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**
Test Result	**PASS**
Test Project Number	**3164931**
References	Title 47 CFR 15: RADIO FREQUENCY DEVICES Subpart C – Intentional Radiators
Total Pages Including Appendices:	**26**
	Low-power License-exempt Radio Communication Devices (All Frequency Bands): Category 1 Equipment

Tested By : Randy Thompson

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	Randy Thompson	9-29-09	Michael Spataro

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D I R E C T O R Y

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 ±3.14dB and for Radiated Emissions is calculated to be ±4.4dB in the frequency range of 10kHz – 1000MHz at 3m and ±4.9dB in the frequency range of 1 – 18GHz at 3m. For testing at 10m ±4.8dB in the frequency range of 30 – 1000MHz. For Disturbance Power, ±3.3dB 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

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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

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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*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

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

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

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Appendix A

Test Data Sheets

and

Test Equipment Used

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Fundamental field strength
And
Harmonics of the Fundamental

15.247

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Field Strength Measurements
Fundamental and Spurious of the Transmitter

Test Report #:	**3164931 EN1702**	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) (dB\m) (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 $20*\log_{10}$(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								

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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)
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
Axis 2								
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
Axis 3								
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
Axis 3 was determined to be the worst case axis								
All Harmonics will be measured in Axis 3								
Harmonics - Low Channel								
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
Harmonics - Mid Channel								
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

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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)
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
Harmonics - High Channel								
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*log (E) - 95.2289

P is power in dBm
E is uV/m

118.1 - 95.2289 = 22.87 dBm

Limit (FCC Part 15.247) = 23.98dBm

Delta from Limit = 22.87 - 23.98 = - 1.1 dBm

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List of Equipment Utilized for Final Test

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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

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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 and 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)

EMC Testing/Services	
☐ Requesting Estimate	☐ On-site/In-Situ Testing
☐ Pre-Compliance Scans / Engineering test	☐ TCF Compilation/Review Service

Radio Device Testing and Certification	
☒ FCC Certification	☒ Industry Canada Certification (Receivers required)
☐ Class 2 Notification Under the R&TTED	☐ TCF Compilation/Review Service

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

Any Additional Interest(s)	
☐ ISO Certification (Another RFQ is required)	☐ Energy Star Compliance
☐ FDA 510K Services (Another RFQ is required)	☐ NEBS
☐ International Approvals Management	☐ Wire and Cable
☐ Product Verification and Integrity Testing	☐ Other:

General Product Information: (Required for all Devices)

Product/Model Number(s):	EN1702
Description of product(s):	900 MHz transmitter
Intended Use:	☐ Household/Office ☒ Commercial ☒ Industrial ☐ Hospital ☐ Life Supporting
Intended Location:	☒ Dry ☐ Damp ☐ Wet ☐ Hazardous Location
Product Type:	☒ Prototype ☐ Production Sample ☐ Manufacturing Design Change: Please Describe
Is it a stand-alone device or part of a system?	☒ Stand Alone Device ☐ 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:	☐ Metal ☒ Plastic ☐ 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?	☐ Yes ☐ No If Yes Please Describe:

Are there Multiple Modes of Operation?

☐ Yes ☒ No If Yes Please Describe:

Is there programmable software?

☐ Yes ☒ No

Can all modes of operation be operated simultaneously?

☒ Yes ☐ 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?	
☒ FCC/ICES (US & Canada)	☐ SII (Israel)
☐ CE / EMC / MMD	☐ AS/NZS (Australia/New Zealand)
☐ BSMI (Taiwan)	☐ Korea MIC Certification / RRL
☐ VCCI (Japan)	☐ 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?	
☐ NRTL Listing US/Canada	☐ Limited Production Certification/Listing
☐ CB Certification (Worldwide – Outside US/Can)	☐ S Mark
☐ EU Investigation (EU – LVD/MDD)	☐ GS Mark
☐ Field Label (Onsite Inspection)	☐ 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?	☐ Yes ☒ No Standard tested to: Organization tested by: ☐ Yes ☐ No

Do manuals and installation instructions exist? (Not always a necessity for quoting but most useful for complex products)	☒ Yes ☐ 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?	☐ Yes ☐ No Standard tested to: Organization tested by: ☐ Yes ☐ 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:	☐ Intertek Lab ☐ Customer site ☒ Intertek Local Lab (May increase turn around time and expense)

Radio Information: (Required only if the device contains an intentional transmitter)

What Radio certifications are desired?	
☒ FCC (USA) ☒ Industry Canada ☐ ETSI (R&TTE)	☐ Notified or Competent Body TCF Review ☐ 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?	☐ Yes ☒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?	☒ Yes ☐ 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.

