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**Report for Emissions Testing of Sentry 3000
In accordance with FCC Part 15, Subpart C (2000)**

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Prepared for: General Dynamics Canada.

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APPENDIX A: Test Sample Description: 4WARN Sentry 3000 System

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, RSS-210 and ICES-003.

1.2 APPLICANT

This test report has been prepared for General Dynamics Canada, located in Calgary, Alberta, Canada.

1.3 APPLICABILITY

All test procedures, limits, and results defined in this document apply to the General Dynamics Canada 4WARN Sentry 3000 system, 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 a 4WARN Sentry 3000 system:

Product Type:	Aerosol monitoring equipment
Model Number:	4WARN sentry 3000 system
Serial Number:	n/a
Cables:	Ethernet, power
Power Requirements:	90 - 240VAC, 10A, 50 - 60 Hz
Peripheral Equipment:	Personal Computer and external wireless modem, CCS Terminal

More detailed information is provided by General Dynamics Canada test plan number GDC-4WARN3000-TP-009 Version 1.1 and 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 (2003), and ANSI C63.4 (2002).

1.6.1 VARIATIONS IN TEST METHODS

None

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 unit under test 4WARN sentry 3000 system 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. It was not possible to separate the receive and transmit functions, so the measurements for § 4.3a were performed with the transmitter active.

The unit under test 4WARN Sentry 3000 system was placed on an 80cm high wooden table in a 3m RF anechoic chamber.

2.0 ABBREVIATIONS

AP	-Average Peak
Av	-Average
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	4WARN Sentry 3000 system	nil	See § 1.6.3	PASS
§4.2	Conducted Emissions at Antenna Port	FCC Part 15.247 and RSS-210	4WARN Sentry 3000 system	nil	See § 1.6.3	PASS
§4.3a	Radiated Emissions (Rx Mode)	FCC Part 15.109 and ICES-003	4WARN Sentry 3000 system	nil	See § 1.6.3	PASS
§4.3b	Radiated Emissions (Tx Mode)	FCC Parts 15.205, 15.209 and RSS-210	4WARN Sentry 3000 system	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: Trung Nuguen Test Date: 13 August 2004	Product: 4WARN Sentry 3000 system															
Test Result, 4WARN Sentry 3000 system: 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 = 23 °C Humidity = 42 %	Specification: <table border="0"> <tr> <td>Frequency</td> <td></td> <td></td> </tr> <tr> <td>(MHz)</td> <td>QP</td> <td>Avg</td> </tr> <tr> <td>0.150 - 0.50</td> <td>66 – 56</td> <td>56 - 46</td> </tr> <tr> <td>0.50 – 5.0</td> <td>56</td> <td>46</td> </tr> <tr> <td>5 – 30</td> <td>60</td> <td>50</td> </tr> </table> Units of measurement are dB μ V.	Frequency			(MHz)	QP	Avg	0.150 - 0.50	66 – 56	56 - 46	0.50 – 5.0	56	46	5 – 30	60	50
Frequency																
(MHz)	QP	Avg														
0.150 - 0.50	66 – 56	56 - 46														
0.50 – 5.0	56	46														
5 – 30	60	50														
There were no emissions measured within -6 dB of the specified limit. Refer to the test 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	Meter	Gain/Loss	Transducer	Level	Limit:1	2	3	4
Frequency	Reading	Factor	Factor	[dB(uVolts)]				
[MHz]	[dB(uV)]	[dB]	[dB]					
=====								
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

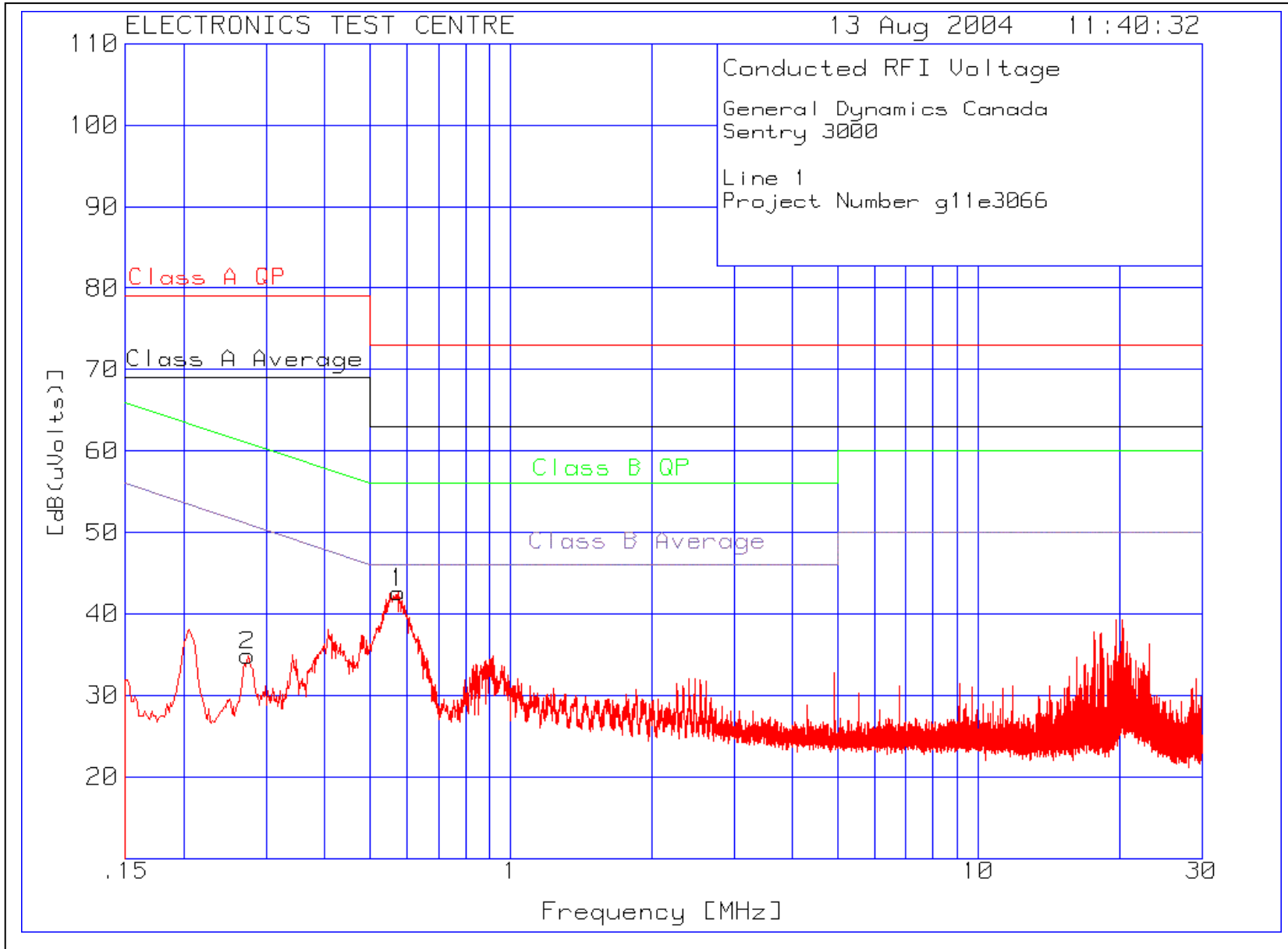
L1		This reading was taken on Line 1
Test Frequency [MHz]	.3052	Test Frequency f = 0.3052 MHz (305.2 kHz)
Meter Reading [dB (uV)]	35.6 pk	The reading with Peak detector
Gain/Loss Factor [dB]	10	Net correction for preamp gain & cable loss
Transducer Factor [dB]	1.1	Correction for LISN loss
Level [dB (uVolts)]	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

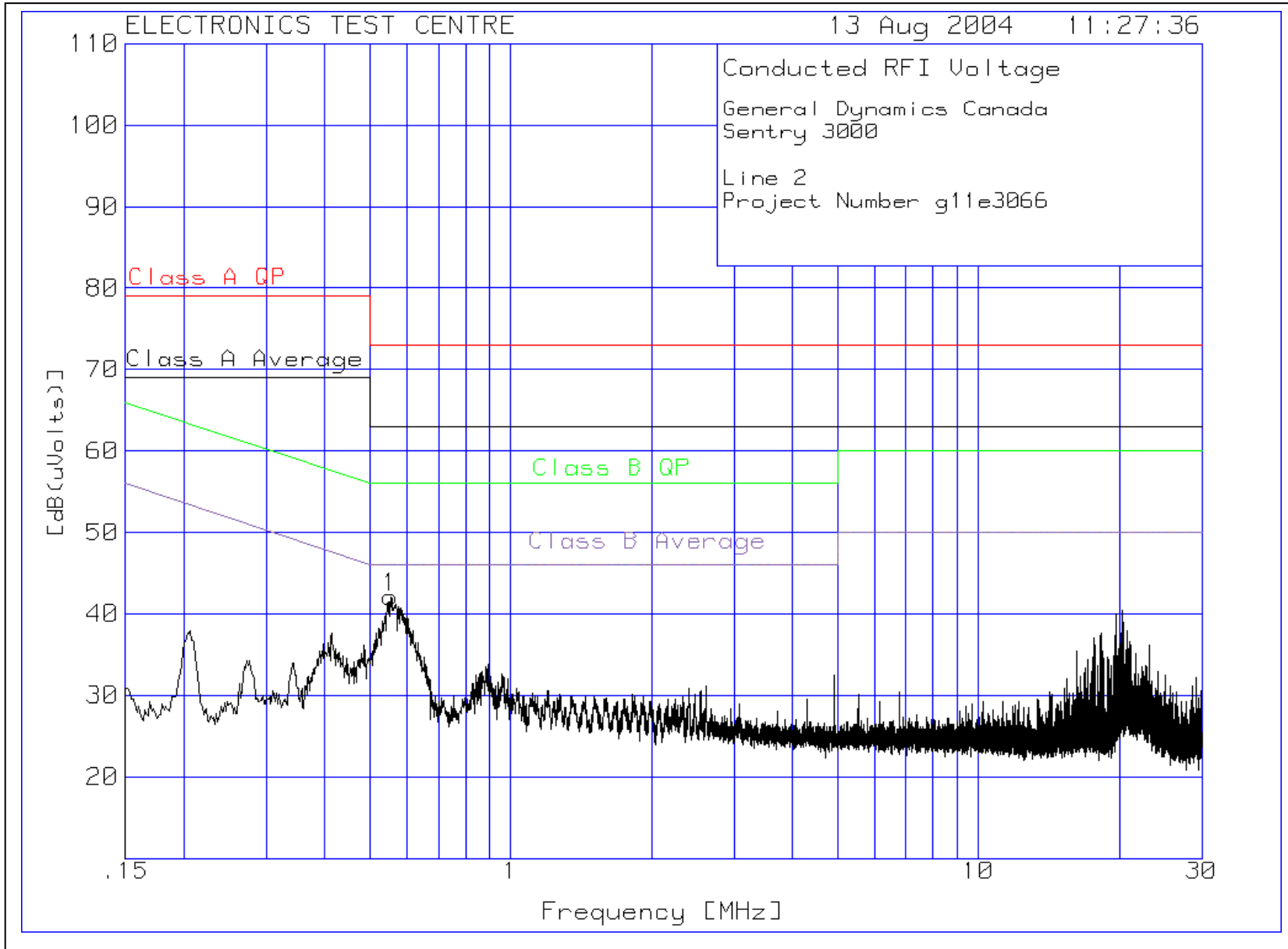
Note: When a preamp is used, the resulting gain is compensated.

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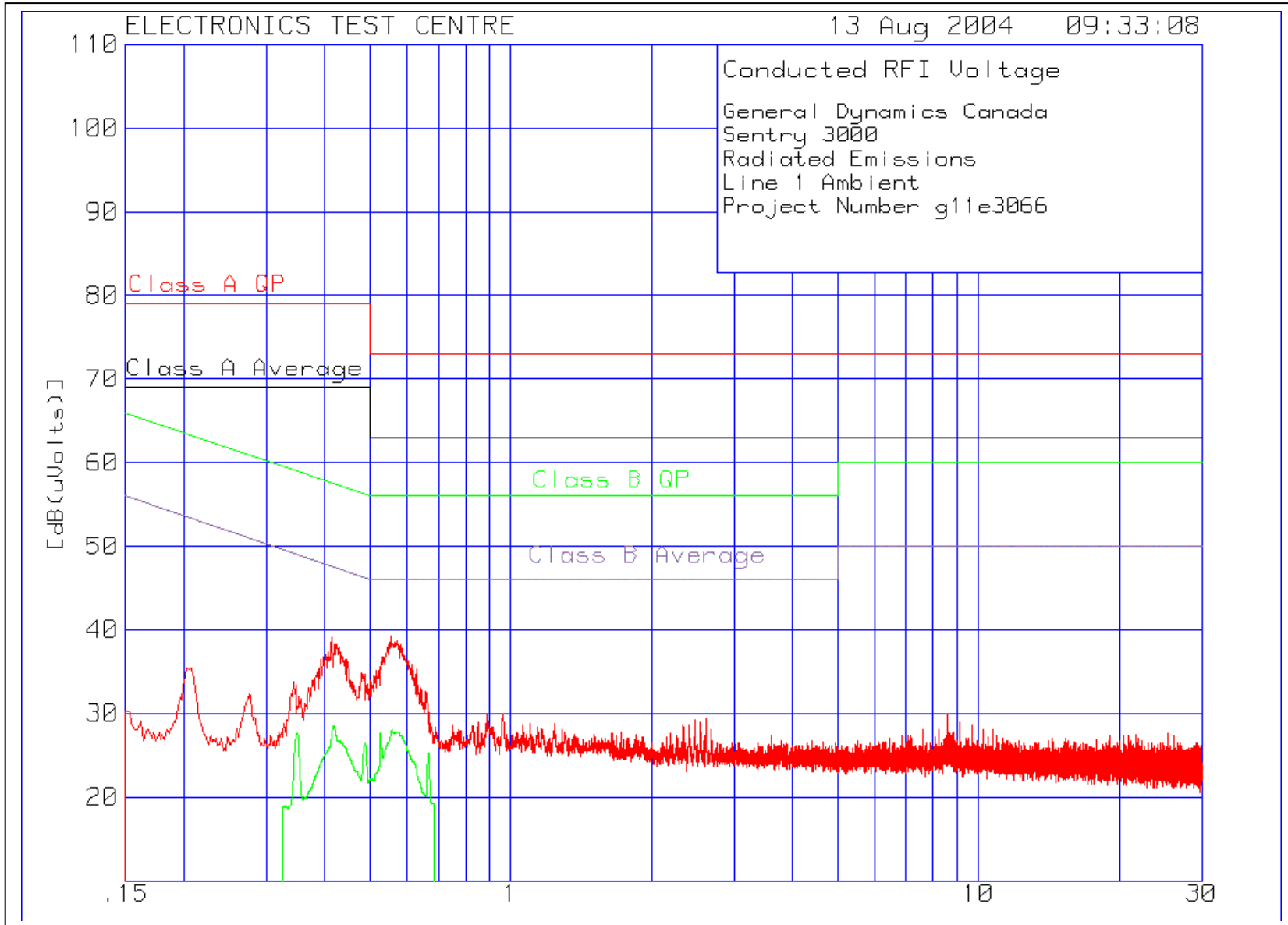
Plot of Conducted Emissions on AC Power Lines: (green trace = QuasiPeak)



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



Plot of Conducted Emissions on AC Power Lines Test Chamber Line1(Neutral) Ambient:

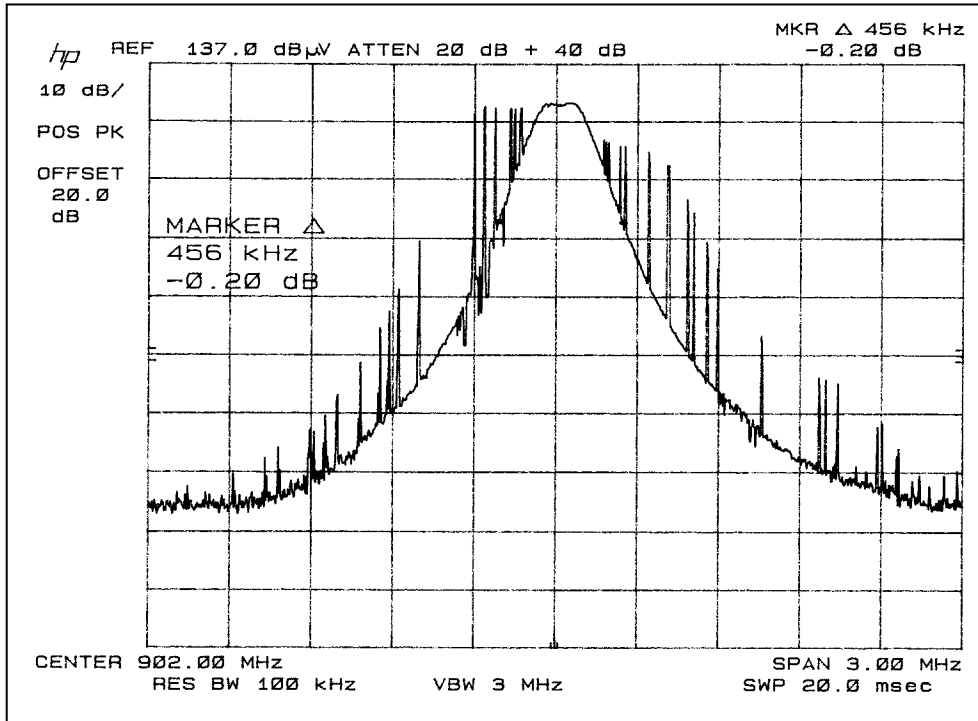


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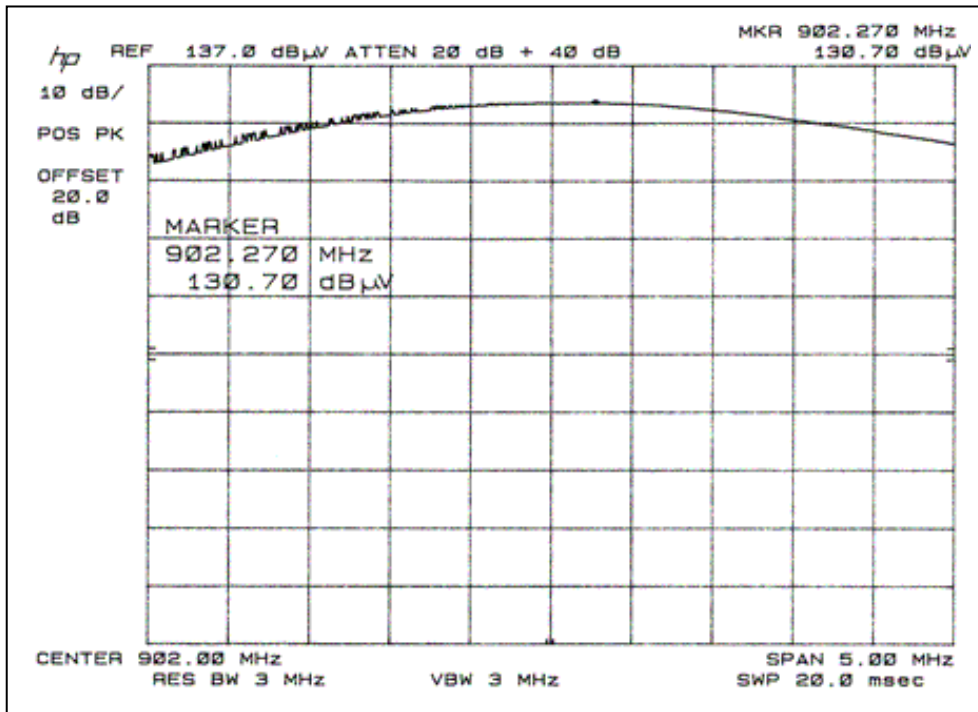
4.2 CONDUCTED EMISSIONS MEASURED AT ANTENNA PORT

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: David Raynes Test Date:			Product: 4WARN Sentry 3000 system		
Test Result, 4WARN Sentry 3000 system: PASS					
15.247(a): BW ≤ 500 kHz			15.247(b): 1 Watt (30 dBm) AC line = 120 Vrms, 60 Hz		
Carrier Frequency [MHz]	Bandwidth [kHz]	Delta from limit [kHz]	Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from limit]
902	456	-44	902	23.7	-6.3
915	441	-59	915	23.9	-6.1
928	456	-44	928	23.5	-6.5
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]
902	23.7	0	902	23.7	0
915	23.9	0	915	23.9	0
928	23.5	0	928	23.5	0
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]
902	101.2	110.7	902	n/a	n/a
915	101.4	110.9	915	n/a	n/a
928	101.1	110.5	928	n/a	n/a
Measurements were performed while the 4WARN sentry 3000 system was transmitting continuously. Refer to the test data and plots for more detail.					

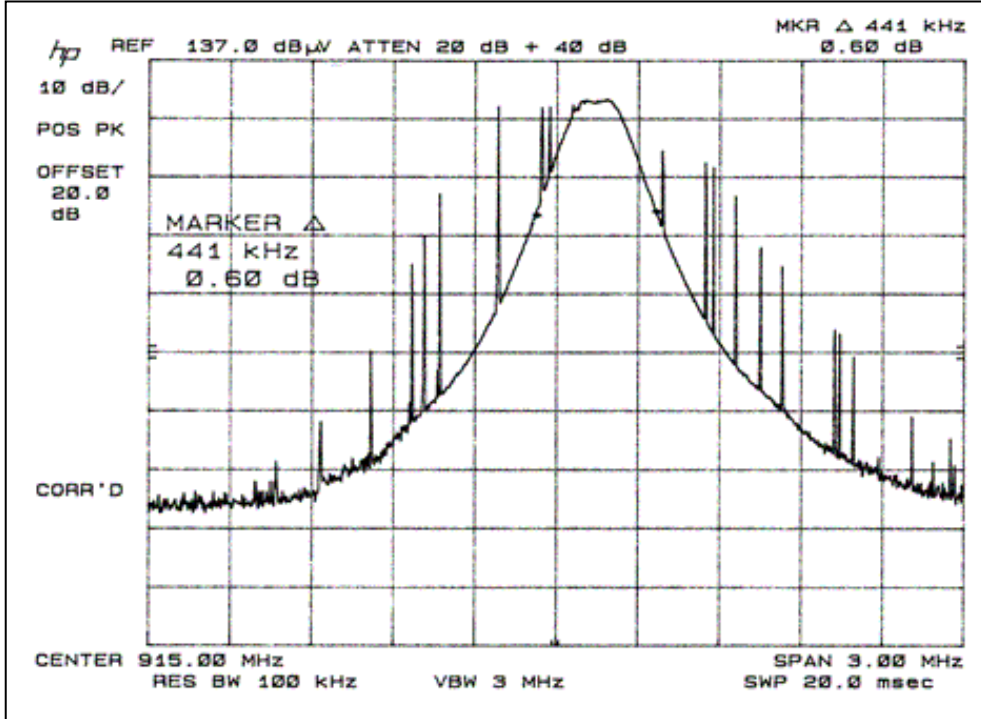
Spectrum Analyzer Plot of 20 dB Bandwidth: Tx @ 902 MHz



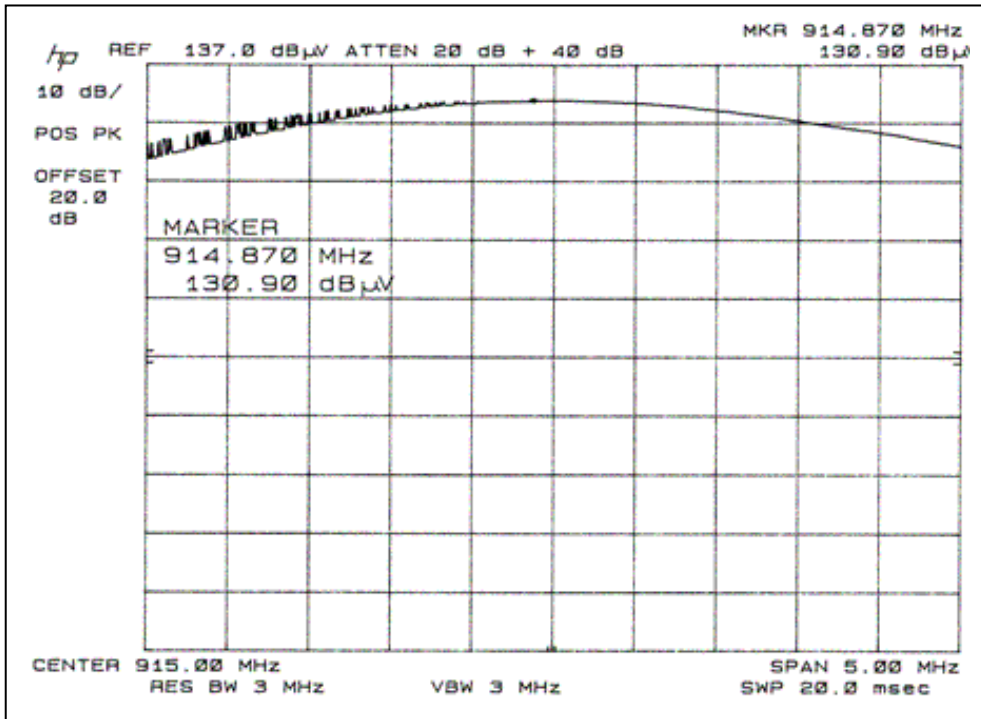
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 902 MHz



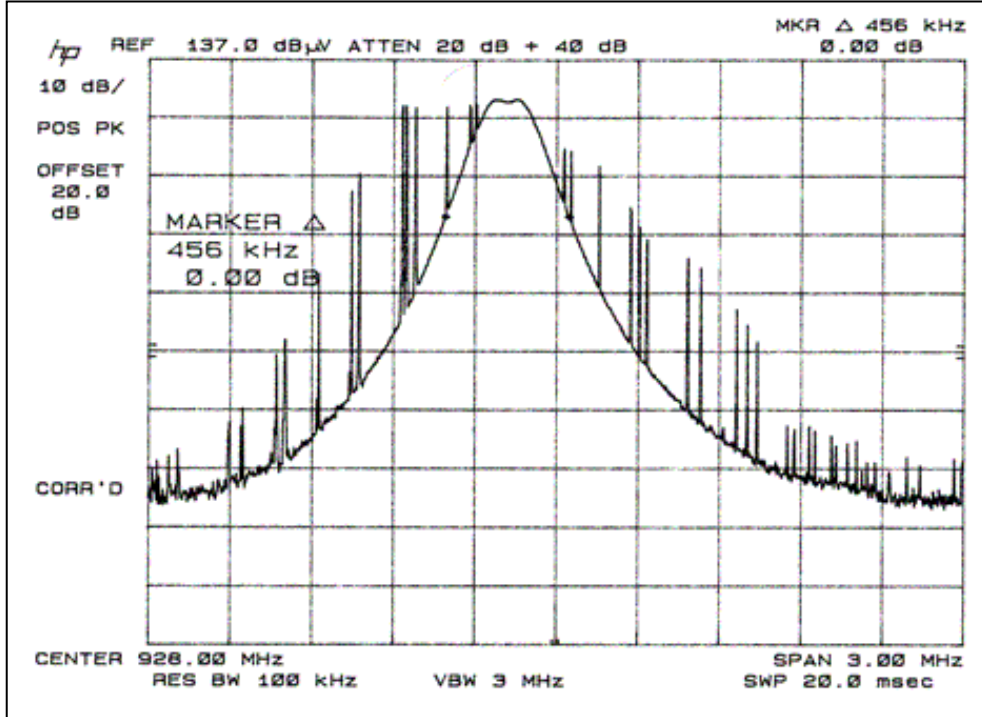
Spectrum Analyzer Plot of 20 dB Bandwidth: Tx @ 915 MHz



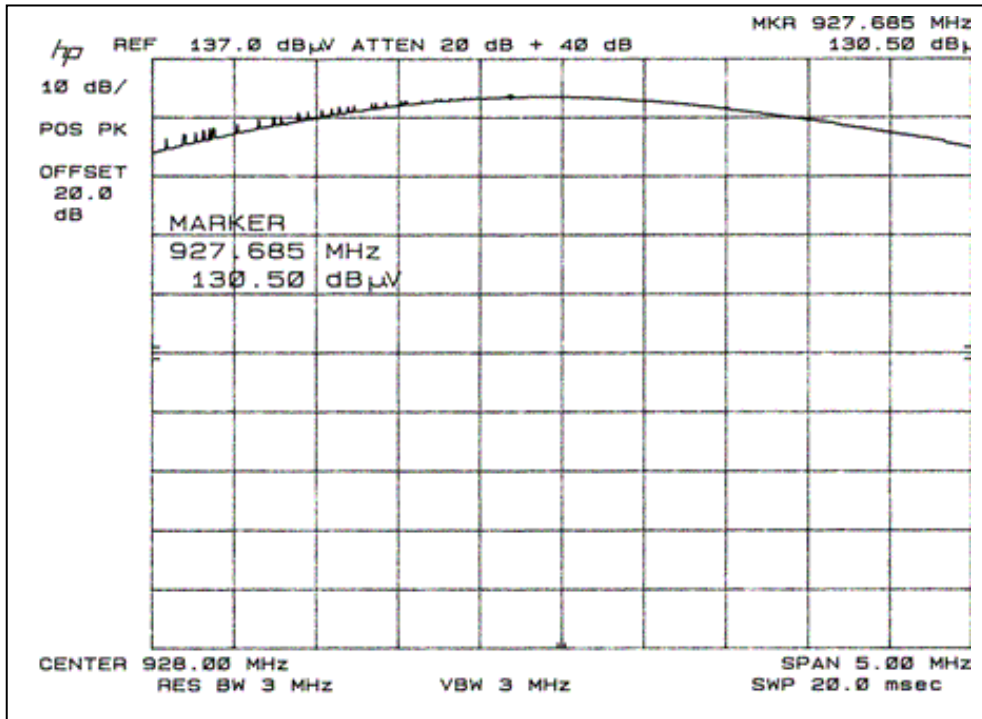
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 915 MHz



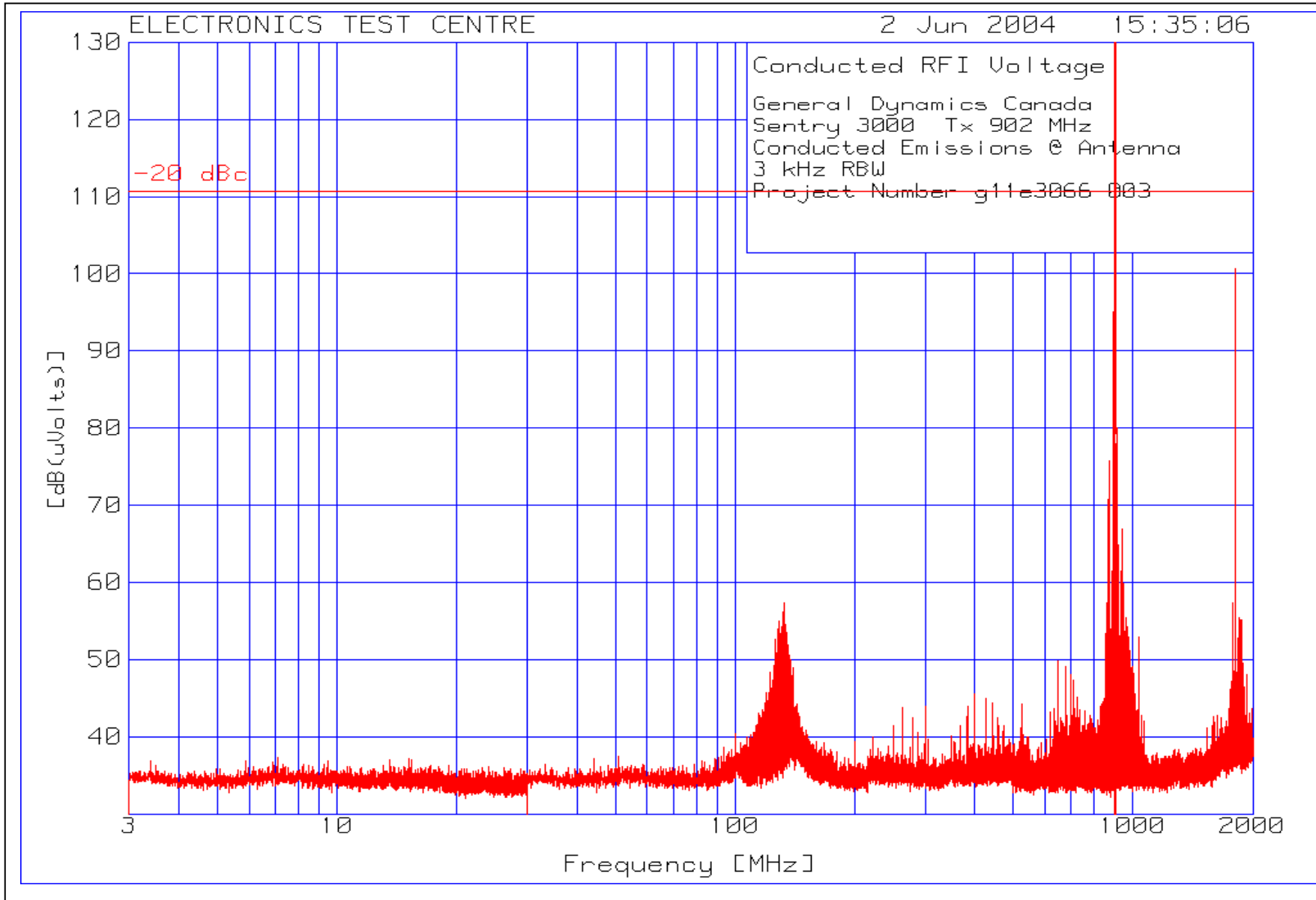
Spectrum Analyzer Plot of 20 dB Bandwidth: Tx @ 928 MHz



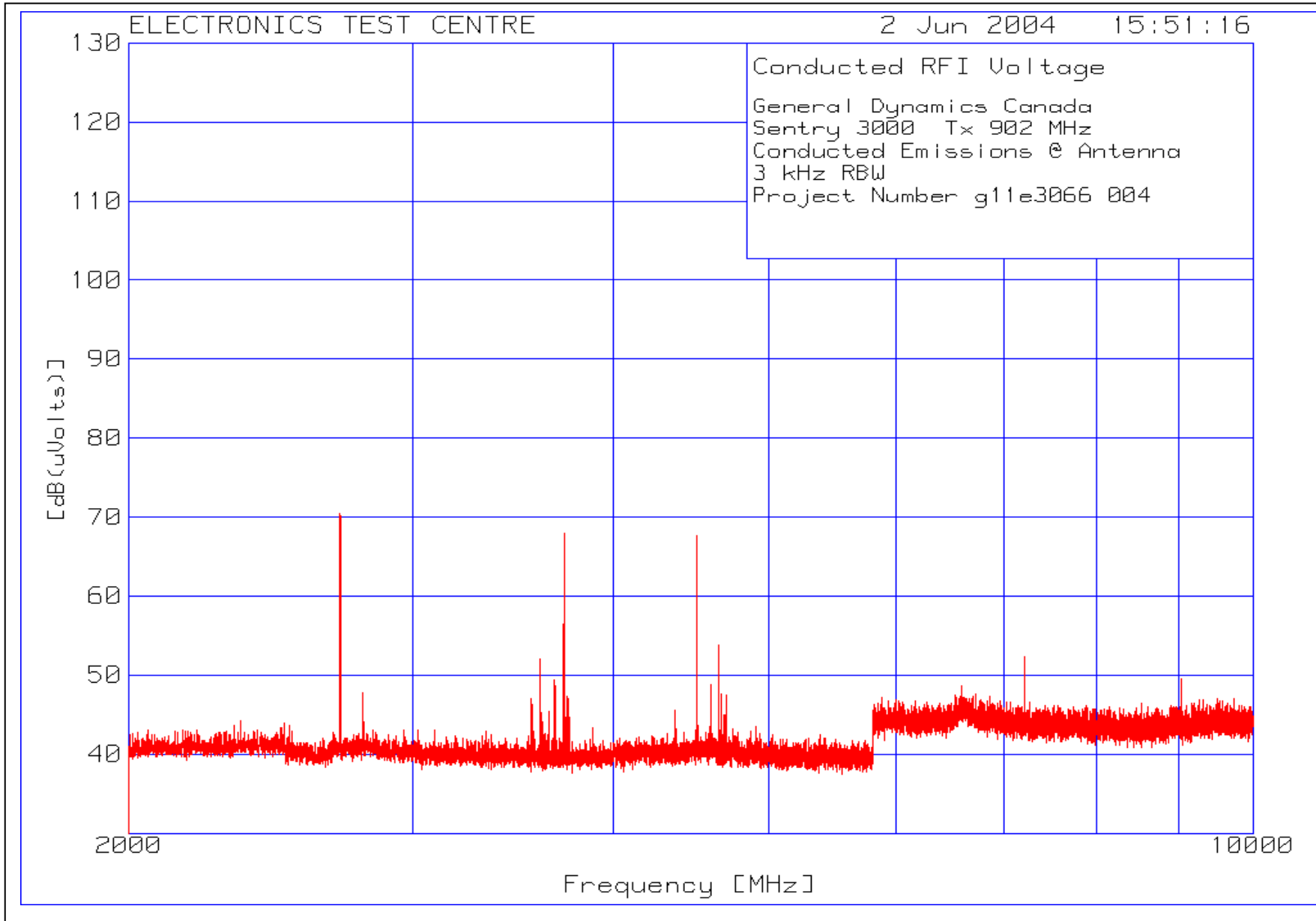
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 928 MHz



