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Date: 13 September 2006

**Emissions Testing of the CCU3100 Wireless Modem
in accordance with FCC Part 15.247 (2004)
Spread Spectrum Operation 902 – 928 & 2400 – 2483.5 & 5725 – 5850 MHz.**

Test Personnel: T. Ngyuen, H. Shahryar, D. Raynes

Prepared for: WaveRider Communications Inc.

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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 15.247 (2005), Spread Spectrum Operation 902 - 928 & 2400 - 2483.5 & 5725 – 5850 MHz.

1.2 APPLICANT

This test report has been prepared for WaveRider Communications Inc., located in Calgary, Alberta, Canada.

1.3 APPLICABILITY

All test procedures, limits, and results defined in this document apply to the WaveRider Communications Inc. CCU3100 Wireless Modem unit, referred to herein as the Equipment Under Test (EUT).

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

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

1.4 TEST SAMPLE DESCRIPTION

The test sample provided for testing was a CCU3100 Wireless Modem:

Product Type:	wireless modem
Model Number:	CCU3100
Serial Number:	622682
Cables:	Ethernet cables, Power cable, RF Antenna
Power	120VAC
Requirements:	
Peripheral Equipment:	Personal computer

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

1.5 GENERAL TEST CONDITIONS AND ASSUMPTIONS

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

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

Environmental conditions are recorded for each test.

1.6 SCOPE OF TESTING

Testing was performed in accordance with FCC Part 15 Subpart C (2005), and ANSI C63.4 (2004).

1.6.1 VARIATIONS IN TEST METHODS

The following variations in test methodology were noted during testing:

Carrier measurements were performed with additional attenuation in order to prevent saturation of the test equipment. All reported values are compensated for system attenuation.

The Tx antennas were connected to the CCU3100 modem via 10 meters of LMR400 coaxial cable and a 3 dB attenuator. Radiated Emissions are reported as measured. The minimum installed system attenuation required in order to achieve compliance is also reported.

Measurements performed above 1 GHz were made with a Peak detector only.

1.6.2 TEST SAMPLE CONFIGURATION & MODIFICATIONS

The EUT met the requirements without modification.

2.0 ACRONYMS

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

STATEMENT OF COMPLIANCE

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

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.

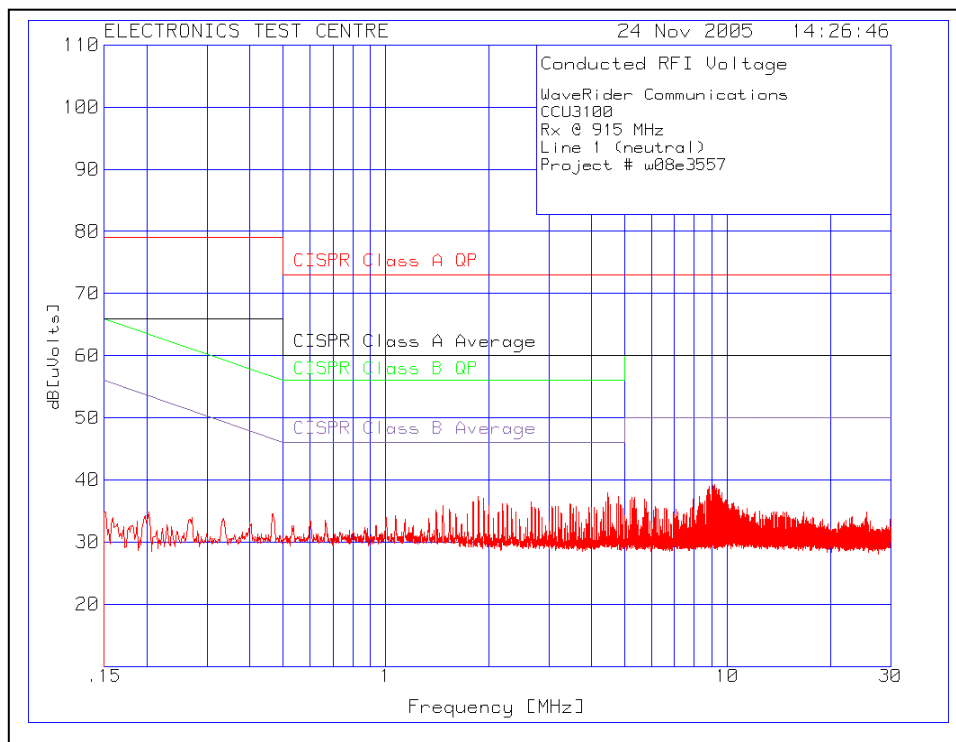
TEST CASE	TEST TYPE	SPECIFICATION	TEST SAMPLE	MOD. STATE	CONFIGURATION	RESULT
§4.1	Conducted Emissions at AC lines	FCC Part 15.107 and 15.207	CCU3100 Wireless Modem	nil	See § 1.6.2	PASS
§4.2	Conducted Emissions at Antenna Port	FCC Part 15.247	CCU3100 Wireless Modem	nil	See § 1.6.2	PASS
§4.3a	Radiated Emissions (Rx Mode)	FCC Part 15.109	CCU3100 Wireless Modem	nil	See § 1.6.2	PASS
§4.3b	Radiated Emissions (Tx Mode)	FCC Parts 2.1053, 15.205, 15.209 & 15.247	CCU3100 Wireless Modem	nil	See § 1.6.2	PASS

4.1 CONDUCTED EMISSIONS ON AC POWER LINES (15.107 & 15.207)

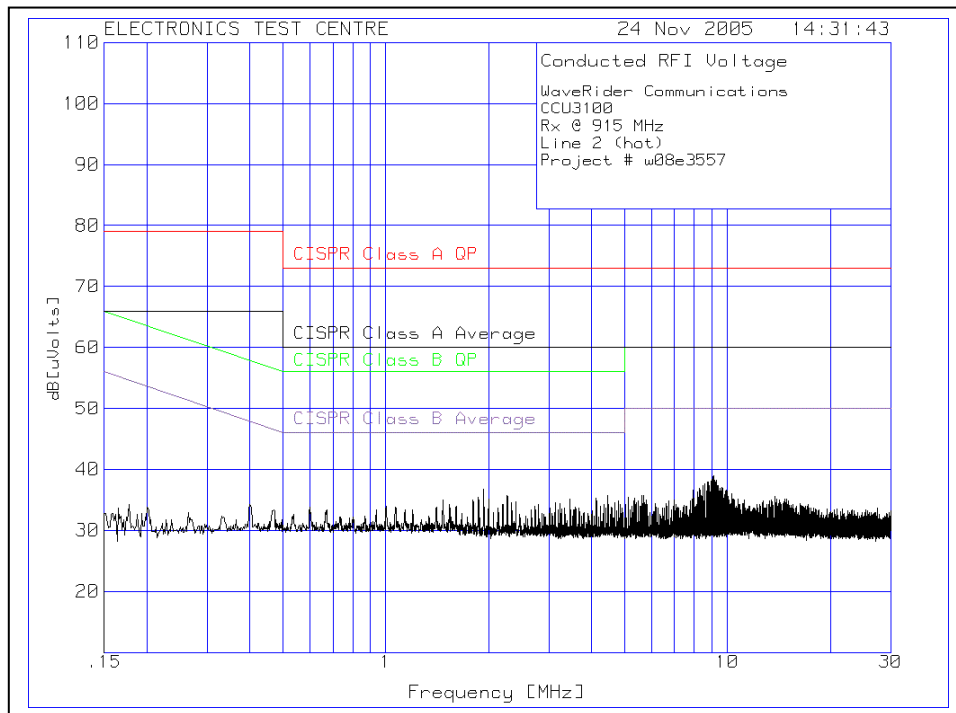
4.1a Receive Mode (Part 15.107)

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: D. Raynes Test Date: 24 November 2005	Product: CCU3100 Wireless Modem																									
Test Result, CCU3100 Wireless Modem: PASS																										
Objectives/Criteria The Conducted emissions produced by a system or sub-system shall not exceed the limits for the specifications as stated. The EUT was assessed against the requirements for Class B . Temperature = 20.5 °C Humidity = 28 %	Specification: <table><tr><th>Frequency (MHz)</th><th colspan="2">Class A</th><th colspan="2">Class B</th></tr><tr><td></td><th>QP</th><th>Avg</th><th>QP</th><th>Avg</th></tr><tr><td>0.150 - 0.50</td><td>79</td><td>66</td><td>66 – 56</td><td>56 - 46</td></tr><tr><td>0.50 – 5.0</td><td>73</td><td>60</td><td>56</td><td>46</td></tr><tr><td>5 – 30</td><td>73</td><td>60</td><td>60</td><td>50</td></tr></table> Units of measurement are dBμV.	Frequency (MHz)	Class A		Class B			QP	Avg	QP	Avg	0.150 - 0.50	79	66	66 – 56	56 - 46	0.50 – 5.0	73	60	56	46	5 – 30	73	60	60	50
Frequency (MHz)	Class A		Class B																							
	QP	Avg	QP	Avg																						
0.150 - 0.50	79	66	66 – 56	56 - 46																						
0.50 – 5.0	73	60	56	46																						
5 – 30	73	60	60	50																						
There were no emissions measured within -10 dB of the specified limit. Refer to the test plots for more detail.																										

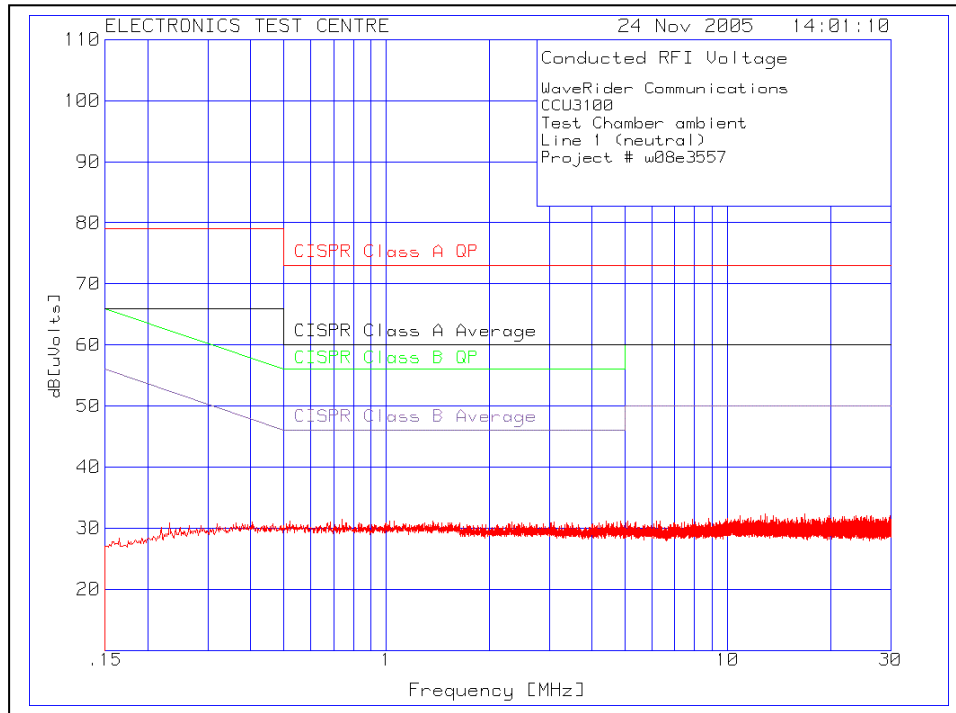
Plot of Conducted Emissions on AC Power Lines: Line 1, Peak
RBW = 9 kHz. VBW = 3 MHz.



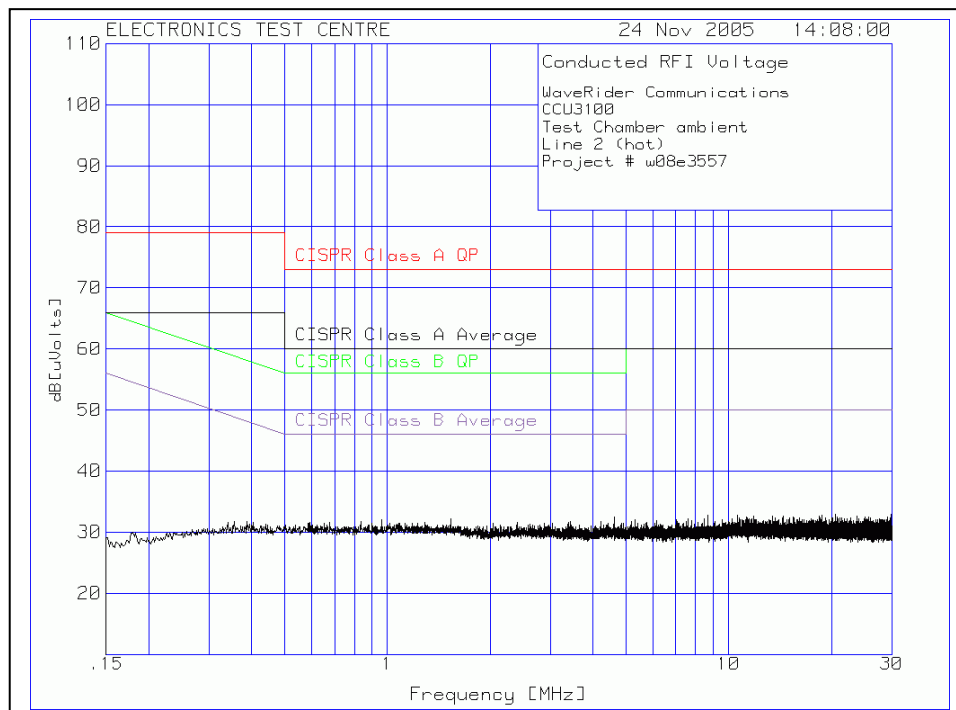
Plot of Conducted Emissions on AC Power Lines: Line 2, Peak
RBW = 9 kHz. VBW = 3 MHz.



Plot of Conducted Emissions Test Chamber Ambient: (measurement noise floor): Line 1
RBW = 9 kHz. VBW = 3 MHz.



