TIMCO ENGINEERING, Inc.

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FCC PART 15.231 & IC RSS-210 ISSUE 7
LOW POWER RADIO
TEST REPORT

Applicant	GuardRFID
Address	11920 Forge Place Richmond, BC V7A 4V9 Canada
FCC ID	VZKTT1
Model Number	RFID Tag
Product Description	433.92 MHz RFID Transmitter
Date Sample Received	12/3/2007
Date Tested	12/13/2007
Tested By	Richard Block
Approved By	Mario de Aranzeta
Report Number	3754BUT7TestRepot.pdf
Test Results	☒ PASS ☐ FAIL

ACCREDITED
Certificate # 0955-01

TABLE OF CONTENT

ATTESTATION

Certificate #0955-01

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment does comply with the appropriate standards.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

I attest that the necessary measurements were made by me or under my supervision, at TIMCO ENGINEERING, INC. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

Authorized by: Mario de Aranzeta, Lab Supervisor / Test Engineer

Signature: On file

Function: Engineer

Date: December 20, 2007

REPORT SUMMARY

Disclaimer	The test result only related to the item tested.
Purpose of Test Report	To demonstrate the DUT in compliance with FCC Part 15.231 and RSS-210 requirements for a 433.92 MHz RFID device.
Applicable Rule(s)	Industry Canada RSS-210 Issue 7, Annex 1, FCC Part 15.231, ANSI C63.4

TEST ENVIRONMENT AND SYSTEM

Test Facility	The test sites used by Timco Engineering Inc. is located at 849 NW State Road 45 Newberry, FL 32669 USA.
Test Condition:	The DUT was tested in the laboratory in an environment with normal temperature and humidity. The temperature was 26ºC with a relative humidity of 50%.
Test Exercise (e.g software description, test signal, etc.):	The DUT was placed in continuous transmit mode of operation.
Supporting Peripheral Equipment	Not applicable. The device is a stand-alone remote control radio.
Deviation to the standard(s)	No deviation to the standard(s).
Modification to the DUT:	No modification was made to the DUT during testing.

DUT SPECIFICATION

DUT Description	433.92 MHz Infant Hospital Security Transmitter		
FCC ID	VZKTT1		
Model Number	TT1		
Family Model(s)	TT1, TT2, UT2 (Note: Three models are identical. The only different among three models is the color. Different color represents different accounts. Hence one FCC ID is sufficient to cover three models)		
Serial Number	N/A		
Trade Name	N/A		
Operating Frequency	433.92 kHz		
No. of Channels	1		
Max. Output Power	N/A		
Modulation	OOK		
DUT Power Source	☐ 110–120Vac/50– 60Hz		
	☐ DC Power		
	☒ Battery Operated Exclusively		
Test Item	☐ Prototype	☒ Pre-Production	☐ Production
Type of Equipment	☐ Fixed	☐ Mobile	☒ Portable
Antenna Specification	N/A		

EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
3-Meter OATS	TEI	N/A	N/A	Listed 1/11/06	1/10/09
3/10-Meter OATS	TEI	N/A	N/A	Listed 3/27/07	3/26/10
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	CAL 12/7/07	12/7/09
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	CAL 12/7/07	12/7/09
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	CAL 12/8/07	12/8/09
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	CAL 12/8/07	12/8/09
Analyzer Blue Tower Spectrum Analyzer	HP	8568B	2928A04729 2848A18049	CAL 4/13/07	4/13/09
Analyzer Blue Tower RF Preselector	HP	85685A	2926A00983	CAL 9/5/07	9/5/09
Analyzer Blue Tower Quasi-Peak Adapter	HP	85650A	2811A01279	CAL 4/13/07	4/13/09
Analyzer Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	CAL 10/30/06	10/30/08

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Analyzer Silver Tower RF Preselector	HP	85685A	2620A00294	CAL 10/30/06	10/30/08
Analyzer Silver Tower Quasi-Peak Adapter	HP	85650A	3303A01844	CAL 10/30/06	10/30/08
Analyzer Open-Frame Tower Preamplifier	HP	8449B	3008A01075	CAL 8/8/07	8/8/09
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	CAL 4/29/07	4/29/09
Antenna: Biconnical	Eaton	94455-1	1096	CAL 10/11/06	10/11/08
Antenna: Biconnical	Eaton	94455-1	1057	CAL 12/12/07	12/12/09

TEST PROCEDURES

Power Line Conducted Interference: The procedure used was ANSI C63.4-2003 using a 50uH LISN. The spectrum was scanned from .15 to 30 MHz. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Radiation Interference: The test procedure used was ANSI standard C63.4-2003 using an Agilent spectrum analyzer with a pre-selector. In the frequency range 10 kHz to 30 MHz the RBW was 10 kHz and from 30-1000 MHz the RBW of the spectrum analyzer was 100 kHz with an appropriate sweep speed. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz and the video bandwidth was 300 kHz.

Occupied Bandwidth: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

Formula Of Conversion Factors: The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBuV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

Example:

Freq (MHz)	Meter Reading	+ ACF	+CL	= FS
33	20 dBuV	+ 10.36 dB/m	+0.40 dB	=30.76 dBuV/m @ 3m

ANSI C63.4-2003 Measurement Procedures: The DUT was placed on a non-conducting table 80 cm above the ground plane with the DUT located in the center of the table. With the antenna vertical a preliminary scan was done at 1 meters distance, the DUT was moved to a 3.0-meter distance and the antenna height varied and also placed in a horizontal position. The frequency was scanned from 9.0 kHz to 1.0 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The DUT was measured in three (3) orthogonal planes.

SUMMARY OF COMPLIANCE (REFER TO FCC RULE PART)

Rule Part No.	Description of Rule	Yes	No	N/A
Pt 15.231(a)	Continuous transmission		No	
Pt 15.231(a)	Control Signals		No	
Pt 15.231(a)	Data transmission with control signal	Yes		
Pt 15.231(a)(1)	Manually operated		No	
	Automatically deactivate within 5 seconds of being released			N/A
15.231(a)(2)	Automatically operated	Yes		
	Deactivate within 5 seconds after activation	Yes		
Pt 15.231(a)(3)	Periodic transmission at regular predetermined intervals		No	
	Polling or supervision transmission, including data, to determine system integrity or transmitters used in security or safety applications requires no total duration of transmission not exceeding 2s/hr.			N/A
Pt 15.231(a)(4)	Operation involving fire, security, or safety of life, when activated to signal an alarm, may operate during the pendency of the alarm condition.	Yes		

This is an RFID tag and is only active in the filed of the Signpost 125 kHz.

RADIATION INTERFERENCE

Rules Part No.: FCC Part 15.231, RSS-210, Issue 6, Annex 1, Para A1.1.2

Requirements: The emissions of fundamental frequencies shall not exceed the limits shown in the following table based on the average value of the measured emissions. As an alternative, compliance many be demonstrated using a CISPR quasi-peak detector.

Unwanted emissions shall be attenuated to the limits shown in Table 2 or can not exceed the limits for fundamental frequencies, whichever is the less stringent.

Fundamental Frequency (MHz)	Field Strength of Fundamental (dBµV)	Field Strength of Harmonics and Spurious Emissions (dBµV/m @ 3m)
40.66 to 40.70	67.04	47.04
70 to 130	61.94	41.94
130 to 174	61.94 to 71.48	41.94 to 51.48
174 to 260	71.48	51.48
260 to 470	71.48 to 81.94	51.48 to 61.94
470 and above	81.94	61.94

The limit for average field strength dBuV/m for the fundamental frequency = 80.82 dBµV/m. No fundamental is allowed in the restricted bands.

The limit for average field strength dBuV/m for the harmonics and spurious frequencies = 60.82 dBµv/m. Spurious in the restricted bands must be less than 54 dBµV/m or 15.209.

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows:
1) for the band 130-174 MHz, uV/m at 3 meters = 56.81818(F)-6136.3636;
2) for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F)-7083.3333.

Sample calculation of limit @ 315 MHz:

41.6667 (315)-7083.3333 = 6041.68 uV/m
20log(6041.68) = 75.62dBuV/m limit @ 315 MHz

Sample calculation of limit @ 433.92 MHz:

41.6667 (433.9)-7083.3333 = 10,995.85 uV/m
20log(10,995.85) = 80.82 dBuV/m limit @ 433.9 MHz

Test Data:

Tuned Freq MHz	Emission Freq. MHz	*	Meter Reading dBuV	Ant. Polarity V/H	Coax Loss dB	Correction Factor dB	Duty Cycle Factor dB	Field Strength dBuV/m	Margin dB
433.9	433.93		74.4	H	3.44	17.34	20.00	75.18	5.65
433.9	433.93		75.6	V	3.44	16.96	20.00	76.00	4.83
433.9	867.86		16.0	H	4.94	22.86	20.00	23.80	38.14
433.9	867.86		17.8	V	4.94	22.08	20.00	24.82	37.12
433.9	1,301.80	**	28.3	V	2.00	27.78	20.00	38.08	15.92
433.9	1,301.80	**	32.0	H	2.00	27.78	20.00	41.78	12.22
433.9	1,735.70		28.7	V	2.58	29.79	20.00	41.07	20.87
433.9	1,735.70		29.6	H	2.58	29.79	20.00	41.97	19.97
433.9	2,169.60		34.2	V	3.17	32.14	20.00	49.51	12.43
433.9	2,169.60		38.9	H	3.17	32.14	20.00	54.21	7.73
433.9	2,603.60		30.6	V	3.60	32.64	20.00	46.84	15.10
433.9	2,603.60		31.0	H	3.60	32.64	20.00	47.24	14.70
433.9	3,037.50		34.4	H	4.02	32.82	20.00	51.24	10.70
433.9	3,037.50		34.7	V	4.02	32.82	20.00	51.54	10.40
433.9	3,471.40		19.0	V	4.24	33.08	20.00	36.32	25.62
433.9	3,471.40		20.9	H	4.24	33.08	20.00	38.22	23.72
433.9	3,905.40	**	36.0	H	4.45	33.42	20.00	53.87	0.13
433.9	3,905.40	**	36.0	V	4.45	33.42	20.00	53.87	0.13
433.9	4,339.30	**	16.9	H	4.74	33.77	20.00	35.41	18.59
433.9	4,339.30	**	20.2	V	4.74	33.77	20.00	38.71	15.29

** -Denotes restricted bands

Note: Emissions attenuated more than 20 dB below the limit are not reported.

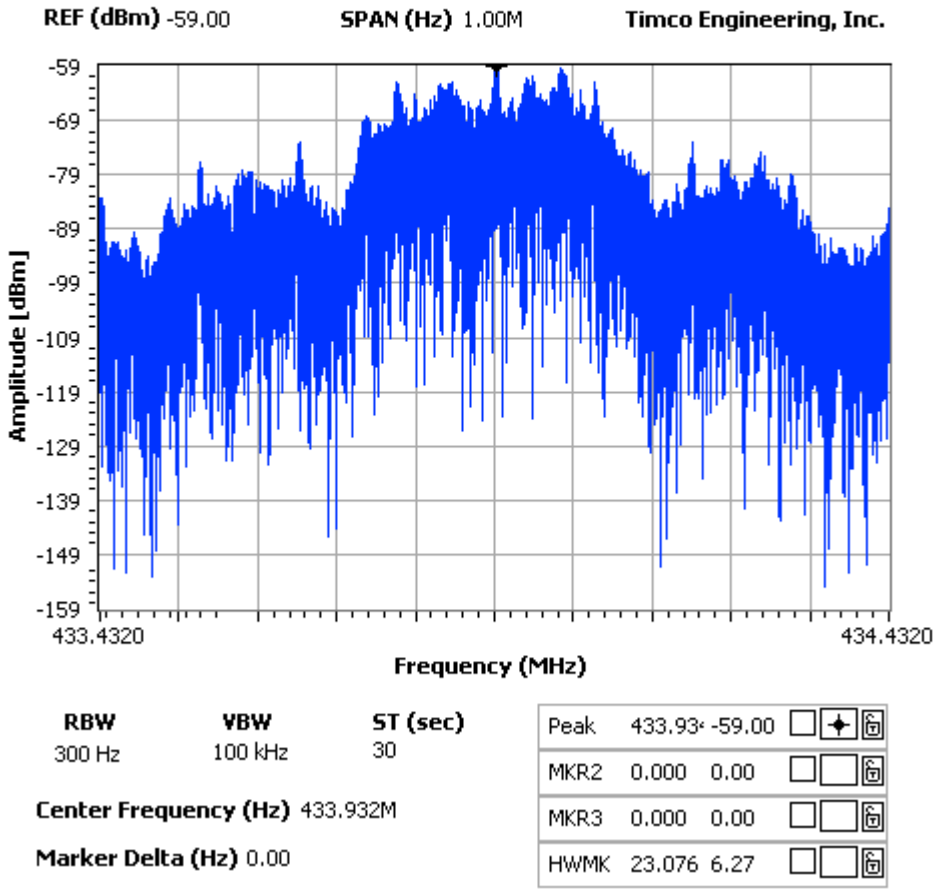
OCCUPIED BANDWIDTH

Rules Part No.: FCC Pt 15.231, RSS-210, Issue 6, Annex 1, Para A1.1.3

Requirements: The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating between 70 and 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier. Limit = 1.085 MHz.

Test Data: The following plot represents the emissions taken for the device.

NOTES:
OCCUPIED BANDWIDTH
GuardRFID -- Tag



CALCULATION OF DUTY CYCLE

The period of the pulse train is determined by observing it on an oscilloscope or a spectrum analyzer with zero (0) frequency span. A plot is then made of the pulse train with a sweep time of 100 milliseconds. This sweep determines the duration of the pulse train, which in this case is millisecond. This sweep allows the determination of the number of and type of pulses, i.e. long & short. Plots are then made showing the duration of each type of pulse and its duration. From the 100 millisecond Plot, the number of a given type of pulse is then multiplied by the duration of that type pulse. This allows the calculation of the amount of time the DUT is on within 100 ms. If the pulse train is longer than 100 ms then this number is multiplied by 100 to determine the percentage ON TIME. If the pulse train is less than 100 ms the total on time is divided by the length of the pulse train and then multiplied by 100 to determine the percentage ON TIME.

Duty cycle was declared by the customer and described in Operational Description.

POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: RSS-Gen

Requirements:

Frequency (MHz)	Quasi Peak Limits (dBuV)	Average Limits (dBuV)
0.15 – 0.5	66 – 56	56 – 46 *
0.5 – 5.0	56	46
5.0 – 30	60	50
* Decrease with the logarithm of frequency		

Test Data: Not applicable because the DUT is battery operated exclusively.