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Test Report: 94969-1TRFWL


Applicant: Lotek Wireless Inc.
115 Pony Drive
Newmarket, ON
L3Y 7B5

Apparatus: BIOTRACK Tracking receiver

FCC ID: FW9BIOTRACKER

In Accordance With: FCC Part 15 Subpart B, 15.107 and 15.109
Unintentional Radiators

Tested By: Nemko Canada Inc.
303 River Road
Ottawa, Ontario
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Authorized By: 
Roman Kuleba, Wireless Specialist

Date: October 31, 2007

Total Number of Pages: 23

Report Summary

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart B. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.

The assessment summary is as follows:

Apparatus Assessed:	BIOTRACK Tracking receiver
Specification:	FCC Part 15 Subpart B, 15.107 and 15.109
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None
Report Release History:	Original Release

Author: Jason Nixon, Telecom Specialist

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

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Section 1 : Equipment Under Test

1.1 Product Identification

The Equipment Under Test was identified as follows:

BIOTRACK tracking receiver

1.2 Samples Submitted for Assessment

The following samples of the apparatus have been submitted for type assessment:

Sample No.	Description	Serial No.
1	BIOTRACK tracking receiver	001
2	Monopole antenna	None
3	Base for antenna	None
4	AC Power adapter (M/N: PSA-10P-12)	None
5	Headphones	None

The first samples were received on: October 17, 2007

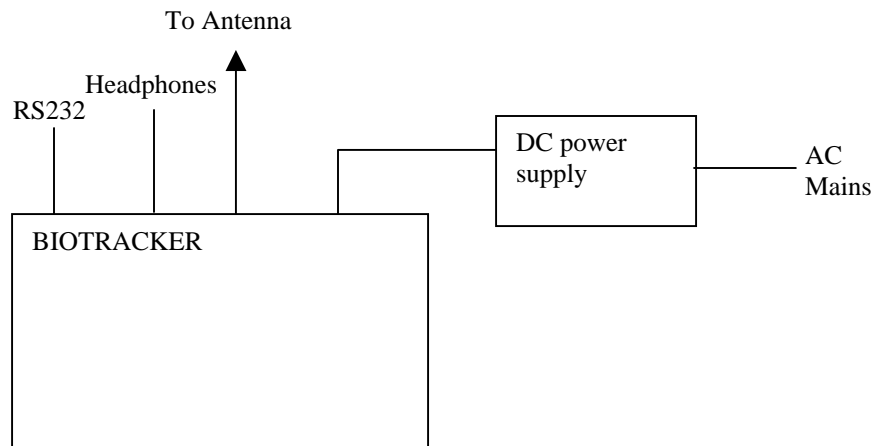
1.3 Theory of Operation

The EUT is used for tracking tags, which emit a 20msec pulse of RF energy. The pulse of energy is then converted to an audible beep. The EUT can be operated in Scan mode or on fixed frequencies. The fixed frequencies can also be selected using a PC connected to the RS232 port of the EUT.

1.4 Technical Specifications of the EUT

Receive Frequencies:	138.000-173.999MHz
Receiver Type:	Superheterodyne
Receiver LO:	148.700-184.699MHz
Antenna Data:	2dBi Monopole antenna
Power Source:	4.8VDC NiMH internal battery with external 12VDC power supply for charging.
Software Version:	4.9

1.5 Block Diagram of the EUT



Section 2 : Test Conditions

2.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart B, 15.107 and 15.109
Unintentional Radiators

2.2 Deviations From Laboratory Test Procedures

No deviations were made from laboratory test procedures.

2.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	15 – 30 °C
Humidity range	:	20 - 75 %
Pressure range	:	86 - 106 kPa
Power supply range	:	+/- 5% of rated voltages

2.4 Measurement Uncertainty

Nemko Canada measurement uncertainty has been calculated using guidance of UKAS LAB 34:2003 and TIA-603-B Nov 7, 2002. All calculations have been performed to provide a confidence level of 95% and can be found in Nemko Canada document MU-003.

2.5 Test Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next Cal.
Spectrum Analyzer	Rohde & Schwarz	FSU46	FA001877	Jan 16/08
Radiocommunication analyzer	Rohde & Schwarz	CMTA54	FA001317	Sept 11/08
Signal Generator	Rohde & Schwarz	SMIQ06B	FA001878	Sept 4/08
Combiner	Mini-circuits	ZA3PD-2	FA001155	COU
Signal Generator	Rohde & Schwarz	SMR40	FA001879	Aug 8/08
Signal Generator	HP	33120A	FA001082	Aug 10/08
Spectrum Analyzer	HP	8565E	FA000981	Oct 11/08
Transient Limiter	HP	11947A	FA000975	Sept 11/08
Cable set 1	—	—	—	Sept 11/08
LISN	EMCO	4825/2	FA001545	Aug 29/08
Receiver	Rohde & Schwarz	ESHS 10	FA001918	Sept 5/08
Electro-Magnetic Interference Test Chamber	TDK	SAC-3	FA002047	May 19/08
Biconical	Sunol	BC2	FA002078	July 25/08
Log Periodic Antenna	Sunol	LP5	FA002077	July 25/08
Flush Mount Turntable	Sunol	FM2022	FA002082	NCR
Controller	Sunol	SC104V	FA002060	NCR
Mast	Sunol	TLT2	FA002061	NCR
LISN	Rohde & Schwarz	ENV216	FA002023	Sept. 04/08
Receiver/Spectrum Analyzer	Rohde & Schwarz	ESU	FA002043	Oct. 24/07
50 Coax cable	HUBER + SUHNER	None	FA002074	July 03/08

COU – Calibrate on Use

NCR – No Calibration Required

2.6 Support Equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.
Laptop	IBM	T23	FA001894
Laptop power supply	IBM	02K6657	1Z0ZA026ECS
Mouse	Compaq	MUS9JN	None

Section 3 : Observations

3.1 Modifications Performed During Assessment

No modifications were performed during assessment.

