



1250 Peterson Dr., Wheeling, IL 60090

Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

FCC Rules and Regulations / Intentional Radiators

Periodic operational in the 40.66-40.70 MHz Band and above 70 MHz.

Part 15, Subpart C, Section 15.231(e)

THE FOLLOWING "**MEETS**" THE ABOVE TEST SPECIFICATION

Formal Name: Wireless Remote Temperature Sensor
Kind of Equipment: Temperature Sensor
Test Configuration: Tested at 3.3 vdc
Model Number(s): F145RF-1328
Model(s) Tested: F145RF-1328
Serial Number(s): 9132
Date of Tests: March 12, 2007
Test Conducted For: White-Rodgers
8100 West Florissant Ave, P.O BOX 36922
St. Louis, Missouri 63136-9022

NOTICE: "This report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S. Government". Please see the "Additional Description of Equipment Under Test" page listed inside of this report.

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SIGNATURE PAGE

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Reviewed By:

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White-Rodgers



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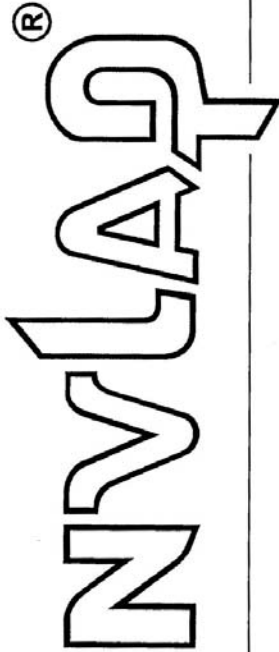
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United States Department of Commerce
National Institute of Standards and Technology



Certificate of Accreditation to ISO/IEC 17025:1999

NVLAP LAB CODE: 100276-0

D.L.S. Electronic Systems, Inc.
Wheeling, IL

is recognized by the National Voluntary Laboratory Accreditation Program for conformance with criteria set forth in
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ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

2006-10-01 through 2007-09-30

Effective dates



Sally S. Buce
For the National Institute of Standards and Technology

NVLAP-01C (REV. 2005-05-19)



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1.0 SUMMARY OF TEST REPORT

It was found that the Wireless Remote Temperature Sensor, Model Number(s) F145RF-1328, "meets" the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.231(b) for periodic operational in the 40.66-40.70 MHz Band and above 70 MHz. The Power Line Conducted emissions test was not required because the Wireless Remote Temperature Sensor is powered from a D.C. power source. It does not have a line cord to plug into the A.C. power line.

2.0 INTRODUCTION

On March 12, 2007, a series of radio frequency interference measurements was performed on Wireless Remote Temperature Sensor, Model Number(s) F145RF-1328, Serial Number: 9132. The tests were performed according to the procedures of the FCC as stated in the "Methods of Measurement of Radio-Noise Emissions for Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz" found in the American National Standards Institute, ANSI C63.4-2003. Tests were performed by personnel of D.L.S. Electronic Systems, Inc. who are responsible to Donald L. Sweeney, Senior EMC Engineer.

D.L.S. Electronic Systems, Inc. is a full service EMC/Safety Testing Laboratory accredited to ISO 17025. NVLAP Certificate and Scope can be viewed at <http://www.dlsemc.com/certificate>. Our facilities are registered with the FCC, Industry Canada, and VCCI.

3.0 OBJECT

The purpose of this series of tests was to determine if the test sample could meet the radio frequency interference emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Sections 15.33, 15.35, 15.205, 15.209 & 15.231 for Intentional Radiators operating in the Band 40.66-40.70 and above 70 MHz.



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4.0 TEST SET-UP

All emission tests were performed at D.L.S. Electronic Systems, Inc. and set up according to the American National Standards Institute, ANSI C63.4-2003, Section 8, (Figures 11a and 11b).

All radiated emissions tests were performed with the test item placed on a 80 cm high rotating non-conductive table, located in the test room. Equipment normally operated on the floor was placed on a metal covered turntable which is flush with the surrounding conducting ground plane. The ground plane has an electrical isolation layer over its surface approximately 7 mm thick. The EUT is separated from the turntable ground plane by a non-conductive layer. The equipment under test was set up according to ANSI C63.4-2003, Sections 6 and 8.

5.0 TEST EQUIPMENT (Bandwidths and Detector Function)

All preliminary data below 1000 MHz was automatically plotted using the ESI 26/40 Fixed Tuned Receiver. The data was taken using Quasi-Peak Detector Functions. This information was then used to determine the frequencies of maximum emissions. Above 1000 MHz, final data was taken using the Average Detector.

Below 1000 MHz, final data was taken using the ESI 26/40 Fixed Tuned Receiver. These plots were made using the Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak Detector Function of the ESI 26/40 Fixed Tuned Receiver. Above 1000 MHz, final data was taken using the Average Detector on the ESI 26/40 Fixed Tuned Receiver.

The bandwidths shown below are specified by ANSI C63.4-2003, Section 4.2.

Frequency Range	Bandwidth (-6 dB)
10 to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz
30 MHz to 1 GHz	120 kHz
Above 1 GHz	1 MHz

A list of the equipment used can be found in Table 1. All primary equipment was calibrated against known reference standards with a verified traceable path to NIST.



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6.0 AMBIENT MEASUREMENTS

For emissions measurements, broadband antennas and an EMI Test Receiver with a panoramic spectrum display are used. First the frequency range is scanned and displayed on the test receiver display. Next the scanned frequency range is divided into smaller ranges, and then it is manually tuned through to determine the emissions from the EUT. A headset or loudspeaker is connected to the test receiver's AM/FM demodulated output as an aid in detecting ambient signals and finding frequencies of significant emission from the EUT. If there is any doubt as to the source of the emission, it is further investigated by rotating the EUT, or by disconnecting the power from the EUT.

The EUT is set up in its typical configuration and operated in its various modes. For tabletop systems, cables are manipulated within the range of likely configurations. For floor-standing equipment, the cables are located in the same manner as the user would install them and no further manipulation is made. If the manner of cable installation is not known, or if it changes with each installation, cables or wires for floor-standing equipment shall be manipulated to the extent possible to produce the maximum level of emissions. For each mode of operation, the frequency spectrum is monitored. Variations in antenna height, antenna polarization, EUT azimuth, and cable or wire placement (each variable within bounds specified elsewhere) are explored to produce the emissions that have the highest amplitude relative to the limit. These methods are performed to the specifications in MP-5 or ANSI C63.4-2003, as appropriate.



