



**FCC PART 15 SUBPARTS B & C
CERTIFICATION REPORT**

FOR

RF TAG READER

MODEL NUMBER: COMPACT eLINK READER

FCC ID: HE7APC

Prepared For

**EXI WIRELESS SYSTEMS, INC.
SUITE 100, 13551 COMMERCE PARKWAY
RICHMOND, BC V6V 2L1
CANADA**

Prepared By

**COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD
MORGAN HILL CA 95037
USA**

Report No : 03U2095-1

Revision No: A

Date: 8/8/03



Total number of pages: 28

REPORT REVISION HISTORY

Date	Revision	Page No

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Verification Of Compliance

GENERAL INFORMATION	
Applicant	EXI WIRELESS SYSTEMS, INC. SUITE 100, 13551 COMMERCE PARKWAY RICHMOND, BC V6V 2L1 CANADA
Manufacturer	EXI WIRELESS SYSTEMS, INC.

PRODUCT DESCRIPTION	
EUT Description	RF TAG READER
Model Name	COMPACT eLINK READER
Product Family	N/A
Serial No	N/A

<i>Technical Standard</i>	<i>Class</i>	<i>Result</i>
FCC Part 15 Subparts B & C	N/A	Passed
FCC Part 15.209	N/A	Passed
FCC Part 15.205	N/A	Passed
FCC Part 15.109	N/A	Passed
FCC Part 15.107	N/A	Passed

MEASUREMENT FACILITIES	
Laboratory Name	Accreditation
Compliance Certification Services 561F Monterey Road, Morgan Hill CA 95037 USA TEL: (408)463-0885 FAX: (408)463-0888	NVLAP, NEMKO, VCCI, BSMI and Industry Canada

This device has been shown to be in compliance with and was tested in accordance with the measurement procedures specified in the Standards & Specifications listed above and as indicated in the measurement report number :03U2095-1

This Verification of Compliance is hereby issued to the above named company and is only valid for the type of equipment which is identical mechanically and electronically with the unit tested under Compliance Certification Services' supervision.



Tested By: Chin Pang – EMC Engineer Signature _____ Dated _____



Reviewed By: Thu Chan – Senior EMC Engineer Signature _____ Dated _____

SECTION 1: LABORATORY INFORMATION

1.1 General Condition:

This report contains an assessment of an apparatus against Electromagnetic Interference Technical Requirements based upon tests carried out on the samples submitted.

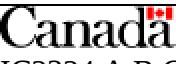
With regard to this assessment, the following points should be noted:

- a) The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties. ent reports conditions under which testing was conducted and results of tests performed. This document may not be altered or revised in any way unless done so by Compliance Certification Services and all revisions are duly noted in the revisions section.
- b) The apparatus was set up and exercised using the configurations, modes of operation and arrangements defined in this report only.
- c) Where relevant, the apparatus was only assessed using the susceptibility criteria defined in this report .
- d) All testing was performed under the following environmental conditions:
 - Temperature 15°C to 35°C (54°F to 95°F)
 - Atmospheric Pressure 860mbar to 1060mbar (25.4" to 31.3")
 - Humidity 10% to 75*%

1.2 Measurement Facilities

Compliance Certification Services
561F Monterey Road
Morgan Hill CA 95037
USA
Tel: (408)463-0885, Fax: (408)463-0888

1.3 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	NVLAP*	FCC Part 15, CISPR 22, AS/NZS 3548, IEC 61000-4-2, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-5, IEC 61000-4-6, IEC 61000-4-8, IEC 61000-4-11, CNS 13438	 200065-0
USA	FCC	3/10 meter Open Area Test Sites to perform FCC Part 15/18 measurements	 1300
Japan	VCCI	CISPR 22 Two OATS and one conducted Site	VCCI R-1014, R-619, C-640
Norway	NEMKO	EN50081-1, EN50081-2, EN50082-1, EN50082-2, IEC61000-6-1, IEC61000-6-2, EN50083-2, EN50091-2, EN50130-4, EN55011, EN55013, EN55014-1, EN55104, EN55015, EN61547, EN55022, EN55024, EN61000-3-2, EN61000-3-3, EN60945, EN61326-1	 ELA 117
Norway	NEMKO	EN60601-1-2 and IEC 60601-1-2, the Collateral Standards for Electro-Medical Products. MDD, 93/42/EEC, AIMD 90/385/EEC	 ELA-171
Taiwan	BSMI	CNS 13438	 SL2-IN-E-1012
Canada	Industry Canada	RSS210 Low Power Transmitter and Receiver	 IC2324 A,B,C, and F

*No part of this report may be used to claim or imply product endorsement by NVLAP or any agency of the US Government

1.4 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Radiated Emission	
30MHz – 200 MHz	+/- 3.3dB
200MHz – 1000MHz	+4.5/-2.9dB
1000MHz – 2000MHz	+4.6/-2.2dB
Power Line Conducted Emission	
150kHz – 30MHz	+/-2.9

Any results falling within the above values are deemed to be marginal.

1.5 Deviation from measurement specification

Not Applicable

1.6 Measurement Instrument Calibration

The measuring equipment which was utilized in performing the tests documented herein has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment which is traceable to recognized national standards.

SECTION 2: PRODUCT INFORMATION

2.1 Product Description:

The Compact eLink Reader is a detection device usually used as a departure alarm. A local field is generated by the controller at the frequency of 307 kHz, and a TAG in the field responds at 433.92MHz.

2.2 Power Requirements

AC	N/A
DC	24 VDC from Bench Supply
Battery Power	N/A
AC-DC Adaptor	N/A

2.3 Local Osc. Or Crystal:

Board Name	Local Osc. / Crystal (MHz)
Main Board	18.432 MHz

2.4 Serial Number

N/A

SECTION 3. TEST SUMMARY

3.1 Applicable Electromagnetic Interference Requirements:

Radiated Emission Technical Requirements For Class B Device		
Frequency (MHz)	FCC limits @ 3 meter Quasi-Peak/dBuV/m	Cisper 22 limits @10 meter Quasi-Peak/dBuV/m
30 –88	40.0	30.0
88-216	43.5	30.0
216-230	46.0	30.0
230-960	46.0	37.0
960-1000	54.0	37.0
Above 1000	54.0	Not Applicable

Conducted Emission Technical Requirements For Class B Device			
Frequency Range	FCC limits Quasi-Peak/dBuV	Cisper 22 limits Quasi-Peak/dBuV	Cisper 22 limits Average/dBuV
450kHz-0.5 MHz	48	---	---
150kHz –0.5MHz	---	66-56	56-46
0.5MHz-5MHz	48	56	46
5MHz- 30MHz	48	60	50

3.2 Engineering Justification:

Not Applicable

3.3 Sample Received date and Test Period

Sample received date	7/15/03
Test Period	7/15/03

SECTION 4 ELECTROMAGNETIC INTERFERENCE TEST

Ambient Conditions:

	Temperature	Humidity
Radiated Emission	26 ° C	50 %
Conducted Emission	24 ° C	48 %

Test Configuration:

Software Used During The Tests	
File Name	☐ EMCTEST ☐ Pinging ☐ Read & Write ☐ Terminal ☐ Music ☐ Joy-Stick ☒ Other:
Program Sequence	

Mode of Operational Investigated:

Worse Case Emission Levels			
Mode of Operation		Radiated Emission	Conducted Emission
1	Tx	☒	☒
2		☐	☐
3		☐	☐

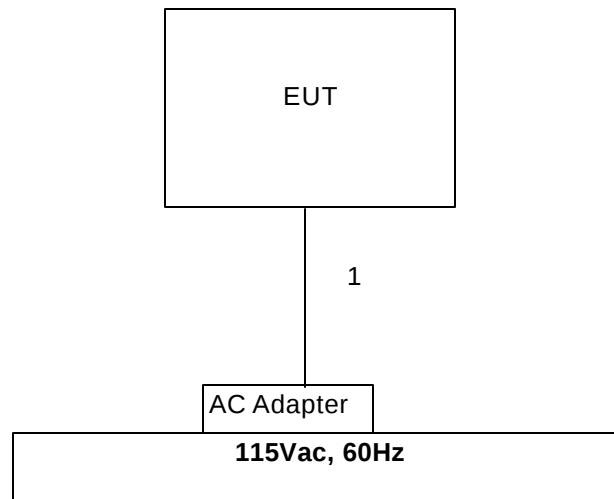
Frequency Range Investigated:

	From	To
Radiated Emissions	30MHz	1GHz
Conducted Emissions	150 KHz	30 MHz

Test Peripherals

TEST PERIPHERALS				
Device Type	Manufacturer	Model Number	Serial Number	FCC ID
AC Adapter	China	52-BWP-WA	NA	NA

Test Configuration Diagram



I/O Cable Configuration

Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	DC	1	DC	Un-Shielded	2m	No	No	NA

4.1 Radiated Emission Test Procedures

The EUT and all other support equipment were placed on a wooden table 80 cm above the ground screen. The antenna to EUT distance was 3 meters. During the test, the table was rotated 360 degrees to maximize emissions and the antenna was positioned from 1 to 4 meters above the ground screen to further maximize emissions. Measurements were made with the antenna polarized in both the vertical and the horizontal positions.

The EUT test configuration was according to Section 8 of ANSI C63.4/1992.

The following procedure was used to make the measurements: The frequency range of interest was monitored at a fixed antenna height and EUT azimuth. The Frequency span was set small enough to easily differentiate between broadcast stations, intermittent ambient signals and EUT emissions. The EUT was rotated through 360 degrees to maximize emissions received. During the rotation if emission increased by more than 1 dB, or if another emission appeared that was greater by 1 dB, the EUT was returned to the azimuth where the maximum occurred, and additional cable manipulation was performed to further maximize received emissions.

The antenna was moved up and down to further maximize the suspected highest amplitude signal. If the emission increased by 1 dB or more, or if another emission appeared that was greater by 1dB or more, the antenna was returned to the height where maximum signal was observed, and, cables were manipulated to produce highest emissions, noting frequency and amplitude.

4.1.1 Instrument Setting

Frequency Range	Instrument	Detector Function	Resolution Bandwidth	Video Bandwidth
30 - 1000 MHz	EMI Receiver	Quasi-Peak	120kHz	N/A
30 – 1000 MHz	Spectrum Analyzer	Peak	100kHz	100kHz
Above 1000 MHz	Spectrum Analyzer	Peak	1 MHz	1 MHz

4.1.2 Measurement Instrument Configuration

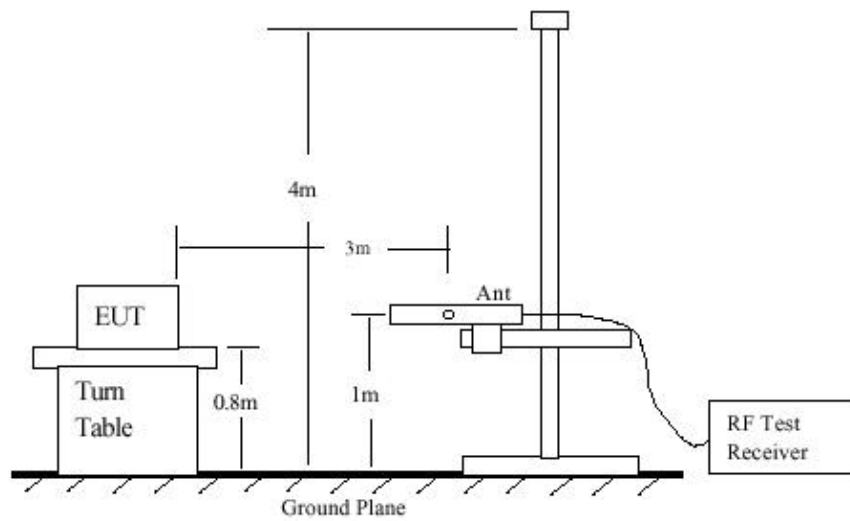


Fig 1: Radiated Emission Measurement 30 to 1000 MHz

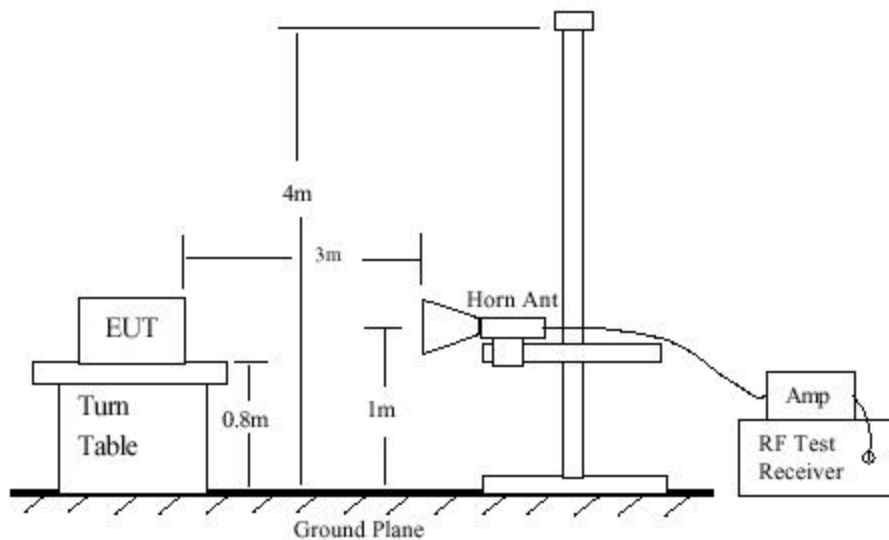


Fig 2: Radiated Emission Above 1000 MHz

4.1.3 Measurement Equipment Used

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Quasi-Peak Adaptor	HP	85650A	2521A01038	7/16/04
SA Display Section 3	HP	85662A	2314A04793	7/16/04
SA RF Section, 1.5 GHz	HP	85680A	2314A02604	7/16/04
Preamplifier, 1300 MHz	HP	8447D	2944A06550	8/22/03
Antenna, Biconical	Eaton	94455-1	1214	3/6/04
Antenna, Log Periodic 200 ~ 1000 MHz	EMCO	3146	9107-3163	3/6/04
Loop Antenna	EMCO	6502	NA	4/2/04
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/04
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/03
Line Filter	Lindgren	LMF-3489	497	CNR

4.1.4 Radiated Emission Test Setup Photos



Radiated Emission Test Setup

4.1.5 Radiated Emission Test Result

						Project #: 03U2095-1 Report #: 030715C1 Date& Time: 07/15/03 2:47 PM Test Engr: Chin Pang					
FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP 561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888											
Company: EXI Wireless Systems Inc. EUT Description: RF Tag Reader (307KHz Transmitting; 433.92MHz Receiving) Test Configuration : EUT Only Type of Test: FCC Part 15.209 Mode of Operation: Tx											
<< Main Sheet											

Freq.	Reading	AF	Closs	Pre-amp	Level	Limit	Margin	Pol	Az	Height	Mark
(MHz)	(dBuV)	(dB)	(dB)	(dB)	(dBuV/m)	FCC B	(dB)	(H/V)	(Deg)	(Meter)	(P/Q/A)
55.29	47.60	9.16	1.16	27.17	30.76	40.00	-9.24	3mV	0.00	1.00	P
110.60	47.80	11.05	1.72	27.02	33.55	43.50	-9.95	3mV	0.00	1.00	P
55.29	45.90	9.16	1.16	27.17	29.06	40.00	-10.94	3mH	0.00	1.50	P
73.70	48.20	6.33	1.37	27.13	28.77	40.00	-11.23	3mV	0.00	1.00	P
110.60	43.00	11.05	1.72	27.02	28.75	43.50	-14.75	3mH	0.00	1.50	P
313.20	40.00	14.63	3.07	26.49	31.22	46.00	-14.78	3mH	0.00	1.50	P
6 Worst Data											



FCC, VCCI, CISPR, CE, AUSTEL, NZ
UL, CSA, TUV, BSMI, DHHS, NVLAP

561F MONTEREY ROAD, SAN JOSE, CA 95037-9001
PHONE: (408) 463-0885 FAX: (408) 463-0888

Project #: 03U2095-1
Report #: 030715C2
Date & Time: 07/15/03 6:52 PM
Test Engr: Chin Pang

Company: EXI Wireless Systems Inc.
EUT Description: RF Tag Reader (307KHz Transmitting: 433.92MHz Receiving)
Test Configuration : EUT Only
Type of Test: FCC Part 15.209
Mode of Operation: Rx

07/15/03

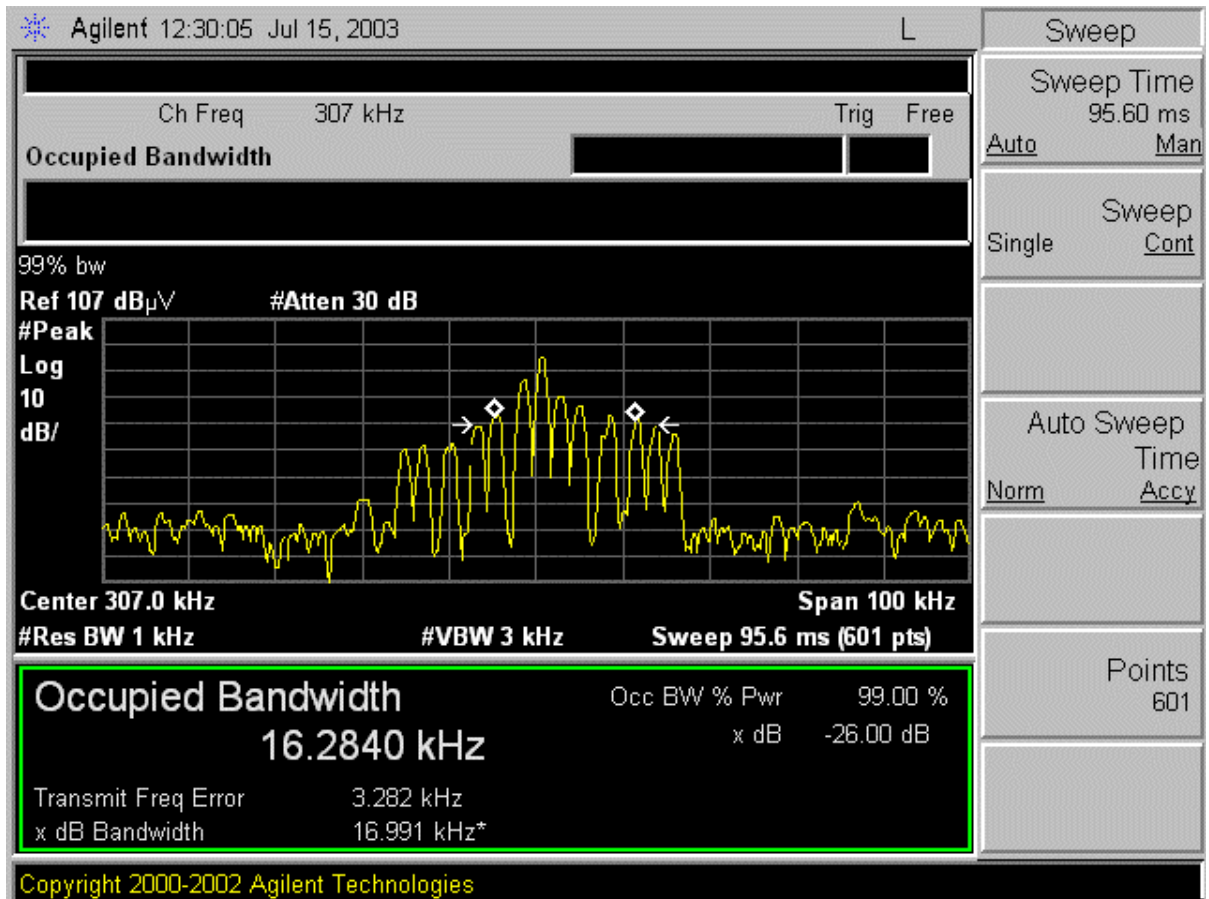
Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
150.80	41.70	16.58	2.06	26.86	33.48	43.50	-10.02	3mH	0.00	1.50	P
56.00	47.00	8.94	1.17	27.17	29.94	40.00	-10.06	3mV	0.00	1.00	P
38.50	43.50	12.66	0.98	27.21	29.93	40.00	-10.07	3mV	0.00	1.00	P
38.50	42.80	12.66	0.98	27.21	29.23	40.00	-10.77	3mH	0.00	1.50	P
120.30	45.60	10.81	1.81	26.99	31.24	43.50	-12.26	3mV	0.00	1.00	P
221.20	45.20	11.06	2.54	26.54	32.26	46.00	-13.74	3mH	0.00	1.50	P
6 Worst Data											

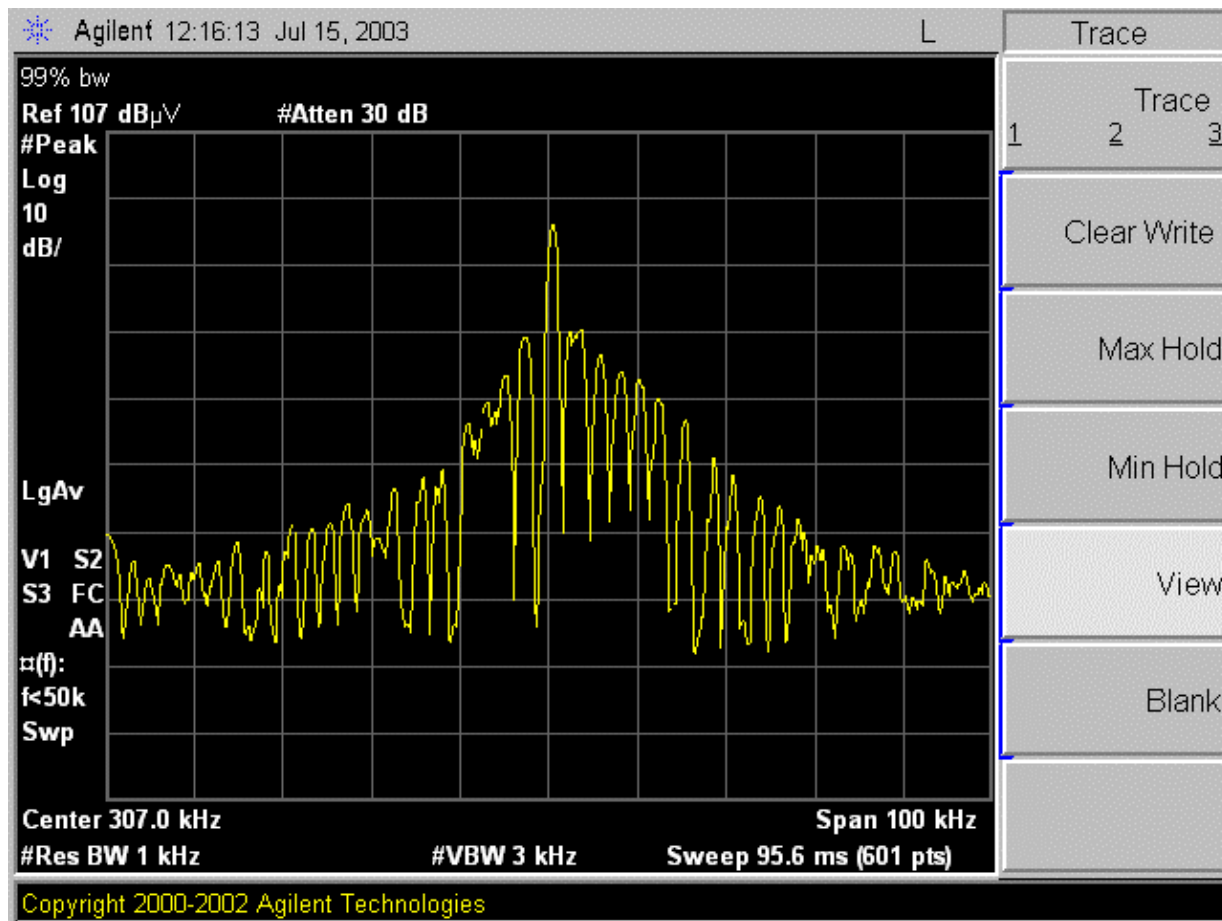
High Frequency Data:

						Project #: 03u2095-1 Report #: 030715C2 Date & Time: 07/15/03 3:46 PM Test Engr: Chin Pang					
FCC, VCCI, CISPR, CE, AUSTEL, NZ UL, CSA, TUV, BSMI, DHHS, NVLAP 561F MONTEREY ROAD, SAN JOSE, CA 95037-9001 PHONE: (408) 463-0885 FAX: (408) 463-0888											
Company: EXI Wireless Systems Inc. EUT Description: RF Tag Reader (307KHz Transmitting) Test Configuration : EUT Only Type of Test: FCC 15.209 Mode of Operation: TX											
☐ A-Site		☐ B-Site		☒ C-Site		☐ F-Site		6 Worst Data		Descending	

Freq. (KHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Dist (dB)	Level (dBuV/m)	Limit FCC B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
Test at worst position:											
307.00	64.90	10.80	0.30	59.08	16.92	17.86	-0.95	10mV	0.00	1.00	P
307.00	62.40	10.80	0.30	59.08	14.42	17.86	-3.45	10mV	0.00	1.00	QP
614.00	55.08	10.60	0.30	40.00	25.98	31.84	-5.86	3mV	0.00	1.00	P
921.00	42.00	10.60	0.30	40.00	12.90	28.32	-15.42	3mV	0.00	1.00	P
1228.00	52.00	10.60	0.30	40.00	22.90	25.82	-2.92	3mV	0.00	1.00	P
1535.00	35.60	10.60	0.30	40.00	6.50	23.88	-17.38	3mV	0.00	1.00	P
1840.00	27.00	10.60	0.30	40.00	-2.10	29.54	-31.64	3mV	0.00	1.00	P
2149.00	27.00	10.60	0.30	40.00	-2.10	29.54	-31.64	3mV	0.00	1.00	P
2456.00	22.50	10.60	0.30	40.00	-6.60	29.54	-36.14	3mV	0.00	1.00	P
2763.00	20.00	10.60	0.30	40.00	-9.10	29.54	-38.64	3mV	0.00	1.00	P
No other emissions were found up to 30MHz with Loop Antenna											
Total data #: 9											
V.2c											

Bandwidth Plots:





(For reference only)

4.2 Conducted Emission Test Procedures

The EUT was setup and located so that the distance between the boundary of the EUT and the closest surface to the LISN was 0.8m or more.

EUT test configuration was according to Section 7 of ANSI C63.4/1992.

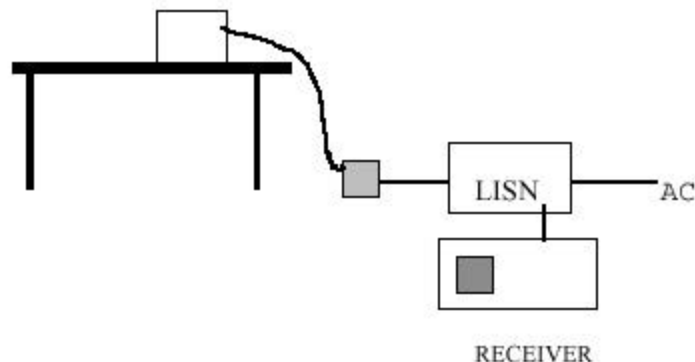
Conducted disturbance was measured between the phase lead and the ground, and between the neutral lead and the ground. The frequency 0.150 - 30 MHz was investigated.

The EMI receiver was set to PEAK detector setting, and swept continuously over the frequency range to be investigated. The resolution bandwidth was set to 9kHz minimum. The EMI receiver input cable was connected to LINE 1 RF measurement connection on the LISN. A 50ohm terminator was connected to the unused RF port on the LISN. For each mode of EUT operation, emissions readings were maximized by manipulating cable and wire positions. The configuration for each EUT power cord which produced emissions closest to the limit was recorded. The same procedure was repeated for LINE 2 of each EUT power cord.

4.2.1 Instrument Settings

Frequency Range	Peak	Quasi-Peak	Average
0.15 – 30 MHz	10 kHz	9 kHz	10 kHz

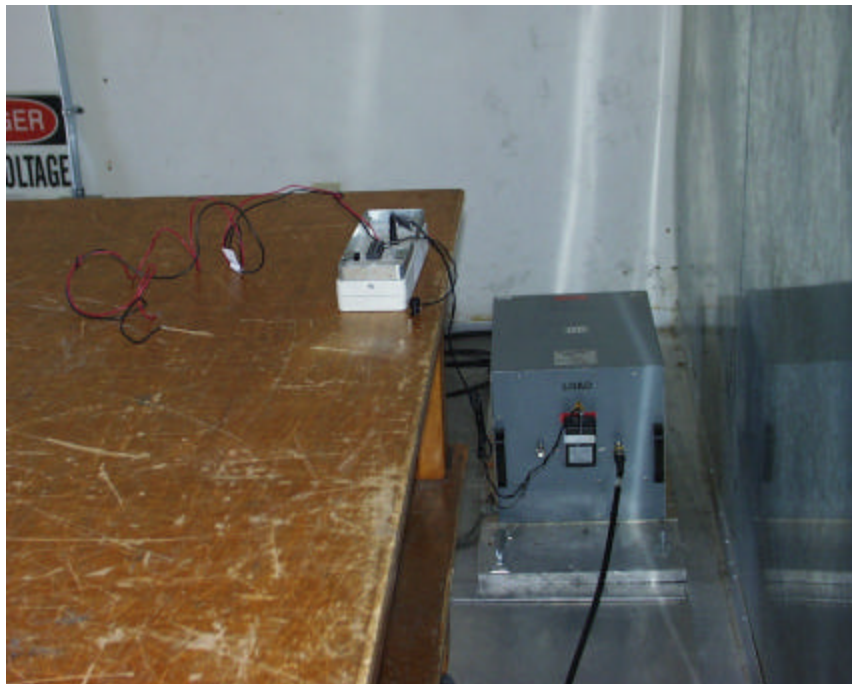
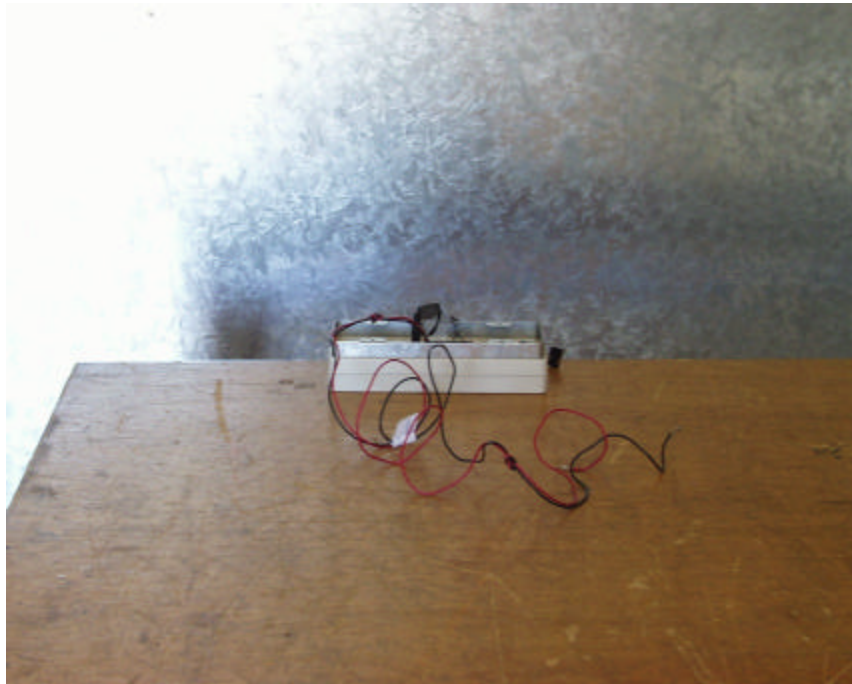
4.2.2 Measurement Instrument Configuration



4.2.3 Measurement Equipment Used

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Quasi-Peak Adaptor	HP	85650A	2521A01038	7/16/04
SA Display Section 3	HP	85662A	2314A04793	7/16/04
SA RF Section, 1.5 GHz	HP	85680A	2314A02604	7/16/04
Preamplifier, 1300 MHz	HP	8447D	2944A06550	8/22/03
Antenna, Biconical	Eaton	94455-1	1214	3/6/04
Antenna, Log Periodic 200 ~ 1000 MHz	EMCO	3146	9107-3163	3/6/04
Loop Antenna	EMCO	6502	NA	4/2/04
EMI Test Receiver	R & S	ESHS 20	827129/006	7/17/04
LISN, 10 kHz ~ 30 MHz	FCC	50/250-25-2	114	9/6/03
Line Filter	Lindgren	LMF-3489	497	CNR