3.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

3.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

3.4 Test Deleted

No Tests were deleted from this assessment.

3.5 Additional Observations

There were no additional observations made during this assessment.

Section 4 : Results Summary

This section contains the following:

FCC Part 15 Subpart B : Test Results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

- N No : not applicable / not relevant.
- Y Yes : Mandatory i.e. the apparatus shall conform to these tests.
- N/T Not Tested, mandatory but not assessed. (See section 3.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

4.1 FCC Part 15 Subpart C : Test Results

Part 15	Test Description	Required	Result
15.107(a)	Conducted Emissions for Class B	Y	PASS
15.109(a)	Radiated Emissions for Class B	Y	PASS
15.121(b)	Scanning receivers and frequency converters used with scanning receivers	Y	PASS

Notes:

Appendix A : Test Results

Clause 15.107(a) Conducted Emissions

Frequency of Conducted limit (dB μ V)		
Emission (MHz)	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50
* Decreases with the logarithm of the frequency.		

Test Conditions:

Sample Number:	1	Temperature (°C):	22
Date:	October 23, 2007	Humidity (%):	30
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	Shielded room

Test Results: See Attached Plots and Table

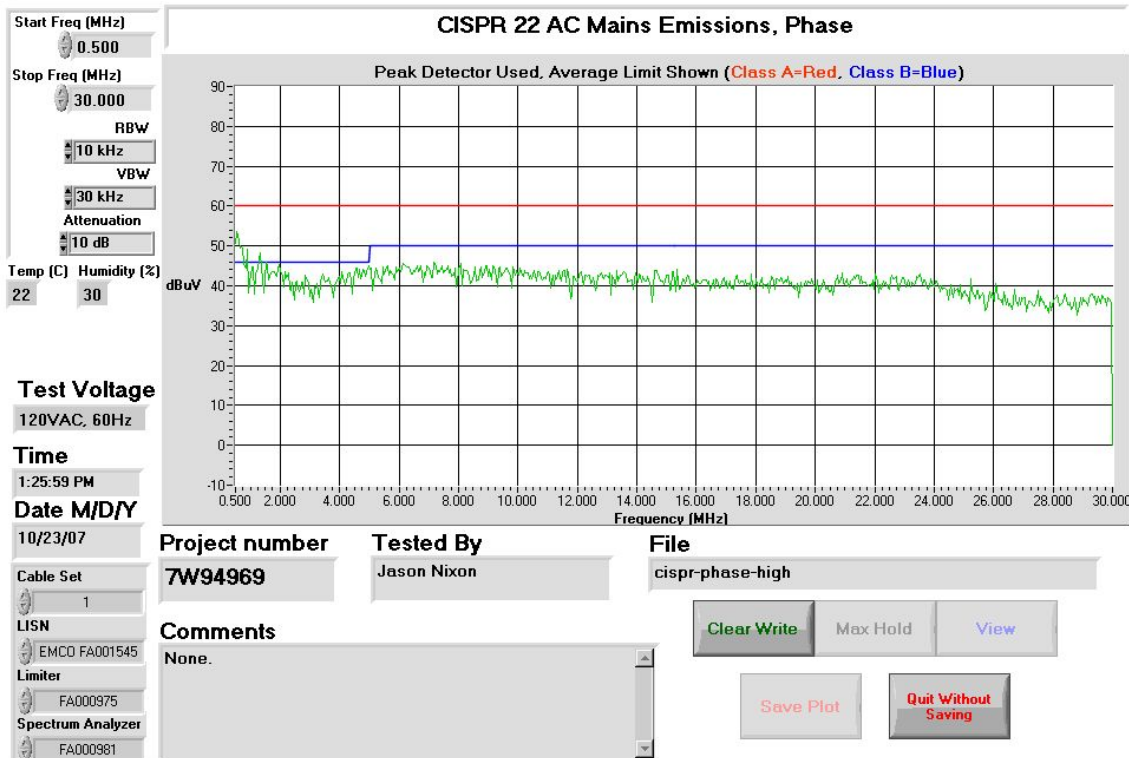
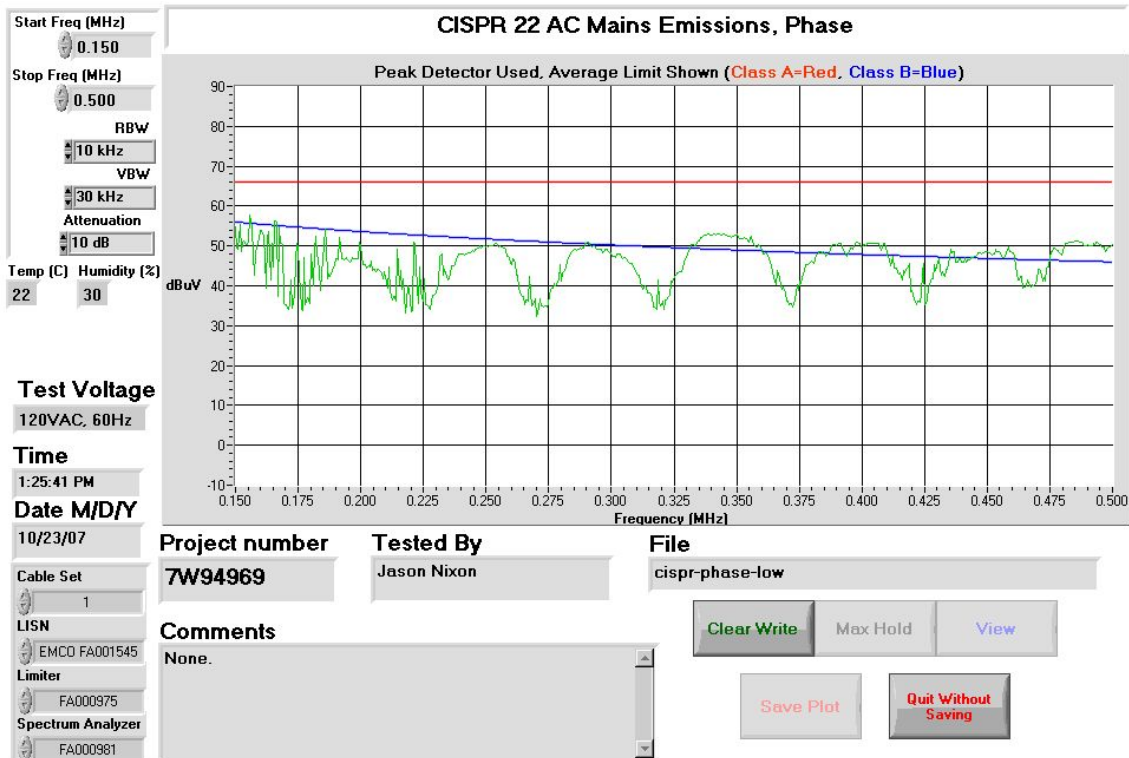
Additional Observations:

All plots were taken using a 10kHz RBW/30kHz VBW Peak detector and compared to the average limit. The plots have been corrected with the LISN, cable and limiter losses to show compliance.

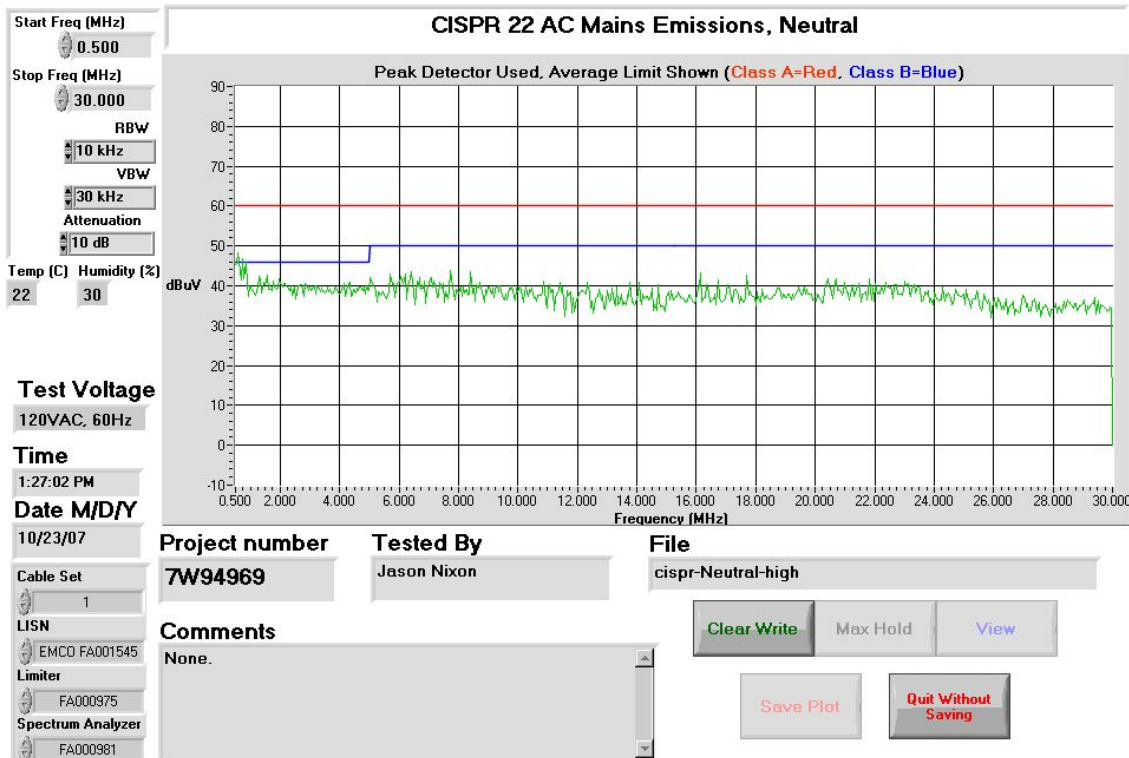
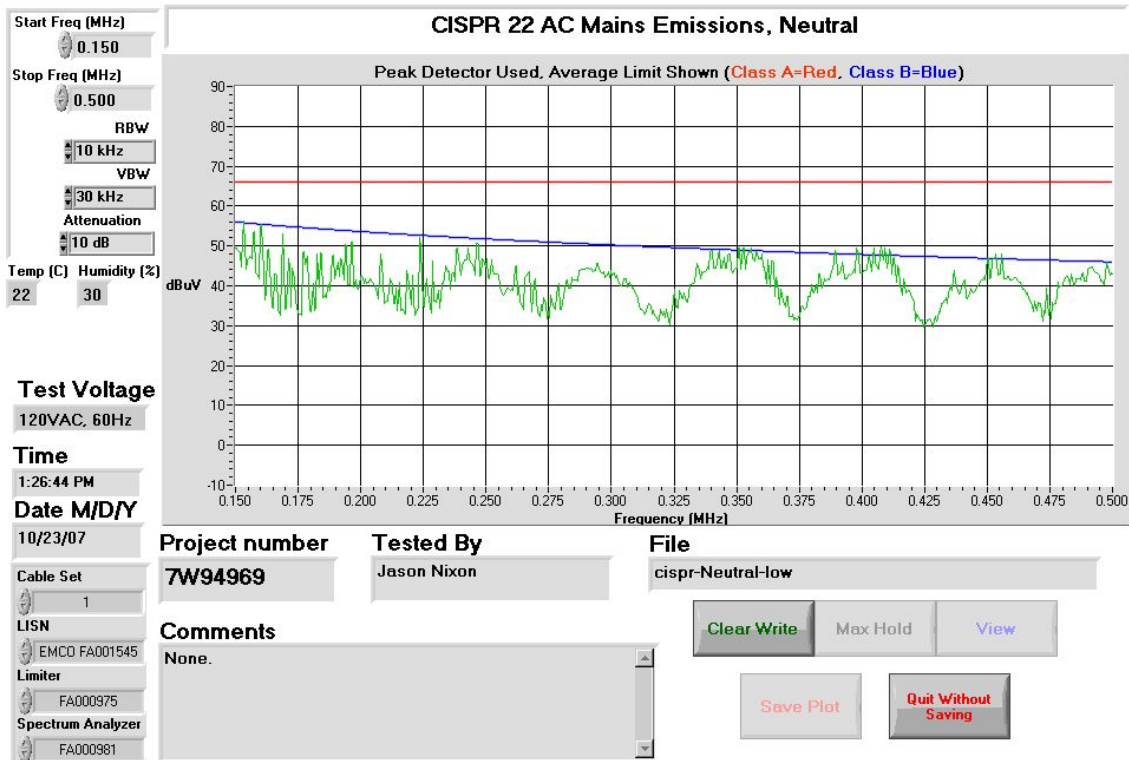
Tabular results were taken with a receiver having a 10kHz Quasi-peak or Average detector.

Conductor		Frequency (MHz)	Detector	Emission Level (dBuV)	LISN Loss (dB)	Cable Loss (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)
1	Neutral	0.1568	Quasi Peak	43.3	0.1	0.1	43.5	65.6	22.1
			Average	24.1	0.1	0.1	24.3	55.6	31.3
2	Neutral	0.1700	Quasi Peak	41.0	0.1	0.1	41.2	65.0	23.7
			Average	17.3	0.1	0.1	17.5	55.0	37.4
3	Neutral	0.2262	Quasi Peak	33.3	0.1	0.1	33.5	62.6	29.1
			Average	10.7	0.1	0.1	10.9	52.6	41.7
4	Neutral	0.3577	Quasi Peak	42.7	0.1	0.1	42.9	58.8	15.9
			Average	29.7	0.1	0.1	29.9	48.8	18.9
5	Neutral	0.4008	Quasi Peak	42.3	0.1	0.1	42.5	57.8	15.3
			Average	29.8	0.1	0.1	30.0	47.8	17.8
6	Neutral	0.4586	Quasi Peak	42.1	0.1	0.1	42.4	56.7	14.4
			Average	27.0	0.1	0.1	27.2	46.7	19.5
7	Neutral	0.6000	Quasi Peak	44.2	0.1	0.1	44.4	56.0	11.6
			Average	28.5	0.1	0.1	28.7	46.0	17.3
8	Neutral	0.7500	Quasi Peak	41.9	0.1	0.1	42.1	56.0	13.9
			Average	24.8	0.1	0.1	25.0	46.0	21.0
9	Neutral	0.8400	Quasi Peak	36.6	0.1	0.1	36.8	56.0	19.2
			Average	23.1	0.1	0.1	23.3	46.0	22.7
10	Phase	0.1605	Quasi Peak	42.2	0.1	0.1	42.4	65.4	23.0
			Average	17.8	0.1	0.1	18.0	55.4	37.4
11	Phase	0.1700	Quasi Peak	39.9	0.1	0.1	40.1	65.0	24.8
			Average	17.2	0.1	0.1	17.4	55.0	37.5
12	Phase	0.2961	Quasi Peak	45.4	0.1	0.1	45.6	60.4	14.7
			Average	31.5	0.1	0.1	31.7	50.4	18.6
13	Phase	0.3456	Quasi Peak	50.2	0.1	0.1	50.4	59.1	8.6
			Average	36.6	0.1	0.1	36.8	49.1	12.2
14	Phase	0.3944	Quasi Peak	49.6	0.1	0.1	49.8	58.0	8.1
			Average	34.9	0.1	0.1	35.1	48.0	12.8
15	Phase	0.4603	Quasi Peak	49.5	0.1	0.1	49.7	56.7	7.0
			Average	33.8	0.1	0.1	34.0	46.7	12.7
16	Phase	0.4872	Quasi Peak	46.8	0.1	0.1	47.0	56.2	9.2
			Average	26.9	0.1	0.1	27.1	46.2	19.1
17	Phase	0.6500	Quasi Peak	48.0	0.1	0.1	48.2	56.0	7.8
			Average	30.9	0.1	0.1	31.1	46.0	14.9
18	Phase	0.8000	Quasi Peak	48.0	0.1	0.1	48.2	56.0	7.8
			Average	30.0	0.1	0.1	30.2	46.0	15.8
19	Phase	1.3370	Quasi Peak	43.7	0.1	0.2	44.0	56.0	12.0
			Average	27.8	0.1	0.2	28.1	46.0	17.9