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7.0 DESCRIPTION OF TEST SAMPLE: (See also Paragraph 8.0)

7.1 Description:

The wireless remote temperature sensor utilizes an RF transmitter to transmit temperature and associated information to the host controlling thermostat.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 108.42mm x Width: 66.31mm x Height: 22.987mm

7.3 LINE FILTER USED:

NA

7.4 INTERNAL CLOCK FREQUENCIES:

Clock Frequencies:

32768 Hz, 1MHz, 14.7456 MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Panel

PN: 0059-4584F



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8.0 ADDITIONAL DESCRIPTION OF TEST SAMPLE:
(See also Paragraph 7.0)

1: There were no additional descriptions noted at the time of test.

NOTE:

The test was run in the continuous transmit mode for Low, Mid and High Channels.

I certify that the above, as described in paragraph 7.0, describes the equipment tested and will be manufactured as stated.

By: _____
Signature Title

For: _____
Company Date



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9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 Wireless Remote Temperature Sensor

Model Number: F145RF-1328 Serial Number: 9132



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10.0 RADIATED PHOTOS TAKEN DURING TESTING

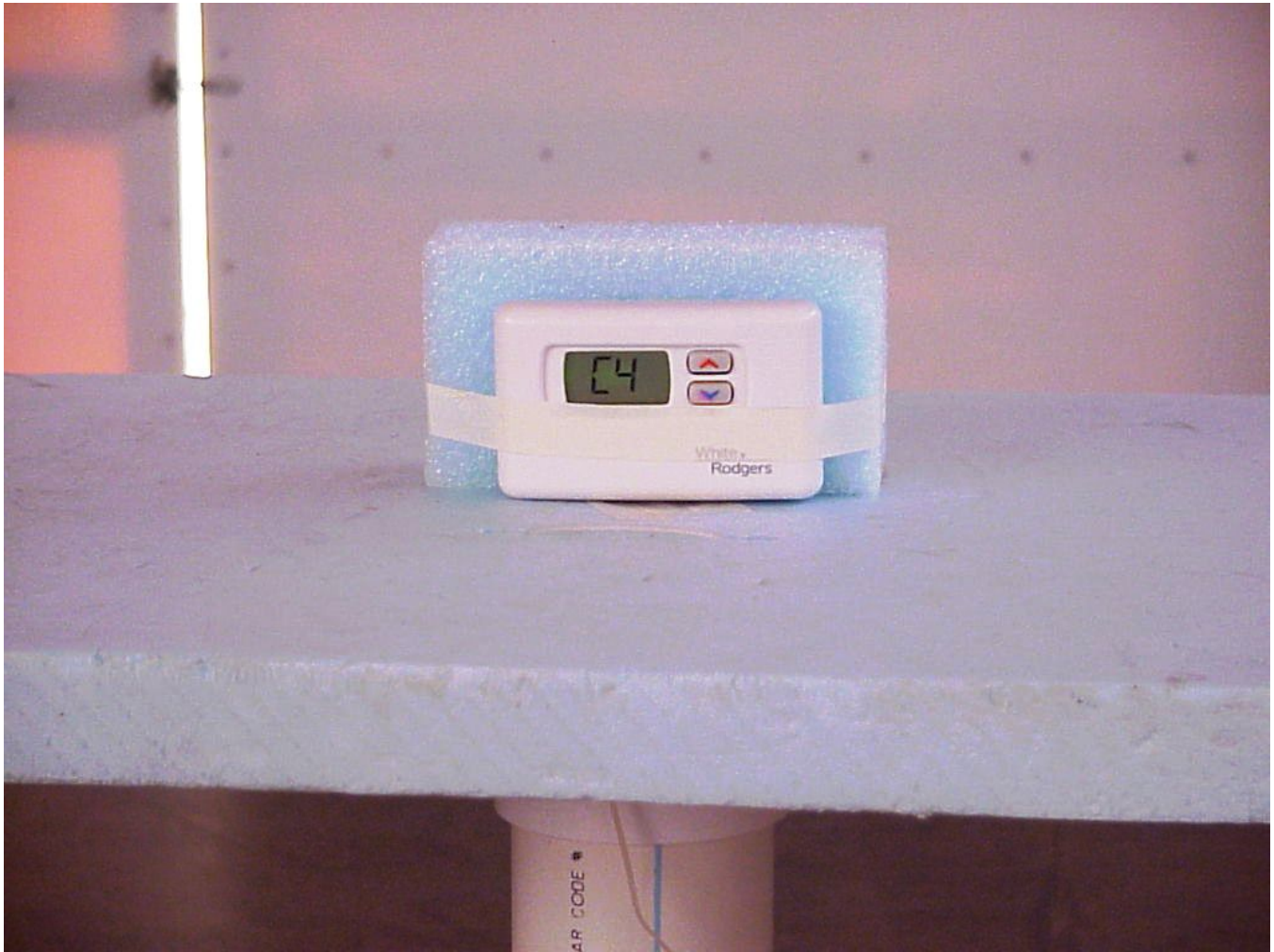




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10.0 RADIATED PHOTOS TAKEN DURING TESTING





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11.0 RESULTS OF TESTS

The radio interference emission charts results can be seen on the pages at the end of this report. Data sheets indicating the test measurements taken during testing can also be found at the end of this report.

12.0 CONCLUSION

It was found that the Wireless Remote Temperature Sensor, Model Number(s) F145RF-1328 "meets" the radio interference radiated emission requirements of the FCC "Rules and Regulations", Part 15, Subpart C, Section 15.231 for periodic operational in the 40.66-40.70 MHz Band and above 70 MHz.



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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Receiver	Rohde & Schwarz	ESI 26	837491/010	20 Hz – 26 GHz	11/07
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/07
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/07
Antenna	EMCO	3104C	00054891	20 MHz – 200 MHz	2/08
Antenna	Electrometrics	LPA-25	1114	200 MHz – 1 GHz	3/08
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/08
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/08
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/08
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/08
Antenna	EMCO	3115	2479	1 GHz – 18 GHz	8/07
Antenna	EMCO	3115	99035731	1 GHz – 18 GHz	4/07
Antenna	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/08
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/07

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
LISN	Solar	8012-50-R-24-BNC	8305116	10 MHz – 30 MHz	8/07
LISN	Solar	8012-50-R-24-BNC	814548	10 MHz – 30 MHz	8/07
LISN	Solar	9252-50-R-24-BNC	961019	10 MHz – 30 MHz	12/07
LISN	Solar	9252-50-R-24-BNC	971612	10 MHz – 30 MHz	10/07
LISN	Solar	9252-50-R-24-BNC	92710620	10 MHz – 30 MHz	7/07

All primary equipment is calibrated against known reference standards with a verified traceable path to NIST.



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APPENDIX A

TEST PROCEDURE

Part 15, Subpart C, Section 15.231(e)

ELECTRIC FIELD RADIATED EMISSIONS TEST



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TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

1.0 PULSED OPERATION (Duty Cycle Correction Factor)

The radiated emission tests made at D.L.S. Electronic Systems, Inc. for the Wireless Remote Temperature Sensor, Model Number F145RF-1328, are shown by the graphs on the following pages. The actual total "on time" during the 100 msec is 13.67 msec with a total "off time" of 86.33 msec resulting in a **17.28 Duty Cycle Correction Factor**.

