

## EMC EMISSIONS - TEST REPORT (In Part)

Test Report No. **3164931DEN-004F-CSA** Issue Date: Thursday 18/Dec/2008

Model / Serial No. MN: EN1702 /SN: 3711619

Product Type Wireless Temperature Sensor

Client Inovonics Wireless Corporation

Manufacturer Inovonics Wireless Corporation

License holder Inovonics Wireless Corporation

Address 315 - CTC Boulevard

Louisville, CO 80027

Test Criteria Applied

**FCC 47 CFR Part 15.247  
IC RSS-210 Issue 7**

Title 47 CFR 15: RADIO FREQUENCY  
DEVICES  
Subpart C – Intentional Radiators

Test Result

**PASS**

Low-power License-exempt Radio  
Communication Devices  
(All Frequency Bands):  
Category 1 Equipment

Test Project Number  
References  
Total Pages  
Including  
Appendices:

**3164931**

**26**

*Randy Thompson*

Tested By : Randy Thompson

*Michael Spataro*

Reviewed By: Michael Spataro

**REVISION SUMMARY - The following changes have been made to this Report:**

Rev.	Revision Statement	Author	Revision Date	Reviewer
	Initial Release of Document	See above	See above	
A	Update report to include RSS-210 Notes  per Quote 500177658	<i>Randy Thompson</i>	9-29-09	Michael Spataro <i>Michael Spataro</i>

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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  $\pm 3.14$ dB and for Radiated Emissions is calculated to be  $\pm 4.4$ dB in the frequency range of 10kHz – 1000MHz at 3m and  $\pm 4.9$ dB in the frequency range of 1 – 18GHz at 3m. For testing at 10m  $\pm 4.8$ dB in the frequency range of 30 – 1000MHz. For Disturbance Power,  $\pm 3.3$ dB in the frequency range of 30 – 1000MHz. For Flicker and Harmonics testing the equipment used is calibrated by the manufacture and is with in the tolerances specified in 61000-3-2/3. These uncertainties have been calculated using CISPR 16-4-2:2003 and represent a 95% confidence level ( $k=2$ ).

EUT Received Date: 5-November-2008

Testing Start Date: 5-November-2008

Testing End Date: 5-November-2008

The tests were performed according to following regulations:

1. FCC CFR47 Part 15 subpart C
2. IC RSS-210e Issue 7 2007
3. IC RSS-GEN Issue 2 2007

Emission Test Results:

**Conducted Emissions 15.207 - NA**

**Test Result**

Minimum limit margin 0.0 dB at 0.0 MHz

Remarks: EUT is powered via battery.

**Radiated Unintentional and Spurious Emissions 15.247(D) /15.205/209 - NA**

**Test Result**

Minimum limit margin 0.0 dB at 0.0 MHz

Remarks: Covers RSS-210 section 2.7 Tables 1 and 2.  
Radiated Unintentional and Spurious Emissions for this product were tested and covered in a separate report. Refer to Report 3164931DEN-004B for details.

**Peak Output Power – Fundamental: 15.247 (b)(2) - PASS**

**Test Result**

Minimum limit margin - 1.1 dB at 902.41 MHz

Remarks: Covers RSS-210 Annex 8.  
Low Channel

**Radiated Emissions – Harmonics of the Fundamental: 15.205/15.247(d) - PASS**

**Test Result**

Minimum limit margin - 0.5 dB at 7420.93 MHz

Remarks: Covers RSS-210 Section 2.7 Tables 1 and 2  
High Channel

**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 Intertek.

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.

Whenever possible the approved test procedures specified in FCC DA 00-705 for FHSS devices was used for testing.

**Limit Calculation:**

At the time of testing, Intertek was unable to obtain the gain of the antenna for the EUT from the manufacture of the EUT or from the manufacture of the antenna. Therefore, the following calculation was used to determine the field strength limit for a test distance of 3m.

This calculation assumes ideal isotropic radiation from the source.

$$P = 20 \cdot \log(E) - 95.2289$$

P is power in dBm

E is uV/m

EUT is battery powered.

Only the fundamental and harmonics of the fundamental are covered in this report, as requested by the customer.

Sample:

Production     Prototype     See Annex B

Modifications required to pass: None

Test Specification Deviations: Additions to or Exclusions from: None

Test-setup photo(s):  
Radiated Intentional Emissions: Worst-Case Axis 3



Test-setup photo(s):  
Radiated Intentional Emissions: Worst-Case Axis 3



**Appendix A**

Test Data Sheets  
and  
Test Equipment Used

**Fundamental field strength  
And  
Harmonics of the Fundamental**

**15.247**



# Field Strength Measurements Fundamental and Spurious of the Transmitter

Test Report #: <b>3164931 EN1702</b>	Test Area: Pinewood Site 1 (3m)	Temperature: 23.8 °C
Test Method: FCC 15.247	Test Date: 5-Nov-2008	Relative Humidity: 32.1 %
EUT Model #: EN 1702	EUT Power: 3VDC Battery	Air Pressure: 99.4 kPa
EUT Serial #: 3711619		
Manufacturer: Inovonics Wireless Corporation		
EUT Description: Temperature Sensor		
Notes:		

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) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)

The following Duty Cycle was declared by the manufacturer:

**20.8%**

**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**

**Fundamental Measurements**

**Low Channel Axis 1 - EUT is Flat on the table.**

902.41	77.6 Pk	3.6 / 22.7 / 0.0	103.9	V / 1.0 / 48.0	0.0	103.9	119.2	-15.3
902.41	90.2 Pk	3.6 / 22.7 / 0.0	116.5	H / 1.6 / 356.0	0.0	116.5	119.2	-2.7

**Axis 2 - EUT is Vertical on the table.**

902.41	82.3 Pk	3.6 / 22.7 / 0.0	108.6	V / 2.4 / 144.0	0.0	108.6	119.2	-10.6
902.41	88.3 Pk	3.6 / 22.7 / 0.0	114.6	H / 1.5 / 144.0	0.0	114.6	119.2	-4.6

**Axis 3 - EUT is Vertical on the table & Rotated 90 Deg.**

902.41	81.5 Pk	3.6 / 22.7 / 0.0	107.8	H / 1.9 / 144.0	0.0	107.8	119.2	-11.4
902.41	91.8 Pk	3.6 / 22.7 / 0.0	118.1	V / 1.2 / 144.0	0.0	118.1	119.2	-1.1

**Mid Channel Axis 1**

914.82	89.4 Pk	3.6 / 22.7 / 0.0	115.8	H / 1.1 / 356.0	0.0	115.8	119.2	-3.4
914.82	78.1 Pk	3.6 / 22.7 / 0.0	104.5	V / 1.9 / 356.0	0.0	104.5	119.2	-14.7

**Axis 2**

914.82	84.7 Pk	3.6 / 22.7 / 0.0	111	H / 1.0 / 186.0	0.0	111.0	119.2	-8.2
914.82	81.2 Pk	3.6 / 22.7 / 0.0	107.5	V / 1.2 / 192.0	0.0	107.5	119.2	-11.7

**Axis 3**

914.82	90.7 Pk	3.6 / 22.7 / 0.0	117.1	V / 1.1 / 186.0	0.0	117.1	119.2	-2.1
914.82	79.3 Pk	3.6 / 22.7 / 0.0	105.7	H / 1.3 / 332.0	0.0	105.7	119.2	-13.5

**High Channel Axis 1**

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
927.63	75.8 Pk	3.6 / 22.8 / 0.0	102.2	V / 2.1 / 356.0	0.0	102.2	119.2	-17.0
927.63	86.7 Pk	3.6 / 22.8 / 0.0	113.2	H / 1.1 / 356.0	0.0	113.2	119.2	-6.0
<b>Axis 2</b>								
927.63	78.5 Pk	3.6 / 22.8 / 0.0	104.9	V / 1.1 / 192.0	0.0	104.9	119.2	-14.3
927.63	83.1 Pk	3.6 / 22.8 / 0.0	109.6	H / 1.0 / 192.0	0.0	109.6	119.2	-9.6
<b>Axis 3</b>								
927.63	76.8 Pk	3.6 / 22.8 / 0.0	103.2	H / 3.4 / 5.0	0.0	103.2	119.2	-16.0
927.63	88.7 Pk	3.6 / 22.8 / 0.0	115.2	V / 1.1 / 284.0	0.0	115.2	119.2	-4.0
<b>Axis 3 was determined to be the worst case axis</b>								
<b>All Harmonics will be measured in Axis 3</b>								
<b>Harmonics - Low Channel</b>								
1804.83	96.7 Pk	3.0 / 26.3 / 37.1	88.9	V / 2.1 / 348.0	-13.6	75.3	98.1	-22.8
1804.83	95.5 Pk	3.0 / 26.3 / 37.1	87.7	H / 1.7 / 10.0	-13.6	74.1	98.1	-24.0
2707.24	58.5 Pk	3.8 / 29.7 / 37.6	54.5	V / 1.8 / 12.0	-13.6	40.9	54.0	-13.1
2707.24	63.1 Pk	3.8 / 29.7 / 37.6	59	H / 2.1 / 358.0	-13.6	45.4	54.0	-8.6
3609.65	54.5 Pk	5.0 / 31.7 / 38.4	52.8	V / 1.3 / 42.0	-13.6	39.2	54.0	-14.8
3609.65	57.1 Pk	5.0 / 31.7 / 38.4	55.4	H / 1.6 / 42.0	-13.6	41.8	54.0	-12.2
4512.05	49.9 Pk	5.3 / 31.3 / 40.7	45.7	V / 2.2 / 220.0	-13.6	32.1	54.0	-21.9
4512.05	54.4 Pk	5.3 / 31.3 / 40.7	50.2	H / 2.1 / 356.0	-13.6	36.6	54.0	-17.4
5414.47	54.6 Pk	6.0 / 33.3 / 39.9	54.1	V / 1.5 / 38.0	-13.6	40.5	54.0	-13.5
5414.47	63.5 Pk	6.0 / 33.3 / 39.9	62.9	H / 1.4 / 8.0	-13.6	49.3	54.0	-4.7
6316.87	65.0 Pk	6.6 / 33.8 / 40.4	65	V / 1.2 / 299.0	-13.6	51.4	98.1	-46.7
6316.88	70.5 Pk	6.6 / 33.8 / 40.4	70.5	H / 1.4 / 352.0	-13.6	56.9	98.1	-41.2
7219.3	58.4 Pk	7.3 / 35.9 / 39.9	61.7	V / 1.3 / 336.0	-13.6	48.1	98.1	-50.0
7219.3	63.6 Pk	7.3 / 35.9 / 39.9	67	H / 1.4 / 12.0	-13.6	53.4	98.1	-44.7
8121.71	57.4 Pk	7.7 / 36.3 / 47.5	53.9	H / 1.4 / 48.0	-13.6	40.3	54.0	-13.7
8121.71	55.4 Pk	7.7 / 36.3 / 47.5	51.9	V / 1.3 / 298.0	-13.6	38.3	54.0	-15.7
9024.11	52.8 Pk	8.4 / 36.7 / 48.5	49.3	H / 1.2 / 48.0	-13.6	35.7	54.0	-18.3
9024.11	52.1 Pk	8.4 / 36.7 / 48.5	48.7	V / 1.6 / 198.0	-13.6	35.1	54.0	-18.9
<b>Harmonics - Mid Channel</b>								
1829.64	94.7 Pk	3.0 / 26.4 / 37.1	87	H / 1.7 / 10.0	-13.6	73.4	97.1	-23.7
1829.64	95.3 Pk	3.0 / 26.4 / 37.1	87.7	V / 1.9 / 312.0	-13.6	74.1	97.1	-23.0
2744.46	67.2 Pk	3.8 / 29.8 / 37.6	63.3	H / 2.1 / 348.0	-13.6	49.7	54.0	-4.3
2744.46	63.5 Pk	3.8 / 29.8 / 37.6	59.6	V / 1.9 / 312.0	-13.6	46.0	54.0	-8.0
3659.28	56.5 Pk	5.1 / 31.8 / 38.4	55.1	H / 1.6 / 312.0	-13.6	41.5	54.0	-12.5
3659.28	52.5 Pk	5.1 / 31.8 / 38.4	51.1	V / 1.7 / 312.0	-13.6	37.5	54.0	-16.5
4574.07	54.0 Pk	5.3 / 31.3 / 40.7	49.9	V / 2.3 / 329.0	-13.6	36.3	54.0	-17.7
4574.08	60.6 Pk	5.3 / 31.3 / 40.7	56.5	H / 1.5 / 340.0	-13.6	42.9	54.0	-11.1
5488.88	68.2 Pk	6.1 / 33.3 / 40.1	67.6	H / 1.4 / 340.0	-13.6	54.0	97.1	-43.1
5488.88	60.6 Pk	6.1 / 33.3 / 40.1	60	V / 1.5 / 321.0	-13.6	46.4	97.1	-50.7
6403.7	59.0 Pk	6.7 / 34.0 / 40.5	59.3	V / 1.3 / 321.0	-13.6	45.7	97.1	-51.4
6403.71	65.3 Pk	6.7 / 34.0 / 40.5	65.5	H / 1.3 / 8.0	-13.6	51.9	97.1	-45.2
7318.52	62.9 Pk	7.4 / 36.2 / 40.3	66.1	H / 1.3 / 8.0	-13.6	52.5	54.0	-1.5

FREQ	LEVEL	CABLE / ANT / PREAMP	FINAL	POL / HGT / AZ	Duty Cycle Correction	Final Corrected	Limit	DELTA
(MHz)	(dBuV)	(dB) (dBm) (dB)	(dBuV)	(m) (DEG)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
7318.52	59.6 Pk	7.4 / 36.2 / 40.3	62.8	V / 1.3 / 338.0	-13.6	49.2	54.0	-4.8
8233.34	49.1 Pk	7.9 / 36.1 / 47.7	45.5	V / 1.3 / 212.0	-13.6	31.9	54.0	-22.1
8233.34	52.2 Pk	7.9 / 36.1 / 47.7	48.5	H / 1.3 / 6.0	-13.6	34.9	54.0	-19.1
9148.14	56.9 Pk	8.5 / 36.6 / 48.6	53.4	V / 1.3 / 329.0	-13.6	39.8	54.0	-14.2
9148.14	58.8 Pk	8.5 / 36.6 / 48.6	55.2	H / 1.3 / 6.0	-13.6	41.6	54.0	-12.4
<b>Harmonics - High Channel</b>								
1855.24	90.0 Pk	3.0 / 26.5 / 37.1	82.5	V / 1.8 / 346.0	-13.6	68.9	95.2	-26.3
1855.24	88.5 Pk	3.0 / 26.5 / 37.1	80.9	H / 1.6 / 348.0	-13.6	67.3	95.2	-27.9
2782.85	65.7 Pk	3.8 / 30.0 / 37.6	61.8	V / 1.8 / 15.0	-13.6	48.2	54.0	-5.8
2782.85	67.2 Pk	3.8 / 30.0 / 37.6	63.4	H / 2.1 / 15.0	-13.6	49.8	54.0	-4.2
3710.48	53.9 Pk	5.2 / 31.9 / 38.2	52.7	V / 1.6 / 15.0	-13.6	39.1	54.0	-14.9
3710.48	60.8 Pk	5.2 / 31.9 / 38.2	59.6	H / 1.5 / 15.0	-13.6	46.0	54.0	-8.0
4638.08	56.5 Pk	5.4 / 31.5 / 40.5	52.9	V / 2.4 / 336.0	-13.6	39.3	54.0	-14.7
4638.08	66.8 Pk	5.4 / 31.5 / 40.5	63.2	H / 1.5 / 352.0	-13.6	49.6	54.0	-4.4
5565.68	62.3 Pk	6.1 / 33.4 / 39.8	62	V / 1.5 / 352.0	-13.6	48.4	95.2	-46.8
5565.7	71.5 Pk	6.1 / 33.4 / 39.8	71.3	H / 1.3 / 352.0	-13.6	57.7	95.2	-37.5
6493.3	70.2 Pk	6.8 / 33.8 / 40.2	70.5	H / 1.2 / 6.0	-13.6	56.9	95.2	-38.3
6493.31	64.0 Pk	6.8 / 33.8 / 40.2	64.4	V / 1.3 / 335.0	-13.6	50.8	95.2	-44.4
7420.93	59.8 Pk	7.4 / 36.2 / 39.8	63.6	V / 1.3 / 338.0	-13.6	50.0	54.0	-4.0
7420.93	63.3 Pk	7.4 / 36.2 / 39.8	67.1	H / 1.3 / 23.0	-13.6	53.5	54.0	-0.5
8348.53	60.7 Pk	8.0 / 36.0 / 47.9	56.8	H / 1.3 / 48.0	-13.6	43.2	54.0	-10.8
8348.55	54.5 Pk	8.0 / 36.0 / 47.9	50.7	V / 1.3 / 284.0	-13.6	37.1	54.0	-16.9
9276.15	56.0 Pk	8.5 / 36.8 / 48.5	52.7	H / 1.2 / 10.0	-13.6	39.1	95.2	-56.1
9276.15	53.9 Pk	8.5 / 36.8 / 48.5	50.6	V / 1.1 / 198.0	-13.6	37.0	95.2	-58.2

## Electric Field to Power Conversion

Worst case emission from above: 118.1 dBuV

This calculation assumes ideal isotropic radiation from the source.

$$P = 20 \cdot \log(E) - 95.2289$$

P is power in dBm

E is uV/m

$$118.1 - 95.2289 = 22.87 \text{ dBm}$$

$$\text{Limit (FCC Part 15.247)} = 23.98 \text{ dBm}$$

$$\text{Delta from Limit} = 22.87 - 23.98 = -1.1 \text{ dBm}$$

## **List of Equipment Utilized for Final Test**

# Project Report

**Begin Date:** 11/5/2008 **End Date:** 11/5/2008

**Technician** Randall Thompson

**Project** 3164931

Capital Asset ID	Manufacturer	Model #	Serial #	Description	Test Performed	Service Type	Service Date	Service Due
18882	Hewlett-Packard	8566B	2410A00154	Spectrum Analyzer (dc-22 GHz)	R Radiated Emissions	For Cal	11/13/2007	11/13/2008
18886	TENSOR	4105	2020	Ridged Guide Antenna 1-18GHz	R Radiated Emissions	For Cal	3/6/2008	3/6/2009
18888	EMCO	3146	9402-3775	Log Periodic Antenna (200-1000MHz)	R Radiated Emissions	For Cal	10/21/2008	10/21/2009
18900	Avantek	AFT97-8434-10F	1007	RF Pre-Amplifier (4-8 GHz)	R Radiated Emissions	For Ver	5/2/2008	5/2/2009
18901	Avantek	AWT-18037	1002	RF Pre-Amplifier (8-18 GHz)	R Radiated Emissions	For Ver	5/2/2008	5/2/2009
18906	Mini-Circuits Lab	ZHL-42	N052792-2	RF Pre-Amplifier (1-4 GHz)	R Radiated Emissions	For Ver	5/2/2008	5/2/2009

**Appendix B**

Test Plan

and

Constructional Data Form

[Provided by Client]

# Request for Estimate & Test Plan

## Please contact with any questions:

Contact:	Bryant Hart
Title:	Account Manager
Phone Number:	(303) 402-5272
Email Address:	Bryant.Hart@Intertek.com

## Client Information:

License Holder:	Inovonics Wireless Corp.
Address:	315 CTC Boulevard
Contact:	Jerry Klintz
Title:	Engineering Manager
Phone Number:	303-209-7259
Fax Number:	303-939-8977
Email Address:	Jerry.klintz@inovonics.com

Please fill out the pertinent pages within this document and email this Form to Bryant and Amy at [Bryant.Hart@intertek.com](mailto:Bryant.Hart@intertek.com) and [Amy.Baumberger@Intertek.com](mailto:Amy.Baumberger@Intertek.com) for a quotation. Other pages that do not pertain to your device can be left blank.

*I.E. EMC Quote – Pages 1,2 & 3, Add Safety – add Page 4, If a radio is part of the device add page 5 etc.*

This document is compiled as a WORD FORM. To enable the FORM tool, right click on the tool bar and select FORMS. You will then be able to add attachments, drawings etc by clicking on the “Lock” Graphic to unlock the FORM document. To make all the check boxes work within the FORM, the “Lock” graphic must be selected. Thank you for all your time and effort on this matter.

## Estimates Requested: (Required for all devices)

<b>EMC Testing/Services</b>	
<input type="checkbox"/> Requesting Estimate	<input type="checkbox"/> On-site/In-Situ Testing
<input type="checkbox"/> Pre-Compliance Scans / Engineering test	<input type="checkbox"/> TCF Compilation/Review Service

<b>Radio Device Testing and Certification</b>	
<input checked="" type="checkbox"/> FCC Certification	<input checked="" type="checkbox"/> Industry Canada Certification (Receivers required)
<input type="checkbox"/> Class 2 Notification Under the R&TTED	<input type="checkbox"/> TCF Compilation/Review Service

<b>Safety Testing and Certification</b>	
<input type="checkbox"/> NRTL Listing	<input type="checkbox"/> 1 Day Pre-Assessment (conducted at your facility)
<input type="checkbox"/> Letter of Findings	<input type="checkbox"/> CB Report Covering all country Deviations
<input type="checkbox"/> CE Report to Cover the LVD/MDD	<input type="checkbox"/> CB Report Covering - Specify Countries:

<b>Any Additional Interest(s)</b>	
<input type="checkbox"/> ISO Certification (Another RFQ is required)	<input type="checkbox"/> Energy Star Compliance
<input type="checkbox"/> FDA 510K Services (Another RFQ is required)	<input type="checkbox"/> NEBS
<input type="checkbox"/> International Approvals Management	<input type="checkbox"/> Wire and Cable
<input type="checkbox"/> Product Verification and Integrity Testing	<input type="checkbox"/> Other:

**General Product Information:** (Required for all Devices)

Product/Model Number(s):	EN1702			
Description of product(s):	900 MHz transmitter			
Intended Use:	<input type="checkbox"/> Household/Office <input checked="" type="checkbox"/> Commercial <input checked="" type="checkbox"/> Industrial <input type="checkbox"/> Hospital <input type="checkbox"/> Life Supporting			
Intended Location:	<input checked="" type="checkbox"/> Dry <input type="checkbox"/> Damp <input type="checkbox"/> Wet <input type="checkbox"/> Hazardous Location			
Product Type:	<input checked="" type="checkbox"/> Prototype <input type="checkbox"/> Production Sample <input type="checkbox"/> Manufacturing Design Change: Please Describe			
Is it a stand-alone device or part of a system?	<input checked="" type="checkbox"/> Stand Alone Device <input type="checkbox"/> Component of a System			
If part of a system, please describe system parts and accessories:				
If there is more than one product/model what are the differences?				
Is the Product Enclosure:	<input type="checkbox"/> Metal <input checked="" type="checkbox"/> Plastic <input type="checkbox"/> Both			
Size:	Length:3.5"	Width:1.5"	Height:1"	Weight:6 oz
What Voltages/Current does the EUT run at? (AC/DC etc.) – if the unit runs off of DC though it is supplied with an AC/DC converter, please state the operating parameters of the converter.	Rated Voltage:3.0 VDC Rated Current:30 uA Avg., 26 ma peak # of Phases/Conductors: / # of Power Cords:			
Are their multiple suppliers of power supplies?	<input type="checkbox"/> Yes <input type="checkbox"/> No If Yes Please Describe:			
Are there Multiple Modes of Operation? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If Yes Please Describe:				
Is there programmable software? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No				
Can all modes of operation be operated simultaneously? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Explain:				
In which countries will you be selling the product? US & Canada				
When can you supply samples of the device and all pertinent documentation (where applicable) to Intertek for testing? 8/4/08				



**EMC Information:** (Required only if EMC work is requested)

What EMC certifications are desired?

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> FCC/ICES (US & Canada) | <input type="checkbox"/> SII (Israel)                   |
| <input type="checkbox"/> CE / EMC / MMD                    | <input type="checkbox"/> AS/NZS (Australia/New Zealand) |
| <input type="checkbox"/> BSMI (Taiwan)                     | <input type="checkbox"/> Korea MIC Certification / RRL  |
| <input type="checkbox"/> VCCI (Japan)                      | <input type="checkbox"/> Other: Please Specify          |

Highest frequency utilized for device operation:  
927.6

List of Clock Frequencies:  
32.768 kHz, 4 MHz, 10 MHz, 16 MHz

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) (please list per mode of operation)  
10 sec

Total Number of I/O Cables: # Greater than 3m (9.75 feet) in Length # Greater than 30m (97.5 feet) in Length # of cables at a longer length (specify)	0
--	---

Number of Dedicated Earth Equalization Ports  
0

Number of Ethernet and/or Telecommunications Ports  
0

When the device is a compilation of subsystems (in separate chassis) how many interconnecting I/O's are greater than 1 meter in length between the Subsystem chassis?

**CISPR11/EN 55011 Specific Devices:**

1. Does the EUT use RF Energy to affect a material?  Yes  No If yes, state frequency of energy:

**General Safety Information:** (Required only if Safety Listing/Certification/Testing is requested)

What Safety certifications are desired?	
<input type="checkbox"/> NRTL Listing US/Canada	<input type="checkbox"/> Limited Production Certification/Listing
<input type="checkbox"/> CB Certification (Worldwide – Outside US/Can)	<input type="checkbox"/> S Mark
<input type="checkbox"/> EU Investigation (EU – LVD/MDD)	<input type="checkbox"/> GS Mark
<input type="checkbox"/> Field Label (Onsite Inspection)	<input type="checkbox"/> Other: Please Specify

Please list all applicable safety standards that you would like your device certified under: EN 60950
--

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

Do manuals and installation instructions exist? (Not always a necessity for quoting but most useful for complex products)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
---	---

Power Supply Safety Information:  A. Is the power supply an approved “off-the-shelf” supply?  B. Can you provide the test report/CB Report?	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Standard tested to:
	Organization tested by:
	<input type="checkbox"/> Yes <input type="checkbox"/> No

Does the device contain batteries? Yes	What Type? CR123 LiMnO2 How Many? 1
--	--

What technology is used? (i.e., lasers, X Ray, etc.)	
--	--

If Laser:	Class:	Output Power:	Beam Divergence Angle:	Wavelength:
-----------	--------	---------------	------------------------	-------------

Preferred testing location:	<input type="checkbox"/> Intertek Lab <input type="checkbox"/> Customer site <input checked="" type="checkbox"/> Intertek Local Lab (May increase turn around time and expense)
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**Radio Information:** (Required only if the device contains an intentional transmitter)

What Radio certifications are desired?	
<input checked="" type="checkbox"/> FCC (USA) <input checked="" type="checkbox"/> Industry Canada <input type="checkbox"/> ETSI (R&TTE)	<input type="checkbox"/> Notified or Competent Body TCF Review <input type="checkbox"/> Other: Please Specify
Please list the particular radio standards that apply. EN 300 220, EN 301 489, EN 50130	
Operating Frequency:	902.4 – 927.6 MHz
RF Output Power:	250 mW
Is there an RF Conducted Port?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No      Description:
Number of Antennas & Description: (Internal, External, Known Gain, etc.)	1, internal
Modulation Technique:	2 FSK
Number of Channels/Number of Discrete frequencies per Channel:	25/1
Can the device be operated in CW Mode?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
What is the lowest utilized frequency within the device?	32.768 Khz

**Notes: Please ensure to bring a notch filter covering your fundamental operating frequency.**

### 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 but should be filled out to show a completed report under the applicable standards for EMC etc. Thank you for your time in effort in completing this section of the RFQ/Test Plan.

### Support Equipment:

Intertek requires our customers provide all support equipment necessary to fully operate the device undergoing testing. This includes any filters required for testing radio devices, computer equipment, etc.

Item	Description	Manufacturer	Model No.
1	Laptop Computer		
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.

**For Intertek Internal Use Only**  
Please do not fill in the following Information.

<b>Quoting Engineer:</b>			
<b>Emissions Testing Required</b>			
<input type="checkbox"/> Class A <input type="checkbox"/> Class B <input type="checkbox"/> Radio Device <input type="checkbox"/> Group 1 <input type="checkbox"/> Group 2			
<input checked="" 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"/> Art. Hand.	<input type="checkbox"/> IEC/EN 61326	<input type="checkbox"/> CISPR14/ EN 55014-2	
<input type="checkbox"/> ETSI/EN 301 489	<input type="checkbox"/> Add Israel Frequencies		
<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"/> 30% 0.5 Cycles <input type="checkbox"/> 60% 5 Cycles <input type="checkbox"/> 60% 50 Cycles	<input type="checkbox"/> 30% 25 Cycles <input type="checkbox"/> >95% 250 Cycles <input type="checkbox"/> >95% 1 Cycle	<input type="checkbox"/> Other:
<b>Test Reports Requested</b>			
<b>EMC Reports:</b>		<b>Safety Reports:</b>	
<input type="checkbox"/> Emissions	<input type="checkbox"/> Immunity	<input type="checkbox"/> Product Evaluation	Misc. Deliverables: <input type="checkbox"/> Other:
<input type="checkbox"/> Engineering Data Only	<input checked="" type="checkbox"/> FCC/Industry Canada "Radio"	<input type="checkbox"/> Listing Report	
<input type="checkbox"/> ETSI "Radio"		<input type="checkbox"/> CB Certificate/Report	
<b>Overall Scheduling Time:</b>			
<b>Electromagnetic Compatibility:</b>			
Emissions:		<b>Safety:</b>	
Immunity:		<b>Testing/Reports:</b>	
Radio:			
<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  $\text{dB}\mu\text{V}$ , is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

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

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

#### RADIATED EMISSIONS

The final level, expressed in  $\text{dB}\mu\text{V}/\text{m}$ , is arrived at by taking the reading from the spectrum analyzer (Level  $\text{dB}\mu\text{V}$ ) and adding the antenna correction factor and cable loss factor (Factor  $\text{dB}$ ) 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.

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

Measured Level	+	Transducer & Cable Loss factor	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
( $\text{dB}\mu\text{V}$ )		( $\text{dB}$ )		( $\text{dB}\mu\text{V}/\text{m}$ )	( $\text{dB}\mu\text{V}/\text{m}$ )		( $\text{dB}\mu\text{V}/\text{m}$ )		
<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 C63.4-2003 - "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.



**Conducted Emissions Diagram:**