4.2.4 Conducted Emission Test Setup Photos



Conducted Emission Test Setup

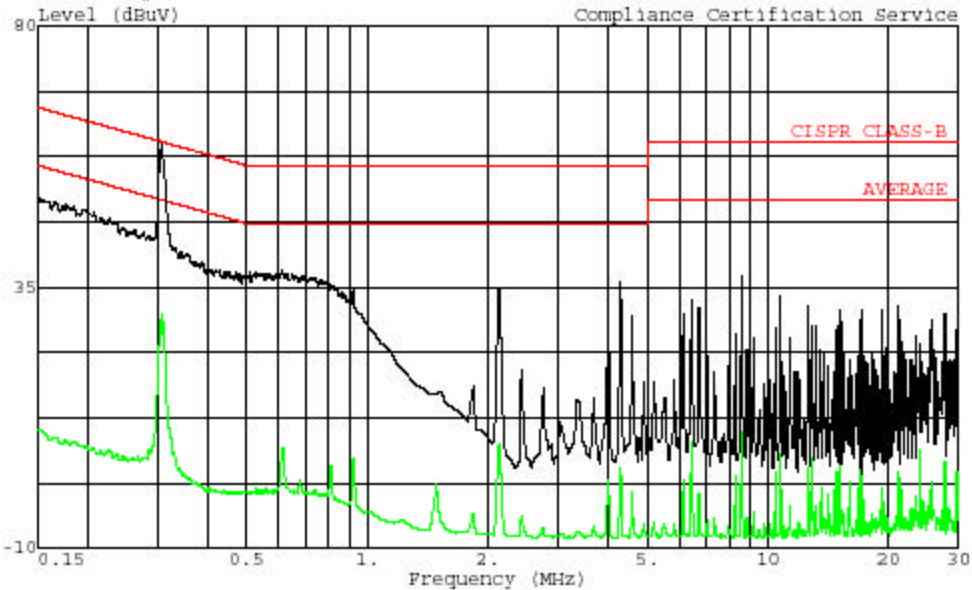
4.2.5 Conducted Emission Test Result

CONDUCTED EMISSIONS DATA (115VAC 60Hz)									
Freq.	Reading			Closs	Limit	EN B	Margin		Remark
(MHz)	PK (dBuV)	QP (dBuV)	AV (dBuV)	(dB)	QP	AV	QP (dB)	AV (dB)	L1 / L2
0.17	50.05	--	10.31	0.00	65.51	55.51	-15.46	-45.20	L1
0.31	60.25	--	30.84	0.00	61.57	51.57	-1.32	-20.73	L1
4.29	36.58	--	3.85	0.00	56.00	46.00	-19.42	-42.15	L1
0.16	52.52	--	12.02	0.00	65.80	55.80	-13.28	-43.78	L2
0.31	57.69	--	26.30	0.00	61.57	51.57	-3.88	-25.27	L2
2.13	33.84	--	6.15	0.00	56.00	46.00	-22.16	-39.85	L2
6 Worst Data									



561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 7 File#: 2095LC.EMI Date: 07-15-2003 Time: 16:54:24



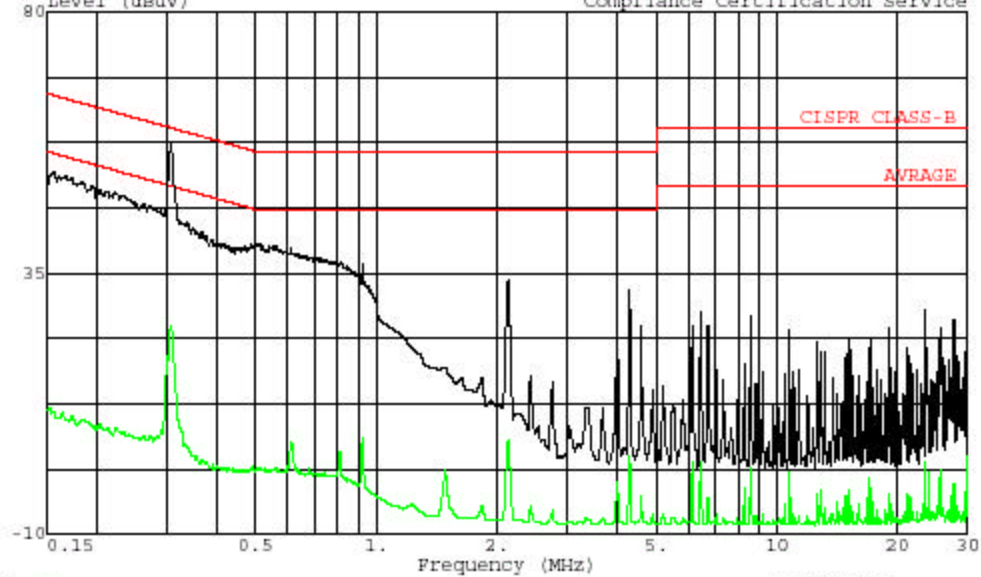
Trace: 5
Project # : 03U2095-1
Test Engineer : Chin Pang
Company : EXI Wireless Systems Inc.
EUT : RF Tag Reader (307KHz Transmitting)
Model : Compact eLink Reader
Configuration : EUT only
FCC ID: HE7APC
Mode of Operation: TX
Target of Test : CISPR B
115Vac, 60HZ
L1: Peak (Black), avg (green)

Ref Trace:



561F Monterey Road,
San Jose, CA 95037 USA
Tel: (408) 463-0885
Fax: (408) 463-0888

Data#: 14 File#: 2095LC.EMI Date: 07-15-2003 Time: 17:04:59
Level (dBuV) Compliance Certification Service



Trace: 12
Project # : 03U2095-1
Test Engineer : Chin Pang
Company : EXI Wireless Systems Inc.
EUT : RF Tag Reader (307KHz Transmitting)
Model : Compact eLink Reader
Configuration : EUT only
Mode of Operation: TX
Target of Test : FCC ID: HE7APC
: CISPR B
: 115Vac, 60HZ
: L2: Peak (Black), Avg (Green)

Ref Trace: