

**IAL****INTERNATIONAL APPROVALS  
LABORATORIES****EMC EMISSIONS - TEST REPORT (Full)**Test Report No. **BC500159-1** Issue Date: **Mon 14/Mar/2005**Model No. **DS200**Product Type **Security Key Fob**Client **Inovonics Wireless Corp.**Manufacturer **Inovonics Wireless Corp.**License holder **Inovonics Wireless Corp.**Address **315 CTC Boulevard****Louisville, CO 80027**Test Criteria Applied  
Test Result**FCC CFR47 Part 15.247****PASS**Test Project Number  
References  
Total Pages  
Including  
Appendices:**BC500159-1**Title 47 CFR 15: RADIO FREQUENCY  
DEVICES

35

*Michael Spataro**Robert Cresswell*

Reviewed By : Mike Spataro

Approved By : Robert Cresswell

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Lab Code:200264-0

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## DIRECTORY

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### STATEMENT OF MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty for Conducted Emissions in the frequency range of 150kHz – 30MHz is calculated to be  $\pm 2.30\text{dB}$  and for Radiated Emissions is calculated to be  $\pm 3.60\text{dB}$  in the frequency range of 30MHz – 200MHz and  $\pm 3.38\text{dB}$  in the frequency range of 200MHz – 1000MHz.

EUT Received Date: 24-Feb-2005

Testing Start Date: 24-Feb-2005

Testing End Date: 9-Mar-2005



#### GENERAL REMARKS:

The following remarks are to be considered as “where applicable” and are taken into account while completing any FCC/IC/ETSI radio tests at International Approvals Laboratories, LLC.

Testing was performed in 3 different orthogonal axis to determine the worst case emissions from the device. The worst case emissions measurements are shown in this report.

**FCC CFR47 Part 15.31: Measurement Standards:** In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was varied per Part 15.31 to find worst case emissions.

**FCC CFR47 Part 15.35: Measurement Detector Functions and Bandwidths:** FCC Part 15.35 was utilized when performing the measurements within this report.

In any case where the device is powered off a battery, a fresh battery was used during test. In cases where the device is powered off an AC supply, voltage was verified per Part 15.31 to find worst case emissions.

The actual test distance for the FCC Part 15.209 testing was conducted at 10m for the fact that the device was being tested to EN55022 Class B from 30 MHz to 1000 MHz (meets/exceeds the FCC Part 15.209 & 109B limits) The data is automatically extrapolated back to the FCC 3m limits and measurements are corrected to better show the compliance to FCC requirements and reduce confusion. A correction factor of 10.54dB is used in cases of 30MHz and up for a difference between 10m and 3m measurement distances. All measurements that are lesser than 30MHz where applicable are accompanied with the fall of measurements and calculations to support the interpolation.

Modifications required to pass:

Test Specification Deviations: Additions to or Exclusions from

**This test report is in-part, International Approvals Laboratories, LLC was asked to test only the field strength of the fundamental and harmonics as well as the unintentional radiated and conducted emissions when applicable.**

**Required Information In Accordance to FCC CFR 47 Part 2.1033:**

<i>Rule Part 11, 15 &amp; 18 Devices</i>	<i>Other Rule Part Devices</i>	<i>Description</i>	<i>Comments</i>
2.1033(b)(1)	2.1033(c)(1)	Manu. Contact	See Page 1 of this report
2.1033(b)(2)	2.1033(c)(2)	FCC Identifier	
2.1033(b)(3)	2.1033(c)(3)	Users Manual to include Operating, installation	Attached as Exhibit
	2.1033(c)(4)	Emissions Designator per 2.	
	2.1033(c)(5)	Frequency Range	Not Applicable to Part 15 Devcies
	2.1033(c)(6)	Power range and controls	Not Applicable to Part 15 Devcies
	2.1033(c)(7)	Maximum power ouput rating	Not Applicable to Part 15 Devcies
	2.1033(c)(8)	DC Voltage and Current suplying final RF stages	Not Applicable to Part 15 Devcies
2.1033(b)(3)	2.1033(c)(9)	Tune –up procedure	Please refer to the users manual for applicability
2.1033(b)(4&5)	2.1033(c)(10)	Complete Circuit Diagrams and circuit operation description	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(11)	Photographs/drawings of the identification label & its location on the device	Attached as Exhibit
2.1033(b)(7)	2.1033(c)(12)	Photographs of the external and internal surfaces, and construction	Attached as Exhibit
	2.1033(c)(13)	Digital Modulation	Not Applicable
2.1033(b)(6)	2.1033(c)(14)	Report of Measurement Data Required by 2.1046 –2.1057	See Data Below (This report consists of the testing required under Part 15.231)
2.1033(b)(8)		Description of publicly available support equipment used during test	Refer to Exhibit B of this report (Client Test Plan)
2.1033(b)(9)		Statement of Autorization to Part 15.37 of CFR47	The equipment herein is being authorized in accordance to 15.37 of the CFR47 Rules.
2.1033(b)(10)		Direct Sequence Spread Spectrum Devices (DSSS)	Exhibit of compliance to 15.247(e)
2.1033(b)(10)		Frequency Hopping Devices	Exhibit of compliance to 15.247(a)(1)
2.1033(b)(11)		Scanning receiver construction	Exhibit stating compliance to construction in accordance to 15.121.
15.31	15.31	Transmitter Supply Voltage	Testing herein was completed in accordance to FCC CFR47 Part 15.31

**Exhibits Including (where applicable):**

- |                                    |   |
|------------------------------------|---|
| 1. Users Manual                    | 7. Parts List   |
| 2. Operation Description           | 8. Tuning Procedure (if applicable)                     |
| 3. Block Diagram                   | 9. Test Setup Photograph                                |
| 4. Report of Measurement           | 10. Label Drawings and or Photographs                   |
| 5. External & Internal Photographs | 11. Description of Support Equipment (where Applicable) |
| 6. Schematic                       |   |

**Required Information in Accordance to Industry Canada Regulations (In addition to the above):**

<i>Information Required</i>	<i>Description</i>	<i>Comments</i>
<b>Modulation Type</b>	(i.e. ASK, NON, FSK, DSSS, FHSS, etc.)	
<b>Emissions Designator</b>	Per TRC-49	
<b>In Country Representative</b>	Contact Information	
<b>99% Bandwidth Measurement</b>	Per RSS-210	

Test-setup photo(s):  
Radiated Unintentional Emissions





Test-setup photo(s):  
Radiated Unintentional Emissions



Test-setup photo(s):  
Radiated Intentional Emissions





Test-setup photo(s):  
Radiated Intentional Emissions



**Appendix A**

Test Data Sheets  
and  
Test Equipment Used



**15.209 Test Data**

# Radiated Electromagnetic Emissions

Test Report #: Inovonics Run 2      Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC Part 15.209      Test Date: 24-Feb-2005  
 EUT Model #: DS200      EUT Power: Battery Power 3VDC  
 EUT Serial #: \_\_\_\_\_  
 Manufacturer: Inovonics  
 EUT Description: Security Key Fob  
 Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Temperature: 26.1 °C  
 Relative Humidity: 84 %  
 Air Pressure: <26 kPa  
 Page: 1 of 6

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209 Qp	FCC Part 15.209 Av
0 degrees						
90 degrees						
180 degrees						
270 degrees						
No emissions were detected with 20dB of the limit						
The following emissions are noise floor points						
30.00	23.8 Qp	0.5 / 12.9 / 28.4	8.8	H / 2.0 / 0.0	-31.2	N/A
60.57	28.7 Qp	0.7 / 8.4 / 28.3	9.4	H / 2.0 / 0.0	-30.6	N/A
110.00	23.0 Qp	1.1 / 10.7 / 28.2	6.7	H / 2.0 / 0.0	-36.8	N/A
140.00	19.4 Qp	1.3 / 11.9 / 28.0	4.6	H / 2.0 / 0.0	-38.9	N/A
160.00	22.9 Qp	1.4 / 11.9 / 27.9	8.3	H / 2.0 / 0.0	-35.2	N/A
190.00	19.3 Qp	1.4 / 12.8 / 27.7	5.9	H / 2.0 / 0.0	-37.6	N/A
Changing to vertical						
0 degrees						
90 degrees						
180 degrees						
No emissions were detected with in 20dB of the limit						
The following emissions are noise floor points						
30.00	28.8 Qp	0.5 / 12.9 / 28.4	13.8	V / 1.0 / 0.0	-26.2	N/A
60.57	30.7 Qp	0.7 / 8.4 / 28.3	11.5	V / 1.0 / 0.0	-28.5	N/A
110.00	25.0 Qp	1.1 / 10.7 / 28.2	8.7	V / 1.0 / 0.0	-34.8	N/A
140.00	21.5 Qp	1.3 / 11.9 / 28.0	6.7	V / 1.0 / 0.0	-36.8	N/A
160.00	22.2 Qp	1.4 / 11.9 / 27.9	7.6	V / 1.0 / 0.0	-35.9	N/A
190.00	22.2 Qp	1.4 / 12.8 / 27.7	8.8	V / 1.0 / 0.0	-34.7	N/A
0 degrees						
90 degrees						
180 degrees						
270 degrees						
No emissions detected with in 20dB of limit						

# Radiated Electromagnetic Emissions

Test Report #: Inovonics Run 2      Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC Part 15.209      Test Date: 24-Feb-2005  
 EUT Model #: DS200      EUT Power: Battery Power 3VDC  
 EUT Serial #: \_\_\_\_\_  
 Manufacturer: Inovonics  
 EUT Description: Security Key Fob  
 Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Temperature: 26.1 °C  
 Relative Humidity: 84 %  
 Air Pressure: <26 kPa  
 Page: 2 of 6

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209 Qp	FCC Part 15.209 Av
The following emissions are noise floor points						
200.00	19.7 Qp	1.5 / 10.9 / 27.6	4.5	H / 2.0 / 0.0	-39.0	N/A
330.00	18.3 Qp	2.0 / 13.9 / 27.3	6.9	H / 2.0 / 0.0	-39.1	N/A
440.00	19.0 Qp	2.4 / 15.7 / 28.3	8.8	H / 2.0 / 0.0	-37.2	N/A
660.00	19.3 Qp	3.0 / 19.9 / 28.5	13.7	H / 2.0 / 0.0	-32.3	N/A
889.12	18.7 Qp	3.5 / 22.3 / 28.1	16.4	H / 2.0 / 0.0	-29.6	N/A
990.00	18.5 Qp	3.7 / 22.9 / 27.6	17.5	H / 2.0 / 0.0	-36.5	N/A
0 degrees						
90 degrees						
180 degrees						
270 degrees						
No emissions detected with in 20dB of limit						
The following emissions are noise floor points						
200.00	20.9 Qp	1.5 / 10.9 / 27.6	5.7	V / 1.0 / 0.0	-37.8	N/A
330.00	18.8 Qp	2.0 / 13.9 / 27.3	7.4	V / 1.0 / 0.0	-38.6	N/A
440.00	19.0 Qp	2.4 / 15.7 / 28.3	8.7	V / 1.0 / 0.0	-37.3	N/A
660.00	19.3 Qp	3.0 / 19.9 / 28.5	13.7	V / 1.0 / 0.0	-32.3	N/A
889.12	18.7 Qp	3.5 / 22.3 / 28.1	16.4	V / 1.0 / 0.0	-29.6	N/A
990.00	18.6 Qp	3.7 / 22.9 / 27.6	17.5	V / 1.0 / 0.0	-36.5	N/A
No significant emissions detected between 1-4GHz						
The following readings are noise floor points						
1500.00	33.6 Av	2.9 / 25.1 / 37.0	24.7	V / 1.0 / 0.0	N/A	-49.3
2600.00	34.4 Av	4.1 / 28.9 / 37.7	29.7	V / 1.0 / 0.0	N/A	-44.3
3500.00	34.6 Av	4.8 / 31.5 / 37.8	33.1	V / 1.0 / 0.0	N/A	-40.9
Changing to Horizontal						
No significant emissions detected with in 20dB of the limit						
Between 1-4 GHz						
The following readings are noise floor points						
1500.00	33.9 Av	2.9 / 25.1 / 37.0	25.0	H / 2.0 / 0.0	N/A	-49.0



# Radiated Electromagnetic Emissions

Test Report #: Inovonics Run 2      Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC Part 15.209      Test Date: 24-Feb-2005  
 EUT Model #: DS200      EUT Power: Battery Power 3VDC  
 EUT Serial #: \_\_\_\_\_  
 Manufacturer: Inovonics  
 EUT Description: Security Key Fob  
 Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Temperature: 26.1 °C  
 Relative Humidity: 84 %  
 Air Pressure: <26 kPa  
 Page: 3 of 6

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209 Qp	FCC Part 15.209 Av
2600.00	34.2 Av	4.1 / 28.9 / 37.7	29.5	H / 2.0 / 0.0	N/A	-44.5
3500.00	34.6 Av	4.8 / 31.5 / 37.8	33.1	H / 2.0 / 0.0	N/A	-40.9
There were no significant emissions detected between 4-8GHz						
The following readings are noise floor points						
4500.00	32.6 Av	6.6 / 32.3 / 39.6	31.9	H / 2.0 / 0.0	N/A	-42.1
5500.00	31.7 Av	6.7 / 34.3 / 38.7	34.0	H / 2.0 / 0.0	N/A	-40.0
7500.00	30.4 Av	8.2 / 36.8 / 39.6	35.8	H / 2.0 / 0.0	N/A	-38.2
There were no significant emission detected between 4-8GHz						
The follwing readings are noise floor points						
4500.00	33.0 Av	6.6 / 32.3 / 39.6	32.3	V / 1.0 / 0.0	N/A	-41.7
5500.00	32.1 Av	6.7 / 34.3 / 38.7	34.4	V / 1.0 / 0.0	N/A	-39.6
7500.00	30.7 Av	8.2 / 36.8 / 39.6	36.1	V / 1.0 / 0.0	N/A	-37.9
There were no significant emissions detected between 8-10GHz						
The following readings are noise floor points						
9250.00	40.2 Av	8.9 / 37.6 / 47.3	39.5	V / 1.0 / 0.0	N/A	-34.5
8200.00	39.5 Av	8.4 / 37.0 / 45.3	39.6	V / 1.0 / 0.0	N/A	-34.4
9600.00	42.2 Av	9.4 / 38.0 / 47.9	41.7	V / 1.0 / 0.0	N/A	-32.3
There were no significant emissions detected between 8-10GHz						
The following readings are noise floor points						
8200.00	39.6 Av	8.4 / 37.0 / 45.3	39.7	H / 2.0 / 0.0	N/A	-34.3
9250.00	40.1 Av	8.9 / 37.6 / 47.3	39.4	H / 2.0 / 0.0	N/A	-34.6
9600.00	42.1 Av	9.4 / 38.0 / 47.9	41.7	H / 2.0 / 0.0	N/A	-32.3
0,90,180,270 degrees						
There were no significant emissions detected between 32kHz-30MHz						
The following readings are noise floor points						
0.0400	47.8 Qp	0.0 / 11.5 / 0.0	59.3	H / 1.0 / 0.0	N/A	N/A
1.03	22.5 Qp	0.1 / 10.3 / 0.0	32.9	H / 1.0 / 0.0	-14.5	N/A
2.00	16.0 Qp	0.1 / 10.2 / 0.0	26.3	H / 1.0 / 0.0	-23.7	N/A
0.0320	44.6 Qp	0.0 / 11.9 / 0.0	56.5	H / 1.0 / 0.0	N/A	N/A

# Radiated Electromagnetic Emissions

Test Report #: Inovonics Run 2 Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC Part 15.209 Test Date: 24-Feb-2005  
 EUT Model #: DS200 EUT Power: Battery Power 3VDC  
 EUT Serial #: \_\_\_\_\_  
 Manufacturer: Inovonics  
 EUT Description: Security Key Fob  
 Notes: \_\_\_\_\_  
 \_\_\_\_\_

Temperature: 26.1 °C  
 Relative Humidity: 84 %  
 Air Pressure: <26 kPa  
 Page: 4 of 6

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209 Qp	FCC Part 15.209 Av
5.20	7.7 Qp	0.2 / 10.0 / 0.0	17.9	H / 1.0 / 0.0	-32.1	N/A
12.39	4.2 Qp	0.3 / 10.3 / 0.0	14.8	H / 1.0 / 0.0	-35.2	N/A
24.00	1.4 Qp	0.5 / 9.4 / 0.0	11.3	H / 1.0 / 0.0	-38.7	N/A
29.00	2.9 Qp	0.5 / 8.4 / 0.0	11.8	H / 1.0 / 0.0	-38.2	N/A

# Radiated Electromagnetic Emissions

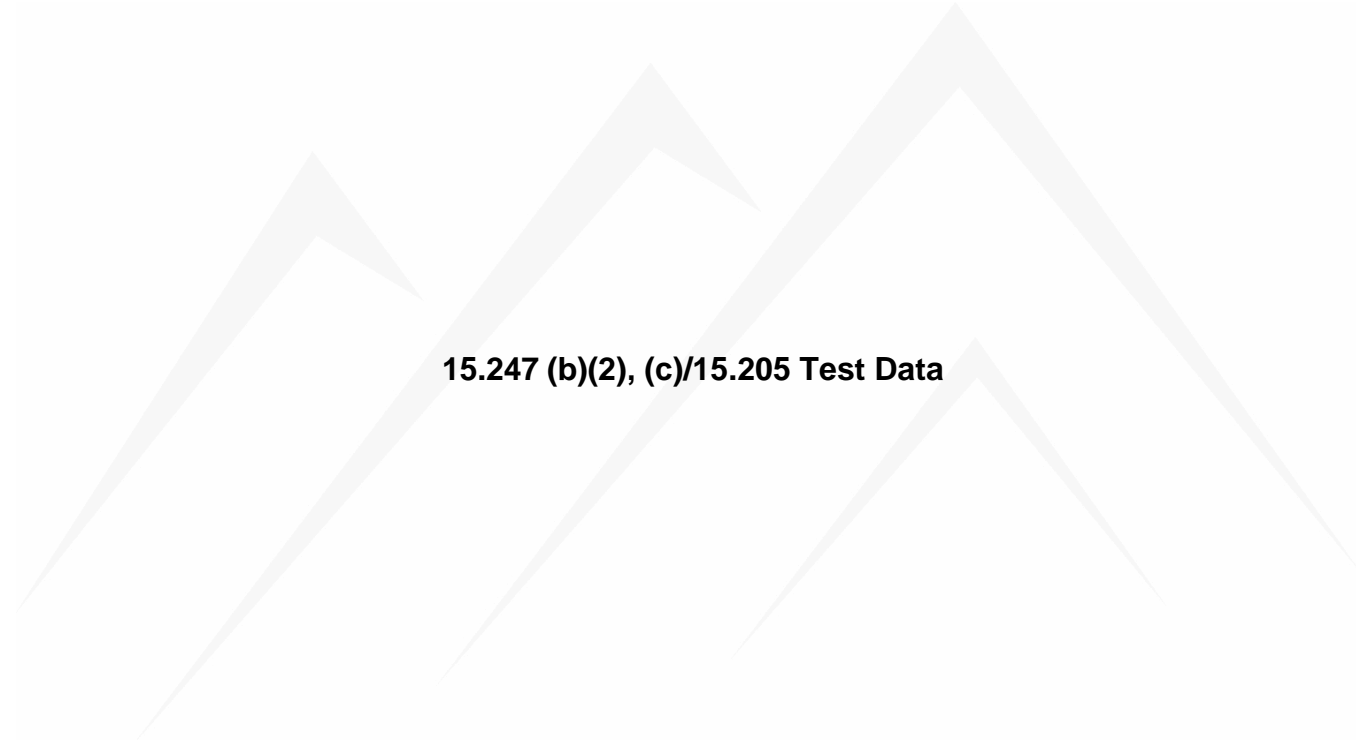
Test Report #: Inovonics Run 2      Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC Part 15.209      Test Date: 24-Feb-2005  
 EUT Model #: DS200      EUT Power: Battery Power 3VDC  
 EUT Serial #: \_\_\_\_\_  
 Manufacturer: Inovonics  
 EUT Description: Security Key Fob

Temperature: 26.1 °C  
 Relative Humidity: 84 %  
 Air Pressure: <26 kPa  
 Page: 5 of 6

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

Notes: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	DELTA1 (dB)	DELTA2 (dB)
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV/m)	(m) (DEG)	FCC Part 15.209 Qp	FCC Part 15.209 Av
<b>***** Measurement Summary *****</b>						
1.03	22.5 Qp	0.1 / 10.3 / 0.0	32.9	H / 1.0 / 0.0	-14.5	N/A
2.00	16.0 Qp	0.1 / 10.2 / 0.0	26.3	H / 1.0 / 0.0	-23.7	N/A
30.00	28.8 Qp	0.5 / 12.9 / 28.4	13.8	V / 1.0 / 0.0	-26.2	N/A
60.57	30.7 Qp	0.7 / 8.4 / 28.3	11.5	V / 1.0 / 0.0	-28.5	N/A
889.12	18.7 Qp	3.5 / 22.3 / 28.1	16.4	V / 1.0 / 0.0	-29.6	N/A
5.20	7.7 Qp	0.2 / 10.0 / 0.0	17.9	H / 1.0 / 0.0	-32.1	N/A
660.00	19.3 Qp	3.0 / 19.9 / 28.5	13.7	V / 1.0 / 0.0	-32.3	N/A
9600.00	42.1 Av	9.4 / 38.0 / 47.9	41.7	H / 2.0 / 0.0	N/A	-32.3
8200.00	39.6 Av	8.4 / 37.0 / 45.3	39.7	H / 2.0 / 0.0	N/A	-34.3
9250.00	40.2 Av	8.9 / 37.6 / 47.3	39.5	V / 1.0 / 0.0	N/A	-34.5
190.00	22.2 Qp	1.4 / 12.8 / 27.7	8.8	V / 1.0 / 0.0	-34.7	N/A
110.00	25.0 Qp	1.1 / 10.7 / 28.2	8.7	V / 1.0 / 0.0	-34.8	N/A
12.39	4.2 Qp	0.3 / 10.3 / 0.0	14.8	H / 1.0 / 0.0	-35.2	N/A
160.00	22.9 Qp	1.4 / 11.9 / 27.9	8.3	H / 2.0 / 0.0	-35.2	N/A
990.00	18.6 Qp	3.7 / 22.9 / 27.6	17.5	V / 1.0 / 0.0	-36.5	N/A
140.00	21.5 Qp	1.3 / 11.9 / 28.0	6.7	V / 1.0 / 0.0	-36.8	N/A
440.00	19.0 Qp	2.4 / 15.7 / 28.3	8.8	H / 2.0 / 0.0	-37.2	N/A
200.00	20.9 Qp	1.5 / 10.9 / 27.6	5.7	V / 1.0 / 0.0	-37.8	N/A
7500.00	30.7 Av	8.2 / 36.8 / 39.6	36.1	V / 1.0 / 0.0	N/A	-37.9
29.00	2.9 Qp	0.5 / 8.4 / 0.0	11.8	H / 1.0 / 0.0	-38.2	N/A
330.00	18.8 Qp	2.0 / 13.9 / 27.3	7.4	V / 1.0 / 0.0	-38.6	N/A
24.00	1.4 Qp	0.5 / 9.4 / 0.0	11.3	H / 1.0 / 0.0	-38.7	N/A
5500.00	32.1 Av	6.7 / 34.3 / 38.7	34.4	V / 1.0 / 0.0	N/A	-39.6
3500.00	34.6 Av	4.8 / 31.5 / 37.8	33.1	H / 2.0 / 0.0	N/A	-40.9
4500.00	33.0 Av	6.6 / 32.3 / 39.6	32.3	V / 1.0 / 0.0	N/A	-41.7
2600.00	34.4 Av	4.1 / 28.9 / 37.7	29.7	V / 1.0 / 0.0	N/A	-44.3
0.0320	44.6 Qp	0.0 / 11.9 / 0.0	56.5	H / 1.0 / 0.0	N/A	N/A
0.0400	47.8 Qp	0.0 / 11.5 / 0.0	59.3	H / 1.0 / 0.0	N/A	N/A
1500.00	34.5 Av	2.9 / 25.1 / 37.0	25.5	V / 1.0 / 0.0	N/A	N/A



**15.247 (b)(2), (c)/15.205 Test Data**

# Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: **BC500159** Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC CFR47 Part 15.247/205 Test Date: 24-Feb-2005  
 EUT Model #: DS200 EUT Power: Battery Power 3 VDC  
 EUT Serial #:  
 Manufacturer: Inovonics Wireless Corp.  
 EUT Description: Security Key Fob  
 Notes:

Temperature: 22.6 °C  
 Relative Humidity: 39 %  
 Air Pressure: 80 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

**Fundamentals of the EUT**

EUT is flat on the table

**Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.**

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.247 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor\* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.247 and the emission/limit delta was calculated.

the DTCF is calculated as follows  $20 \cdot \log_{10}(\text{duty cycle in 100ms})$  "not to exceed 20dB"

Part 15.247 and 15.205 Respectively

EUT is flat on the table

**Low channel**

902.40	73.9 Pk	3.6 / 22.4 / 0.0	99.9	V / 1.3 / 181.0	0	99.9	119	-19.1
902.40	77.1 Pk	3.6 / 22.4 / 0.0	103.1	H / 1.0 / 309.4	0	103.1	119	-15.9

**Mid Channel**

914.80	73.1 Pk	3.6 / 22.5 / 0.0	99.2	V / 1.2 / 174.0	0	99.2	119	-19.8
914.80	76.3 Pk	3.6 / 22.5 / 0.0	102.5	H / 1.0 / 313.7	0	102.5	119	-16.5

**High Channel**

927.60	72.3 Pk	3.6 / 22.6 / 0.0	98.5	V / 1.3 / 208.6	0	98.5	119	-20.5
927.45	75.6 Pk	3.6 / 22.6 / 0.0	101.8	H / 1.0 / 310.4	0	101.8	119	-17.2

EUT vertical on table.

**Low Channel**

902.40	75.0 Pk	3.6 / 22.4 / 0.0	101.0	H / 1.5 / 198.5	0	101.0	119	-18
902.26	91.5 Pk	3.6 / 22.4 / 0.0	101.0	V / 1.1 / 127.2	0	101.0	119	-18

**Mid Channel**

914.80	78.0 Pk	3.6 / 22.5 / 0.0	104.1	V / 1.0 / 149.7	0	104.1	119	-14.9
914.80	74.5 Pk	3.6 / 22.5 / 0.0	100.6	H / 1.0 / 41.8	0	100.6	119	-18.4

**High Channel**

927.60	74.4 Pk	3.6 / 22.6 / 0.0	100.7	H / 1.0 / 44.9	0	100.7	119	-18.3
927.60	77.7 Pk	3.6 / 22.6 / 0.0	103.9	V / 1.1 / 147.4	0	103.9	119	-15.1



# Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: **BC500159** Test Area: Pinewood Site 1 (3m)  
 Test Method: FCC CFR47 Part 15.247/205 Test Date: 24-Feb-2005  
 EUT Model #: DS200 EUT Power: Battery Power 3 VDC  
 EUT Serial #: \_\_\_\_\_  
 Manufacturer: Inovonics Wireless Corp.  
 EUT Description: Security Key Fob  
 Notes: \_\_\_\_\_

Temperature: 22.6 °C  
 Relative Humidity: 39 %  
 Air Pressure: 80 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB/m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

The following duty cycle was declared by the manufacturer.  
 Duty Cycle = active / 100ms. = 20%

**Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.**

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.247 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor\* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.247 and the emission/limit delta was calculated.

The DTFC is calculated as follows  $20 \cdot \log_{10}(\text{duty cycle in 100ms})$  "not to exceed 20dB"

Part 15.247 and 15.205 Respectively

90 degree angle

Low Channel

902.40	76.5 Pk	3.6 / 22.4 / 0.0	102.5	V / 1.1 / 111.0	0	102.5	119	-16.5
902.40	74.8 Pk	3.6 / 22.4 / 0.0	100.8	H / 1.0 / 217.1	0	100.8	119	-18.2

Mid Channel

914.80	73.2 Pk	3.6 / 22.5 / 0.0	99.3	H / 1.0 / 219.1	0	99.3	119	-19.7
914.80	77.1 Pk	3.6 / 22.5 / 0.0	103.3	V / 1.1 / 131.1	0	103.3	119	-15.7

High Channel

927.60	76.8 Pk	3.6 / 22.6 / 0.0	103.0	V / 1.1 / 199.2	0	103.0	119	-16
927.60	73.6 Pk	3.6 / 22.6 / 0.0	99.9	H / 1.0 / 100.8	0	99.9	119	-19.1

Worst case EUT is vertical on table.

2-4<sup>th</sup> Harmonic Low Channel

1804.80	65.0 Pk	3.1 / 26.5 / 34.3	60.3	V / 1.2 / 193.8	-13.98	46.32	99	-52.68
2702.20	61.6 Pk	4.2 / 29.2 / 37.0	58.1	V / 1.2 / 129.1	-13.98	44.12	54	-9.88
3609.60	52.4 Pk	5.0 / 31.8 / 36.8	52.4	V / 1.2 / 240.6	-13.98	38.42	54	-15.58
3609.6	51.5 Pk	5.0 / 31.8 / 36.8	51.5	H / 1.8 / 222.4	-13.98	37.52	54	-16.48
2702.20	60.1 Pk	4.2 / 29.2 / 37.0	56.7	H / 1.9 / 343.8	-13.98	42.72	54	-11.28
1804.8	66.2 Pk	3.1 / 26.5 / 34.3	61.5	H / 1.2 / 189.5	-13.98	47.52	99	-51.48
4512.00	48.5 Pk	6.6 / 32.3 / 39.6	47.8	H / 1.8 / 26.7	-13.98	33.82	54	-20.18
5414.40	44.5 Pk	6.9 / 34.2 / 38.3	47.3	H / 1.7 / 53.4	-13.98	33.32	54	-20.68
6316.80	31.6 Pk	8.2 / 34.8 / 38.9	35.8	H / 1.1 / 28.2	-13.98	41.32	99	-57.68
7219.20	45.5 Pk	8.1 / 36.1 / 40.7	49.0	H / 1.5 / 64.0	-13.98	40.72	99	-58.28

# Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: <b>BC500159</b>	Test Area: Pinewood Site 1 (3m)	Temperature: 22.6 °C								
Test Method: FCC CFR47 Part 15.247/205	Test Date: 24-Feb-2005	Relative Humidity: 39 %								
EUT Model #: DS200	EUT Power: Battery Power 3 VDC	Air Pressure: 80 kPa								
EUT Serial #:		Page:								
Manufacturer: Inovonics Wireless Corp.		<table border="0" style="width: 100%;"> <tr><th colspan="2" style="text-align: center;">Level Key</th></tr> <tr><td>Pk – Peak</td><td>Nb – Narrow Band</td></tr> <tr><td>Qp – QuasiPeak</td><td>Bb – Broad Band</td></tr> <tr><td>Av - Average</td><td></td></tr> </table>	Level Key		Pk – Peak	Nb – Narrow Band	Qp – QuasiPeak	Bb – Broad Band	Av - Average	
Level Key										
Pk – Peak	Nb – Narrow Band									
Qp – QuasiPeak	Bb – Broad Band									
Av - Average										
EUT Description: Security Key Fob										
Notes:										

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

The following duty cycle was declared by the manufacturer.

Duty Cycle = active / 100ms. = 20%

**Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.**

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.247 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor\* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.247 and the emission/limit delta was calculated.

The DTCF is calculated as follows  $20 \cdot \log_{10}(\text{duty cycle in 100ms})$  "not to exceed 20dB"

**Part 15.247 and 15.205** Respectively

7219.20	45.5 Pk	8.1 / 36.1 / 40.7	49.0	V / 1.6 / 360.0	-13.98	35.02	99	-63.98
6316.80	44.3 Pk	8.2 / 34.8 / 38.9	48.4	V / 1.4 / 38.1	-13.98	34.42	99	-64.58
5414.40	45.0 Pk	6.9 / 34.2 / 38.3	47.8	V / 1.1 / 150.7	-13.98	33.82	54	-20.18
4512.00	49.7 Pk	6.6 / 32.3 / 39.6	49.1	V / 1.3 / 111.2	-13.98	38.82	54	-15.18
8121.60	53.3 Pk	8.3 / 37.0 / 45.4	53.2	V / 1.0 / 147.4	-13.98	39.22	54	-14.78
9024.00	42.1 Pk	8.5 / 37.4 / 46.8	41.3	V / 1.0 / 0.0	-13.98	27.32	54	-26.68
9024.00	41.5 Pk	8.5 / 37.4 / 46.8	40.6	H / 2.0 / 360.0	-13.98	39.22	54	-14.78
8121.00	45.0 Pk	8.3 / 37.0 / 45.4	44.9	H / 2.0 / 0.0	-13.98	30.92	54	-23.08

**Mid Channel**

1829.60	63.3 Pk	3.1 / 26.6 / 35.0	58.0	H / 1.8 / 196.0	-13.98	44.02	99	-54.98
2744.40	63.3 Pk	4.3 / 29.4 / 37.0	60.0	H / 1.7 / 158.7	-13.98	46.02	54	-7.98
3659.20	50.9 Pk	5.1 / 31.9 / 36.8	51.2	H / 1.6 / 343.8	-13.98	37.22	54	-16.78
3659.20	52.1 Pk	5.1 / 31.9 / 36.8	52.3	V / 1.0 / 21.2	-13.98	38.32	54	-15.68
2744.40	63.9 Pk	4.3 / 29.4 / 37.0	60.6	V / 1.1 / 153.9	-13.98	46.62	54	-7.38
1829.60	61.8 Pk	3.1 / 26.6 / 35.0	56.5	V / 1.1 / 158.7	-13.98	42.52	99	-56.48
4574.00	48.1 Pk	6.7 / 32.5 / 39.4	48.0	V / 1.0 / 223.4	-13.98	34.02	54	-19.98
5488.80	46.5 Pk	6.7 / 34.3 / 38.6	48.9	V / 1.0 / 139.9	-13.98	34.92	99	-64.08
6403.60	45.5 Pk	8.3 / 34.9 / 39.0	49.7	V / 1.1 / 209.3	-13.98	35.72	99	-63.28
7318.40	44.9 Pk	8.2 / 36.4 / 40.5	48.9	V / 1.6 / 18.3	-13.98	34.92	54	-19.08
7318.40	43.4 Pk	8.2 / 36.4 / 40.5	47.4	H / 1.6 / 302.9	-13.98	33.42	54	-20.58
6403.60	45.0 Pk	8.3 / 34.9 / 39.0	49.2	H / 1.7 / 62.9	-13.98	35.22	99	-63.78
5488.80	46.6 Pk	6.7 / 34.3 / 38.6	48.9	H / 1.5 / 46.2	-13.98	34.92	99	-64.08
4574.00	44.8 Pk	6.7 / 32.5 / 39.4	44.7	H / 1.5 / 329.1	-13.98	30.72	54	-23.28

# Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: **BC500159**  
 Test Method: FCC CFR47 Part 15.247/205  
 EUT Model #: DS200  
 EUT Serial #: \_\_\_\_\_  
 Manufacturer: Inovonics Wireless Corp.  
 EUT Description: Security Key Fob  
 Notes: \_\_\_\_\_

Test Area: Pinewood Site 1 (3m)  
 Test Date: 24-Feb-2005  
 EUT Power: Battery Power 3 VDC

Temperature: 22.6 °C  
 Relative Humidity: 39 %  
 Air Pressure: 80 kPa

Page:

Level Key	
Pk – Peak	Nb – Narrow Band
Qp – QuasiPeak	Bb – Broad Band
Av - Average	

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dB\m) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

The following duty cycle was declared by the manufacturer.

Duty Cycle = active / 100ms. = 20%

**Averaging method for pulsed signals and calculation in accordance to FCC CFR47 Part 15.35 utilized to calculate field strength emissions.**

The testing performed in accordance to FCC CFR47 Part 15.205 (restricted bands of operation) and 15.247 emissions and delta limits were calculated as follows:

Final Corrected Peak Measurement – Duty Cycle Correction Factor\* = Final Calculated Emission

The Final Calculated Emission was then compared to the Limits in CFR47 Part 15.209 and 15.247 and the emission/limit delta was calculated.

The DTCF is calculated as follows  $20 \cdot \log_{10}(\text{duty cycle in 100ms})$  "not to exceed 20dB"

Part 15.247 and 15.205 Respectively

8233.20	41.4 Pk	8.4 / 37.0 / 45.3	41.5	H / 2.0 / 360.0	-13.98	27.52	54	-26.48
9148.00	39.0 Pk	8.8 / 37.5 / 47.1	38.2	H / 2.0 / 0.0	-13.98	24.22	54	-29.78
9148.00	39.9 Pk	8.8 / 37.5 / 47.1	39.2	V / 1.0 / 360.0	-13.98	25.22	54	-28.78
8233.20	52.3 Pk	8.4 / 37.0 / 45.3	52.4	V / 1.0 / 207.6	-13.98	38.42	54	-15.58
<b>High Channel</b>								
1855.20	59.4 Pk	3.1 / 26.7 / 35.1	54.2	V / 1.0 / 53.0	-13.98	40.22	99	-58.78
2782.80	60.7 Pk	4.3 / 29.5 / 36.9	57.6	V / 1.6 / 27.9	-13.98	43.62	54	-10.38
3710.40	46.8 Pk	5.2 / 32.0 / 36.7	47.3	V / 1.2 / 342.8	-13.98	33.32	54	-20.68
3710.40	46.5 Pk	5.2 / 32.0 / 36.7	46.9	H / 1.0 / 213.0	-13.98	32.92	54	-21.08
2782.80	60.6 Pk	4.3 / 29.5 / 36.9	57.5	H / 1.0 / 194.2	-13.98	43.52	54	-10.48
1855.20	56.8 Pk	3.1 / 26.7 / 35.1	51.6	H / 1.6 / 230.0	-13.98	37.62	99	-61.38
4638.00	45.6 Pk	6.9 / 32.6 / 39.2	46.0	H / 1.7 / 360.0	-13.98	32.02	54	-21.98
5565.60	44.5 Pk	6.8 / 34.4 / 38.4	47.3	H / 1.4 / 61.5	-13.98	33.32	99	-65.68
6493.20	34.5 Pk	8.5 / 34.9 / 39.1	38.8	H / 1.0 / 24.4	-13.98	24.82	99	-74.18
7420.80	33.6 Pk	8.2 / 36.6 / 40.0	38.4	H / 1.0 / 179.0	-13.98	24.42	54	-29.58
7420.80	30.8 Pk	8.2 / 36.6 / 40.0	35.6	V / 1.0 / 280.0	-13.98	21.62	54	-32.38
6493.20	34.4 Pk	8.5 / 34.9 / 39.1	38.7	V / 1.0 / 0.0	-13.98	24.72	99	-74.28
5565.60	35.4 Pk	6.8 / 34.4 / 38.4	38.2	V / 1.0 / 0.0	-13.98	24.22	99	-74.78
4637.85	45.0 Pk	6.9 / 32.6 / 39.2	45.4	V / 1.9 / 230.8	-13.98	31.42	54	-22.58
8348.40	40.8 Pk	8.4 / 37.1 / 45.2	41.2	V / 1.0 / 0.0	-13.98	27.22	54	-26.78
9276.00	41.8 Pk	9.0 / 37.7 / 47.4	41.1	V / 1.0 / 360.0	-13.98	27.12	99	-71.88
9276.00	40.3 Pk	9.0 / 37.7 / 47.4	39.6	H / 2.0 / 0.0	-13.98	25.62	99	-73.38
8348.40	40.6 Pk	8.4 / 37.1 / 45.2	41.0	H / 2.0 / 360.0	-13.98	27.02	54	-26.98

# Project Report

**Begin Date:** 3/9/2005

**End Date:** 3/9/2005

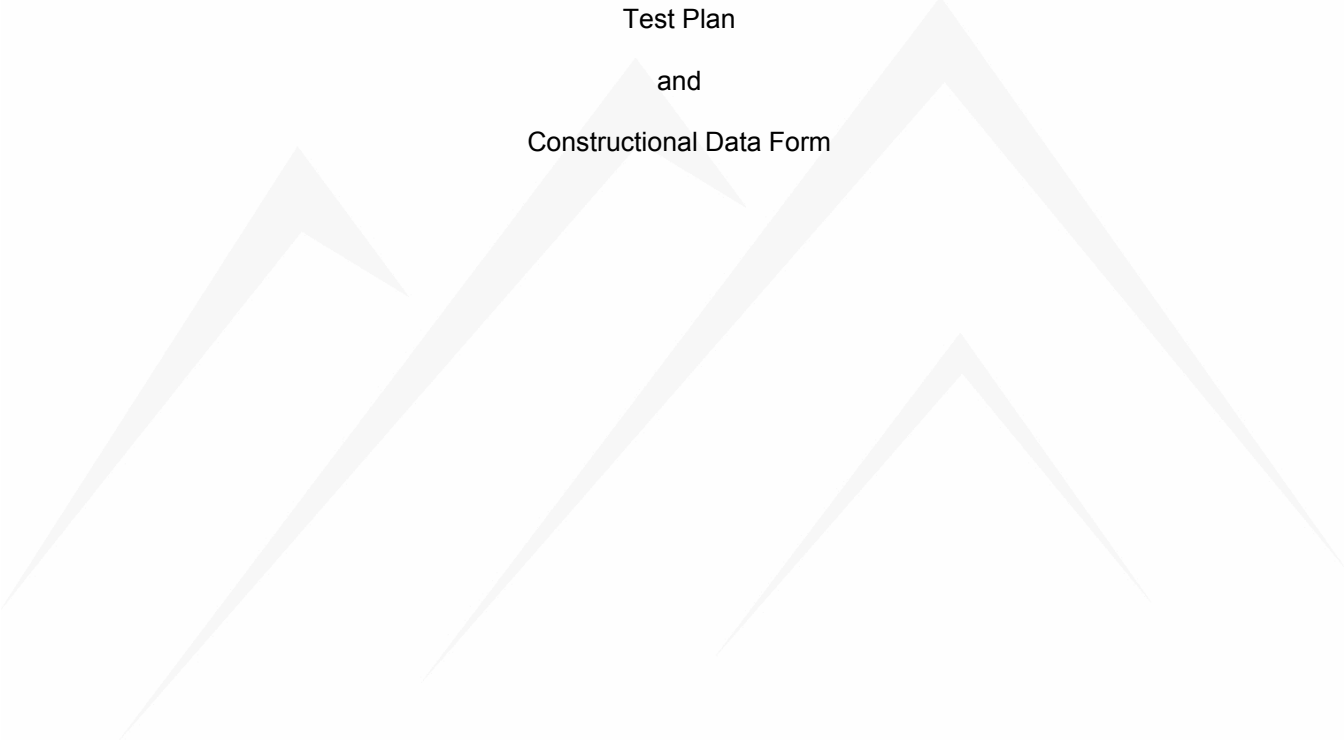
**Technician** Alisha Bullock

**Project:** BC500159

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
6	Hewlett-Packard	8594E	3223A00145	Spectrum Analyzer	R Radiated Emissions	For Cal	1/6/2005	1/6/2006
106	TENSOR	4105	2020	Ridged Guide Antenna 1-18GHz	R Radiated Emissions	For Cal	6/28/2004	6/28/2005
135	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	9/18/2004	9/18/2005
138	EMC TEST SYSTEMS	3109	3142	Biconical Antenna 30-300MHz	R Radiated Emissions	For Cal	9/30/2004	9/30/2005
195	EMCO	6502	9205-2738	Magnetic loop	R Radiated Emissions	For Cal	6/2/2004	6/2/2005
202	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	R Radiated Emissions	For Ver	4/7/2004	4/7/2005
203	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	4/7/2004	4/7/2005
213	Mini-Circuits Lab	ZHL-42	N052792-2	Amplifier	R Radiated Emissions	For Ver	6/5/2004	6/5/2005
248	Hewlett-Packard	8447F	3113A05545	9 kHz- 1.3GHz Pre Amp	R Radiated Emissions	For Ver	6/22/2004	6/22/2005
259	Hewlett-Packard	E7405A	My44211889	Spectrum Analyzer	R Radiated Emissions	For Cal	10/11/2004	10/11/2005

**Appendix B**

Test Plan  
and  
Constructional Data Form







315 CTC Boulevard, Louisville, CO 80027 | ph. 303.939.9336 | fx. 303.939.8977 | www.inovonicswireless.com

July 13, 2004

Todd Seeley  
IA Labs  
5451 Central Ave.  
Boulder, CO 80301

Dear Todd,

Pursuant to section 15.247 of the FCC rules Inovonics transmitters are limited to 0.25 Watts maximum transmitted power. These devices contain integrated antennas and it is therefore impossible to measure the transmitted power in a conducted manner without significantly modifying the devices.

At the test lab the field strength is measured using an antenna located 3 meters from the device under test. The rules do not explicitly state the field strength at 3 meters corresponding to 0.25 Watts, so it must be calculated as follows:

The test facility measures the transmitted field strength, E, having units of Volts/meter, or the logarithmic equivalent. The transmitted power density as measured by the antenna is then  $\frac{E^2}{\eta}$ , where  $\eta$  is the intrinsic impedance of free space.

Assuming isotropic radiation from the product, the Effective Isotropic Radiated Power (EIRP) is found by multiplying the above power density by the area of a sphere having a radius of 3 meters,

$$P_{EIRP} = \frac{E^2}{\eta} 4\pi R^2 \tag{1}$$

Solving for E,

$$E = \frac{1}{2R} \left( \frac{\eta P_{EIRP}}{\pi} \right)^{1/2} \tag{2}$$

Given that  $P_{EIRP} = 0.25$  Watts (FCC limit),  $R = 3$  meters, and  $\eta = 377$  Ohms,  $E = 0.913$  V/m = 119.2 dB  $\mu$ V/m.

Remember the above assumption of isotropic radiation- all real antennas have non-isotropic radiation patterns. Using the 119.2 dB  $\mu$ V/m limit guarantees that the total RF power transmitted by the device is below the 0.25 Watt limit.

Also, according the part 15.35 we are allowed a relaxation of the general radiation limits found in 15.209 while using a peak detector, as applied to the harmonics of the fundamental. Inovonics EchoStream security transmitters have a transmission pulse duration of 20 ms, which corresponds to a duty cycle of 0.2 per 15.35(c). This duty cycle allows for a 14 dB relaxation of the general radiation limits from 54 dB  $\mu$ V/m (500  $\mu$ V/m, per 15.209(a) ) to 68 dB  $\mu$ V/m for peak measurements.

Sincerely,



Steven Dunbar  
RF Engineer

## Request for Estimate:

**Agent/Test Lab:** International Approvals Laboratories, LLC  
**Address:** 5541 Central Avenue Suite 110 Boulder, CO 80301  
**Contact:** Todd Seeley  
**Title:** Principal Engineer (Services Development Focus)  
**Phone Number:** (303) 402-5272  
**Cell Number:** (303) 503-2491  
**Fax Number:** (303) 449-6160  
**Email Address:** todd@ialabs.com

**License Holder:** Inovonics  
**Address:**  
**Contact:**  
**Title:**  
**Phone Number:**  
**Fax Number:**

*Please provide all pertinent information below and email this Form to Todd Seeley at [todd@ialabs.com](mailto:todd@ialabs.com) for a quotation:*

### General Product Information:

<b>Product/Model Number:</b>	DS200/ES1255			
<b>Description of product:</b>	Transmitter			
<b>Intended Use:</b>	<input type="checkbox"/> Household <input checked="" type="checkbox"/> Commercial <input type="checkbox"/> Industrial <input type="checkbox"/> Hospital <input type="checkbox"/> Life Supporting			
<b>Intended Location:</b>	<input checked="" type="checkbox"/> Dry <input type="checkbox"/> Damp <input type="checkbox"/> Wet <input type="checkbox"/> Hazardous Location			
<b>Product Type:</b>	<input type="checkbox"/> Prototype <input checked="" type="checkbox"/> Production Sample <input type="checkbox"/> Manufacturing Design Change: Please Describe			
<b>If more than one product, what are the differences?</b>				
<b>Is the Product Enclosure:</b>	<input type="checkbox"/> Metal <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Both			
<b>Size:</b>	Length: 3"	Width: 1.5"	Height: .75"	Weight: 2 oz
<b>What Voltages/Current does the EUT run at?</b>	Rated Voltage: 3V Rated Current: 50mA # of Phases/Conductors: / # of Power Cords:N/A			
<b>Are there Multiple Modes of Operation?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <b>If Yes Please Describe:</b>			
<b>Can all modes of operation be operated simultaneously?</b>	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No         Explain:			
<b>In which countries will you be selling the product?</b>	USA, CANADA			

**EMC Information:**

<b>What EMC certifications are desired?</b>	<input checked="" type="checkbox"/> FCC/ICES (US & Canada) <input type="checkbox"/> CE / EMC / MMD <input type="checkbox"/> BSMI (Taiwan) <input type="checkbox"/> VCCI (Japan) <input type="checkbox"/> SII (Israel) <input type="checkbox"/> AS/NZS (Australia/New Zealand) <input type="checkbox"/> Other: Please Specify
---	--

<b>Highest frequency utilized for device operation:</b>	<b>928 MHz</b>
---	----------------

<b>List of Clock Frequencies:</b>	<b>6MHz</b>
-----------------------------------	-------------

<b>What is the time that it takes for the device to complete a full cycle of operation? (time required to identify any degradation in performance)</b>	
--	--

<b>Total Number of I/O Cables:</b> # Greater than 3m (9.75 feet) in Length # Greater than 30m (97.5 feet) in Length # of cables at a longer length (specify)	<b>NONE</b>
---	-------------

<b>Number of Dedicated Earth Equalization Ports</b>	
---	--

<b>Number of Ethernet and/or Telecommunications Ports</b>	
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**Radio Information:**

<b>What Radio certifications are desired?</b>	<input checked="" type="checkbox"/> FCC (USA) <input type="checkbox"/> Industry Canada <input type="checkbox"/> ETSI (R&TTE) <input type="checkbox"/> Other: Please Specify
---	--

<b>Operating Frequency:</b>	<b>902MHz to 928MHz</b>
-----------------------------	-------------------------

<b>RF Output Power:</b>	<b>&lt; 50mW</b>
-------------------------	------------------

<b>Number of Antennas &amp; Description: (Internal, External, etc.)</b>	<b>1 internal</b>
---	-------------------

<b>Modulation Technique:</b>	<b>FSK</b>
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<b>Number of Channels:</b>	<b>25</b>
----------------------------	-----------

<b>Can the device be operated in CW Mode?</b>	<input checked="" type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
---	---

**Safety Information:**

<b>What safety certifications are desired?</b>	<input type="checkbox"/> NRTL Listing <input type="checkbox"/> CE / LVD / MDD <input type="checkbox"/> CB Certification <input type="checkbox"/> Other: Please Specify
--	---

<b>Has the device been tested and certified for product safety before?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No  Standard tested to:  Organization tested by:
<b>A. If it has been previously tested, to which standard and by which organization?</b>	
<b>B. Can you provide the test report?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No

<b>Is the power supply</b>	<input type="checkbox"/> An approved off the shelf power supply  OR  <input type="checkbox"/> A Custom Model that will need evaluation/ certification
----------------------------	---

<b>Does the device contain batteries?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No  What Type?  How Many?
---	---

<b>What technology is used? (i.e., lasers, X Ray, etc.)</b>	
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<b>If Laser:</b>	Class:	Output Power:	Beam Divergence Angle:	Wavelength:
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<b>Is the product a Medical Device?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No
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<b>Is it an In Vitro Diagnostic Device?</b>	<input type="checkbox"/> Yes <input type="checkbox"/> No
---	--

<b>Testing location: (to be filled in by IALabs)</b>	
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**Additional Information:**

This information is required to be filled in to act as a test plan and constructional data form required to be supplied as part of the test report in accordance to the required standards. This information is not required to obtain a quote.

**Support Equipment:**

IALabs requires our customers provide all support equipment necessary to fully operate the EUT.

Item	Description	Manufacturer	Model No.
1			
2			
3			
4			

**Cabling Information:**

Cable	Function*	Type of Shield	Length	Connectors	Connection**
1					
2					
3					
4					
5					
6					

\* Function examples (Ethernet, RS232, USB, Analog, physiological parameter, etc.)

\*\* Connection examples (Outside Plant, Patient Coupled, Ring Voltage, etc.)

**Monitoring the EUT:**

Please provide instructions below on how to observe the EUT to verify proper operation in all modes. (including software revision)

**Any other information required: (Notes, Photos, Block Diagrams, Drawings, etc.)**

A minimum of a block diagram showing the equipment under test and its support equipment.

Note: To insert files and photos within this document please fill in the information above and then unlock the FORM by:

1. Right click on the tool bar above and select "Form"
2. Select the Lock Button within the "form" toolbar

For International Approvals Laboratories, Use Only.  
Please do not fill in the following Information.

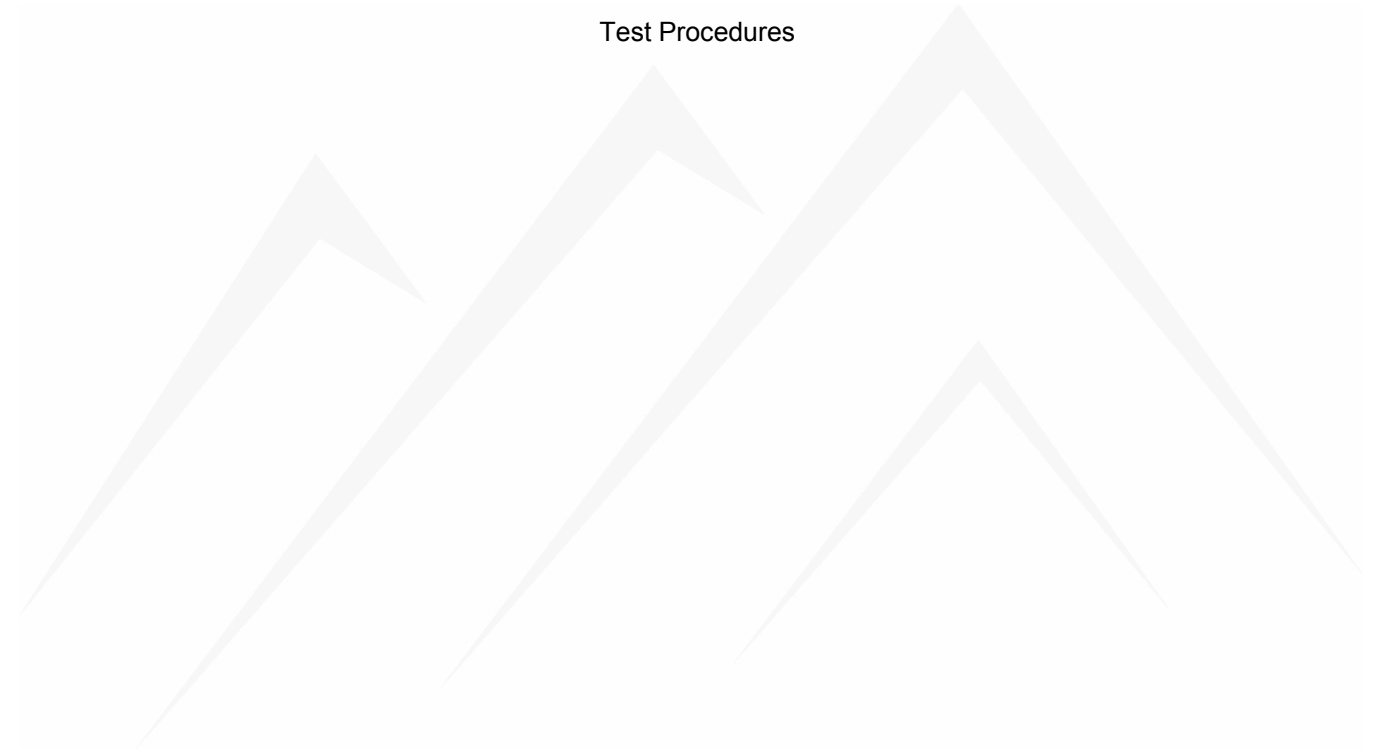
<b>Emissions Testing Required</b>		
<input type="checkbox"/> FCC Part 15	<input type="checkbox"/> ICES-003	<input type="checkbox"/> VCCI
<input type="checkbox"/> FCC Part 18	<input type="checkbox"/> BSMI	<input type="checkbox"/> CISPR 22/EN 55022
<input type="checkbox"/> CISPR 11/EN 55011	<input type="checkbox"/> IEC/EN 61326	<input type="checkbox"/> IEC/EN61000-6-3
<input type="checkbox"/> IEC/EN61000-6-4	<input type="checkbox"/> CNS13438	<input type="checkbox"/> AS/NZS 3548
<input type="checkbox"/> IEC/EN61000-3-2	<input type="checkbox"/> IEC/EN61000-3-3	<input type="checkbox"/> ETSI/EN 301 489
<input type="checkbox"/> Other:		
<b>OATS Testing Voltages</b>		
<input type="checkbox"/> 100VAC/50 Hz	<input type="checkbox"/> 120VAC/60Hz	<input type="checkbox"/> 230VAC/50Hz
<input type="checkbox"/> 110VAC/60Hz	<input type="checkbox"/> 220VAC/60Hz	<input type="checkbox"/> 240VAC/50Hz
<input type="checkbox"/> Other:		
<b>Immunity Product Family Standard</b>		
<input type="checkbox"/> CISPR24/EN 55024	<input type="checkbox"/> IEC/EN 61000-6-1	<input type="checkbox"/> IEC/EN 61000-6-2
<input type="checkbox"/> IEC/EN 60601-1-2	<input type="checkbox"/> IEC/EN 61326	<input type="checkbox"/> CISPR14/ EN 55014-2
<input type="checkbox"/> ETSI/EN 401 489		
<input type="checkbox"/> Other:		
<b>Immunity Methods</b>		
<input type="checkbox"/> EN61000-4-2	<input type="checkbox"/> 4kV/8kV <input type="checkbox"/> 6kV/8kV <input type="checkbox"/> 8kV <input type="checkbox"/> 12kV <input type="checkbox"/> 15kV	<input type="checkbox"/> Other:
<input type="checkbox"/> EN61000-4-3	<input type="checkbox"/> 3V/m <input type="checkbox"/> 10V/m <input type="checkbox"/> 1 kHz Modulation <input type="checkbox"/> 400 Hz Modulation <input type="checkbox"/> 2 Hz Modulation	<input type="checkbox"/> Other:
<input type="checkbox"/> EN61000-4-4	<input type="checkbox"/> 0.5 kV <input type="checkbox"/> 1.0 kV <input type="checkbox"/> 2.0 kV	<input type="checkbox"/> Other:
<input type="checkbox"/> EN61000-4-5	<input type="checkbox"/> 0.5 kV <input type="checkbox"/> 1.0 kV <input type="checkbox"/> 2.0 kV <input type="checkbox"/> 4.0 kV	<input type="checkbox"/> Other:
<input type="checkbox"/> EN61000-4-6	<input type="checkbox"/> 3Vrms <input type="checkbox"/> 10Vrms <input type="checkbox"/> 1 kHz Modulation <input type="checkbox"/> 400 Hz Modulation <input type="checkbox"/> 2 Hz Modulation	<input type="checkbox"/> Other:
<input type="checkbox"/> EN61000-4-8	<input type="checkbox"/> 1A/m <input type="checkbox"/> 30A/m <input type="checkbox"/> 400A/m	<input type="checkbox"/> Other:
<input type="checkbox"/> EN61000-4-11	<input type="checkbox"/> >95% 0.5 Cycles <input type="checkbox"/> 60% 5 Cycles <input type="checkbox"/> 30% 25 Cycles <input type="checkbox"/> >95% 250 Cycles	<input type="checkbox"/> Other:
<input type="checkbox"/> Other/special notes:		

**Appendix C**

Measurement Protocol

And

Test Procedures



## MEASUREMENT PROTOCOL

### GENERAL INFORMATION

#### Test Methodology

Conducted and radiated emission testing is performed according to the procedures in ANSI C63.4 & CNS13438.

#### Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral into its characteristic impedance or left unterminated. When appropriate, the cables are manually manipulated with respect to each other to obtain maximum emissions from the unit.

#### CONDUCTED EMISSIONS

The final level, expressed in dB $\mu$ V, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dB $\mu$ V and  $\mu$ V, the following conversions apply:

- dB $\mu$ V = 20(log  $\mu$ V)
- $\mu$ V = Inverse log(dB $\mu$ V/20)

#### RADIATED EMISSIONS

The final level, expressed in dB $\mu$ V/m, is arrived at by taking the reading from the spectrum analyzer (Level dB $\mu$ V) and adding the antenna correction factor and cable loss factor (Factor dB) to it. This result then has the applicable limit subtracted from it to provide the Delta which gives the tabular data as shown in the data sheets in Attachment B. The amplifier gain is automatically accounted for by using an analyzer offset.

*Example: At a Test Frequency of 30 MHz, with a peak reading on the spectrum analyzer or measuring receiver of 14 dB $\mu$ V:*

Measured Level	+	Transducer & Cable Loss factor	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dB $\mu$ V)		(dB)		(dB $\mu$ V/m)	(dB $\mu$ V/m)		(dB $\mu$ V/m)		
<b>14.0</b>		<b>14.9</b>		<b>28.9</b>	<b>40.0</b>		<b>28.9</b>		<b>-11.1</b>

## DETAILS OF TEST PROCEDURES

### *General Standard Information*

The test methods used comply with ANSI C63.4-1992 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

### **Conducted Emissions**

Conducted emissions on the 50 Hz and/or 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection, and a Line Impedance Stabilization Network (LISN), with 50  $\Omega$ /50  $\mu$ H (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimeters above the floor and is positioned 40 centimeters from the vertical ground plane (wall) of the screen room. In some cases, a pre-scan using a spectrum analyzer is initially performed on the units comprising the system under test to locate the highest emissions. If the minimum passing margin appears to be less than 20 dB with a peak mode measurement, the emissions are re-measured using a tuned receiver or spectrum analyzer with quasi-peak and average detection and recorded on the data sheets.

### **Radiated Emissions**

Radiated emissions from the EUT are measured in the frequency range of 30 to 22GHz using a spectrum analyzer and appropriate broadband linearly polarized antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection and measurements above 1000 MHz are made with a 1 MHz/6 dB bandwidth and peak detection. Table top equipment is placed on a 1.0 X 1.5 meter non-conducting table 80 centimeters above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. Interface cables that are closer than 40 centimeters to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimeters from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screen room located outside the test area. The antenna is positioned 3, 10 or 30 meters horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 meters, measurement scans are made with both horizontal and vertical antenna polarizations and the EUT are rotated 360 degrees.



