TEST REPORT

Report Number: 3076910.011
Project Number: 3076910
May 12, 2005

Evaluation of the
ZIR000 Motion Sensor
FCC ID: QIE0685-0X

to
FCC Part 2
FCC Part 15, Subpart C, Section 15.249

For
Advanced Control Technologies Inc.

Test Performed by:
Intertek
7250 Hudson Blvd. Suite 100
Oakdale, MN 55128

Test Authorized by:
Advanced Control Technologies Inc.
8076 Woodland Drive
PO Box 78095
Indianapolis, MN 46278

Prepared by: _____ Date: May 12, 2005
Uri Spector

Approved by: _____ Date: May 12, 2005
Yuriy Litvinov

CONTENTS

1.0 GENERAL DESCRIPTION

1.1 Related Submittals Grants

This is single application of the *Advanced Control Technologies Inc. ZIR000 Motion Sensor* Certification under FCC Part 15, Subpart C.
There are no other simultaneous applications.

1.2 Product Description

The *ZIR000 Motion Sensor* is a RF transmitter operating in 908.39MHz. The intended use of the *ZIR000 Motion Sensor* is to generate and transmit a RF signal to activate load receiver. *ZIR000 Motion Sensor* is powered at 6VDC AAA internal batteries.

Antenna Description:

Single isolated wire 9cm length soldered to the RF Board inside the unit

Sample Submitted: May 9, 2005
Test Work Started: May 9, 2005
Test Work Completed: May 12, 2005

1.3 Test Methodology

Emission measurements were performed according to the procedures in ANSI C63.4-2001. All field strength radiated emissions measurements were performed in the semi-anechoic chamber, and for each scan, the procedure for maximizing emissions in Appendices D and E were followed. All field strength radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

1.4 Test Facility

The test site facility used to collect the radiated and conducted measurement data is located at 7250 Hudson Blvd., Suite 100, Oakdale, Minnesota. This test facility has been fully described in a report dated on March 2003 submitted to FCC. Please reference the site registration number: 90706, dated April 18, 2003.

2.0 SYSTEM TEST CONFIGURATION

2.1 Justification

Line Conducted Emissions testing is inappropriate and therefore unnecessary as batteries power the equipment.

2.2 EUT Setup

For simplicity of testing, the transmitter was setup to transmit continuously for spurious emissions testing.

2.3 EUT Exercising Software

N/A

2.4 Special Accessories

There are no special accessories necessary for compliance of these products.

Cables

N/A

2.5 Equipment Modification

No modifications were installed during the testing.

2.6 Support Equipment List and Description

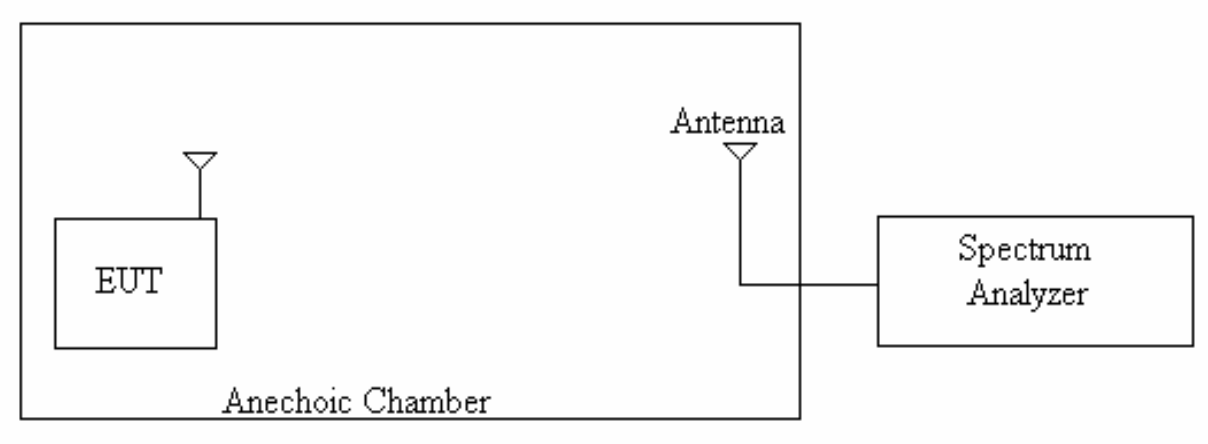
N/A

2.7 Test Configuration Block Diagrams

The EUT was setup as tabletop equipment.
The EUT was powered at 6VDC form new internal AAA batteries.

Field Strength Measurements

For simplicity of testing, the Unit was set to transmit continuously for spurious emissions measurements.



3.0 TEST RESULTS

Data is included for the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs, data tables and graphical representations of the emissions are included.

The EUT is intended for operation under the requirements of Part 15 Subpart C. Specific test requirements include the following:

47 CFR 15.249(a)(b)	Field Strength of Fundamental
47 CFR 15.249(a)(b), 15.205	Field Strength of Harmonics
47 CFR 15.249(c), 15.209	Out of Band Spurious Emissions
	Bandwidth of Emissions
47 CFR 15.109	Unintentional Radiated Emissions

3.1 Field Strength of Fundamental and Harmonics Emissions, FCC 15.249(a)(b), 15.205

Field Strength of Fundamental and Harmonics Emissions measurements were made with Fundamental frequency at 908.39MHz. The Harmonics emissions were tested up to 10th harmonic.

The Tables 3-1-1 and 3-1-2 show the Field Strength of Fundamental Radiation and Restricted Band Harmonics Emissions. No emissions above the floor noise were found above 5th harmonics.

Field Strength of Fundamental **Date:** 5/9/2005
Company: ACT, Inc.
Model: ZIR000
Test Engineer: Uri Spector
Standard: FCC Part 15.249
Test Site: 3 m Anechoic Chamber
Note: Measurements were taking using peak detector
with 100kHz Resolution Bandwidth
Antenna Factors include Antenna Correction Factors and Cable Loss

Table # 3-1-1

Frequency	Antenna		Antenna Factor	Peak Reading	Net at 3m.	Limit	Margin
MHz	Polarity	Hts(m)	dB(1/m)	dBµV	dBµV/m	dBµV/m	dB
908.39	V	175	25.1	52.0	77.1	94.0	-16.9
908.39	H	152	25.1	57.8	82.9	94.0	-11.1

Radiated Emissions of Spurious Emissions in restricted band **Date:** 5/9/2005

Company: ACT, Inc.
Model: ZIR000
Test Engineer: Uri Spector
Standard: FCC Part 15.249, 15.205
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a Peak detector
Total Antenna Factors include Antenna Correction Factors, Cable Loss and Filter Loss
Measurments above 1GHz were taken with RBW1MHz

Table # 3-1-2

Frequency MHz	Antenna Polarity	Ant. Factor dB1/m	Pre-Amp Gain (dB)	Peak Reading dBµV	Total Emissions dBµV/m	Limit dBµV/m	Margin dB
2725.14	V	32.6	35.1	43.0	40.6	54.0	-13.4
3633.52	V	35.4	34.5	42.9	43.8	54.0	-10.2
4541.90	V	37.1	34.0	38.5	41.6	54.0	-12.3
2725.14	H	32.6	35.1	48.0	45.6	54.0	-8.4
3633.52	H	35.4	34.5	43.2	44.1	54.0	-9.9
4541.90	H	37.1	34.0	40.0	43.1	54.0	-10.8

Comments: No emissions above floor noise were found above the 5th harmonic.

3.2 Out of Band Spurious Emissions, FCC 15.249(c), 15.209

Out-of-band measurements were made for frequencies:
- 902MHz
- 928MHz.

Output frequency of the EUT is 908.39MHz

The EUT complies with the Standard requirements Out of Band Spurious Emissions for Section 15.249(c). Table 3-2-1 shows the Out of Band Spurious Emissions.

Out of Band Spurious Emissions **Date:** **5/9/2005**

Company: ACT, Inc.
Model: ZIR000
Test Engineer: Uri Spector
Standard: FCC Part 15.249(c),15.209
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a peak detector

Table # 3-2-1

Frequency	Antenna			Peak reading	Total Peak	QP Limit	Margin	Comments
MHz	Polarity	Hts(cm)	Factor (dB1/m)	dBµV	dBµV/m	dBµV/m	dB	
902.00	V	100	25.0	10.9	35.9	46.0	-10.1	
902.00	H	100	25.0	11.3	36.3	46.0	-9.7	
928.00	V	100	25.3	10.4	35.7	46.0	-10.3	
928.00	H	100	25.3	11.8	37.1	46.0	-8.9	

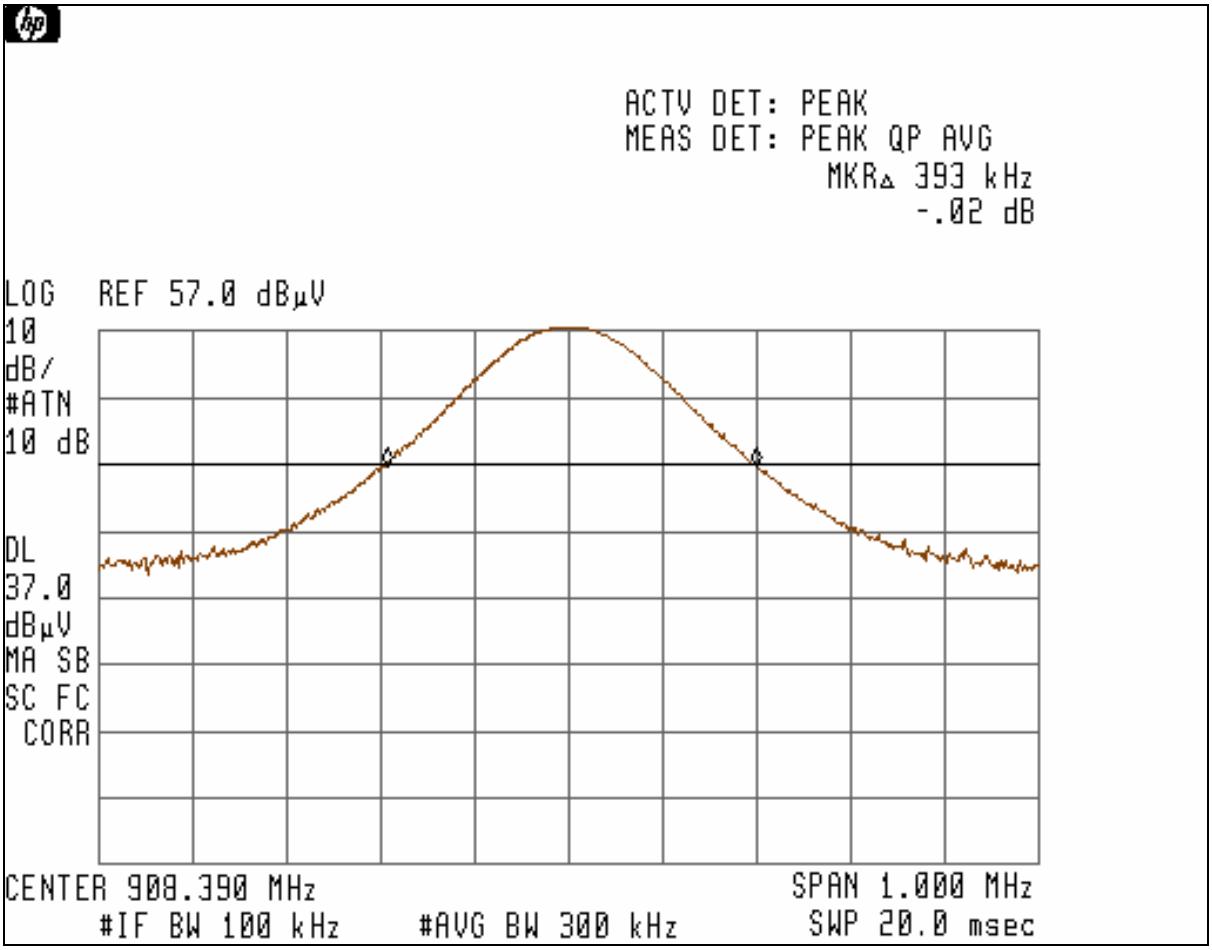
3.3 Bandwidth of Emissions

Bandwidth of Emissions measurements was made for frequency of 908.39MHz.

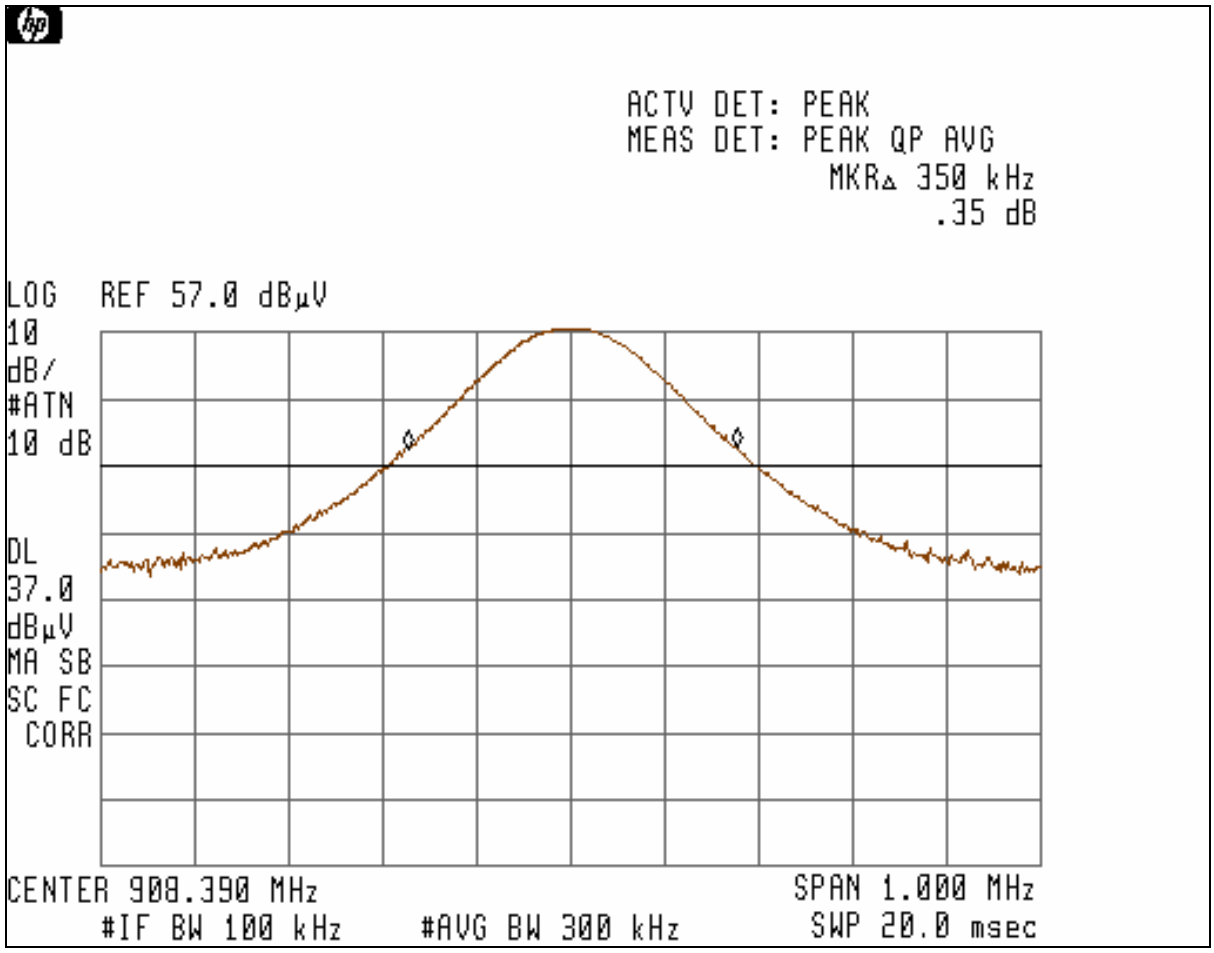
Bandwidth of Emissions for the EUT at level –20dB was measured at 393kHz
Bandwidth of Emissions for the EUT at 99% power was measured at 350kHz

The Graphs 3-3-1 & 3-3-2 show the Bandwidth of Emissions.

Graph # 3-3-1



Graph # 3-3-2


ACTV DET: PEAK
MEAS DET: PEAK QP AVG
MKRΔ 350 kHz
.35 dB
LOG REF 57.0 dBµV
10
dB/
#ATN
10 dB
DL
37.0
dBµV
MA SB
SC FC
CORR
CENTER 908.390 MHz
SPAN 1.000 MHz
#IF BW 100 kHz
#AVG BW 300 kHz
SWP 20.0 msec

3.4 Radiated Emissions, FCC 15.109, Class B

The EUT was tested as a digital device according to FCC Part 15.109, Class B in frequency range from 30MHz to 5GHz. Radiated Emissions testing was performed in Anechoic Chamber with 3m-easurement distance. Signal generator was used in close proximity to activate the EUT in receiving mode.

Note: No Radiated Emissions above the floor noise were detected during testing above 1GHz.

The Tables 3-4-1 shows the worst-case Radiated Emissions.

TILE Instrument Control System EMI Measurement Software

Radiated Emissions **Date:** 05-9-2005
Company: ACT, Inc.
Model: ZIR000
Test Engineer: Uri Spector
Standard: FCC Part 15.109, Class B
Test Site: 3m Anechoic Chamber, 3m measurement distance
Note: The table shows the worst case radiated emissions
All measurements were taken using a Peak detector

Table # 3-4-1

Frequency	Ant. Polarity	Peak Reading dBµV	Total CF dB1/m	Total at 3m dBµV/m	QP Limit dBµV/m	Margin dB
30.316 MHz	V	12.80	20.41	33.21	40.00	-6.79
125.712 MHz	V	13.90	13.62	27.52	43.53	-16.00
175.93 MHz	V	12.40	10.86	23.26	43.52	-20.26
190.00 MHz	V	11.20	10.90	22.10	43.52	-21.42
222.30 MHz	V	13.93	12.70	26.63	46.02	-19.39
410.60 MHz	V	12.52	18.70	31.22	46.02	-14.80

3.5 Test Procedure

Field Strength Measurements

The EUT was placed on a non-conductive table 0.8m above the ground plane inside the Anechoic Chamber. The table was centered on a motorized turntable, which allows 360-degree rotation. The measurement antenna was positioned at 3m distance. The Bicono-Log antenna was used in frequency range from 30MHz to 1GHz, and the Horn antenna was used in frequency range above 1GHz. The radiated emissions were maximized by configuring the EUT through its placement in three orthogonal axes, by rotating the EUT, by changing antenna polarization, and by changing antenna height from 1 to 4m. Method of the direct Field Strength Calculation is shown in Section 3.6.

Conducted Emissions

For conducted emissions testing, the equipment is moved to an insulating platform over the ground plane, and the EUT is powered from a LISN. Both sides of the AC line are measured and the results are compared to the applicable limits. Measurements are taken using CISPR quasi-peak and average detectors when the peak readings approach or exceed the average limit. Only quasi-peak readings are taken when the emissions from the EUT meet the average limit as measured with the quasi-peak detector.

3.7 Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain (if any) from the measured emissions reading on the EMI Receiver.
The basic equation with a sample calculation is as follows:
FS = RA + AF + CF - AG

Where: FS = Field Strength in dB(µV/m)
RA = Receiver Amplitude in dB(µV)
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB(m^{-1})
AG = Amplifier Gain in dB

Assume a receiver reading of 48.1 dB(µV) is obtained. The antenna factor of 7.4 dB(m^{-1}) and cable factor of 1.6 dB is added and amplifier gain of 16.0 dB is subtracted giving field strength of 41.1 dB(µV/m).

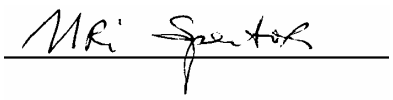
RA = 48.1 dB(µV)
AF = 7.4 dB(m^{-1})
CF = 1.6 dB
AG = 16.0 dB
FS = RA + AF + CF - AG
FS = 48.1 + 7.4 + 1.6 – 16.0
FS = 41.1 dB(µV/m)

In the tables the Cable correction factors are included to the Antenna Factors.

Tested by:

Uri Spector
EMC Project Engineer
Intertek ETL SEMKO

Signature



Date: May 12, 2005

4.0 TEST EQUIPMENT

Receivers/Spectrum Analyzers and Test Software

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
HP85462A Receiver RF Section	3325A00106	08/04	08/05	X
HP85460A RF Filter Section	3330A00109	08/04	08/05	X
Advantest Spectrum Analyzer R3271A	55050084	06/04	06/05	X
TILE! Instrument Control System	ver. 3.4.G.1	N/A	N/A	X

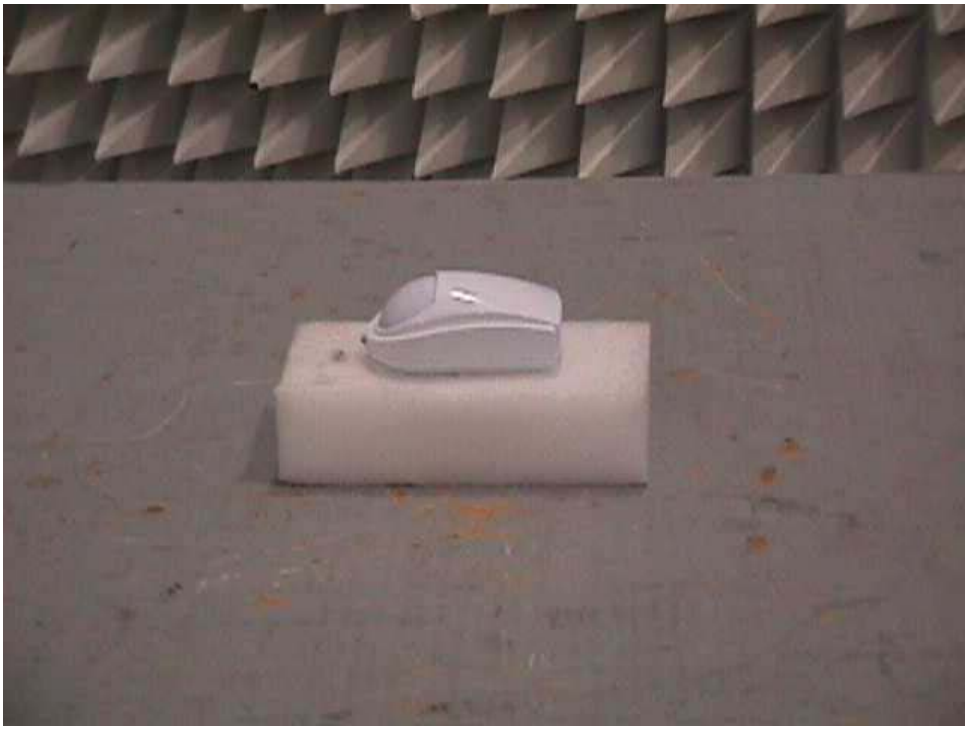
Antennas

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
Schaffner-Chase Bicono-Log Antenna	2468	01/05	01/06	X
EMCO Horn Antenna 3115	9507-4513	12/04	12/05	X

Pre-Amplifiers/Filters

DESCRIPTION	SERIAL NO.	LAST CAL	CAL DUE	USED
HP 83017A Pre-Amplifier	3123A00475	04/05	04/06	X
Reactel 7HS-1G-S12 Filter	0223	01//05	01/06	X

EXHIBIT 1
CONFIGURATION PHOTOS



Radiated Emissions Test Configuration

Radiated Emissions Test Configuration