Plot of Conducted Emissions Test Chamber Ambient: (measurement noise floor): Line 2
RBW = 9 kHz. VBW = 3 MHz.

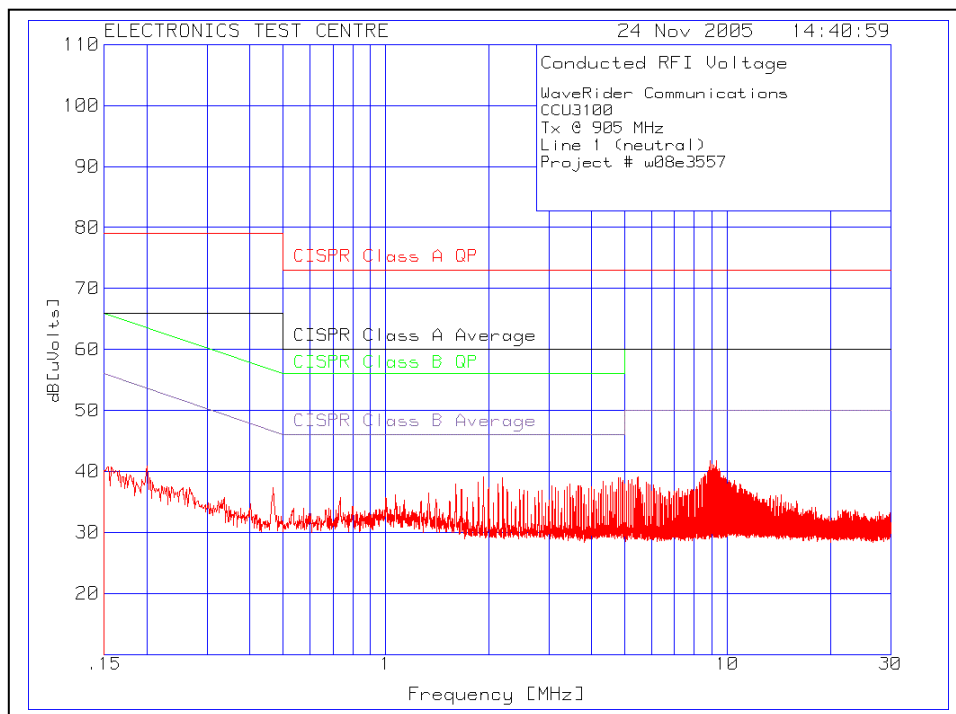


4.1b Transmit Mode (Part 15.207)

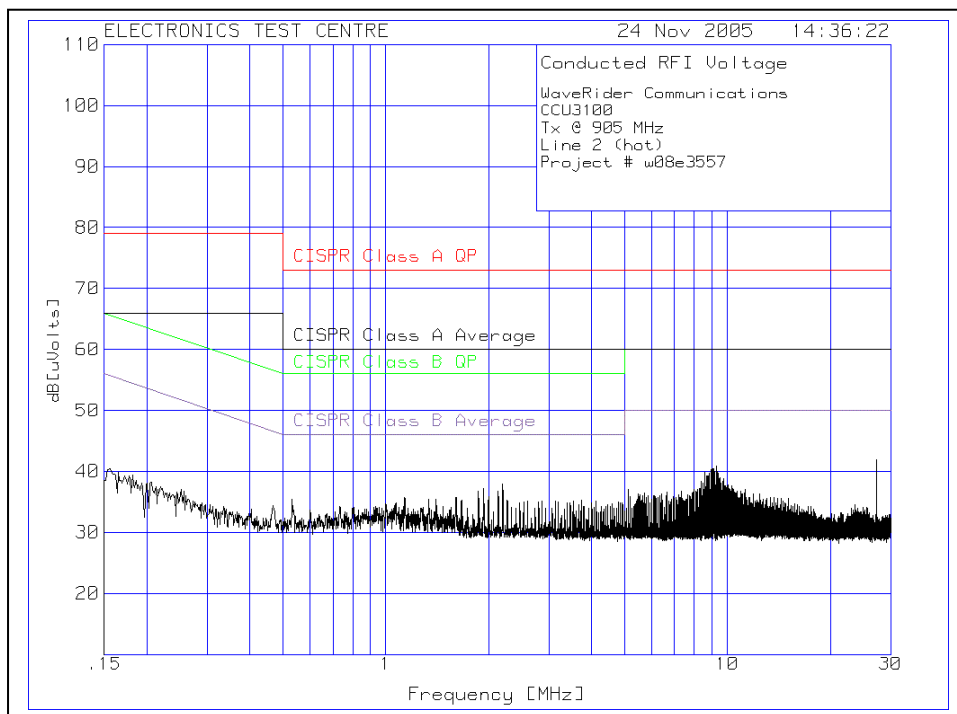
$f_c = 905 \text{ MHz}$

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: D. Raynes Test Date: 24 November 2005	Product: CCU3100 Wireless Modem																									
Test Result, CCU3100 Wireless Modem: PASS																										
Objectives/Criteria The Conducted emissions produced by a system or sub-system shall not exceed the limits for the specifications as stated. The EUT was assessed against the requirements for Class B . Temperature = 20.5 °C Humidity = 28 %	Specification: <table><tr><th>Frequency (MHz)</th><th colspan="2">Class A</th><th colspan="2">Class B</th></tr><tr><td></td><th>QP</th><th>Avg</th><th>QP</th><th>Avg</th></tr><tr><td>0.150 - 0.50</td><td>79</td><td>66</td><td>66 – 56</td><td>56 - 46</td></tr><tr><td>0.50 – 5.0</td><td>73</td><td>60</td><td>56</td><td>46</td></tr><tr><td>5 – 30</td><td>73</td><td>60</td><td>60</td><td>50</td></tr></table> Units of measurement are dBμV.	Frequency (MHz)	Class A		Class B			QP	Avg	QP	Avg	0.150 - 0.50	79	66	66 – 56	56 - 46	0.50 – 5.0	73	60	56	46	5 – 30	73	60	60	50
Frequency (MHz)	Class A		Class B																							
	QP	Avg	QP	Avg																						
0.150 - 0.50	79	66	66 – 56	56 - 46																						
0.50 – 5.0	73	60	56	46																						
5 – 30	73	60	60	50																						
There were no emissions measured within -10 dB of the specified limit. Refer to the test data and plots for more detail.																										

Plot of Conducted Emissions on AC Power Lines: Line 1 Peak
RBW = 9 kHz. VBW = 3 MHz.



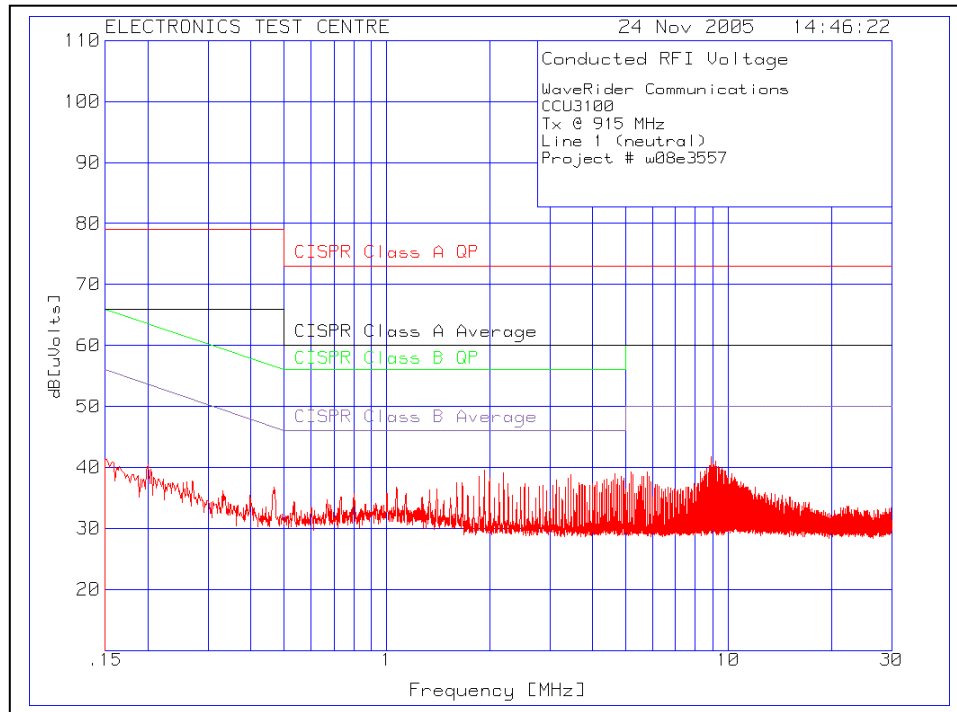
Plot of Conducted Emissions on AC Power Lines: Line 2 Peak
RBW = 9 kHz. VBW = 3 MHz.



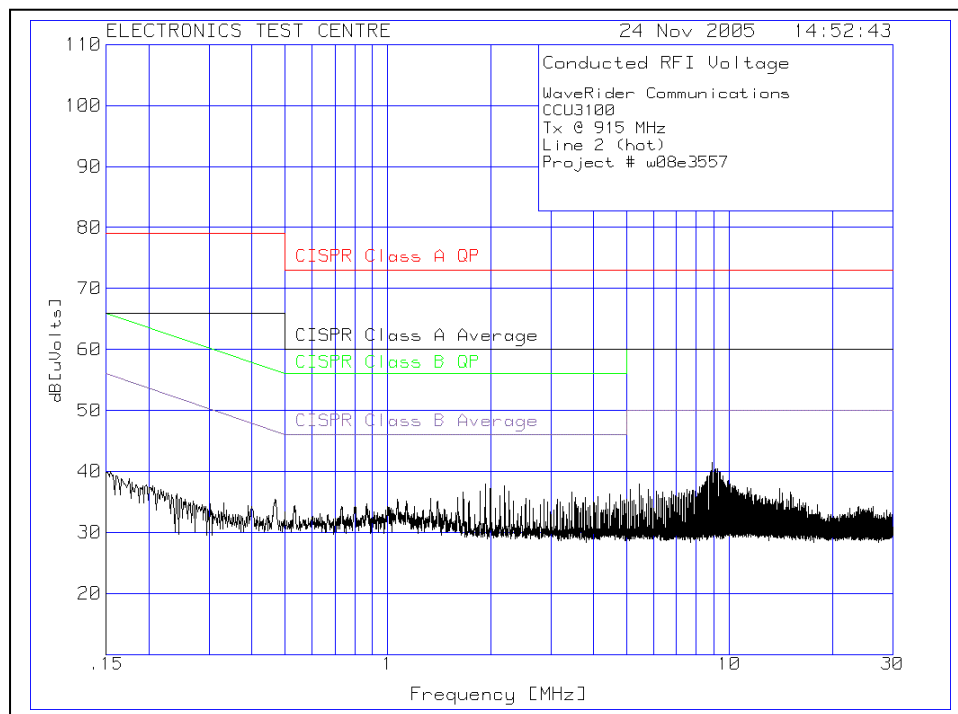
$f_c = 915 \text{ MHz}$

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: D. Raynes Test Date: 24 November 2005	Product: CCU3100 Wireless Modem																								
Test Result, CCU3100 Wireless Modem: PASS																									
Objectives/Criteria The Conducted emissions produced by a system or sub-system shall not exceed the limits for the specifications as stated. The EUT was assessed against the requirements for Class B . Temperature = 20.5 °C Humidity = 28 %	Specification: <table><thead><tr><th rowspan="2">Frequency (MHz)</th><th colspan="2">Class A</th><th colspan="2">Class B</th></tr><tr><th>QP</th><th>Avg</th><th>QP</th><th>Avg</th></tr></thead><tbody><tr><td>0.150 - 0.50</td><td>79</td><td>66</td><td>66 – 56</td><td>56 - 46</td></tr><tr><td>0.50 – 5.0</td><td>73</td><td>60</td><td>56</td><td>46</td></tr><tr><td>5 – 30</td><td>73</td><td>60</td><td>60</td><td>50</td></tr></tbody></table> Units of measurement are dBμV.	Frequency (MHz)	Class A		Class B		QP	Avg	QP	Avg	0.150 - 0.50	79	66	66 – 56	56 - 46	0.50 – 5.0	73	60	56	46	5 – 30	73	60	60	50
Frequency (MHz)	Class A		Class B																						
	QP	Avg	QP	Avg																					
0.150 - 0.50	79	66	66 – 56	56 - 46																					
0.50 – 5.0	73	60	56	46																					
5 – 30	73	60	60	50																					
There were no emissions measured within -10 dB of the specified limit. Refer to the test data and plots for more detail.																									

Plot of Conducted Emissions on AC Power Lines: Line 1 Peak
RBW = 9 kHz. VBW = 3 MHz.



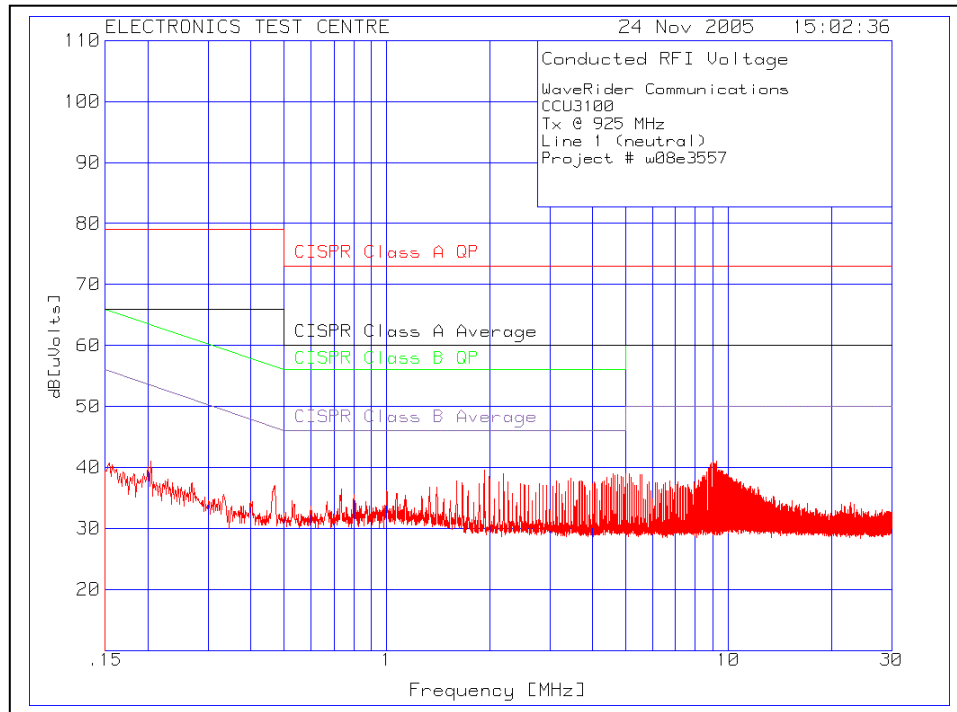
Plot of Conducted Emissions on AC Power Lines: Line 2 Peak
RBW = 9 kHz. VBW = 3 MHz.



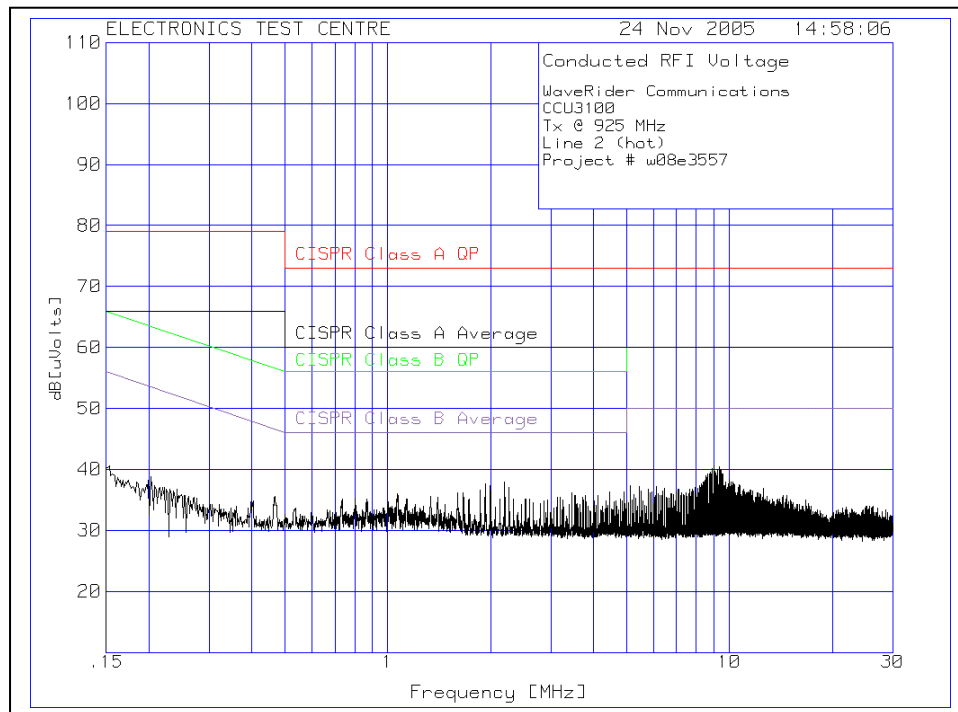
f_c = 925 MHz

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: D. Raynes Test Date: 24 November 2005	Product: CCU3100 Wireless Modem																									
Test Result, CCU3100 Wireless Modem: PASS																										
Objectives/Criteria The Conducted emissions produced by a system or sub-system shall not exceed the limits for the specifications as stated. The EUT was assessed against the requirements for Class B . Temperature = 20.5 °C Humidity = 28 %	Specification: <table><tr><th>Frequency (MHz)</th><th colspan="2">Class A</th><th colspan="2">Class B</th></tr><tr><th></th><th>QP</th><th>Avg</th><th>QP</th><th>Avg</th></tr><tr><td>0.150 - 0.50</td><td>79</td><td>66</td><td>66 – 56</td><td>56 - 46</td></tr><tr><td>0.50 – 5.0</td><td>73</td><td>60</td><td>56</td><td>46</td></tr><tr><td>5 – 30</td><td>73</td><td>60</td><td>60</td><td>50</td></tr></table> Units of measurement are dBμV.	Frequency (MHz)	Class A		Class B			QP	Avg	QP	Avg	0.150 - 0.50	79	66	66 – 56	56 - 46	0.50 – 5.0	73	60	56	46	5 – 30	73	60	60	50
Frequency (MHz)	Class A		Class B																							
	QP	Avg	QP	Avg																						
0.150 - 0.50	79	66	66 – 56	56 - 46																						
0.50 – 5.0	73	60	56	46																						
5 – 30	73	60	60	50																						
There were no emissions measured within -10 dB of the specified limit. Refer to the test data and plots for more detail.																										

Plot of Conducted Emissions on AC Power Lines: Line 1 Peak
RBW = 9 kHz. VBW = 3 MHz.



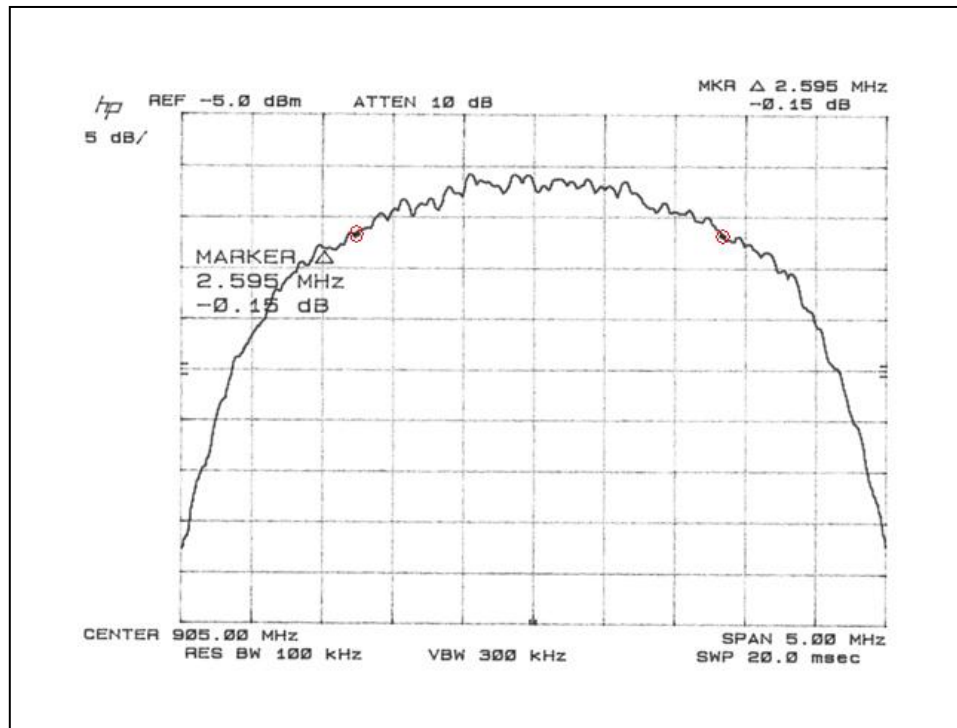
Plot of Conducted Emissions on AC Power Lines: Line 2 Peak
RBW = 9 kHz. VBW = 3 MHz.



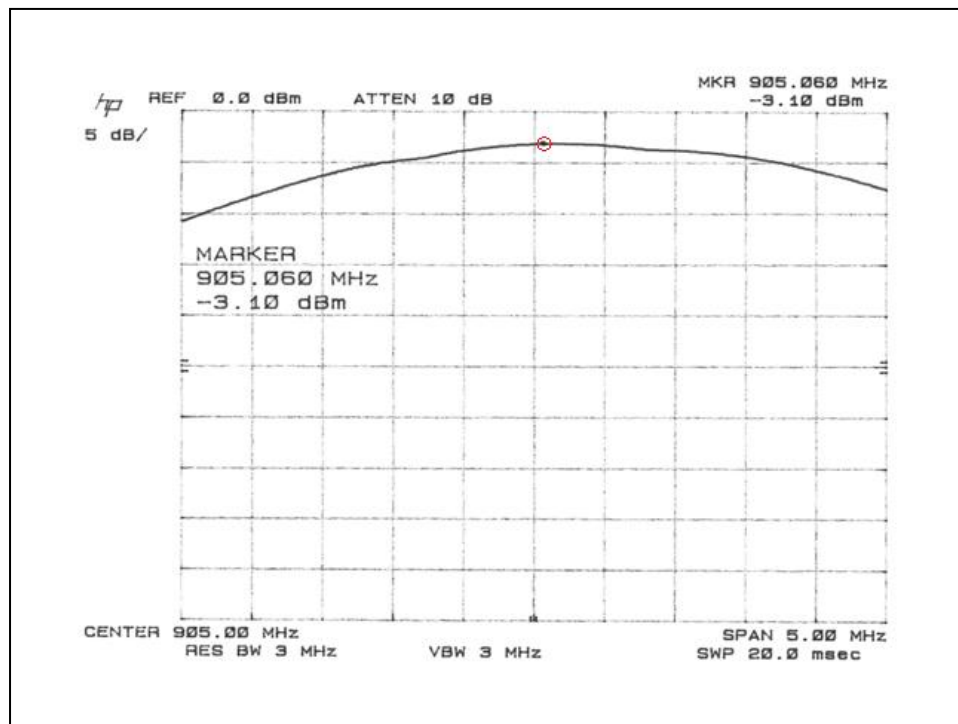
4.2 CONDUCTED EMISSIONS MEASURED AT ANTENNA PORT (PART 15.247 & 15.31)

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: D. Raynes Test Date: 24 November, 2005			Product: CCU3100 Wireless Modem		
Test Result, CCU3100 Wireless Modem: PASS					
Objectives/Criteria The Conducted emissions produced by a device shall meet the specifications as stated. Temperature = 20.5 °C Humidity = 28%					
15.247(a): BW ≥ 500 kHz			15.247(b): 1 Watt (30 dBm)		
Carrier Frequency [MHz]	Bandwidth [MHz]	Delta from limit [MHz]	Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from limit]
905	2.595	+ 2.095	905	26.55	- 3.45
915	2.530	+ 2.030	915	27.50	- 2.50
925	2.530	+ 2.030	925	27.30	- 2.70
15.31(e) RF output @ 85% supply voltage			15.31(e) RF output @ 115% supply voltage		
Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from 100% supply]	Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from 100% supply]
905	26.45	- 0.10	905	26.25	- 0.30
915	27.60	+ 0.10	915	27.50	0
925	27.30	0	925	27.20	- 0.10
15.247(d): -20 dB fc			15.247(e): 8 dBm (115 dBμV)		
There were no reportable emissions. Refer to the data plots for more detail.			Carrier Frequency [MHz]	RF Power [dBm]	Delta [dB from limit]
			905	7.15	- 0.85
			915	7.45	- 0.55
			925	7.50	- 0.50
Measurements were performed while the CCU3100 Wireless Modem was transmitting continuously.					

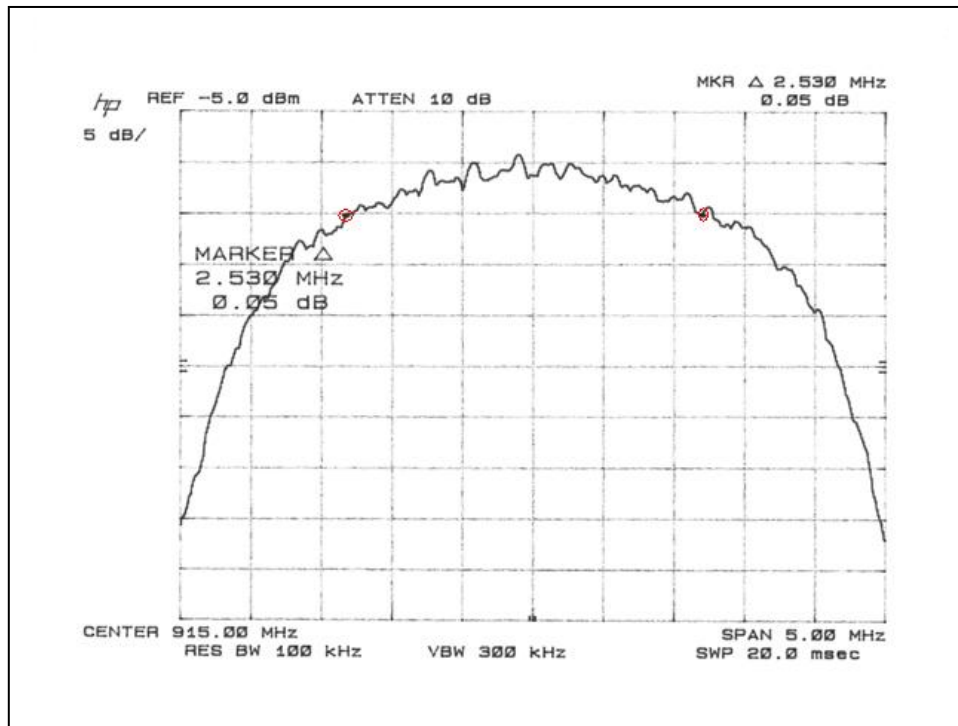
Spectrum Analyzer Plot of 6 dB Bandwidth: Tx @ 905 MHz



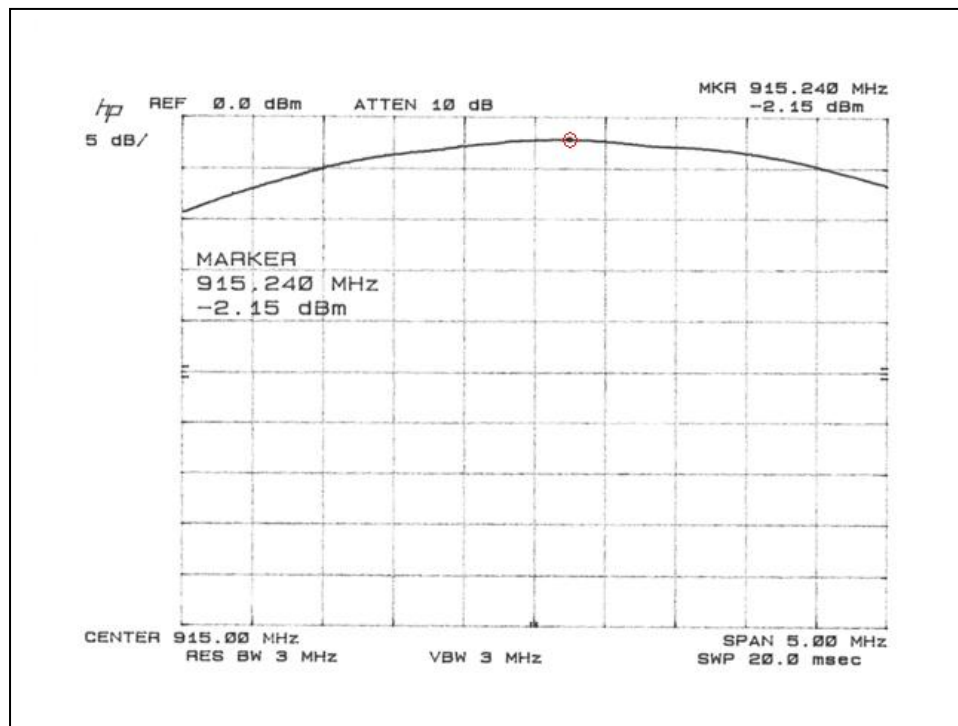
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 905 MHz
Attenuation = 29.65 dB \Rightarrow 26.55 dBm. (Peak detector, Max Hold).



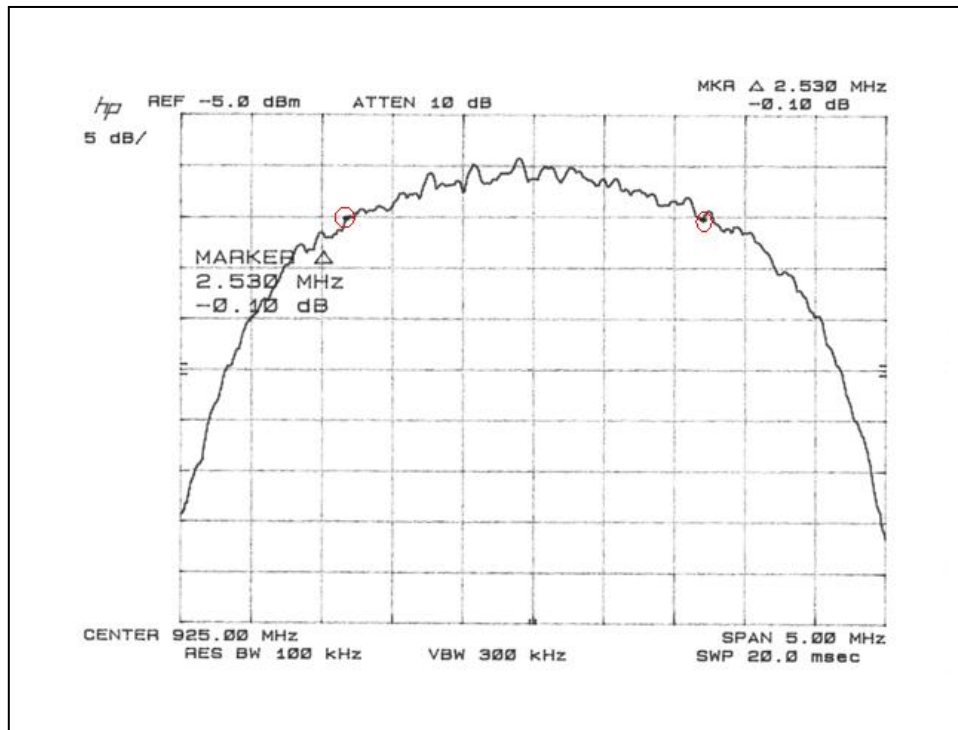
Spectrum Analyzer Plot of 6 dB Bandwidth: Tx @ 915 MHz



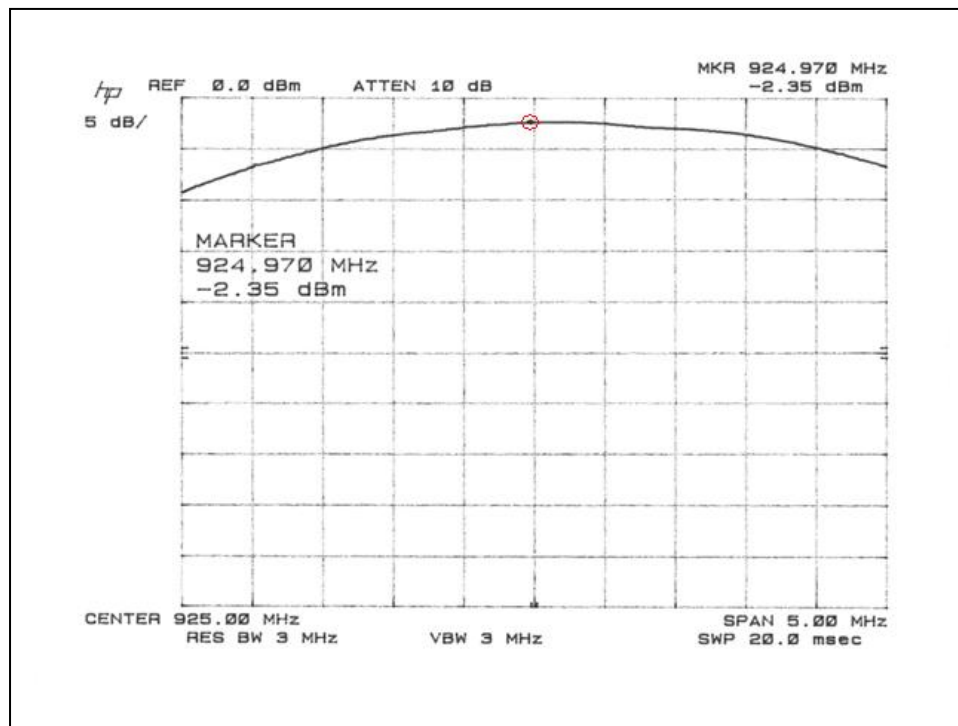
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 915 MHz
Attenuation 29.65 dB \Rightarrow 27.50 dBm. (Peak detector, Max Hold).



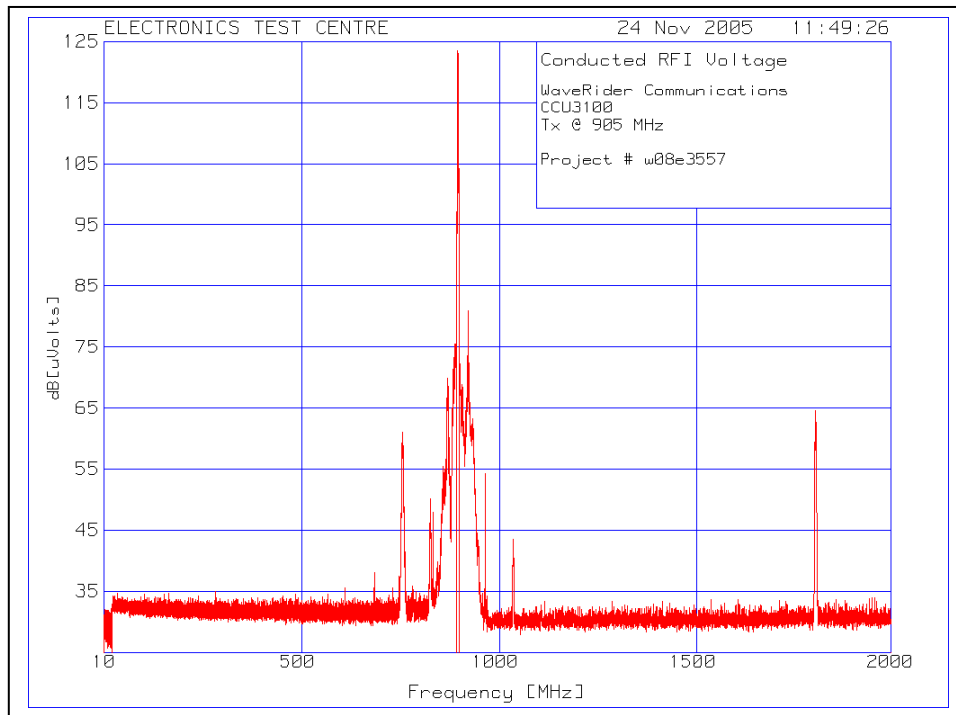
Spectrum Analyzer Plot of 6 dB Bandwidth: Tx @ 925 MHz



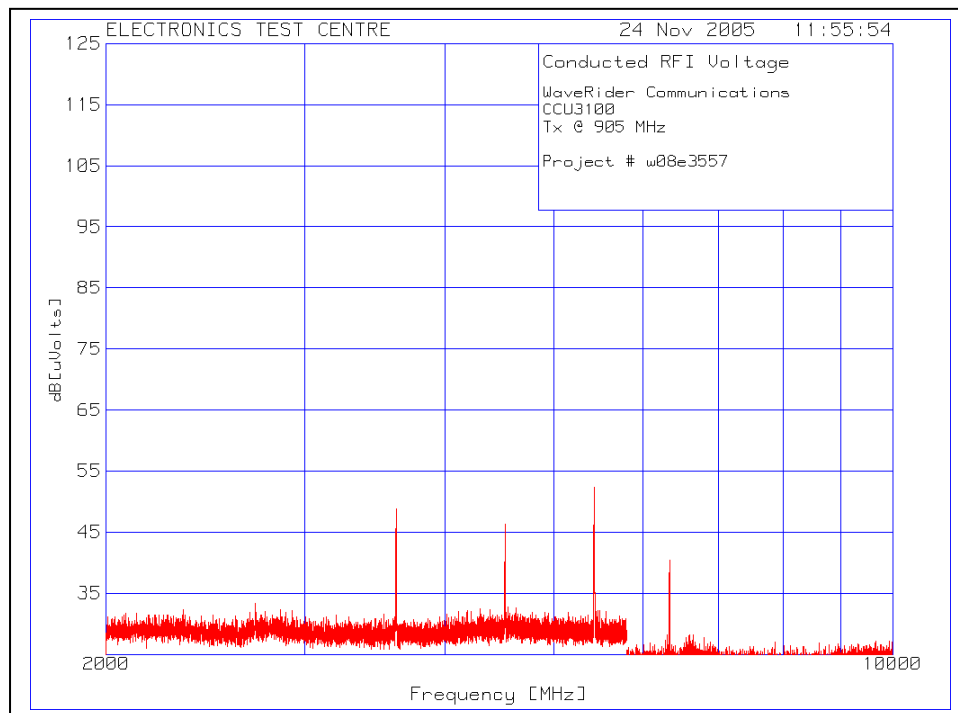
Spectrum Analyzer Plot of Maximum Peak Output Power: Tx @ 925 MHz
Attenuation = 29.65 dB \Rightarrow 27.30 dBm. (Peak detector, Max Hold).



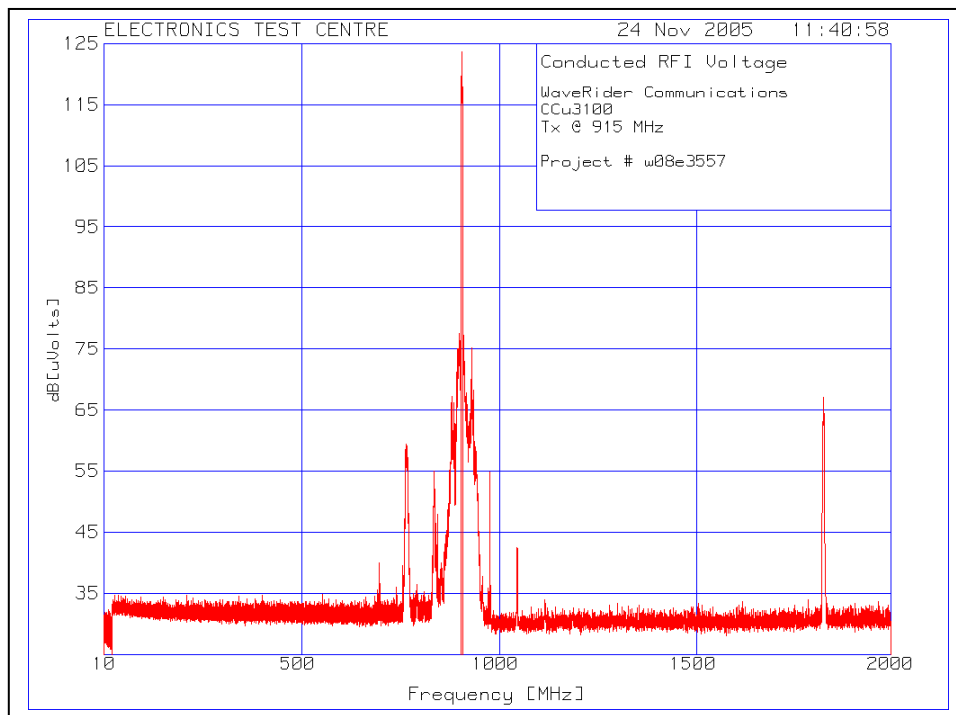
Plot of Conducted Emissions at Antenna Port:
RBW = 100 kHz. VBW = 3 MHz



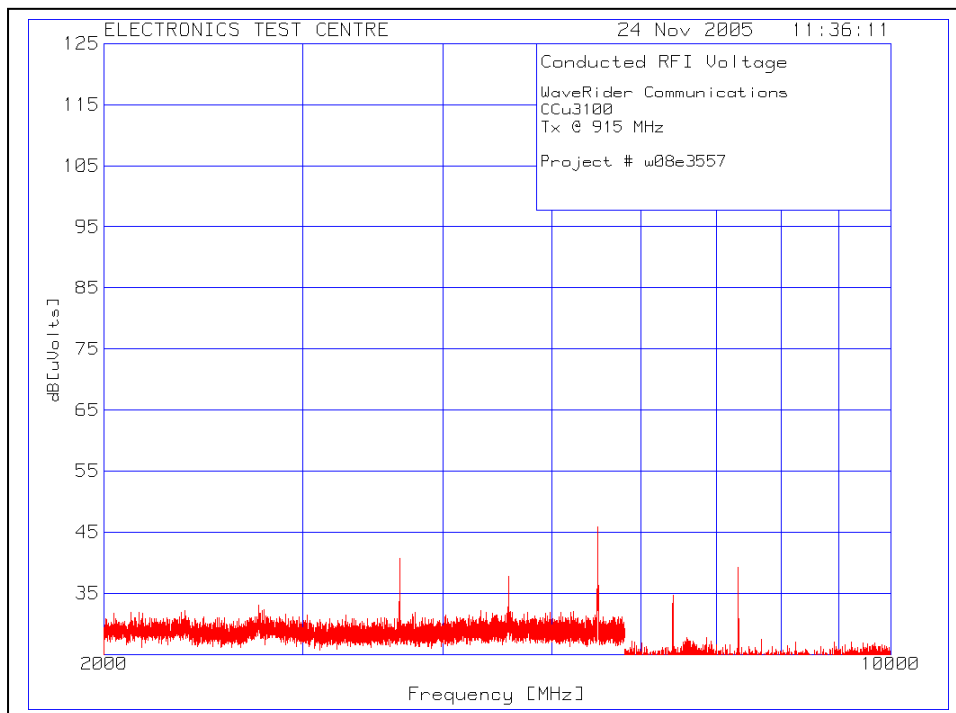
Plot of Conducted Emissions at Antenna Port:
RBW = 100 kHz. VBW = 3 MHz



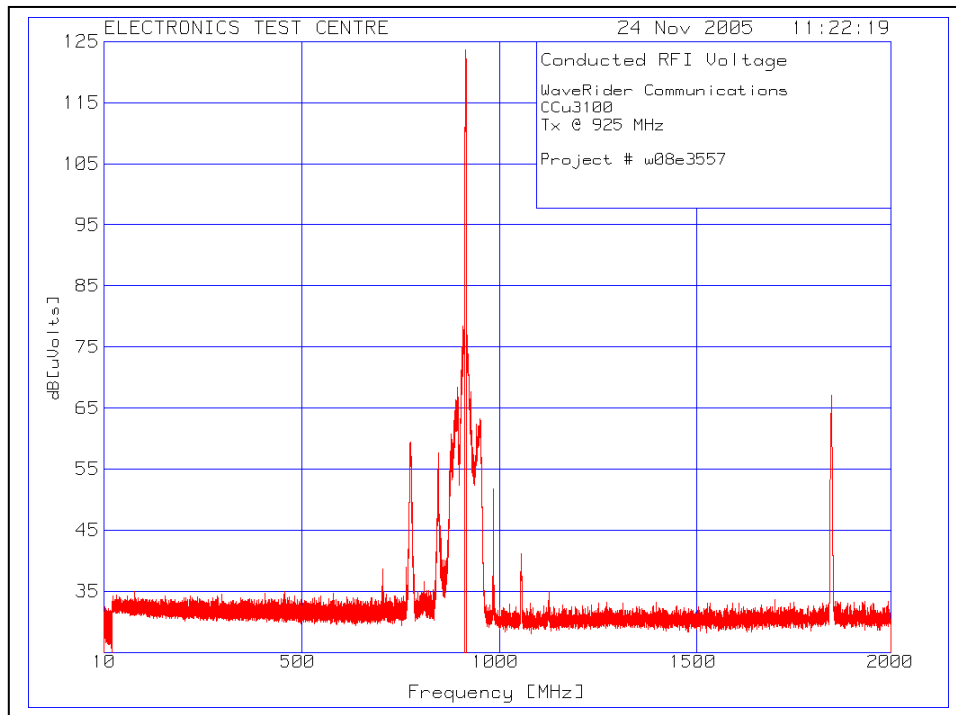
Plot of Conducted Emissions at Antenna Port:
RBW = 100 kHz. VBW = 3 MHz



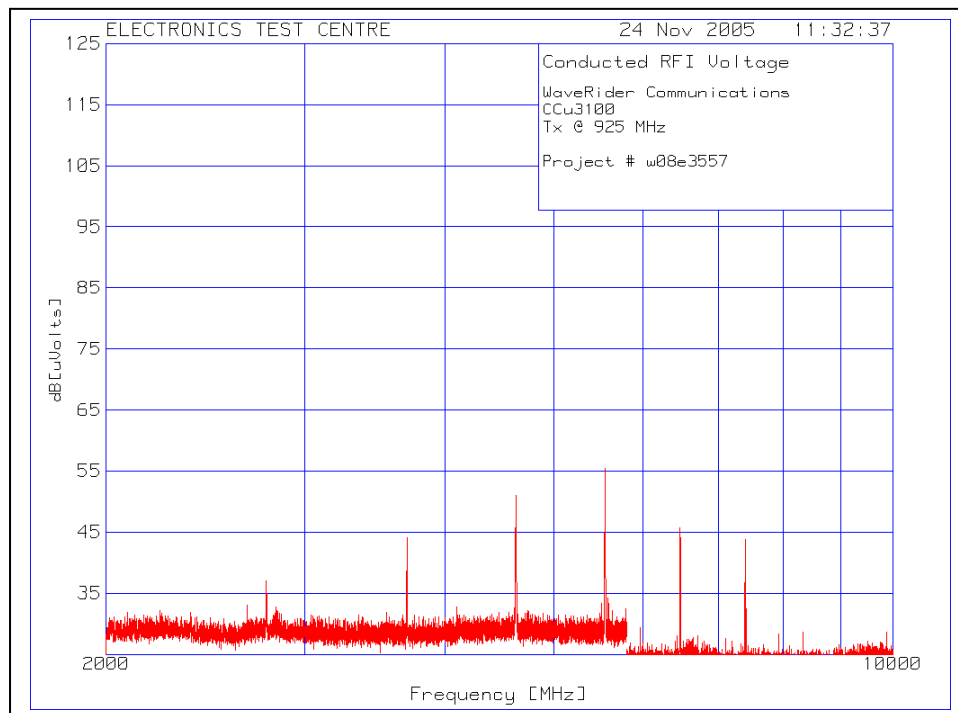
Plot of Conducted Emissions at Antenna Port:
RBW = 100 kHz. VBW = 3 MHz



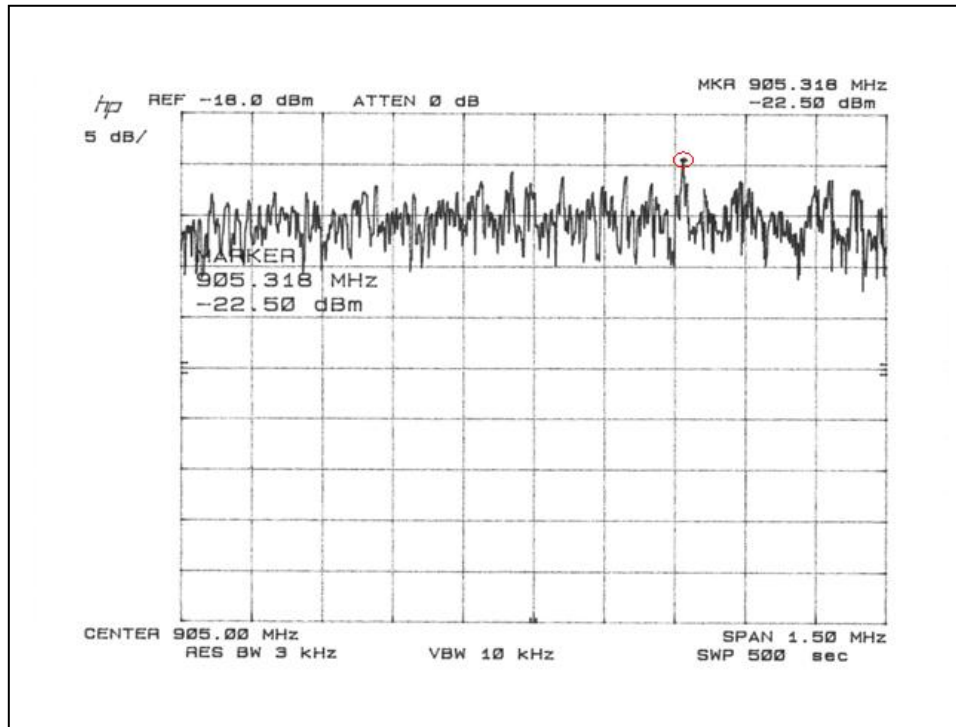
Plot of Conducted Emissions at Antenna Port:
RBW = 100 kHz. VBW = 3 MHz



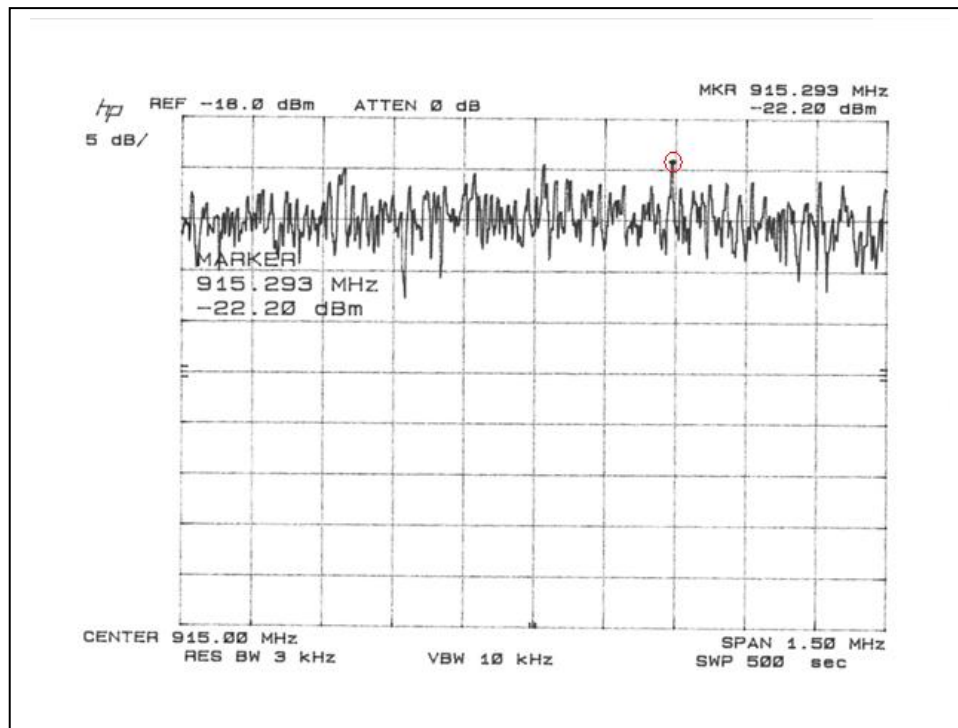
Plot of Conducted Emissions at Antenna Port:
RBW = 100 kHz. VBW = 3 MHz.



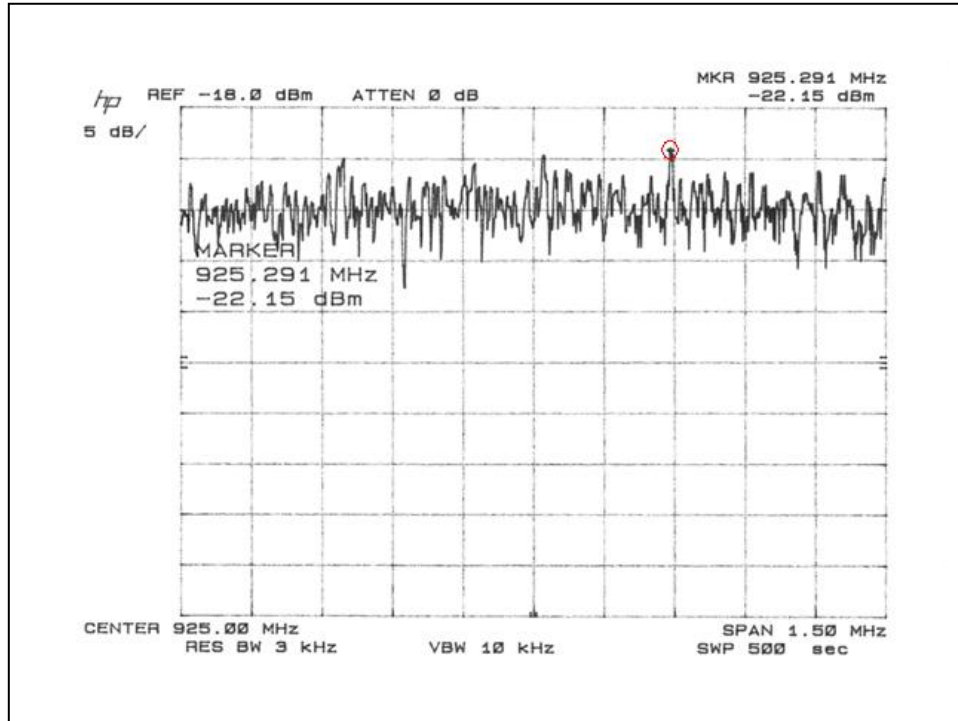
Spectrum Analyzer Plot of Power Spectral Density per Part 15.247(d): Tx @ 905 MHz
Attenuation = 29.65 dB \Rightarrow 7.15 dBm (Peak detector, Max Hold)



Spectrum Analyzer Plot of Power Spectral Density per Part 15.247(d): Tx @ 915 MHz:
Attenuation = 29.65 dB \Rightarrow 7.45 dBm (Peak detector, Max Hold)



Spectrum Analyzer Plot of Power Spectral Density per Part 15.247(d): Tx @ 925 MHz
Attenuation = 29.65 dB \Rightarrow 7.50 dBm (Peak detector, Max Hold)



4.3 RADIATED EMISSIONS INCLUDING RESTRICTED BANDS OF OPERATION

4.3a Receive Mode (Part 15.109)

Test Lab: MPB Technologies Inc. Airdrie Test Personnel: T. Nguyen, H. Shahryar Test Date: 2005/11/24 – 2006/01/12			Product: CCU3100 Wireless Modem		
Test Result, CCU3100 Wireless Modem: PASS					
Objectives/Criteria The Radiated E-Field emissions produced by a system or sub-system, measured at a distance of 3m from the EUT, shall not exceed the limits for the specifications as stated. Emission levels should meet the requirements with a margin of 6dB. The EUT was assessed against the requirements of Class B . Temperature = 20.0 °C Humidity = 20 %			Specification: FCC Part 15 Subpart C		
			Frequency	Class A	Class B
			[MHz]	QP @ 3m	QP @ 3m
			30 – 88	49.54	40.00
			88 – 216	53.98	43.52
			216 – 960	56.90	46.02
			above 960	60.00	53.98
Horizontal:			Vertical:		
Frequency [MHz]	Field Strength [dBμV/m]	Delta [dB from limit]	Frequency [MHz]	Field Strength [dBμV/m]	Delta [dB from limit]
461.9367	38.81	-7.21	-	-	-
There were no more emissions measured within -10 dB of the specified limit. Refer to the test data and plots for more detail.					

Radiated Emissions Data:

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

For example:

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



The applicable Limit

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
Azimuth:	156	The turntable was 156 degrees CW from facing the antenna
Height:	113	The antenna was 113 cm above the ground
Limit: 1	54	The value of Limit 1 at 94.0036 MHz
Margin [dB]	-6.2	The field strength is 6.2 dB below Limit 1
Limit: 2	43.5	The value of Limit 2 at 94.0036 MHz
Margin [dB]	4.3	The field strength is 4.3 dB above Limit 2
Limit: 3	50.5	The value of Limit 3 at 94.0036 MHz
Margin [dB]	-2.7	The field strength is 2.7 dB below Limit 3
Limit: 4	40.5	The value of Limit 4 at 94.0036 MHz
Margin [dB]	7.3	The field strength is 7.3 dB above Limit 4

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

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

WaveRider Communications
CCU3100
Rx @ 915 MHz
Antenna Port terminated
Project # w08e3557V

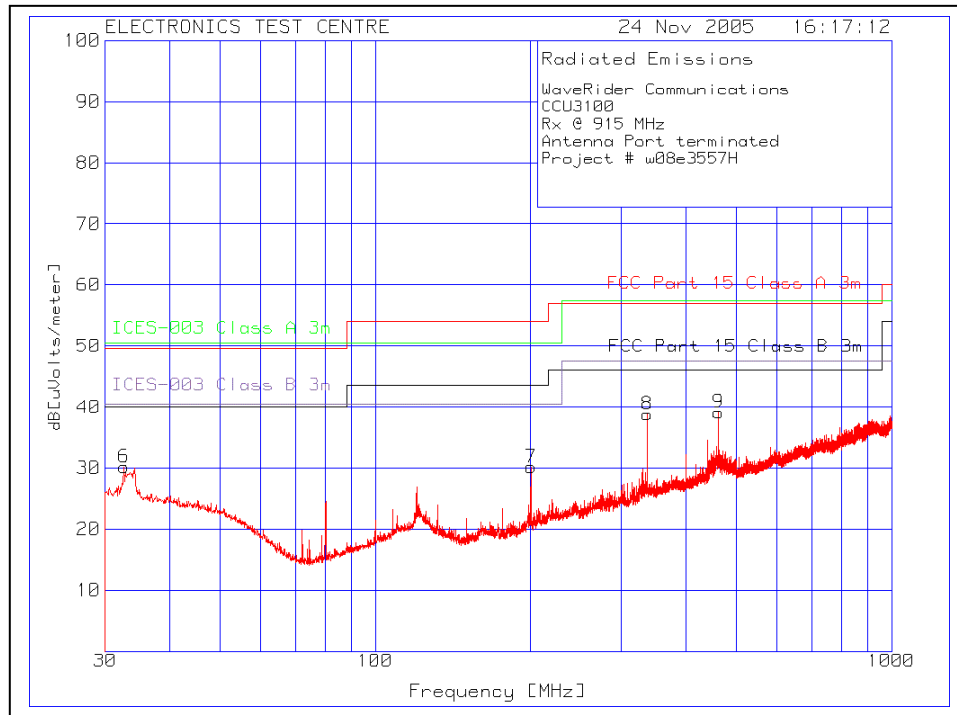
Test Frequency [MHz]	Meter Reading [dB(uV)]	Gain/Loss Factor [dB]	Transducer Factor [dB]	Level dB[uVolts/meter]	Limit:1	2	3	4
=====								
Range: 1 30 - 1000MHz								
33.3281	4.89 qp	1.2	17.9	23.99	49.54	50.46	40	40.46
Azimuth: 223	Height:99	Horz	Margin [dB]:		-25.55	-26.47	-16.01	-16.47
199.9193	11 qp	2.9	10.78	24.68	53.98	50.46	43.52	40.46
Azimuth: 355	Height:173	Horz	Margin [dB]:		-29.3	-25.78	-18.84	-15.78
338.5117	2.12 qp	3.83	15.08	21.03	56.9	57.46	46.02	47.46
Azimuth: 105	Height:102	Horz	Margin [dB]:		-35.87	-36.43	-24.99	-26.43
461.9367	16.76 qp	4.54	17.51	38.81	56.9	57.46	46.02	47.46
Azimuth: 89	Height:102	Horz	Margin [dB]:		-18.09	-18.65	-7.21	-8.65

Range: 1 30 - 1000MHz								
33.6265	5.99 qp	1.2	16.32	23.51	49.54	50.46	40	40.46
Azimuth: 122	Height:100	Vert	Margin [dB]:		-26.03	-26.95	-16.49	-16.95
75.6525	1.53 qp	1.71	6.67	9.91	49.54	50.46	40	40.46
Azimuth: 8	Height:126	Vert	Margin [dB]:		-39.63	-40.55	-30.09	-30.55
79.9293	19.3 qp	1.8	6.51	27.61	49.54	50.46	40	40.46
Azimuth: 329	Height:132	Vert	Margin [dB]:		-21.93	-22.85	-12.39	-12.85
99.9207	17.15 qp	2	10.19	29.34	53.98	50.46	43.52	40.46
Azimuth: 74	Height:108	Vert	Margin [dB]:		-24.64	-21.12	-14.18	-11.12
199.923	8.19 qp	2.9	10.87	21.96	53.98	50.46	43.52	40.46
Azimuth: 110	Height:102	Vert	Margin [dB]:		-32.02	-28.5	-21.56	-18.5

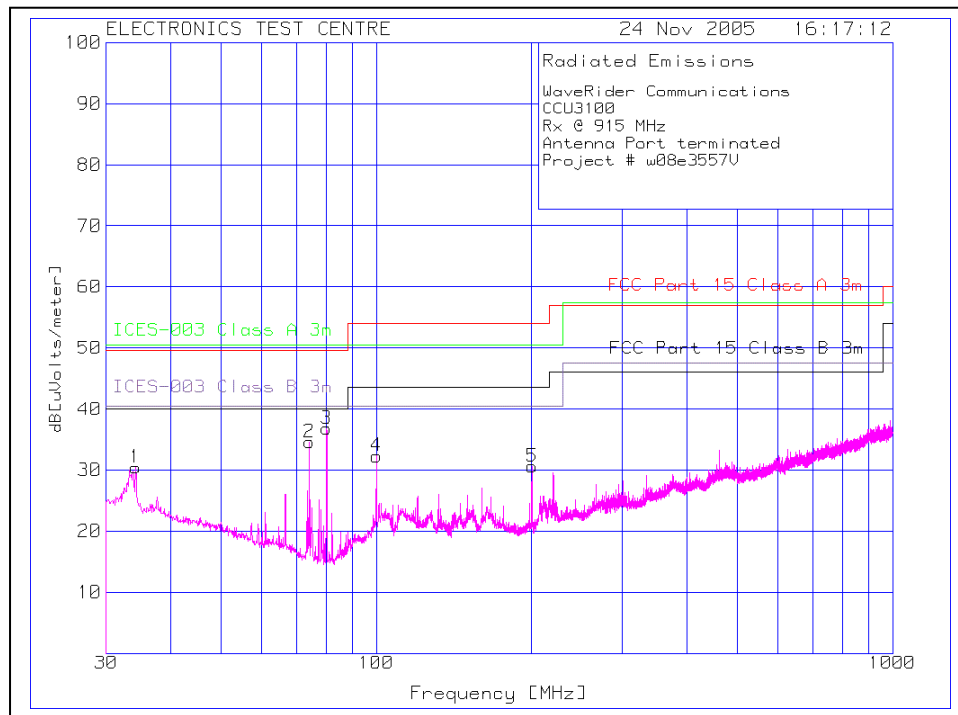
LIMIT 1: FCC Part 15 Class A 3m
LIMIT 2: ICES-003 Class A 3m
LIMIT 3: FCC Part 15 Class B 3m
LIMIT 4: ICES-003 Class B 3m

qp - Quasi-Peak detector

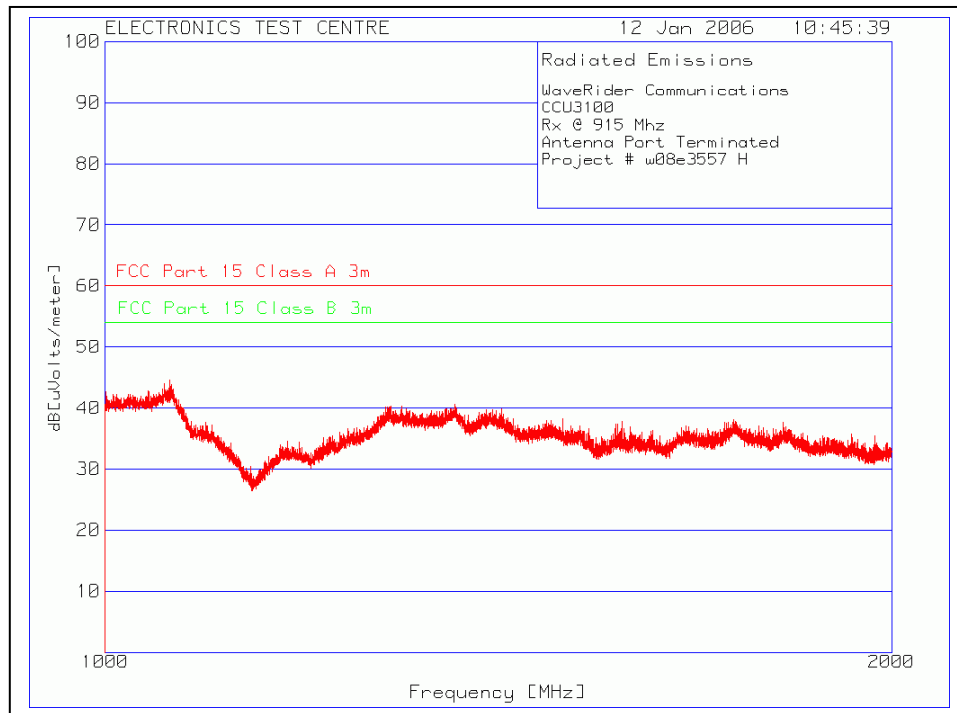
Plot of Radiated Emissions: Horizontal polarization
RBW = 120 kHz. VBW = 3 MHz.



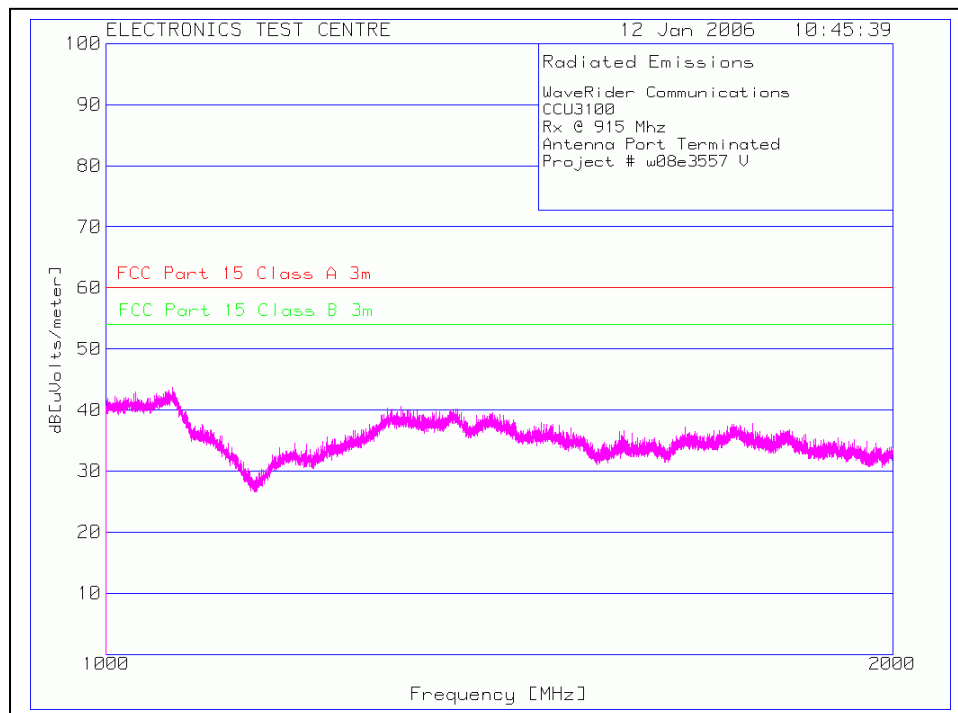
Plot of Radiated Emissions:
RBW = 120 kHz. VBW = 3 MHz.



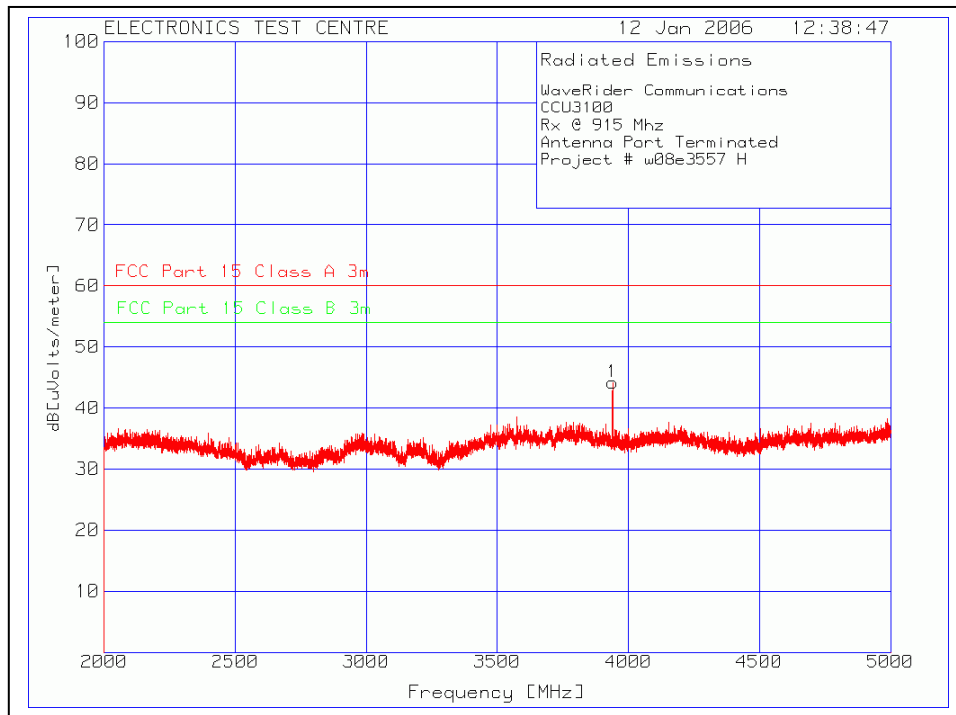
Plot of Radiated Emissions:
RBW = 1 MHz. VBW = 3 MHz.



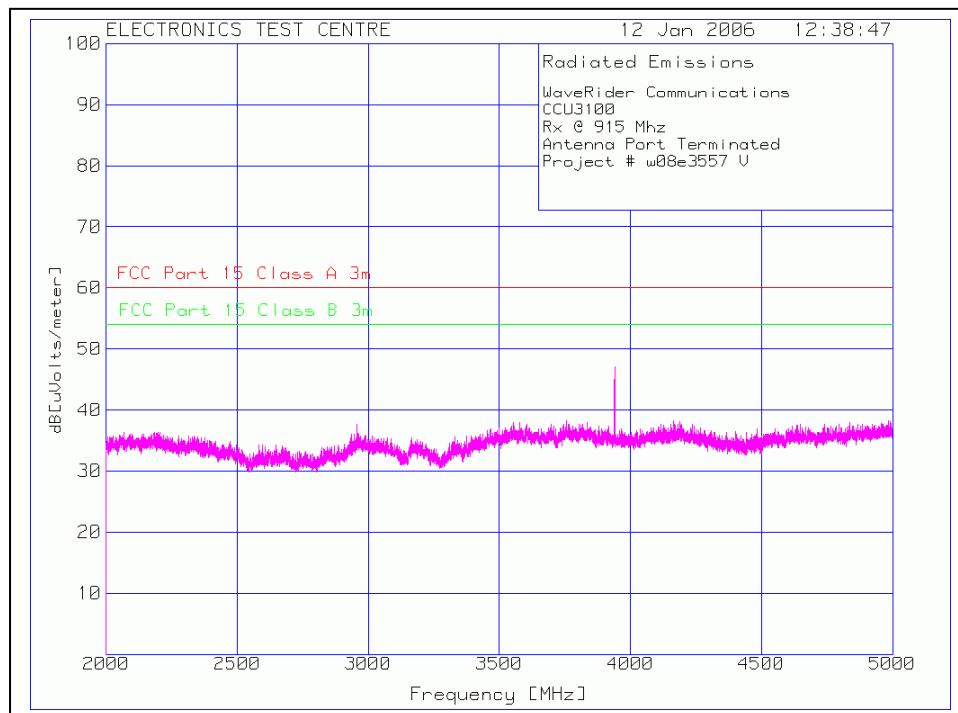
Plot of Radiated Emissions:
RBW = 1 MHz. VBW = 3 MHz.



Plot of Radiated Emissions:
RBW = 1 MHz. VBW = 3 MHz.



Plot of Radiated Emissions:
RBW = 1 MHz. VBW = 3 MHz.



4.3b Transmit Mode (Part 2.1053, 15.205, 15.209 & 15.247)

Test Lab: Electronics Test Centre (Airdrie) Test Personnel: T. Nguyen, H. Shahryar Test Date: 2005/11/24 – 2006/01/12	Product: CCU3100 Wireless Modem																
Test Result, CCU3100 Wireless Modem: PASS																	
The Radiated E-Field emissions produced by EUT, measured at a distance of 3m, shall not exceed these limits within the restricted bands of operation. Any emissions lying outside these bands shall be at least 20 dB down from the level of the fundamental. Attenuation below the limits of 15.209 is not required. Emission levels should meet the requirements with a margin of 6dB.	<table> <tr> <th>Frequency [MHz]</th><th>Limit (QP @ 3m) [dBμV/m]</th></tr> <tr> <td>.009 – 0.490</td><td>88.5 – 53.8</td></tr> <tr> <td>.490 – 1.7</td><td>53.8 – 43</td></tr> <tr> <td>1.7 – 30</td><td>49.50</td></tr> <tr> <td>30 – 88</td><td>40.00</td></tr> <tr> <td>88 – 216</td><td>43.52</td></tr> <tr> <td>216 – 960</td><td>46.02</td></tr> <tr> <td>above 960</td><td>53.98</td></tr> </table>	Frequency [MHz]	Limit (QP @ 3m) [dBμV/m]	.009 – 0.490	88.5 – 53.8	.490 – 1.7	53.8 – 43	1.7 – 30	49.50	30 – 88	40.00	88 – 216	43.52	216 – 960	46.02	above 960	53.98
Frequency [MHz]	Limit (QP @ 3m) [dBμV/m]																
.009 – 0.490	88.5 – 53.8																
.490 – 1.7	53.8 – 43																
1.7 – 30	49.50																
30 – 88	40.00																
88 – 216	43.52																
216 – 960	46.02																
above 960	53.98																

Restricted Bands of Operation per Part 15.205:

MHz	MHz	MHz	MHz	MHz	GHz	GHz
0.0900000 – 0.1100000	8.2910000 - 8.2940000	16.804250 - 16.804750	162.01250 - 167.17000	1660.0000 – 1710.0000	3.6000000 – 4.4000000	14.470000 – 14.500000
0.4950000 - 0.5050000	8.3620000 - 8.3660000	25.500000 - 25.670000	167.72000 - 173.20000	1718.8000 – 1722.2000	4.5000000 – 5.1500000	15.350000 – 16.200000
2.1735000 - 2.1905000	8.3762500 - 8.3867500	37.500000 - 38.250000	240.00000 – 285.00000	2200.0000 – 2300.0000	5.3500000 – 5.4600000	17.700000 – 21.400000
4.1250000 - 4.1280000	8.4142500 - 8.4147500	73.000000 - 74.600000	322.00000 - 335.40000	2310.0000 – 2390.0000	7.2500000 – 7.7500000	22.010000 – 23.120000
4.1772500 - 4.1777500	12.2900000 - 12.2930000	74.800000 - 75.200000	399.90000 – 410.00000	2483.5000 – 2500.0000	8.0250000 – 8.5000000	23.600000 – 24.000000
4.2072500 - 4.2077500	12.519750 - 12.520250	108.00000 - 121.94000	608.00000 – 614.00000	2655.0000 – 2900.0000	9.0000000 – 9.2000000	31.200000 – 31.800000
5.6770000 - 5.6830000	12.576750 - 12.577250	123.00000 - 138.00000	960.00000 – 1240.0000	3260.0000 – 3267.0000	9.3000000 – 9.5000000	36.430000 – 36.500000
6.2150000 - 6.2180000	13.360000 - 13.410000	149.90000 - 150.05000	1300.0000 – 1427.0000	3332.0000 – 3339.0000	10.600000 – 12.700000	Above 38.600000
6.2677500 - 6.2682500	16.420000 - 16.423000	156.52475 - 156.52525	1435.0000 – 1626.5000	3345.8000 – 3358.0000	13.250000 – 13.400000	
6.3117500 - 6.3122500	16.694750 - 16.695250	156.70000 - 156.90000	1645.5000 – 1646.5000	3500.0000 – 3600.0000		

US only

** Canada 108 – 138 MHz

*** Canada 960 – 1427 MHz

**** Canada only

Radiated Emissions Data:

Operation in Restricted Bands: ANTEL antenna

nominal f_c (MHz)	f (MHz)	Field Strength (Average) (dB μ V/m)	Limit (Average) (dB μ V/m)	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	3619.4030	41.91	53.98	- 12.07	H	142	325
905	3620.222	49.81	53.98	- 4.17	V	111	0
905	4525.1500	49.27	53.98	- 4.71	H	144	323
905	4525.2200	51.70	53.98	- 2.28	V	150	355
905	5429.8740	42.04	53.98	- 11.94	H	104	358
905	5429.8920	41.80	53.98	- 12.18	V	112	0
915	3660.4320	46.04	53.98	- 7.94	H	114	320
915	3660.0660	51.46	53.98	- 2.52	V	106	0
915	4575.2760	53.21	53.98	- 0.77	H	125	322
915	4574.9360	52.54	53.98	- 1.44	V	132	353
925	3699.9160	46.77	53.98	- 7.21	H	135	320
925	3700.2520	49.90	53.98	- 4.08	V	99	358
925	4624.8920	50.26	53.98	- 3.72	H	122	314
925	4624.6400	53.81	53.98	- 0.17	V	131	24

Note: The EUT faces the measuring antenna at 0 ° of turntable azimuth.

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

Operation in Restricted Bands: Swedcom antenna

nominal f_c (MHz)	f (MHz)	Field Strength (Average) (dB μ V/m)	Limit (Average) (dB μ V/m)	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	3619.6860	50.40	53.98	- 3.58	H	102	241
905	3619.9796	52.71	53.98	- 1.27	V	120	53
905	4524.9510	52.24	53.98	- 1.74	H	141	83
905	4525.0050	51.00	53.98	- 2.98	V	118	335
905	5430.6030	52.24	53.98	- 1.74	H	121	27
905	5430.3990	50.40	53.98	- 3.58	V	151	36
915	3660.2940	49.84	53.98	- 4.14	H	175	62
915	3660.1080	52.56	53.98	- 1.42	V	108	327
915	4575.0830	51.91	53.98	- 2.07	H	109	326
915	4575.0290	51.65	53.98	- 2.33	V	117	335
915	5490.2418	50.30	53.98	- 3.68	H	118	335
915	5490.2420	49.23	53.98	- 4.75	V	121	188
925	3699.6930	52.97	53.98	- 1.01	H	117	327
925	3700.3830	53.80	53.98	- 0.18	V	102	38
925	4625.9900	47.46	53.98	- 6.52	H	377	153
925	4624.7960	52.91	53.98	- 1.07	V	128	6

Note: The EUT faces the measuring antenna at 0 ° of turntable azimuth.

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

Operation in Restricted Bands: TilTek antenna, Horizontal polarization

nominal f_c (MHz)	f (MHz)	Field Strength (Peak) (dB μ V/m)	Limit (Average) (dB μ V/m)	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	3620.4580	45.91	53.98	- 8.07	H	137	152
905	3619.9170	49.21	53.98	- 4.77	V	149	133
905	4525.2600	46.77	53.98	- 7.21	H	115	165
905	4524.9240	49.79	53.98	- 4.19	V	139	140
915	3659.8520	45.34	53.98	- 8.64	H	137	152
915	3659.8320	44.95	53.98	- 9.03	V	165	13
915	4575.0620	46.11	53.98	- 7.87	H	143	52
915	4574.8980	46.54	53.98	- 7.44	V	211	87
925	3700.3530	45.87	53.98	- 8.11	H	110	154
925	3699.4660	46.19	53.98	- 7.79	V	111	322
925	4625.2420	48.66	53.98	- 5.32	H	139	51
925	4624.9400	50.22	53.98	- 3.76	V	138	136

Note: The EUT faces the measuring antenna at 0 ° of turntable azimuth.

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

Operation in Restricted Bands: TilTek antenna, Vertical polarization

nominal f_c (MHz)	f (MHz)	Field Strength (Peak) (dB μ V/m)	Limit (Average) (dB μ V/m)	Delta (dB)	Antenna Polarization	Antenna Height (cm)	Azimuth (Degrees)
905	3619.6330	46.90	53.98	- 7.08	H	178	332
905	3619.9340	48.91	53.98	- 5.07	V	156	97
905	4525.4250	45.37	53.98	- 8.61	H	159	239
905	4525.1160	47.70	53.98	- 6.28	V	159	239
915	3659.9800	44.05	53.98	- 9.93	H	183	137
915	3659.7420	44.85	53.98	- 9.13	V	127	250
915	4575.0660	46.10	53.98	- 7.88	H	140	52
915	4575.1010	47.05	53.98	- 6.93	V	148	83
925	3699.9870	44.47	53.98	- 9.51	H	113	127
925	3699.9990	44.30	53.98	- 9.68	V	115	247
925	4625.1400	49.16	53.98	- 4.82	H	141	52
925	4324.8290	49.91	53.98	- 4.07	V	184	84

Note: The EUT faces the measuring antenna at 0 ° of turntable azimuth.

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

ANTEL Antenna

Carrier and spurious emissions:

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

Investigation was performed up to 9.5 GHz

ERP of all spurious emissions was found to be less than – 33 dBm

Swedcom Antenna

Carrier and spurious emissions:

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

Investigation was performed up to 9.5 GHz

ERP of all spurious emissions was found to be less than – 33 dBm

TiITek Antenna, Horizontal Polarization

Carrier and spurious emissions:

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

Investigation was performed up to 9.5 GHz

ERP of all spurious emissions was found to be less than – 33 dBm

TiITek Antenna, Vertical Polarization

Carrier and spurious emissions:

Total attenuation between the modem RF port and the antenna during measurement:

905 MHz: 4.24 dB

915 MHz: 4.20 dB

925 MHz: 4.22 dB

Investigation was performed up to 9.5 GHz

ERP of all spurious emissions was found to be less than – 33 dBm

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 in accordance with WaveRider Communications Inc. 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

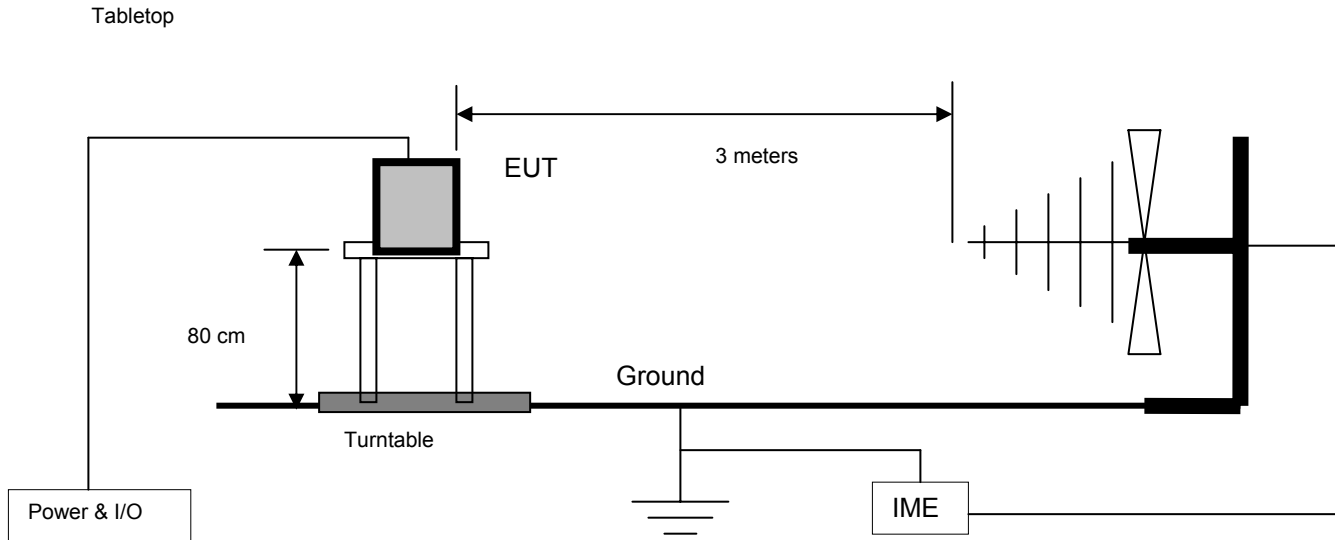
Ambient conducted and radiated electromagnetic emission profiles were generated throughout the tests and are included in the test data.

5.5 TEST CONFIGURATION

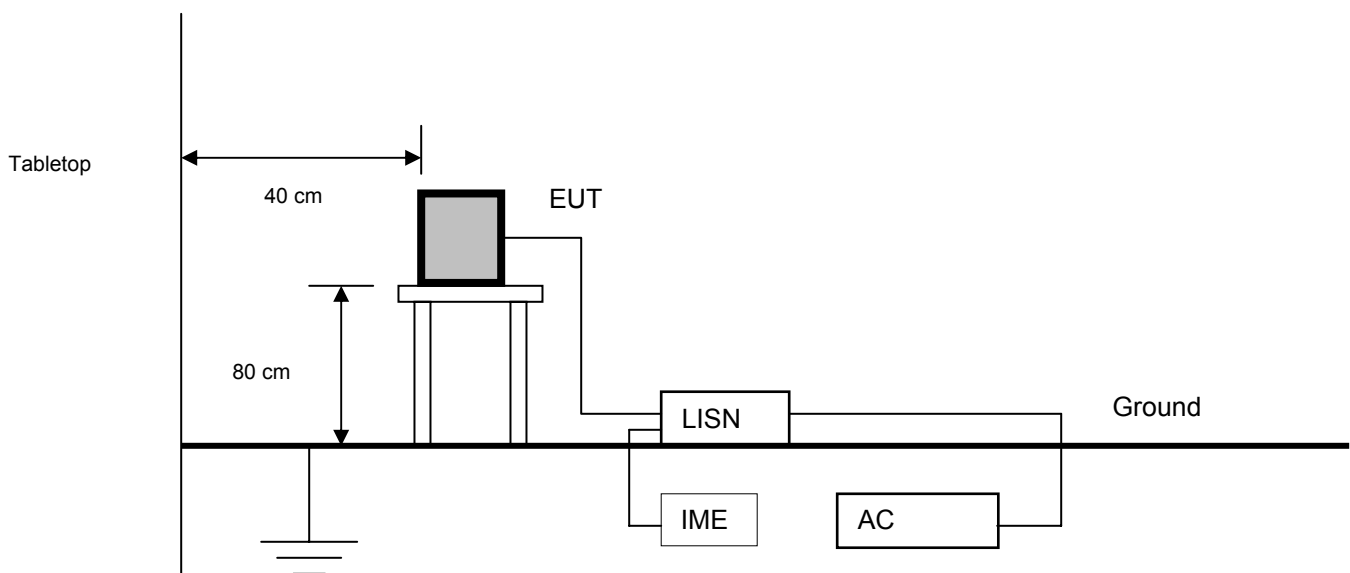
5.5.1 Tabletop Equipment

The following diagrams illustrate the configuration of the EUT test and measurement equipment for Radiated and Conducted Emissions Testing of tabletop 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) DRG horn antenna (1 – 18 GHz)
- f) Antenna mast positioner and controller
- g) Flush-mounted turntable and controller
- h) 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) Power Isolation Transformers
- 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

Testing was performed with equipment selected from the following list.

Instrument	Manufacturer	Model No.	Asset No.	Calibration Due
Spectrum Analyzer & Display	Hewlett Packard	8566B & 85662	9565	26 April 2006
Spectrum Analyzer & Display	Hewlett Packard	8566B & 85662	9168	7 September 2006
RF Preselector	Hewlett Packard	85685A	9728	8 September 2006
RF Preselector	Hewlett Packard	85685A	4464	26 April 2006
Quasi-Peak Adapter	Hewlett Packard	85650A	4411	26 April 2006
Quasi-Peak Adapter	Hewlett Packard	85650A	9243	8 September 2006
Measurement System Software	Underwriters Laboratories	Version 6.0	4443	n/a
Inverter (single phase)	California Instruments	5000iX	4378	6 September 2007
Low Noise Amplifier	MITEQ	JS43-01001800-21-5P	4354	7 January 2007
Line Impedance Stabilization Network	EMCO	3825/2r	9331	5 January 2007
Line Impedance Stabilization Network	EMCO	3825/2r	9259	5 January 2007
Line Impedance Stabilization Network	EMCO	38100/1SPEC	9331	5 January 2007
Line Impedance Stabilization Network	EMCO	38100/1SPEC	9259	5 January 2007
Active Monopole	EMCO	3301B	9764	21 July 2007
Biconilog Antenna	ARA	LPB-2520/A	4318	7 January 2007
Biconical Antenna	EMCO	3104	9257	12 January 2007
Log-periodic Array	EMCO	3147	20721	18 January 2007
DRG Horn	EMCO	3106	9699	10 August 2007
DRG Horn	Tensor	4106	9576	11 January 2007
DRG Horn	EMCO	3115	9588	5 January 2007
Low Noise Amplifier	MITEQ	JS43-01001800-21-5P	4354	7 January 2007

Appendix A

CCU3100 Wireless Modem

Test Sample Description (from data provided by WaveRider Communications Inc.)

CLIENT SAMPLE DESCRIPTION

Company Name : WaveRider Communications (Canada) Inc.		Contact Name : Lawrence Gordon
Address : Ste. 4, 6110-1A Street SW		Phone : 403-770-1026 or 403-253-5366
Calgary, AB, T2H 0G3		Fax : 403-253-5366
		E-mail : lgordon@waverider.com
Product Name: CCU3100		# of units to be tested : 1
Product Application Commercial <input checked="" type="radio"/> Military <input type="checkbox"/>	Designated Marketplaces Canada <input checked="" type="radio"/> Other <input type="checkbox"/> United States of America <input checked="" type="radio"/> European Union <input type="checkbox"/>	

GENERAL INFORMATION REQUIRED FOR ALL PRODUCTS

Dimensions (L x W x H) 6 x 6 x 2 inches		Weight: 1 kgs.			
Power Requirements: AC <input checked="" type="radio"/>		Voltage: 100-250 VAC	# of AC phases: 1	current: <0.4 Amps	frequency: 47-63 Hz
DC <input type="checkbox"/>		Voltage: VDC		current: Amps	
Duration of self-test : 10 s		Fault Recovery Time: na		Reaction Time (delay between fault & alarm): na	
Product Intended Application ;		Wireless Internet Base Station Modem in 902-927 MHz ISM band			
Product Deployment Environments		Professionally installed on radio towers, masts, etc.			
Operating Modes in the Field		Continuously receiving except when transmitting packets. Transmission time is approx 1 to 5 msec, with interpacket gap of about 0.8 msec (min.).			
Description of interconnecting leads & cables (Attach separate sheet, if required)	Type:	Cable 1 AC power	Cable 2 RF Coax LMR-200	Cable 3 Ethernet	Cable 4 Ethernet with 48 VDC power
	Connectors:	AC plug / IEC 3 prong connector	N-type	RJ-45	RJ-45
	Terminations :				
	Shielding:	None	Coax	none	none
	Length:	~2 m	<= 3m	~3m	~3 m
List of internally generated frequencies: Crystal / Oscillator / Switcher / LO		11 MHz (DSSS BBP) 22 MHz (microprocessor) 25 MHz (Ethernet reference) 44 MHz (synthesizer and reference oscillator) 70 MHz (Intermediate Frequency) 140 MHz (IF Oscillator) 905 – 925 MHz (RFLO – IF) 975 – 995 MHz (Radio Frequency Local Oscillator)			

Typical installation and operating instructions/configuration to expedite EUT set-up (Attach a Separate sheet, if required)	Connected via an Ethernet cable (Cable 3) to a personal computer or an Ethernet router. Connect PoE Injector to AC mains (Cable 1). Connect PoE Injector to Modem (Cable 4). Connect Modem to antenna using Cable 2 plus whatever length of RF cable is needed to get to antenna. Antenna is fixed mounted.
Brief Functional description of Product including System Block Diagram (Attach a Separate sheet, if required)	The CCU3100 is based on currently verified EUM3006. It is a 900MHz radio module intended to be the base station / access point to provide connectivity between an end-user's computer and an Internet Service Provider. It is a single PCB wireless solution based on the Intersil PRISM II Direct Sequence Chip Set. Data from the I/O port is spread using a defined PN code and then modulated using CCK modulation. The modulated signal is then up-converted to the 900MHz band. In receive mode, the signal from the antenna port is amplified and then down converted to an IF frequency of 70MHz before it is demodulated and despread. The CCU3100 is intended for professional installation on radio towers or masts.

CLIENT SAMPLE DESCRIPTION
WIRELESS PRODUCT INFORMATION

Type of Radio Device (check all applicable Equipment Configurations)

Intentional transmitter <input checked="" type="radio"/>	Receiver <input checked="" type="radio"/>	Transceiver <input type="checkbox"/>
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Type of Radio Operating License

Unlicensed Personal Communication (902-927 MHz ISM) <input checked="" type="radio"/>	Unlicensed National Information Infrastructure <input type="checkbox"/>	Ultra-Wideband Operation <input type="checkbox"/>	Licensed <input type="checkbox"/>
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Type of Modulation of Radio Device

CDMA <input type="checkbox"/>	TDMA <input type="checkbox"/>	Other <input type="checkbox"/>
Spread Spectrum Technology <input checked="" type="radio"/>	Direct sequencer <input type="checkbox"/>	Frequency hopper <input type="checkbox"/>
Transmitter Power Output : 27 dBm	Emission Designator : 4M25G1D	

Information on Radio Frequencies

Transmitter Operating Frequency(s) & Bandwidth	905-925 MHz, 5.5 MHz full band, 2.8 MHz per 15.247(a) testing
Transmitter Channel Frequencies & separations (If required, attach a separate sheet)	905 to 925 in 0.2 MHz spacings. Typical testing is at 905, 915, 925 MHz, which provides 3 non-overlapping channels.
Receiver Operating Frequency(s) & Bandwidth	Same as TX
Receiver Channel Frequencies & separations (If required, attach a separate sheet)	Same as TX

Information on Antenna(s)

Is the antenna removable? YES <input checked="" type="radio"/> NO <input type="checkbox"/>	Antenna Connector Type : N-F	Number of Antennas : 3
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Gain of Each Antenna (and tolerance)	<p>There are current 3 antenna types specified for the CCU3100 Base Station. The highest gain version of each type is to be tested.</p> <p>1) Omni directional dipole – 12.2 dBi – 11’2” high</p> <p>2) Stacked vertical dipoles with reflector (100 degree sector) – 15 dBi – 7’ high</p> <p>3) Stacked horizontal dipoles with reflector – 13.7 dBi – 6’ high.</p>
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Radio Transmission Type

Radio Transmission Type		
Continuous <input type="checkbox"/>	Intermittent <input checked="" type="checkbox"/>	ON Time/ OFF Time : 5 ms / 0.8 ms (worst case)
Activity and State of Digital Circuitry during OFF Time	Attempting to receive data	
Activity and State of Digital Circuitry during ON Time	Formatting packet for transmission	
<p>Pre-Approved Radio Systems & Sub-Assemblies – The CCU3100 is based on EUM3006 (FCC ID: OOX-EUM3006), but we wish a separate FCC ID for the CCU3100. We use Curtis-Straus as our TCB</p>		
Prepared By: Lawrence Gordon	Title: Sr. Technical Design Lead	Date: 15 Nov 2005