Quoting Engineer:		
Emissions Testing Required ☐ **Class A** ☐ **Class B** ☐ **Radio Device** ☐ **Group 1** ☐ **Group 2**		
☒ FCC Part 15	☐ ICES-003	☐ VCCI
☐ FCC Part 18	☐ BSMI	☐ CISPR 22/EN 55022
☐ CISPR 11/EN 55011	☐ IEC/EN 61326	☐ IEC/EN61000-6-3
☐ IEC/EN61000-6-4	☐ CNS13438	☐ AS/NZS 3548
☐ IEC/EN61000-3-2	☐ IEC/EN61000-3-3	☐ ETSI/EN 301 489
☐ Other:		
OATS Testing Voltages		
☐ 100VAC/50 Hz	☐ 120VAC/60Hz	☐ 230VAC/50Hz
☐ 110VAC/60Hz	☐ 220VAC/60Hz	☐ 240VAC/50Hz
☐ Other:		
Immunity Product Family Standard		
☐ CISPR24/EN 55024	☐ IEC/EN 61000-6-1	☐ IEC/EN 61000-6-2
☐ IEC/EN 60601-1-2 ☐ Art. Hand.	☐ IEC/EN 61326	☐ CISPR14/ EN 55014-2
☐ ETSI/EN 301 489	☐ Add Israel Frequencies	
☐ Other:		

Immunity Methods			
☐ EN61000-4-2	☐ 4kV/8kV ☐ 6kV/8kV	☐ 8kV ☐ 12kV ☐ 15kV	☐ Other:
☐ EN61000-4-3	☐ 3V/m ☐ 10V/m	☐ 1 kHz Modulation ☐ 400 Hz Modulation ☐ 2 Hz Modulation	☐ Other:
☐ EN61000-4-4	☐ 0.5 kV ☐ 1.0 kV	☐ 2.0 kV	☐ Other:
☐ EN61000-4-5	☐ 0.5 kV ☐ 1.0 kV	☐ 2.0 kV ☐ 4.0 kV	☐ Other:
☐ EN61000-4-6	☐ 3Vrms ☐ 10Vrms	☐ 1 kHz Modulation ☐ 400 Hz Modulation ☐ 2 Hz Modulation	☐ Other:
☐ EN61000-4-8	☐ 1A/m ☐ 30A/m	☐ 400A/m	☐ Other:
☐ EN61000-4-11	☐ >95% 0.5 Cycles ☐ 30% 0.5 Cycles ☐ 60% 5 Cycles ☐ 60% 50 Cycles	☐ 30% 25 Cycles ☐ >95% 250 Cycles ☐ >95% 1 Cycle	☐ Other:

Test Reports Requested

EMC Reports:
☐ Emissions
☐ Immunity
☐ Engineering Data Only
☒ FCC/Industry Canada "Radio"
☐ ETSI "Radio"

Safety Reports:
☐ Product Evaluation
☐ Listing Report
☐ CB Certificate/Report

Misc. Deliverables:
☐ Other:

Overall Scheduling Time:

Electromagnetic Compatibility:
Emissions:
Immunity:
Radio:

Safety:
Testing/Reports:

☐ 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 it's 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 dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the applicable limit.

To convert between dBμV and μV, the following conversions apply:

- dBμV = 20(log μV)
- μV = Inverse log(dBμV/20)

RADIATED EMISSIONS

The final level, expressed in dBμV/m, is arrived at by taking the reading from the spectrum analyzer (Level dBμV) 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.

Example: At a Test Frequency of 30 MHz, with a peak reading on the spectrum analyzer or measuring receiver of 14 dBμV:

Measured Level	+	Transducer & Cable Loss factor	=	Corrected Reading	Specification Limit	-	Corrected Reading	=	Delta Specification
(dBμV)		(dB)		(dBμV/m)	(dBμV/m)		(dBμV/m)		
14.0		**14.9**		**28.9**	**40.0**		**28.9**		**-11.1**

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."

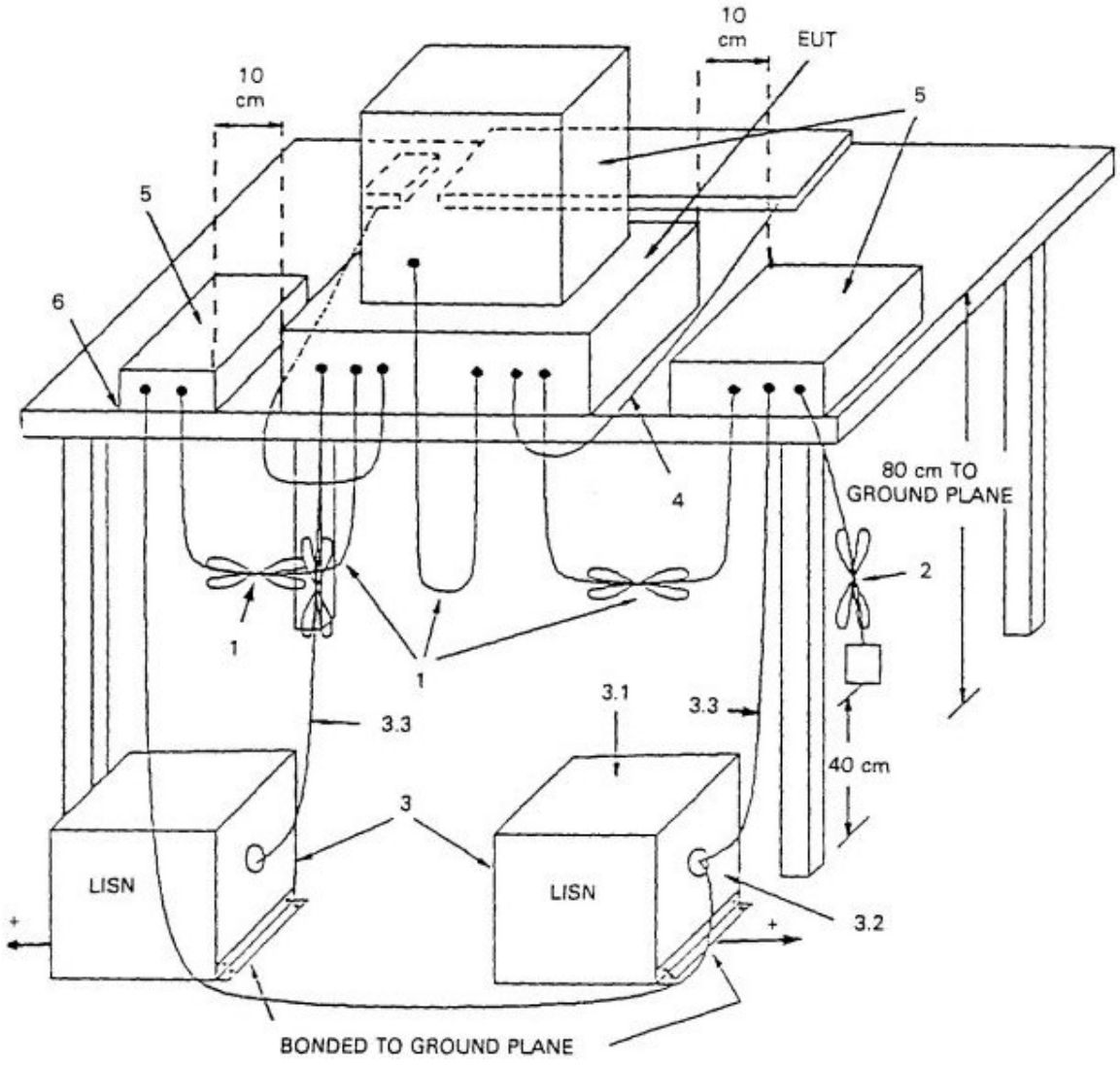
Conducted Emissions

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 Ω/50 μH (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:



Radiated Emissions Diagram: