

TEST REPORT FROM RFI GLOBAL SERVICES LTD

Test of: Infinity Metering Corporation Inc. ESP

To: FCC Part 15.249: 2008 Subpart C

Test Report Serial No:
RFI/RPT2/RP74685JD01B

Supersedes Test Report Serial No:
RFI/RPT1/RP74685JD01B

This Test Report Is Issued Under The Authority
Of Brian Watson, Operations Director:

A handwritten signature in black ink, appearing to read 'Brian Watson', located in the top right corner of the report's header section.

Checked By:

A handwritten signature in black ink, appearing to read 'Brian Watson', located in the bottom left corner of the report's header section.

Report Copy No: PDF01

Issue Date: 27 February 2009

Test Dates: 05 Febuary to 10 February 2009

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1. Customer Information

Company Name:	Kenure Developments Ltd
Address:	Springlakes Deadbrook Lane Aldershot Hampshire GU12 4UH

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2. Equipment Under Test (EUT)

2.1. Identification of Equipment Under Test (EUT)

Brand Name:	Infinity Metering Corporation Inc.	
Model Name or Number:	ESP	
Serial Number:	Not stated	
FCC ID Number:	V2AESP	

2.2. Description of EUT

The equipment under test was a radio metering device.

2.3. Modifications Incorporated in the EUT

During the course of testing the EUT was not modified.

2.4. Support Equipment

No support equipment was used to exercise the EUT during testing.

2.5. Additional Information Related to Testing

Type of Unit:	Transmitter	
Transmit Frequency:	919 MHz	
Power Supply Requirement (DC):	Nominal (V)	3.6

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3. Test Specification, Methods and Procedures

3.1. Test Specifications

Reference:	FCC Part 15.249: 2008 Subpart C
Title:	Code of Federal Regulations, (47CFR15) Radio Frequency Devices.

3.2. Methods and Procedures

The methods and procedures used were as detailed in:

ANSI C63.2 (1996)

Title: American National Standard for Instrumentation - Electromagnetic noise and field strength.

ANSI C63.4 (2003)

Title: American National Standard Methods of Measurement of Electromagnetic Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.

ANSI C63.5 (1988)

Title: American National Standard for the Calibration of antennas used for Radiated Emission measurements in Electromagnetic Interference (EMI) control.

ANSI C63.7 (1988)

Title: American National Standard Guide for Construction of Open Area Test Sites for performing Radiated Emission Measurements.

CISPR 16-1: (1999)

Title: Specification For Radio Disturbance and Immunity Measuring Apparatus and Methods. Part 1: Radio Disturbance and Immunity Measuring Apparatus.

3.3. Definition of Measurement Equipment

The measurement equipment used complied with the requirements of the standards referenced in the Methods & Procedures section above. Appendix 1 contains a list of the test equipment used.

4. Deviations from the Test Specification

There were no deviations from the test specification.

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5. Operation of the EUT During Testing

5.1. Operating Modes

The EUT was tested in the following operating modes:

- Continuous transmit or transmitting a 3.5 ms transmission burst every 5 s repetitively (as required)

5.2. Configuration and Peripherals

The EUT was tested in the following configuration:

- Standalone.

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6. Summary of Test Results

Range of Measurements	FCC Part 15 Reference	Port Type	Result
Transmitter Fundamental Fieldstrength	FCC Part 15 Section 15.249(a)	Antenna	Complied
Transmitter 20 dB Bandwidth	FCC Part 15 Section 2.1049	Antenna	Complied
Transmitter Radiated Spurious Emissions	FCC Part 15 Section 15.249(a)(d)(e) & 15.209	Antenna	Complied
Transmitter Band Edge Radiated Emissions	FCC Part 15 Section 15.249(d) & 15.209	Antenna	Complied

6.1. Location of Tests

All the measurements described in this report were performed at the premises of RFI Global Services Ltd, Wade Road, Basingstoke, Hampshire, RG24 8AH.

6.2. Site Registration Numbers

FCC: 209735

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7. Measurements, Examinations and Derived Results

7.1. General Comments

7.1.1. This section contains test results only.

7.1.2. Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%.

Please refer to Section 8 for details of measurement uncertainties.

7.1.3. The peak level for emissions above 1 GHz was measured with the EUT in continuous transmit mode as it was impractical to measure the emission with EUT transmit a 3.5 ms burst every 5 seconds.

The average level was determined by subtracting the duty cycle correction factor from the measured peak level. The duty cycle correction factor was calculated using formula $20 \log (\text{On Time}/100\text{ms})$ as per FCC Part 15.35(c), with the EUT transmits a 3.467 ms burst every 5 s.

7.1.4. All tests apart from the measurement of the average level of radiated spurious emissions above 1 GHz were performed with the transmitter in a continuous transmit mode of operation.

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7.2. Test Results

7.2.1. Transmitter Fundamental Fieldstrength

Test Summary:

FCC Part:	15.249(a)
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	32

Results: Battery Powered Device

Frequency (MHz)	Antenna Polarity	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
919.9	Horizontal	91.5	94.0	2.5	Complied

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7.2.2. Transmitter 20 dB Bandwidth

Test Summary:

FCC Part:	2.1049
Test Method Used:	As detailed in ANSI C63.4 Section 13.1.7 and relevant annexes (see note below)

Environmental Conditions:

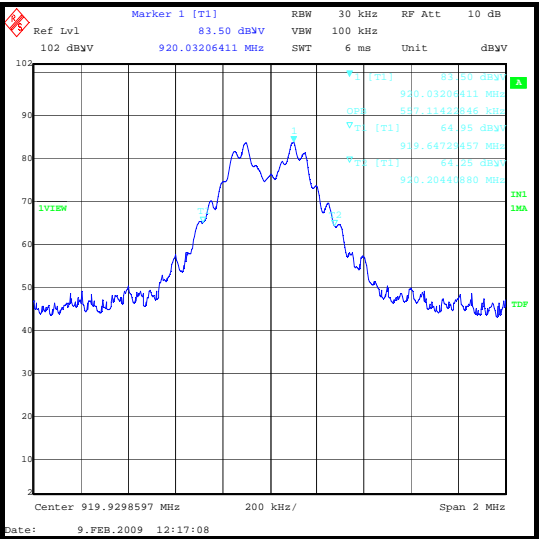
Temperature (°C):	22
Relative Humidity (%):	28

Results:

Transmitter 20 dB Bandwidth (kHz)
557.114

Note(s):

1. In lieu of the test method detailed in ANSI C63.4 Section13.1.7 the 99% occupied bandwidth was measured using the Occupied Bandwidth function of the spectrum analyser



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7.2.3. Transmitter Radiated Emissions

Test Summary:

FCC Part:	15.249(a)(d)(e) & Section 15.209
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	30 MHz to 1000 MHz

Environmental Conditions:

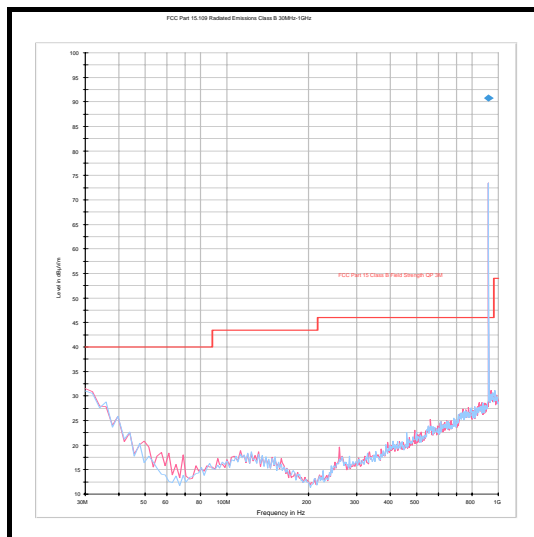
Temperature (°C):	21
Relative Humidity (%):	32

Results:

Frequency (MHz)	Antenna Polarity	Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
458.793	Horizontal	27.4	46.0	18.6	Complied

Note(s):

1. The emission shown at approximately 920 MHz on the 30 MHz to 1 GHz plot is the fundamental.



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7.2.4. Transmitter Radiated Emissions

Test Summary:

FCC Part:	15.249(a)(d)(e) & Section 15.209
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes
Frequency Range:	1 GHz to 10 GHz

Environmental Conditions:

Temperature (°C):	21
Relative Humidity (%):	32

Results: Highest Peak Level

Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1839.831	Horizontal	58.4	-1.9	56.5	74.0	17.5	Complied
2759.735	Vertical	51.0	-1.7	49.3	74.0	24.7	Complied
6440.170	Horizontal	57.1	1.9	59.0	74.0	15.0	Complied
9200.091	Horizontal	47.7	6.7	54.4	74.0	19.6	Complied

Results: Highest Average Level

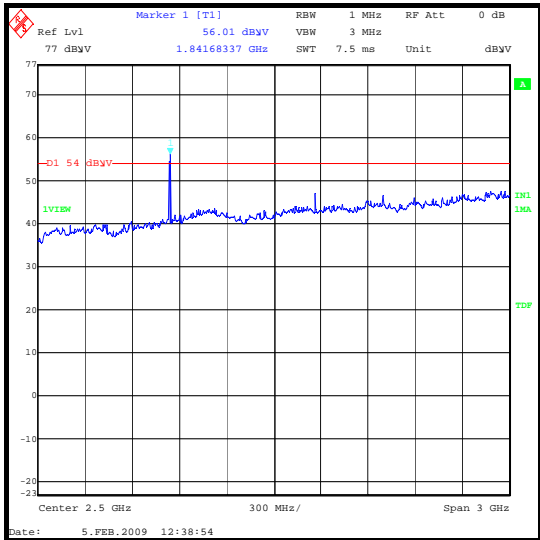
Frequency (MHz)	Antenna Polarity	Detector Level (dBμV)	Transducer Factor (dB)	Actual Level (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Result
1839.831	Horizontal	29.2	-1.9	27.3	54.0	26.7	Complied
2759.735	Vertical	21.8	-1.7	20.1	54.0	33.9	Complied
6440.170	Horizontal	27.9	1.9	29.8	54.0	24.2	Complied
9200.091	Horizontal	18.5	6.7	25.2	54.0	28.8	Complied

Note(s):

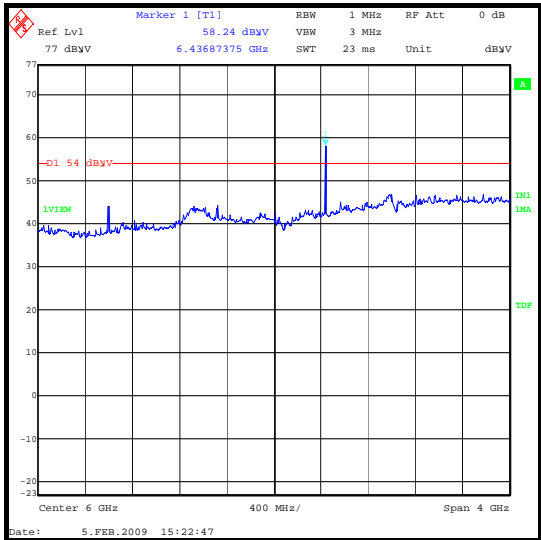
1. The peak level for emissions above 1 GHz was measured with the EUT in continuous transmit mode as it was impractical to measure the emission with EUT transmit a 3.5ms burst every 5 seconds. The average level was determined by subtracting the duty cycle correction factor from the measured peak level. The duty cycle correction was calculated using formula $20 \log (\text{On Time}/100\text{ms})$ as per FCC Part 15.35(c), with the EUT transmits a 3.467 ms burst every 5 s.

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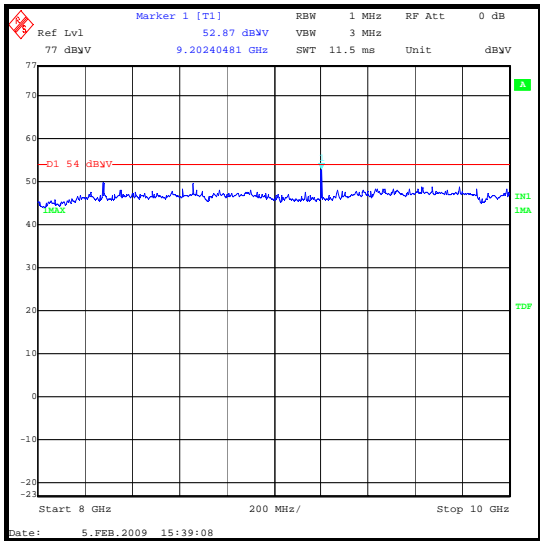
Transmitter Radiated Emissions (continued)



1 GHz to 4 GHz



4 GHz to 8 GHz



8 GHz to 10 GHz

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7.2.5. Transmitter Duty Cycle

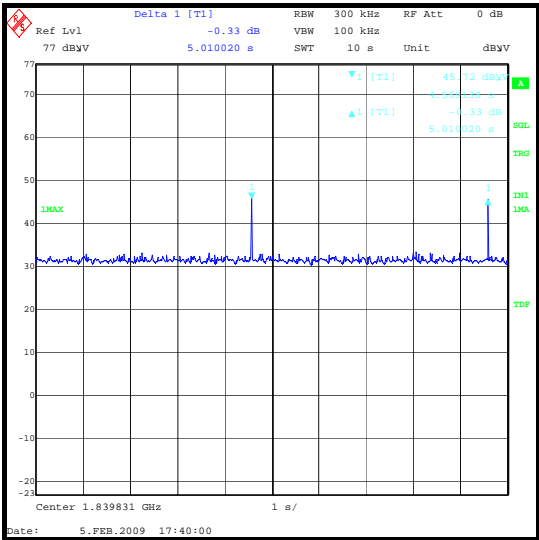
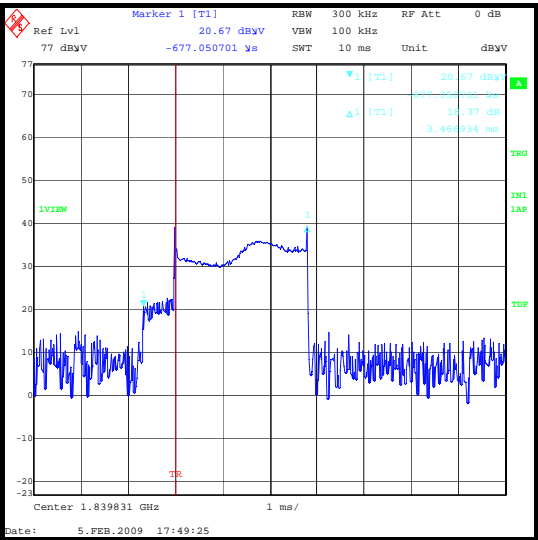
Results:

Transmit Duration Time (milliseconds)
3.467

Silent Period (seconds)
5.010

Note(s):

1. In order to assist with the determination of the average level of radiated spurious emissions above 1 GHz measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter.



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7.2.6. Transmitter Radiated Emissions at Band Edges

Test Summary:

FCC Part:	15.249(d) & 15.209
Test Method Used:	As detailed in ANSI C63.4 Section 8 and relevant annexes

Environmental Conditions:

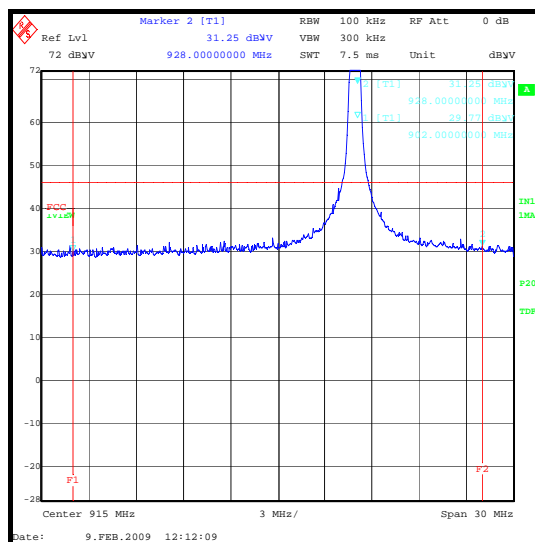
Temperature (°C):	22
Relative Humidity (%):	23

Results: Bottom Band Edge

Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
902	29.8	46.0	16.2	Complied

Results: Top Band Edge

Frequency (MHz)	Q-P Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
928	31.3	46.0	14.7	Complied



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8. Measurement Uncertainty

No measurement or test can ever be perfect and the imperfections give rise to error of measurement in the results. Consequently the result of a measurement is only an approximation to the value of the measurand (the specific quantity subject to measurement) and is only complete when accompanied by a statement of the uncertainty of the approximation.

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

Measurement Type	Range	Confidence Level (%)	Calculated Uncertainty
Occupied Bandwidth	N/A	95%	±11.4 ppm
Radiated Spurious Emissions	30 MHz to 40 GHz	95%	+/- 2.94 dB

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

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Appendix 1. Test Equipment Used

RFI No.	Instrument	Manufacturer	Type No.	Serial No.	Date Last Calibrated	Cal. Interval (Months)
A1299	Antenna	Schaffner	CBL6143	5094	28 Jul 2008	12
A1534	Pre Amplifier	Hewlett Packard	8449B OPT H02	3008A00405	Calibrated before use	-
A1792	Pre Amplifier	A.H.Systems	PAM-0118	182	28 Nov 2008	12
A1818	Antenna	EMCO	3115	00075692	25 Oct 2008	12
A259	Antenna	Chase	CBL6111	1513	25 Jul 2008	12
K0001	5m RSE chamber	Rainford EMC	N/A	N/A	13 Aug 2008	12
K0002	3m RSE chamber	Rainford EMC	N/A	N/A	26 Aug 2008	12
M1124	Spectrum Analyser	Rohde & Schwarz	ESIB26	100046K	19 Feb 2008	12
M1273	Test Receiver	Rhode & Schwarz	ESIB26	100275	26 Feb 2008	12

NB In accordance with UKAS requirements, all the measurement equipment is on a calibration schedule.