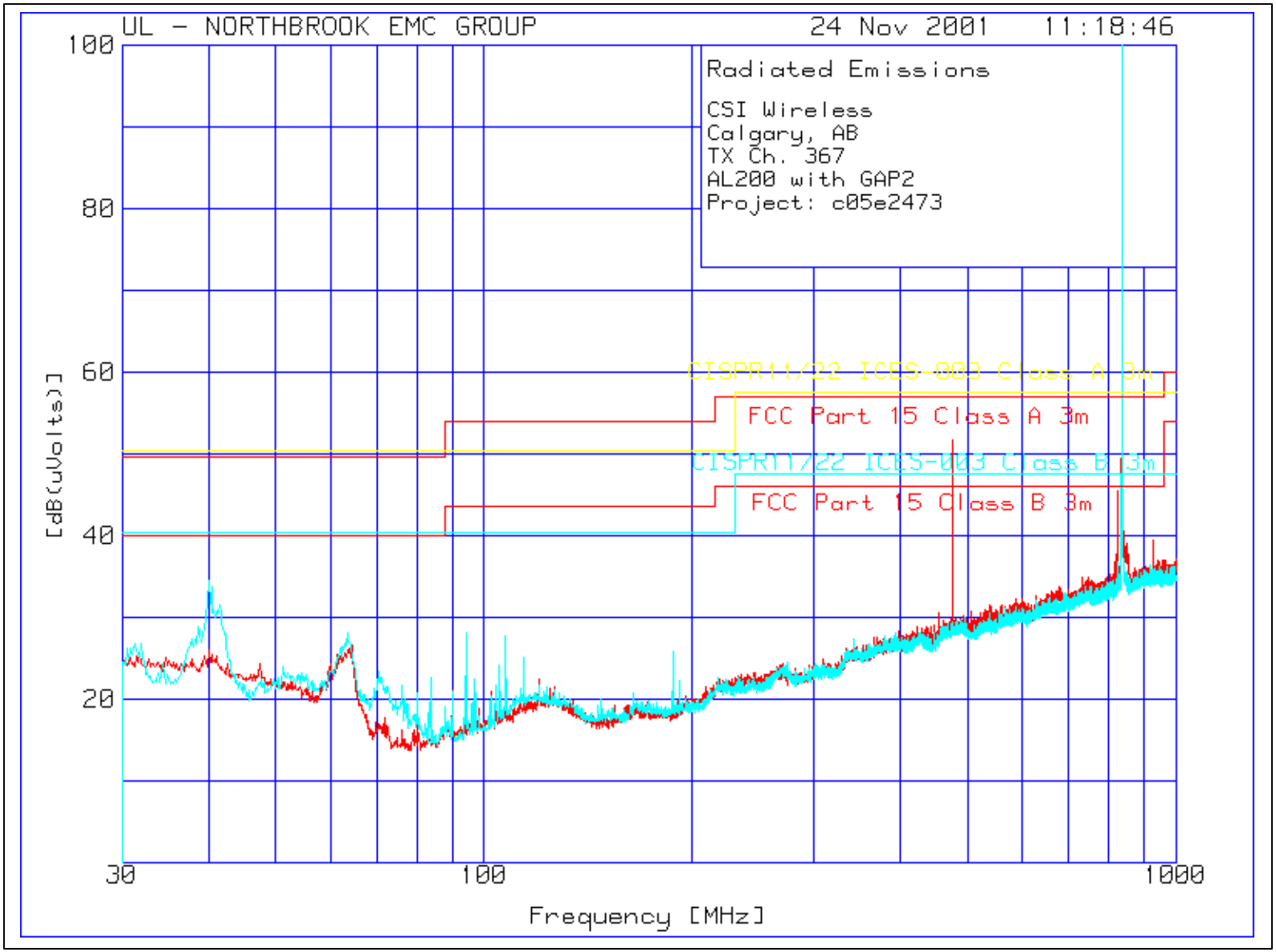
Plots of Radiated Emissions for Transmit at Channel 001:

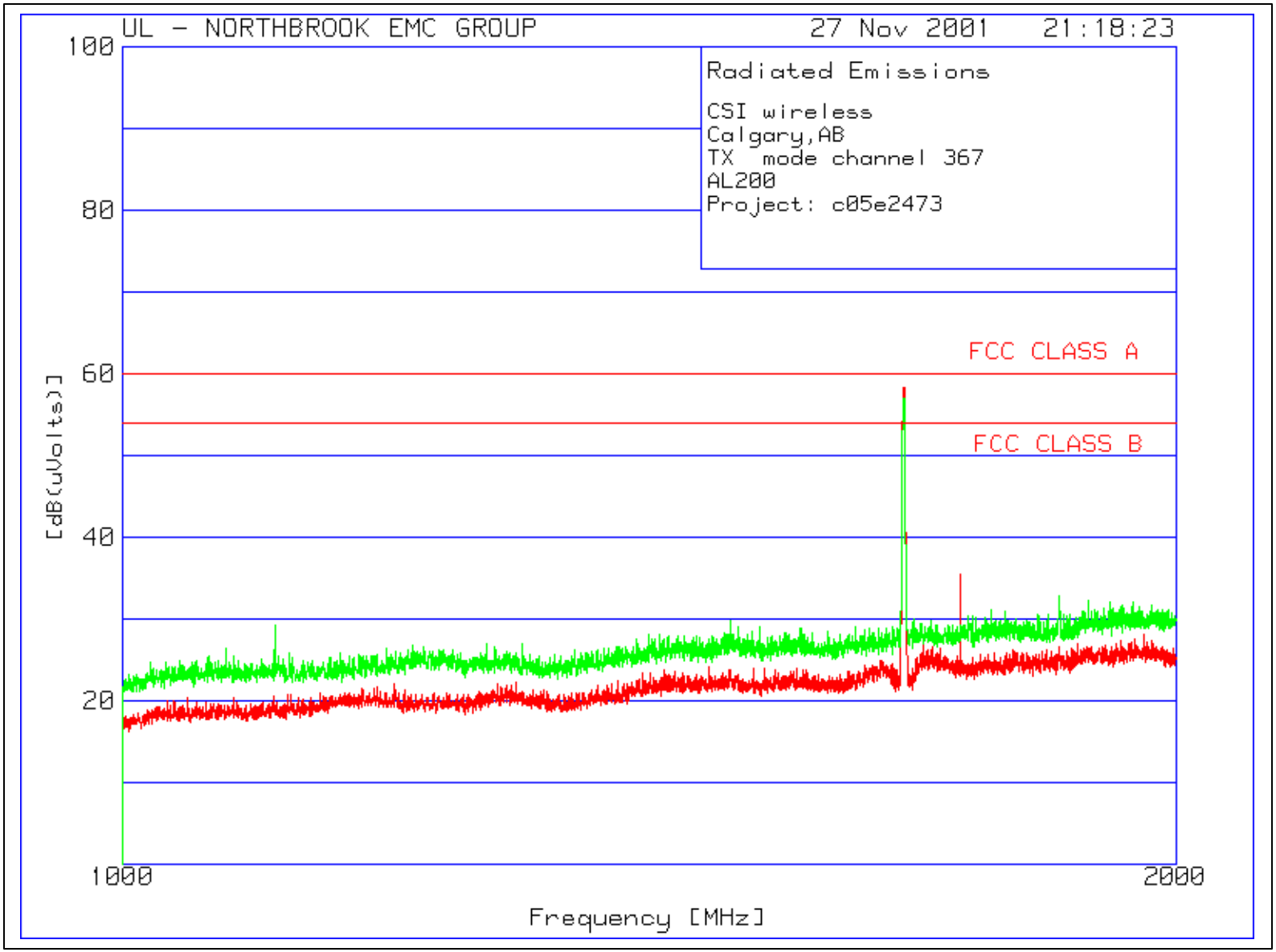


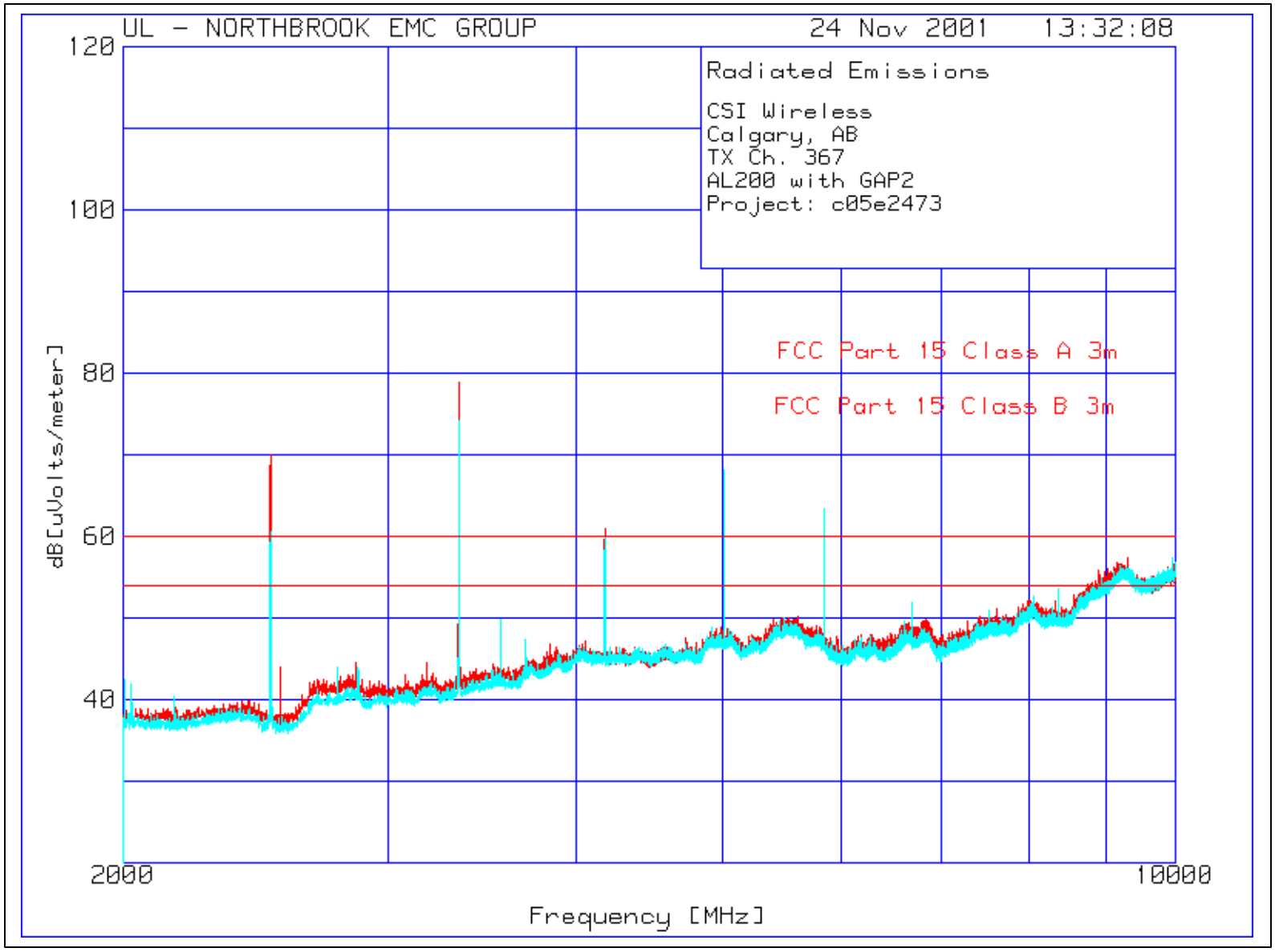




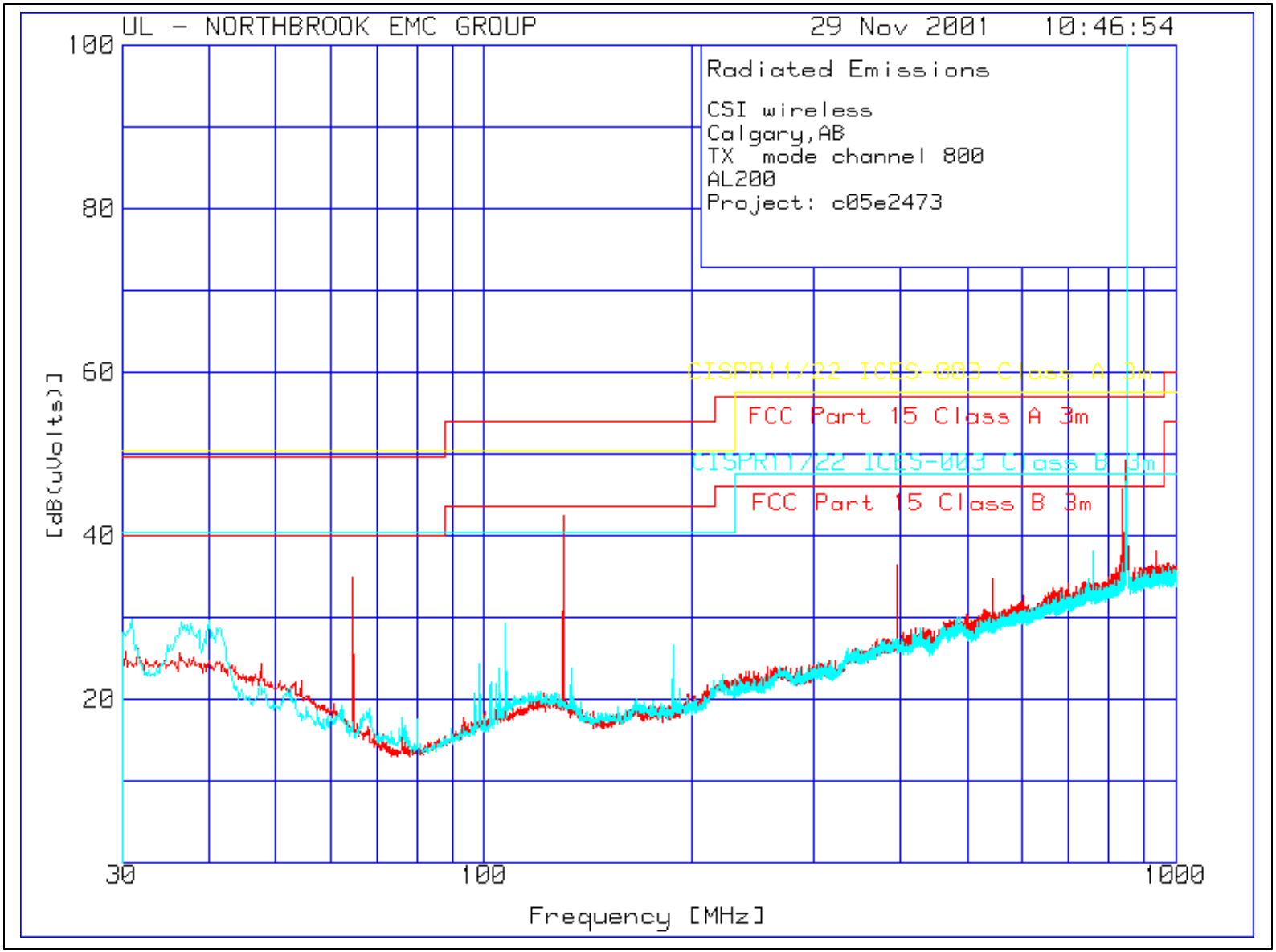
Plots of Radiated Emissions for Transmit at Channel 367:

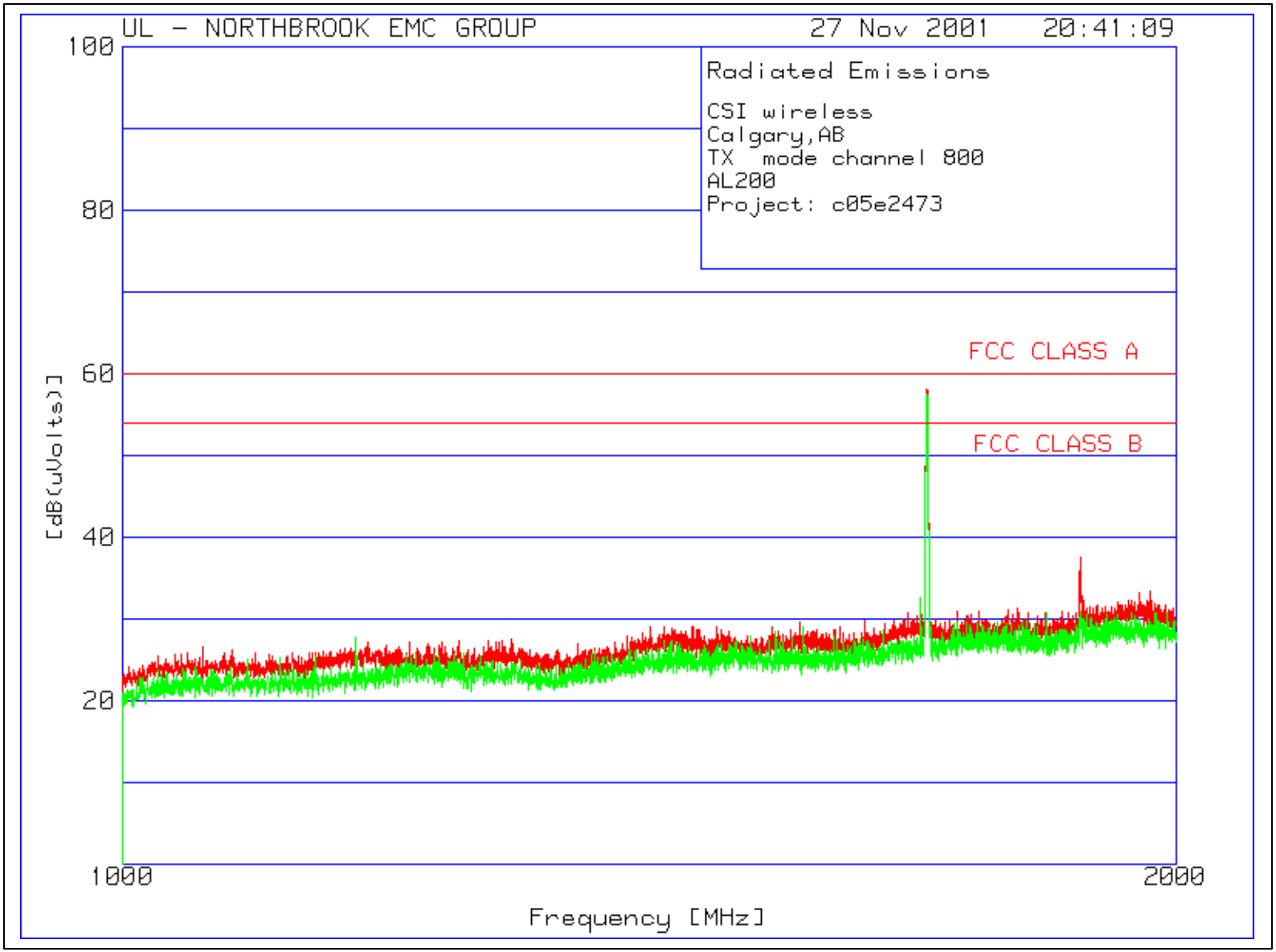


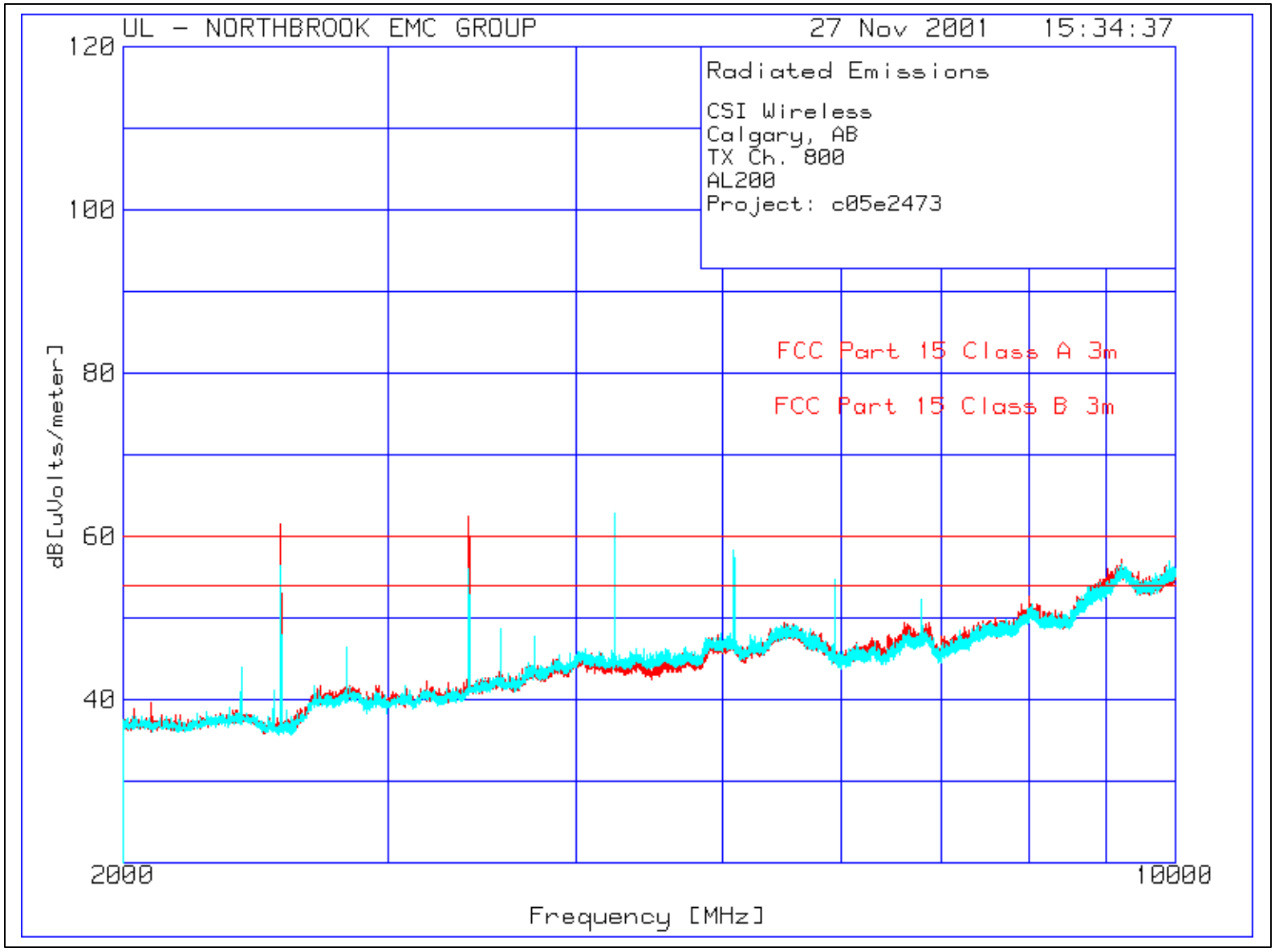




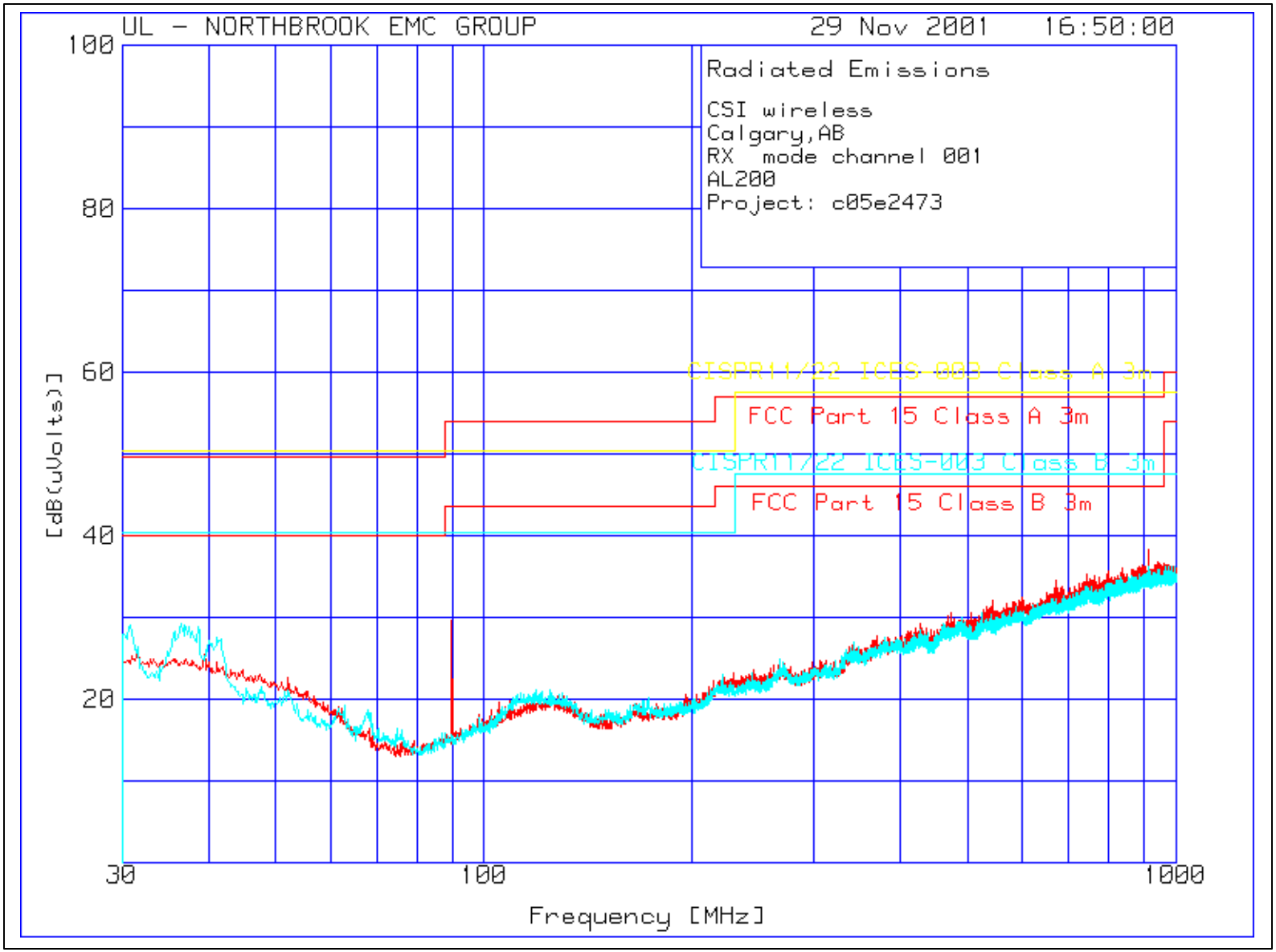
Plots of Radiated Emissions for Transmit at Channel 800:

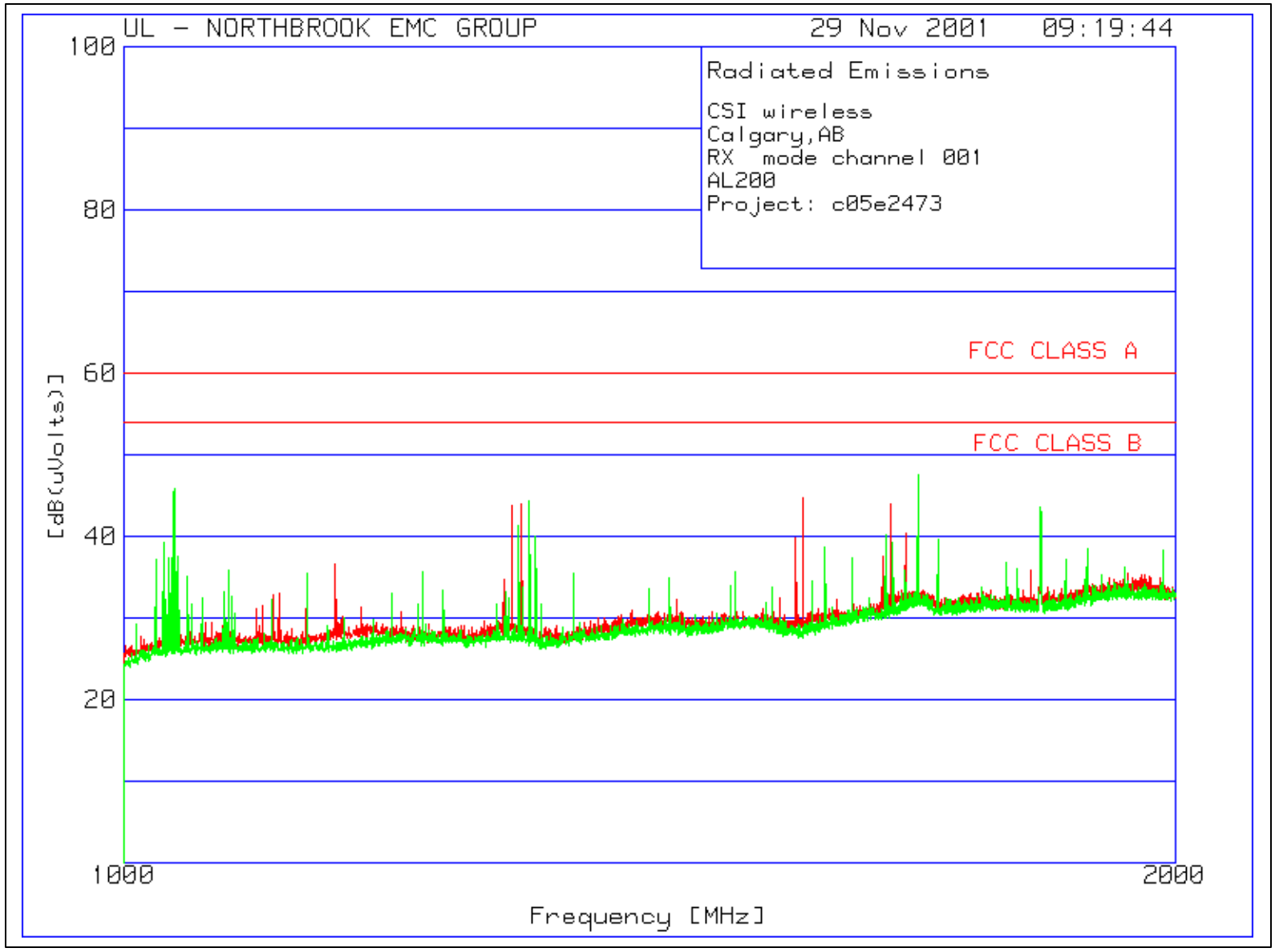


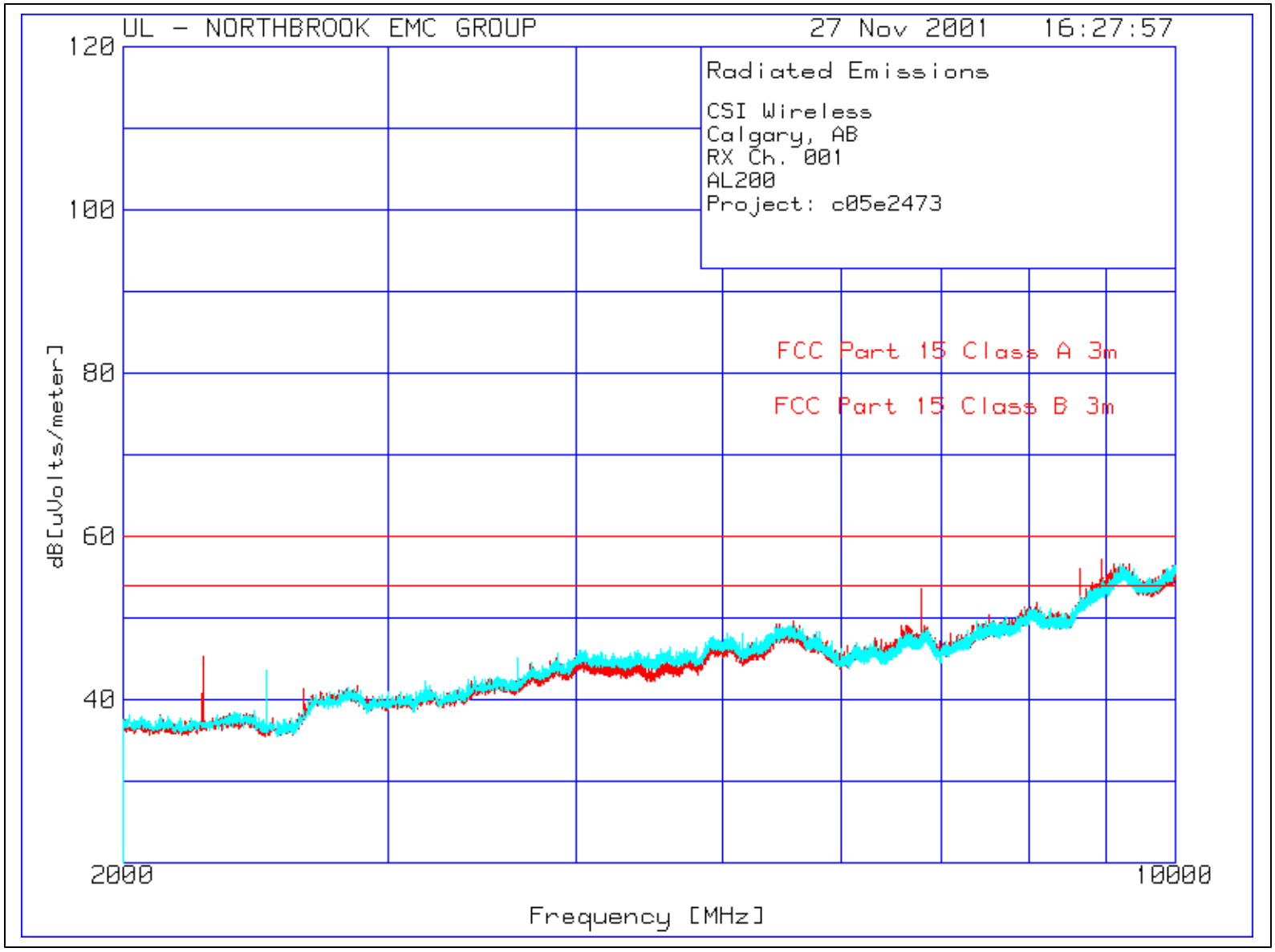




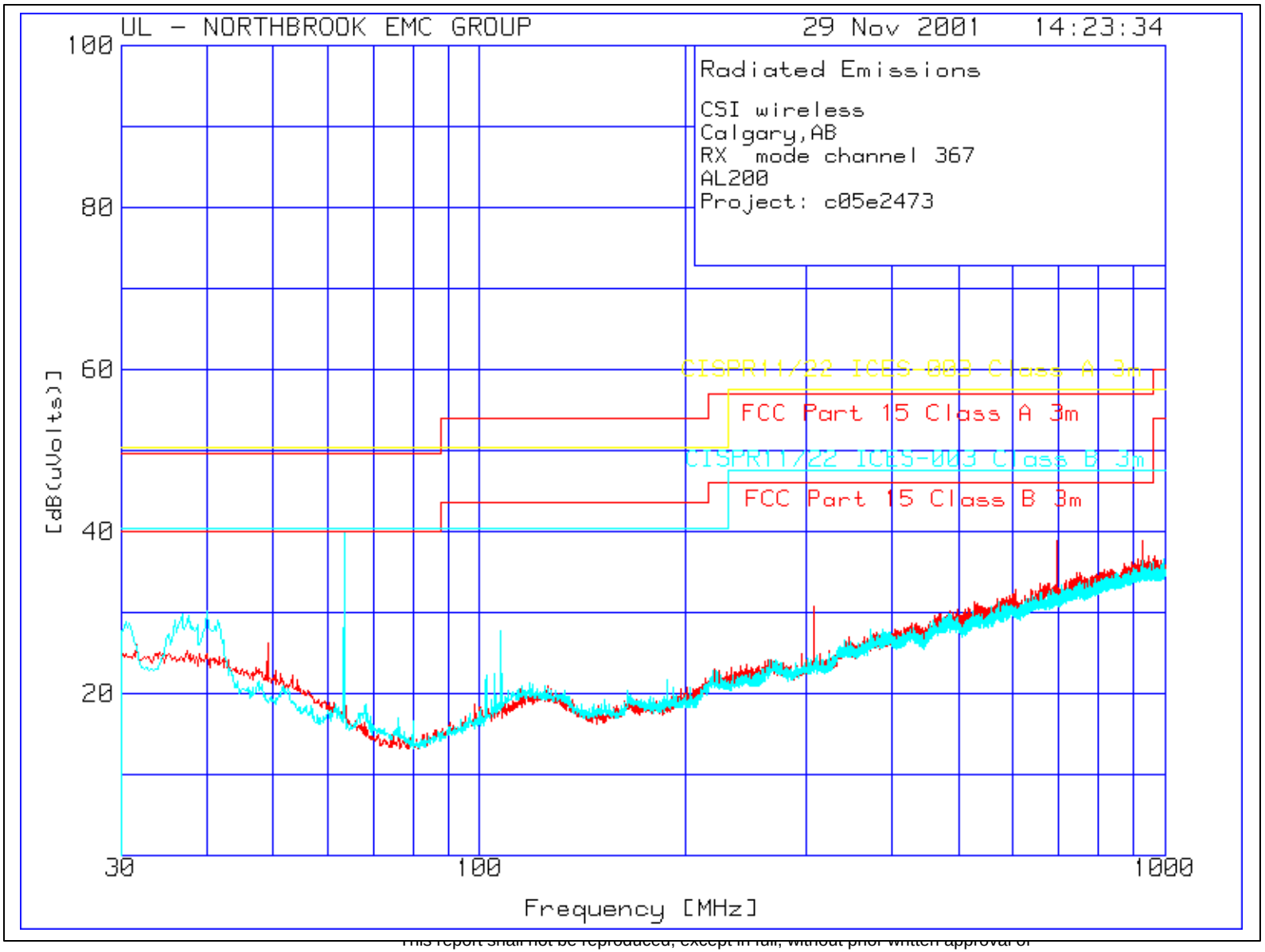
Plots of Radiated Emissions for Receive at Channel 001:

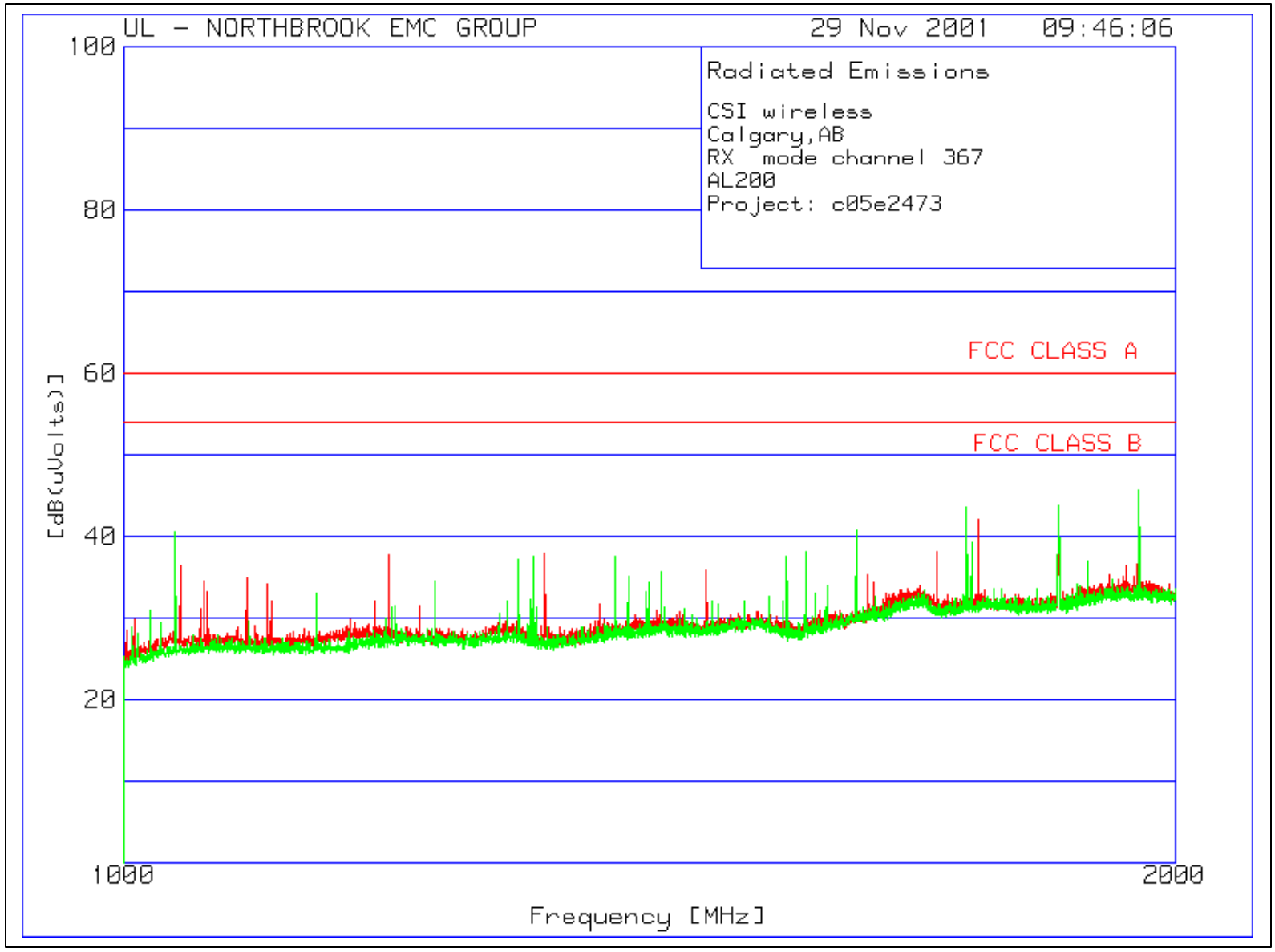


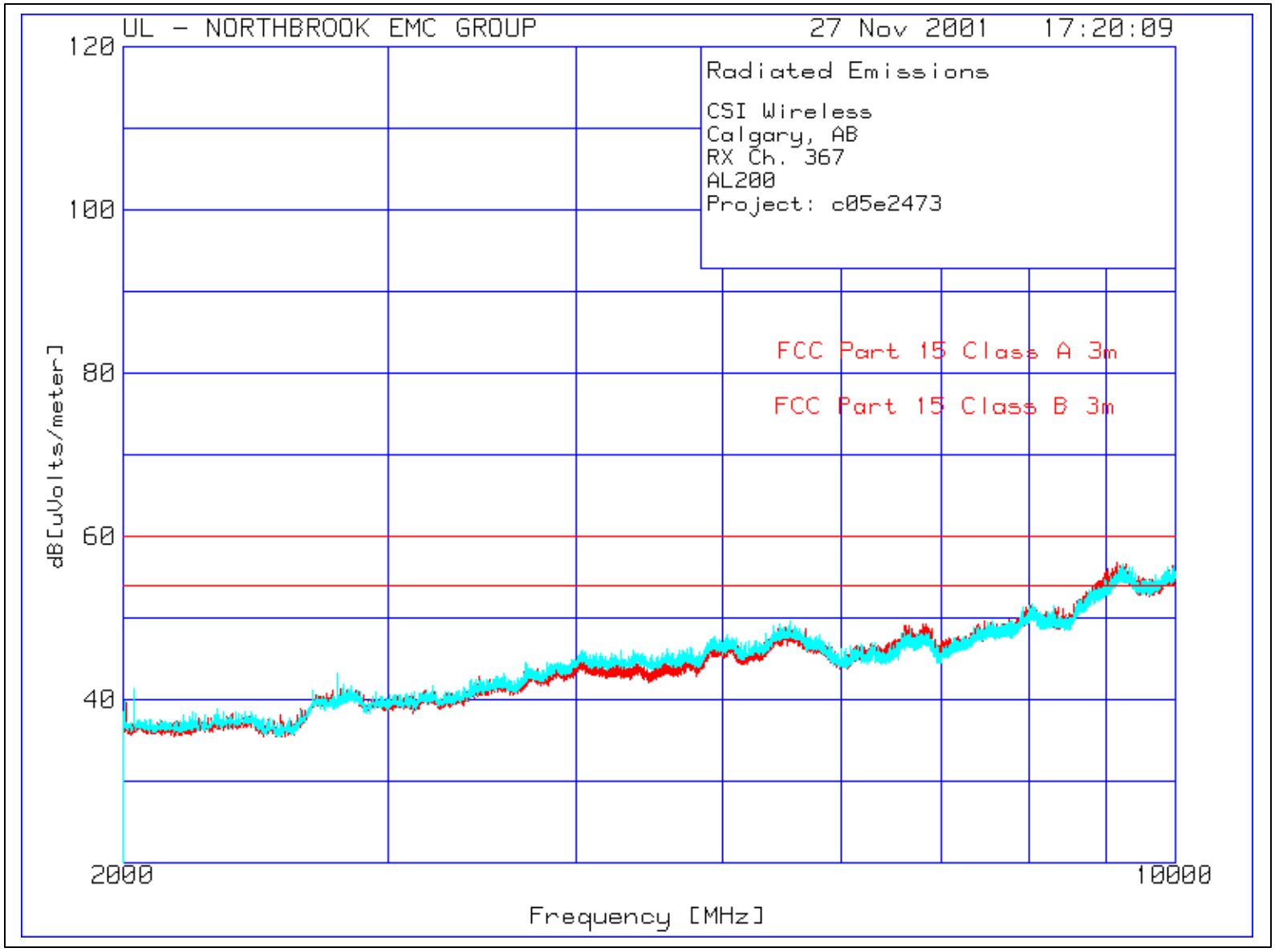




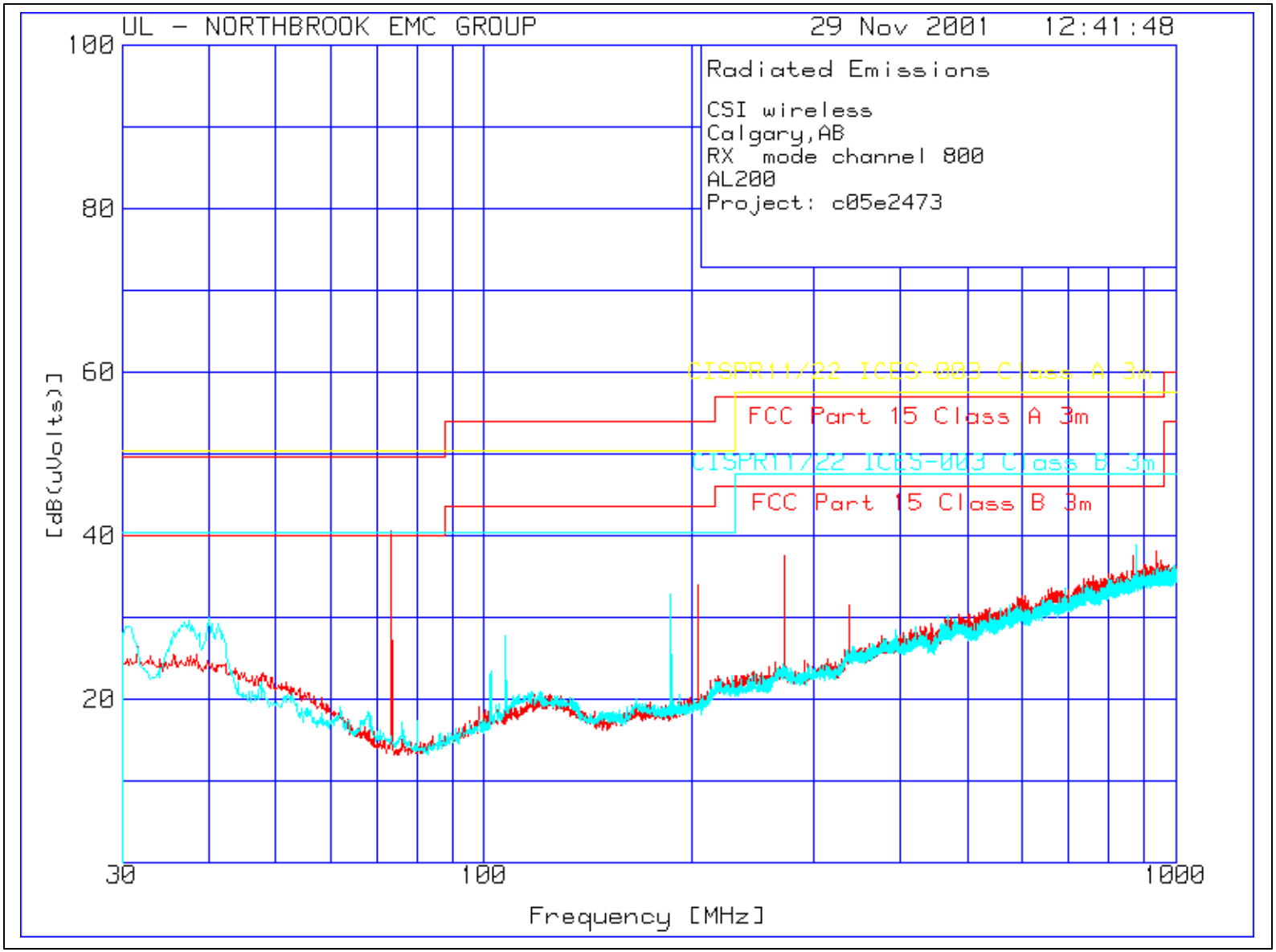
Plots of Radiated Emissions for Receive at Channel 367:

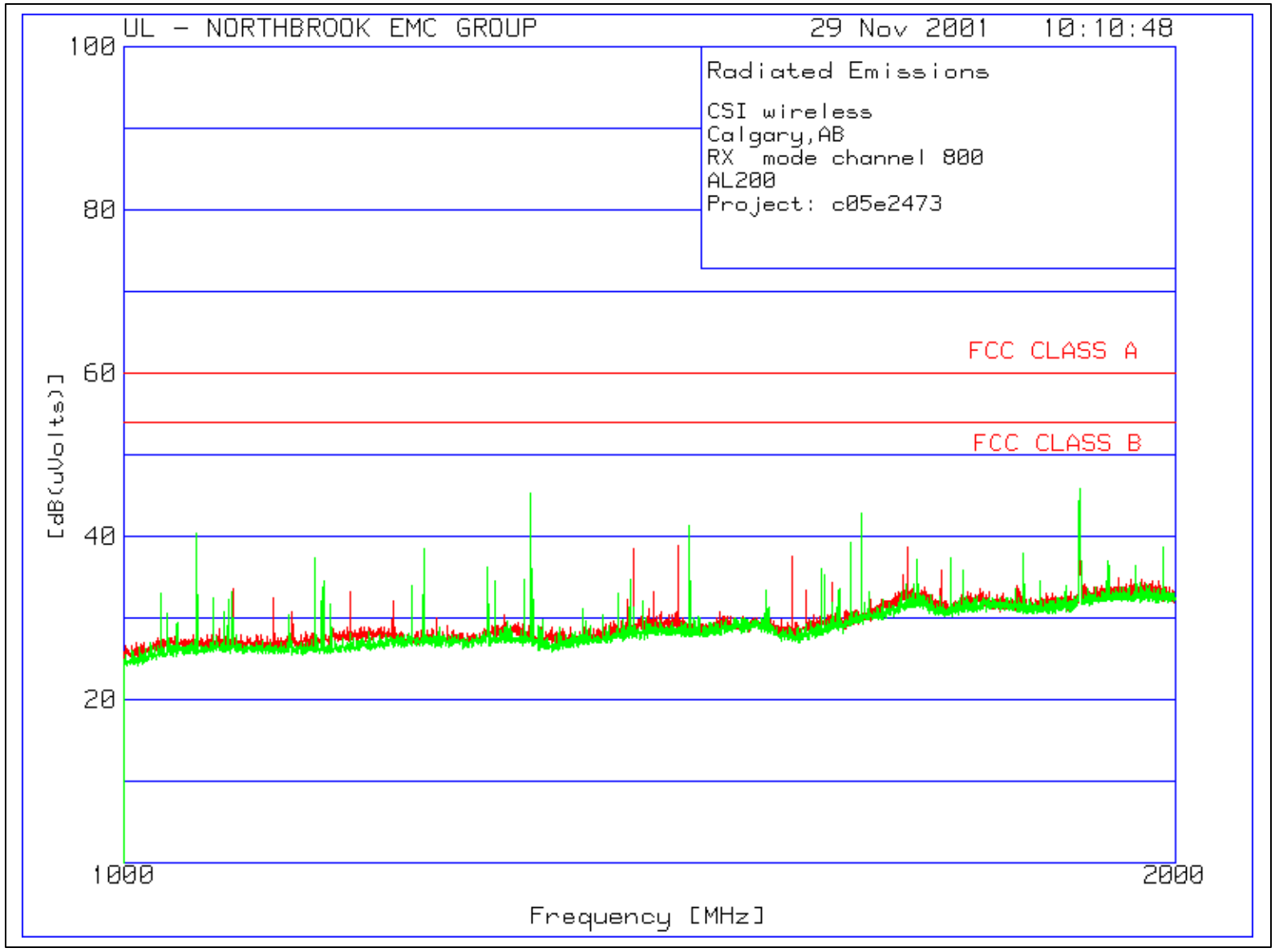


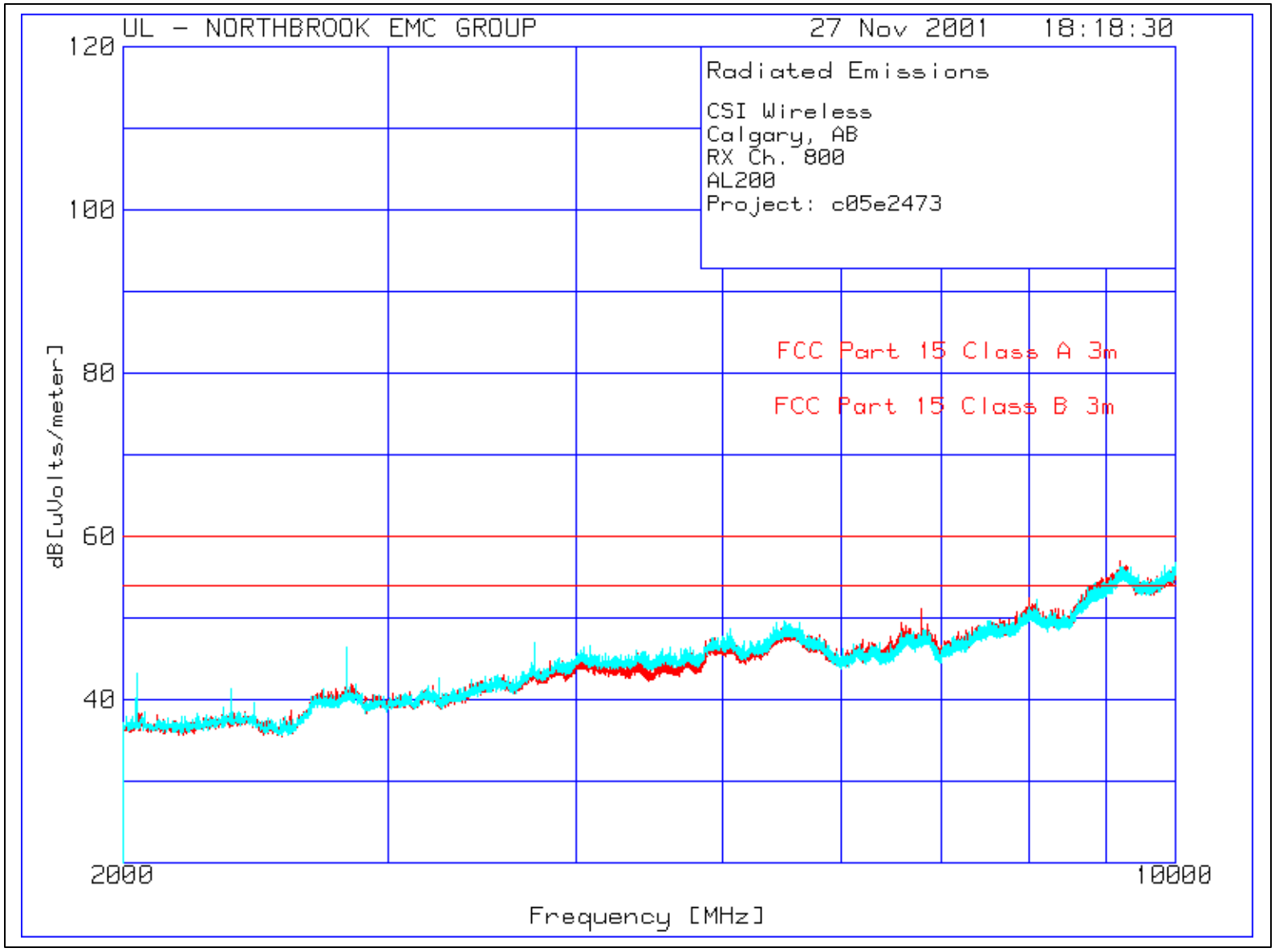




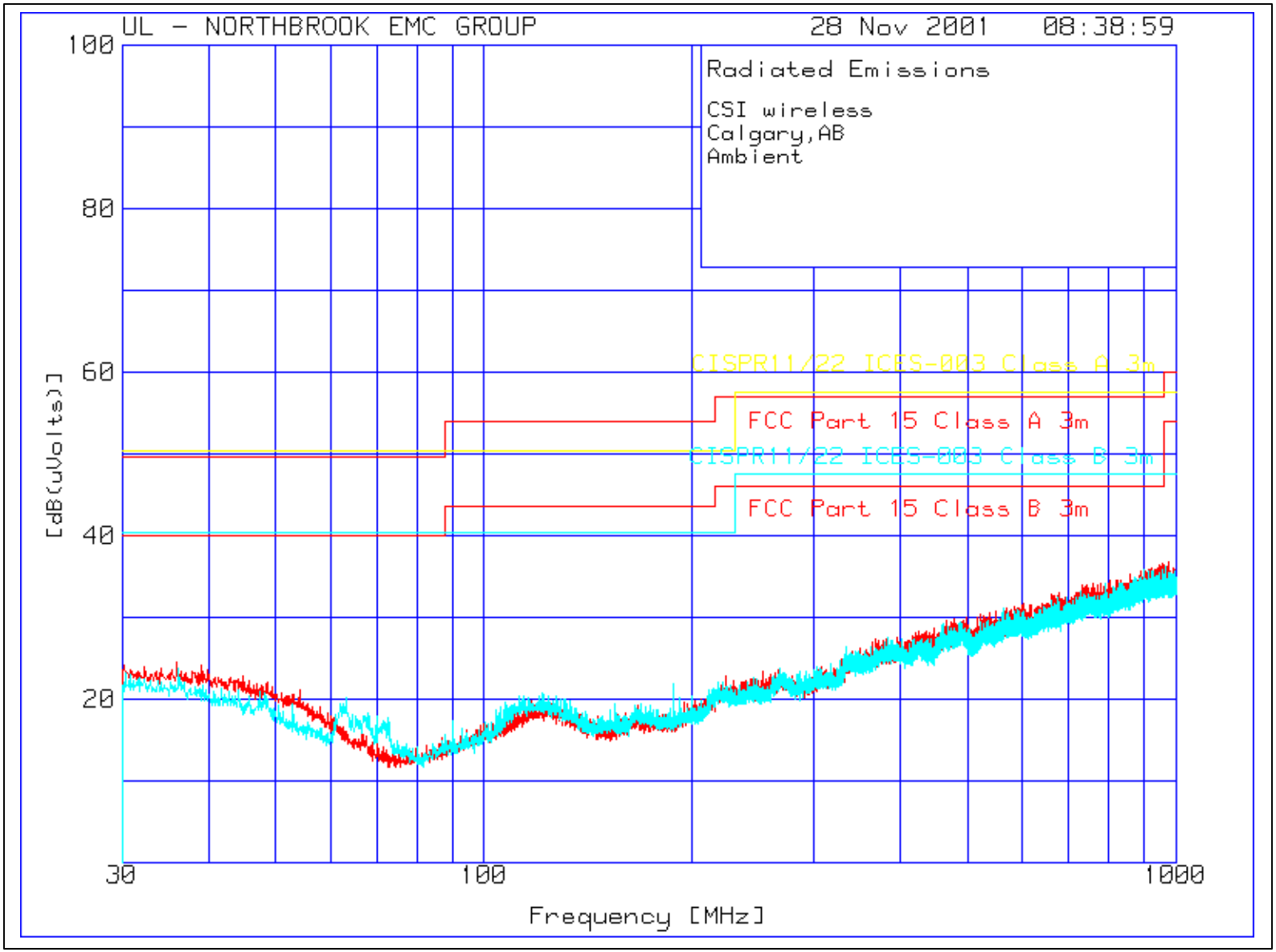
Plots of Radiated Emissions for Receive at Channel 800:

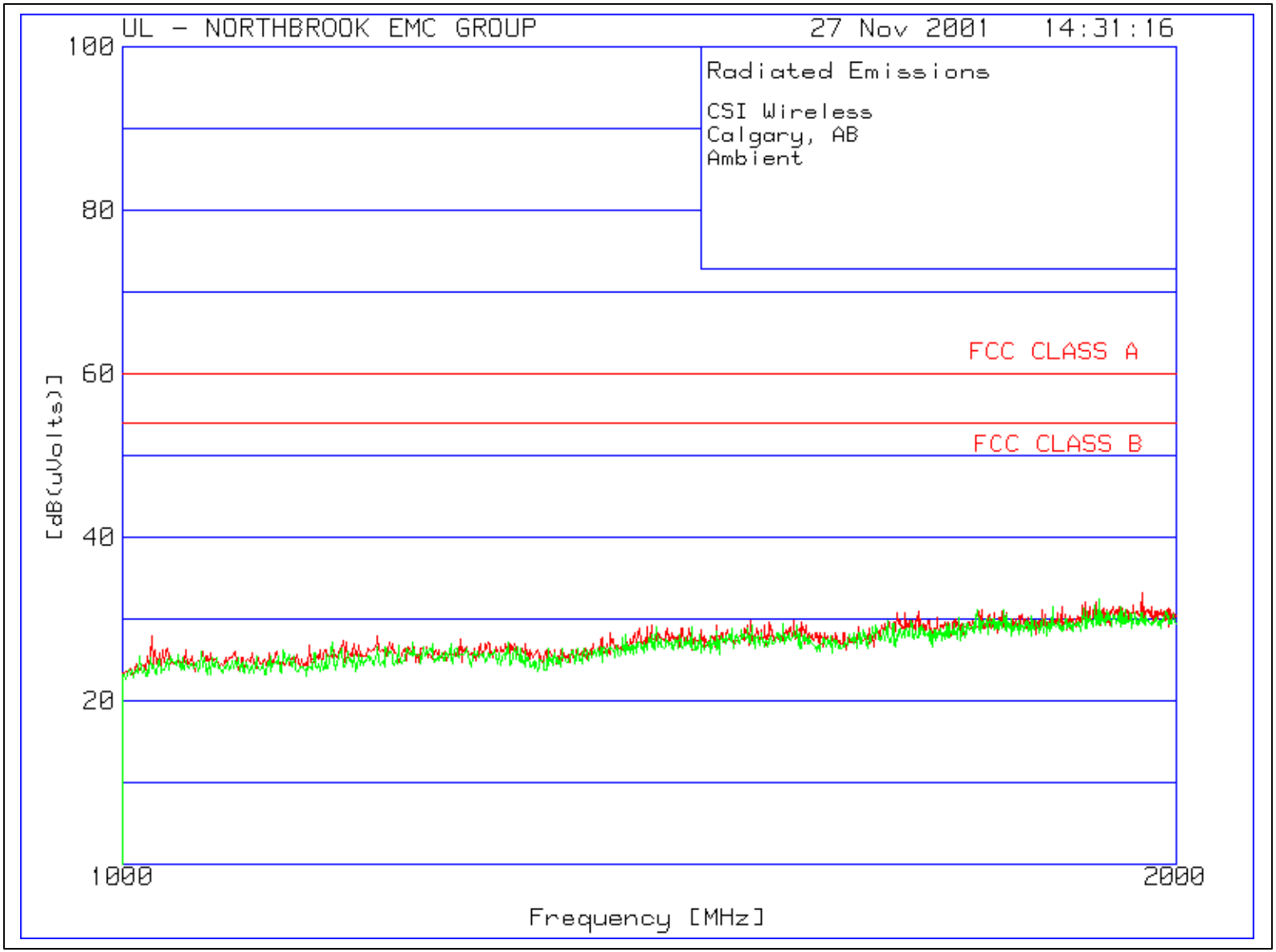


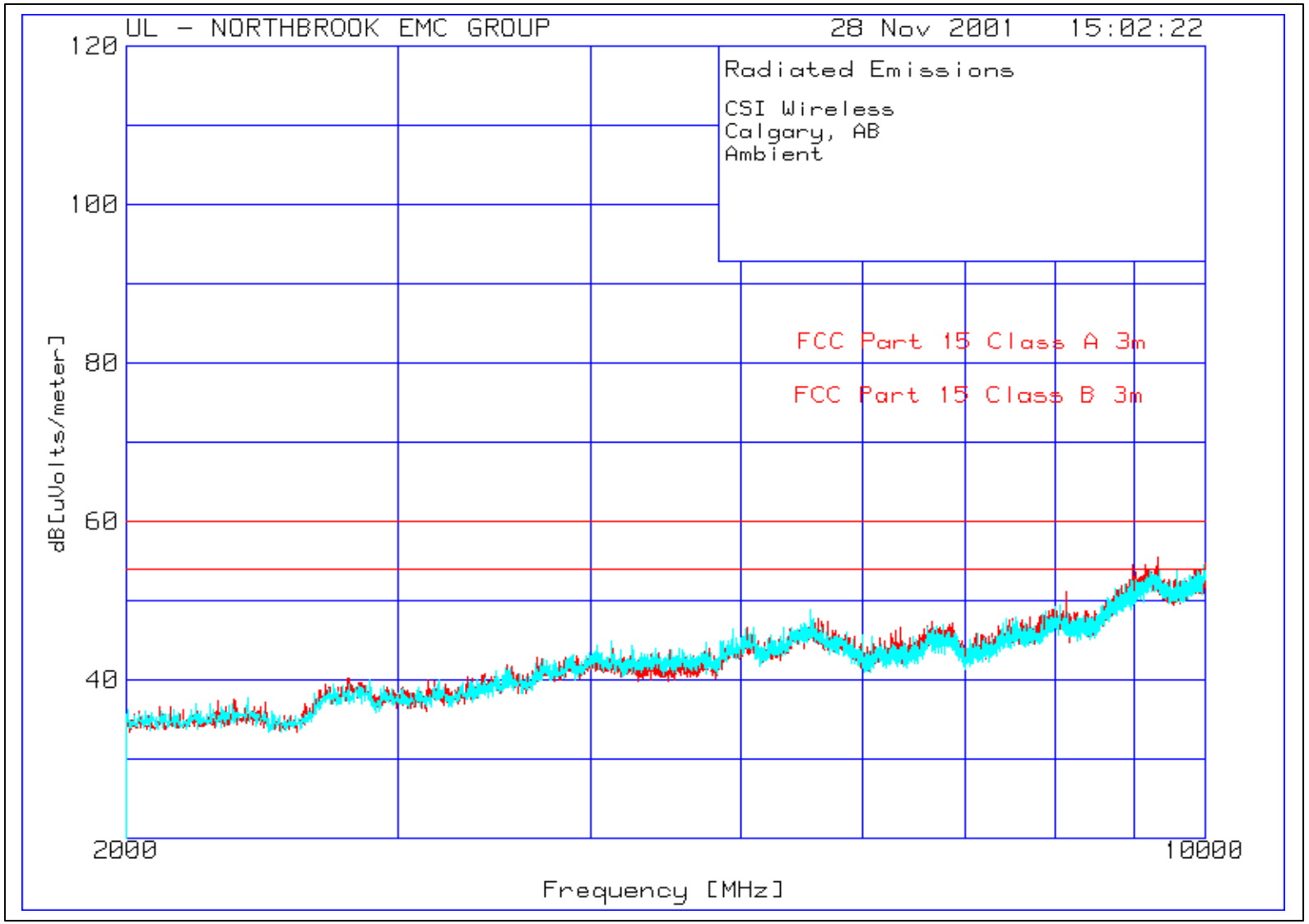




Plots of Radiated Emissions for Ambient:







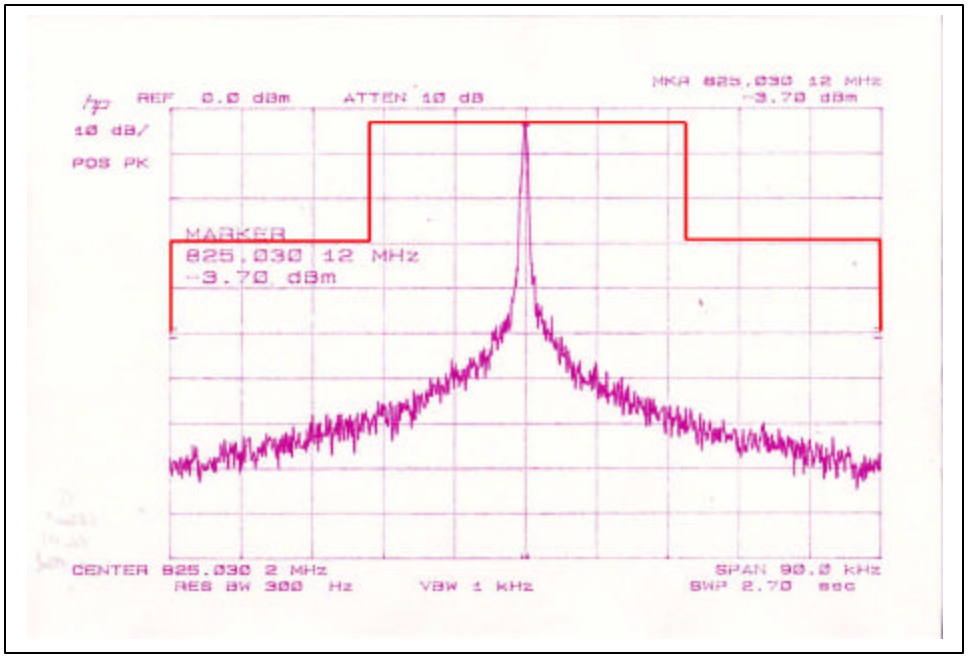
4.3 OCCUPIED BANDWIDTH WITH MODULATION

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Steven Tarkowski Test Date: 30 November 2001 & 17 December 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria 30 Nov 2001: Temperature = 21.0 °C Humidity = 28 % 17 December 2001: Temperature = 22.0 °C Humidity = 28 %	Specifications FCC Part 22.917 (b)(d) Mask is defined as: +/- 20 kHz, -26 dB +/- 45 kHz, -45 dB > +/- 90 kHz, -60 dB or – (43+10 log P) dB (which ever is the lesser attenuation)

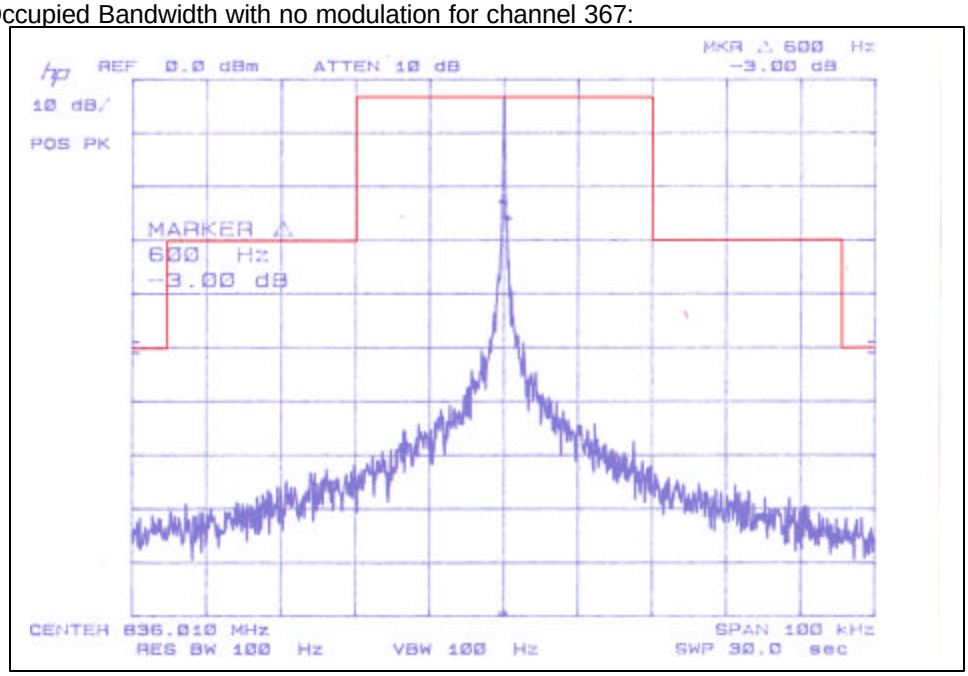
The following waveforms were captured with the occupied bandwidth (OBW) measured using the Spectrrum Analyzer 8566B command PWRBW TRA,99.0.

Channel	OBW with	Δ Marker (kHz)	Δ Marker (dB)	Pass/ Fail
367	No modulation	0.6	-3.0	Pass
001	SAT (6000 Hz)	12.41	0	Pass
367	SAT (6000 Hz)	12.32	+1.10	Pass
800	SAT (6000 Hz)	12.32	+1.50	Pass
001	Data sequence (9E, 8C, 8A, CC, EA)	32.57	+0.3	Pass
367	Data sequence (9E, 8C, 8A, CC, EA)	32.48	+0.2	Pass
800	Data sequence (9E, 8C, 8A, CC, EA)	32.57	+0.9	Pass
367	SAT and DTMF (1,5,9,0)	16.9	6.60	Pass
001	SAT and audio	24.11	13.9	Pass
367	SAT and audio	25.01	-0.1	Pass
800	SAT and audio	25.19	+1.1	Pass
367	Audio	23.8	0.20	Pass
367	Modem	23.6	1.70	Pass
001	ST	39.68	-3.3	Pass
367	ST	39.58	-2.9	Pass
800	ST	39.67	+1.4	Pass

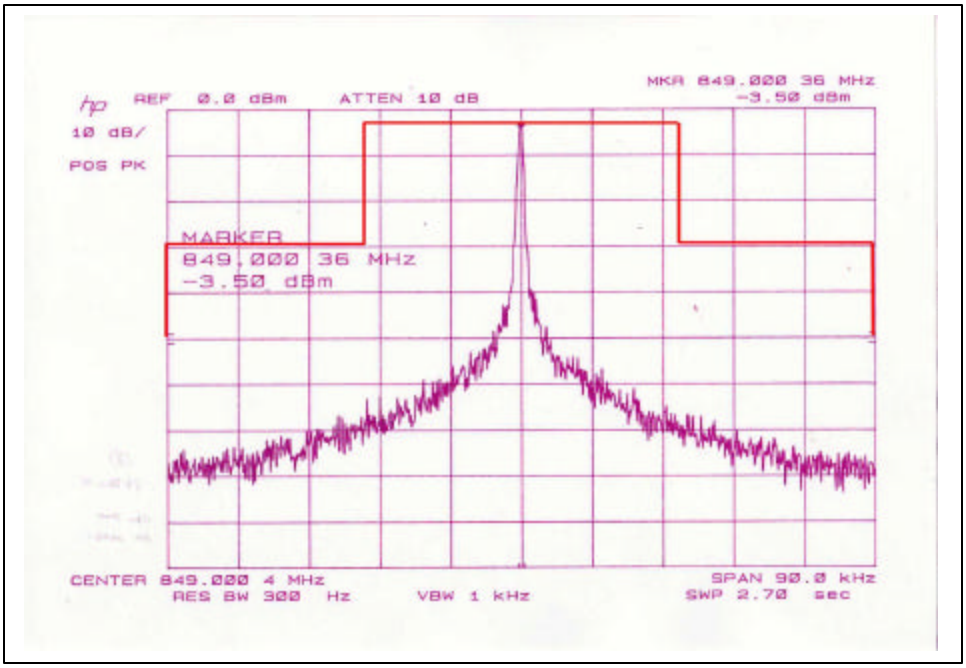
Occupied Bandwidth Mask with no modulation for channel 001:



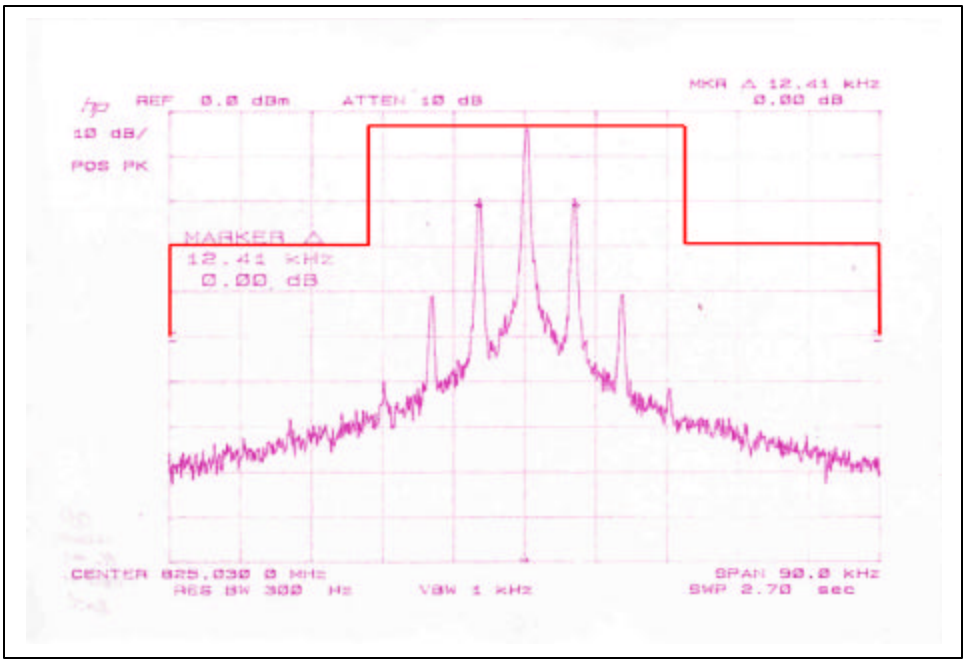
Occupied Bandwidth with no modulation for channel 367:



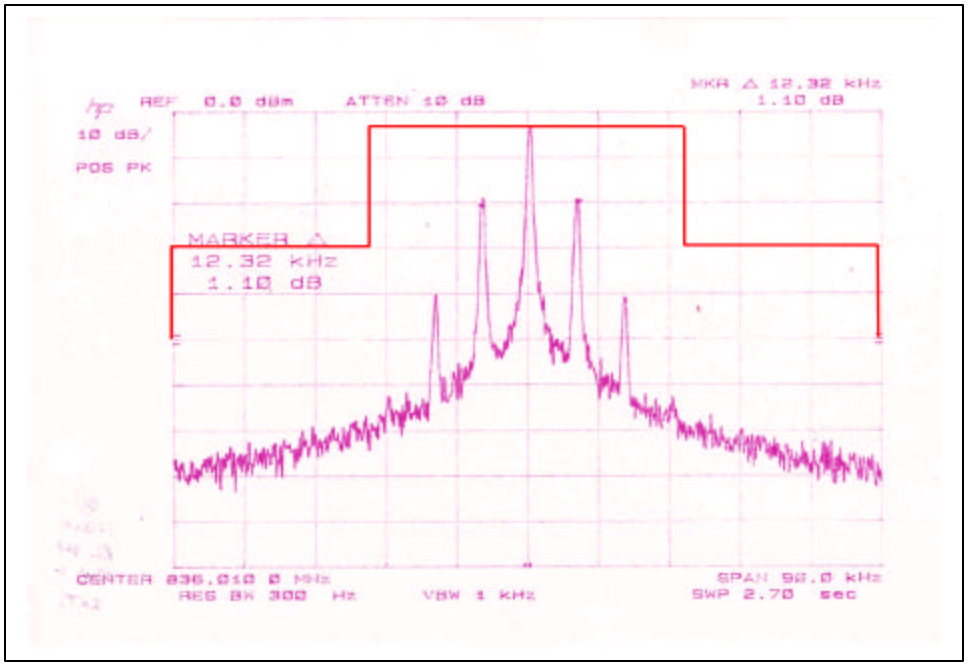
Occupied Bandwidth Mask with no modulation for channel 800:



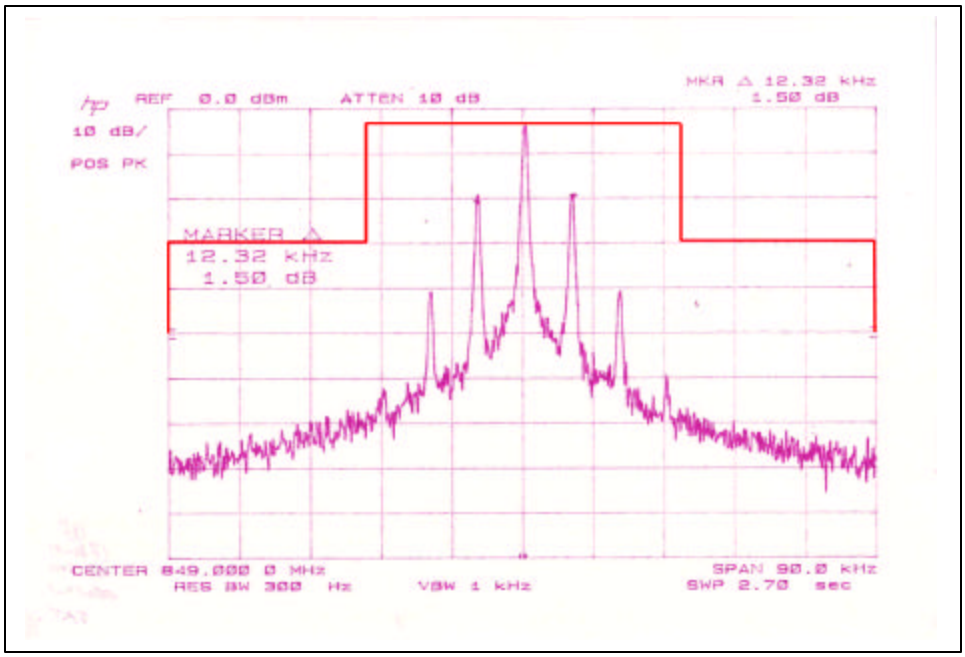
Occupied Bandwidth with SAT (6000 Hz) for channel 001:



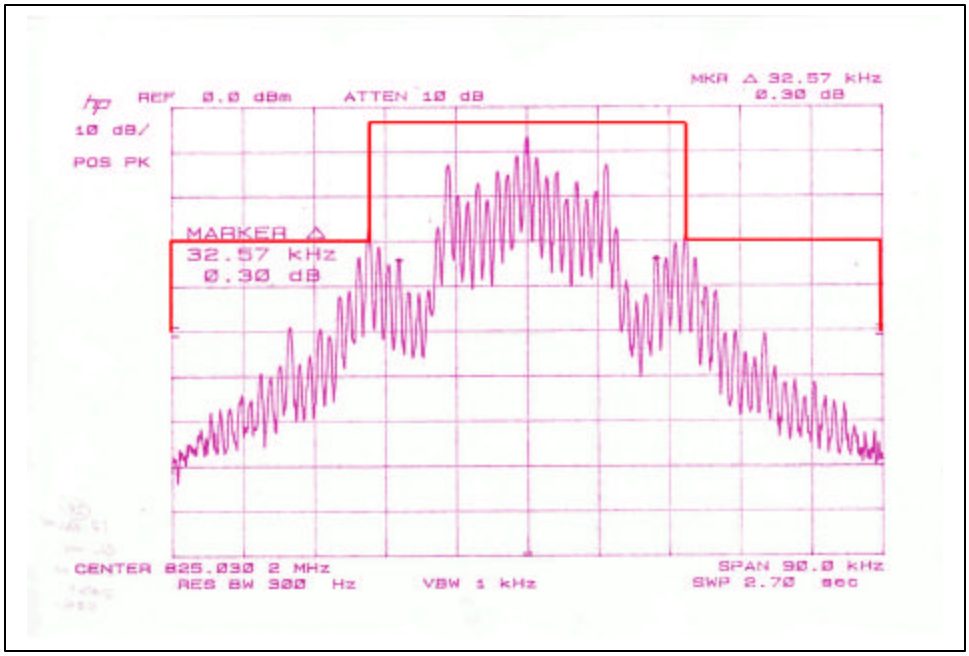
Occupied Bandwidth with SAT (6000 Hz) for channel 367:



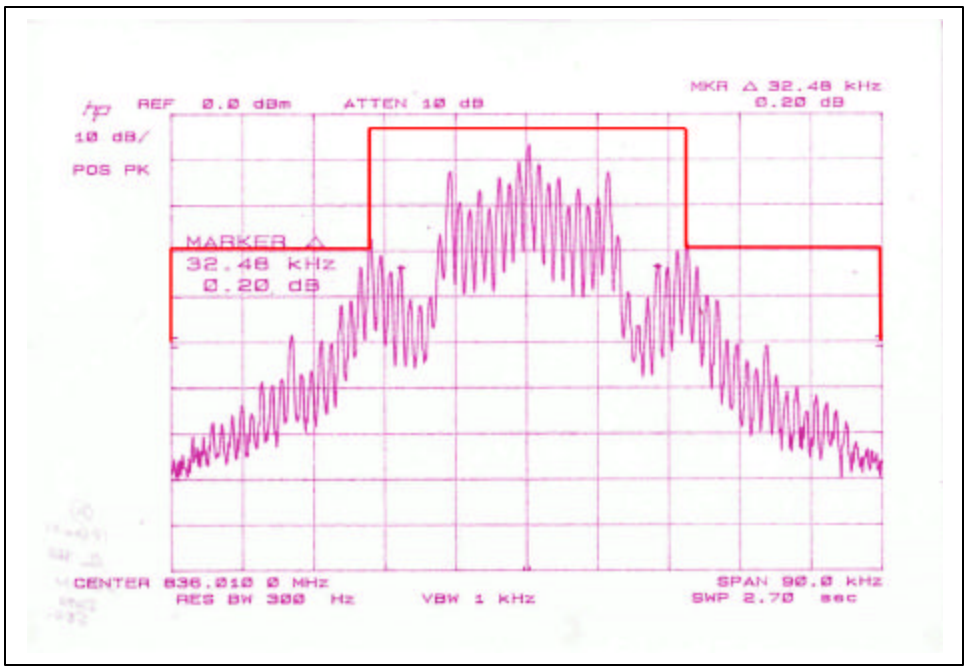
Occupied Bandwidth with SAT (6000 Hz) for channel 800:



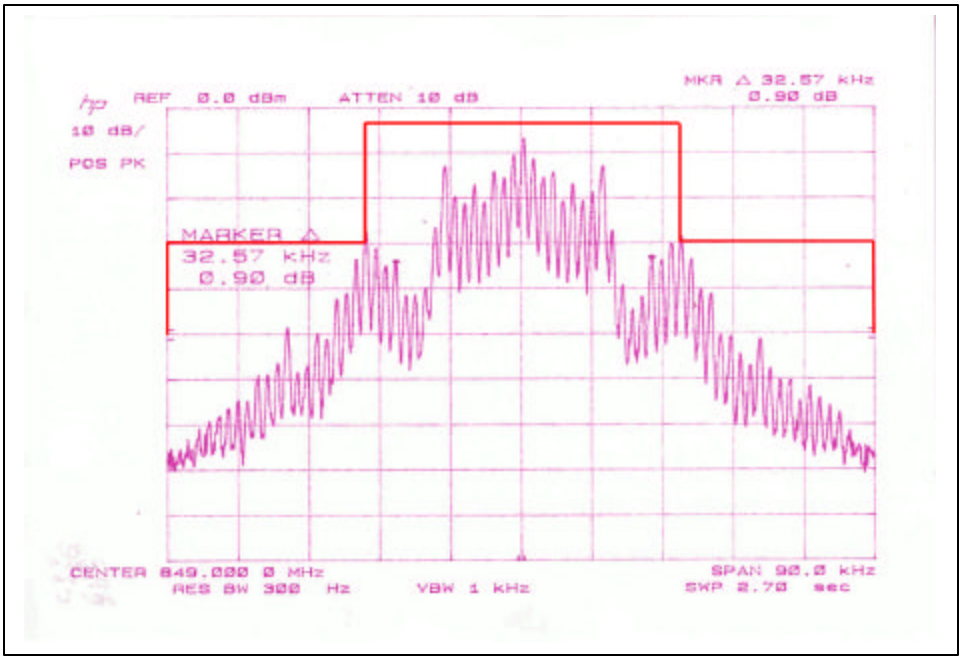
Occupied Bandwidth with data sequence (9E, 8C, 8A, CC, EA) for channel 001:



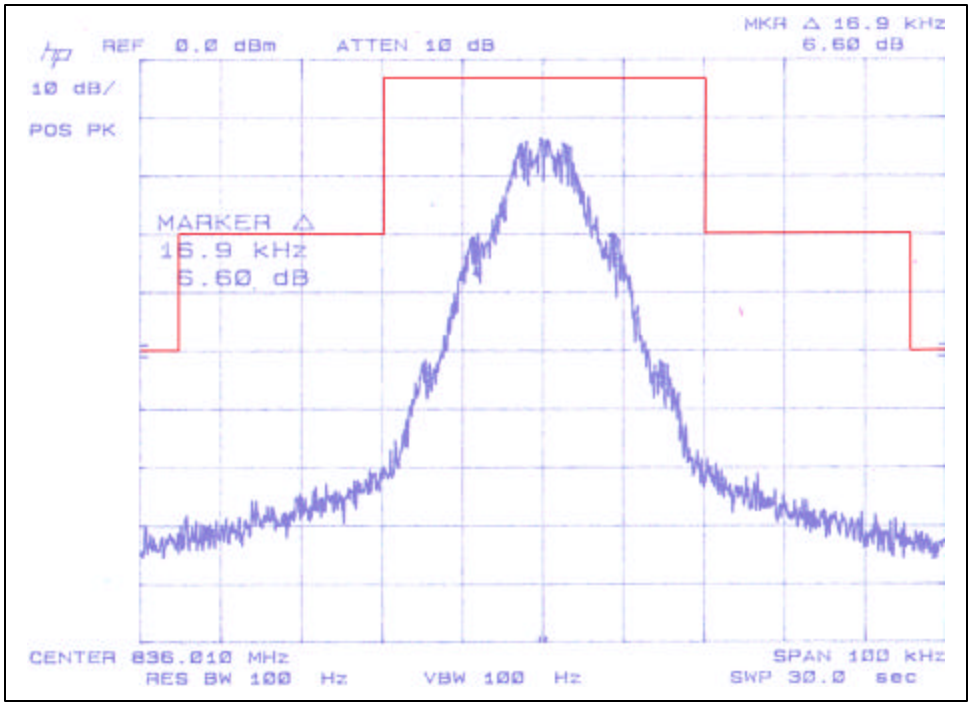
Occupied Bandwidth with data sequence (9E, 8C, 8A, CC, EA) for channel 367:



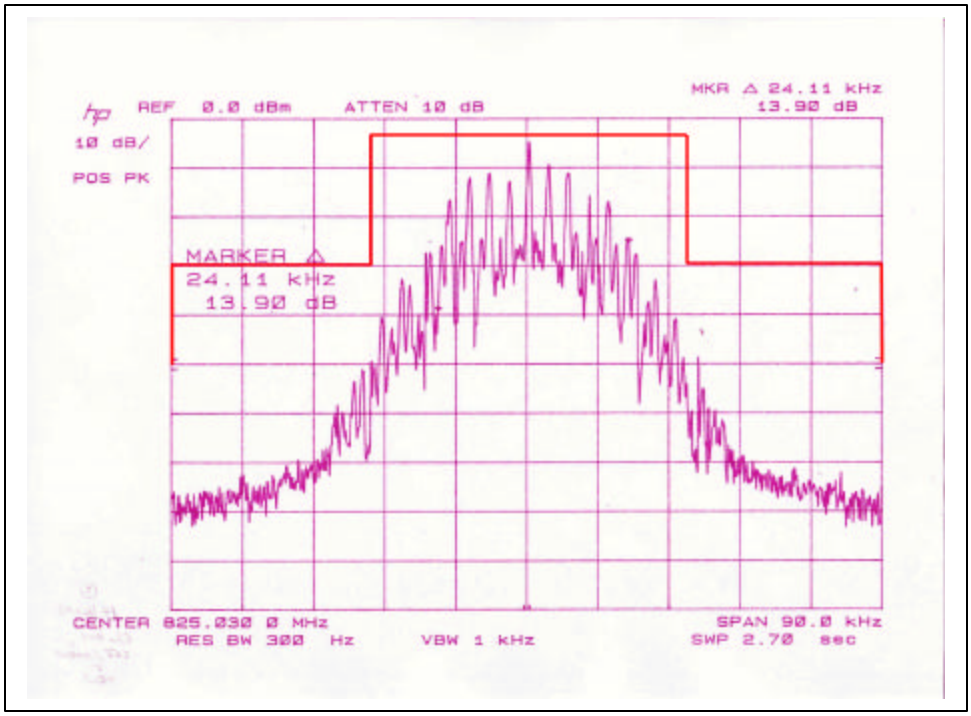
Occupied Bandwidth with data sequence (9E, 8C, 8A, CC, EA) for channel 800:



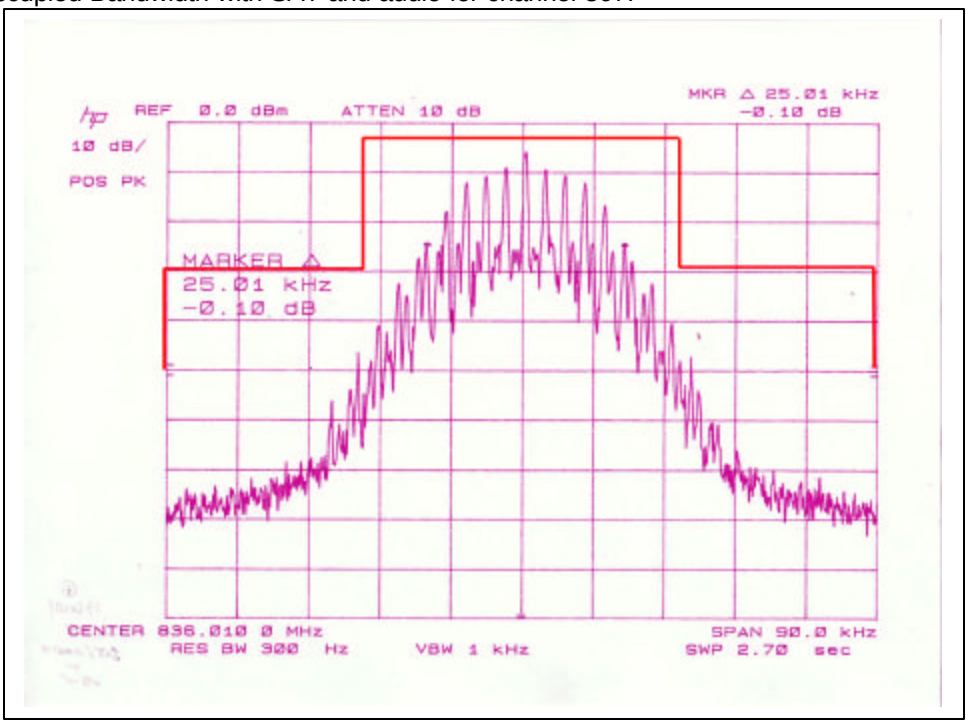
Occupied Bandwidth with SAT and DTMF (1,5,9,0) for channel 367:



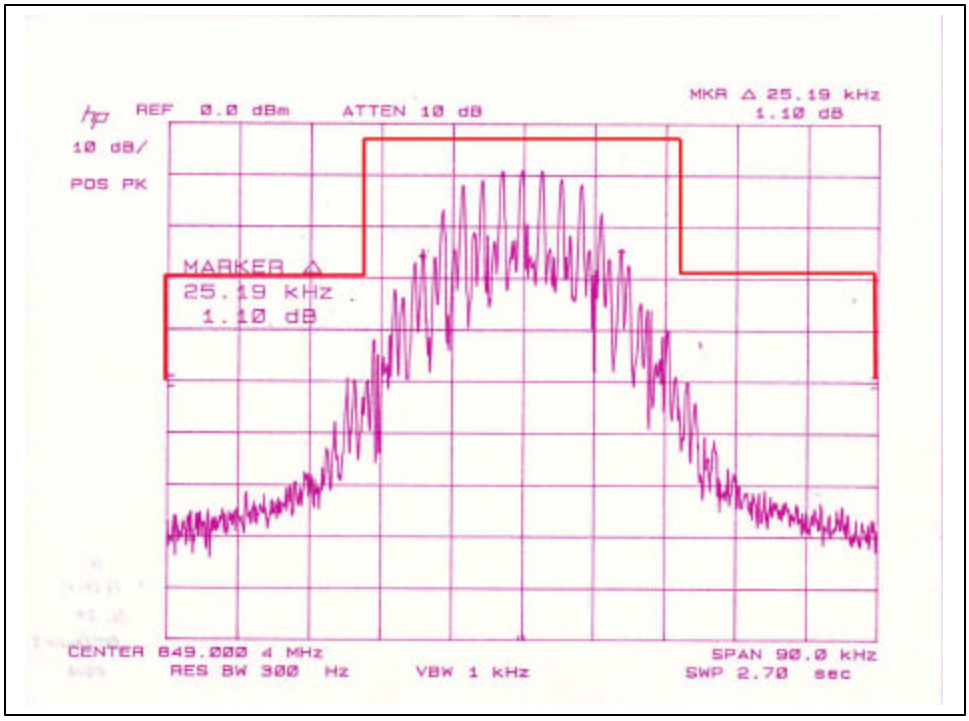
Occupied Bandwidth with SAT and audio for channel 001:



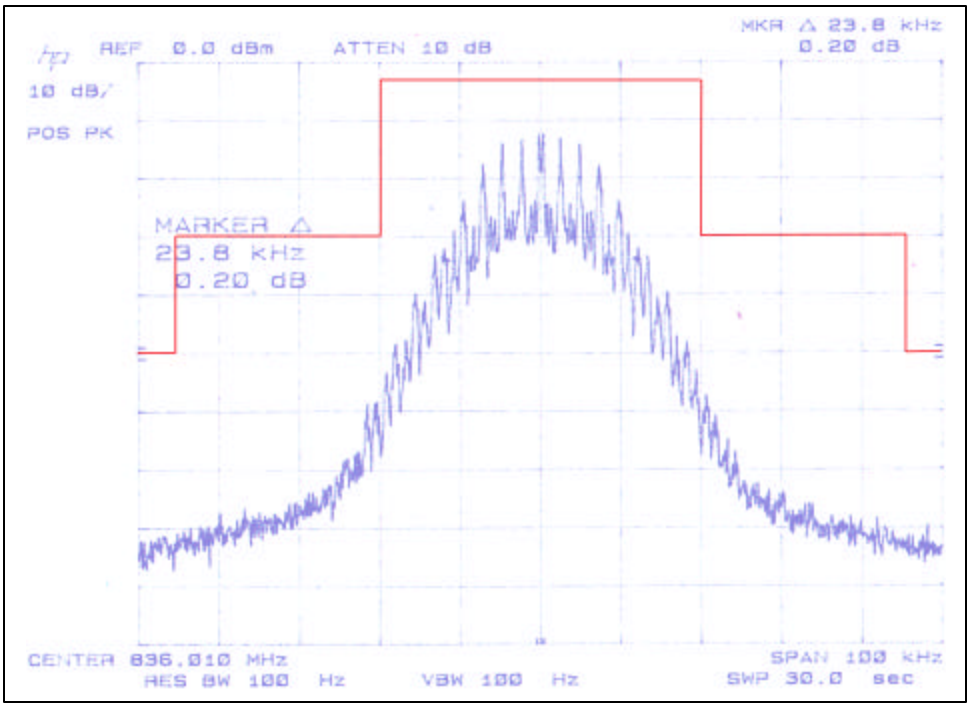
Occupied Bandwidth with SAT and audio for channel 367:



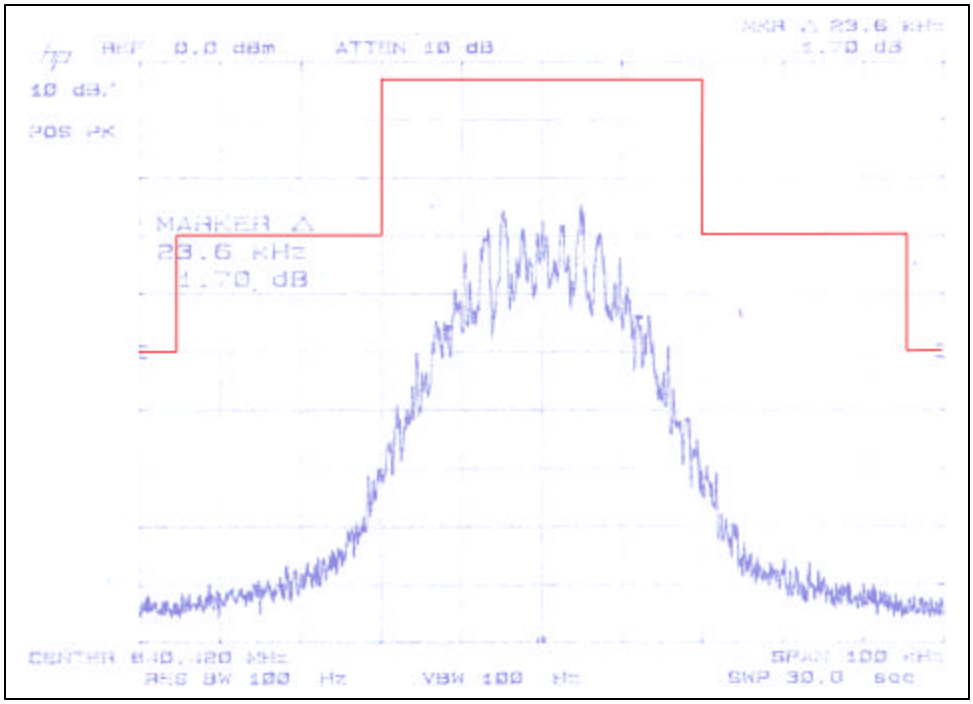
Occupied Bandwidth with SAT and audio for channel 800:



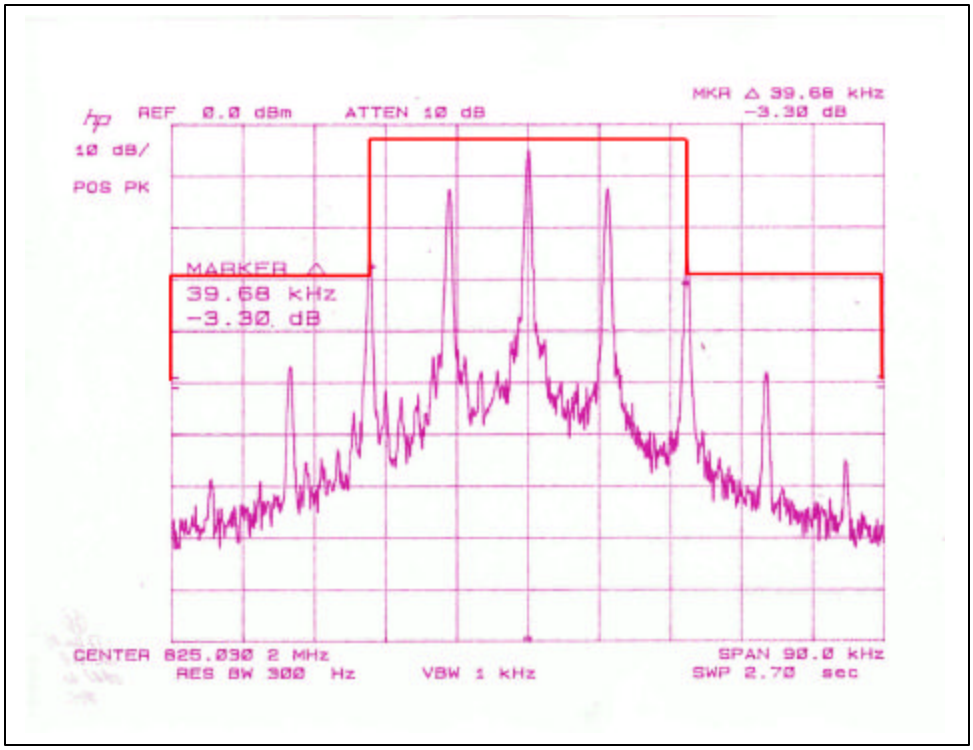
Occupied Bandwidth with audio for channel 367:



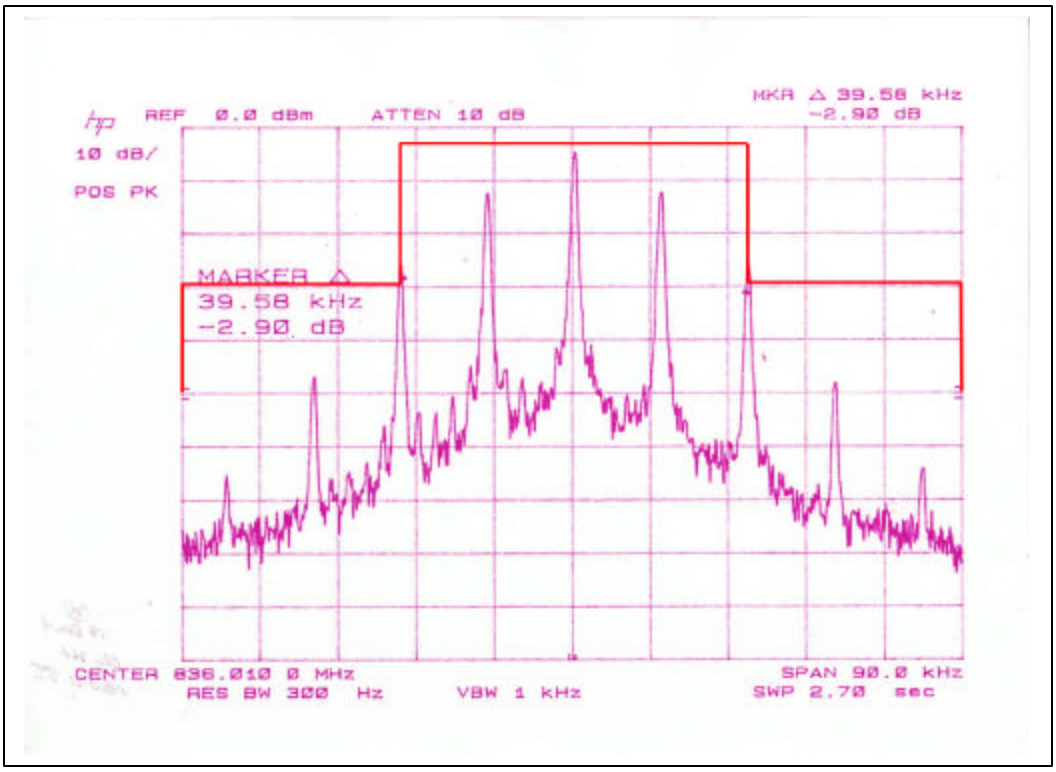
Occupied Bandwidth with modem and random data for channel 367:



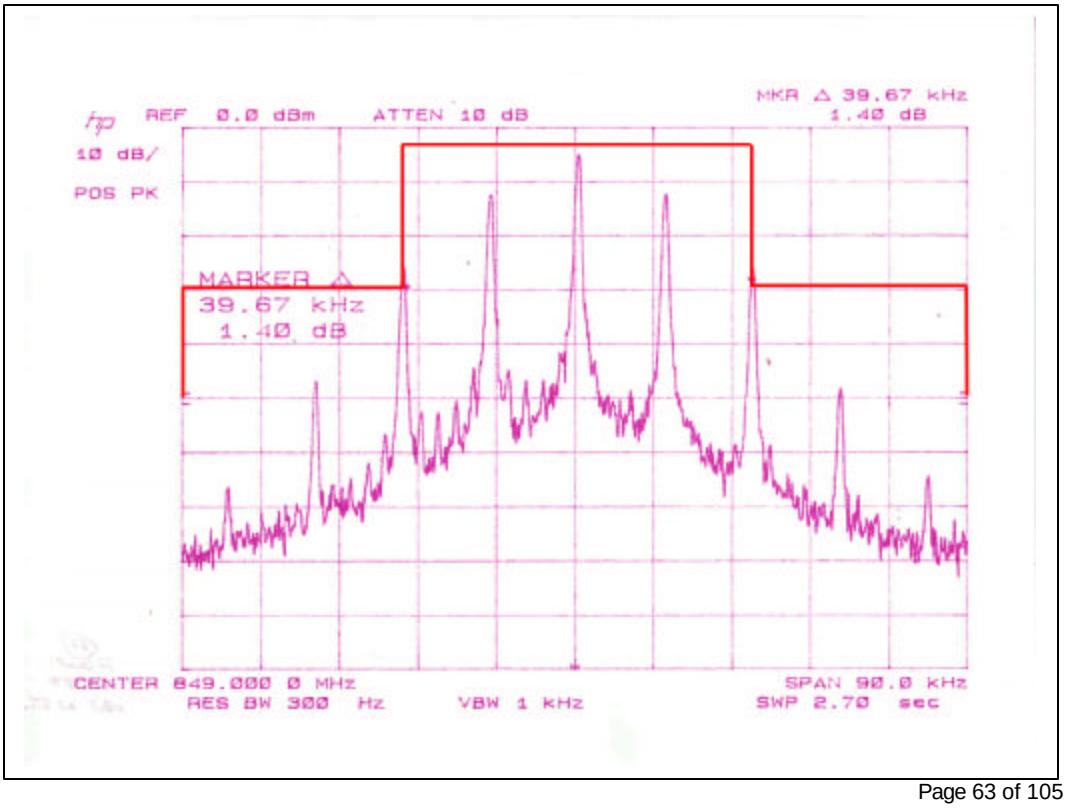
OBW with ST for channel 001:



OBW with ST for channel 367:



OBW with ST for channel 800:



4.4 FREQUENCY STABILITY VERSUS TEMPERATURE

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Erin Hails Test Date: 20 July 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria 20 Jul 2001: Temperature = 23.0 °C Humidity = 28 %	Specifications FCC 22.355 Frequency tolerance +/- 2.5 ppm

The data below was collected from 20 July 2001 (refer to ETC project c05e2295).

Frequency Stability versus Temperature for channel 001:

Channel 001	Frequency 825.030 MHz		
Temperature	Measured	Difference	
[°C]	[Hz]	[Hz]	[ppm]
-30	825029550	-450	-0.55
-20	825029548	-452	-0.55
-10	825029428	-572	-0.69
0	825029488	-512	-0.62
10	825030038	38	0.05
20	825030090	90	0.11
30	825029954	-46	-0.06
40	825029950	-50	-0.06
50	825029852	-148	-0.18

Frequency Stability versus Temperature for channel 367:

Channel 367	Frequency 836.010 MHz		
Temperature	Measured	Difference	
[°C]	[Hz]	[Hz]	[ppm]
-30	836009618	-382	-0.46
-20	836009492	-508	-0.61
-10	836009370	-630	-0.75
0	836009418	-582	-0.70
10	836009958	-42	-0.05
20	836010004	4	0.00
30	836010000	0	0.00
40	836009832	-168	-0.20
50	836009868	-132	-0.16

Frequency Stability versus Temperature for channel 800:

Channel 800	Frequency 849.000 MHz		
Temperature	Measured	Difference	
[°C]	[Hz]	[Hz]	[ppm]
-30	848999508	-492	-0.58
-20	848999492	-508	-0.60
-10	848999310	-690	-0.81
0	848999512	-488	-0.57
10	848999994	-6	-0.01
20	849000044	44	0.05
30	848999872	-128	-0.15
40	848999818	-182	-0.21
50	848999812	-188	-0.22

4.5 FREQUENCY STABILITY VERSUS VOLTAGE

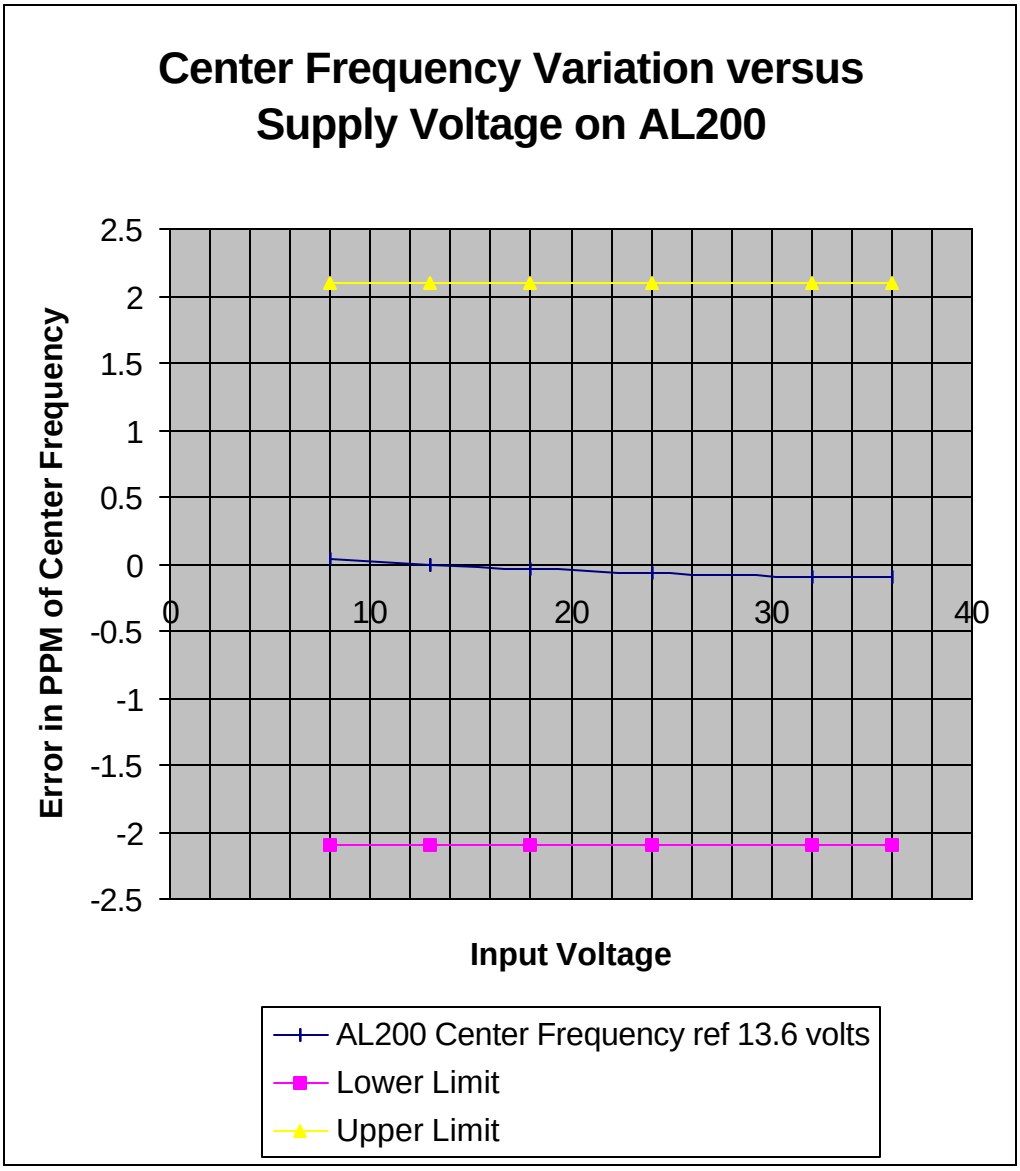
Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Steven Tarkowski Test Date: 30 November 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria 30 Nov 2001: Temperature = 21.0 °C Humidity = 28 %	Specifications FCC 22.355 Frequency tolerance +/- 2.5 ppm

Center Frequency Variations caused by Supply Voltage on AL200

Frequency of RF carrier: 836.01 MHz

Variation versus nominal voltage of 13.6 volts.

AL200 Input Supply Voltage	836.01 MHz Center Frequency Error	Lower Limit at neg 2.5 PPM	Upper Limit at pos 2.5 PPM
Vdc	KHz	KHz	KHz
8	0.04	-2.090025	2.090025
13	0	-2.090025	2.090025
18	-0.03	-2.090025	2.090025
24	-0.06	-2.090025	2.090025
32	-0.09	-2.090025	2.090025
36	-0.1	-2.090025	2.090025



4.6 Output Power: EFFECTIVE RADIATED POWER

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Steven Tarkowski Test Date: 24 Nov 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria 24 Nov 2001: Temperature = 21.0 °C Humidity = 28 %	Specifications FCC Part 22.913 ERP < 7 Watts

The maximum conducted Output Power was measured with the EUT transmitting on channel 800.

The EUT Output Power was measured as 28.42 dBm on the power meter. With 0.3 dB loss in the TNC to N adapter, the corrected value for the EUT Output Power at 849.02 MHz becomes 28.72 dBm.

Therefore the maximum conducted Output Power is 744.7 mW.

According to the user's manual, the maximum gain of the cellular antenna to be used with the transmitter is 3 dBd.

Therefore the maximum effective radiated power (ERP) is 1.49 Watts.

4.7 AUDIO FILTER CHARACTERISTICS

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Steven Tarkowski Test Date: 30 November 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria 25 Nov 2001: Temperature = 21.0 °C Humidity = 28 %	Specifications FCC Part 22.915(d) Signals must be attenuated, relative to the level at 1 kHz, as follows: 3 – 5.9 kHz and 6.1 – 15 kHz by –40 log (f/3) dB, 5.9 – 6.1 kHz, -35 dB, > 15 kHz, -28 dB.
Input Level constant at 20 mV peak to peak. Noise level from unmodulated transmitter is 0.220 KHz. **Note: ratio of 12KHz to 2.9 KHz gives 12.3 dB for limit below 3 KHz.**	

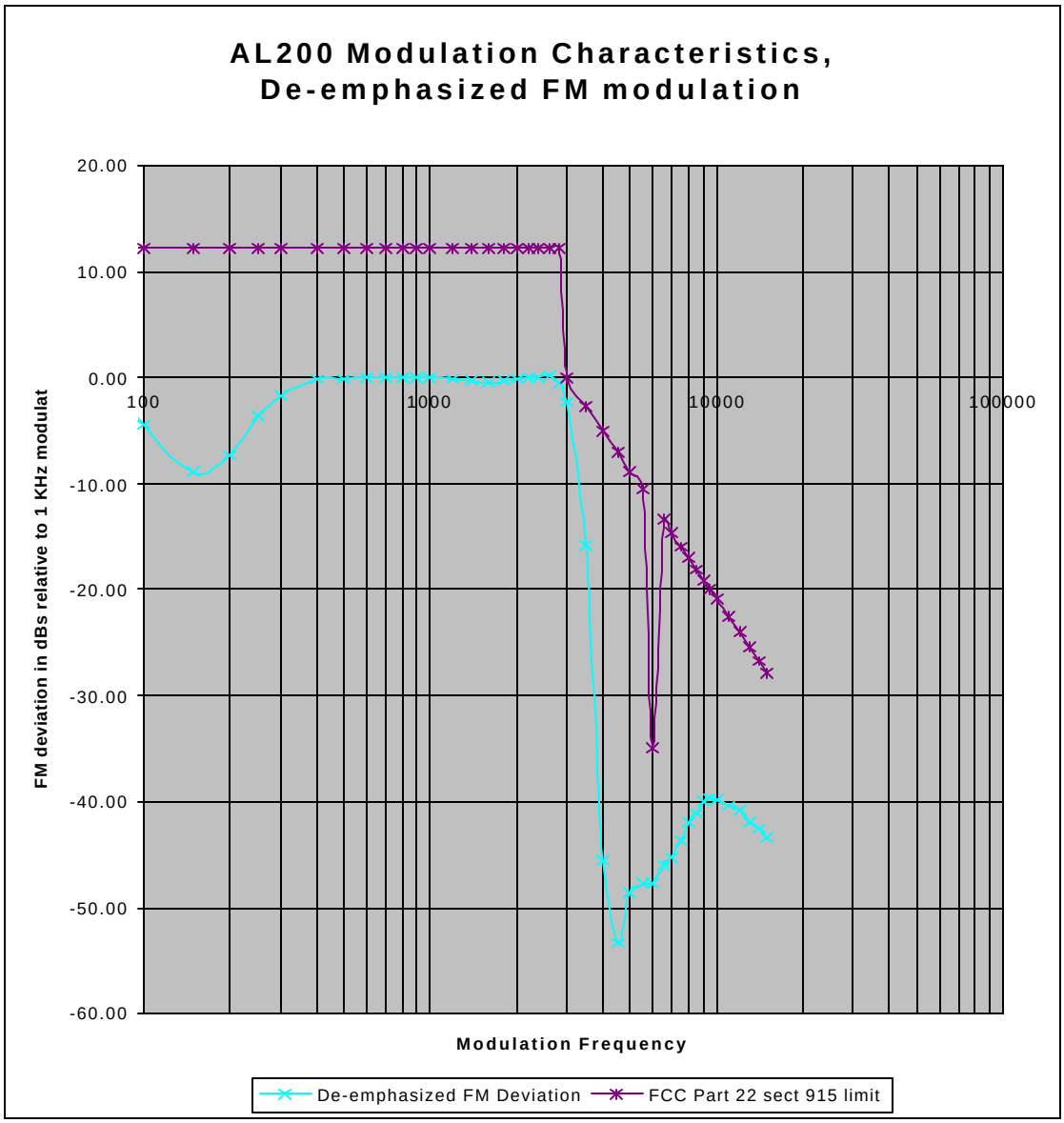
Modulation Characteristics corrected for pre-emphasis ON. The deviation is measured from the microphone input.

Modulation Freq. (Hz)	FM Deviation including noise (kHz)	FM Deviation (kHz)	FM Deviation relative to 1 KHz	**FM Deviation, de-empahsis applied**	**FCC Limit**
50	0.540	0.320	-18.46	7.56	12.3
100	0.380	0.160	-24.48	-4.48	12.3
150	0.365	0.145	-25.34	-8.86	12.3
200	0.450	0.230	-21.33	-7.35	12.3
250	0.663	0.443	-15.63	-3.59	12.3
300	0.883	0.663	-12.13	-1.67	12.3
400	1.270	1.050	-8.14	-0.18	12.3
500	1.530	1.310	-6.22	-0.20	12.3
600	1.840	1.620	-4.37	0.06	12.3
700	2.100	1.880	-3.08	0.02	12.3
800	2.380	2.160	-1.87	0.06	12.3
900	2.630	2.410	-0.92	-0.01	12.3
1000	2.900	2.680	0.00	0.00	12.3
1200	3.380	3.160	1.43	-0.15	12.3
1400	3.850	3.630	2.64	-0.29	12.3
1600	4.300	4.080	3.65	-0.43	12.3
1800	4.860	4.640	4.77	-0.34	12.3
2000	5.520	5.300	5.92	-0.10	12.3
2200	6.150	5.930	6.90	0.05	12.3
2400	6.670	6.450	7.63	0.02	12.3
2600	7.330	7.110	8.47	0.18	12.3
2800	7.220	7.000	8.34	-0.60	12.3
3000	6.420	6.200	7.29	-2.26	0
3500	1.740	1.520	-4.93	-15.81	-2.67787
4000	0.276	0.056	-33.60	-45.64	-4.99755
4500	0.246	0.026	-40.26	-53.33	-7.04365
5000	0.270	0.050	-34.58	-48.56	-8.87395
5500	0.280	0.060	-33.00	-47.81	-10.5297
6000	0.286	0.066	-32.17	-47.73	-35
6500	0.307	0.087	-29.77	-46.03	-13.4317
7000	0.321	0.101	-28.48	-45.38	-14.7191
7500	0.350	0.130	-26.28	-43.79	-15.9176
8000	0.389	0.169	-24.00	-42.07	-17.0387
8500	0.418	0.198	-22.63	-41.22	-18.0919
9000	0.462	0.242	-20.89	-39.97	-19.0849
9500	0.485	0.265	-20.10	-39.65	-20.0241
10000	0.493	0.273	-19.84	-39.84	-20.9151
11000	0.500	0.280	-19.62	-40.45	-22.5709
12000	0.512	0.292	-19.26	-40.84	-24.0824
13000	0.498	0.278	-19.68	-41.96	-25.4729
14000	0.499	0.279	-19.65	-42.57	-26.7603
15000	0.489	0.269	-19.97	-43.49	-27.9588

Modulation Characteristics corrected for Pre-emphasis

Deviation from microphone input.

Pre-emphasis is ON.



4.8 MODULATION DEVIATION LIMITING

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Russ Braathen (of CSI Wireless) Test Date: 18 December 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria	Specifications Fcc Part 22.915(c): **Peak Deviation at +/- 12 KHz +/- 10%.** **Limits are then 10.8 KHz to 13.2 KHz.**
The measured peak is 11.54 kHz. The EUT passes.	

AssetLink Deviation Limiting Test for FCC 22.915

0.0225 volts RMS stepped to 0.00225 V RMS at 5 times a second.
Peak hold deviation with above input is 12.39 KHz including noise.

4.0 KHz deviation is measured with 0.00225 volts RMS at input.
This varies, depending on direction of change of level.
Also:
4.0 KHz deviation with noise is obtained from 0.00102 volts RMS
4.5 KHz deviation with noise is obtained from 0.0014 volts RMS.
Note that the compressor changes the input non-linearily.

Re-testing: 0.022 volts RMS to 0.0022 volts RMS at 5 times a second: 11.66 KHz
Re-testing: 0.0225 volts RMS to 0.00225 volts RMS at 5 times a second: 12.24 KHz
There are two distinct level of inputs due to selection of L1 mic gain.

Setting input level to 0.001 volts RMS, at 2500 Hz, measuring top, mid and bottom channels:

Channel	Dev
1	4.025
367	4.030
800	4.032

Stepping from 0.0100 volts RMS to 0.001 volts RMS at 2500 Hz 5 times a second:

Channel	Peak Hold Dev	Peak Hold Noise	Peak Dev
1	12.380	0.880	**11.500**
367	12.370	0.881	**11.489**
800	12.380	0.880	**11.500**

Tests for various levels at 2500 Hz tone, stepping to 10 times level:

From	To	From Dev	To Dev	Peak Hold Dev	
volts RMS	volts RMS	KHz FM	KHz FM	KHz FM	
0.001	0.01	4.05	9.52	12.39	
0.00124	0.0124	4.45	9.46	12.41	
0.00225	0.0225	5.9	9.513	12.36	

Test for 2500 Hz stepping 15 dB in level:

From	To	From Dev	To Dev	Peak Hold Dev	
volts RMS	volts RMS	KHz FM	KHz FM	KHz FM	
0.00124	0.0774	4.43	9.47	12.15	

Detector used was pk+-/2HOLD, and 20 Hz to 99 KHz filter.
Noise using peak hold was found to be 870 Hz.

Test performed by CSI (Russ Braathen)
Test Date: 18 December 2001
EUT is AL200 S/N 49

Channel 001 Deviation Readings, uncorrected.

Audio Input Level	300 Hz tone deviation	1000 Hz tone deviation	3000 Hz tone deviation
millivolts RMS	Pk+-/2 KHz FM	Pk+-/2 KHz FM	Pk+-/2 KHz FM
1	0.61	1.66	3.37
2	0.76	2.24	4.65
5	1.12	3.41	6.89
10	1.45	4.72	6.86
20	1.96	6.60	6.91
30	2.40	8.16	6.90
40	3.74	8.00	6.94
50	3.42	7.90	6.93
60	3.93	8.67	6.93
70	4.23	8.82	6.93
80	4.33	9.02	6.86
90	4.38	8.81	6.90
100	4.40	8.16	6.94
150	4.61	8.08	6.87
200	4.52	8.01	6.89
250	4.50	7.85	6.91
300	4.84	7.92	6.92
400	4.45	7.93	6.93
500	4.43	7.76	6.95
600	4.43	7.75	6.95
700	4.42	7.76	6.93
800	4.43	7.80	6.93
900	4.44	7.78	6.95
1000	4.43	7.78	6.94

Above data is readings from HP8920B, 50 Hz to 15 KHz filters.
Deviation with no input is 480 Hz, which is system noise.
Readings include noise deviation

Channel 001 Deviation Results

Audio Input Level	300 Hz tone deviation	1000 Hz tone deviation	3000 Hz tone deviation
millivolts RMS	Pk+-/2 KHz FM	Pk+-/2 KHz FM	Pk+-/2 KHz FM
1	0.13	1.18	2.89
2	0.28	1.76	4.17
5	0.64	2.93	6.41
10	0.97	4.24	6.38
20	1.48	6.12	6.43
30	1.92	7.68	6.42
40	3.26	7.52	6.46
50	2.94	7.42	6.45
60	3.45	8.19	6.45
70	3.75	8.34	6.45
80	3.85	8.54	6.38
90	3.90	8.33	6.42
100	3.92	7.68	6.46
150	4.13	7.60	6.39
200	4.04	7.53	6.41
250	4.02	7.37	6.43
300	4.36	7.44	6.44
400	3.97	7.45	6.45
500	3.95	7.28	6.47
600	3.95	7.27	6.47
700	3.94	7.28	6.45
800	3.95	7.32	6.45
900	3.96	7.30	6.47
1000	3.95	7.30	6.46

Above data is readings from HP8920B, 50 Hz to 15 KHz filters.
Deviation with no input is 480 Hz, which is system noise.
Above figures have noise deviation subtracted

Test performed by CSI (Russ Braathen)
Test Date: 18 December 2001
Channel 367 Deviation Results

Channel 367 Deviation Readings, uncorrected.

Audio Input Level	300 Hz tone deviation	1000 Hz tone deviation	3000 Hz tone deviation
millivolts RMS	Pk+-/2 KHz FM	Pk+-/2 KHz FM	Pk+-/2 KHz FM
1	0.61	1.67	3.38
2	0.76	2.22	4.66
5	1.14	3.38	6.87
10	1.43	4.70	6.84
20	1.94	6.56	6.89
30	2.36	8.09	6.90
40	3.52	7.92	6.92
50	3.41	7.95	6.90
60	3.97	7.88	6.91
70	4.18	8.36	6.91
80	4.23	8.76	6.86
90	4.29	9.03	6.90
100	4.37	8.82	6.92
150	4.55	8.19	6.87
200	4.50	8.07	6.87
250	4.46	7.99	6.89
300	4.45	7.84	6.91
400	4.43	7.93	6.92
500	4.43	7.76	6.92
600	4.42	7.75	6.93
700	4.41	7.78	6.93
800	4.40	7.80	6.92
900	4.43	7.79	6.95
1000	4.41	7.78	6.93

Above data is readings from HP8920B, 50 Hz to 15 KHz filters.
Deviation with no input is 480 Hz, which is system noise.
Readings include noise deviation

Channel 367 Deviation Results

Audio Input Level	300 Hz tone deviation	1000 Hz tone deviation	3000 Hz tone deviation
millivolts RMS	Pk+-/2 KHz FM	Pk+-/2 KHz FM	Pk+-/2 KHz FM
1	0.13	1.19	2.90
2	0.28	1.74	4.18
5	0.66	2.90	6.39
10	0.95	4.22	6.36
20	1.46	6.08	6.41
30	1.88	7.61	6.42
40	3.04	7.44	6.44
50	2.93	7.47	6.42
60	3.49	7.40	6.43
70	3.70	7.88	6.43
80	3.75	8.28	6.38
90	3.81	8.55	6.42
100	3.89	8.34	6.44
150	4.07	7.71	6.39
200	4.02	7.59	6.39
250	3.98	7.51	6.41
300	3.97	7.36	6.43
400	3.95	7.45	6.44
500	3.95	7.28	6.44
600	3.94	7.27	6.45
700	3.93	7.30	6.45
800	3.92	7.32	6.44
900	3.95	7.31	6.47
1000	3.93	7.30	6.45

Above data is readings from HP8920B, 50 Hz to 15 KHz filters.
Deviation with no input is 480 Hz, which is system noise.
Above figures have noise deviation subtracted

Test performed by CSI (Russ Braathen)
Test Date: 18 December 2001
EUT is AL200 S/N 49

Channel 800 Deviation Readings, uncorrected.

Audio Input Level	300 Hz tone deviation	1000 Hz tone deviation	3000 Hz tone deviation
millivolts RMS	Pk+-/2 KHz FM	Pk+-/2 KHz FM	Pk+-/2 KHz FM
1	0.61	1.67	3.37
2	0.72	2.25	4.66
5	1.01	3.40	6.88
10	1.35	4.71	6.87
20	1.83	6.60	6.92
30	2.21	8.13	6.91
40	3.02	7.96	6.94
50	3.40	7.97	6.95
60	3.62	8.10	6.93
70	3.95	8.64	6.92
80	4.03	8.82	6.87
90	4.18	9.05	6.92
100	4.28	8.81	6.93
150	4.62	8.15	6.88
200	4.53	8.10	6.88
250	4.45	7.01	6.91
300	4.46	7.85	6.91
400	4.42	7.93	6.92
500	4.44	7.77	6.92
600	4.39	7.76	6.92
700	4.40	7.78	6.93
800	4.43	7.78	6.93
900	4.40	7.80	6.94
1000	4.41	7.79	6.94

Above data is readings from HP8920B, 50 Hz to 15 KHz filters.
Deviation with no input is 480 Hz, which is system noise.
Readings include noise deviation

Channel 800 Deviation Results

Audio Input Level	300 Hz tone deviation	1000 Hz tone deviation	3000 Hz tone deviation
millivolts RMS	Pk+-/2 KHz FM	Pk+-/2 KHz FM	Pk+-/2 KHz FM
1	0.13	1.19	2.89
2	0.24	1.77	4.18
5	0.53	2.92	6.40
10	0.87	4.23	6.39
20	1.35	6.12	6.44
30	1.73	7.65	6.43
40	2.54	7.48	6.46
50	2.92	7.49	6.47
60	3.14	7.62	6.45
70	3.47	8.16	6.44
80	3.55	8.34	6.39
90	3.70	8.57	6.44
100	3.80	8.33	6.45
150	4.14	7.67	6.40
200	4.05	7.62	6.40
250	3.97	6.53	6.43
300	3.98	7.37	6.43
400	3.94	7.45	6.44
500	3.96	7.29	6.44
600	3.91	7.28	6.44
700	3.92	7.30	6.45
800	3.95	7.30	6.45
900	3.92	7.32	6.46
1000	3.93	7.31	6.46

Above data is readings from HP8920B, 50 Hz to 15 KHz filters.
Deviation with no input is 480 Hz, which is system noise.
Above figures have noise deviation subtracted

4.9 CONDUCTED EMISSIONS AT ANTENNA PORT

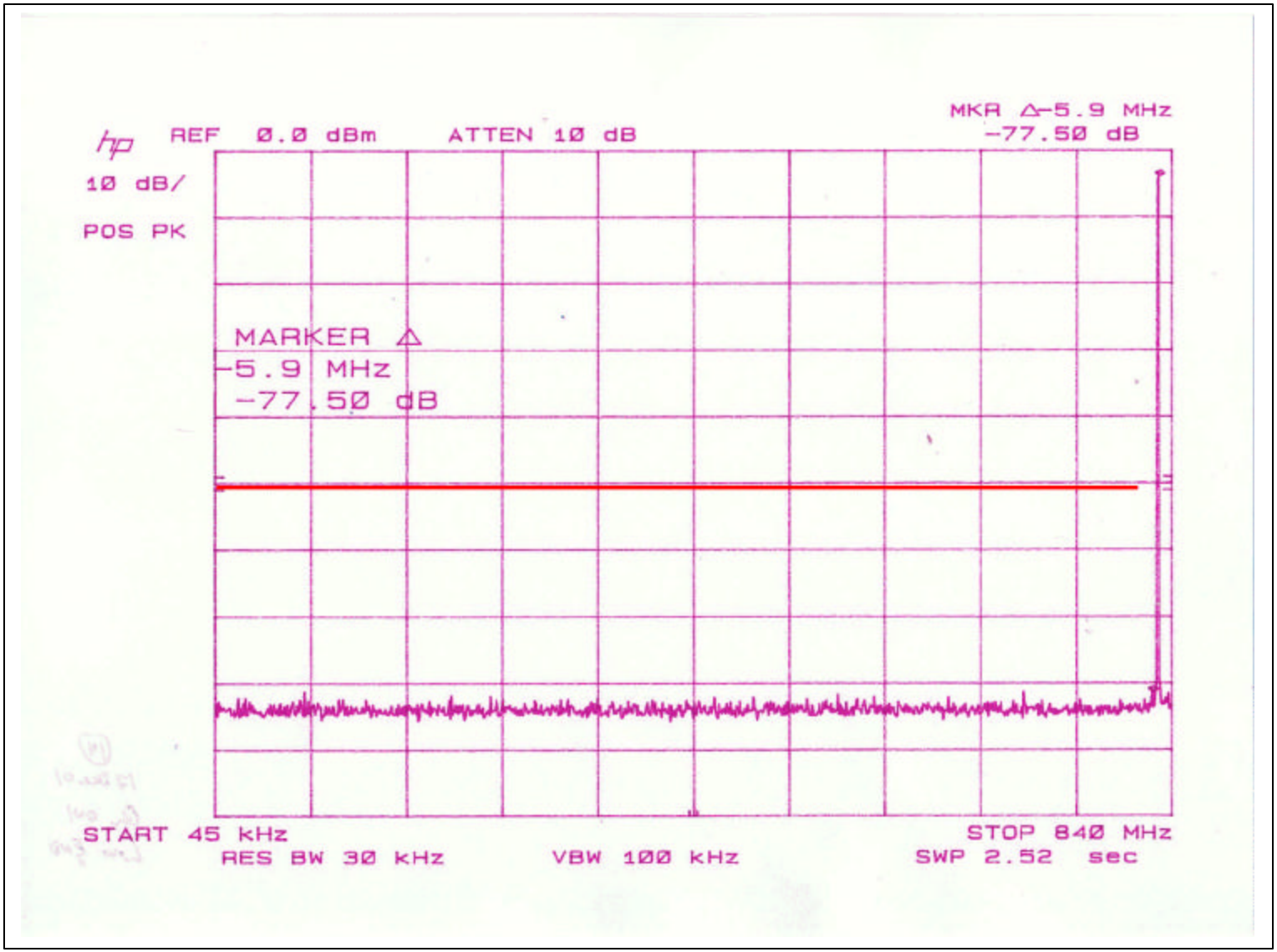
Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Steven Tarkowski Test Date: 17 December 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria 17 Dec 2001: Temperature = 22.0 °C Humidity = 28 %	Specifications Fcc Part 22.917 Mask is defined as: +/- 20 kHz, -26 dB, +/- 45 kHz, -45 dB, > + 90 kHz, -60 dB or –(43 + 10log(P)) dB < - 90 kHz, -60 dB or –(43 + 10log(P)) dB
Conducted emission measurements were made at the antenna port to verify the spurious emission levels. Measurements were measured using a 30 dB pad.	

Conducted Emissions Data:

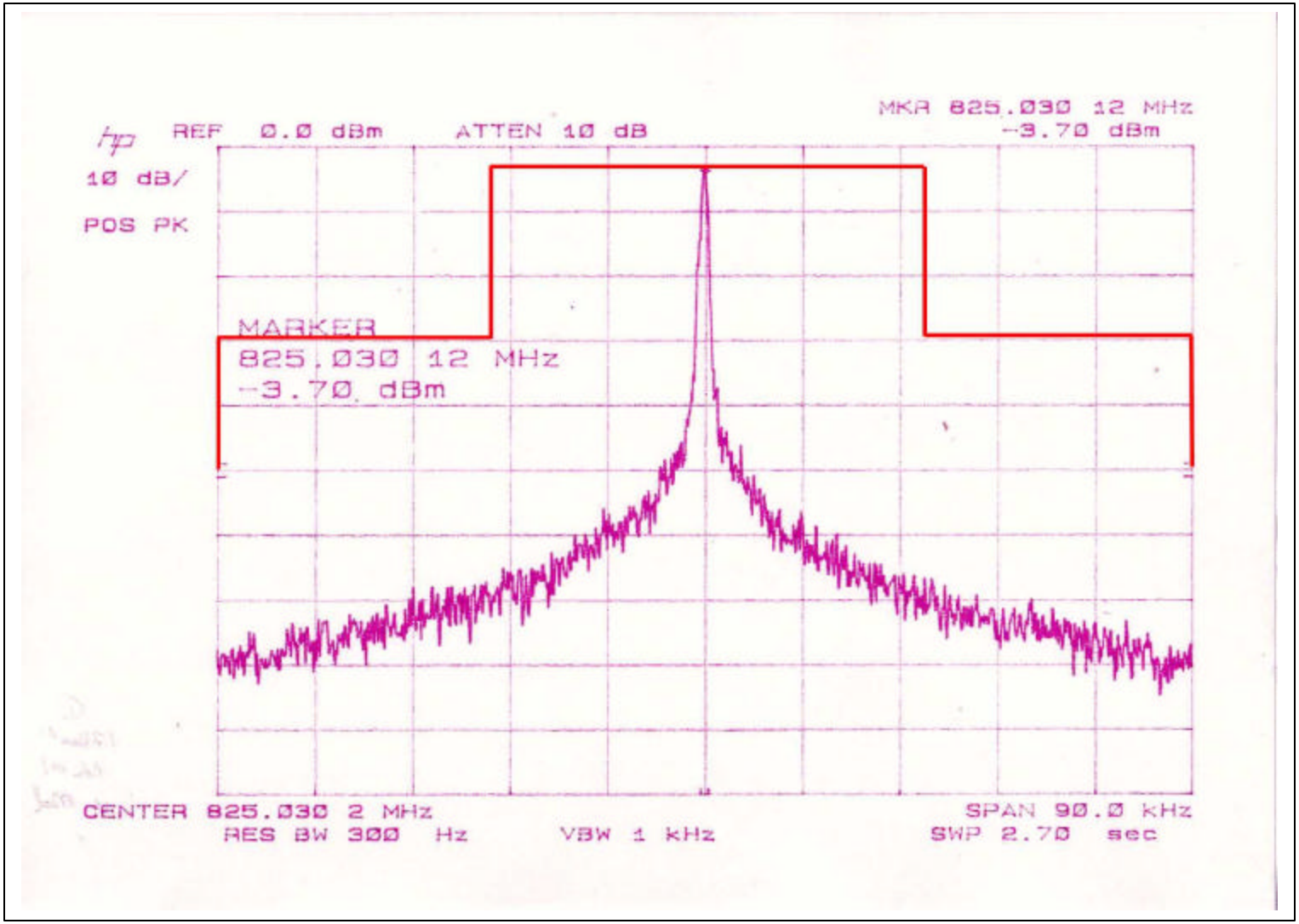
		Level of Emission via conducted measurement at antenna port *	Delta from Fundamental	Margin
Channel 001				
Harmonic	Freq [MHz]	[dBm]	[dBc]	[dB]
1	825.03	-3.00	0.00	0.00
2	1650.06	-55.10	52.10	-10.38
3	2475.09	-54.70	51.70	-9.98
4	3300.12	-79.60	76.60	-34.88
5	4125.15	noise floor	Noise floor	-
6	4950.18	noise floor	Noise floor	-
7	5775.21	noise floor	Noise floor	-
8	6600.24	-73.00	70.00	-
9	7425.27	noise floor	Noise floor	-
10	8250.30	noise floor	Noise floor	-
Channel 367				
1	836.01	-3.00	0	0.00
2	1672.02	-53.30	50.3	-8.58
3	2508.03	noise floor	Noise floor	-
4	3344.04	-73.50	70.5	-28.78
5	4180.05	noise floor	Noise floor	-
6	5016.06	noise floor	Noise floor	-
7	5852.07	noise floor	Noise floor	-
8	6688.08	noise floor	Noise floor	-
9	7524.09	noise floor	Noise floor	-
10	8360.10	noise floor	Noise floor	-
Channel 800				
1	849.00	-3.00	0	0.00
2	1698.00	-49.10	46.1	-4.38
3	2547.00	noise floor	Noise floor	-
4	3396.00	noise floor	Noise floor	-
5	4245.00	noise floor	Noise floor	-
6	5094.00	noise floor	Noise floor	-
7	5943.00	noise floor	Noise floor	-
8	6792.00	noise floor	noise floor	-
9	7641.00	noise floor	noise floor	-
10	8490.00	noise floor	noise floor	-

* An 30 dB attenuator was used with the measurement.

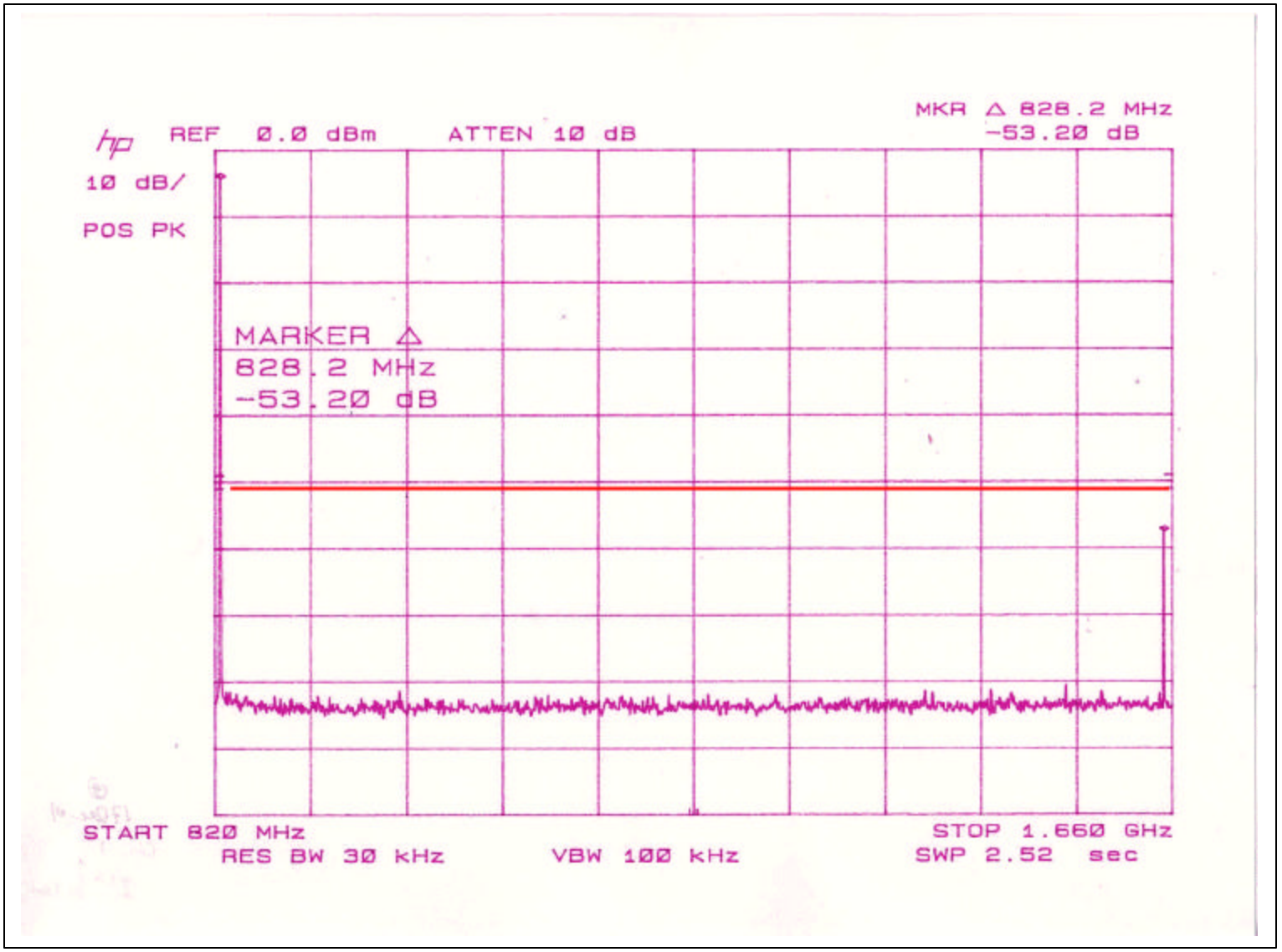
Conducted Emissions Plots: Channel 001 2nd Harmonic Part 1



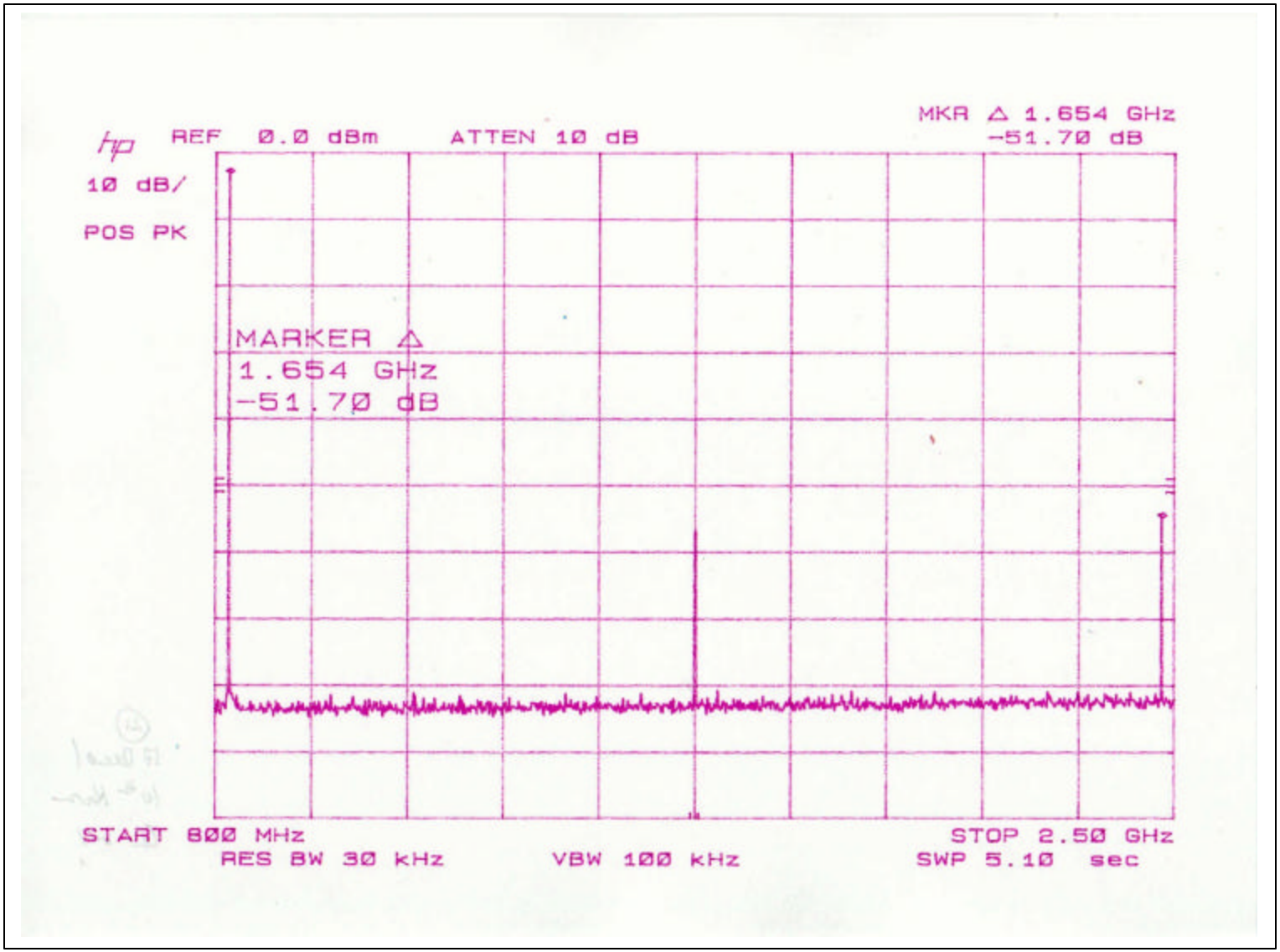
Conducted Emissions Plots: Channel 001 2nd Harmonic Part 2



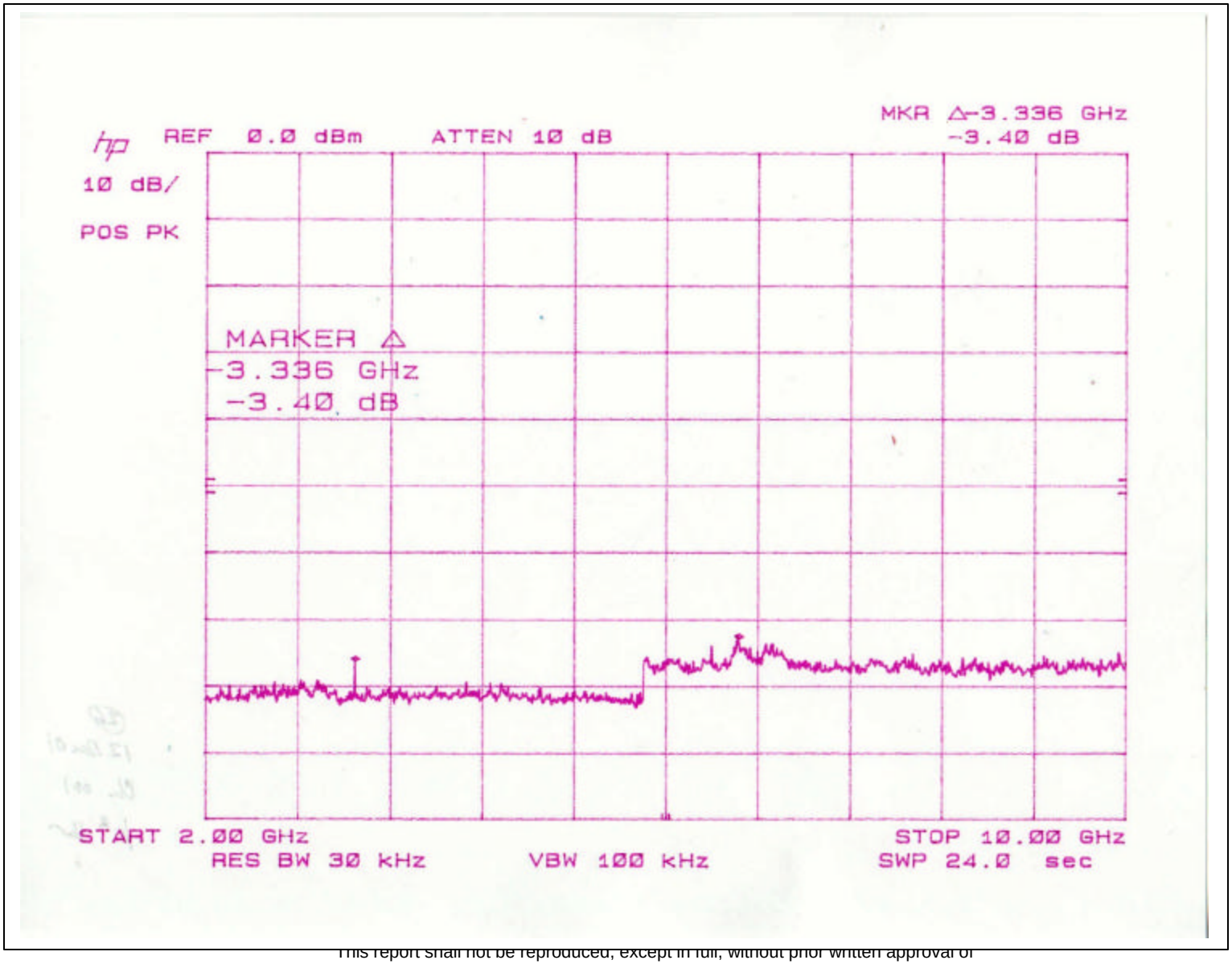
Conducted Emissions Plots: Channel 001 2nd Harmonic Part 3



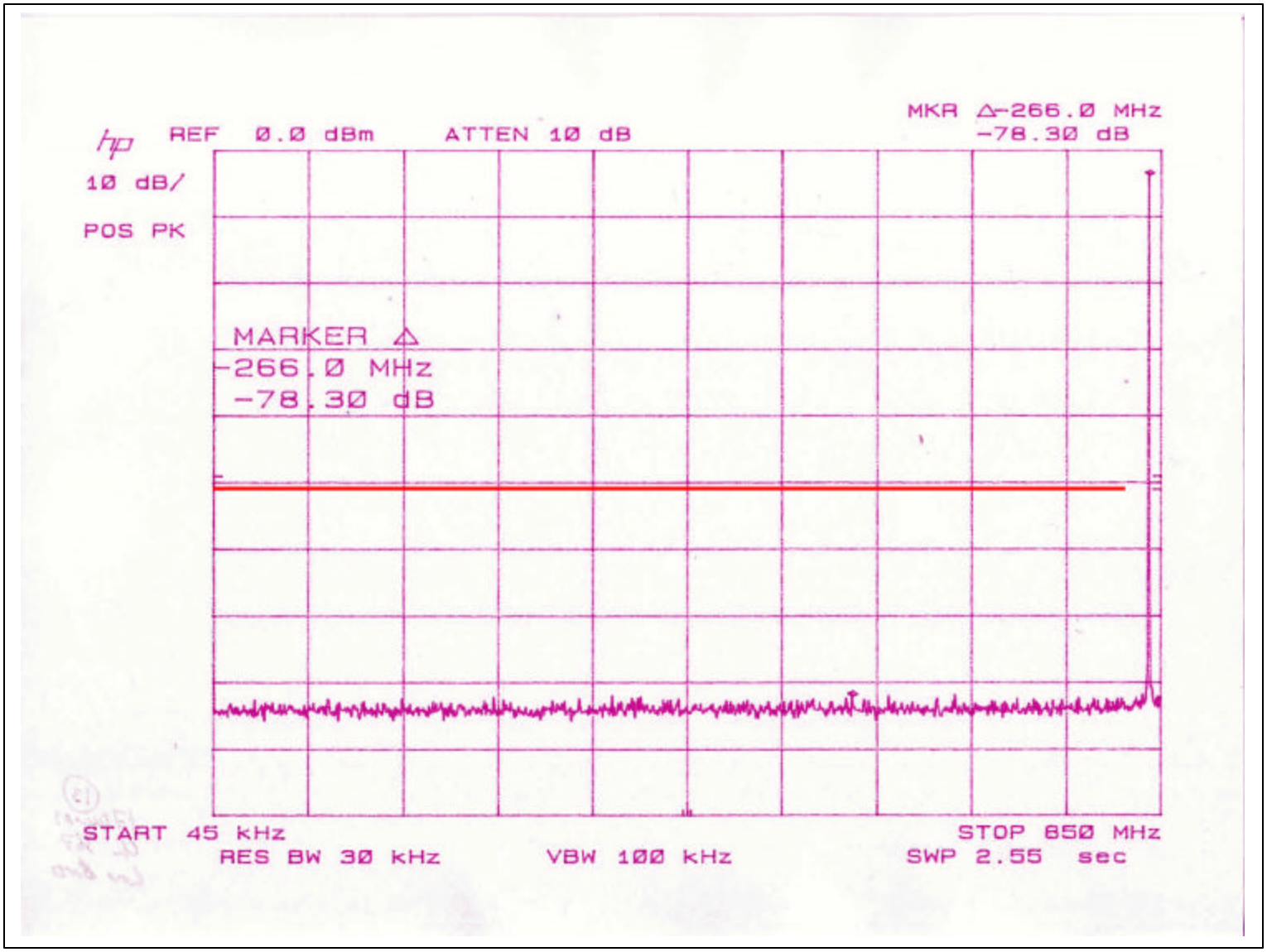
Channel 001: 10th Harmonic Range Fundamental to 2.5 GHz



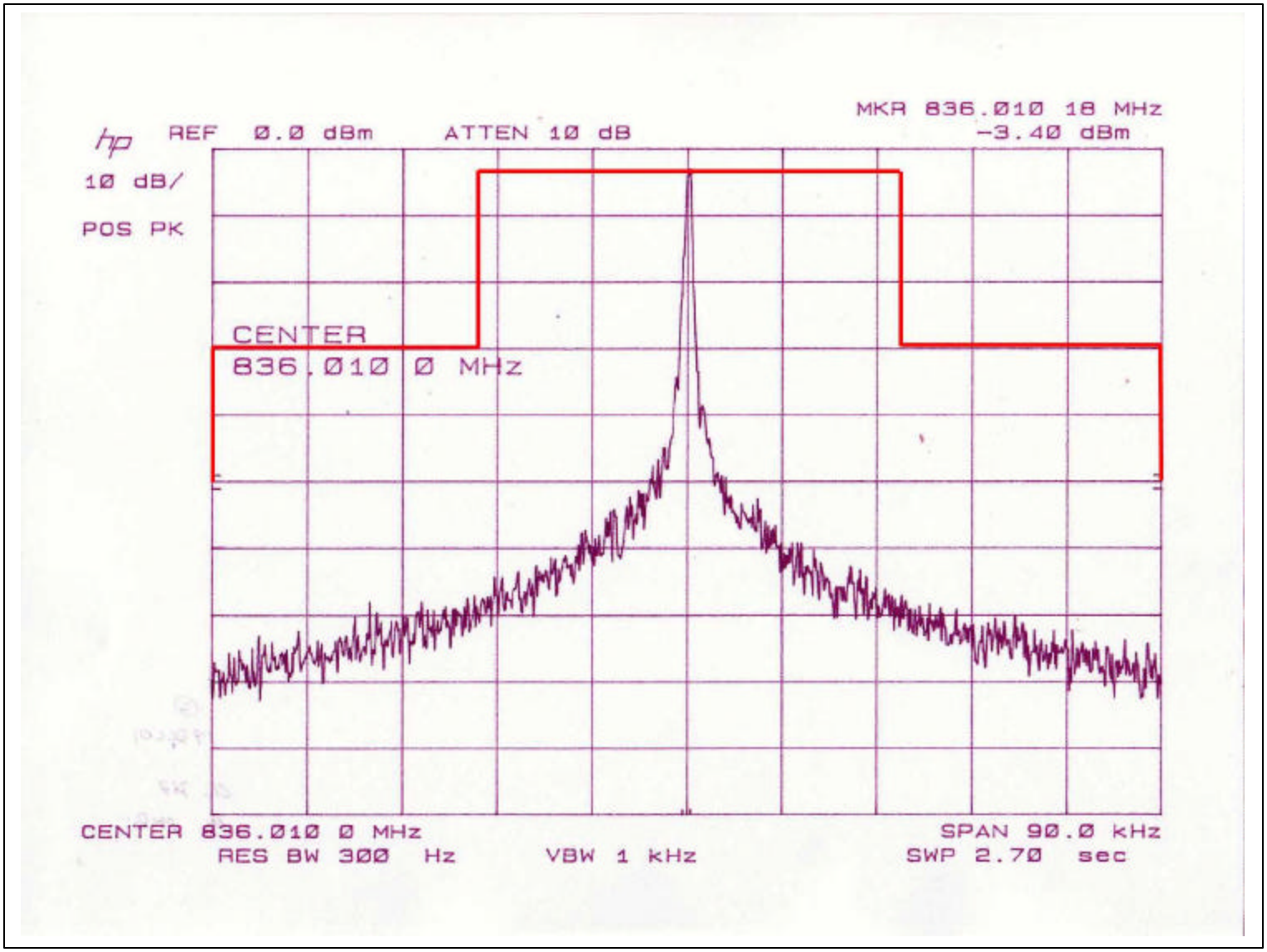
Channel 001: 10th Harmonic Range 2.0 - 10 GHz



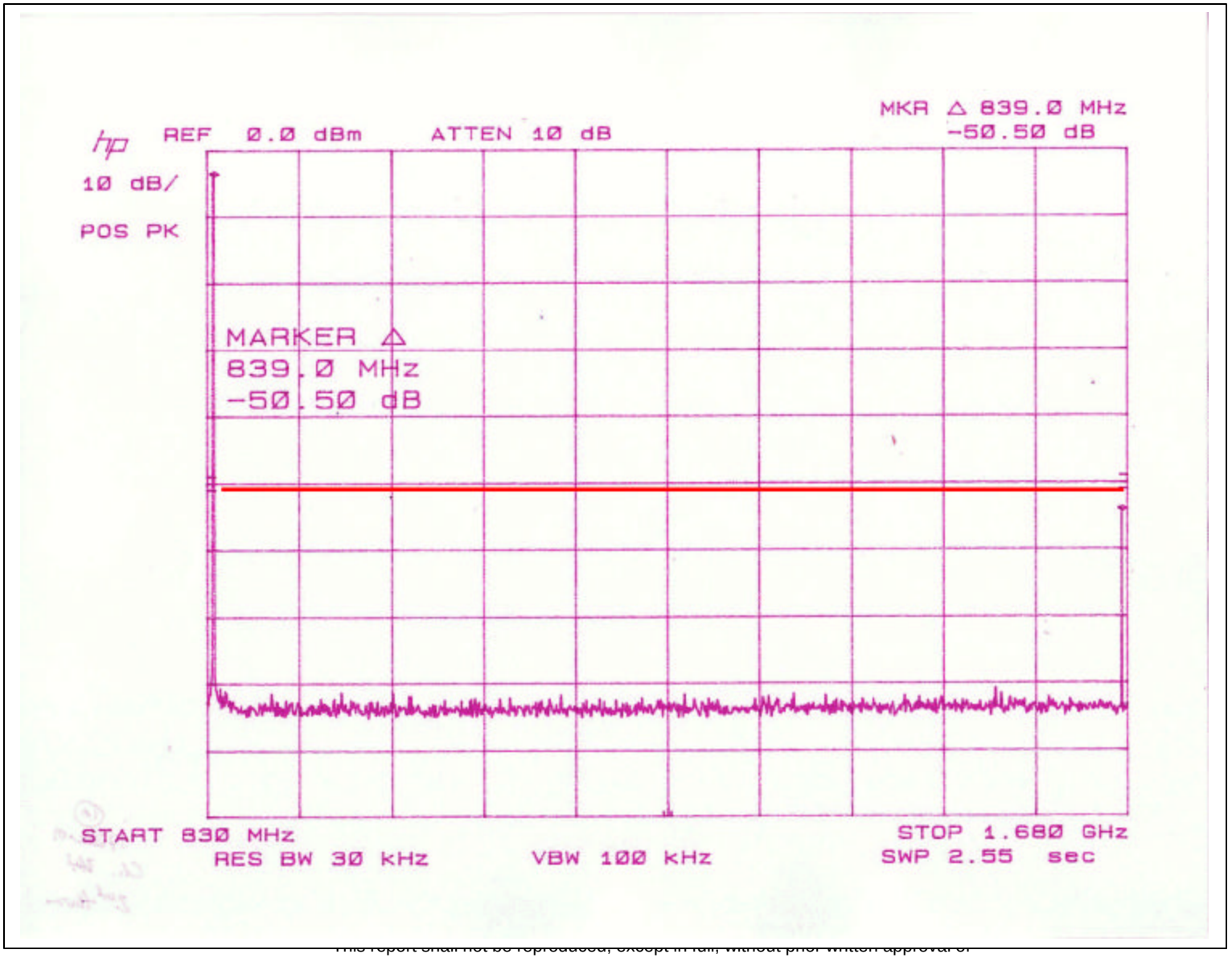
Channel 367: 2nd Harmonics Part 1



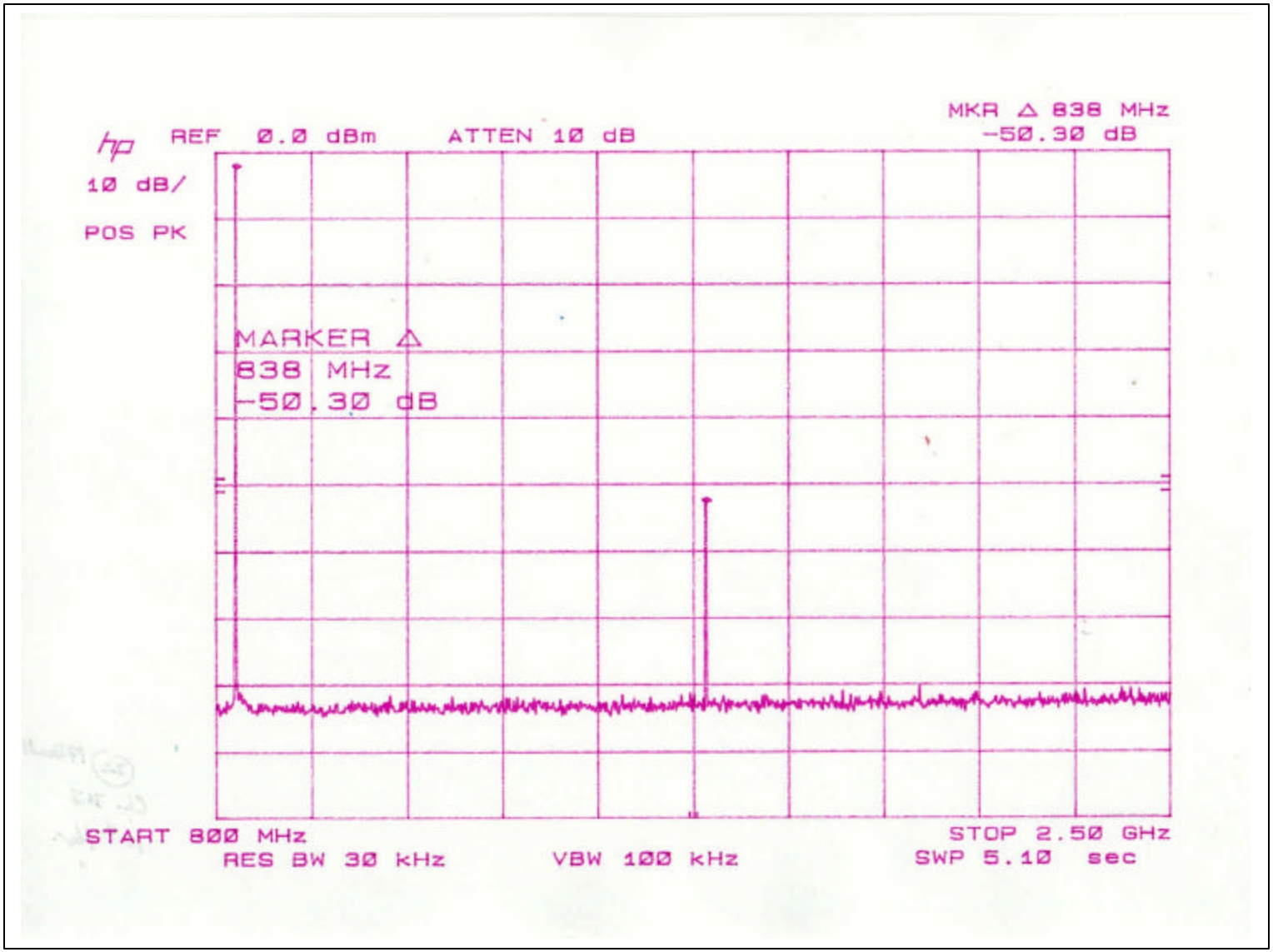
Channel 367: 2nd Harmonics Part 2



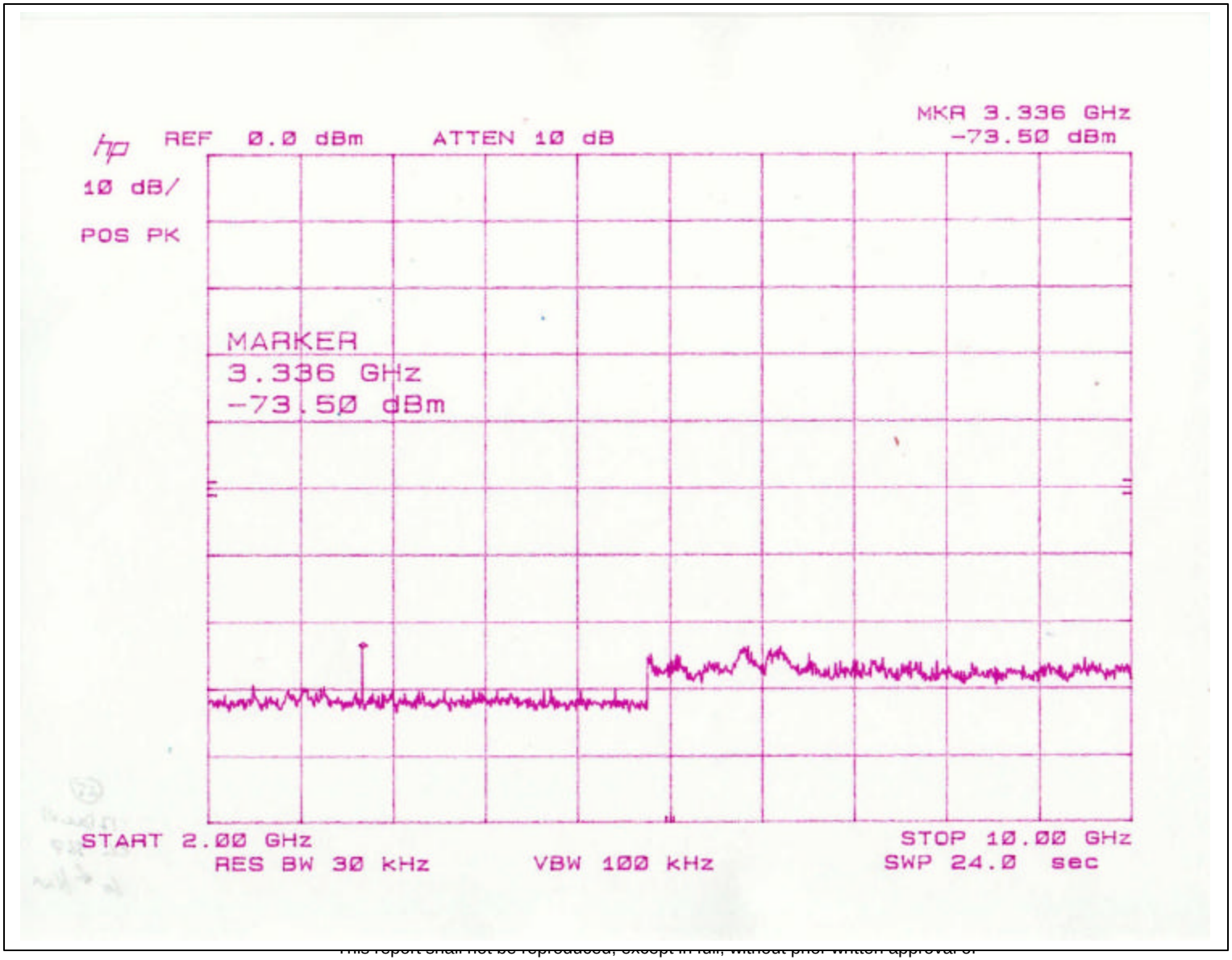
Channel 367: 2nd Harmonics Part 3



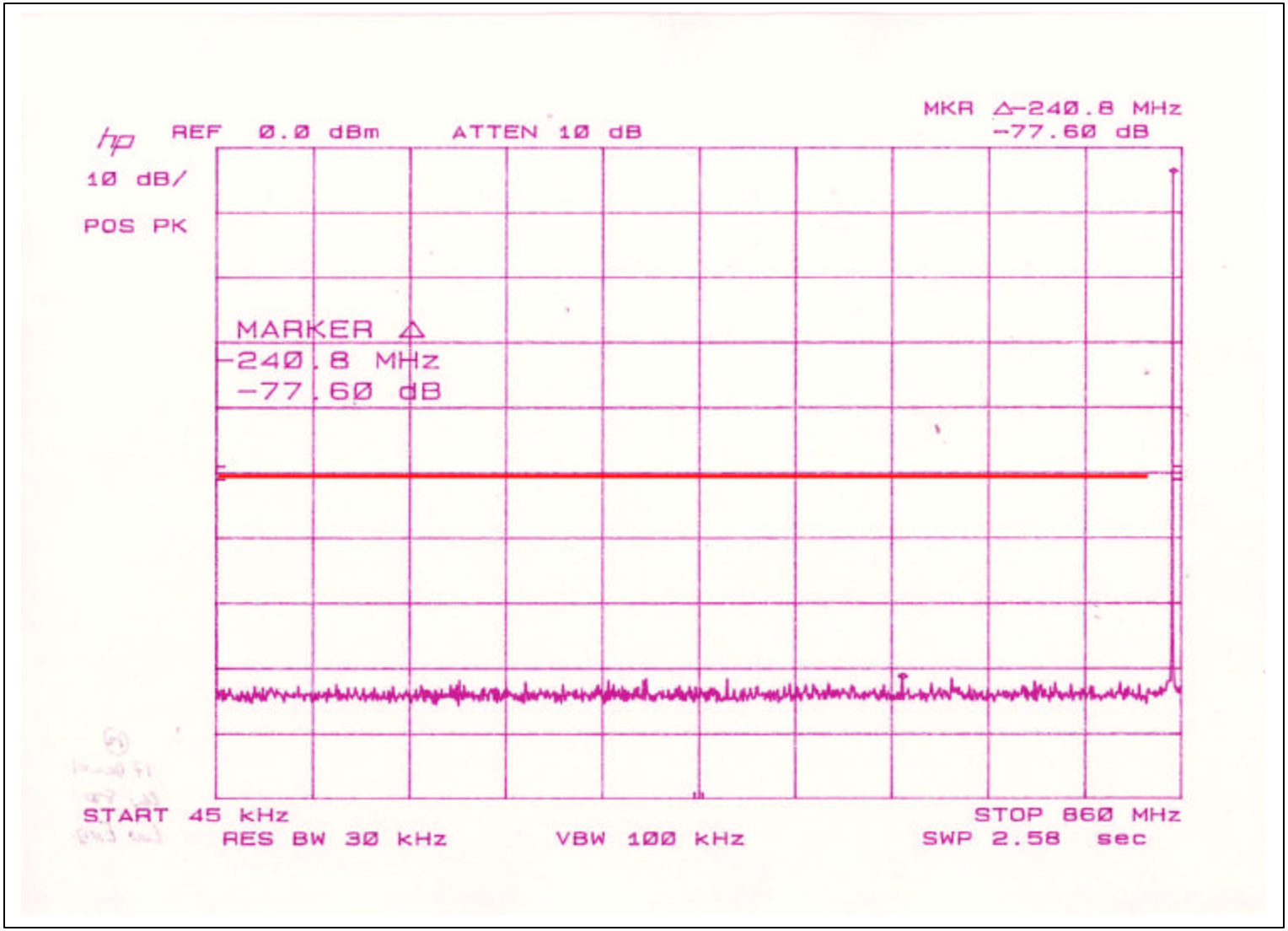
Channel 367: 10th Harmonics Range from Fundamental to 2.5 GHz



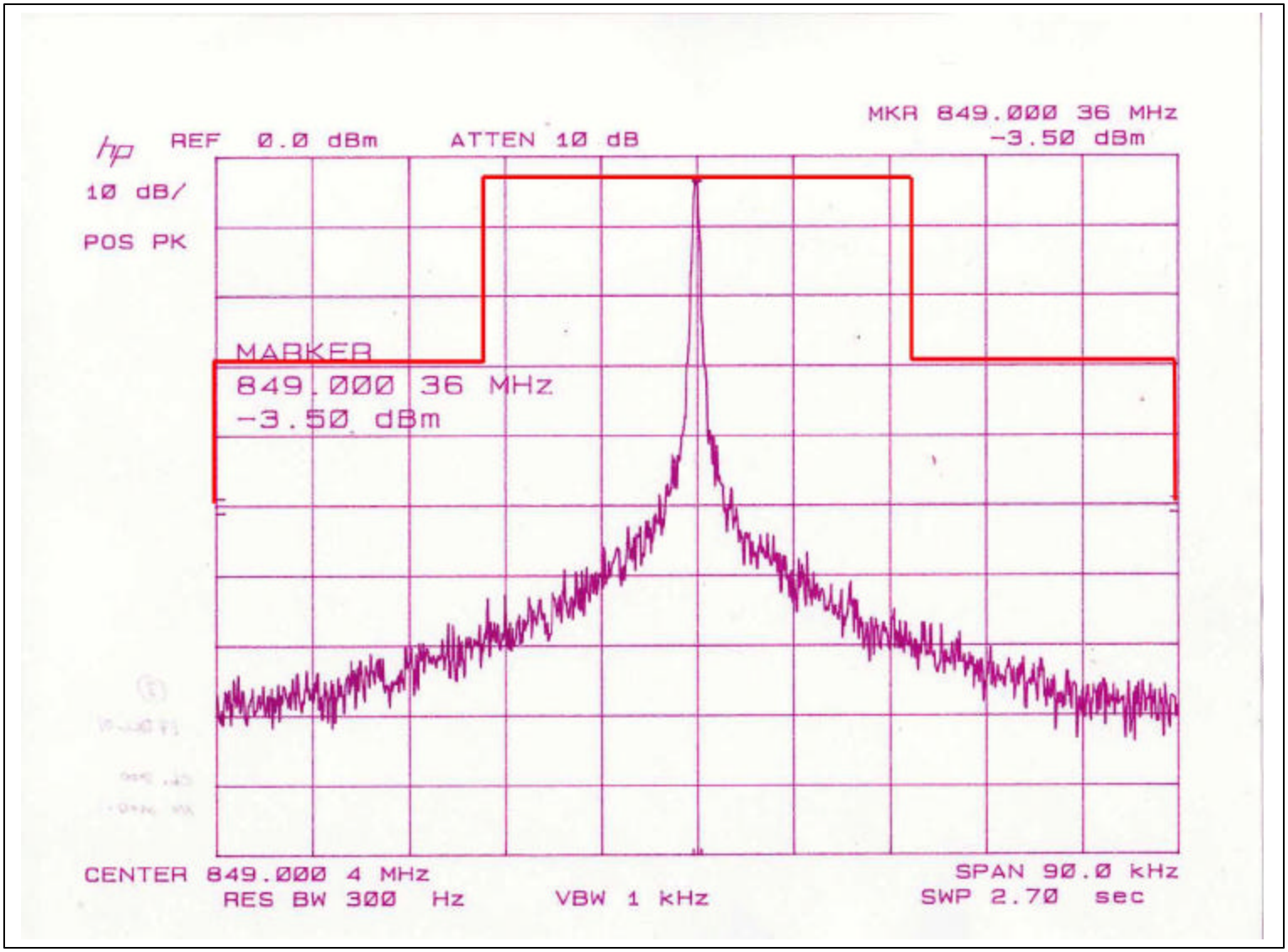
Channel 367: 10th Harmonics Range from 2.0 - 10 GHz



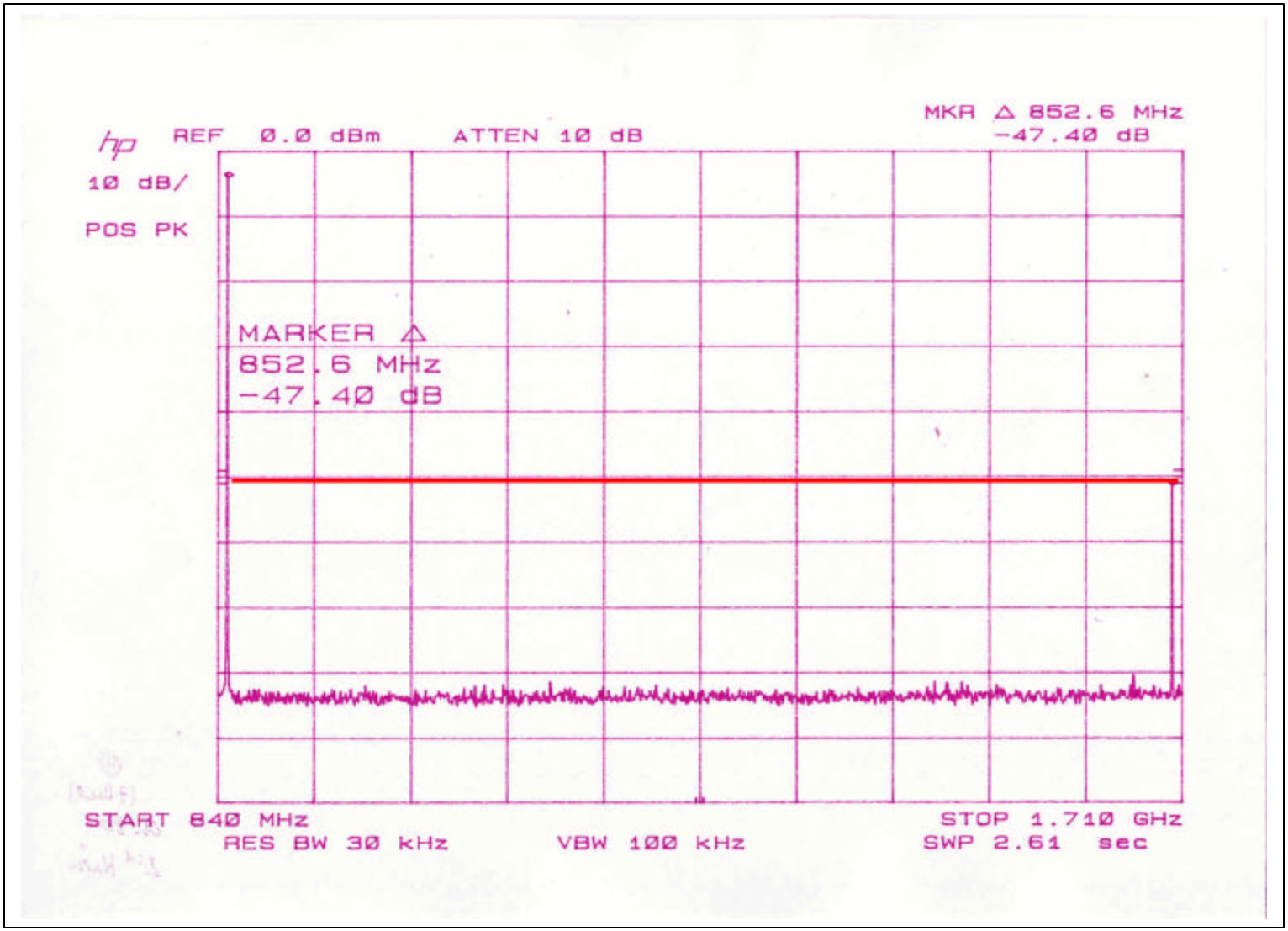
Channel 800: 2nd Harmonic Part 1



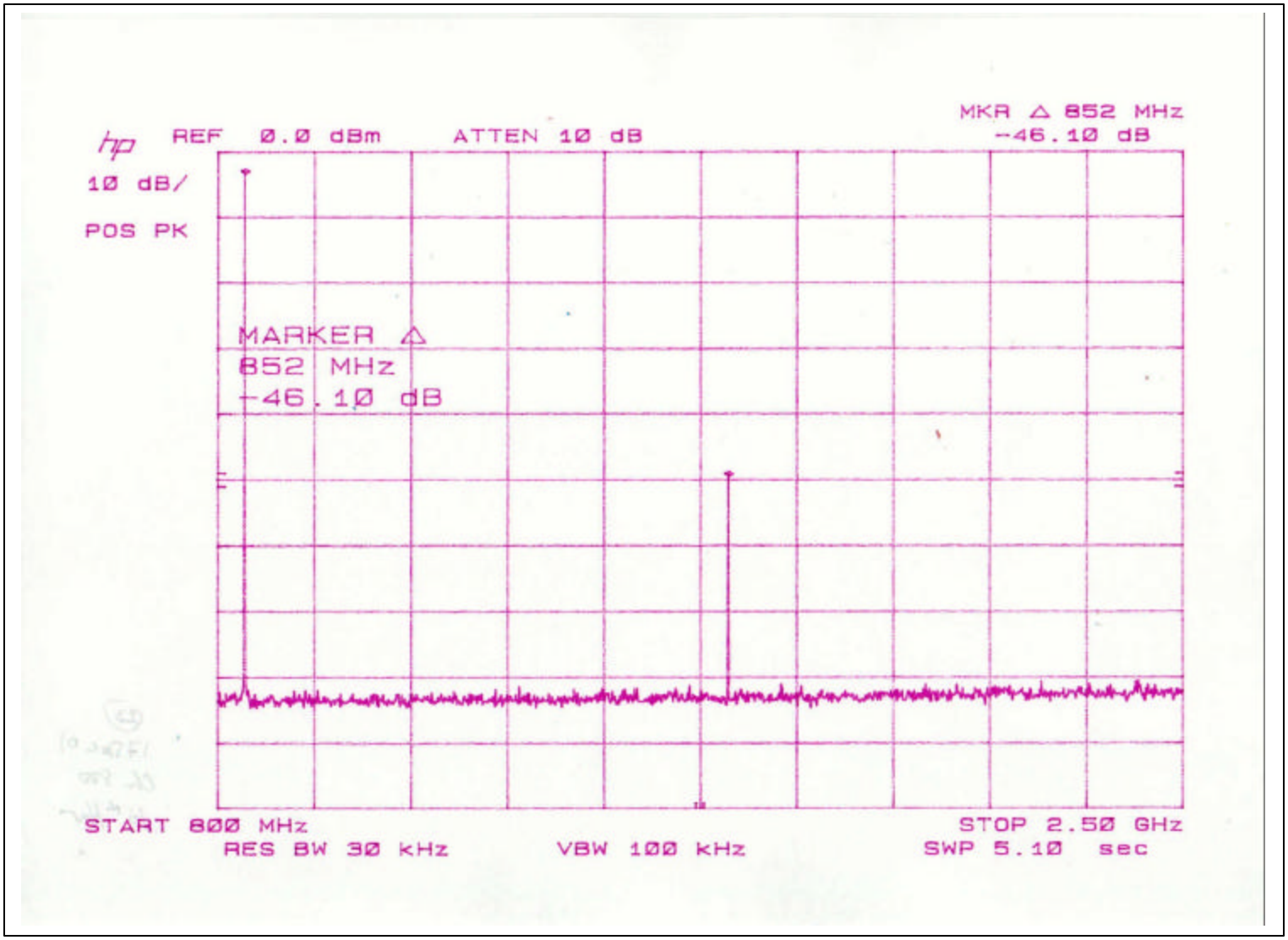
Channel 800: 2nd Harmonic Part 2



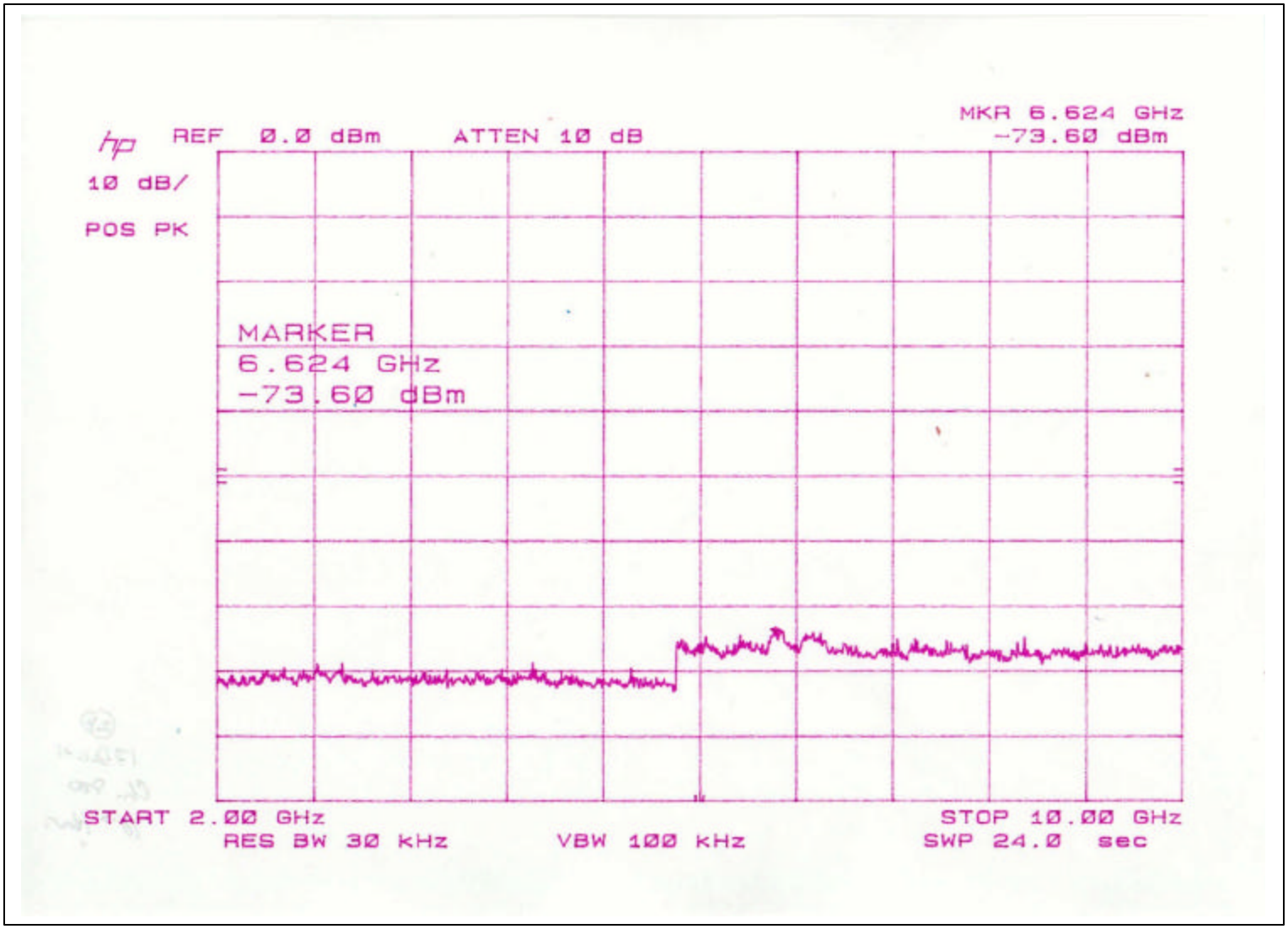
Channel 800: 2nd Harmonic Part 3



Channel 800: 10th Harmonic from range fundamental to 2.5 GHz



Channel 800: 10th Harmonic from range 2.0 - 10 GHz



4.10 Receive Band Emissions

See Appendix B.

4.11 EFFECTIVE RADIATED POWER OF SPURIOUS EMISSIONS

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Steven Tarkowski Test Date: 24 Nov 2001	Product: AL200
Test Result, AL200: **PASS**	
Objectives/Criteria 24 Nov 2001: Temperature = 21.0 °C Humidity = 28 %	Specifications FCC Part 22.917 Spurious Emission Attenuation > 43 + 10 log (P in Watts)
The Spurious Emission was measured up to 10th harmonics Only harmonics up to 4th were recorded. The peak values above the 4th harmonics were lower than the lower harmonic values. The AL200 passed.	

Effective Radiated Power of Spurious Emissions with the fundamental as a reference:

Channel	Frequency	Measured Peak at S/A (from EUT) *** (R eut)	ERP of Generator and Tx Antenna (Pg)	Measured Peak at S/A (from Gen. and Tx antenna) (Rg)	Effective Radiated Power of the EUT	Spurious Emission Attenuation	Spurious Emission Attenuation Limit	Margin
	[MHz]	[dBuV]	[dBm]	[dBuV]	[dBm]	[dBc]	[dB]	[dB]
001	825.03	88.48	5.65 *	79.40	14.73	-	-	-
367	836.01	88.88	6.40 *	79.40	15.88	-	-	-
800	849.00	89.06	6.00 *	79.40	15.66	-	-	-
001	1650.06	79.40	-28.25 **	91.30	-40.15	54.88	41.72	-13.16
367	1672.02	79.30	-28.25 **	90.40	-39.35	55.23	41.72	-13.51
800	1698.00	79.30	-28.25 **	88.90	-37.85	53.51	41.72	-11.79
001	2475.09	47.20	-26.75 **	87.70	-67.25	81.98	41.72	-40.26
367	2508.03	55.30	-26.75 **	87.70	-59.15	75.03	41.72	-33.31
800	2547.00	47.40	-26.75 **	86.10	-65.45	81.11	41.72	-39.39
001	3300.12	63.60	-28.55 **	81.70	-46.65	61.38	41.72	-19.66
367	3344.04	69.20	-29.65 **	81.70	-42.15	58.03	41.72	-16.31
800	3396.00	53.20	-29.65 **	71.30	-47.75	63.41	41.72	-21.69

* Transmit antenna used for substitution was a dipole antenna (Roberts Antenna)
** Transmit antenna used for substitution was a horn antenna (EMCO 3115)
*** The GAP2 antenna from CSI Wireless was connected to the transmitter.
Spurious Emission Attenuation Limit equals 43 + 10 log (P in Watts) = 41.72 dB

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. The EUT was grounded according to the client's specifications.

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

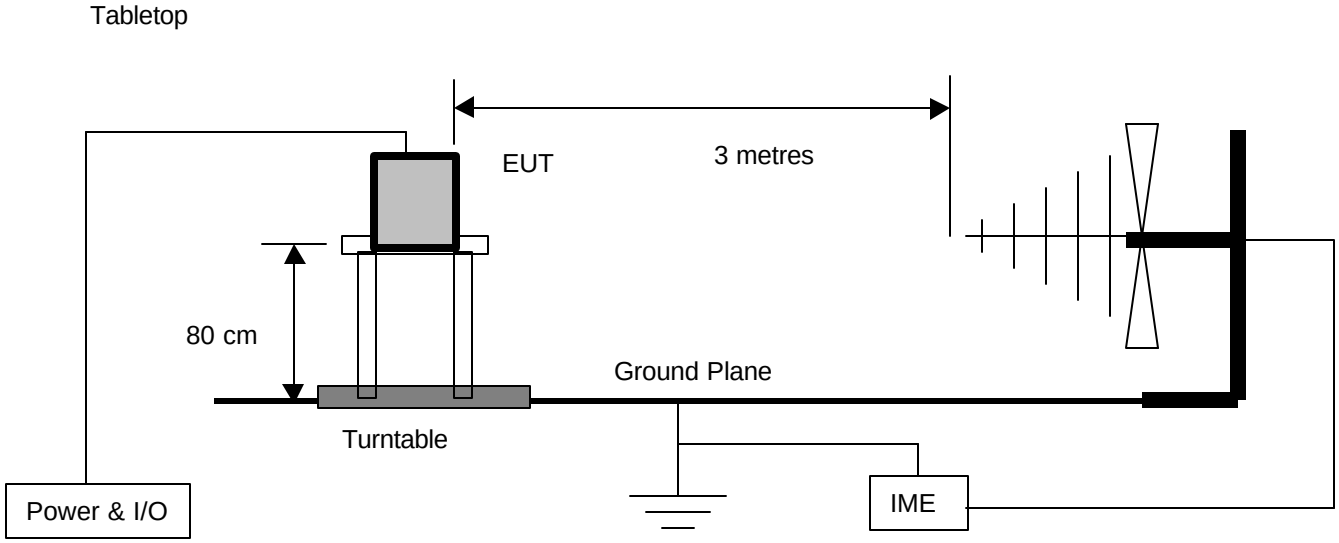
Ambient conducted and radiated electromagnetic emission profiles were generated throughout the tests and are included in the test data.

5.5 TEST CONFIGURATION

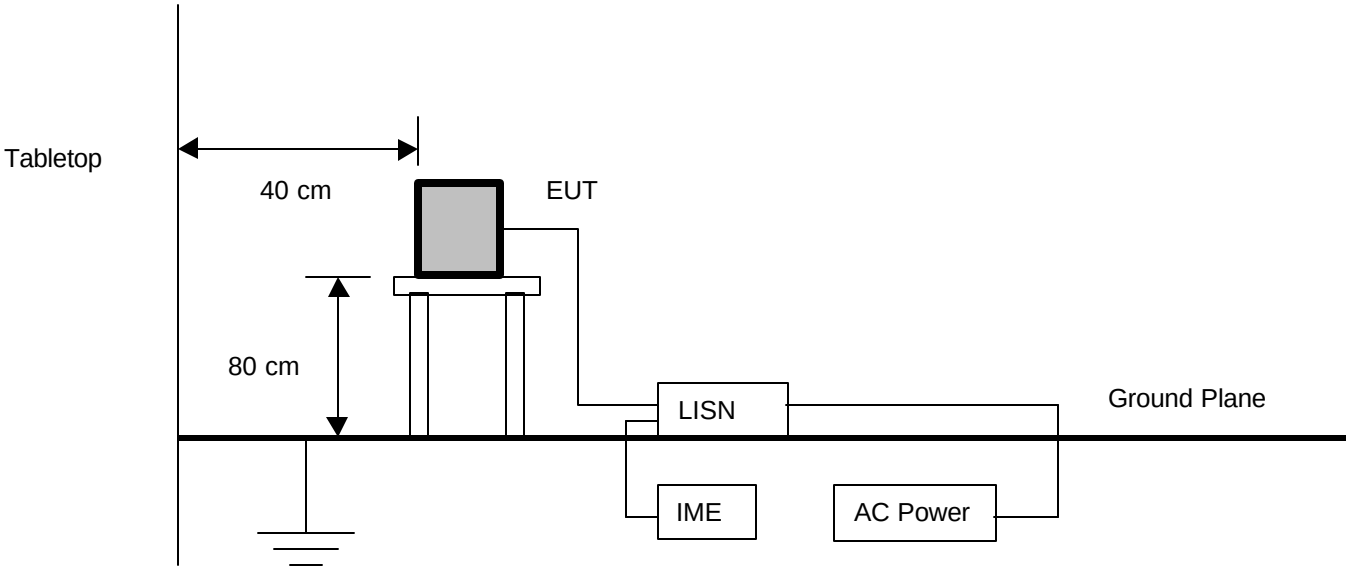
5.5.1 Tabletop Equipment

Radiated Emissions

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



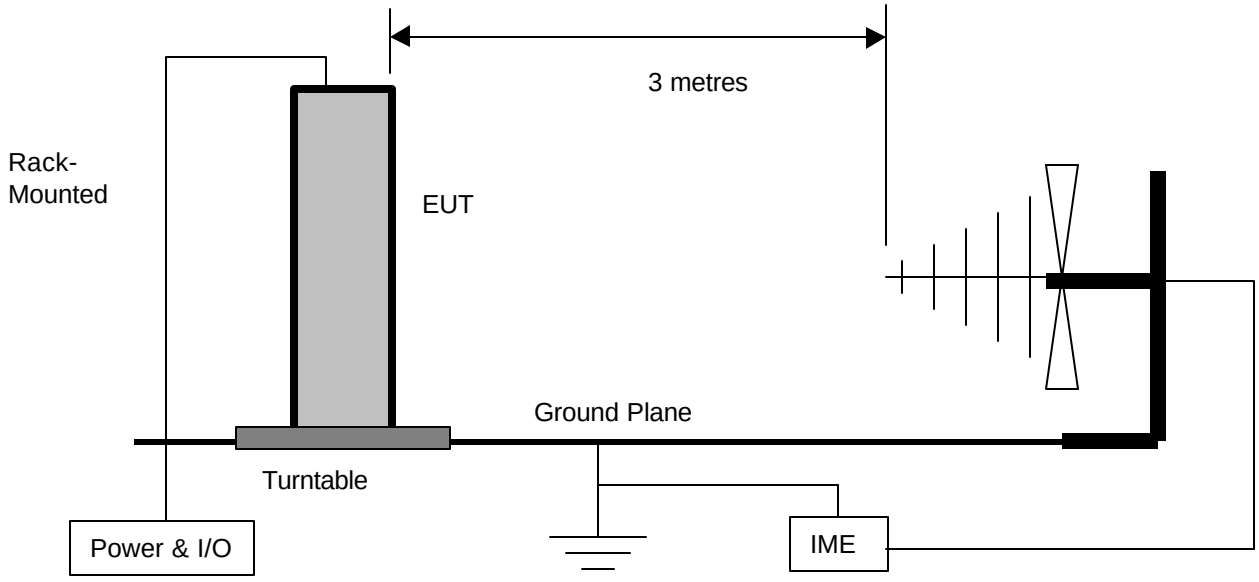
Conducted Emissions



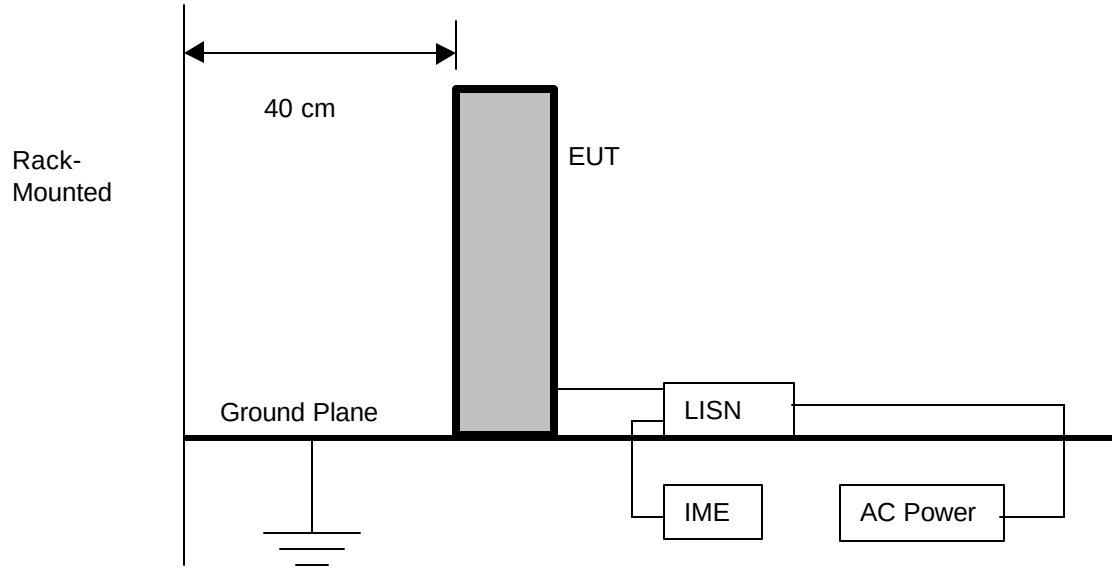
5.5.2 Rack Mount

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 μH
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	11 April 2002
Spectrum Analyzer	Hewlett Packard	8566B	9168	30 January 2002
RF Preselector	Hewlett Packard	85685A	9563	29 May 2002
RF Preselector	Hewlett Packard	85685A	9728	1 August 2002
Quasi-Peak Adapter	Hewlett Packard	85650A	9243	22 June 2002
Biconilog Antenna	ARA	Lpb-2520/A	4318	13 June 2002
Dual Ridged Guide Antenna	EMCO	3115	9588	22 June 2002
Low Noise Amplifier	MITEQ	JS43-01001800-21-5P	4354	14 February 2002
Power Meter	Hewlett Packard	437B	4423	13 April 2002
Power Sensor	Hewlett Packard	8481A	4424	28 November 2001
RF Communication Test Set*	Agilent	8920B	US39225383	2 Oct 2003
Oscilloscope	Tektronix	2236	9058	30 January 2002
Function Generator	Hewlett Packard	3312A	9092	28 October 1998

* Client test equipment.

Appendix A

AL200 - Test Sample Description

(from data provided by CSI Wireless Inc.)

Product Name	Asset Link	Number of units to be tested	1
Part/Model No.	AL200	Serial No.	49
Product Application	Product Category		
Commercial ☐ Military ☐	Telecommunication ☐ Information Technology ☐ Surface Transportation ☐	Aerospace ☐ Test & Measurement ☐ Other ☐	

GENERAL INFORMATION REQUIRED FOR ALL PRODUCTS

What are the dimensions and weight?	6”x4”x1” 0.4 kG	Typical installation instructions or configuration (Please Attach)	
What countries would you like to market you product in	USA & Canada	List of internally generated frequencies (MHz)	914-940, 24.5535, 90, 44-55, 14.85, 16
Power Requirements: (Voltage, AC/DC, Hz, Current)	8.0 V to 18 V dc (16 to 36 V)	Duration of self-test (delay between fault and alarm)	1 minute
Peripheral support equipment (to be supplied by client)	Cellcom CVDM program, Serial Ad., Hands-free headset (Radio Shack 43-1951)	Are we to do the submission?	YES/NO
Description and number of Interconnecting leads & cables	2x DC and 3x digital communications		
Brief functional description	Cellular telephone with integral GPS		
Any additional information?			

WIRELESS PRODUCTS ONLY

Is your unit a transmitter, receiver or transceiver?	Transceiver	Is this the spread spectrum device?	YES/NO
What is the power output?	0.6 Watts	If yes, is it a direct sequencer or frequency hopper	-
How many Antennas?	2	What is the bandwidth to your operating frequency?	
How may channels (frequencies)?	900	Is your antenna removable?	YES/NO
What is the separation of those channels?	30 kHz	What type of connector?	TNC/SMA
What is the operating frequency(s)?	824 – 849 MHz	Is the transmitting signal always on?	YES/NO
How many different antennas are available for sale with the unit?	Cellular, GPS or dual antenna	What is the gain of each antenna?	Cellular is < 3 dBi, GPS is 14 dB receive

Prepared By:	Russ Braathen	Title: RF Engineer	Date: 14 Nov 2001

Appendix B:
Receive Band Emissions for AL200

Prepared by CSI Wireless