RADIO FREQUENCY EMISSIONS TEST REPORT

FOR

TRANSCEIVER

MODEL NUMBER: EAC TRANSCEIVER

FCC ID: HE7EAC

REPORT NUMBER: 04U3150-1

ISSUE DATE: JANUARY 28, 2005

Prepared for

EXI WIRELESS SYSTEMS INC.
SUITE 100, 13551 COMMERCE PARKWAY
RICHMOND, BC, CANADA

Prepared by

COMPLIANCE ENGINEERING SERVICES, INC.
d.b.a.
COMPLIANCE CERTIFICATION SERVICES
561F MONTEREY ROAD,
MORGAN HILL, CA 95037, USA
TEL: (408) 463-0885
FAX: (408) 463-0888

LAB CODE:200065-0

Revision History

Rev.	Revisions	Revised By

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: EXI WIRELESS SYSTEMS INC.
SUITE 100, 13551 COMMERCE PARKWAY
RICHMOND BC, CANADA

EUT DESCRIPTION: TRANSCEIVER

MODEL: EAC TRANSCEIVER

SERIAL NUMBER: 710010

DATE TESTED: DECEMBER 13-14, 2004 and JANURAY 28, 2005

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART B	NON-COMPLIANCE NOTED

Compliance Certification Services, Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. 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. Any alteration of this document not carried out by Compliance Certification Services will constitute fraud and shall nullify the document. No part of this report may be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any government agency.

Approved & Released For CCS By:

THU CHAN
EMC SUPERVISOR
COMPLIANCE CERTIFICATION SERVICES

Tested By:

CHIN PANG
EMC TECHNICIAN
COMPLIANCE CERTIFICATION SERVICES

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2003.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 561F Monterey Road, Morgan Hill, California, USA. The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.7 and CISPR Publication 22. All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

CCS is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://www.ccsemc.com.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

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

PARAMETER	UNCERTAINTY
Radiated Emission, 30 to 200 MHz	+/- 3.3 dB
Radiated Emission, 200 to 1000 MHz	+4.5 / -2.9 dB
Radiated Emission, 1000 to 2000 MHz	+4.5 / -2.9 dB
Power Line Conducted Emission	+/- 2.9 dB

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The eXI product eLINK Area Controller Transceiver (EAC Transceiver) is designed to comply with FCC Part 15 Low Power Non-licensed transmitters. It functions as a Tag Reader to identify eLINK RF Tags that are within a 307 kHz interrogation field.

5.2. DETAILS OF TESTED SYSTEM

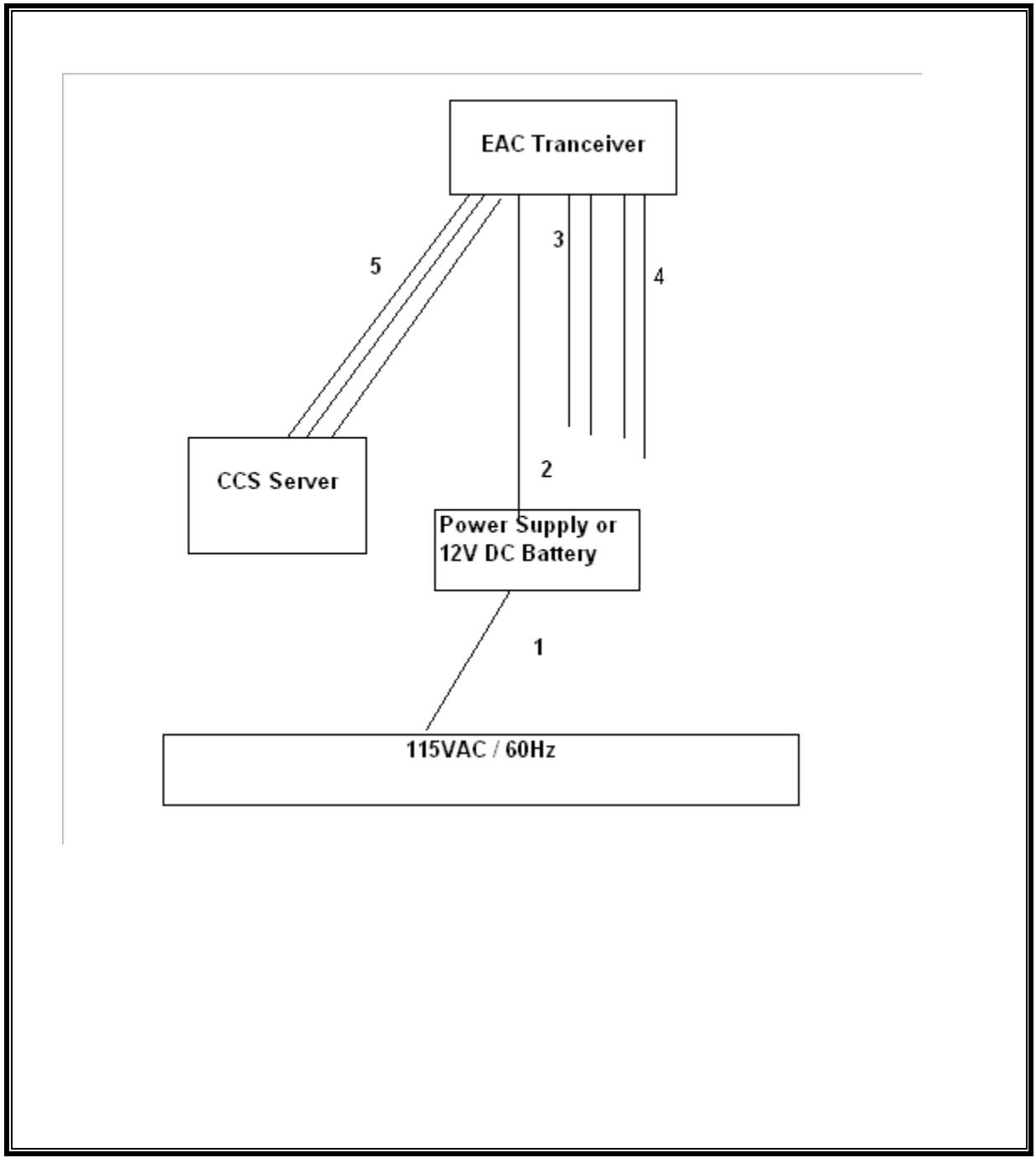
SUPPORT EQUIPMENT & PERIPHERALS

Not applicable, EUT is standalone unit.

I/O CABLES

TEST I / O CABLES								
Cable No	I/O Port	# of I/O Port	Connector Type	Type of Cable	Cable Length	Data Traffic	Bundled	Remark
1	AC	1	US 115V	Un-shielded	2m	No	No	N/A
2	DC	1	DC	Un-shielded	3m	No	No	Use AC Power or Battery
3	RS-485	1	ED1707 plug	Un-shielded	2m	No	No	N/A
4	Door SW	1	ED1707 plug	Un-shielded	30m	No	No	N/A
5	Ethernet	3	RJ45	Un-shielded	30m	No	No	Connected to CCS Server

TEST SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
Preamplifier, 1300MHz	HP	8447D	2944A06550	8/26/2005
Quasi-Peak Adaptor	HP	85650A	2521A01038	1/15/2006
SA Display Section 3	HP	85662A	2314A04793	1/15/2006
SA RF Section, 1.5 GHz	HP	85680A	2314A02604	1/15/2006
Antenna, Loop 9 kHz ~ 30 MHz	EMCO	6502	9202-2722	9/7/2006
Amplifier 1-26GHz	MITEQ	NSP2600-SP	924342	8/17/2005
30MHz---- 2Ghz	Sunol Sciences	JB1 Antenna	A121003	9/1/2005
Antenna, Bilog	CHASE	CBL6112B	2586	3/8/2005

7. EUT MODIFICATION

To achieve compliance to FCC technical limits, the following change(s) were made during compliance testing:

1. Added one 1000pf capacitor on U8 pin 12, 25 and 26.
2. Added one 1500pf capacitor on U8 pin 13.

8. APPLICABLE LIMITS AND TEST RESULTS

8.1. TX RADIATED EMISSIONS BELOW 30 MHZ

TEST PROCEDURE

ANSI C63.4

LIMIT

The field strength of radiated emissions from an intentional radiator, shall not exceed the following, for frequencies below 30 MHz:

Frequency range (MHz)	Limits (μV/m)	Measurement Distance (meters)
0.009 – 0.490	2400 / F (kHz)	300
0.490 – 1.705	24000 / F (kHz)	30
1.705 – 30.0	30	30
Note: The lower limit shall apply at the transition frequency.		

Testing was done at a distance of 10m, and an extrapolation factor of 40 dB / decade was applied to readings.

RESULTS

No non-compliance noted.

SPURIOUS EMISSIONS BELOW 30 MHz (WORST-CASE CONFIGURATION)

FCC Part 15, Subpart C 10 Meter Distance Measurement At Open Field

Company: EXI
Project #: 04U3150-1
Model #: Transceiver 433.92MHZ Receiver and 307KHz Transmitter
Test Configuration: Tx Mode
Tester: Chin Pang
Date: 12/13/2004

Frequency (MHz)	PK (dBu/V)	QP (dBu/V)	AV (dBuV)	AF dB/m	Distance Correction (dB)	PK Corrected Reading (dBuV/m)	AV Corrected Reading (dBuV/m)	QP Limit (dBuV/m)	AV Limit (dBuV/m)	PK Margin (dB)	AV Margin (dB)	Notes
Loop Antenna Face On:												
0.307	67.8		55.83	10.34	-59.08	19.06	7.09	37.86	17.86	-18.8	-10.8	10m distance
0.614	45.8	35.4		10.22	-19.08	26.54		31.84		-5.3		10m distance
0.912	42.5	33.5		10.28	-19.08	24.70		28.40		-3.7		10m distance
1.228	40.7	30.8		10.29	-19.08	22.00		25.82		-3.8		10m distance
1.842	31.5	25.8		10.26	-19.08	16.97		22.30		-5.3		10m distance
2.149	28.4	24.8		10.24	-19.08	15.96		20.96		-5.0		10m distance
2.456	31.7	25.4		10.23	-19.08	16.54		19.80		-3.3		10m distance
Loop Antenna Face Off:												
0.307	74.1		62.13	10.34	-59.08	25.36	13.39	37.86	17.86	-12.5	-4.5	10m distance
0.614	44.8	34.2		10.22	-19.08	25.34		31.84		-6.5		10m distance
0.912	39.5	30.2		10.28	-19.08	21.40		28.40		-7.0		10m distance
1.228	41.2	31.3		10.29	-19.08	22.50		25.82		-3.3		10m distance
1.842	30	23.2		10.26	-19.08	14.37		22.30		-7.9		10m distance
2.149	28.6	24		10.24	-19.08	15.16		20.96		-5.8		10m distance
2.456	25.4			10.23	-19.08	16.54		19.80		-3.3		10m distance

* No more emissions were found up to 30MHz

Note: The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 10000Mhz. Radiated emission limits in these three bands are based on measurements employing an average detector.

P.K. = Peak
Q.P. = Quasi Peak Reading
A.F. = Antenna factor

8.2. DUTY CYCLE

CALCULATION:

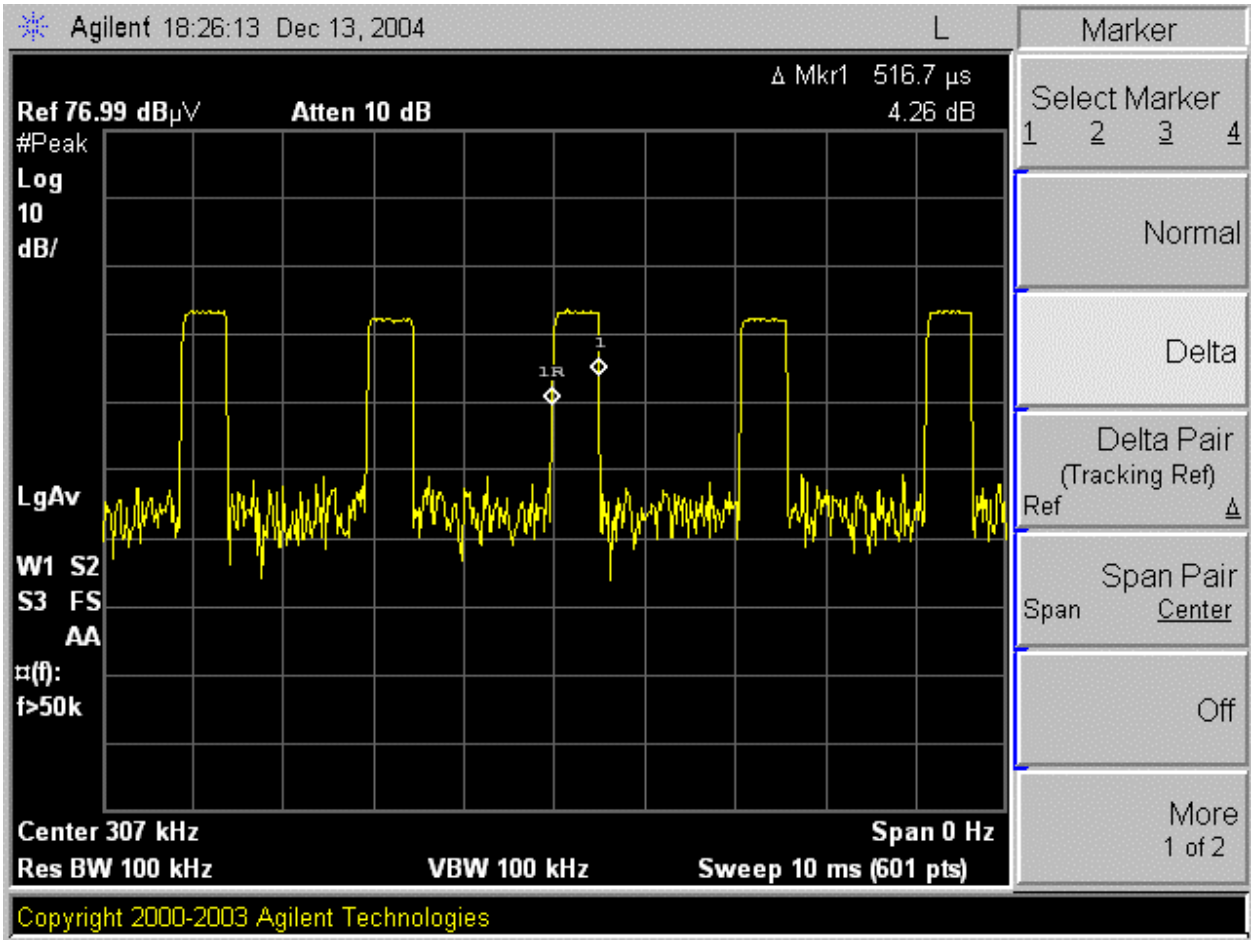
Average Reading = Peak Reading (dBuV/m) + 20log (Duty Cycle)

In order to determine possible Maximum Modulation percentage, alternations are made to the EUT. We measured:

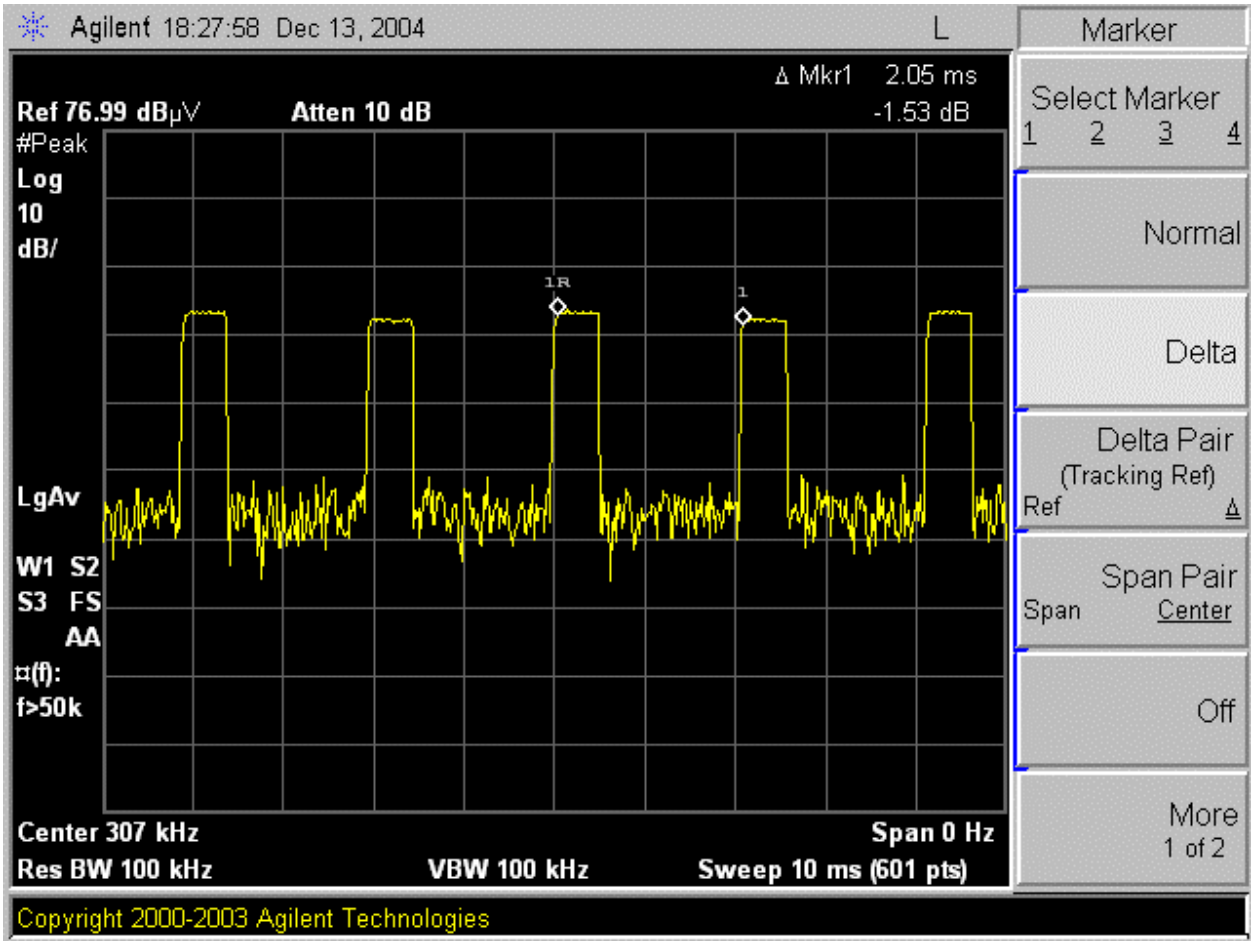
WHERE	1 Cycle	= 2.05 ms
	ON time	= 0.5167 ms

20 log (Duty Cycle) = -11.97 dB

DUTY CYCLE 1



DUTY CYCLE 2



8.3. 99% BANDWIDTH

LIMIT

None; for reporting purposes only.

TEST PROCEDURE

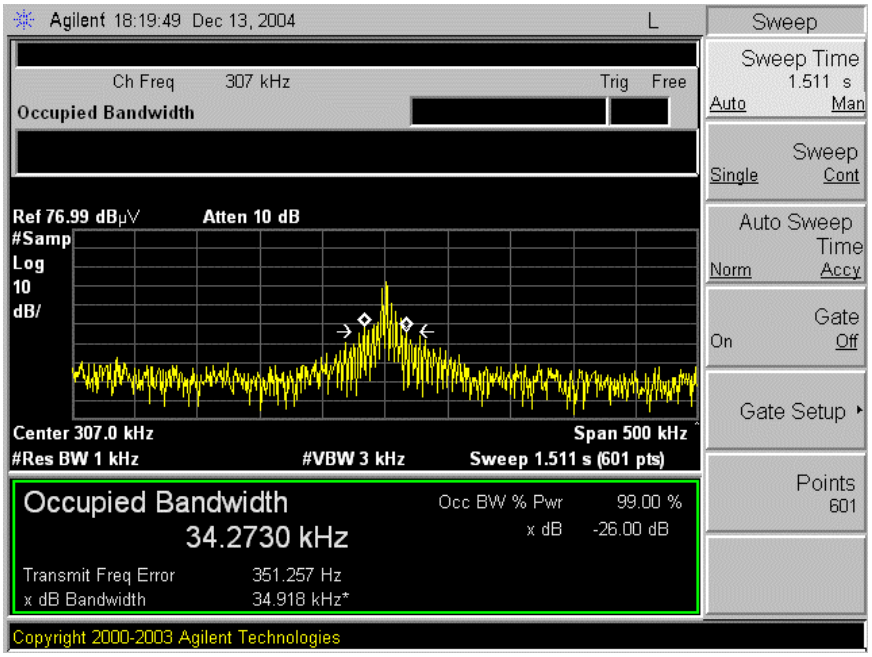
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1% to 3% of the 99 % bandwidth. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

No non-compliance noted:

99% BANDWIDTH

99% BANDWIDTH



8.4. RADIATED EMISSIONS RELATIVE TO CLASS B LIMITS

TEST PROCEDURE

ANSI C63.4

LIMIT

§15.109 (a) 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:

Limits for radiated disturbance of Class B ITE at measuring distance of 3 m	
Frequency range (MHz)	Quasi-peak limits (dBµV/m)
30 to 88	40
88 to 216	43.5
216 to 960	46
Above 960 MHz	54
Note: The lower limit shall apply at the transition frequency.	

RESULTS

No non-compliance noted.

SPURIOUS EMISSIONS 30 TO 2000 MHz (WORST-CASE CONFIGURATION)

COMPLIANCE Certification Services

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 #: 04U3150-3
Report #: 041214C1
Date& Time: 12/14/04 1:48 PM
Test Engr: Chin Pang

Company: EXI Wireless System Inc.
EUT Description: Tranceiver: 433MHzMHz receiver and 307KHz Transmitter
Test Configuration : EUT only
Type of Test: FCC 15.209, RSS 210
Mode of Operation: Receiving

○ A-Site ○ B-Site ◉ C-Site ○ F-Site 6 Worst Data Descending

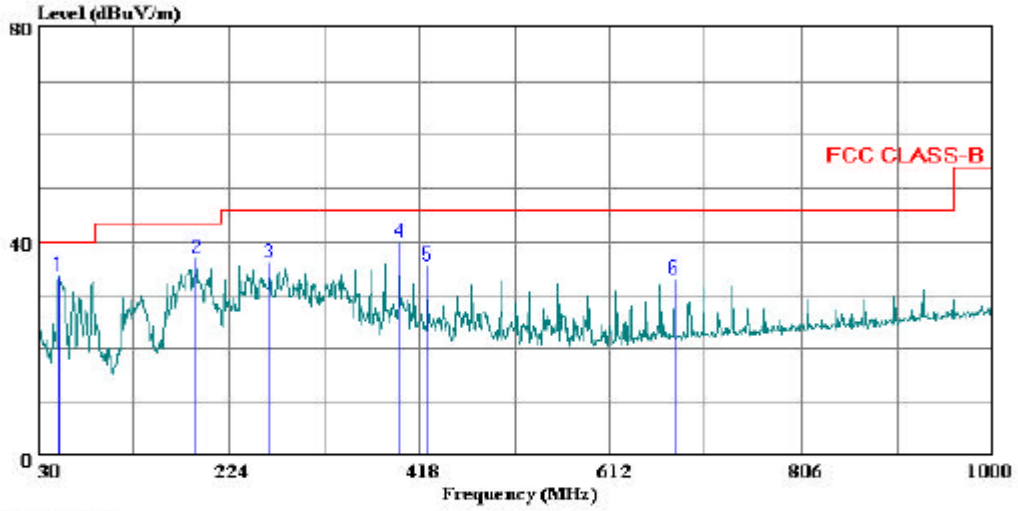
Freq. (MHz)	Reading (dBuV)	AF (dB)	Closs (dB)	Pre-amp (dB)	Level (dBuV/m)	Limit FCC_B	Margin (dB)	Pol (H/V)	Az (Deg)	Height (Meter)	Mark (P/Q/A)
427.72	46.50	16.61	2.95	26.76	39.30	46.00	-6.70	3mV	0.00	1.00	P
430.06	44.10	16.67	2.97	26.77	36.97	46.00	-9.03	3mV	0.00	1.00	P
431.76	41.20	16.71	2.98	26.77	34.13	46.00	-11.87	3mV	0.00	1.00	P
434.60	41.80	16.79	3.00	26.78	34.82	46.00	-11.18	3mV	0.00	1.00	P
435.95	42.00	16.82	3.01	26.78	35.06	46.00	-10.94	3mV	0.00	1.00	P
441.10	44.90	16.96	3.05	26.79	38.12	46.00	-7.88	3mV	0.00	1.00	P
427.62	42.50	16.61	2.95	26.76	35.29	46.00	-10.71	3mH	0.00	1.00	P
431.16	42.20	16.70	2.98	26.77	35.11	46.00	-10.89	3mH	0.00	1.00	P
435.96	43.50	16.82	3.01	26.78	36.56	46.00	-9.44	3mH	0.00	1.00	P
441.15	46.70	16.96	3.05	26.79	39.92	46.00	-6.08	3mH	0.00	1.00	P
Total data #: 10											
V.2c											
Note: No other emissions found up to 2GHz											

DIGITAL - SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

Horizontal Plot

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

Data#: 33 File#: 3150 exi.EMI Date: 01-25-2005 Time: 17:34:41



(Audix ATC)

Trace: 32 Ref Trace:

Condition: FCC CLASS-B HORIZONTAL
Test Operator: : Chin Pang
Project #: : 04U3150-1
Company: : EXI Wireless Systems Inc.
EUT: : Transceiver: 433.92MH receiver and
: 307KHz Transmitter
Model No: : EAC Transceiver
Configuration: : EUT only
Target of Test: : RSS 210
Mode of Operation: RX mode

Horizontal Data

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	51.340	52.50	-18.92	33.58	40.00	-6.42	Peak
2	191.020	51.90	-15.21	36.69	43.50	-6.81	Peak
3	264.740	49.47	-13.43	36.04	46.00	-9.96	Peak
4	397.630	51.10	-11.10	40.00	46.00	-6.00	Peak
5	426.730	46.00	-10.68	35.32	46.00	-10.68	Peak
6	677.960	40.20	-7.30	32.90	46.00	-13.10	Peak

DIGITAL - SPURIOUS EMISSIONS 30 TO 1000 MHz (WORST-CASE CONFIGURATION)

Vertical Plot, 30-230 MHz

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

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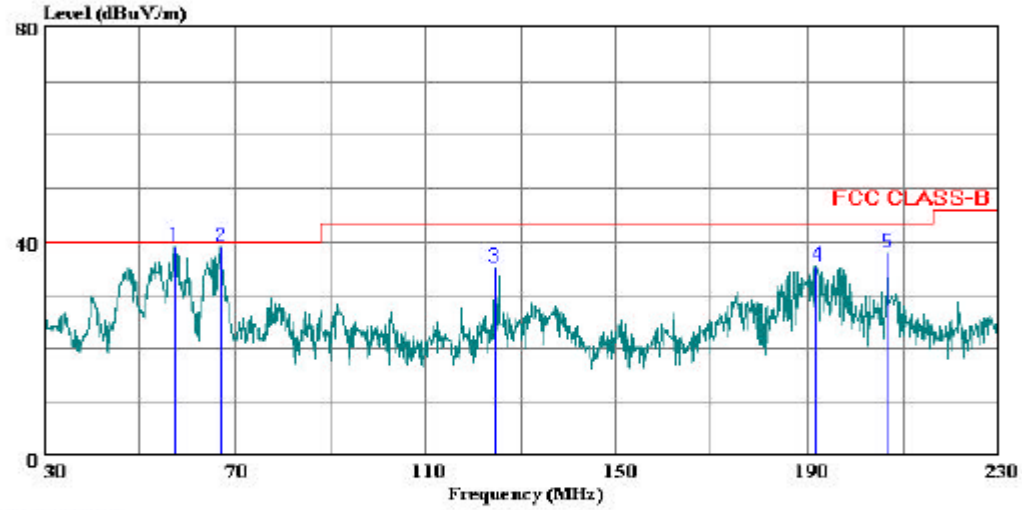

(Audix ATC)
Trace: 34 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 04U3150-1
Company: : EXI Wireless Systems Inc.
EUT: : Transceiver: 433.92MH receiver and
: 307KHz Transmitter
Model No: : EAC Transceiver
Configuration: : EUT only
Target of Test: : RSS 210
Mode of Operation: RX mode

Vertical Data, 30-230 MHz

Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	57.600	58.70	-19.57	39.13	40.00	-0.87	Peak
2	67.200	57.80	-18.88	38.92	40.00	-1.08	Peak
3	124.600	48.00	-12.86	35.14	43.50	-8.36	Peak
4	191.800	50.60	-15.19	35.41	43.50	-8.09	Peak
5	206.600	52.70	-14.81	37.89	43.50	-5.61	Peak

Vertical Plot, 230-1000 MHz

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

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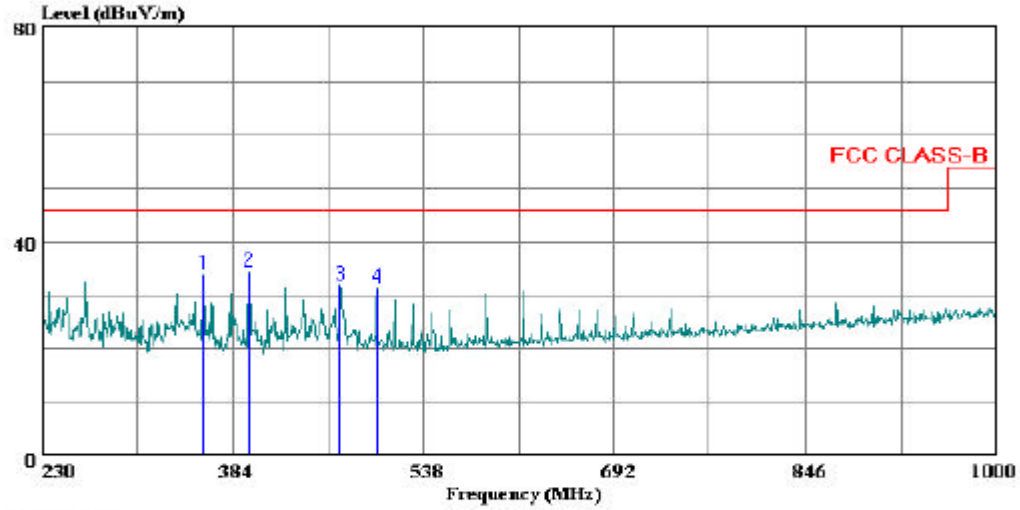


(Audix ATC)
Trace: 36 Ref Trace:

Condition: FCC CLASS-B VERTICAL
Test Operator: : Chin Pang
Project #: : 04U3150-1
Company: : EXI Wireless Systems Inc.
EUT: : Transceiver: 433.92MH receiver and
: 307KHz Transmitter
Model No: : EAC Transceiver
Configuration: : EUT only
Target of Test: : RSS 210
Mode of Operation: RX mode

Vertical Data, 30-230 MHz

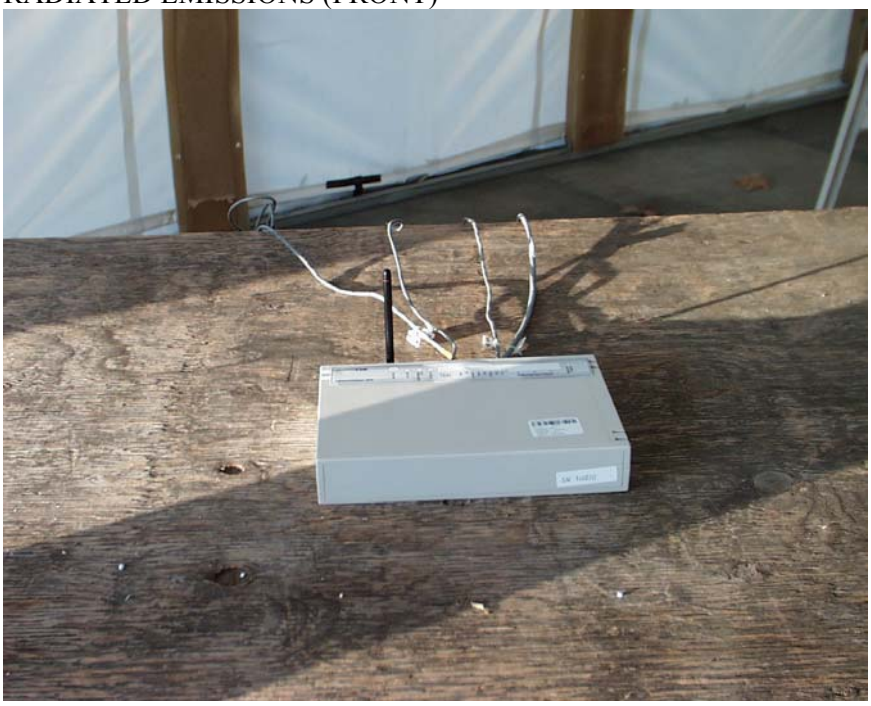
Page: 1

	Freq	Read Level	Factor	Level	Limit Line	Over Limit	Remark
	MHz	dBuV	dB	dBuV/m	dBuV/m	dB	
1	360.900	45.50	-11.61	33.89	46.00	-12.11	Peak
2	397.090	45.50	-11.10	34.40	46.00	-11.60	Peak
3	471.010	41.90	-9.96	31.94	46.00	-14.06	Peak
4	501.040	40.91	-9.55	31.36	46.00	-14.64	Peak

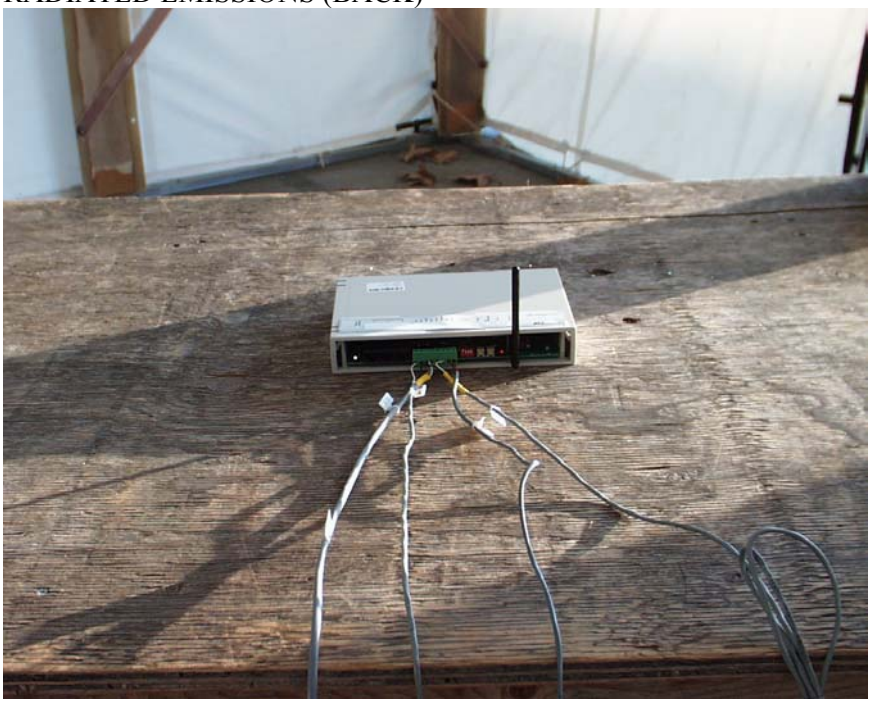
9. SETUP PHOTOS

RADIATED EMISSION

RADIATED EMISSIONS (FRONT)



RADIATED EMISSIONS (BACK)



END OF REPORT