Phase conductor



Neutral Conductor



Clause 15.109(a) Radiated Emissions

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of Emission (MHz)	Field Strength (microvolts/meter)
30 - 88	100
88 - 216	150
216 - 960	200
Above 960	500

Test Conditions:

Sample Number:	1	Temperature (°C):	22
Date:	October 23, 2007	Humidity (%):	30
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	3m Chamber

Test Results:

See Attached Table for Results

Additional Observations:

The Spectrum was searched from 30MHz to 1GHz.

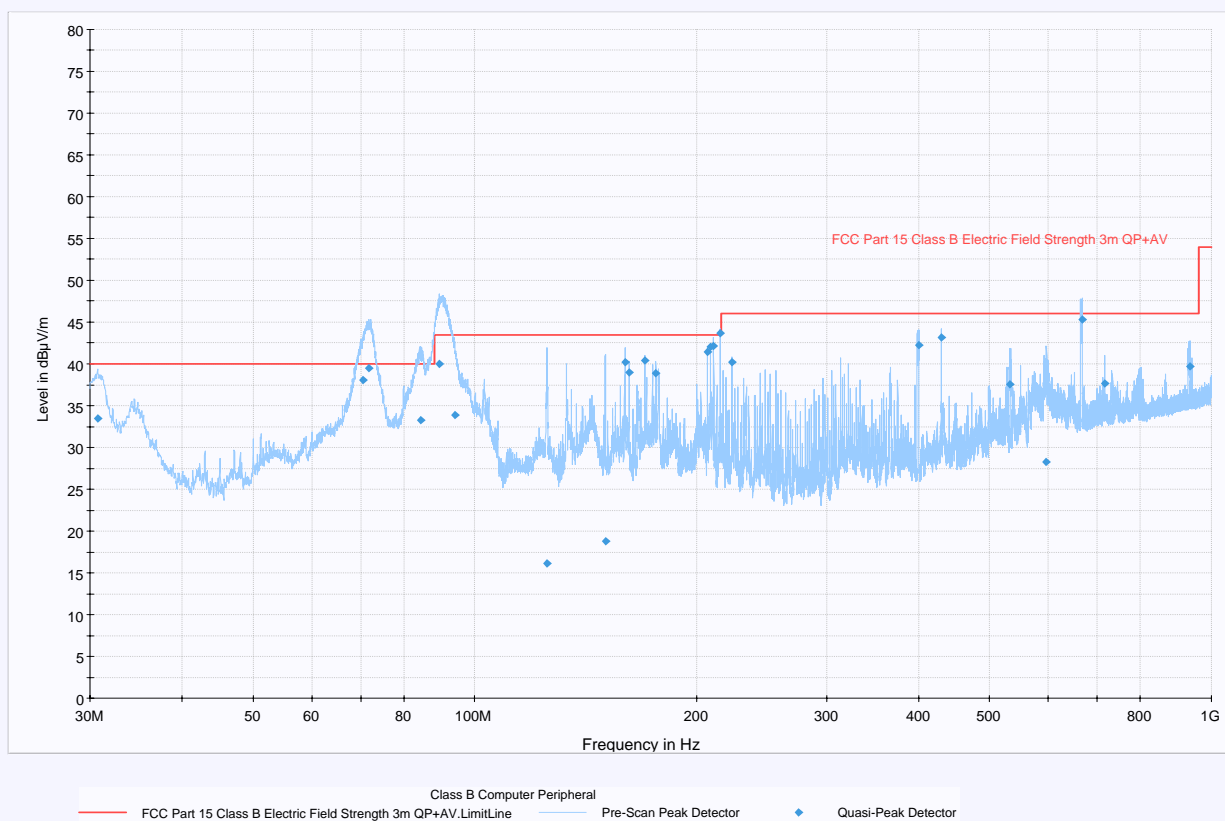
Measurement equipment setup was 120kHz Quasi-peak detector for measurements below 1GHz and 1MHz RBW/VBW peak detector above 1GHz.

All Measurements were performed at 3 meters.

The EUT can be controlled via a PC to set frequencies. The EUT was also evaluated as a computer peripheral.

The EUT can be set to discrete channels or frequencies or set into a scanning mode. Radiated emissions were measured in both modes on three different channels. In scanning mode the EUT was scanning between the three channels with a 1 second dwell time.

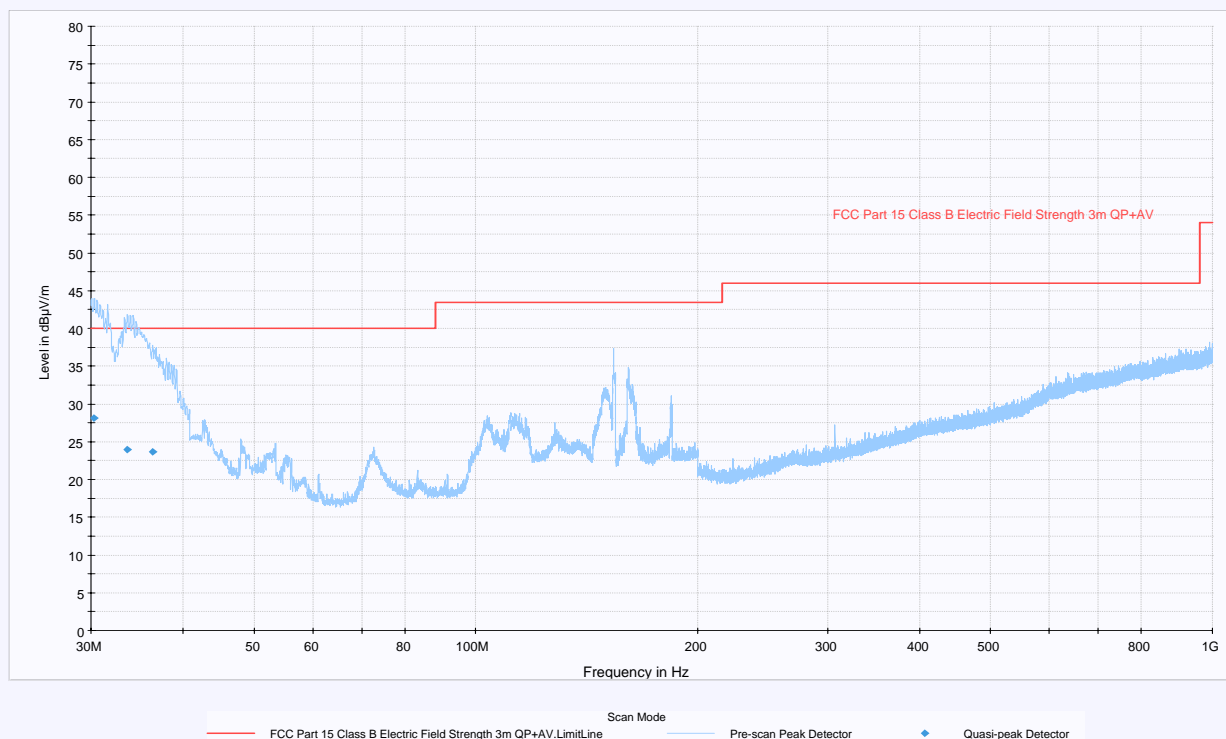
Class B Computer peripheral assessment



Frequency (MHz)	QuasiPeak (dB μ V/m)	Polarity	Corr. (dB)	Margin (dB)	Limit (dB μ V/m)
30.75	33.50	V	11.39	6.50	40.00
70.38	38.04	V	9.90	2.00	40.00
71.73	39.52	V	9.96	0.50	40.00
84.42	33.31	V	10.38	6.70	40.00
89.49	40.02	V	10.54	3.50	43.50
93.81	33.85	V	10.77	9.70	43.50
125.19	16.08	H	12.44	27.40	43.50
150.24	18.76	H	13.04	24.70	43.50
160.02	40.25	V	13.11	3.30	43.50
161.79	39.02	V	13.14	4.50	43.50
170.01	40.39	V	13.25	3.10	43.50
176.13	38.92	V	13.68	4.60	43.50
206.84	41.44	H	12.90	2.10	43.50
208.91	42.02	H	12.84	1.50	43.50
210.95	42.11	H	12.76	1.40	43.50
215.03	43.19	H	12.58	0.31	43.50
223.22	40.17	H	12.70	5.80	46.00
400.04	42.26	H	17.78	3.70	46.00
429.53	43.16	H	18.25	2.80	46.00
531.95	37.52	H	20.29	8.50	46.00
597.14	28.29	V	20.91	17.70	46.00
667.61	45.31	V	21.58	0.70	46.00
715.88	37.65	V	22.35	8.30	46.00
934.76	39.71	V	24.85	6.30	46.00

QuasiPeak measurements are the final measurement and include the Corr values. The corr values include antenna factor and cable losses.

Receiver Stand alone



Frequency (MHz)	QuasiPeak (dBμV/m)	Polarity	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.30	28.15	V	11.42	11.90	40.00
33.63	23.96	V	10.76	16.00	40.00
36.39	23.64	V	10.25	16.40	40.00
153.69	32.99	H	13.04	10.51	43.50
153.69	39.15	V	12.84	4.35	43.50
161.17	36.44	V	13.14	7.06	43.50
161.17	33.45	H	13.04	10.05	43.50
183.92	29.41	V	14.11	14.09	43.50
183.92	24.68	H	14.02	18.82	43.50

QuasiPeak measurements are the final measurement and include the Corr values. The corr values include antenna factor and cable losses.

Clause 15.121(b) Scanning receivers and frequency converters used with scanning receivers

Except as provided in paragraph (c) of this section, scanning receivers shall reject any signals from the Cellular Radiotelephone Service frequency bands that are 38 dB or lower based upon a 12 dB SINAD measurement, which is considered the threshold where a signal can be clearly discerned from any interference that may be present.

Test Conditions:

Sample Number:	1	Temperature (°C):	22
Date:	October 24, 2007	Humidity (%):	28
Modification State:	0	Tester:	Jason Nixon
		Laboratory:	Wireless

Test Results: See Attached Plots.

Test Method Used:

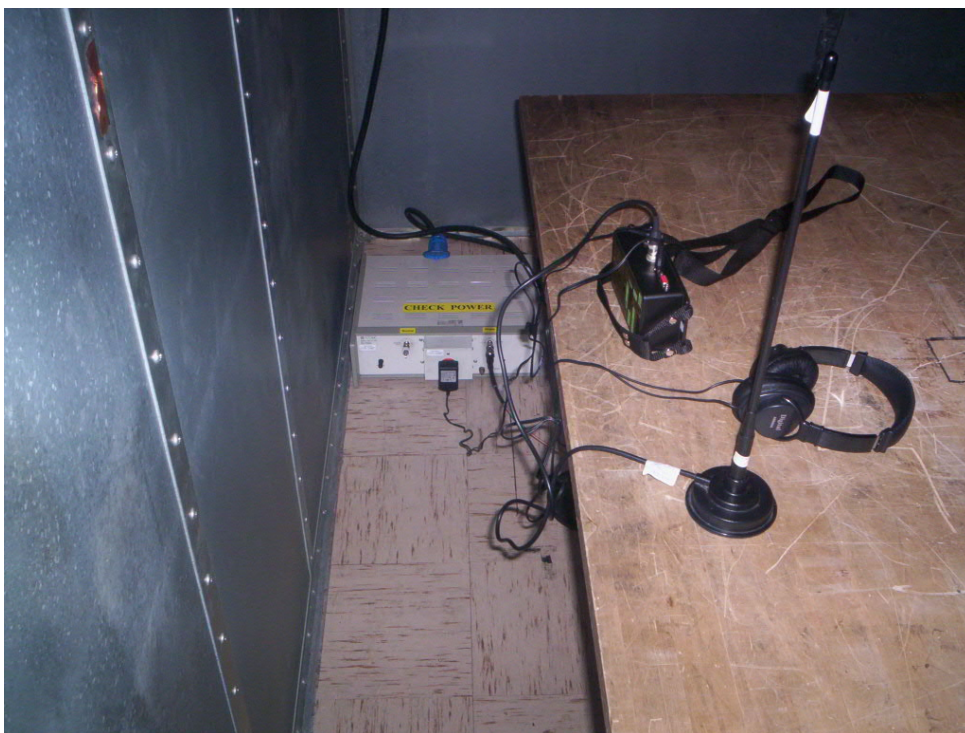
- 1) The EUT was connected as illustrated in appendix C.
- 2) Reference sensitivity of the EUT was measured according to the following procedure. In the absence of any other signals a input signal of pulse modulated CW carrier at 1kHz was applied to the RF Antenna port through a calibrated combining network. The level of the signal was reduced until the gain combination gave a 12dB SINAD value at the AF output of the receiver. The highest sensitivity value obtained in this way in all frequency bands was recorded as reference sensitivity (-115dBm).
- 3) The reference input signal was then increased by 3dB.
- 4) An unwanted input signal added through the second input terminal of the combining network. The level of the unwanted signal was adjusted according to the following:
$$P_{\text{Unwanted}} = P_{\text{reference}} + \text{Required Rejection} + 6\text{dB}$$
$$P_{\text{Unwanted}} = (-115\text{dBm} + 3\text{dB}) + 38\text{dB} + 6\text{dB} = -68\text{dBm}$$
- 5) The frequency of the unwanted signal was swept through the frequency bands allocated to the Cellular Radiotelephone Service (824-849MHz and 880-894MHz).

No change in SINAD value was measured at the output of the receiver.

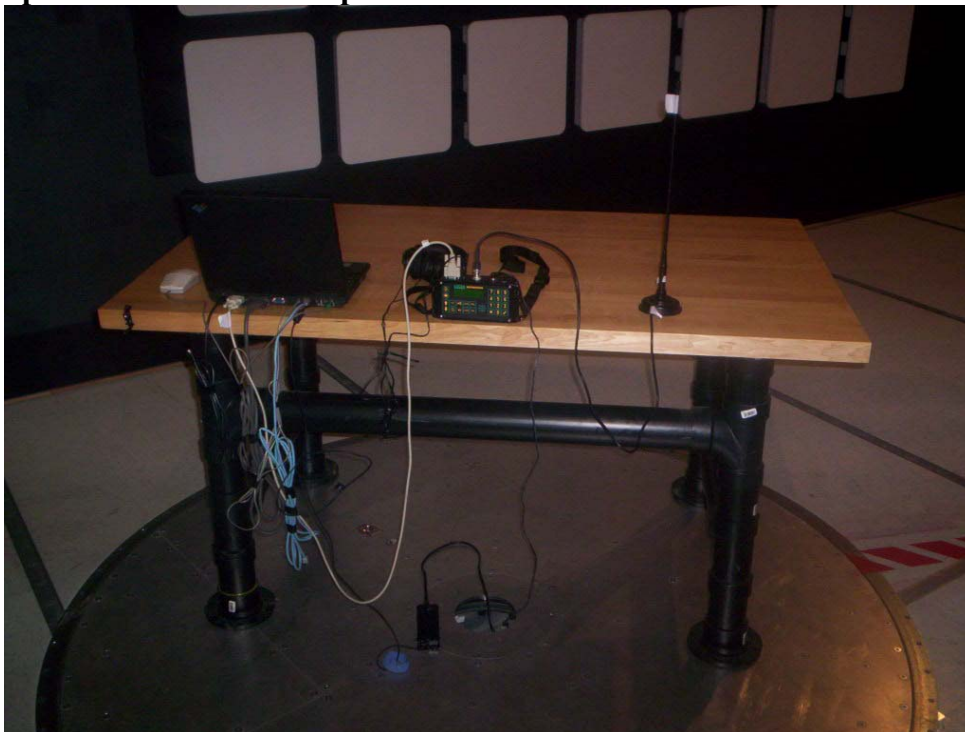
Test Result: PASS

Appendix B : Setup Photographs

Conducted Emissions Setup:



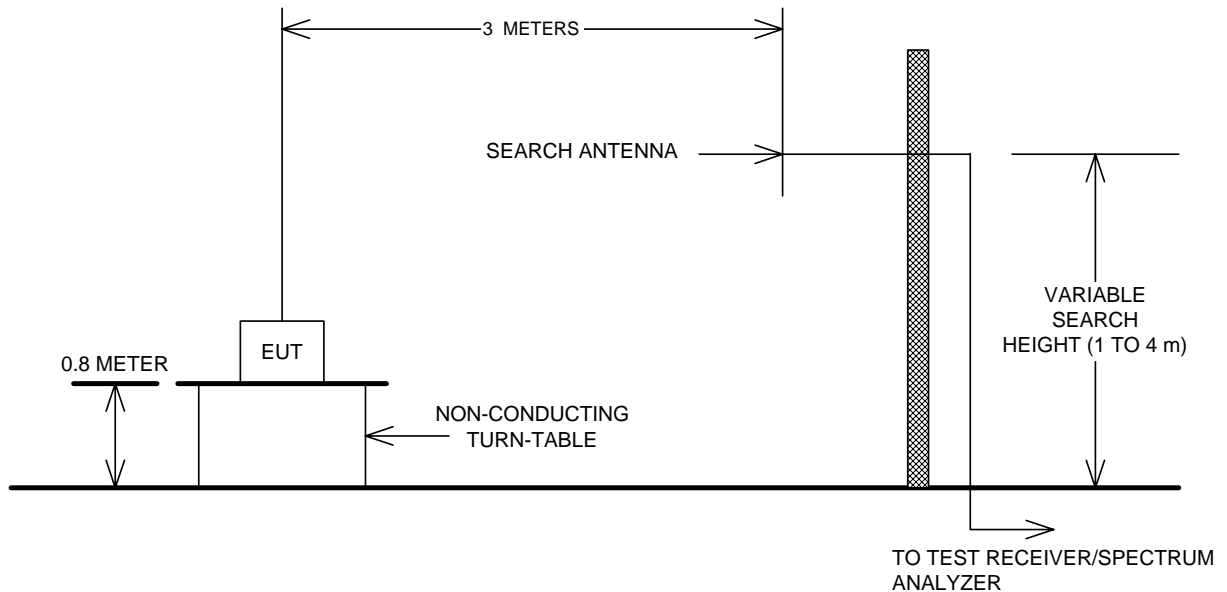
Spurious Emissions Setup:



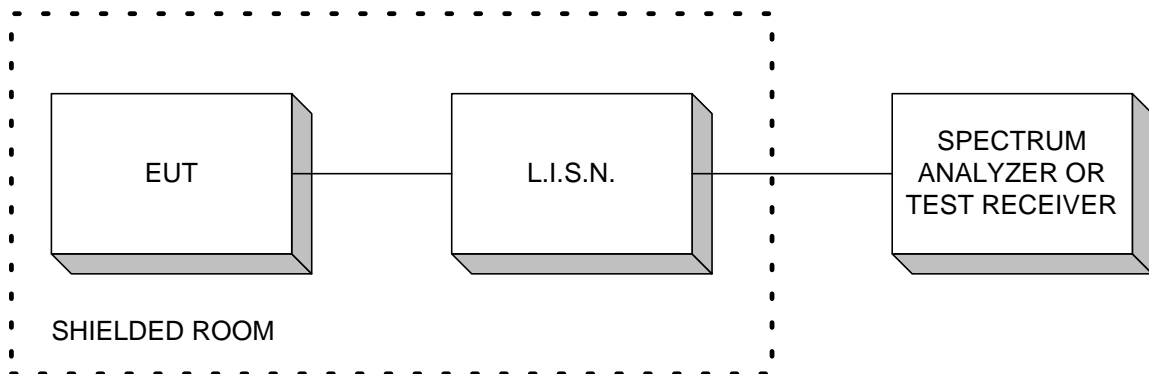


Appendix C : Block Diagram of Test Setups

Test Site For Radiated Emissions



Conducted Emissions



Cellular Rejection

