FCC PART 15 SUB-PART B & C
EMI TEST REPORT

on

Remote Meter Interface Transceiver

[FCC ID: OWS-900]

model names

Information Management Unit (IMU) 900 [Internal Antenna] &
Information Management Unit (IMU) 901 [External Antenna]

provided for evaluation by

Innovatec Communications, LLC
101 South Second Street
Milwaukee, Wisconsin 53204

evaluated and prepared by

International Technology Company (ITC)
9959 Calaveras Road, Box 543
Sunol, California 94586-0543
Tel: (925) 862-2944
Fax: (925) 862-9013
Email: itcemc@aol.com
Web Site: www.itcemc.com

EN45001 Accredited Compliance Laboratory (RES-GmbH)
Registration number: TTI-P-G 159/98-00 (RES-GmbH)

TEST RESULT SUMMARY
FCC PART 15 SUB-PART B & C

General Information

Product Name *FCC ID* *Model / Type*	Transceiver OWS-900 IMU 900 [Internal Antenna] & IMU 901 [External Antenna]
Manufacturer's Name: *Manufacturer's Address* *Contact:*	Innovatec Communications, LLC 101 South Second Street Milwaukee, Wisconsin 53204 USA Tel: (414) 272-2255 • Fax: (414) 272-5421 Mr. Kimbel A. Nap
Laboratory	International Technology Company (ITC) 9959 Calaveras Road, PO Box 543 Sunol, CA 94586-0543 Tel: (925) 862-2944 • Fax: (925) 862-9013 Email: itcemc@aol.com • Web Site: www.itcemc.com
Test Number	120000216-1
Test Report Number	0002RS116-1/F
Test Date	January 27 through February 16, 2000
Project Technician	Bruce Gordon

According to testing performed at International Technology Company (ITC); the above-mentioned unit is in compliance with the emissions requirements defined in FCC Part 15 B and C. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical characteristics. Any modifications necessary for compliance made during testing on the above mentioned date(s) must be implemented in all production units for compliance to be maintained.

International Technology Company (ITC) as an independent testing laboratory, declares that the equipment tested as specified above conforms to the emissions requirements of FCC Part 15 B & C.

EMI Test Report

Product Type	Remote Meter Interface Transceiver
Model	IMU 900 [Internal Antenna & IMU 901 [External Antenna]
Applicant / Manufacturer	Innovatec Communications, LLC
Address	101 South Second Street Milwaukee, Wisconsin 53204 USA Tel: (414) 272-2255 • Fax: (414) 272-5421
Client Contact	Mr. Mr. Kimbel A. Nap
Test Results	☑ Pass ❑ Fail
Total Number of Pages including Appendices	37 Pages
Test Report File No. 0002RS116-1/F	***Date of Issue:*** February 24, 2000

International Technology Company is:

Accepted by the Federal Communications Commission (FCC) for FCC Methods, CISPR Methods and AUSTEL Technical Standards (Ref: NVLAP Lab Code 200172-0)

Validated by the Chinese Taipei Bureau of Standards, Metrology, and Inspection (BSMI) under APEC MRA as a Conformity Assessment Body (CAB) under Appendix B, Phase 1 Procedures. BSMI # SL2-IN-E-024R

Approved by the Industry Canada for Telecom Testing

Certified by International Technology Company (ITC)GmbH for EMC Testing according to the European EMC Directive 89/336/EEC per EN45001

Certified by Reg. TP for EMC Testing according to the European EMC Directive 89/336/EEC per EN45001 for RES GmbH (DAR-Registration number: TTI-P-G 159/98-00)

Certified by the Voluntary Control Council for Interference by Information Technology Equipment (VCCI) for EMC testing, in accordance with the Regulations for Voluntary Control Measures, Article 8, Registration Numbers- Site 1: C-714 & R-696 and Site 2: C-715 & R-697

Engineering Services Offered by ITC

1) RELIABILITY CONSULTING AND SERVICES

- Reliability Services for Systems & Components
- MTBF Calculations
- MTTF Calculations
- Temperature Cycling Testing
- Thermal Shock Testing
- Vibration Shock testing

2) ENGINEERING EVALUATION & TESTING

- OSHA Third Party Evaluations
- SEMI S2 Reviews, 1993
- USB Specification Evaluations/Testing
- SAE Specification Evaluations/Testing
- EIA/TIA Specifications i.e. 571-A and 631
- MIL-STD i.e. 461,462,1541/EMC, 883/ESD

3) COMPLIANCE DESIGN CONSULTATION AND REGULATORY TESTING SERVICES

US: EMI/Telecom (FCC)	**Product Safety (UL/NRTL)**	**EU: EMI/EMC (EN)**
FCC 15 /class A	**All UL Standards, Including:**	EN 50081-1 /50081-2
FCC 15 /Class B and B DoC	UL 1950 /ITE	EN 50082-1 /50082-2
FCC 15 /SubPart C	UL 2601/Medical	EN 55103-1/ 55103-2
FCC 24	UL 1459 /Telecom	EN 60601-1-2
FCC 68 (Analog and Digital)	UL 1411 /Audio, Radio, TV	EN 55011 /55013 /55014
FCC 90	UL 813 /Commercial Audio	EN 55015 /55020 /55022
FCC 95	UL 1604 /Hazard. Location	EN 60555-2 /60555-3
	UL 508 /Energy Mgmt. Equip.	EN 61000-3-2 /61000-3-3
		EN 61000-4-2 /61000-4-3
		EN 61000-4-4 /61000-4-5
		EN 61000-4-6 /61000-4-8 /61000-4-11

Canada: EMI, Safety, Telecom Asia - Australia/ International		
RSS 210 & RSS 221	CISPR 11, 13, 14, 15, 16, 20, 22	
Industry Canada /IC CS-03	VCCI Class 1 & 2 /Japan	
All c-UL Standards for Canada	AS/NZ 3548: C-Tick Mark, EMC	EU: Safety/Machinery (EN)
All CSA Standards, including:	CNS 13438 - 1996/Taiwan	EN 60950 /61010-1
CSA No. 950/ ITE	ITU Standards	EN 60204 /60065
CSA No. 601-1/Medical	IEC /ETSI Standards	EN 60601-1-1
CSA No. 1010-1/ Lab, Measurement	BellCore Standards	TÜV
CSA No. 225/ Telecom	IEEE /ANSI Standards	*Competent Body Representation/EU

ITC – Your One-Stop-Shop

Our comprehensive capabilities, friendly environment & fast project turn-around time makes ITC the ideal **one-stop-shop** for your engineering services needs, providing manufacturers with compliance design consultation, reliability & compliance engineering. We are committed to delivering the highest-quality engineering services & expertise you can expect at reasonable, competitive rates. We look forward to working with you on your next design, reliability compliance or engineering consultation project. For more information, contact our Business Services Department.

You can call or e-mail us at:

Toll-Free: 1-888-336-7625 – **Internet:** http://www.itcemc.com – **E-mail:** itcemc@aol.com

Table of Contents

Table of Contents.....

PART 1
GENERAL

1.1 Test Methodology

The tests described in this report were performed by an independent electromagnetic compatibility Laboratory, International Technology Company, in accordance with the FCC test procedure ANSI C63.4-1992.

1.1.1 Test Facility

The open area test site, the conducted measurement facility, and the test equipment used to collect the emissions data is located in Sunol, California, and is fully described in site attenuation report. The approved site attenuation description is on file at the Federal Communications Commission.

1.1.2 Accuracy of Test Data

The test results contained in this report accurately represent Open Field Radiated Emissions, Occupied Bandwidth, Frequency Stability, RF Power Output, Spurious and Harmonic Emissions and Modulation Characteristics tests generated by the sample equipment under test.

Equipment Tested	Transceiver
FCC ID	OWS-900
Date of Test	January 27 through February 16, 2000

Tests Performed:

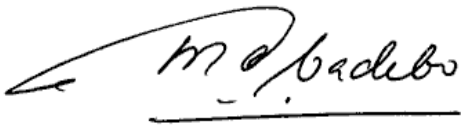
1. Radiated Emissions in a 3-meter open area site in accordance with the FCC test procedure 47 CFR §15.209 and §15.31(m). Part 3 of this report contains details.

2. Occupied Bandwidth Test in accordance with the FCC test procedure 47 CFR §15.247(2). Part 4 of this report contains details.

3. Harmonics and Spurious Emissions Test in accordance with the FCC test procedure 47 CFR §2.1053 and §15.249(a). Part 5 of this report contains details.

4. Maximum Peak Output Power Test Requirement in accordance with 47 CFR §15.247(b). Part 6 of this report contains details.

The results show that the sample equipment tested as described in this report is in compliance with the FCC Rules Part 15, SubPart B: Open Field Radiated Emissions. Occupied Bandwidth, Harmonics and Spurious Emissions and Maximum Peak Output Power test requirement limits of, SubPart C.



Michael Gbadebo, PE
Chief Engineer/Principal Consultant

Prepared By: International Technology Company (ITC)
Tel: (925) 862-2944
Fax: (925) 862-9013
Email: itcemc@aol.com
Web: www.itcemc.com

1.2 Summary

1.2.1 Description of Equipment under Test (EUT)

See Appendix D for more information

Model Name(s):	Information Management Unit IMU 900 (Internal Antenna) IMU 901 (External Antenna)
Applicant:	Innovatec Communications, LLC
Address:	101 South Second Street Milwaukee, Wisconsin 53204 USA • Tel: (414) 272-2255 • Fax: (414) 272-5421
Client Contact:	Mr. Mr. Kimbel A. Nap
Test Technician:	Bruce Gordon
Test Number:	120000216-1
File Number:	0002RS116-1/F
EUT:	IMU 900 Test data on IMU 901 (external Antenna) will be submitted shortly under the same FCC ID No: OWS-900.

1.2.2 Support Equipment included in the Tests:

The Transceiver was tested as a stand-alone device.

PART 2
POWERLINE CONDUCTED EMISSIONS
per FCC PART 15 SUBPART B

Powerline Conducted Emissions test was not performed on the Transceiver because it was powered by 3.6Vdc Lithium-Ion Battery

PART 3
OPEN FIELD RADIATED EMISSIONS per FCC PART 15 SUBPART B

3.1 Configuration and Procedure

3.1.1 EUT Configuration

Pre-scan measurements were first performed with a spectrum analyzer set in fast sweep mode. Significant peaks are marked and then quasi-peaked. Measurement range investigated was from 30 MHz to 1 Ghz. The EUT (IMU) was set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-1992. The measurement instrumentation used was a receiver with bandwidth parameters as stipulated in ANSI C63.4-1992. The IMU Transceiver was set up on a wooden non-conductive table top, 80 cm above the ground reference plane, in an open field. The dimension of the table was 1.5m x 1.0m. Excess cord (if provided) was folded back to form a 30-cm by 40-cm bundle, which was hanging mid-way above the ground plane. Frequency measurement was taken from 30MHz up to 10^{th} harmonic.

3.1.2 Test Procedure

The EUT was set up as described above while transmitting and receiving continuously. The EUT (IMU) was rotated 360 degrees azimuth and the search antenna height varied 1to 4 m in order to maximize the emissions from the EUT. The highest emissions were also analyzed in detail by operating the spectrum analyzer in fixed tuned mode to determine the precise amplitude of the emissions. While doing so, interconnecting cables were moved around to maximize the emissions.

3.1.3 Data Table Legend and Field Strength Calculation

'Margin' indicates the degree of compliance with the applicable limit. For example, a margin of -8 dB means that the emissions are 8 dB below the limit (in compliance); +a margin of +4 dB means that the emission is 4 dB over the limit (out of compliance). The margin calculated as follows:
Margin = Corrected Amplitude - Limit, where Corrected Amplitude = Amplitude + Antenna Correction Factor + Cable Loss – amplifier gain.

3.1.4 Nominal Spectrum Analyzer Configuration (during swept frequency scans)

Start Frequency 30MHz
Stop Frequency.....1000MHz
Sweep Speed .....Manual
Measurements below 1GHz
RES Bandwidth.....100 kHz
Video Bandwidth.....100 kHz
Quasi Peak Adapter Mode..... Normal
Quasi peak Adapter Bandwidth.....120 kHz
Measurements above 1GHz (unless stated otherwise)
Analyzer Mode .....Video Filter
RES Bandwidth..... 1MHz
Video Bandwidth..... 1MHz
Freq. Span..... 3MHz
Offset..... 0dB
Quasi Peak Adapter Mode.....Disabled

3.2 Open Field Radiated Emissions per FCC Part 15 SubPart B

3.2.1 Administrative Details

Date(s) of Test: January 27 through February 16, 2000
Emission Limits: Class B
Temperature/Humidity: $19.8^{0^{\circ}}$C / 64%
ATM Pressure: 1010 Mbar
Test Technician(s): Bruce Gordon
Antenna Used: Biconical Antenna, model # 3104, S/N 3459 and Log Periodic Antenna, model # 3146, S/N 2075 (calibrated June 25, 1999, next calibration due date is June 25, 2000)

3.2.2 Test Results

The table below shows a summary of the highest amplitudes of the radiated emissions from the equipment under test at various antenna heights, antenna polarization, and EUT orientations.

INDICATED FREQ MHz	AMPL dBuV/m	CORRECTION ANT dB	CAB dB	CORR AMPL dBuV/m	T/TAB ANG DEG	HT m	ANT POL -	FCC 15 LIMIT dBuV/m	CLASS B MARGIN dB
33.10	9.2	11.7	2.5	23.4	90	1.0	VB	40.0	-16.6
112.20	8.5	13.9	3.9	26.3	180	2.0	HB	43.5	-17.2
198.10	10.7	15.3	4.7	30.7	0	2.0	HB	43.5	-12.8
249.52	19.1	13.2	5.2	37.5	180	2.0	HL	46.0	-8.5
552.00	12.4	19.7	6.8	38.9	270	1.0	VL	46.0	-7.1
946.00	0.5	23.8	8.3	32.6	180	3.0	HL	46.0	-13.4

Table 3.2.2 Open Field Radiated Emissions for Information Management Unit (IMU)

No emissions of significant levels were observed between 30 Mhz to 1 Ghz. No significant emission levels were observed between 1 Ghz to 10^{th} harmonics of the EUT.

Conclusion: The Information Management Unit meets the requirements of the test reference for Open Field Radiated Emissions of Section 15.109 for class B Digital Devices.

PART 4
OCCUPIED BANDWIDTH
per FCC PART 15 SECTION 47 CFR §15.247(2)

4.1 Configuration and Procedure

4.1.1 EUT Configuration

The IMU Transceiver was set up in accordance with the suggested configuration given in FCC Measurement Procedure ANSI C63.4-1992. The measurement instrumentation used was an Hewlett Packard 8566B Spectrum Analyzer with detector and bandwidth parameters as stipulated in C63.4-1992. The Transceiver was powered by 3.6Vdc power supply.

4.1.2 Test Procedure

The EUT was placed on the wooden turntable and the table was rotated until the highest emissions were observed. The EUT was transmitting continuously with modulation on at low, medium, and high channel frequencies. Signal was monitored with HP 8566B Spectrum Analyzer, using the EMCO Double-Ridged Wave-guide Horn Antenna, model #3115. Unless stated otherwise. The receiving antenna was raised to maximize the signal strength (1-1.6 meter above the referenced ground plane). At each channel frequency, the EUT was monitored for spurious modulation products including harmonics (up to 10^{th}), 6dB bandwidth, peak spectral power density, peak conductive power, and dwell time.

4.2.1 Bandwidth Test

Per FCC Part 15 Section 47 CFR §15.247(2)

6dB Bandwidth Plot Performed at 3-Meter Distance (Low Channel Frequency)

Prepared By: International Technology Company (ITC)
Tel: (925) 862-2944
Fax: (925) 862-9013
Email: itcemc@aol.com
Web: www.itcemc.com