



Nemko USA, Inc.
11696 Sorrento Valley Rd., Suite F
San Diego, CA 92121-1024
Phone (858) 755-5525 Fax (858) 452-1810

CERTIFICATION TEST REPORT

Report Number: 2009 05126317 FCC

Project Number: 18483-1

Nex Number: 126317

Applicant: DIG CORPORATION
1210 ACTIVITY DRIVE
VISTA, CA 92081

Equipment Under Test (EUT): WIRELESS WEATHER STATION


Model: LEIT ET-WWS

FCC ID: UJV-LEIT03

IC: 6694A-LEIT03

In Accordance With: FCC Part 15 Subpart C, 15.249
IC RSS-210 Issue 7 June 2007

Tested By: Nemko USA Inc.
11696 Sorrento Valley Road, Suite F
San Diego, CA 92121

Authorized By: 
Alan Laudani, EMC/RF Test Engineer

Date: May 25, 2009

Total Number of Pages: 20

Section1: Summary of Test Results

General

All measurements are traceable to national standards

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with FCC Part 15; Subpart C and IC RSS-210. Radiated tests were conducted in accordance with ANSI C63.4-2003. Radiated emissions are made on an open area test site. A description of the test facility is on file with the FCC and IC.

The assessment summary is as follows:

Apparatus Assessed:	Wireless Weather Station
Model:	Leit ET-WWS
Specification:	FCC Part 15 Subpart C, 15.249 IC RSS-210 Issue 7 June 2007 A2.9
Date Received in Laboratory:	April 15, 2009
Compliance Status:	Complies
Exclusions:	None
Non-compliances:	None

1.1 Report Release History

REVISION	DATE	COMMENTS
-	May 25, 2009	Prepared By: Ferdinand Custodio
-	May 25, 2009	Initial Release: Alan Laudani

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025.

Nemko USA Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. Nemko USA Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

TESTED BY:


Ferdinand Custodio, EMC Test Engineer

Date: May 25, 2009

TABLE OF CONTENTS

Section1: Summary of Test Results	2
1.1 Report Release History	3
Section 2: Equipment Under Test.....	5
2.1 Product Identification	5
2.2 Samples Submitted for Assessment	5
2.3 Theory of Operation	6
2.4 Technical Specifications of the EUT	6
Section 3: Test Conditions	7
3.1 Specifications.....	7
3.2 Deviations From Laboratory Test Procedures.....	7
3.3 Test Environment.....	7
3.4 Test Equipment.....	8
Section 4: Observations	9
4.1 Modifications Performed During Assessment	9
4.2 Record Of Technical Judgements.....	9
4.3 EUT Parameters Affecting Compliance	9
4.4 Test Deleted.....	9
4.5 Additional Observations	9
Section 5: Results Summary	10
5.1 Test Results	10
Appendix A: Test Results.....	11
Section 15.215 (c) Occupied Bandwidth	11
Clause 15.249(a) Radiated Emissions	13
Clause 15.249(d) Spurious Emissions	15
A2.9 902-928, 2400-2483.5 and 5725-5875 MHz	17
Appendix C: Block Diagram of Test Setups	18



Section 2: Equipment Under Test

2.1 Product Identification

The Equipment Under Test was identified as follows:

LEIT ET-WWS WIRELESS WEATHER STATION

Production sample, serial number not available during assessment:



2.2 Samples Submitted for Assessment

The following sample of the apparatus has been submitted for type assessment:

Sample No.	Description	Serial No.
126317-1	WIRELESS WEATHER STATION	N/A



2.3 Theory of Operation

The Leit ET-WWS is a Wireless Weather Station. Its function is a solar powered weather station that accumulates every half hour the temperature, wind speed, humidity, solar radiation, rain levels to calculate an evapotranspiration value to transmit to a nearby wireless irrigation controller. Normally the duty cycle is to transmit twice every hour, but for testing purposes it will be modified to transmit all the time.

2.4 Technical Specifications of the EUT

Manufacturer:	DIG Corporation
Operating Frequency:	920 MHz in the 902 to 928 MHz Band
Number of Operating Frequencies:	1
Rated Power:	72.4 dBμV/m @ 3 m
Modulation:	FSK
Antenna Connector:	Internal/Integral
Power Source:	5VDC (Super Capacitor)

Section 3: Test Conditions

3.1 Specifications

The apparatus was assessed against the following specifications:

FCC Part 15 Subpart C, 15.249

Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5850 MHz and 24.0-24.25 GHz bands.

IC RSS-210 Issue 7 June 2007

Low-power Licence-exempt Radio-communication Devices (All Frequency Bands): Category I Equipment. Annex 8 - Frequency Hopping and Digital Modulation Systems Operating in the Bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz

3.2 Deviations From Laboratory Test Procedures

No deviations from Laboratory Test Procedure

3.3 Test Environment

All tests were performed under the following environmental conditions:

Temperature range	:	14 - 21 °C
Humidity range	:	41 - 45 %
Pressure range	:	100.9 - 101.2 kPa
Power supply range	:	5VDC (to charge Super Capacitor when testing indoor)

3.4 Test Equipment

Nemko ID	Device	Manufacturer	Model	Serial Number	Cal Date	Cal Due Date
956	Attenuator Set	Narda	118A/4	33693	21-Jan-09	21-Jan-10
936	DC Power Supply 0-50V 0-10A 200W	Hewlett Packard	6002A	N/A	Verified by Asset #815	
815	Multimeter	Fluke	111	78130066	16-Jul-08	16-Jul-09
111	Antenna, LPA	EMCO	3146	1382	20-Oct-08	20-Oct-10
128	Antenna, Bicon	EMCO	3104	2882	09-Feb-09	09-Feb-11
529	Antenna, DRWG	EMCO	3115	2505	30-Sep-08	30-Sep-10
911	Spectrum Analyzer	Agilent	E4440A	US4142126 6	06-Nov-08	06-Nov-09
902	pre amp	Sonoma	310 N	185803	17-Jul-08	17-Jul-09
919	Preamplifier	Spacek Labs MM-Wave Technology	100MHz to 40GHz	3M12 (SLK- 35-3) and 3M13 (SLKa-35-4)	10-Nov-08	11-Nov-09

2040B-1 OATS



Section 4: Observations

4.1 Modifications Performed During Assessment

No modifications were performed during assessment.

4.2 Record Of Technical Judgements

No technical judgements were made during the assessment.

4.3 EUT Parameters Affecting Compliance

The user of the apparatus could not alter parameters that would affect compliance.

4.4 Test Deleted

No Tests were deleted from this assessment.

4.5 Additional Observations

There were no additional observations made during this assessment.





Section 5: Results Summary

This section contains the following:

FCC Part 15 Subpart C: Test Results

§ 15.249 Operation within the bands 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz.

The column headed “Required” indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N No: not applicable / not relevant

Y Yes: Mandatory i.e. the apparatus shall conform to these test.

N/T Not Tested, mandatory but not assessed. (See section 4.4 Test deleted)

The results contained in this section are representative of the operation of the apparatus as originally submitted.

5.1 Test Results

Part 15C/RSS-210	Test Description	Required	Result
15.207	Power Lines Conducted Emissions	N	-
15.209 (a)	Radiated Emissions within Restricted Bands	Y	Pass
15.215 (c)	Occupied Bandwidth	Y	Pass
15.249(a)	Radiated Emissions not in Restricted Bands	Y	Pass
15.249(b)	Operation in the 2400-2483.5 MHZ Band Fixed, point-to-point operation	N	
15.249(d)	Spurious Emissions (except Harmonics)	Y	Pass
A2.9	Annex 2 - Devices Operating in Frequency Bands for Any Application A2.9 902-928, 2400-2483.5 and 5725-5875 MHz	Y	Pass

Appendix A: Test Results

Section 15.215 (c) Occupied Bandwidth

15.215(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

Test Conditions:

Sample Number:	Leit ET-WWS	Temperature:	21°C
Date:	April 20, 2009	Humidity:	45%
Modification State:	Carrier Frequency	Tester:	FSCustodio
		Laboratory:	Shield Room #1

Test Results:

See attached plots.

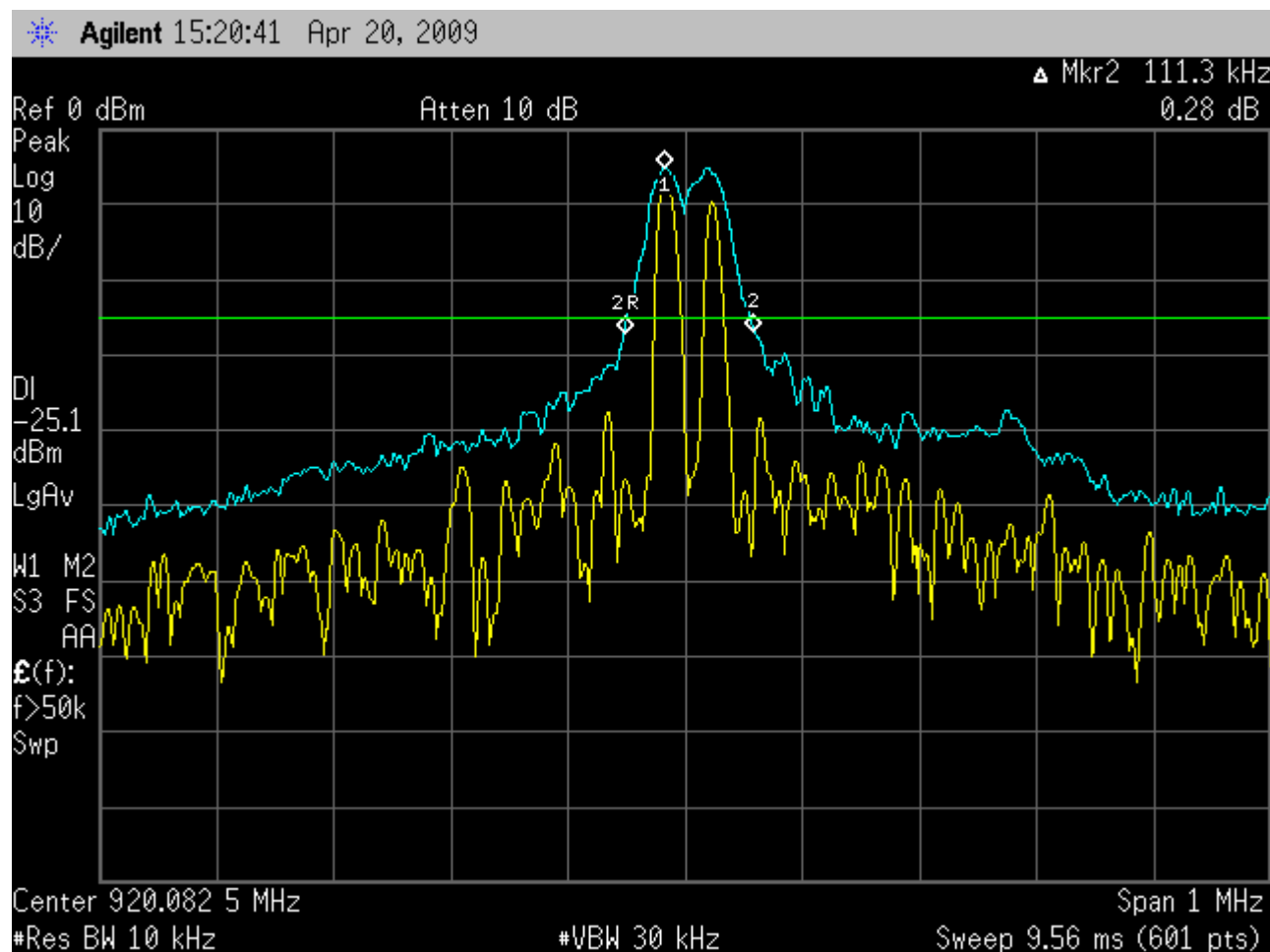
Additional Observations:

- Measurements were made at 1 meter. The spectrum analyzer center frequency was set to the channel carrier. After a PEAK output max hold reading was taken, a line was drawn 20 dB lower than PEAK level. The bandwidth was determined from where the channel output spectrum intersected the display line.
- Analyzer RES BW was set to 1% of the span while VBW is set at 3 times the RBW.

Frequency	20 dB Bandwidth
920 MHz	111.3 kHz

FCC ID: UJV-LEIT03
IC:6694A-LEIT03

Report Number: 2009 05126317 FCC
Specification: FCC Part 15 Subpart C, 15.249



Clause 15.249(a) Radiated Emissions

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902–928 MHz	50	500
2400–2483.5 MHz	50	500
5725–5875 MHz	50	500
24.0–24.25 GHz	250	2500

Test Conditions:

Sample Number:	Leit ET-WWS	Temperature:	14°C
Date:	April 15, 2009	Humidity:	41%
Modification State:	Carrier Frequency	Tester:	FSCustodio
		Laboratory:	SOATS

Test Results:

See attached plots.

Additional Observations:

- The Spectrum was searched from 30MHz to the 10th Harmonic.9200 MHz
- The EUT was tested with freshly charged Super Capacitor.
- Fundamental and harmonic emissions.

Sample Computations:

$$\begin{aligned}
 &\text{Correction factor @ 920 MHz} &&= -3.7 \\
 &&&= \text{Antenna factor} + \text{Cable loss} - \text{Preamp gain} \\
 &&&= 23.5 + 4.4 - 31.6 \\
 &\text{Corrected reading} &&= \text{Max. reading} + \text{Correction factor} \\
 &&&= 76.1 + (-3.7) \\
 &&&= 72.4 \text{ dB}\mu\text{V/m}
 \end{aligned}$$



NEMKO USA, Inc.

San Diego Headquarters:

11696 Sorrento Valley Rd.
San Diego, CA 92121
Tel: (858) 755-5525
Fax: (858) 452-1810

Radiated Emissions Data

Job # : 18483-1 Date : 04/15/2009
NEX # : 126317 Time : 11AM
Staff : FSC

Page 1 of 1

Client Name : DIG Corporation
EUT Name : Wireless Weather Station
EUT Model # : Leit ET-WWS
EUT Serial # : N/A
EUT Config : Continuous transmit @ max power

EUT Voltage : 5VDC
EUT Frequency :
Phase:
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart B, Class B
Loop Ant. # : NA
Bicon Ant.# : 128 3m Temp. (°C) : 14
Log Ant.# : 111 3m Humidity (%) : 41
DRG Ant. # : 529 Spec An.# : 911
Cable LF# : SOATS Spec An. Display # : NA
Cable HF# : SOATS QP # : 911
Preamp LF# : 902 PreSelect# : NA
Preamp HF# : 919

Quasi-Peak	RBW: 120 kHz
	Video Bandwidth 300 kHz
Peak	RBW: 1 MHz
	Video Bandwidth 3 MHz
Average	RBW: 1 MHz
	Video Bandwidth 10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBµV)	Corrected Reading (dBµV/m)	Spec. limit (dBµV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
920.0	75.1	76.1	Q	F	1.2	76.1	72.4	94.0	-21.6	Pass	
1840.0	53.3	52.7	P	F	1.1	53.31	51.8	74.0	-22.1	Pass	
1840.0	46.2	48.9	A	F	1.1	48.93	47.5	54.0	-6.5	Pass	
2760.0	58.6	60.9	P	F	1.1	60.87	62.6	74.0	-11.3	Pass	
2760.0	51.8	50.5	A	F	1.1	51.8	53.6	54.0	-0.4	Pass	
3680.0	47.8	44.8	P	F	1.1	47.75	51.3	74.0	-22.7	Pass	
3680.0	37.1	31.5	A	F	1.1	37.07	40.6	54.0	-13.3	Pass	
4600.0	44.5	43.3	P	F	1.1	44.48	49.2	74.0	-24.7	Pass	
4600.0	33.0	30.9	A	F	1.1	33.04	37.8	54.0	-16.2	Pass	

**Clause 15.249(d) Spurious Emissions**

15.249(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

www.nemko.com

Test Conditions:

Sample Number:	Leit ET-WWS	Temperature:	14°C
Date:	April 15, 2009	Humidity:	41%
Modification State:	Carrier Frequency	Tester:	FSCustodio
		Laboratory:	SOATS

Test Results:

See attached plots.

Additional Observations:

- The Spectrum was searched from 30MHz to the 10th Harmonic.
- The EUT was tested with freshly charged Super Capacitor.
- Non-radio spurious emissions.

Sample Computations:

Correction factor @ 520 MHz = -9.2
= Antenna factor + Cable loss – Preamp gain
= 19 + 3.1 – 31.3
Corrected reading = Max. reading + Correction factor
= 39.89 + (-9.2)
= 30.7 dBμV/m



NEMKO USA, Inc.

San Diego Headquarters:

11696 Sorrento Valley Rd.
San Diego, CA 92121
Tel: (858) 755-5525
Fax: (858) 452-1810

www.nemko.com

Radiated Emissions Data

Job # : 18483-1 Date : 04/15/2009
NEX # : 126317 Time : 11AM
Staff : FSC

Page 1 of 1

Client Name : DIG Corporation
EUT Name : Wireless Weather Station
EUT Model # : Leit ET-WWS
EUT Serial # : N/A
EUT Config : Continuous transmit @ max power

EUT Voltage : 5VDC
EUT Frequency :
Phase :
NOATS
SOATS X
Distance < 1000 MHz: 3 m
Distance > 1000 MHz: 3 m

Specification : CFR47 Part 15, Subpart B, Class B
Loop Ant. # : NA
Bicon Ant. # : 128 3m Temp. (°C) : 14
Log Ant. # : 111 3m Humidity (%) : 41
DRG Ant. # : 529 Spec An. # : 911
Cable LF# : SOATS Spec An. Display # : NA
Cable HF# : SOATS QP # : 911
Preamp LF# : 902 PreSelect# : NA
Preamp HF# : 919

Quasi-Peak	RBW: 120 kHz
	Video Bandwidth 300 kHz
Peak	RBW: 1 MHz
	Video Bandwidth 3 MHz
Average	RBW: 1 MHz
	Video Bandwidth 10 Hz

Measurements below 1 GHz are Quasi-Peak values, unless otherwise stated.

Measurements above 1 GHz are Average values, unless otherwise stated.

Meas. Freq. (MHz)	Meter Reading Vertical	Meter Reading Horizontal	Det.	EUT Side F/L/R/B	Ant. Height m	Max. Reading (dBμV)	Corrected Reading (dBμV/m)	Spec. limit (dBμV/m)	CR/SL Diff. (dB)	Pass Fail	Comment
104.0	29.7	52.6	Q	R	1.0	52.59	33.0	43.5	-10.5	Pass	with FM ambient
208.0	38.3	43.7	Q	L	1.0	43.71	25.8	43.5	-17.7	Pass	
507.0	35.4	29.0	Q	F	1.0	35.36	25.5	46.0	-20.5	Pass	
520.0	39.9	38.9	Q	R	1.0	39.89	30.7	46.0	-15.3	Pass	

A2.9 902-928, 2400-2483.5 and 5725-5875 MHz

This section provides standards for low-power devices that can be used for any application provided the following conditions are met:

(a) The field strengths measured at 3 metres shall not exceed the following:

Fundamental Frequencies (MHz)	Field Strength (millivolts/m)	
	Fundamental	Harmonics
902-928	50 ^(Note 1)	0.5
2400-2483.5	50 ^(Note 1)	0.5
5725-5875	50 ^(Note 1)	0.5

Note 1: Equivalent to 0.75 mW e.i.r.p.

(b) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to Table 2 limits, whichever is the less stringent.

Test Conditions:

Sample Number:	Leit ET-WWS	Temperature:	14°C
Date:	April 15, 2009	Humidity:	41%
Modification State:	Carrier Frequency	Tester:	FSCustodio
		Laboratory:	SOATS

Test Results:

Same as Clause 15.249(a) Radiated Emissions test results

Additional Observations:

- No emissions found on the band edges (902MHz and 928MHz).



Appendix C: Block Diagram of Test Setups

Test Site For Radiated Emissions

