



Electromagnetic Compatibility Test Report

Tests Performed on Tracking Innovations, Incorporated's

Real Time Tracking System aRFID tags
Models 1840-01-100, 1840-01-200, and 1840-01-300

Radiometrics Document RP-6636B



Product Detail:

FCC ID: XZS-TII-1840-0190

IC: 8762A-TII18409

Equipment type: 2.4 GHz Transmitter

Test Standards:

US CFR Title 47, Chapter I, FCC Part 15 Subpart C

FCC Part 15 CFR Title 47: 2008

Industry Canada RSS-210, Issue 7: 2007 as required for Category I Equipment

This report concerns: Original Grant for Certification

FCC Part 15.249

Tests Performed For:

Tracking Innovations, Inc.
Key Center at Fountain Plaza
50 Fountain Plaza, Ste. 620
Buffalo, NY 14202

Test Facility:

Radiometrics Midwest Corporation
12 East Devonwood
Romeoville, IL 60446

Test Date(s): (Month-Day-Year)

August 27 thru October 19, 2009

Document RP-6636B Revisions:

Rev.	Issue Date	Affected Pages	Revised By
0	February 10, 2010		
1	February 15, 2010	7 to end	Joseph Strzelecki
2	February 18, 2010	All	Joseph Strzelecki

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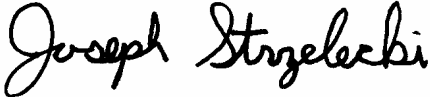
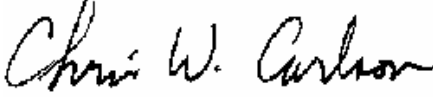
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1 ADMINISTRATIVE DATA

<i>Equipment Under Test:</i> Tracking Innovations, Inc., Real Time Tracking System aRFID tags Models: 1840-01-100, 1840-01-200, & 1840-01-300, Serial Numbers: A0000050, B0000048, & C0000009 These will be referred to as the EUT in this Report	
<i>Date EUT Received at Radiometrics: (Month-Day-Year)</i> August 24, 2009	<i>Test Date(s): (Month-Day-Year)</i> August 27 thru October 19, 2009
<i>Test Report Written By:</i> Joseph Strzelecki Senior EMC Engineer	<i>The Test was not Witnessed by Personnel from:</i> Tracking Innovations, Inc.
<i>Radiometrics' Personnel Responsible for Test:</i>  <hr/> Joseph Strzelecki Senior EMC Engineer NARTE EMC-000877-NE	<i>Test Report Approved By</i>  <hr/> Chris W. Carlson Director of Engineering NARTE EMC-000921-NE

2 TEST SUMMARY AND RESULTS

The EUT (Equipment Under Test) is a Real Time Tracking System aRFID tags, Models 1840-01-100, 1840-01-200, and 1840-01-300, manufactured by Tracking Innovations, Inc. The EUT consists of a Master and Tags. The detailed test results are presented in a separate section. This report covers the tags. The following is a summary of the test results.

Emissions Tests Results

Environmental Phenomena	Frequency Range	FCC Section	RSS-210 Section	Test Result
20 dB Bandwidth Test	2400 to 2483 MHz	15.249	A2.9	Pass
Radiated Emissions	30 MHz to 25 GHz	15.249	A2.9	Pass

AC conducted emissions are not required since the product is battery powered.

2.1 RF Exposure Compliance Requirements

Because the power output is Less than 1 mW, The EUT meets 15.203 of the FCC requirement for RF exposure and it is exempt from RSS-102. There are no power level adjustments and the antenna is permanently attached.

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3 EQUIPMENT UNDER TEST (EUT) DETAILS

3.1 EUT Description

The EUT are Real Time Tracking System aRFID tags, Models 1840-01-100, 1840-01-200, and 1840-01-300 manufactured by Tracking Innovations, Inc. The EUT was in good working condition during the tests, with no known defects.

3.1.1 FCC Section 15.203 & RSS-GEN Antenna Requirements

The Tag antenna is permanently attached to the PCB. The antenna is internal to the EUT and it is not readily available to be modified by the end user. Therefore, it meets the 15.203 Requirement.

4 TESTED SYSTEM DETAILS

4.1 Tested System Configuration

The system was configured for testing in a typical fashion. The EUT was placed on an 80-cm high, nonconductive test stand. The testing was performed in conditions as close as possible to installed conditions. Wiring was consistent with manufacturer's recommendations.

The Tags were tested as a stand-alone device with a fully charged battery.

The identification for all equipment, plus descriptions of all cables used in the tested system, are:

Tested System Configuration List

Item	Description	Type*	Manufacturer	Model Number	Serial Number
1	Tags Module (Tag A)	P	Tracking Innovations, Inc.	1840-01-200	A0000050
2	Tags Module (Tag B)	P	Tracking Innovations, Inc.	1840-01-300	B1000048
3	Tags Module (Tag C)	P	Tracking Innovations, Inc.	1840-01-100	C1000009

* Type: E = EUT, P = Peripheral,

4.2 Special Accessories

No special accessories were used during the tests in order to achieve compliance.

4.3 Equipment Modifications

No modifications were made to the EUT at Radiometrics' test facility in order to comply with the standards listed in this report.

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5 TEST SPECIFICATIONS AND RELATED DOCUMENTS

Document	Date	Title
FCC CFR Title 47	2008	Code of Federal Regulations Title 47, Chapter 1, Federal Communications Commission, Part 15 - Radio Frequency Devices
ANSI C63.4-2003	2003	Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
IC RSS-210 Issue 7	2007	Low Power Licence-Exempt Radiocommunication Devices (All Frequency Bands) Category I Equipment
IC RSS-Gen Issue 2	2007	General Requirements and Information for the Certification of Radiocommunication Equipment (RSS-Gen)
FCC DA 00-705	2000	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
FCC 558074	2005	Measurement of Digital Transmission Systems Operating under Section 15.247

The test procedures used are in accordance with the FCC DA 00-705, or FCC 558074, Industry Canada RSS-212 and ANSI document C63.4-2003, "Methods of Measurement of Radio Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". The specific procedures are described herein. Radiated testing was performed at an antenna to EUT distance of 3 meters. The antenna was raised and lowered from 1 to 4 meters.

6 RADIOMETRICS' TEST FACILITIES

The results of these tests were obtained at Radiometrics Midwest Corp. in Romeoville, Illinois, USA. Radiometrics is accredited by A2LA (American Association for Laboratory Accreditation) to conform to ISO/IEC 17025: 2005 "General Requirements for the Competence of Calibration and Testing Laboratories". Radiometrics' Lab Code is 121191 and Certification Number is 1495.01. Radiometrics' scope of accreditation includes all of the test methods listed herein. A copy of the accreditation can be accessed on our web site (www.radiomet.com). Radiometrics accreditation status can be verified at A2LA's web site (www.a2la2.org).

The following is a list of shielded enclosures located in Romeoville, Illinois used during the tests:

Chamber E: Is a custom made anechoic chamber that measures 52' L X 30' W X 18' H. The walls and ceiling are fully lined with RF absorber. Pro-shield of Collinsville, Oklahoma manufactured the chamber.

Test Station F: Is an area that measures 10' D X 12' W X 10' H. The floor and back wall are metal shielded. This area is used for conducted emissions measurements.

A separate ten-foot long, brass plated, steel ground rod attached via a 6 inch copper braid grounds each of the above chambers. Each enclosure is also equipped with low-pass power line filters.

The FCC has accepted these sites as test site number US1065. The FCC test site Registration Number is 732175. Details of the site characteristics are on file with the Industry Canada as file number IC3124A-1.

A complete list of the test equipment is provided herein. The calibration due dates are indicated on the equipment list. The equipment is calibrated in accordance to ANSI/NCSL Z540-1 with traceability to the National Institute of Standards and Technology (NIST).

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7 DEVIATIONS AND EXCLUSIONS FROM THE TEST SPECIFICATIONS

There were no deviations or exclusions from the test specifications.

8 CERTIFICATION

Radiometrics Midwest Corporation certifies that the data contained herein was taken under conditions that meet or exceed the requirements of the test specification. The results relate only to the EUT listed herein. Any modifications made to the EUT subsequent to the indicated test date will invalidate the data and void this certification.

9 TEST EQUIPMENT TABLE

RMC ID	Manufacturer	Description	Model No.	Serial No.	Frequency Range	Cal Period	Cal Date
AMP-05	RMC/Celeritek	Pre-amplifier	MW110G	1001	1.0-12GHz	12 Mo.	02/01/09
AMP-20	Avantek	Pre-amplifier	SF8-0652	15221	8-18GHz	12 Mo.	02/01/09
AMP-22	Anritsu	Pre-amplifier	MH648A	M23969	0.1-1200MHz	12 Mo.	02/03/09
ANT-13	EMCO	Horn Antenna	3115	2502	1.0-18GHz	24 Mo.	10/22/08
ANT-44	Impossible Machine	Super Log Antenna	SL-20M2G	1002	20-2000MHz	24 Mo.	11/25/09
REC-01	Hewlett Packard	Spectrum Analyzer	8566A	2106A02115, 2209A01349	30Hz-22GHz	24 Mo.	10/23/08
REC-03	Anritsu	Spectrum Analyzer	MS2601B	MT94589	0.01-2200MHz	12 Mo.	03/09/09
REC-07	Anritsu	Spectrum Analyzer	MS2601A	MT53067	0.01-2200MHz	12 Mo.	03/09/09
THM-01	Extech Inst.	Temp/Humid Meter	4465CF	001106557	N/A	24 Mo.	01/18/08

Note: All calibrated equipment is subject to periodic checks.

10 TEST SECTIONS

10.1 Time of Occupancy (Dwell Time)

As required by FCC section 15.35 and RSS-210 section 6.5, the Peak to Average correction factor was calculated. In any 100 ms interval, the worst case transmitter duty cycle is 84.9% as shown below.

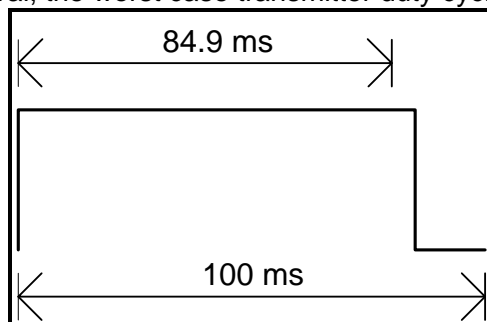


Figure 1. Duty Cycle Plot

The Peak to Average factor is calculated by the highest duty cycle in percent over any 100ms transmission. The factor in dB is $20 * \log(\text{Duty cycle}/100) = 1.4 \text{ dB}$.

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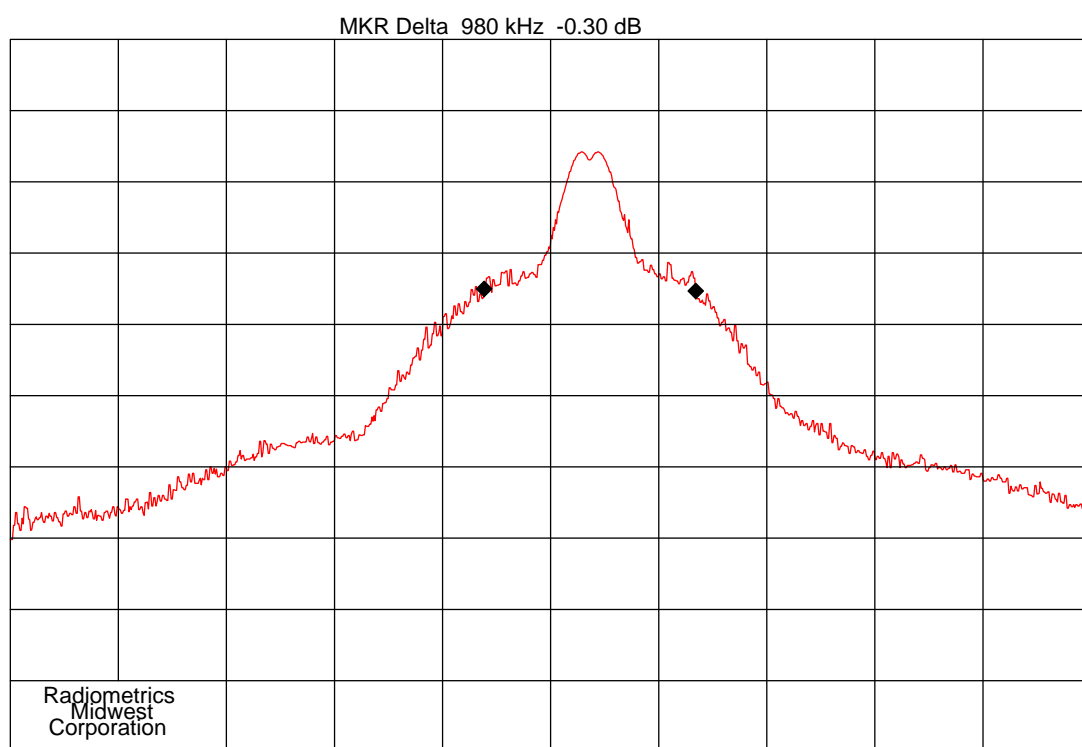
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10.2 Occupied Bandwidth (20 dB)

The spectrum analyzer was set to the MAX HOLD mode to record the worst case of the modulation. The EUT was transmitting at its maximum data rate. The trace was allowed to stabilize.

The marker-to-peak function was set to the peak of the emission. Then the marker-delta function was used to measure 20 dB down one side of the emission. The marker-delta function was reset and then moved to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

Channel	Tags
	20 dB EBW MHz
2401.75	0.980
2441.0	1.000
2481.0	1.005



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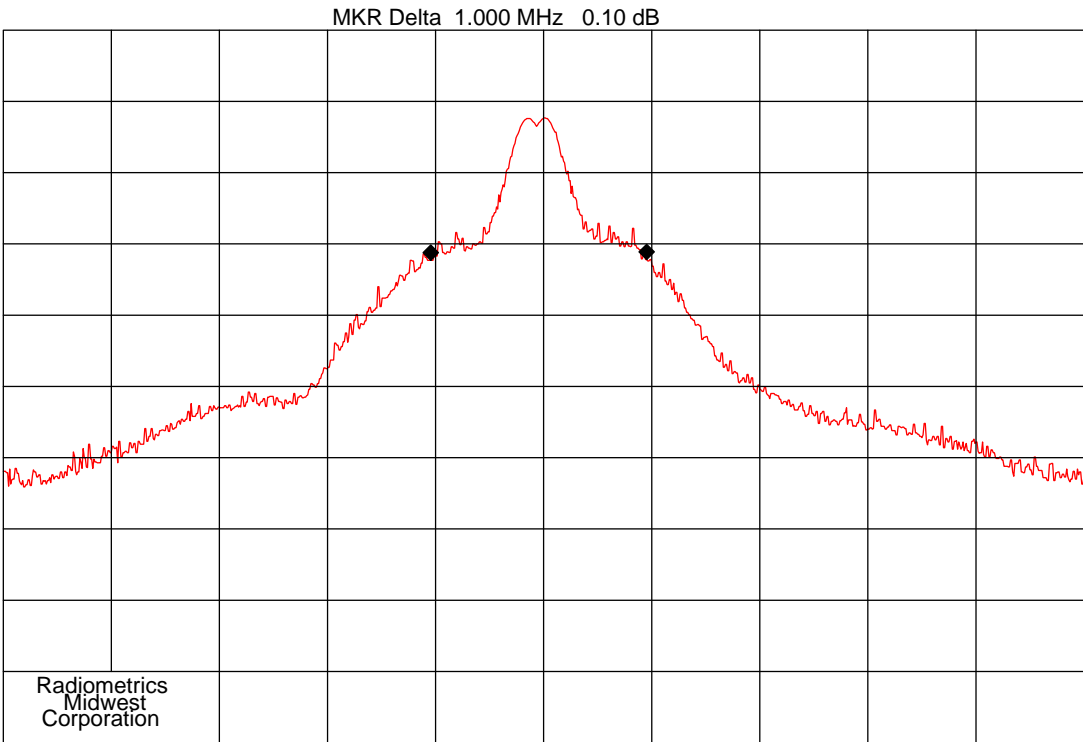
Company: Indsign
CENTER 2.401 58 GHz
RES BW 100 kHz
10 dB/
Notes: Bandwidth,

ITEM : Tag
REF 97.0 dBuV
VBW 300 kHz
Time: 14:09

Date : 10-19-2009
SPAN 5.00 MHz
ATTEN 0 dB
SWP 20.0 msec

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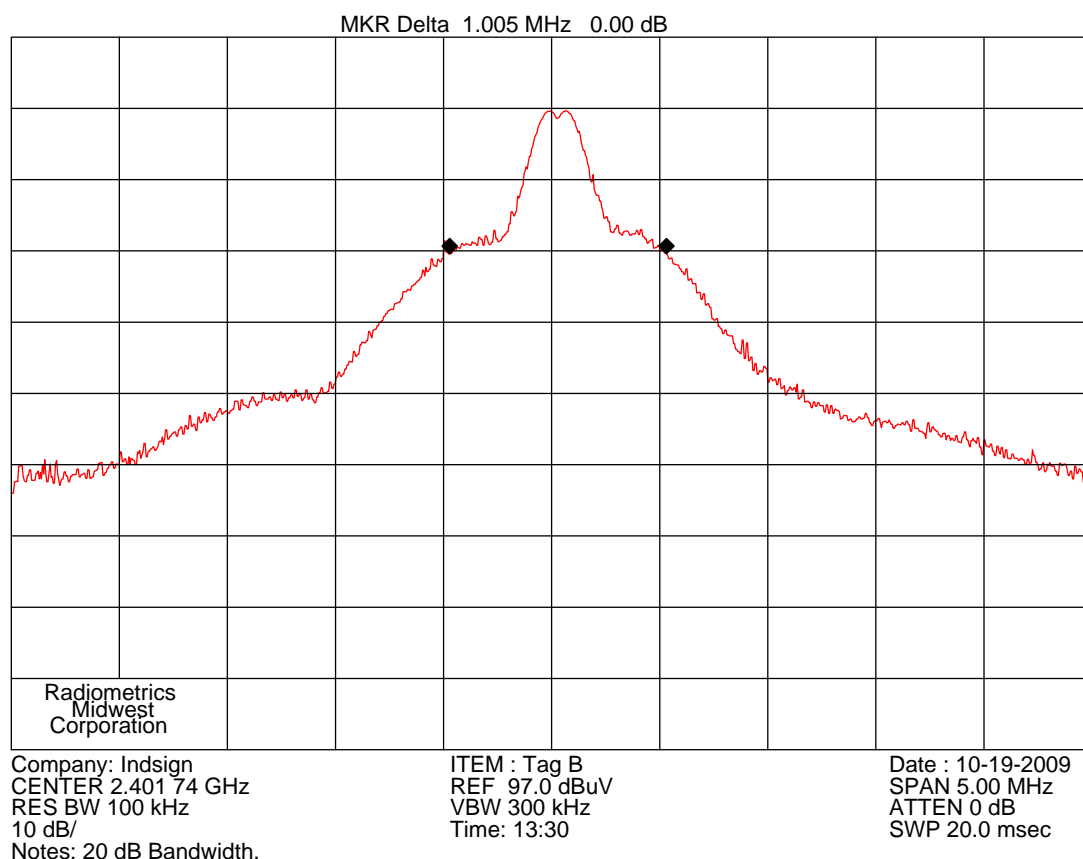
Company: Indsign
CENTER 2.480 98 GHz
RES BW 100 kHz
10 dB/
Notes: Bandwidth,

ITEM : Tag
REF 97.0 dBuV
VBW 300 kHz
Time: 14:00

Date : 10-19-2009
SPAN 5.00 MHz
ATTEN 0 dB
SWP 20.0 msec

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10.3 RF Radiated Emissions

Radiated emission measurements were performed with linearly polarized broadband antennas. The results obtained with these antennas can be correlated with results obtained with a tuned dipole antenna. The radiated emission measurements were performed with a spectrum analyzer. The bandwidth used from 150 kHz to 30 MHz is 9 or 10 kHz and the bandwidth from 30 MHz to 1000 MHz is 100 or 120 kHz. Above 1 GHz, a 1 MHz bandwidth is used. A 10 dB linearity check is performed prior to start of testing in order to determine if an overload condition exists.

From 30 to 1000 MHz, an Anritsu spectrum analyzer was used. For tests from 1 to 25 GHz, an HP 8566 spectrum analyzer was used. For tests from 1 to 10 GHz, a high pass filter was used to reduce the fundamental emission. A harmonic mixer was used from 18 to 25 GHz. Figure 4 herein lists the details of the test equipment used during radiated emissions tests.

The Tags were rotated through three orthogonal axis as per 13.1.4.1 of ANSI C63.4 during the prescans and during final radiated tests.

Final radiated emissions measurements were performed inside of an anechoic chamber at a test distance of 3 meters. The anechoic chamber is designated as Chamber E. This Chamber meets the Site Attenuation requirements of ANSI C63.4 and CISPR 16-1. Chamber E is located at 12 East Devonwood Ave. Romeoville, Illinois EMI test lab.

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The entire frequency range from 30 MHz to 25 GHz was slowly scanned with particular attention paid to those frequency ranges which appeared high. Measurements were performed using two antenna polarizations, (vertical and horizontal). The worst case emissions were recorded. All measurements may be performed using either the peak, average or quasi-peak detector functions. If the peak detector data exceeds or is marginally close to the limits, the measurements are repeated using a quasi-peak detector or average function as required by the specification for final determination of compliance.

The detected emission levels were maximized by rotating the EUT, adjusting the positions of all cables, and by scanning the measurement antenna from 1 to 4 meters above the ground.

10.3.1 Radiated Emissions Field Strength Sample Calculation

The field strength is calculated by adding the Antenna Factor and Cable Loss, and by subtracting the Amplifier Gain from the measured reading. The basic equation is as follows:

$$FS = RA + AF + CF - AG$$

Where: FS = Field Strength

RA = Receiver Amplitude

AF = Antenna Factor

CF = Cable Attenuation Factor

AG = Amplifier Gain

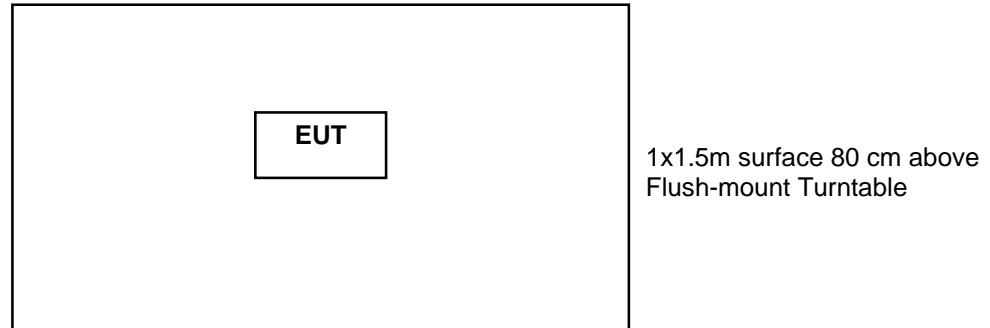
PKA = Peak to Average Factor (This is zero for non-average measurements)

The Peak to average factor is used when average measurements are required. It is calculated by the highest duty cycle in percent over any 100mS transmission. The factor in dB is $20 * \text{Log}(\text{Duty cycle}/100)$. The factor in dB is $20 * \text{Log}(\text{Duty cycle}/100) = 1.4 \text{ dB}$.

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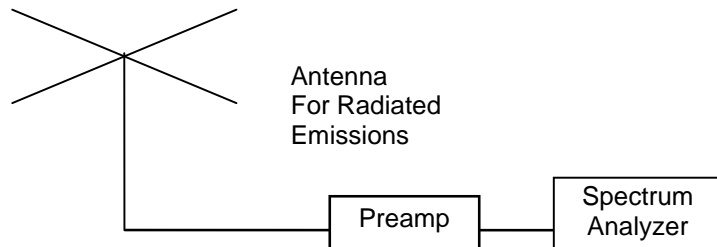
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Figure 2. Drawing of Radiated Emissions Setup



Notes:

- AC outlet with low-pass filter at the base of the turntable
- Antenna height varied from 1 to 4 meters
- Distance from antenna to tested system is 3 meters
- Not to Scale



10.3.2 Radiated Emissions Test Results

The following spectrum analyzer settings were used.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

A Video Bandwidth of 10 Hz was used for Average measurements above 1 GHz.

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10.3.2.1 Emissions Results 30 MHz to 2 GHz

Manufacturer	Tracking Innovations, Inc.	Specification	FCC Part 15 Subpart C & RSS-210
Model	1840-01-300	Test Date	10-14-2009
Serial Numbers	A0000050, B0000048 & C1000009	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain		

10.3.2.1.1 Recieve Mode

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ ID#		EUT	Limit	
45.0	23.8	P	14.8	H/44	-27.7	10.9	40.0	29.1
180.6	24.5	P	9.2	H/44	-26.3	7.5	43.5	36.0
380.0	25.3	P	14.7	H/44	-25.2	14.8	46.0	31.2
550.2	24.5	P	17.7	H/44	-24.1	18.1	46.0	27.9
50.6	24.1	P	13.7	V/44	-27.6	10.2	40.0	29.8
189.8	24.0	P	9.5	V/44	-26.2	7.3	43.5	36.2
389.2	24.1	P	15.1	V/44	-25.2	14.0	46.0	32.0
501.0	24.9	P	17.0	V/44	-24.4	17.5	46.0	28.5

There were no emissions were detected from any of the three EUT in the receive mode within 15 dB of the limits from 30 MHz to 2 GHz. The readings above are the noise floor of the system.

Judgment: Passed by at least 15 dB

10.3.2.1.2 Transmit Mode

Freq. MHz	Meter Reading dBuV	Dect. Type	Antenna		Corr. Factors dB	Field Strength dBuV/m		Margin Under Limit dB
			Factor dB	Pol/ ID#		EUT	Limit	
40.6	23.6	P	15.3	H/44	-27.8	11.2	40.0	28.8
162.6	24.8	P	10.1	H/44	-26.4	8.5	43.5	35.0
359.6	23.1	P	14.8	H/44	-25.1	12.8	46.0	33.2
551.0	22.9	P	17.8	H/44	-24.1	16.6	46.0	29.4
50.0	28.4	P	14.0	V/44	-27.6	14.8	40.0	25.2
213.2	25.3	P	10.9	V/44	-26.1	10.1	43.5	33.4
254.6	25.2	P	13.0	V/44	-25.8	12.5	46.0	33.5
375.0	24.6	P	14.8	V/44	-25.2	14.2	46.0	31.8

There were no emissions were detected from any of the three EUT in the transmit mode within 15 dB of the limits from 30 MHz to 2 GHz. The readings above are the noise floor of the system.

Judgment: Passed by at least 15 dB

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10.3.2.2 Emissions Results 2 to 25 GHz

Manufacturer	Tracking Innovations, Inc.	Specification	FCC Part 15 Subpart C & RSS-210
Model	1840-01-300	Test Date	10-07-2009
Serial Numbers	A0000050, B0000048 & C1000009	Test Distance	3 Meters
Abbreviations	Pol = Antenna Polarization; V = Vertical; H = Horizontal; P = peak; Q = QP		
Notes	Corr. Factors = Cable Loss – Preamp Gain		

10.3.2.2.1 Recieve Mode

All tags were tested in the receive mode up to 12.5 GHz. No emissions were detected in the receive mode from 2 to 12.5 GHz within 10 dB of the limits.

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10.3.2.2.2 Transmit Mode

The transmit mode was tested up to 25 GHz. No emissions in were detected above 8 GHz within 10 dB of the limits.

Tag A; Serial Number A0000050

		Spectrum Analyzer Readings									EUT	Peak	Ave	Peak	Ave	Margin		
hrm	Tx	Peak				Ave	Peak				Ave	Corr.	Emission	Tot. FS		Limit		Under
#	Freq	Vertical Polarization				Horizontal Polarization				Fact.	Freq MHz	dBuV/m		dBuV/m		Limit		
		X	Y	Z	Max	X	Y	Z	Max									
1	2401.8	84.0	88.9	84.0	87.5	90.0	80.8	90.6	89.2	3.8	2401.8	94.4	93.0	114	94	1.0		
BE	2401.8	34.2	39.1	34.2	37.7	40.2	31.0	40.8	39.4	3.8	2400	44.6	43.2	74	54	10.8		
2	2401.8	41.3	38.3	36.5	39.9	39.5	40.4	37.8	39.0	11.8	4803.6	53.1	51.7	74	54	2.3		
3	2401.8	34.0	34.0	34.0	32.6	34.0	34.0	34.0	32.6	15.9	7205.4	49.9	48.5	74	54	5.5		
1	2441.0	81.5	85.0	82.8	83.6	89.4	81.1	88.9	88.0	4.0	2441	93.4	92.0	114	94	2.0		
2	2441.0	38.8	38.4	40.7	39.3	39.8	39.7	40.9	39.5	11.8	4882	52.7	51.3	74	54	2.7		
3	2441.0	34.0	34.0	34.0	32.6	34.0	34.0	34.0	32.6	16.3	7323	50.3	48.9	74	54	5.1		
1	2481.0	81.0	84.0	82.5	82.6	89.9	78.0	87.0	88.5	4.3	2481	94.2	92.8	114	94	1.2		
BE	2481.0	33.2	36.2	34.7	34.8	42.1	30.2	39.2	40.7	4.3	2483.5	46.4	45.0	74	54	9.0		
2	2481.0	39.6	37.3	40.9	39.5	40.5	41.0	41.2	39.8	11.9	4962	53.1	51.7	74	54	2.3		
3	2481.0	34.0	34.0	34.0	32.6	34.0	34.0	34.0	32.6	17.0	7443	51.0	49.6	74	54	4.4		
Column numbers (see below for explanations)																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		

Judgment: Passed by 1.0 dB

No other emissions were detected from 2 to 25 GHz.

The tag was rotated through three orthogonal axis

- Column #1. hrm = Harmonic; BE = Band Edge emissions
- Column #2. Frequency of Transmitter.
- Column #3. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
- Column #4. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
- Column #5. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
- Column #6. Average Reading based on peak reading reduced by the Duty cycle correction
- Column #7. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
- Column #8. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
- Column #9. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
- Column #10. Average Reading based on peak reading reduced by the Duty cycle correction
- Column #11. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
- Column #12. Frequency of Tested Emission
- Column #13. Highest peak field strength at listed frequency.
- Column #14. Highest Average field strength at listed frequency.
- Column #15. Peak Limit.
- Column #16. Average Limit.
- Column #17. The margin (last column) is the worst case margin under the peak or average limits for that row.

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report

Testing of the Tracking Innovations, Inc., Models 1840-01-100, 1840-01-200, and 1840-01-300
Real Time Tracking System aRFID tags

Tag B; Serial Number B0000048

Spectrum Analyzer Readings											EUT	Peak	Ave	Peak	Ave	Margin
hrm	Tx	Peak				Ave				Corr.	Emission	Tot. FS		Limit		Under
#	Freq	Vertical Polarization				Horizontal Polarization				Fact.	Freq MHz	dBuV/m		dBuV/m		Limit
		X	Y	Z	Max	X	Y	Z	Max							
1	2401.8	79.1	85.6	85.0	84.2	89.4	81.3	90.1	88.7	3.8	2401.8	93.9	92.5	114	94	1.5
BE	2401.8	29.3	35.8	35.2	34.4	39.6	31.5	40.3	38.9	3.8	2400	44.1	42.7	74	54	11.3
2	2401.8	38.0	36.2	42.2	40.8	40.0	40.2	37.5	38.8	11.8	4803.6	54.0	52.6	74	54	1.4
3	2401.8	34.0	34.0	34.0	32.6	34.0	34.0	34.0	32.6	15.9	7205.4	49.9	48.5	74	54	5.5
1	2441.0	82.1	84.2	84.9	83.5	89.5	83.0	90.4	89.0	4.0	2441	94.4	93.0	114	94	1.0
2	2441.0	40.6	37.4	42.1	40.7	40.0	39.9	36.8	38.6	11.8	4882	53.9	52.5	74	54	1.5
3	2441.0	34.0	34.0	34.0	32.6	34.0	34.0	34.0	32.6	16.3	7323	50.3	48.9	74	54	5.1
1	2481.0	76.8	79.4	81.5	80.1	89.4	77.6	86.1	88.0	4.3	2481	93.7	92.3	114	94	1.7
BE	2481.0	29.0	31.6	33.7	32.3	41.6	29.8	38.3	40.2	4.3	2483.5	45.9	44.5	74	54	9.5
2	2481.0	42.2	39.3	42.4	41.0	42.3	42.2	38.0	40.9	11.9	4962	54.3	52.9	74	54	1.1
3	2481.0	34.0	34.0	34.0	32.6	34.0	34.0	34.0	32.6	17.0	7443	51.0	49.6	74	54	4.4
Column numbers (see below for explanations)																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Judgment: Passed by 1.0 dB

No other emissions were detected from 2 to 25 GHz.

The tag was rotated through three orthogonal axis

- Column #1. hrm = Harmonic; BE = Band Edge emissions
- Column #2. Frequency of Transmitter.
- Column #3. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
- Column #4. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
- Column #5. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
- Column #6. Average Reading based on peak reading reduced by the Duty cylce correction
- Column #7. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
- Column #8. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
- Column #9. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
- Column #10. Average Reading based on peak reading reduced by the Duty cylce correction
- Column #11. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
- Column #12. Frequency of Tested Emission
- Column #13. Highest peak field strength at listed frequency.
- Column #14. Highest Average field strength at listed frequency.
- Column #15. Peak Limit.
- Column #16. Average Limit.
- Column #17. The margin (last column) is the worst case margin under the peak or average limits for that row.

RADIOMETRICS MIDWEST CORPORATION - EMC Test Report

Testing of the Tracking Innovations, Inc., Models 1840-01-100, 1840-01-200, and 1840-01-300
Real Time Tracking System aRFID tags

Tag C; Serial Number C1000009

Spectrum Analyzer Readings											EUT	Peak	Ave	Peak	Ave	Margin
hrm	Tx	Peak				Ave				Corr.	Emission	Tot. FS		Limit		Under
#	Freq	Vertical Polarization				Horizontal Polarization				Fact.	Freq MHz	dBuV/m		dBuV/m		Limit
		X	Y	Z	Max	X	Y	Z	Max							
1	2401.8	81.9	88.9	79.4	87.5	86.2	77.6	90.6	89.2	3.8	2401.8	94.4	93.0	114	94	1.0
BE	2401.8	32.1	39.1	29.6	37.7	36.4	27.8	40.8	39.4	3.8	2400	44.6	43.2	74	54	10.8
2	2401.8	41.0	38.1	40.1	39.6	40.0	42.3	38.1	40.9	11.8	4803.6	54.1	52.7	74	54	1.3
3	2401.8	33.0	33.8	33.3	32.4	33.2	33.4	33.6	32.2	15.9	7205.4	49.7	48.3	74	54	5.7
1	2441.0	80.1	84.6	81.4	83.2	89.9	77.4	90.5	89.1	4.0	2441	94.5	93.1	114	94	0.9
2	2441.0	41.0	38.3	42.3	40.9	41.9	42.0	40.8	40.6	11.8	4882	54.1	52.7	74	54	1.3
3	2441.0	33.2	33.4	33.1	32.0	33.2	33.7	33.1	32.3	16.3	7323	50.0	48.6	74	54	5.4
1	2481.0	80.1	84.9	81.0	83.5	88.1	75.9	88.9	87.5	4.3	2481	93.2	91.8	114	94	2.2
BE	2481.0	32.3	37.1	33.2	35.7	40.3	28.1	41.1	39.7	4.3	2483.5	45.4	44.0	74	54	10.0
2	2481.0	41.2	38.1	41.9	40.5	42.0	42.3	37.6	40.9	11.9	4962	54.2	52.8	74	54	1.2
3	2481.0	33.8	34.0	33.5	32.6	33.5	34.2	33.6	32.8	17.0	7443	51.2	49.8	74	54	4.2
Column numbers (see below for explanations)																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

Judgment: Passed by 0.9 dB

No other emissions were detected from 2 to 25 GHz.

The tag was rotated through three orthogonal axis

- Column #1. hrm = Harmonic; BE = Band Edge emissions
- Column #2. Frequency of Transmitter.
- Column #3. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
- Column #4. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
- Column #5. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
- Column #6. Average Reading based on peak reading reduced by the Duty cycle correction
- Column #7. Uncorrected readings from the spectrum analyzer with First Axis Rotation.
- Column #8. Uncorrected readings from the spectrum analyzer with Second Axis Rotation.
- Column #9. Uncorrected readings from the spectrum analyzer with Third Axis Rotation.
- Column #10. Average Reading based on peak reading reduced by the Duty cycle correction
- Column #11. Corr. Factors = Cable Loss – Preamp Gain + Antenna Factor
- Column #12. Frequency of Tested Emission
- Column #13. Highest peak field strength at listed frequency.
- Column #14. Highest Average field strength at listed frequency.
- Column #15. Peak Limit.
- Column #16. Average Limit.
- Column #17. The margin (last column) is the worst case margin under the peak or average limits for that row.