To find the actual "on time" during the 100 msec period, the data word is multiplied by the number of data words per 100 msec, yielding actual on time. Taking this number and dividing it by the 100 msec period gives us the Duty Cycle. We then take the Log of the Duty Cycle and multiply it by 20. This gives us the Duty Cycle Correction Factor. The following method was used to determine the Duty Cycle Correction Factor:

Total on time during 100 msec.

13.67 usec/pulse on time * 1 pulses = 13.67 msec (data word on time)

13.67 msec (data on time) = 13.67 msec total "on time"

13.67 msec (total "on time") / 100 msec = .1367 Duty Cycle

20*LOG10 .1367 = **17.28 dB Duty Cycle Correction Factor**

NOTE:

For pulsed operation, the switches were set to generate their maximum "on" time, and measurements were made with the peak detector. As stated in Docket 86-422, the duty cycle of the pulse is determined from the total "on" time for the worst case condition during 100 msec. Using the percentage of the total "on" time over a 100 msec period, the total absolute average value was determined. As stated in Section 3, a maximum of 20 dB can be used.

See the following pages for the graphs of the actual measurements that were made:



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GRAPH(S) TAKEN OF THE PULSED OPERATION

PART 15.231

GRAPHS TAKEN OF THE PULSE TRAIN SHOWING THE FOLLOWING:

1. Number of Bits per Data Word
2. Number of Pulses per 100 msec
3. Off Time between Data Words
4. Data Word On Time



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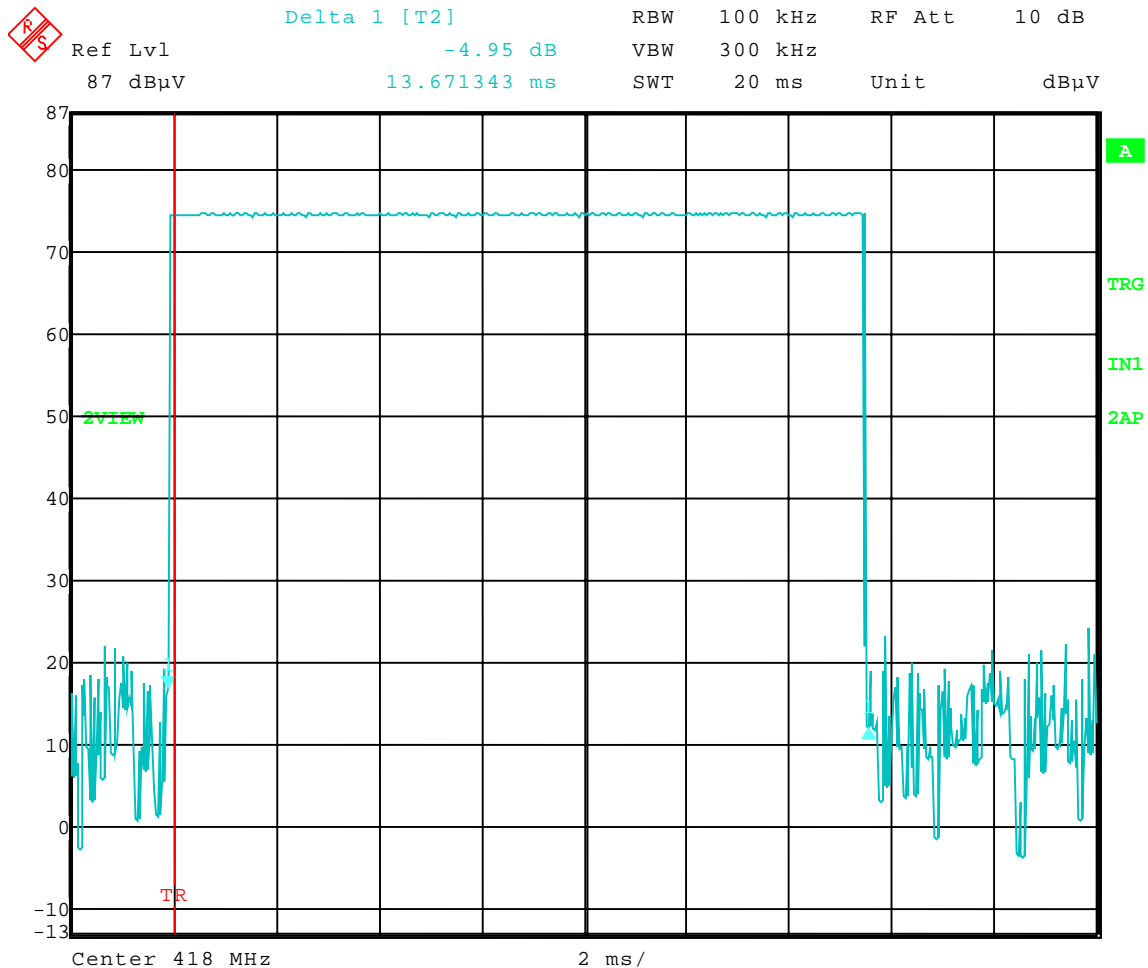
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TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

Test Date: 3-12-2007
Company: White-Rodgers
EUT: F145RF-1328
Test: Duty Cycle (FCC Part 15.35)
Operator: Jason Lauer
Comment: 20 ms sweep
Comment: Total ON Time during 100 ms = 13.67 ms
 $20 \log (13.67\text{ms} / 100\text{ms}) = 17.3 \text{ dB}$
Duty cycle correction factor = 17.3 dB



Date: 12.MAR.2007 10:54:07



Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

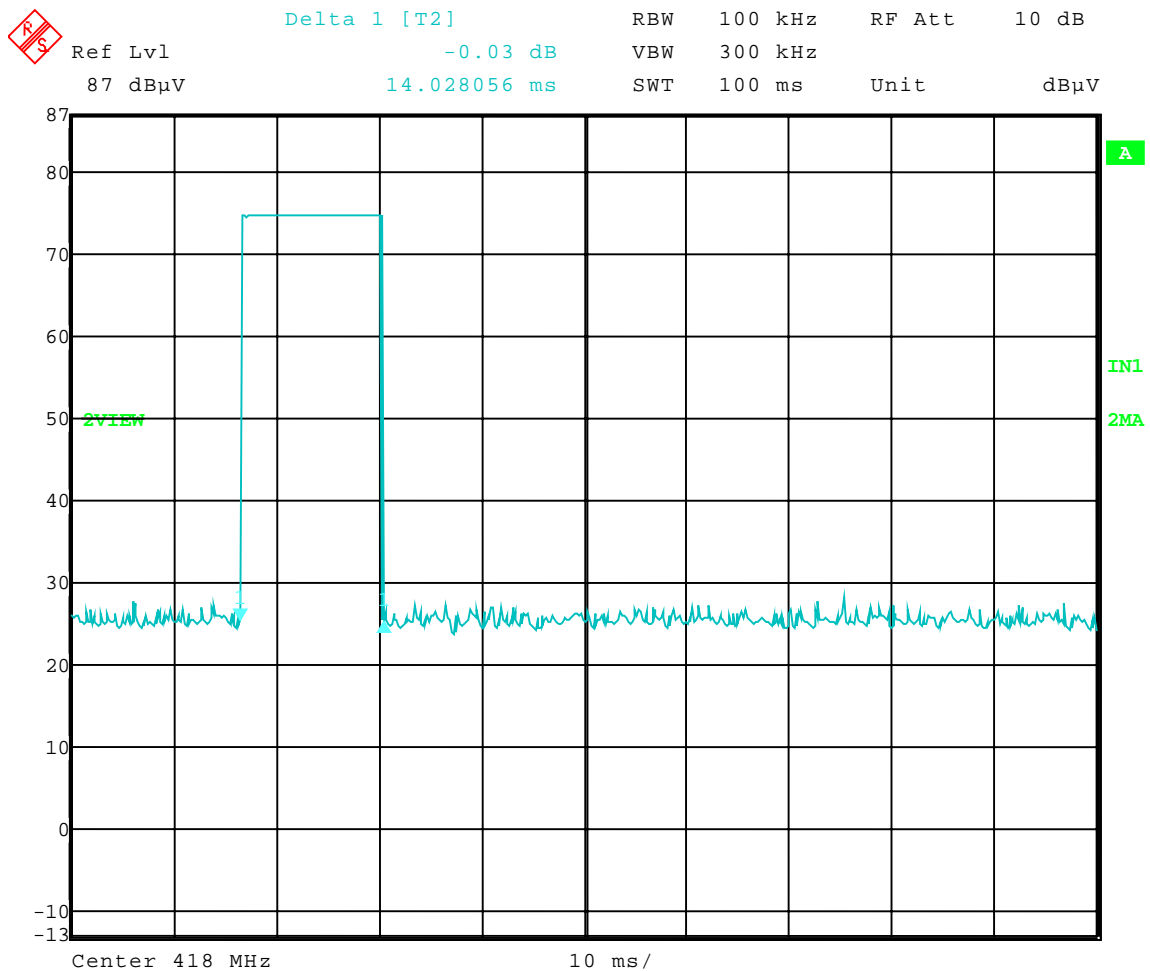
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TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

Test Date: 3-12-2007
Company: White-Rodgers
EUT: F145RF-1328
Test: Duty Cycle
Operator: Jason Lauer
Comment: 100 ms sweep



Date: 12.MAR.2007 10:52:40



Company: White-Rodgers
Model Tested: F145RF-1328
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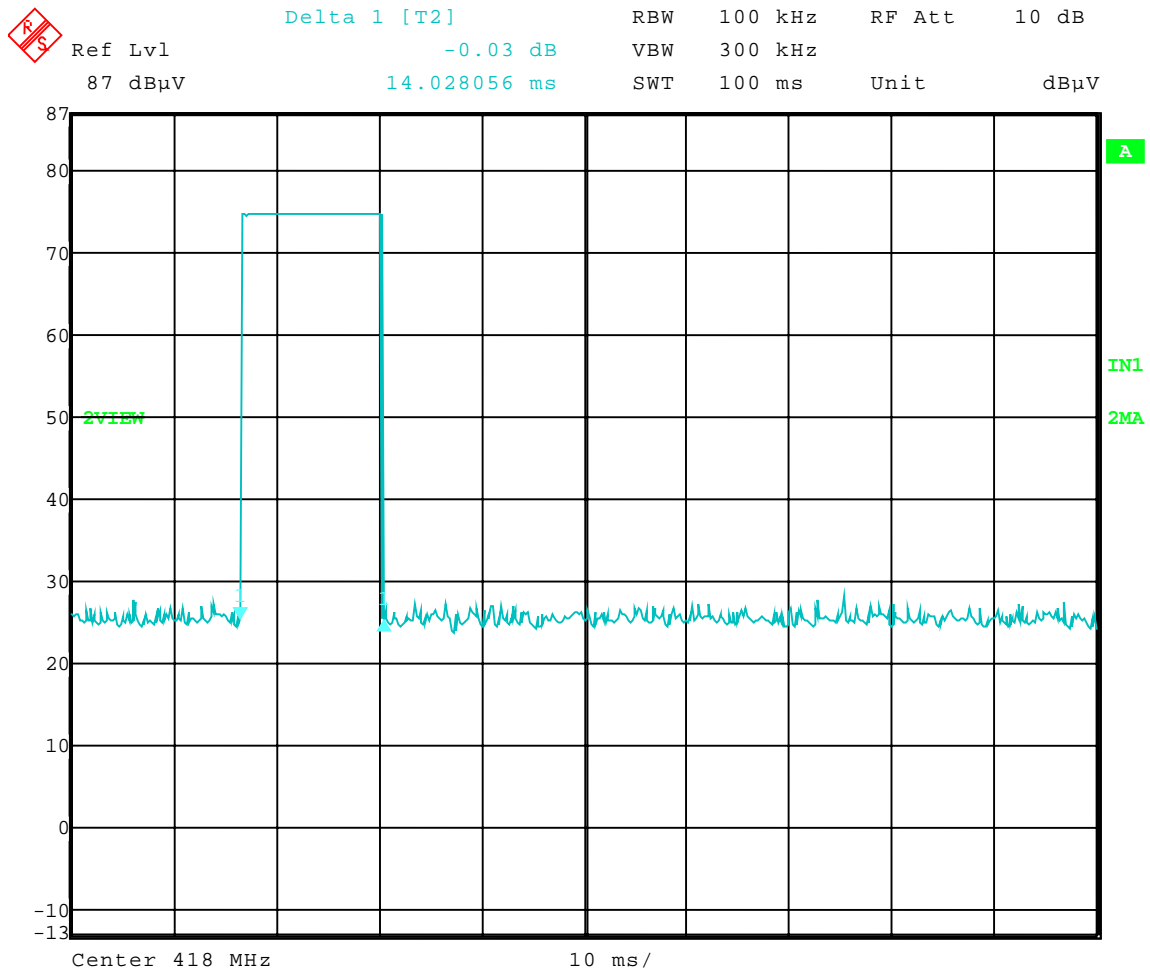
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TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

Test Date: 3-12-2007
Company: White-Rodgers
EUT: F145RF-1328
Test: Duty Cycle
Operator: Jason Lauer
Comment: 100 ms sweep



Date: 12.MAR.2007 10:52:40



Company: White-Rodgers
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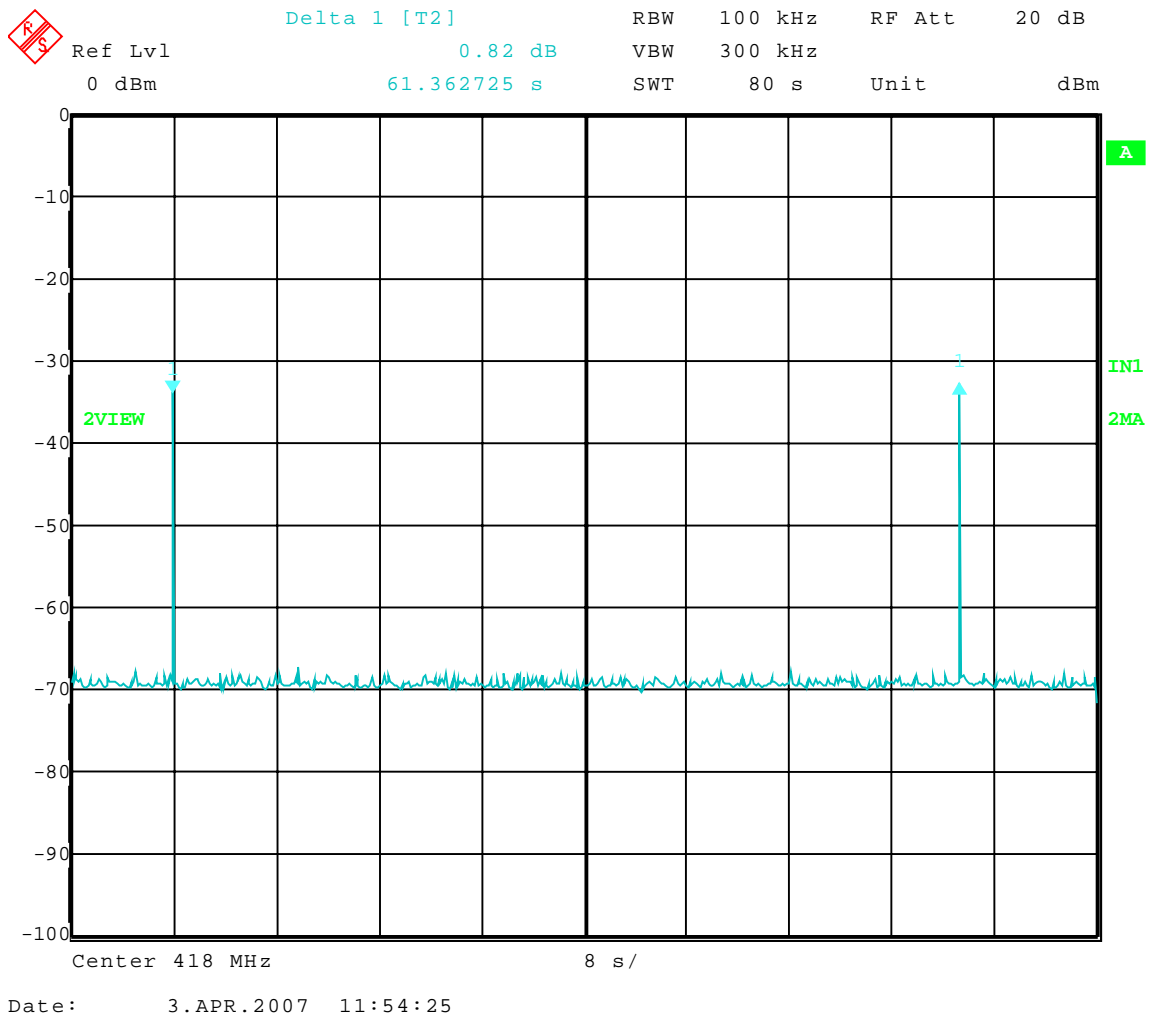
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TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

Test Date: 4-03-2007
Company: White-Rodgers
EUT: F145RF-1328
Test: Silent Period Between Transmissions (FCC Part 15.231e)
Operator: Jason Lauer
Comment: 80 Second Sweep
Comment: **Silent Period = 61.36 Seconds**





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ELECTRIC FIELD RADIATED EMISSIONS TEST

2.0 CONDUCTED EMISSION MEASUREMENTS

Conducted emissions were measured over the frequency range from 150 kHz to 30 MHz in accordance with the power line measurements as specified in FCC Part 15, Subpart C, Section 15.207 & ANSI C63.4-2003. Since the device is operated from the public utility lines, the 120 Vac, 60 Hz power leads, high (hot) and low (neutral) sides, were measured by connecting the measuring equipment to the appropriate meter terminal of the LISN. During the test, the cables were placed and items moved (when appropriate) to maximize emissions. All signals were then recorded. The allowed levels for Intentional Radiators which is designed to connected to the public utility (AC) power line shall not exceed 250 uV (47.96 dBuV) from 150 kHz to 30 MHz

NOTE:

All test measurements were made at a screen room temperature of °F at % relative humidity.

NOTE: This test was not run because the device is battery operated.



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ELECTRIC FIELD RADIATED EMISSIONS TEST

3.0 BANDWIDTHS

The bandwidth of the transmitter shall be confined to the following specifications as specified in Section 15.231c & d:

40.66 MHz to 40.7 MHz	$\pm 0.01\%$ within the band edges
70 MHz to 900 MHz	.25% of the center frequency
Above 900 MHz	.50% of the center frequency

The bandwidth is determined at the points 20 dB down from the modulated carrier.

As shown by the graph on the following page, the bandwidth for the Wireless Remote Temperature Sensor was measured at 60.46 kHz, which meets the above specification. With a fundamental frequency of 427 MHz, the FCC Bandwidth limit is 1067.5 kHz when multiplying the fundamental by .25%, with a margin of 1007.04 kHz.



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GRAPH(S) TAKEN OF THE 20 dB BANDWIDTH EMISSIONS

PART 15.231c & d

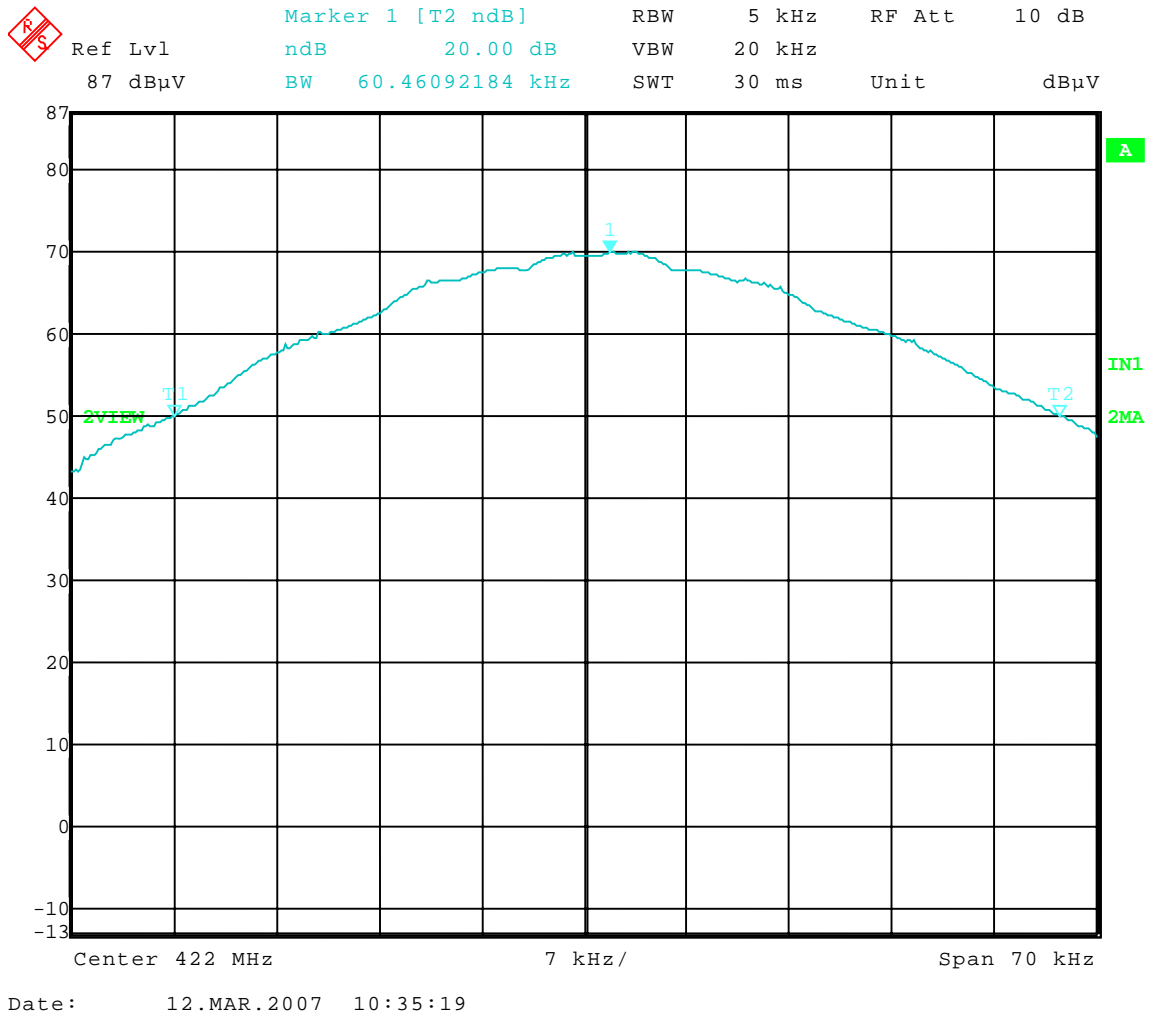


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Test Date: 3-12-2007
Company: White-Rodgers
EUT: F145RF-1328
Test: 20 dB Bandwidth
Operator: Jason Lauer
Comment: Channel C4

20 dB Bandwidth = 60.46 kHz





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ELECTRIC FIELD RADIATED EMISSIONS TEST

4.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS - SECTION 15.231(e)

For operation in the band 40.66 to 40.70 MHz and above 70 MHz the field strength of any emissions within this band shall not exceed the following table at a distance of 3 meters as specified in FCC, Part 15, Section 15.231(e), based on the average value of the measured emissions. The limits are shown in the following table.

Fundamental Frequency in MHz	Field Strength of Fundamental (uV/m at 3m)	Field Strength of Harmonics (uV/m at 3m)
40.66 to 40.70	1000 (60.00 dBuV)	100 (40.00 dBuV)
70 to 130	500 (53.98 dBuV)	50 (33.98 dBuV)
130 to 174	500 (53.98 dBuV) to 1500 (63.52 dBuV)	50 (41.94 dBuV) to 150 (43.52 dBuV)
174 to 260	1500 (63.52 dBuV)	150 (43.52 dBuV)
260 to 470	1500 (63.52 dBuV) to 5000 (81.84 dBuV)	150 (43.52 dBuV) to 500 (61.94 dBuV)
470 and above	5000 (73.98 dBuV)	500 (53.98 dBuV)

NOTE:

Preliminary radiation measurements may have been performed at a 3 meter or ten meter test distance. The frequency range from 30 MHz to 1000 MHz was scanned at receive antenna heights from one to four meters, and with a 360° rotation of the EUT. Plots were made and the worst-case emissions were recorded.

As stated in 15.35b the 20 dB peak-to-average limit is applicable to all devices measured using an average detector.



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GRAPH(S) TAKEN OF FUNDAMENTAL,
SPURIOUS EMISSIONS AND RESTRICTED BANDS

PART 15.231e



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**Radiated Fundamental and Spurious Emissions – 30 MHz to 5 GHz
Tested at a 3 Meter Distance**

EUT: F145RF-1328
Manufacturer: White-Rodgers
Operating Condition: 72 deg F; 30% R.H.
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.231 (e)
Comment: Continuous Transmit
Date: 3/12/2007

Note: All other emissions at least 20 dB under the limit.
Output Power Set to -2.5 dBm

Low Channel: 418 MHz

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
418	Max Peak	Vert	61.3	15.8	4.4	81.6	17.3	64.3	72.3(Avg)	8.0	1.10	90	Fundamental
418	Max Peak	Horz	68.6	15.8	4.4	88.8	17.3	71.5	72.3(Avg)	0.8	1.00	0	Fundamental
418	Max Peak	Vert	61.3	15.8	4.4	81.6	N/A	81.6	92.3(Peak)	10.7	1.10	90	Fundamental
418	Max Peak	Horz	68.6	15.8	4.4	88.8	N/A	88.8	92.3(Peak)	3.5	1.00	0	Fundamental
836	Max Peak	Vert	32.8	21.9	-19.0	35.7	17.3	18.4	52.3(Avg)	33.9	1.40	45	Harmonic
836	Max Peak	Horz	38.0	21.9	-19.0	40.9	17.3	23.6	52.3(Avg)	28.7	1.60	180	Harmonic
836	Max Peak	Vert	32.8	21.9	-19.0	35.7	N/A	35.7	72.3(Peak)	36.6	1.40	45	Harmonic
836	Max Peak	Horz	38.0	21.9	-19.0	40.9	N/A	40.9	72.3(Peak)	31.4	1.60	180	Harmonic
1254	Max Peak	Vert	52.2	24.5	-37.3	39.3	17.3	22.0	54.0(Avg)	32.0	1.40	180	Harmonic
1254	Max Peak	Horz	52.3	24.5	-37.3	39.5	17.3	22.2	54.0(Avg)	31.8	1.20	210	Harmonic
1254	Max Peak	Vert	52.2	24.5	-37.3	39.3	N/A	39.3	74.0(Peak)	34.7	1.40	180	Harmonic
1254	Max Peak	Horz	52.3	24.5	-37.3	39.5	N/A	39.5	74.0(Peak)	34.5	1.20	210	Harmonic
1672	Max Peak	Vert	66.1	25.7	-37.1	54.7	17.3	37.4	54.0(Avg)	16.6	1.00	200	Restricted Band
1672	Max Peak	Horz	60.2	25.7	-37.1	48.9	17.3	31.6	54.0(Avg)	22.5	1.30	160	Restricted Band
1672	Max Peak	Vert	66.1	25.7	-37.1	54.7	N/A	54.7	74.0(Peak)	19.3	1.00	200	Restricted Band
1672	Max Peak	Horz	60.2	25.7	-37.1	48.9	N/A	48.9	74.0(Peak)	25.2	1.30	160	Restricted Band



Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

1250 Peterson Dr., Wheeling, IL 60090

**Radiated Fundamental and Spurious Emissions – 30 MHz to 5 GHz
Tested at a 3 Meter Distance**

EUT: F145RF-1328
Manufacturer: White-Rodgers
Operating Condition: 72 deg F; 30% R.H.
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.231 (e)
Comment: Continuous Transmit
Date: 3/12/2007

Note: All other emissions at least 20 dB under the limit.
Output Power Set to -2.5 dBm

Low Channel: 418 MHz

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
2090	Max Peak	Vert	65.4	27.3	-36.6	56.1	17.3	38.8	54.0(Avg)	15.2	1.00	160	Harmonic
2090	Max Peak	Horz	61.7	27.3	-36.6	52.5	17.3	35.2	54.0(Avg)	18.8	1.20	180	Harmonic
2090	Max Peak	Vert	65.4	27.3	-36.6	56.1	N/A	56.1	74.0(Peak)	17.9	1.00	160	Harmonic
2090	Max Peak	Horz	61.7	27.3	-36.6	52.5	N/A	52.5	74.0(Peak)	21.5	1.20	180	Harmonic
3344	Max Peak	Vert	49.8	30.8	-35.5	45.1	17.3	27.8	54.0(Avg)	26.2	1.20	60	Harmonic
3344	Max Peak	Horz	50.4	30.8	-35.5	45.7	17.3	28.4	54.0(Avg)	25.6	1.30	160	Harmonic
3344	Max Peak	Vert	49.8	30.8	-35.5	45.1	N/A	45.1	74.0(Peak)	28.9	1.20	60	Harmonic
3344	Max Peak	Horz	50.4	30.8	-35.5	45.7	N/A	45.7	74.0(Peak)	28.3	1.30	160	Harmonic



Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

1250 Peterson Dr., Wheeling, IL 60090

**Radiated Fundamental and Spurious Emissions – 30 MHz to 5 GHz
Tested at a 3 Meter Distance**

EUT: F145RF-1328
Manufacturer: White-Rodgers
Operating Condition: 72 deg F; 30% R.H.
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.231 (e)
Comment: Continuous Transmit
Date: 3/12/2007

Note: All other emissions at least 20 dB under the limit.
Output Power Set to -2.5 dBm

Mid Channel: 422 MHz

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
422	Max Peak	Vert	62.0	15.96	4.4	82.37	17.3	65.1	72.5(Avg)	7.4	1.10	90	Fundamental
422	Max Peak	Horz	67.9	15.96	4.4	88.26	17.3	71.0	72.5(Avg)	1.5	1.00	0	Fundamental
422	Max Peak	Vert	62.0	15.96	4.4	82.37	N/A	82.4	92.5(Peak)	10.1	1.10	90	Fundamental
422	Max Peak	Horz	67.9	15.96	4.4	88.26	N/A	88.3	92.5(Peak)	4.2	1.00	0	Fundamental
844	Max Peak	Vert	31.0	21.98	-18.9	34.11	17.3	16.8	52.5(Avg)	35.7	1.40	340	Harmonic
844	Max Peak	Horz	36.6	21.98	-18.9	39.72	17.3	22.4	52.5(Avg)	30.1	1.50	0	Harmonic
844	Max Peak	Vert	31.0	21.98	-18.9	34.11	N/A	34.1	72.5(Peak)	38.4	1.40	340	Harmonic
844	Max Peak	Horz	36.6	21.98	-18.9	39.72	N/A	39.7	72.5(Peak)	32.8	1.50	0	Harmonic
1266	Max Peak	Vert	50.8	24.49	-37.2	38.04	17.3	20.7	54.0(Avg)	33.3	1.40	180	Harmonic
1266	Max Peak	Horz	52.5	24.49	-37.2	39.77	17.3	22.5	54.0(Avg)	31.5	1.10	200	Harmonic
1266	Max Peak	Vert	50.8	24.49	-37.2	38.04	N/A	38.0	74.0(Peak)	36.0	1.40	180	Harmonic
1266	Max Peak	Horz	52.5	24.49	-37.2	39.77	N/A	39.8	74.0(Peak)	34.2	1.10	200	Harmonic
1688	Max Peak	Vert	66.3	25.79	-37	55.06	17.3	37.8	54.0(Avg)	16.2	1.40	225	Restricted Band
1688	Max Peak	Horz	59.1	25.79	-37	47.93	17.3	30.6	54.0(Avg)	23.4	1.10	240	Restricted Band
1688	Max Peak	Vert	66.3	25.79	-37	55.06	N/A	55.1	74.0(Peak)	18.9	1.40	225	Restricted Band
1688	Max Peak	Horz	59.1	25.79	-37	47.93	N/A	47.9	74.0(Peak)	26.1	1.10	240	Restricted Band



Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

1250 Peterson Dr., Wheeling, IL 60090

**Radiated Fundamental and Spurious Emissions – 30 MHz to 5 GHz
Tested at a 3 Meter Distance**

EUT: F145RF-1328
Manufacturer: White-Rodgers
Operating Condition: 72 deg F; 30% R.H.
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.231 (e)
Comment: Continuous Transmit
Date: 3/12/2007

Note: All other emissions at least 20 dB under the limit.
Output Power Set to -2.5 dBm

Mid Channel: 422 MHz

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
2110	Max Peak	Vert	62.7	27.39	-36.6	53.5	17.3	36.2	54.0(Avg)	17.8	1.10	0	Harmonic
2110	Max Peak	Horz	60.2	27.39	-36.6	51.03	17.3	33.7	54.0(Avg)	20.3	1.20	0	Harmonic
2110	Max Peak	Vert	62.7	27.39	-36.6	53.5	N/A	53.5	74.0(Peak)	20.5	1.10	0	Harmonic
2110	Max Peak	Horz	60.2	27.39	-36.6	51.03	N/A	51.0	74.0(Peak)	23.0	1.20	0	Harmonic
3376	Max Peak	Vert	50.5	30.85	-35.6	45.77	17.3	28.5	54.0(Avg)	25.5	1.50	45	Harmonic
3376	Max Peak	Horz	50.2	30.85	-35.6	45.4	17.3	28.1	54.0(Avg)	25.9	1.40	160	Harmonic
3376	Max Peak	Vert	50.5	30.85	-35.6	45.77	N/A	45.8	74.0(Peak)	28.2	1.50	45	Harmonic
3376	Max Peak	Horz	50.2	30.85	-35.6	45.4	N/A	45.4	74.0(Peak)	28.6	1.40	160	Harmonic



Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

1250 Peterson Dr., Wheeling, IL 60090

Radiated Fundamental and Spurious Emissions – 30 MHz to 5 GHz

Tested at a 3 Meter Distance

EUT: F145RF-1328
Manufacturer: White-Rodgers
Operating Condition: 72 deg F; 30% R.H.
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.231 (e)
Comment: Continuous Transmit
Date: 3/12/2007

Note: All other emissions at least 20 dB under the limit.
Output Power Set to -2.5 dBm

High Channel: 427 MHz

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
427	Max Peak	Vert	61.0	15.97	4.4	81.38	17.3	64.1	72.6(Avg)	8.5	1.10	90	Fundamental
427	Max Peak	Horz	65.6	15.97	4.4	85.92	17.3	68.6	72.6(Avg)	4.0	1.00	0	Fundamental
427	Max Peak	Vert	61.0	15.97	4.4	81.38	N/A	81.4	92.6(Peak)	11.2	1.10	90	Fundamental
427	Max Peak	Horz	65.6	15.97	4.4	85.92	N/A	85.9	92.6(Peak)	6.7	1.00	0	Fundamental
854	Max Peak	Vert	40.7	21.92	-18.9	43.76	17.3	26.5	52.6(Avg)	26.1	1.40	300	Harmonic
854	Max Peak	Horz	41.2	21.92	-18.9	44.2	17.3	26.9	52.6(Avg)	25.7	1.50	0	Harmonic
854	Max Peak	Vert	40.7	21.92	-18.9	43.76	N/A	43.8	72.6(Peak)	28.8	1.40	300	Harmonic
854	Max Peak	Horz	41.2	21.92	-18.9	44.2	N/A	44.2	72.6(Peak)	28.4	1.50	0	Harmonic
1281	Max Peak	Vert	51.8	24.52	-37.2	39.09	17.3	21.8	54.0(Avg)	32.2	1.30	160	Harmonic
1281	Max Peak	Horz	49.7	24.52	-37.2	37	17.3	19.7	54.0(Avg)	34.3	1.10	180	Harmonic
1281	Max Peak	Vert	51.8	24.52	-37.2	39.09	N/A	39.1	74.0(Peak)	34.9	1.30	160	Harmonic
1281	Max Peak	Horz	49.7	24.52	-37.2	37	N/A	37.0	74.0(Peak)	37.0	1.10	180	Harmonic
1708	Max Peak	Vert	66.7	25.87	-37	55.52	17.3	38.2	54.0(Avg)	15.8	1.30	180	Restricted Band
1708	Max Peak	Horz	59.6	25.87	-37	48.51	17.3	31.2	54.0(Avg)	22.8	1.30	160	Restricted Band
1708	Max Peak	Vert	66.7	25.87	-37	55.52	N/A	55.5	74.0(Peak)	18.5	1.30	180	Restricted Band
1708	Max Peak	Horz	59.6	25.87	-37	48.51	N/A	48.5	74.0(Peak)	25.5	1.30	160	Restricted Band



Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

1250 Peterson Dr., Wheeling, IL 60090

Radiated Fundamental and Spurious Emissions – 30 MHz to 5 GHz

Tested at a 3 Meter Distance

EUT: F145RF-1328
Manufacturer: White-Rodgers
Operating Condition: 72 deg F; 30% R.H.
Test Site: Site 3
Operator: Jason Lauer
Test Specification: FCC Part 15.231 (e)
Comment: Continuous Transmit
Date: 3/12/2007

Note: All other emissions at least 20 dB under the limit.
Output Power Set to -2.5 dBm

High Channel: 427 MHz

Frequency (MHz)	Measurement Detector	Ant. Pol.	Level (dBuV)	Antenna Factor (dB/m)	System Loss (dB)	Total Level (dBuV/m)	Duty Cycle Correction (dB)	Final Corrected (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Ant. Height (m)	EUT Angle (deg)	Comment
2135	Max Peak	Vert	65.1	27.45	-36.6	55.93	17.3	38.6	54.0(Avg)	15.4	1.00	160	Harmonic
2135	Max Peak	Horz	60.4	27.45	-36.6	51.23	17.3	33.9	54.0(Avg)	20.1	1.40	345	Harmonic
2135	Max Peak	Vert	65.1	27.45	-36.6	55.93	N/A	55.9	74.0(Peak)	18.1	1.00	160	Harmonic
2135	Max Peak	Horz	60.4	27.45	-36.6	51.23	N/A	51.2	74.0(Peak)	22.8	1.40	345	Harmonic
3416	Max Peak	Vert	49.5	30.93	-35.6	44.87	17.3	27.6	54.0(Avg)	26.4	1.40	45	Harmonic
3416	Max Peak	Horz	49.7	30.93	-35.6	44.99	17.3	27.7	54.0(Avg)	26.3	1.10	270	Harmonic
3416	Max Peak	Vert	49.5	30.93	-35.6	44.87	N/A	44.9	74.0(Peak)	29.1	1.40	45	Harmonic
3416	Max Peak	Horz	49.7	30.93	-35.6	44.99	N/A	45.0	74.0(Peak)	29.0	1.10	270	Harmonic



Company: White-Rodgers
Model Tested: F145RF-1328
Report Number: 12797

1250 Peterson Dr., Wheeling, IL 60090

APPENDIX A

TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

5.0 RESTRICTED BANDS

As stated in Section 15.205a, the fundamental emission from the Wireless Remote Temperature Sensor shall not fall within any of the bands listed below:

Frequency in MHz	Frequency in MHz	Frequency in MHz	Frequency in GHz
.0900 to .1100	162.0125 to 167.17	2310.0 to 2390	9.30 to 9.50
.4900 to .5100	167.7200 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.000 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.200 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.900 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.000 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.000 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.000 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.000 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.000 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.800 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.000 to 2300.00	9000.0 to 9200	

NOTE:

The noise floor within the Restricted Bands for the EMC Receiver and HP Spectrum Analyzer will typically lay 20 dB below the limit.

See data taken on pages 27 - 32 of this test report