

KTL Test Report: 0R03227

Applicant: EXI Wireless Systems Inc.
Suite 100 – 13551 Commerce Pk.
Richmond, BC
V6V 2L1

**Equipment Under Test:
(E.U.T.)** Patient Tag 2

FCC ID: HE7PT2

In Accordance With: **FCC Part 15, Subpart C**
For Low Power Transmitters Operating Periodically
In The Band 40.66 - 40.77 MHz And Above 70 MHz

Tested By: KTL Ottawa Inc.
3325 River Road, R.R. 5
Ottawa, Ontario K1V 1H2

Authorized By:

G. Westwell, Technologist

Date:

Total Number of Pages: 14

EQUIPMENT: Patient Tag 2
FCC ID: HE7PT2

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Section 1. Summary of Test Results

General

All measurements are traceable to national standards.

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.231. All tests were conducted using measurement procedure ANSI C63.4-1992. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC.



New Submission



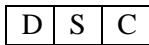
Production Unit



Class II Permissive Change



Pre-Production Unit



Equipment Code

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE TEST
SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".



NVLAP LAB CODE: 100351-0

TESTED BY: _____ DATE: _____
Russell Grant, Wireless Group Manager

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This report applies only to the items tested.

EQUIPMENT: Patient Tag 2
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Summary Of Test Data

Name of Test	Para. Number	Results
Transmission Requirements	15.231(a)	Not Applicable
Radiated Emissions	15.231(b)	Not Applicable
Occupied Bandwidth	15.231(c)	Complies
Frequency Tolerance	15.231(d)	Not Applicable
Periodic Alternate Field Strength Requirements	15.231(e)	Complies
Powerline Conducted Emissions	15.207	Not Applicable

EQUIPMENT: Patient Tag 2
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Section 2. Equipment Under Test (E.U.T.)

General Equipment Information

Manufacturer:	EXI Wireless Systems Inc.
Model No.:	Patient Tag 2
Date Received In Laboratory:	December 5, 2000
KTL Identification No.:	Item #9
Frequency Range:	433.92 MHz
Emission Designator:	72K0L1D
Supply Power Requirement:	Batteries
Duty Cycle Calculation:	$20 \log 0.27 = -11.4 \text{ dB}$

EQUIPMENT: Patient Tag 2
FCC ID: HE7PT2

Regulatory Technical Description

2000-025

970-000013-000
Rev 0.2

3 DATA WAVEFORMS

3.1 TAG IN FIELD (TIF) Communication Signals

The upper trace (2) in Figure 3.1 is the decoded 433.92 MHz signal transmitted by the TAG in response to the 'Wake-up and Respond' signal transmitted by a Controller at 307 kHz, lower trace (1) of Figure 3.1. This generates the maximum communication duty cycle for the 433.92 MHz signal in this mode. The maximum duty cycle over a 100 msec period is 0.1125. This is based on a maximum peak power transmission of 25 pulses of 350 usec and 5 pulses of 500 usec during a 100 msec period. The maximum 433.92 MHz signal burst duration in TIF mode is 85 msec. The TAG will not repeat this process unless in the field for more than 60 seconds.

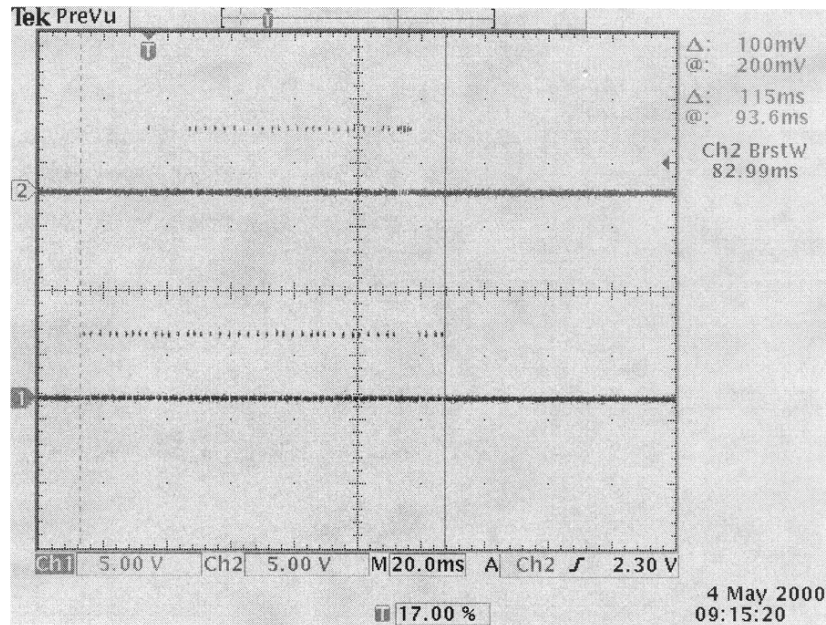


FIG 3.1 Upper Trace (2): Decoded 433.92 MHz Tag ID Response Data Stream
Lower Trace (1): TX Wake UP, Respond & Interrogate Data Stream

EQUIPMENT: Patient Tag 2
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Regulatory Technical Description

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3.2 TAG Initiated Communication (TIC) Signal

When the processor is awakened and detects an off body signal, it initiates a one-way communication (TIC message) to the system Controllers and Receivers. This is a single burst of code from which the system determines the ID of the TAG and 'off-body' alarm condition. Figure 3.2 is the baseband decoded 433.92 MHz signal transmitted by the TAG. This is pulse-width encoded OOK modulation. The maximum duty cycle occurs for an AA AA AA AA hex code sequence repeated three times. The pattern transmitted will be unique to each TAG in that it is constituted of 3 bytes of unique ID and one byte of checksum. In each case the duty cycle will be less than the maximum pattern, therefore the use of the maximum duty cycle for peak to average power adjustment includes a factor of safety. The maximum signal duration (FF FF FF FF) sequence would be 65 msec. The maximum duty cycle over a 100 msec sample time would be 0.27 based on the AA AA AA AA code. Note that each Byte is appended with a 250 usec stop bit. The message is repeated at intervals of 11 seconds minimum, doubling to a nominal message repetition interval of 2 minutes. The 'Off body' alarm is defeated by placing the TAG on the patient or within its conductive storage package.

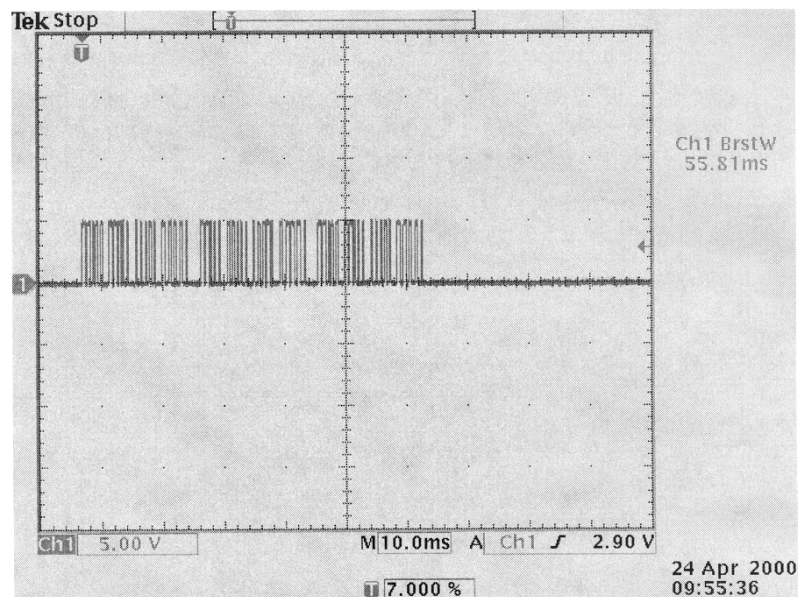
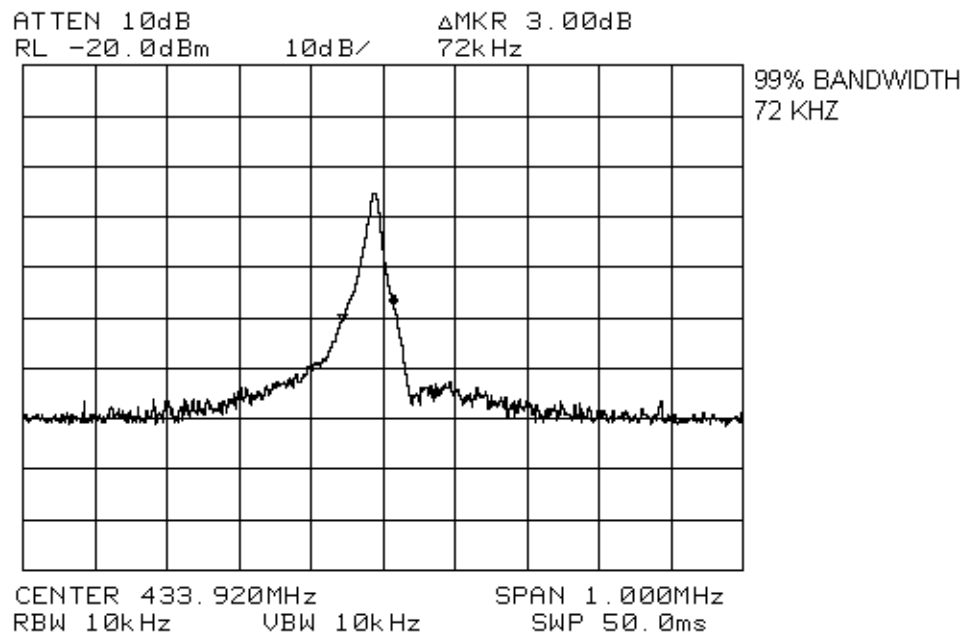


FIG 3.2 Decoded 433.92 MHz Off Body Message

EQUIPMENT: Patient Tag 2
FCC ID: HE7PT2



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Section 3. Occupied Bandwidth

Para. No.: 15.231(c)

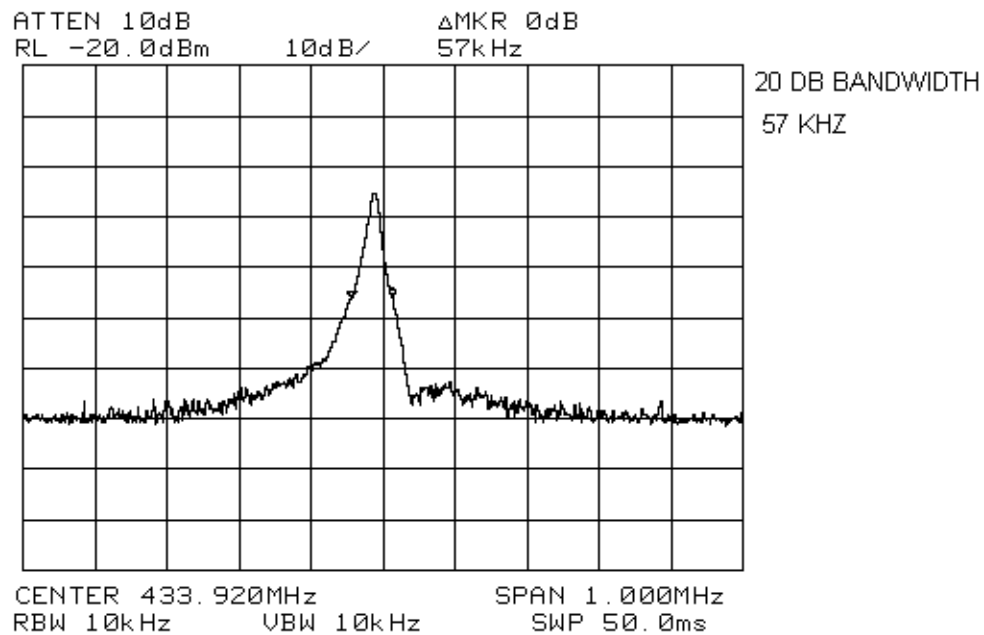
Test Performed By: Russell Grant	Date of Test: December 8, 2000
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Minimum Standard: 15.231(c) The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. For devices operating above 900 MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier.

Test Results: Complies. See attached graph.

Test Data: See attached graph.

EQUIPMENT: Patient Tag 2
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Section 4. Periodic Alternate Field Strength Requirements

Para. No.: 15.231(e)

Test Performed By: Russell Grant

Date of Test: December 8, 2000

Minimum Standard: 15.231(e) Intentional radiators may operate at a periodic rate exceeding that specified in paragraph (a) of this section and may be employed for any type of operation, including operation prohibited in paragraph (a) of this section, provided the intentional radiator complies with the provisions of paragraphs (b) through (d) of this section, except the field strength table in paragraph (b) of this section is replaced by the following.

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 - 40.70	1,000	100
70 - 130	500	50
130 - 174	500 to 1,500	50 to 150
174 - 260	1,500	150
260-470	1,500 to 5,000	150 to 500
Above 470	5,000	500

In addition, devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

Test Results: Complies. The worst case emission is 38.8 dB μ V/m @ 3m at 3471.36 MHz. This is 15.2 dB below the specification limit.

Test Data: See attached table.

EQUIPMENT: Patient Tag 2
FCC ID: HE7PT2**Test Data - Periodic Alternate Field Strength Requirements**

Test Distance (meters) : 3		Range: A Tower		Receiver: ESVP		RBW(kHz): 1000		Detector: Peak	
Freq. (MHz)	Ant. *	Pol. (V/H)	RCVD Signal (dBµV/m)	Ant. Factor (dB)**	Amp. Gain (dB)***	Dist. Corr. (dB)	Field Strength (dBµV/m)	Limit (dBµV/m)	Margin (dB)
433.92	E/D4	V	40.0	24.9		-11.4	53.5	73.0	19.5
433.92	E/D4	H	33.2	24.9		-11.4	46.7	73.0	26.3
867.84	E/D4	V	2.0	31.9		-11.4	22.5	53.0	30.5
867.84	E/D4	H	0.0	31.9		-11.4	20.5	53.0	32.5
1301.76	Hrn2	V	57.0	30.6	-48.0	-11.4	28.2	54.0	25.8
1301.76	Hrn2	H	43.0	30.6	-48.0	-11.4	14.2	54.0	39.8
1735.68	Hrn2	V	59.0	32.2	-48.0	-11.4	31.8	54.0	22.2
1735.68	Hrn2	H	55.0	32.2	-48.0	-11.4	27.8	54.0	26.2
2169.6	Hrn2	V	63.8	34.8	-58.3	-11.4	28.9	54.0	25.1
2169.6	Hrn2	H	67.5	34.8	-58.3	-11.4	32.6	54.0	21.4
2603.52	Hrn2	V	62.5	36.9	-60.0	-11.4	28.0	54.0	26.0
2603.52	Hrn2	H	59.5	36.9	-60.0	-11.4	25.0	54.0	29.0
3037.44	Hrn2	V	65.5	38.1	-59.4	-11.4	32.8	54.0	21.2
3037.44	Hrn2	H	58.7	38.1	-59.4	-11.4	26.0	54.0	28.0
3471.36	Hrn2	V	67.7	39.8	-57.3	-11.4	38.8	54.0	15.2
3471.36	Hrn2	H	59.2	39.8	-57.3	-11.4	30.3	54.0	23.7
3905.28	Hrn2	V	61.3	41.9	-57.8	-11.4	34.0	54.0	20.0
3905.28	Hrn2	H	59.5	41.9	-57.8	-11.4	32.2	54.0	21.8
4339.2	Hrn2	V	55.7	42.5	-54.9	-11.4	31.9	54.0	22.1
4339.2	Hrn2	H	51.5	42.5	-54.9	-11.4	27.7	54.0	26.3

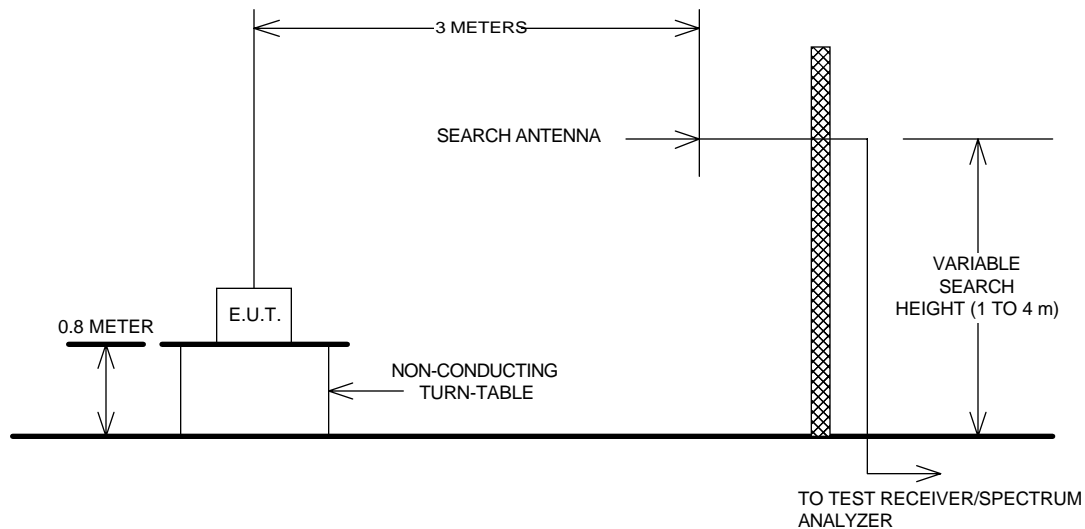
Notes:

B/C = Biconical, B/L = Biconilog, L/P = Log-Periodic, H = Horn, D/P = Dipole
 * Re-measured using dipole antenna.
 ** Includes cable loss when amplifier is not used.
 *** Includes cable loss.
 () Denotes failing emission level.
 N.D. = Not Detected

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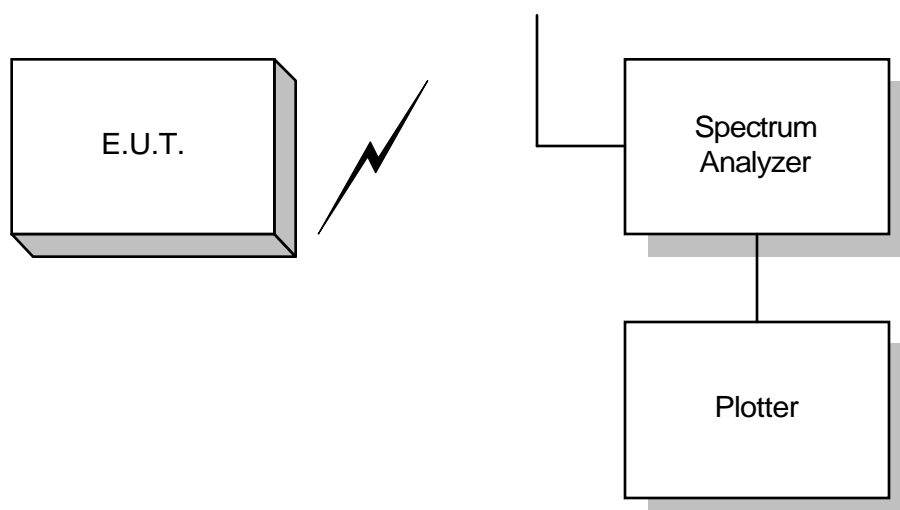
Section 5. Block Diagrams

Outdoor Test Site For Radiated Emissions



The spectrum was searched up to the 10th harmonic of the fundamental frequency of operation.

Occupied Bandwidth



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Section 6. Test Equipment List

CAL CYCLE	EQUIPMENT	MANUFACTURER	MODEL	SERIAL	LAST CAL.	NEXT CAL.
1 Year	Spectrum Analyzer	Hewlett Packard	8565E	FA000981	June 16/00	June 16/01
1 Year	Horn Antenna	EMCO #2	3115	4336	Nov. 11/99	Nov. 11/00
1 Year	Biconical (1) Antenna	EMCO	3109	9204-2708	Aug. 4/99	Aug. 4/00
1 Year	RF AMP	JCA	2-4 GHz	FA001496	May 31/00	May 31/01
1 Year	RF AMP	JCA	1-2 GHz	FA001498	May 31/00	May 31/01
1 Year	RF AMP	JCA	4-8 GHz	FA001497	May 31/00	May 31/01

NA: Not Applicable
NCR: No Cal Required
COU: CAL On Use