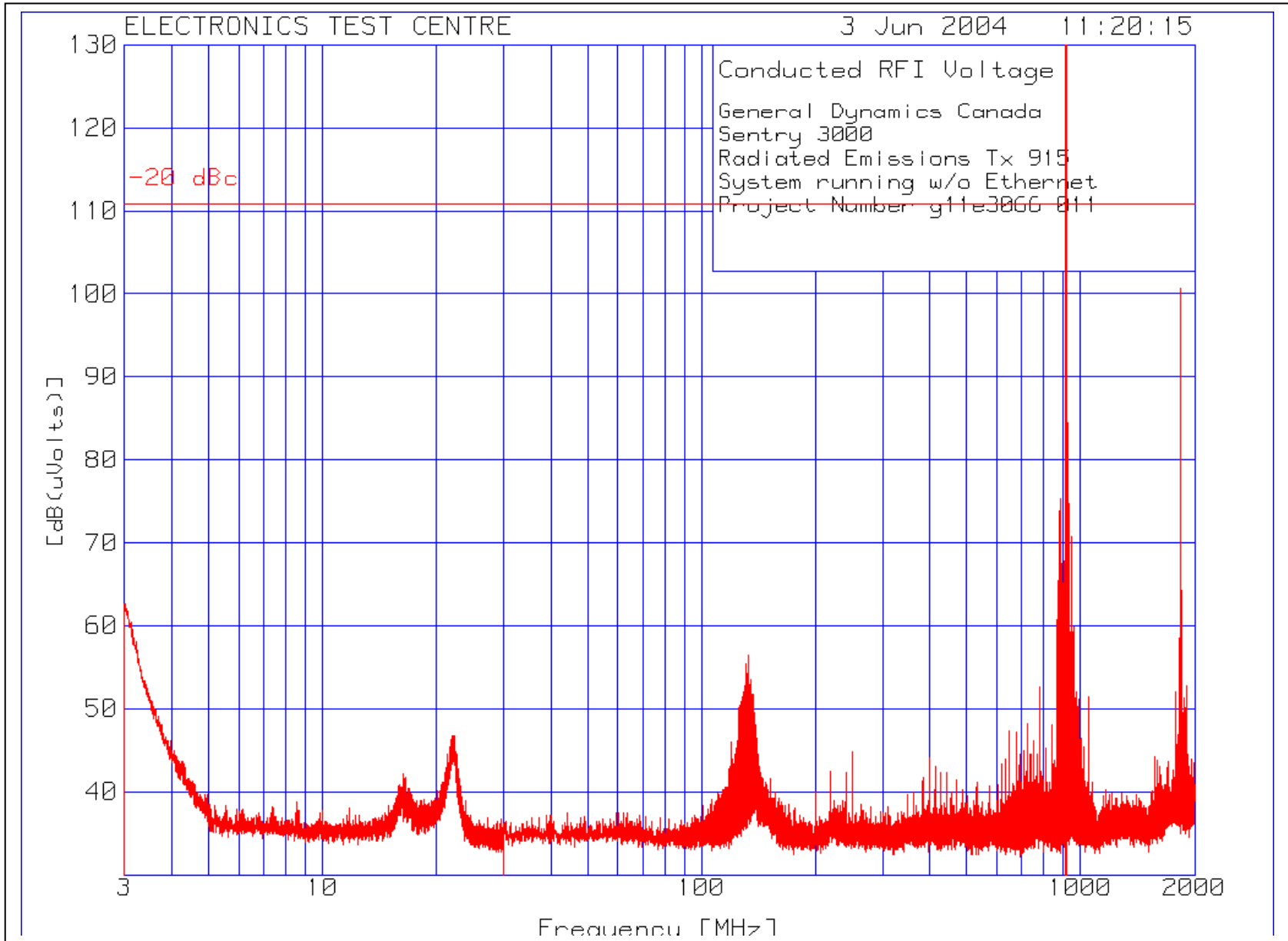
Plot of Conducted Emissions: At antenna port



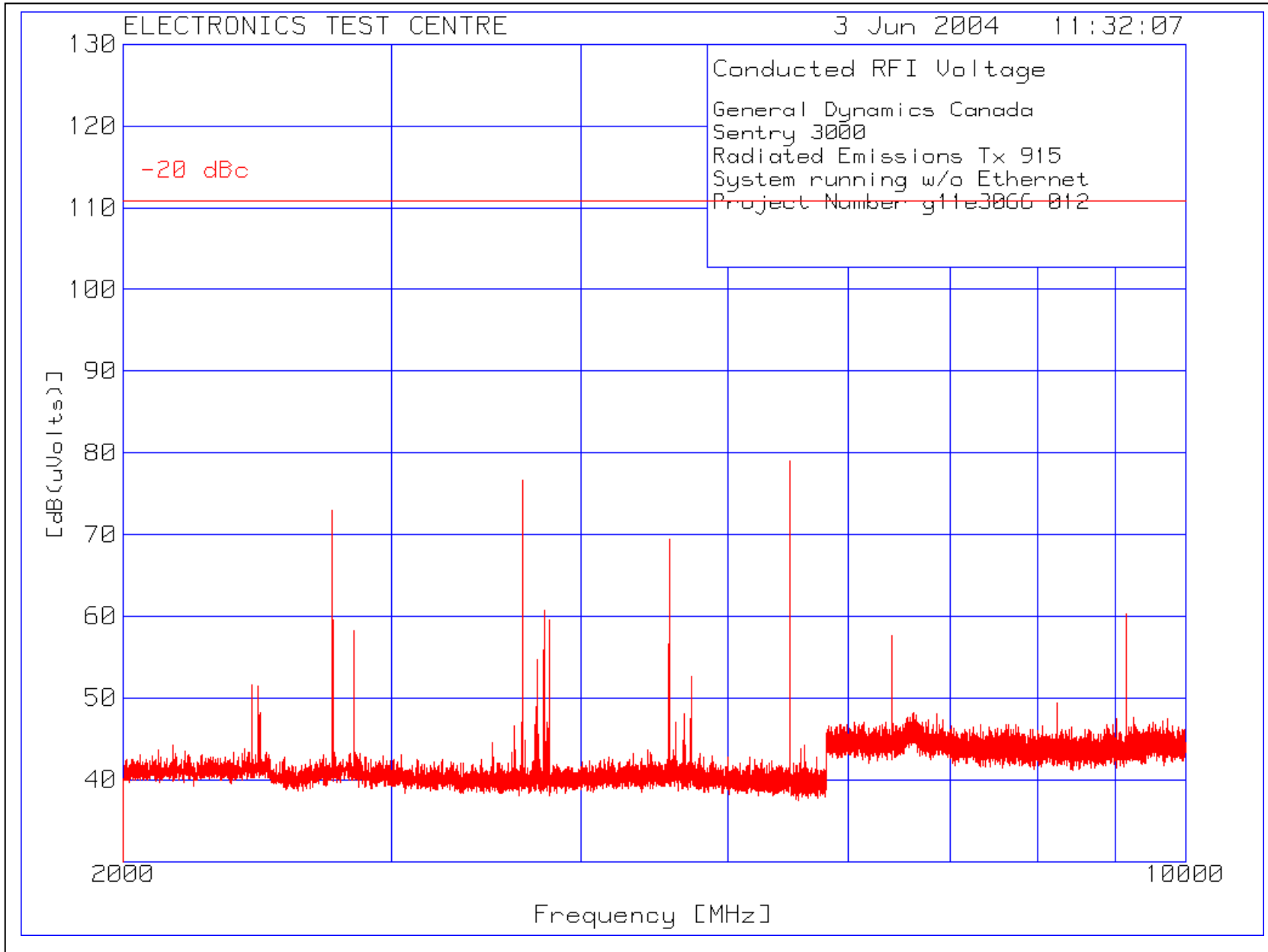
Plot of Conducted Emissions: At antenna port



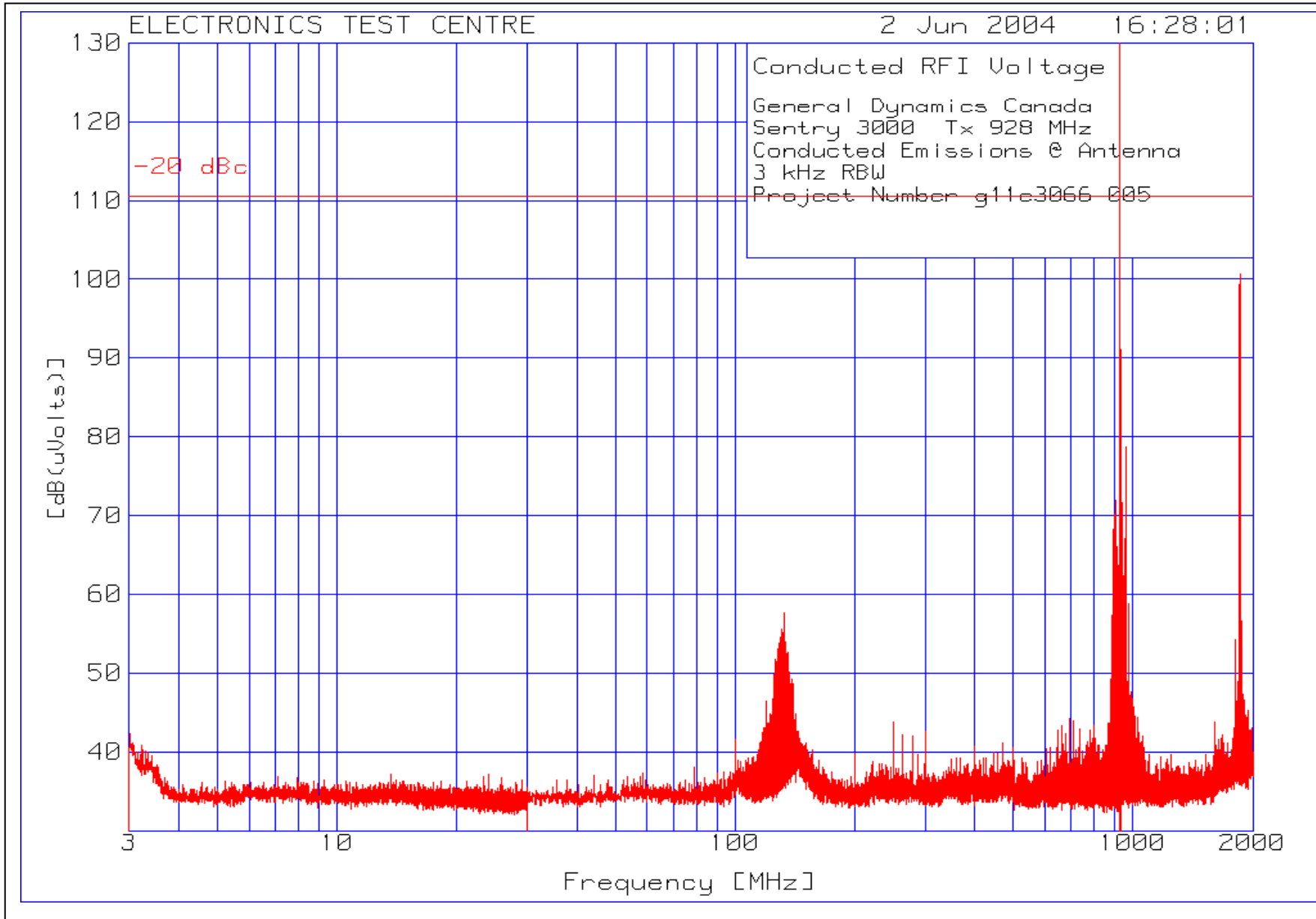
Plot of Conducted Emissions: At antenna port



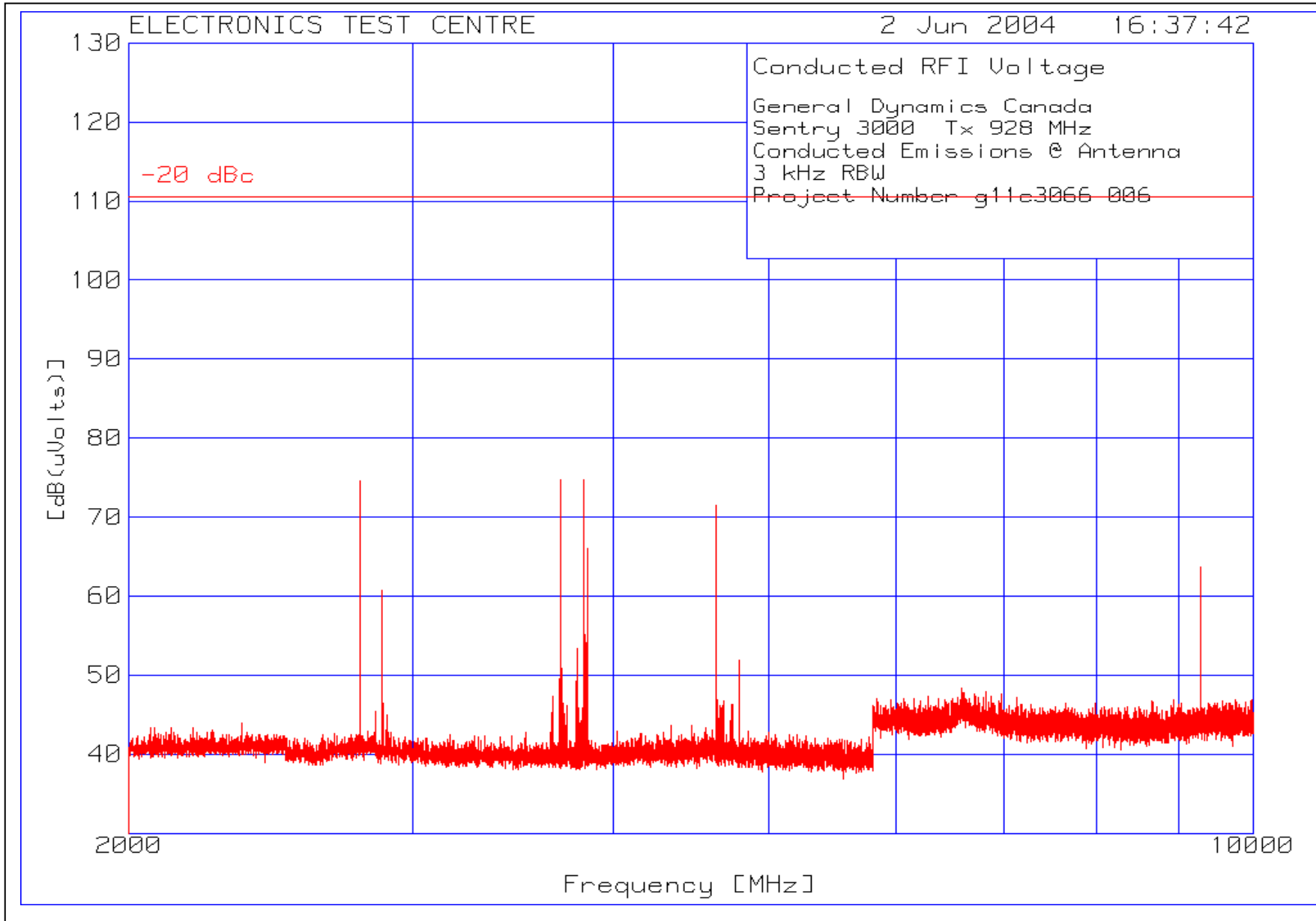
Plot of Conducted Emissions: At antenna port



Plot of Conducted Emissions: At antenna port



Plot of Conducted Emissions: At antenna port



4.3 RADIATED EMISSIONS INCLUDING RESTRICTED BANDS OF OPERATION

4.3a Receive Mode

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: Shankara Malwes/Trung Nuguen Test Date: 11 March to 12 March 2004			Product: 4WARN Sentry 3000 System																	
Test Result, 4WARN Sentry 3000 System: 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 = 23 °C Humidity = 41%			Specification: FCC Part 15 Subpart C, ICES-003 and RSS-210 <table border="1"> <thead> <tr> <th>Frequency [MHz]</th> <th>Class A QP @ 3m</th> <th>Class B QP @ 3m</th> </tr> </thead> <tbody> <tr> <td>30 – 88</td> <td>49.54</td> <td>40.00</td> </tr> <tr> <td>88 – 216</td> <td>53.98</td> <td>43.52</td> </tr> <tr> <td>216 – 960</td> <td>56.90</td> <td>46.02</td> </tr> <tr> <td>above 960</td> <td>60.00</td> <td>53.98</td> </tr> </tbody> </table>			Frequency [MHz]	Class A QP @ 3m	Class B 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
Frequency [MHz]	Class A QP @ 3m	Class B 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]															
887.2551	46.63	-.051	887.3115	44.81	-1.21															
895.2229	45.36	-0.66																		
916.8027	42.81	-3.21																		
200.0254	32.32	-11.20																		
279.9895	34.46	-11.56																		
There were no more emissions measured within -10 dB of the specified limit. Refer to the test data and Transmit mode plots for more detail. These data were taken in the Transmit mode																				

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 Meter Gain/Loss Transducer Level Limit: 1      2      3      4
Frequency Reading  Factor    Factor    [dB(uVolts)]
  [MHz]    [dB(uV)]  [dB]      [dB]
=====
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.

General Dynamics Canada
Sentry 3000



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

200.0254	18.87 qp	3.86	9.59	32.32	53.98	50	43.52	40.46
Azimuth: 292		Height:108	Horz		Margin [dB]:	-21.66	-17.68	-11.2
-8.14								
279.9895	18.18 qp	4.54	11.74	34.46	56.9	57	46.02	47.46
Azimuth: 67		Height:99	Horz		Margin [dB]:	-22.44	-22.54	-11.56
-13								
887.2551	16.62 qp	8.09	21.82	46.63	56.9	57	46.02	47.46
Azimuth: 120		Height:128	Horz		Margin [dB]:	-10.37	-10.47	-.51
-.93								
895.2229	15.16 qp	8.1	22.1	45.36	56.9	57	46.02	47.46
Azimuth: 0		Height:100	Horz		Margin [dB]:	-11.54	-11.64	-.66
-2.1								
894.5420	33.29 qp	8.1	22.1	30.01	56.9	57	46.02	47.46
Azimuth: 355		Height:220	Horz		Margin [dB]:	-26.89	-26.99	-16.01
-17.45								
916.8027	12.75 qp	8.26	21.8	42.81	56.9	57	46.02	47.46
Azimuth: 356		Height:165	Horz		Margin [dB]:	-14.09	-14.19	-3.21
-4.65								

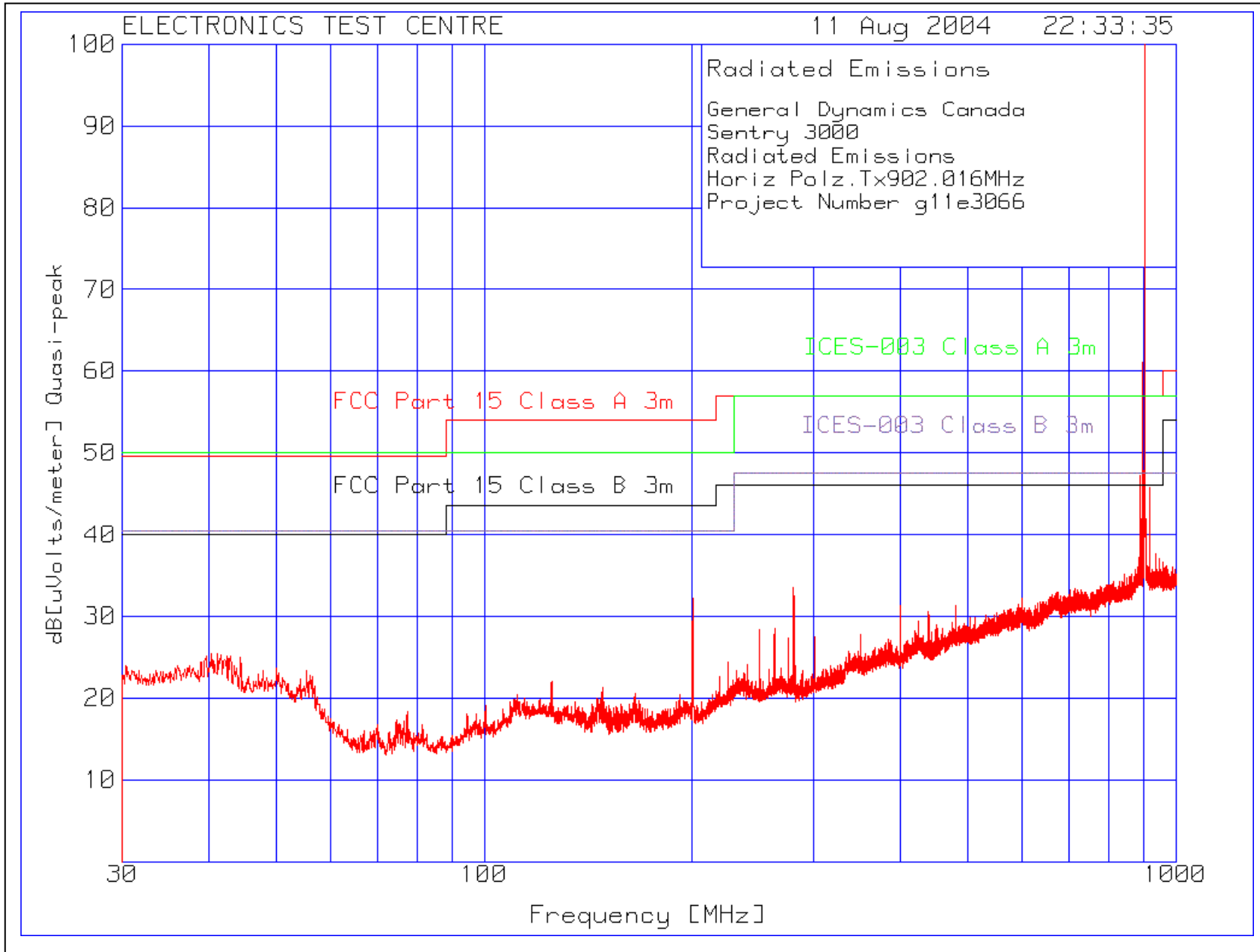
Range: 2 30 - 1000MHz

72.5458	17.59 qp	2.41	6.7	26.7	49.54	50	40	40.46
Azimuth: 355		Height:104	Vert		Margin [dB]:	-22.84	-23.3	-13.3
-13.76								
887.3115	16.12 qp	8.09	20.6	44.81	56.9	57	46.02	47.46
Azimuth: 22		Height:160	Vert		Margin [dB]:	-12.09	-12.19	-1.21
-2.65								
893.7558	-.44 qp	8.09	20.7	28.35	56.9	57	46.02	47.46
Azimuth: 358		Height:101	Vert		Margin [dB]:	-28.55	-28.65	-17.67
-19.11								
918.9113	-.35 qp	8.26	20.7	28.61	56.9	57	46.02	47.46
Azimuth: 359		Height:207	Vert		Margin [dB]:	-28.29	-28.39	-17.41
-18.85								

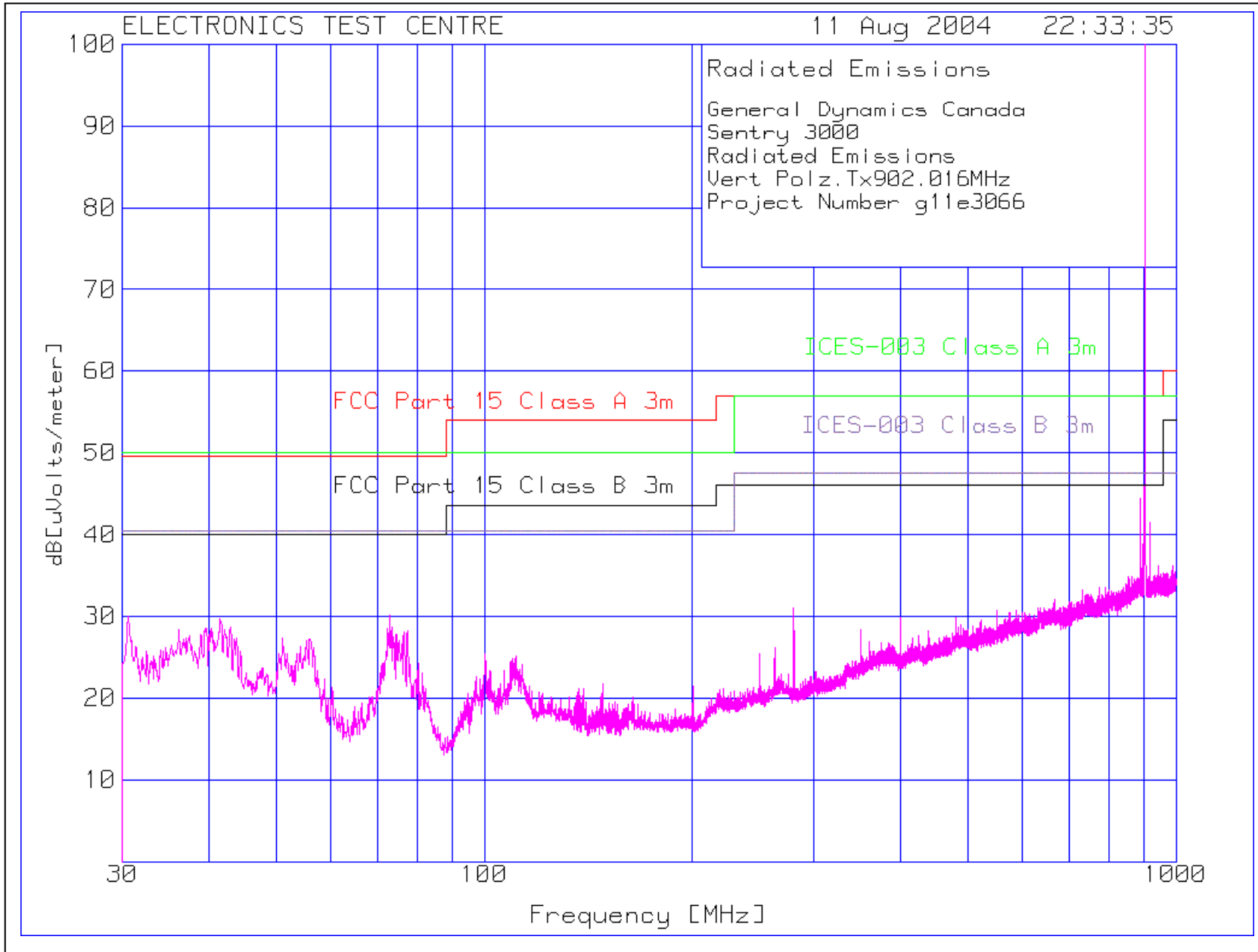
LIMIT 1: FCC Part 15 Class A 3m
 LIMIT 2: ICES-003 Class A 3m
 LIMIT 3: FCC Part 15 Class B 3m ←
 LIMIT 4: ICES-003 Class B 3m

qp - Quasi-Peak detector

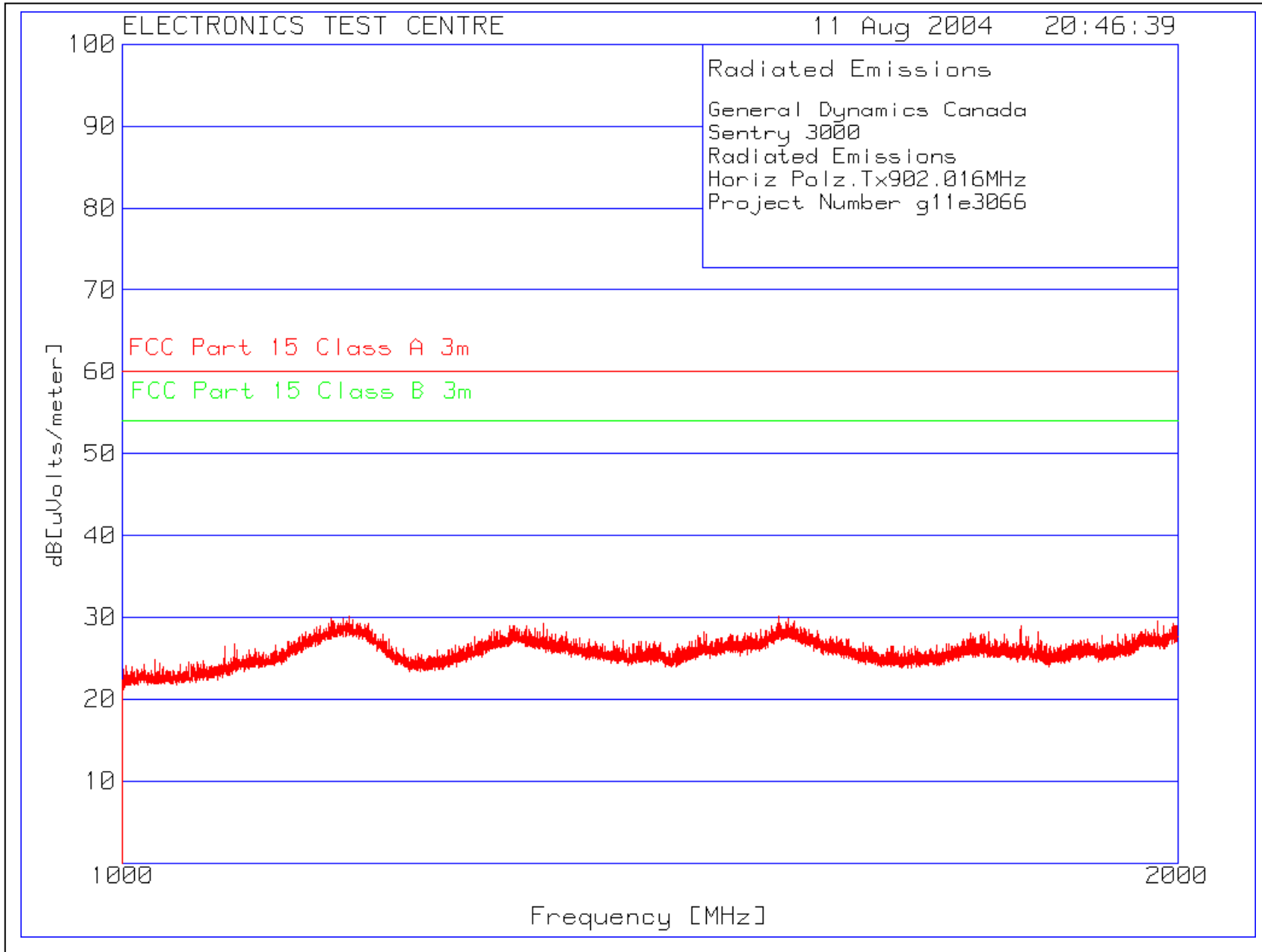
Plot of Radiated Emissions:



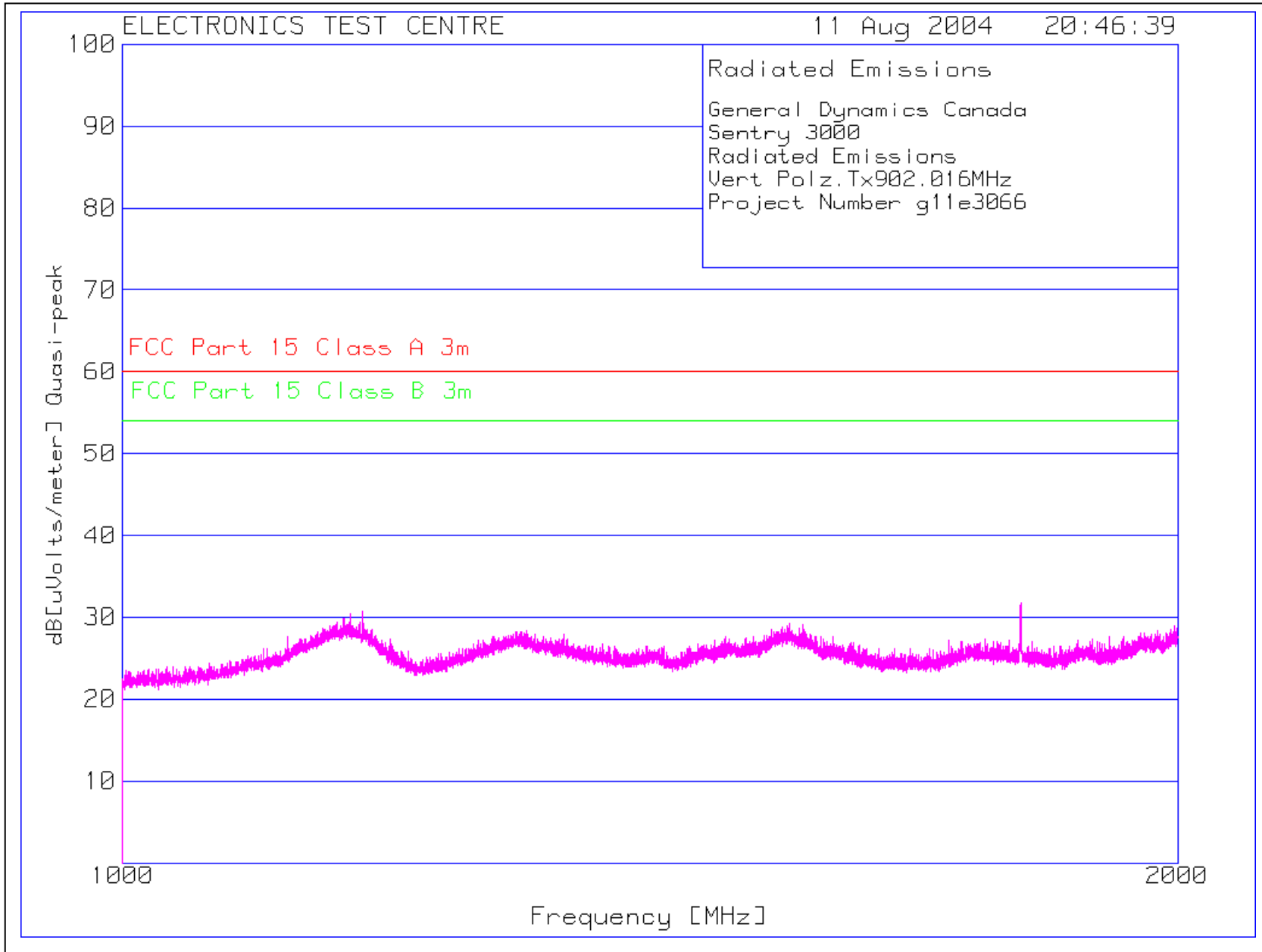
Plot of Radiated Emissions:



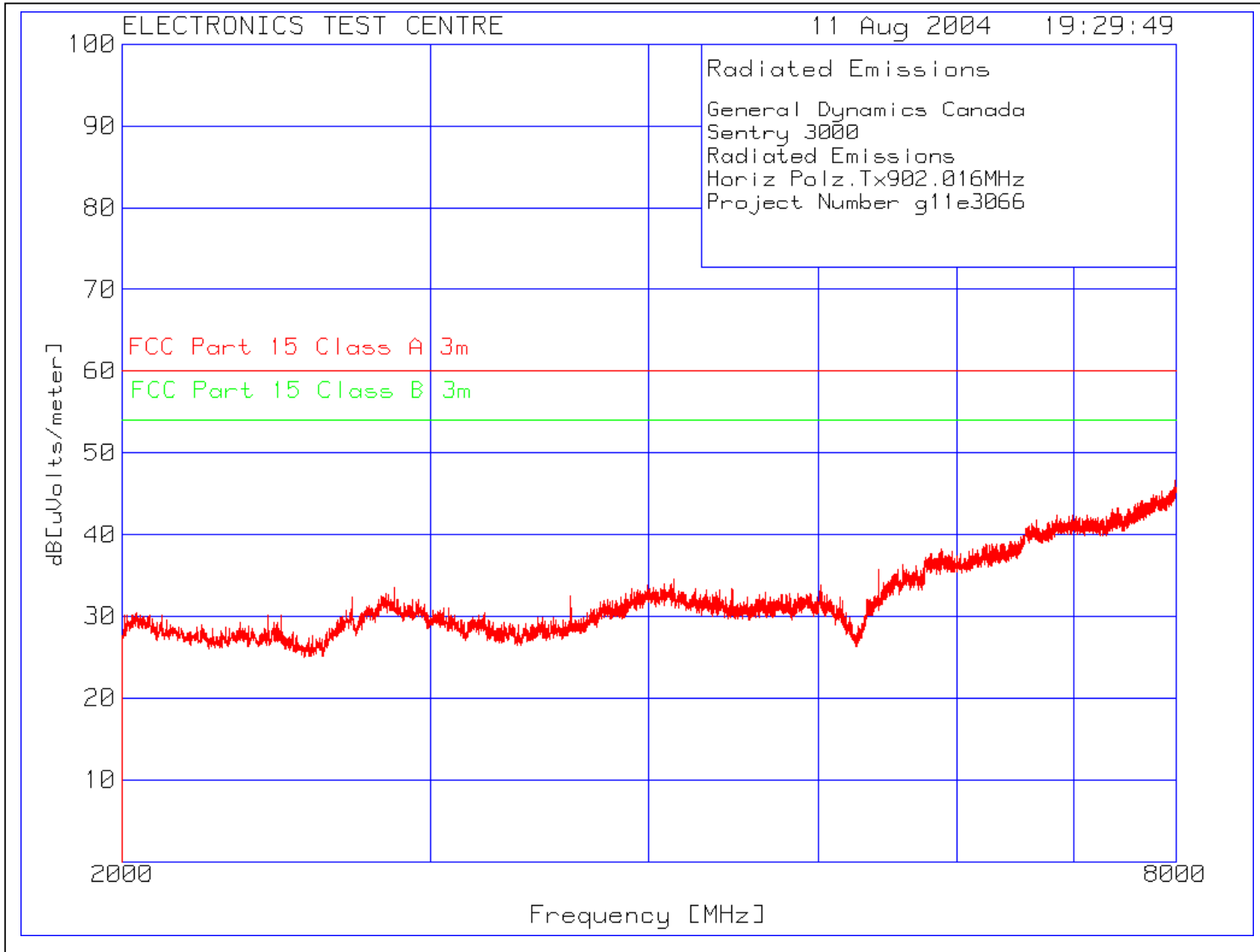
Plot of Radiated Emissions:



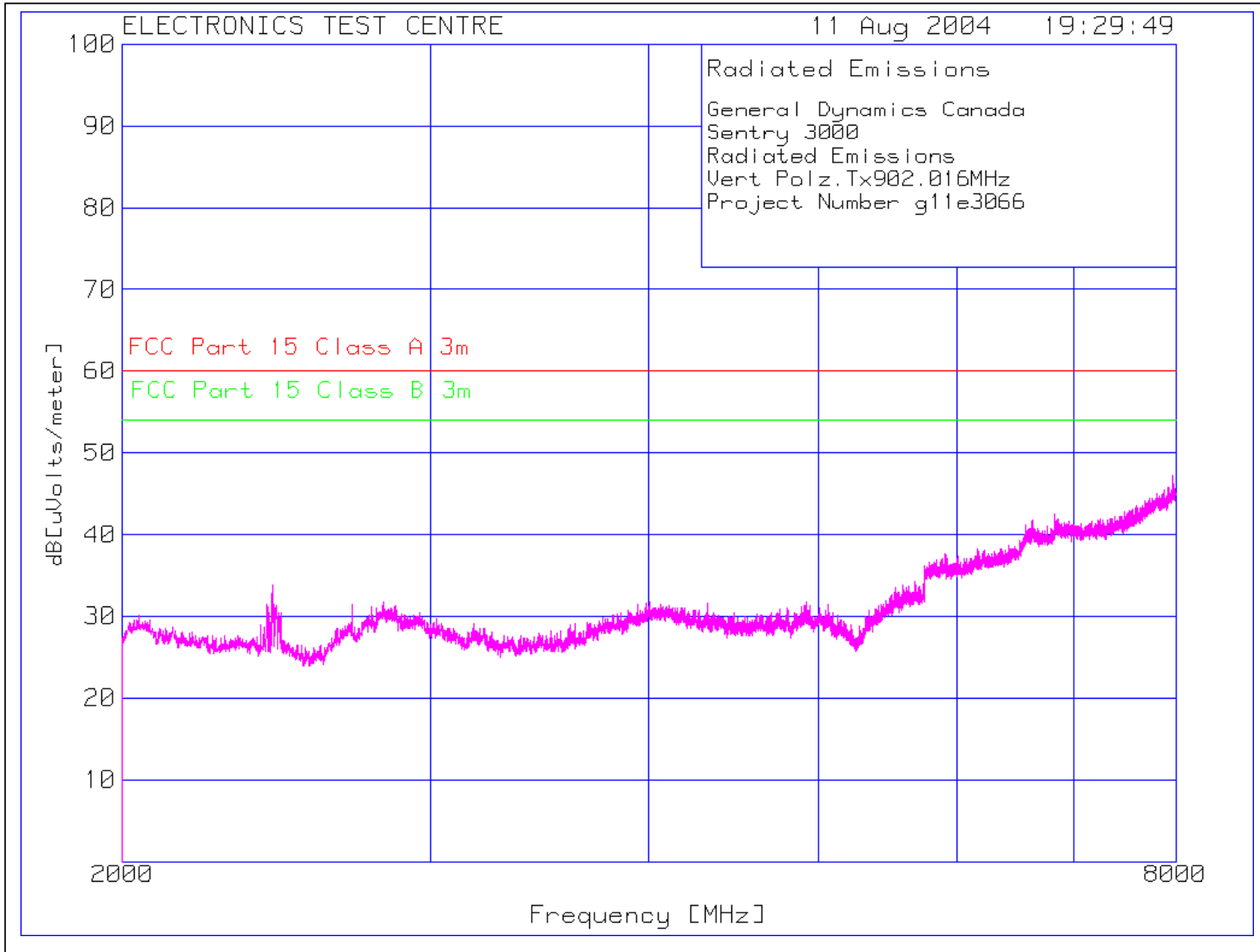
Plot of Radiated Emissions:



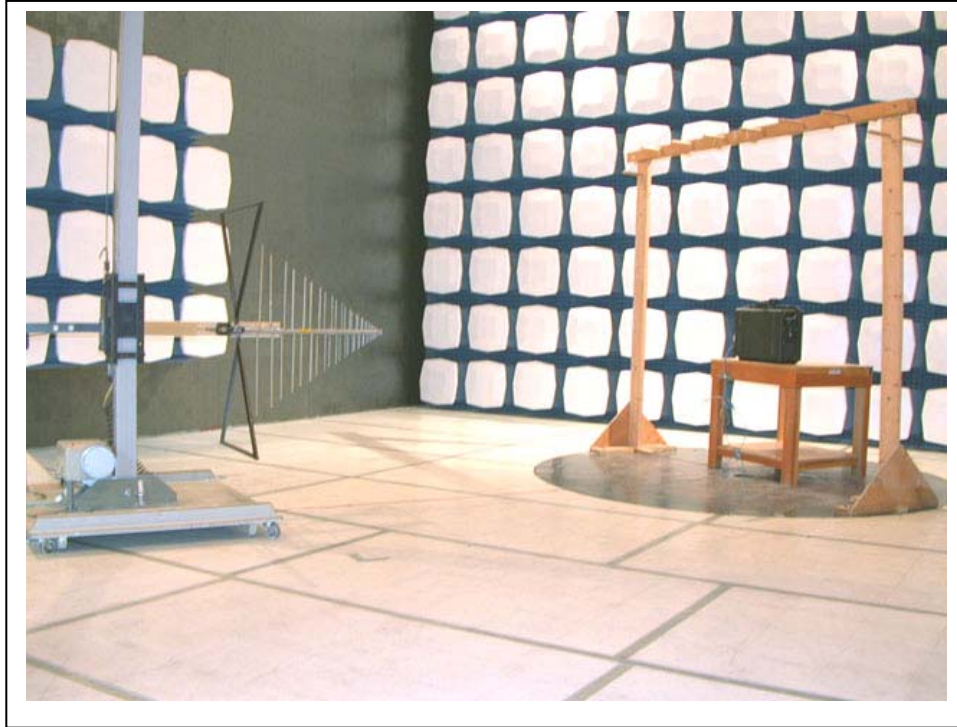
Plot of Radiated Emissions:



Plot of Radiated Emissions:



Picture of Radiated Emissions test setup:



Picture of Radiated Emissions test setup:



Picture of Radiated Emissions test setup:



Picture of Radiated Emissions test setup:



4.3b Transmit Mode

Test Lab: MPB Technologies Inc. Airdrie	Product:	
Test Personnel: Shankara Malwes, and Trung. Nuguen	4WARN Sentry 3000 System	
Dates: 10 August to 12 August 2004		
Test Result, 4WARN Sentry 3000 System: PASS		
<p>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.</p> <p>Emission levels should meet the requirements with a margin of 6dB.</p>	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
0.090000 – 0.110000	8.291000 - 8.294000	16.804250 - 16.804750	162.01250 - 167.17000	1660.0000 – 1710.0000	3.600000 – 4.400000	14.470000 – 14.500000
0.495000 - 0.505000	8.362000 - 8.366000	25.500000 - 25.670000	167.72000 - 173.20000	1718.8000 – 1722.2000	4.500000 – 5.150000	15.350000 – 16.200000
2.173500 - 2.190500	8.376250 - 8.386750	37.500000 - 38.250000	240.00000 – 285.00000	2200.0000 – 2300.0000	5.350000 – 5.460000	17.700000 – 21.400000
4.125000 - 4.128000	8.414250 - 8.414750	73.000000 - 74.600000	322.00000 - 335.40000	2310.0000 – 2390.0000	7.250000 – 7.750000	22.010000 – 23.120000
4.177250 - 4.177750	12.290000 - 12.293000	74.800000 - 75.200000	399.90000 – 410.00000	2483.5000 – 2500.0000	8.025000 – 8.500000	23.600000 – 24.000000
4.207250 - 4.207750	12.519750 - 12.520250	108.00000 - 121.94000	608.00000 – 614.00000	2655.0000 – 2900.0000	9.000000 – 9.200000	31.200000 – 31.800000
5.6770000 - 5.6830000	12.576750 - 12.577250	123.00000 - 138.00000	960.00000 – 1240.0000	3260.0000 – 3267.0000	9.300000 – 9.500000	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

General Dynamics Canada
Sentry 3000



Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
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Range: 1 30 - 1000MHz

200.0254	18.87 qp	3.86	9.59	32.32	53.98	50	43.52	40.46
Azimuth: 292		Height:108	Horz	Margin [dB]:	-21.66	-17.68	-11.2	-8.14
279.9895	18.18 qp	4.54	11.74	34.46	56.9	57	46.02	47.46
Azimuth: 67		Height:99	Horz	Margin [dB]:	-22.44	-22.54	-11.56	-13
887.2551	16.62 qp	8.09	21.82	46.63	56.9	57	46.02	47.46
Azimuth: 120		Height:128	Horz	Margin [dB]:	-10.37	-10.47	-.51	-.93
895.2229	15.16 qp	8.1	22.1	45.36	56.9	57	46.02	47.46
Azimuth: 0		Height:100	Horz	Margin [dB]:	-11.54	-11.64	-.66	-2.1
894.5420	33.29 qp	8.1	22.1	30.01	56.9	57	46.02	47.46
Azimuth: 355		Height:220	Horz	Margin [dB]:	-26.89	-26.99	-16.01	-17.45
916.8027	12.75 qp	8.26	21.8	42.81	56.9	57	46.02	47.46
Azimuth: 356		Height:165	Horz	Margin [dB]:	-14.09	-14.19	-3.21	-4.65

Range: 2 30 - 1000MHz

72.5458	17.59 qp	2.41	6.7	26.7	49.54	50	40	40.46
Azimuth: 355		Height:104	Vert	Margin [dB]:	-22.84	-23.3	-13.3	-13.76
887.3115	16.12 qp	8.09	20.6	44.81	56.9	57	46.02	47.46
Azimuth: 22		Height:160	Vert	Margin [dB]:	-12.09	-12.19	-1.21	-2.65
893.7558	-.44 qp	8.09	20.7	28.35	56.9	57	46.02	47.46
Azimuth: 358		Height:101	Vert	Margin [dB]:	-28.55	-28.65	-17.67	-19.11
918.9113	-.35 qp	8.26	20.7	28.61	56.9	57	46.02	47.46
Azimuth: 359		Height:207	Vert	Margin [dB]:	-28.29	-28.39	-17.41	-18.85

LIMIT 1: FCC Part 15 Class A 3m

LIMIT 2: ICES-003 Class A 3m

LIMIT 3: FCC Part 15 Class B 3m ←

LIMIT 4: ICES-003 Class B 3m

qp - Quasi-Peak detector

nominal f _c (MHz)	f (MHz)	Field Strength (dBμV/m)	Limit (dBμV/m)	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
902	902.0766	118.74			H	109	353
902	902.0781	116.63			V	164	100
915	915.099	118.85			H	173	312
915	915.1046	116.66			V	248	17
	1830.265	26.75	98.85	- 72.10	H	399	33
	1830.331	31.95	96.66	- 64.71	V	336	331
928	928.6991	114.97			H	116	310
928	928.706	115.11			V	174	17
All other emissions ≤ 40 dBμV/m							

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 accordance with General Dynamics Canada 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

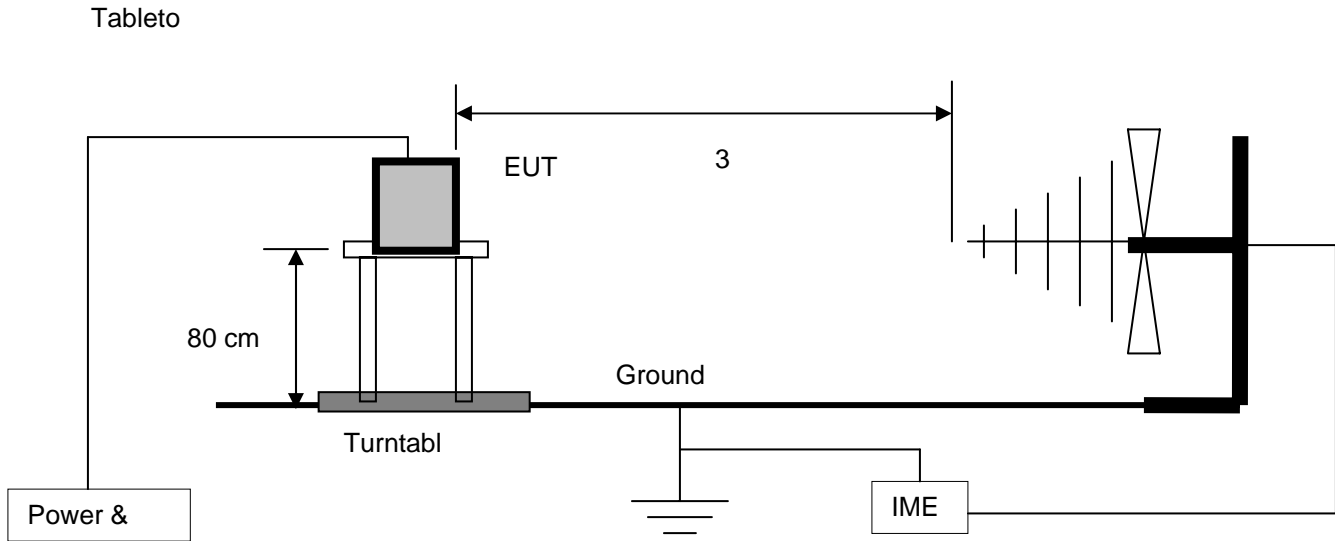
Ambient conducted and radiated electromagnetic emission profiles were generated throughout the tests and are included in the test data.

5.5 TEST CONFIGURATION

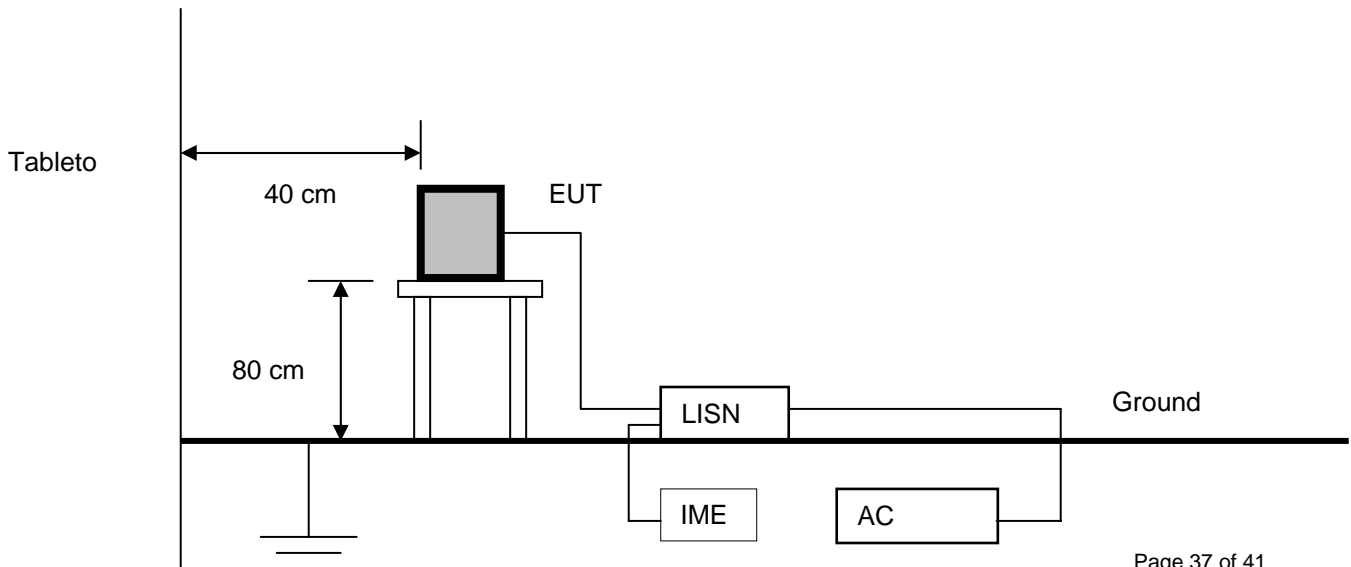
5.5.1 Tabletop Equipment

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

Radiated



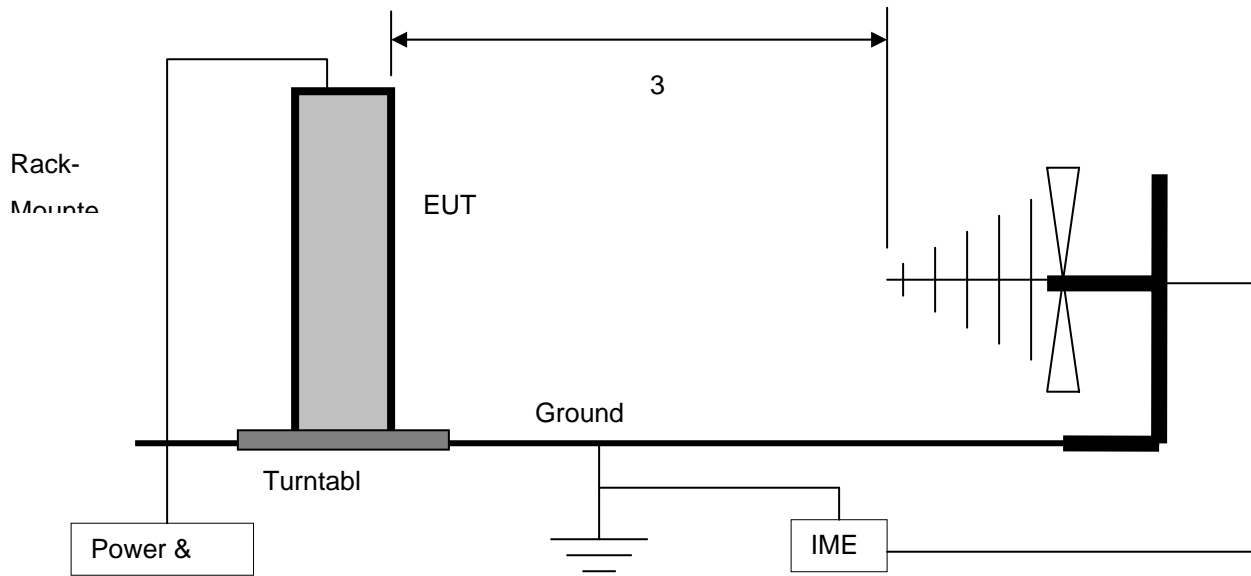
Conducted



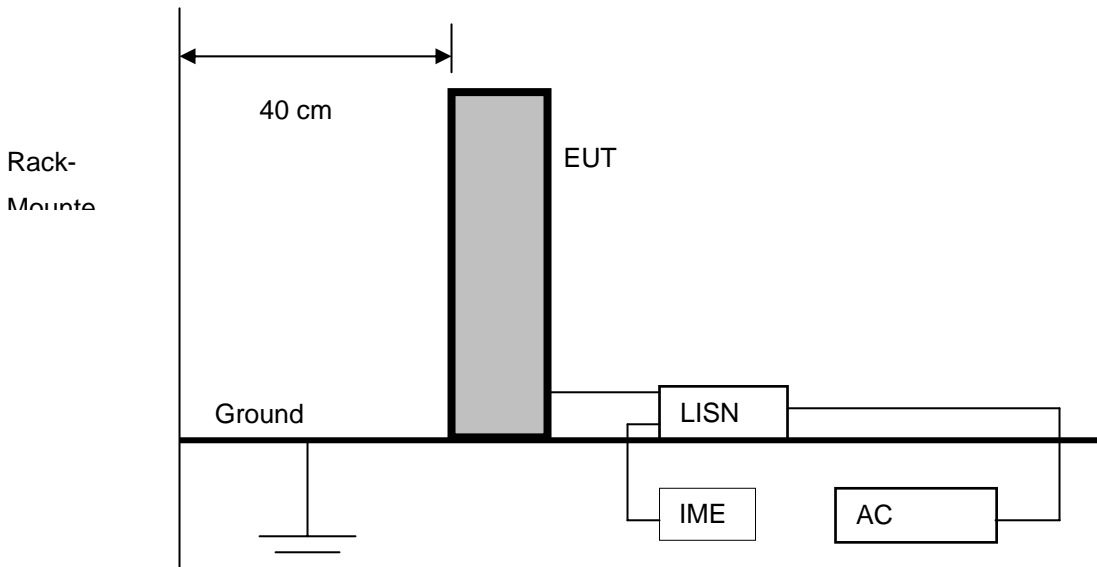
5.5.2 Rack Mount

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

Radiated



Conducted



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 = \pm 1 kHz

Amplitude (RE) = \pm 4.01 dB

Amplitude (CE) = \pm 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	9168	19 August 2004
RF Preselector	Hewlett Packard	85685A	9728	19 August 2004
Quasi-Peak Adapter	Hewlett Packard	85650A Cal cert no.205468	4411	19 August 2004
Measurement System Software	Underwriters Laboratories	Version 6.0	4443	n/a
Line Impedance Stabilization Network	EMCO	3825/2r	9259	07 November 2004
Transient limiter	Electro Metrics	EM-7600	04437	n/a
RF Cable	n/a	PGN01N11360.0	90P62080	n/a
Biconilog Antenna	ARA	Lpb-2520/A	4318	10 September 2005
Antenna Mast RF Cable	n/a	n/a	4436	n/a
Dual Ridged Guide Antenna	EMCO	4105	9588	18 July 2005
Low Noise Amplifier	MITEQ	JS43-01001800- 21-5P	4354	3 November 2004

