



1250 Peterson Dr., Wheeling, IL 60090

Company: VenTek, LLC
Model Tested: WVN05P
Report Number: 12974

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

THE FOLLOWING "MEETS" THE ABOVE TEST SPECIFICATION

Formal Name: e-Guard Monitor
Kind of Equipment: Wireless Sensor/Monitor
Test Configuration: Cable with Pin Connector (Tested at 3.6 vdc)
Model Number(s): WVN05P
Model(s) Tested: WVN05P
Serial Number(s): NA
Date of Tests: January 2, 3, 4, 5, and February 15 & 16, 2007
Test Conducted For: VenTek, LLC
9470 Meridian Way
West Chester, Ohio 45069

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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VenTek, LLC



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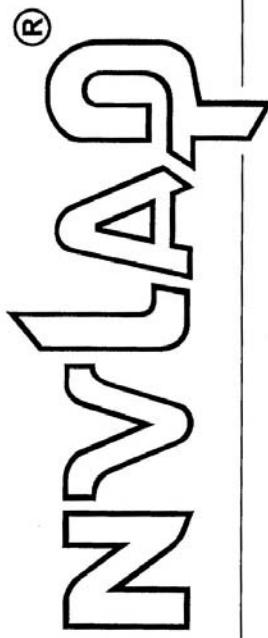
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United States Department of Commerce
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Certificate of Accreditation to ISO/IEC 17025:1999

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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Accreditation is granted for specific services, listed on the Scope of Accreditation, for:*

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS



2006-10-01 through 2007-09-30
Effective dates

Jeff J. Bruce
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 e-Guard Monitor, Model Number(s) WVN05P, "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. The conducted emissions test was not required because the e-Guard Monitor 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 January 2, 3, 4, 5, and February 15 & 16, 2007, a series of radio frequency interference measurements was performed on e-Guard Monitor, Model Number(s) WVN05P, Serial Number: NA. 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 HP Spectrum Analyzer or ESI 26/40 Fixed Tuned Receiver. The data was taken using Peak, Quasi-Peak or the Average Detector Functions as required. 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 HP Spectrum Analyzer and/or ESI 26/40 Fixed Tuned Receiver. These plots were made using the Peak or Quasi-Peak Detector functions, with manual measurements performed on the questionable frequencies using the Quasi-Peak or the Average Detector Function of the Analyzer or ESI 26/40 Fixed Tuned Receiver as required. Above 1000 MHz, final data was taken using the Average Detector on the Spectrum Analyzer.

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:

VenTek's Wireless Monitor provides a simple and cost effective means for monitoring sensor inputs through V-Bus. It is compatible with all VenTek sensors including: Pressure, Temperature, Current, Vibration and Humidity. Data packets are transmitted at 418 MHz to receivers or repeaters up to 600 feet away. VenTek offers a simple software solution to monitor all of the sensors on any Windows Based PC system, utilizing either our OPC/DDE driver through serial or our Manager based receiver with TCP/IP through Serial or 10/100 Ethernet porting.

This is a sensor monitor that is connected to one of 5 sensors and broadcast at 418MHz to a remote receiver. The data is used for predictive maintenance

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length 3.03" x Width 2.5" x depth 1.22"

7.3 LINE FILTER USED:

NA

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

NA

Clock Frequencies:

8, 418 MHz



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7.0 DESCRIPTION OF TEST SAMPLE: (CON'T)

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Radio Board	PN: EA00130-08
2. Vibration V-Bus Board	PN: EA00138-08
3. Pressure V-Bus Board	PN: EA00134-08
4. Temperature V-Bus Board	PN: EA00133-08
5. Temp / Humid V-Bus Board	PN: EA00136-08
6. Current V-Bus Board	PN: EA00137-08
7. Antenna	PN: ANT1N44RM
8. Antenna	PN: ANT1N44SM
9. Antenna	PN: ANT1N44SD



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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:

Tested 3 Antennas: 1) Monopole,
2) 90 Degree Monopole
3) Dipole

Tested with 5 Sensors: 1) Current Sensor S1WP-01
2) Humidity/Temperature Sensor S1WHT-01
3) Pressure Sensor S1WP-01
4) Temperature Sensor S1WT-01
5) Vibration Sensor S1WV-01

Radiated Spurious emissions were tested with the worst-case 90 degree Monopole & Dipole Antennas only.

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 e-Guard Monitor
Model Number: WVN05P, Serial Number: NA

Item 1 Antenna

Item 2 Sensor



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10.0 RADIATED PHOTOS TAKEN DURING TESTING



MONOPOLE ANTENNA



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10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



90 DEGREE MONOPOLE ANTENNA



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10.0 RADIATED PHOTOS TAKEN DURING TESTING (CON'T)



DIPOLE ANTENNA



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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. Points on the emission charts shown with a yellow mark are background frequencies that were verified during testing.

12.0 CONCLUSION

It was found that the e-Guard Monitor, Model Number(s) WVN05P "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. The conducted emissions test was not required because the e-Guard Monitor is powered from a D.C. power source. It does not have a line cord to plug into the A.C. power line.



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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	3/07
Antenna	EMCO	3104C	00054892	20 MHz – 200 MHz	3/07
Antenna	Electrometrics	3146	1205	200 MHz – 1 GHz	3/07
Antenna	EMCO	3104C	97014785	20 MHz – 200 MHz	2/08
Antenna	EMCO	3146	97024895	200 MHz – 1 GHz	3/07
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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APPENDIX A

TEST PROCEDURE

Part 15, Subpart C, Section 15.231e

ELECTRIC FIELD RADIATED EMISSIONS TEST



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APPENDIX A

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 e-Guard Monitor, Model Number WVN05P, are shown by the graphs on the following pages. The actual total "on time" during the 100 msec is 13.78752 msec with a total "off time" of 86.21 msec resulting in a **17.21 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.

1.04208 msec/pulse on time * 1 pulse = 1.04208 msec (data word on time)

721.44 usec/pulse on time * 11 pulses = 7935.84 usec (data word on time)

400.8 usec/pulse on time * 5 pulses = 2004 usec (data word on time)

280.56 usec/pulse on time * 10 pulses = 2805.6 usec (data word on time)

1042.08 usec (on time) + 7935.84 usec (on time) + 2004 usec (on time) + 2805.6 usec (on time) = 13,787.52 usec total "on time"

13.78752 msec (total "on time") / 100 msec = .1378752 Duty Cycle

20*LOG10 .1378752 = **17.21 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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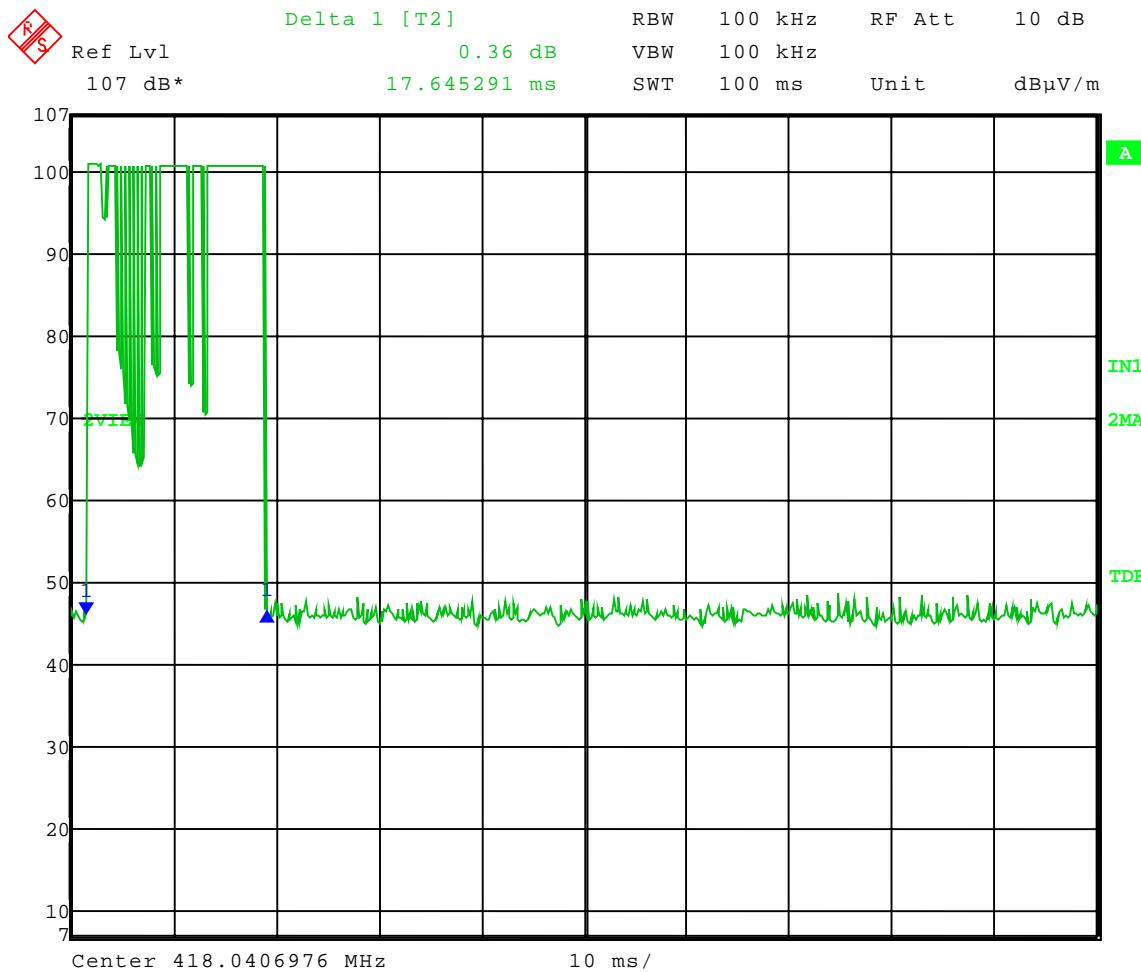
Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Test: Duty Cycle
Operator: Craig Brandt

Comment: One pulse at 1.04208 ms
11 pulses at 721.44 μ s each
Five pulses at 400.80 μ s each
10 pulses at 280.56 μ s each

Total on Time = 13.78752 ms during 100 ms Sweep

20 log (13.78752 / 100) = -17.21

Duty Cycle Correction Factor = 17.21 dB



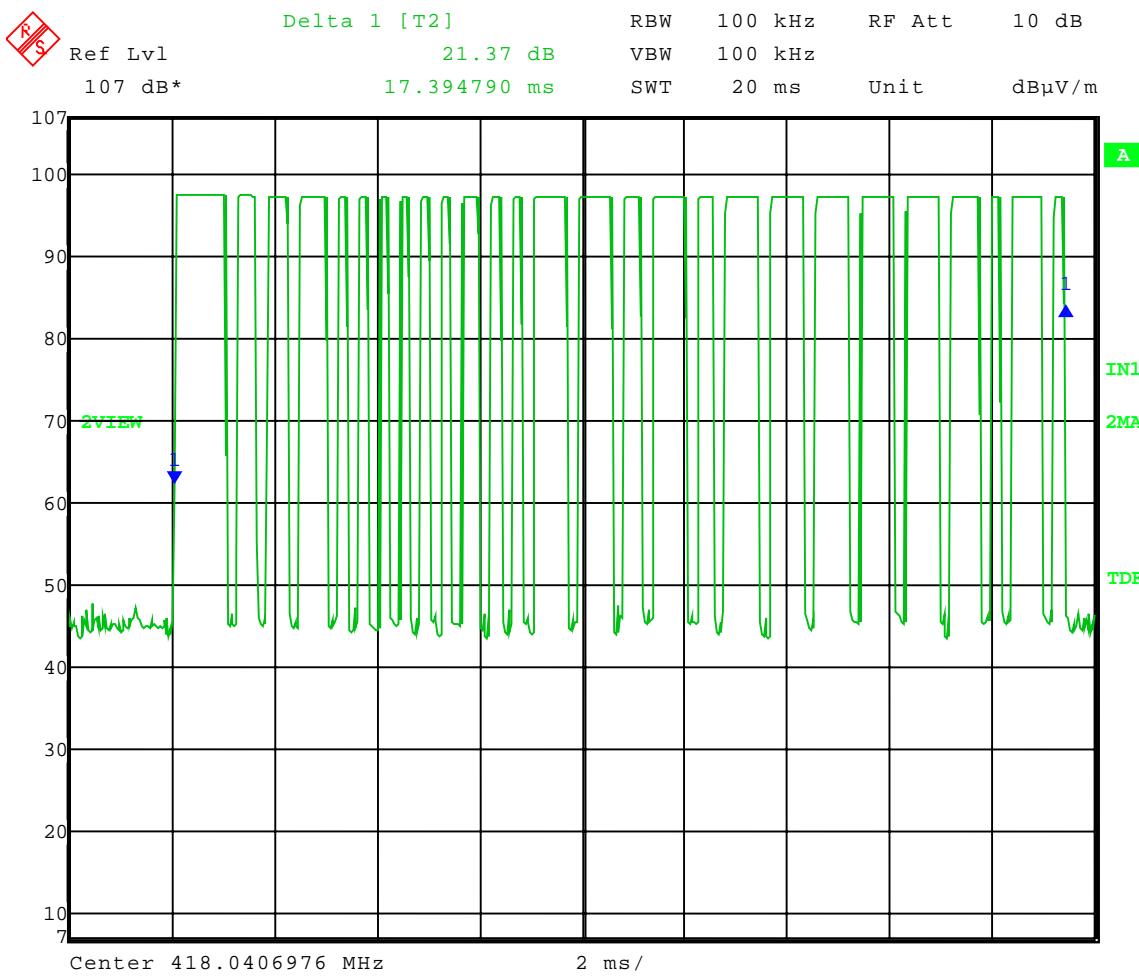
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Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Test: Duty Cycle
Operator: Craig Brandt
Comment: One complete pulse train



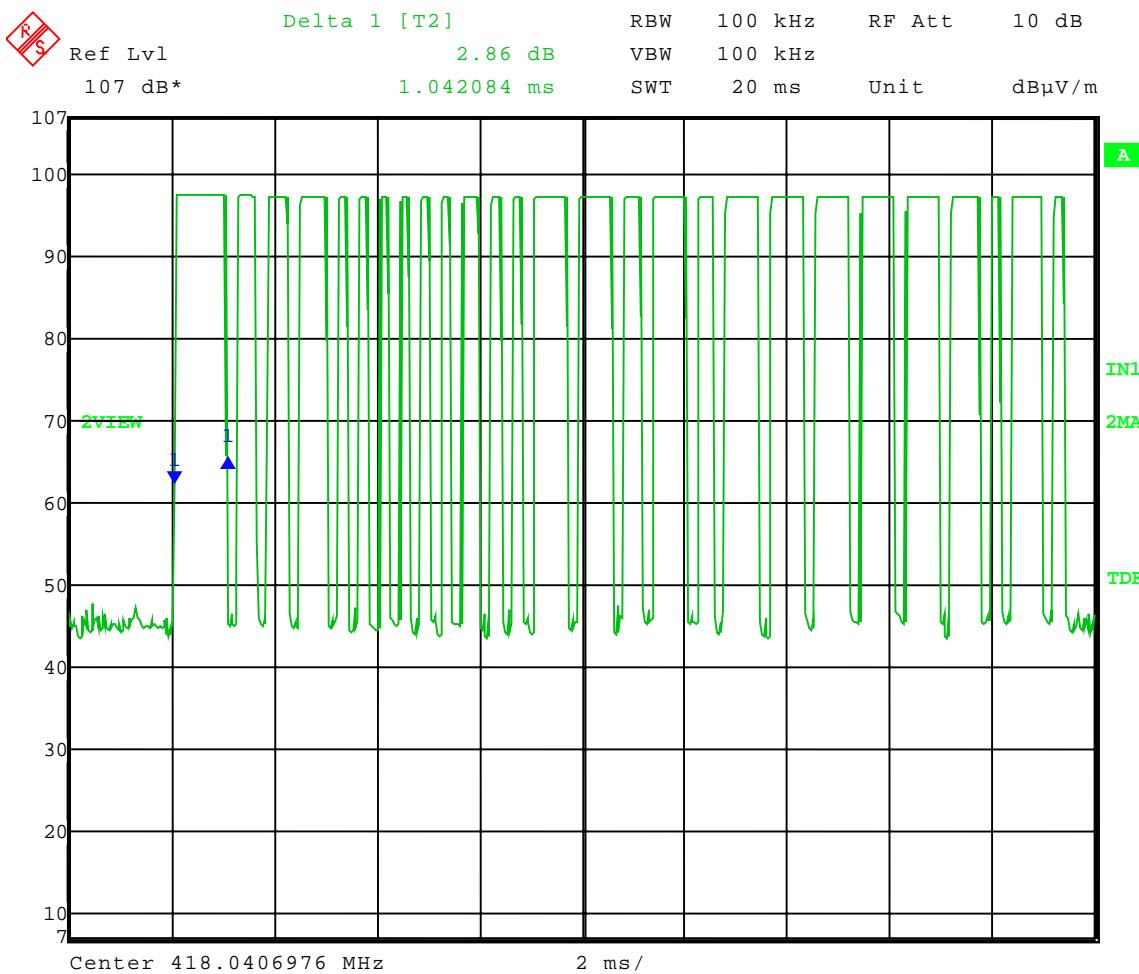
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Company: VenTek, LLC
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Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Test: Duty Cycle
Operator: Craig Brandt
Comment: Pulse = 1.04208 ms pulse



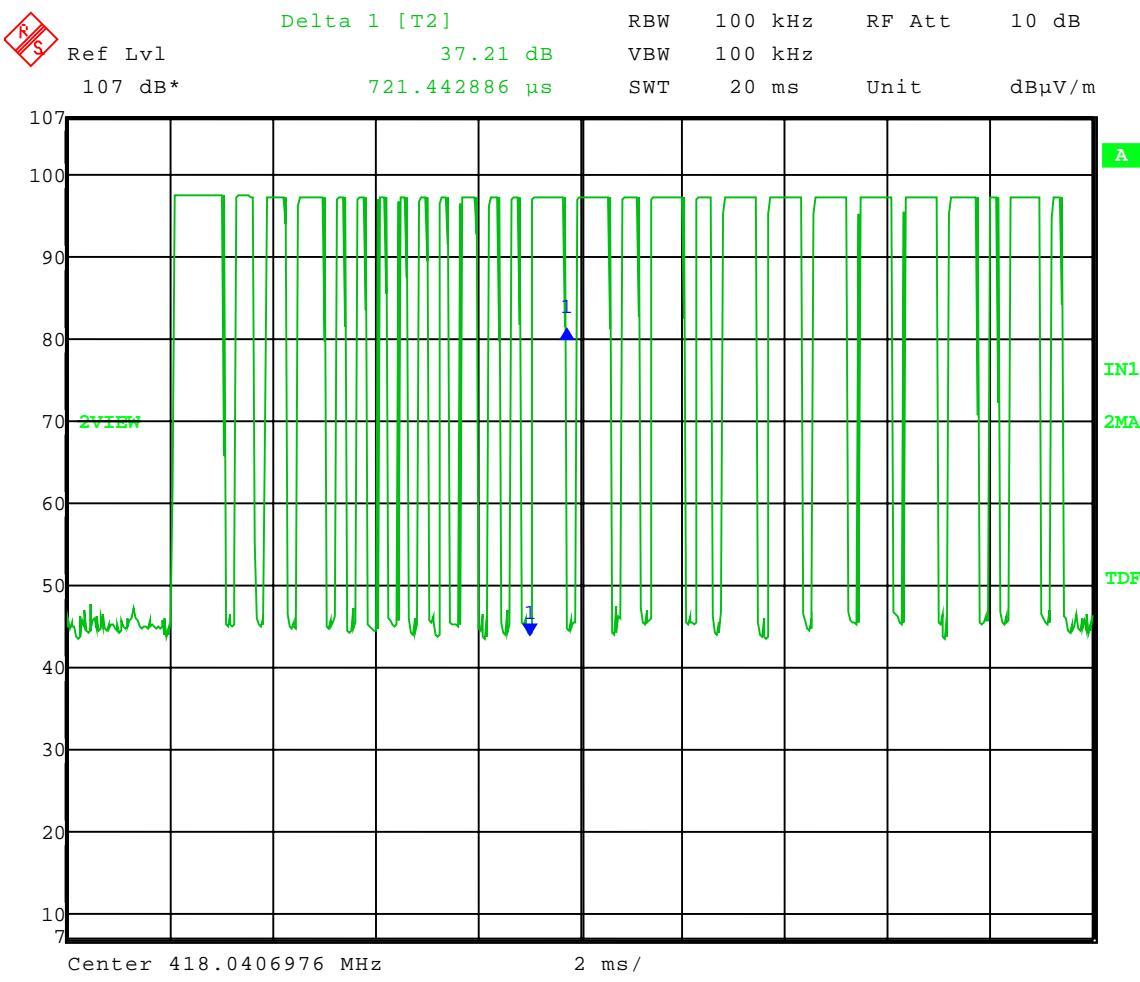
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Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Test: Duty Cycle
Operator: Craig Brandt
Comment: 721.44 μ s pulse

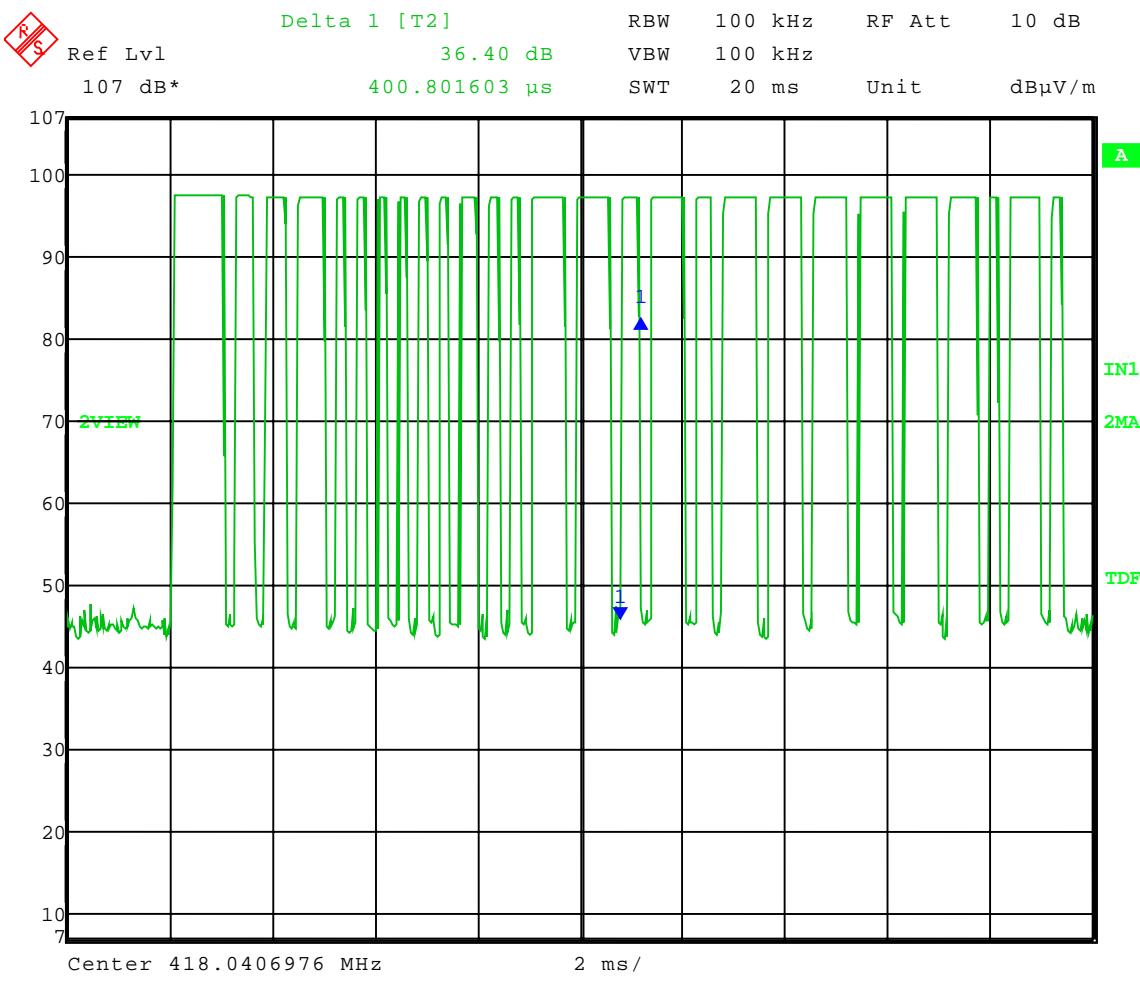




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Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Test: Duty Cycle
Operator: Craig Brandt
Comment: 400.80 μ s pulse

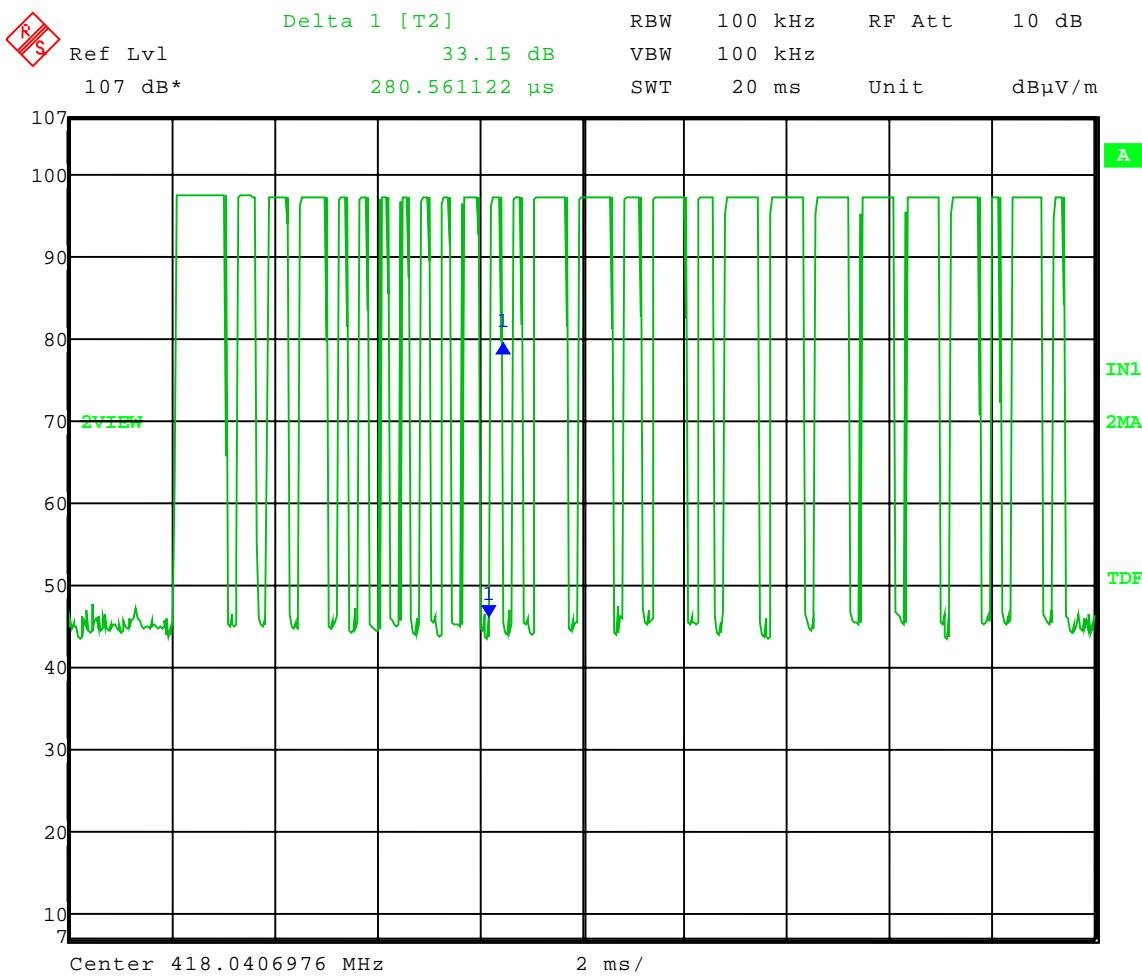




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Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Test: Duty Cycle
Operator: Craig Brandt
Comment: 280.56 μ s pulse



Date: 3.JAN.2007 11:51:53



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APPENDIX A

TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

2.0 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	$\pm .01\%$ 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(s) on the following page(s), the bandwidth for the e-Guard Monitor was measured at 13.59 kHz, which meets the above specification. With a fundamental frequency of 418 MHz, the FCC Bandwidth limit is 1045 kHz when multiplying the fundamental by 0.25%, with a margin of 1031.41 kHz.



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GRAPH(S) TAKEN OF THE 20 dB BANDWIDTH EMISSIONS

PART 15.231c & d

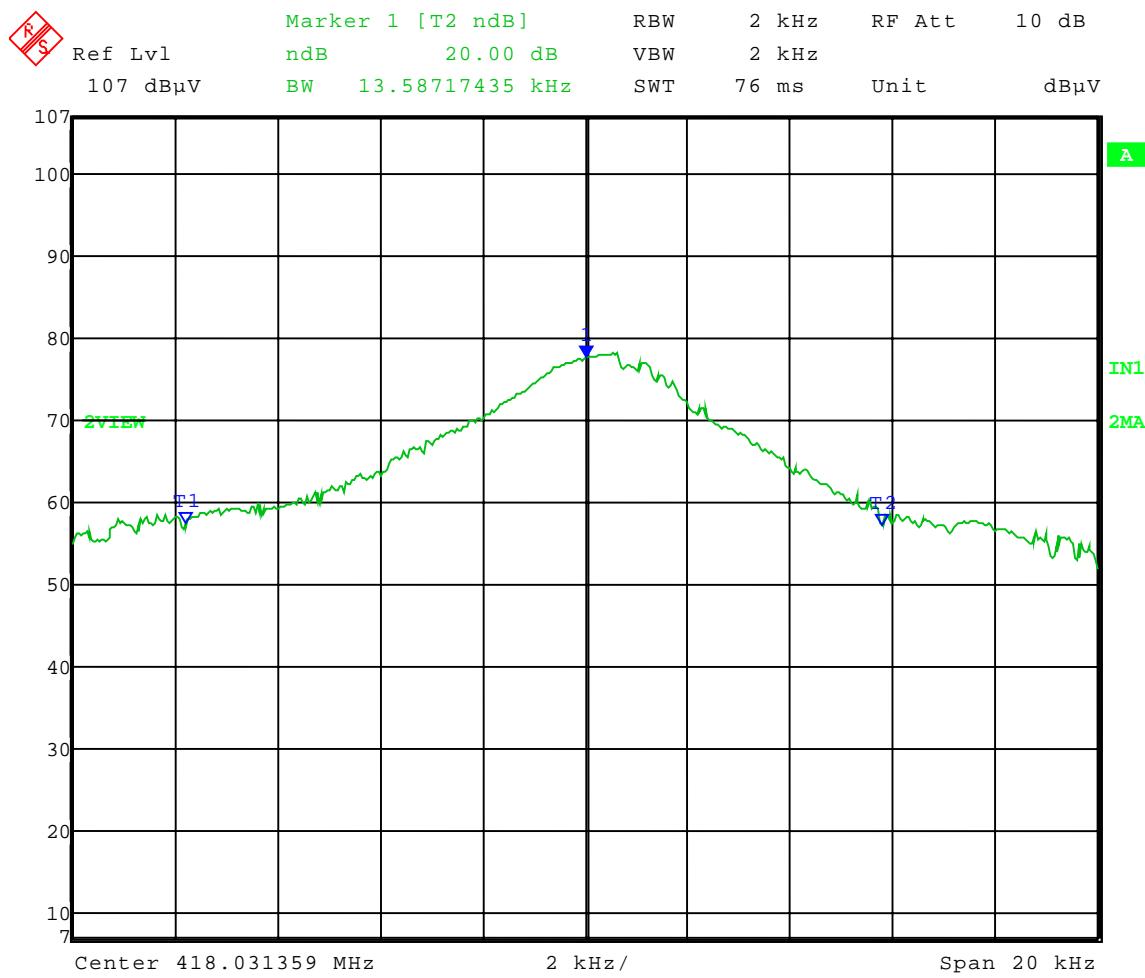


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Test Date: 01-02-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Test: 20 dB Bandwidth - Radiated
Operator: Craig Brandt
Comment: Frequency: 418 MHz

20 dB Bandwidth = 13.59 kHz





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3.0 FIELD STRENGTH OF SPURIOUS EMISSION MEASUREMENTS - SECTION 15.231e

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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DATA TAKEN OF FUNDAMENTAL,
HARMONIC 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: Wireless Sensor Monitor Transmitter Model: WVN05P
Manufacturer: VenTek, LLC
Operating Condition: 72 deg F; 31% R.H.
Test Site: Site 3
Operator: Tim Lusha
Test Specification: FCC Part 15.231(e) and FCC Part 15.205
Date: 02/16/2007

Note: All other emissions at least 20 dB under the limit.

90 Degree Monopole Antenna

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
418.028	Peak	Vert	64.00	15.35	4.6	84.0	17.21	66.8	72.32	5.5	1.0	0	Fundamental
418.028	Peak	Horz	66.57	15.35	4.6	86.6	17.21	69.4	72.32	2.9	2.5	225	Fundamental
836.056	Peak	Vert	50.25	21.93	-18.0	54.2	17.21	37.0	52.32	15.3	1.0	240	Harmonic
836.056	Peak	Horz	49.80	21.93	-18.0	53.7	17.21	36.5	52.32	15.8	1.0	240	Harmonic
1254.084	Peak	Vert	61.55	24.46	-37.9	48.1	17.21	30.9	52.32	21.4	1.0	180	Harmonic
1254.084	Peak	Horz	65.87	24.46	-37.9	52.5	17.21	35.3	52.32	17.0	1.0	270	Harmonic
1672.112	Average	Vert	40.85	25.72	-38.8	27.7	N/A	27.7	54.00	26.3	1.5	315	Restricted Band
1672.112	Average	Horz	39.60	25.72	-38.8	26.5	N/A	26.5	54.00	27.5	1.0	270	Restricted Band
1672.112	Peak	Vert	53.81	25.72	-38.8	40.7	N/A	40.7	74.00	33.3	1.5	315	Restricted Band
1672.112	Peak	Horz	52.43	25.72	-38.8	39.3	N/A	39.3	74.00	34.7	1.0	270	Restricted Band
2090.140	Peak	Vert	54.66	27.33	-39.3	42.7	17.21	25.6	52.32	26.7	1.25	315	Harmonic
2090.140	Peak	Horz	55.43	27.33	-39.3	43.4	17.21	26.2	52.32	26.1	1.5	200	Harmonic
2508.168	Peak	Vert	54.82	28.43	-39.4	43.9	17.21	26.7	52.32	25.6	1.0	180	Harmonic
2508.168	Peak	Horz	50.29	28.43	-39.4	39.4	17.21	22.0	52.32	30.3	1.5	180	Harmonic
2926.196	Peak	Vert	55.30	29.85	-39.0	46.2	17.21	29.0	52.32	23.3	1.0	180	Harmonic
2926.196	Peak	Horz	51.68	29.85	-39.0	42.6	17.21	25.4	52.32	26.9	1.5	200	Harmonic



Company: VenTek, LLC
Model Tested: WVN05P
Report Number: 12974

1250 Peterson Dr., Wheeling, IL 60090

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

EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Manufacturer: VenTek, LLC
Operating Condition: 72 deg F; 31% R.H.
Test Site: Site 3
Operator: Tim Lusha
Test Specification: FCC Part 15.231(e) and FCC Part 15.205
Date: 02/16/2007

Note: All other emissions at least 20 dB under the limit.

90 Degree Monopole Antenna

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
3344.224	Peak	Vert	51.68	30.79	-38.6	43.8	17.21	26.6	52.32	25.7	1.0	90	Harmonic
3344.224	Peak	Horz	52.98	30.79	-38.6	45.1	17.21	27.9	52.32	24.4	1.5	315	Harmonic
3762.252	Average	Vert	44.05	31.83	-37.8	38.1	N/A	38.1	54.00	15.9	1.5	0	Restricted Band
3762.252	Average	Horz	41.70	31.83	-37.8	35.7	N/A	35.7	54.00	18.3	1.5	165	Restricted Band
3762.252	Peak	Vert	56.51	31.83	-37.8	50.6	N/A	50.6	74.00	23.4	1.5	0	Restricted Band
3762.252	Peak	Horz	55.99	31.83	-37.8	50.0	N/A	50.0	74.00	24.0	1.5	165	Restricted Band
4180.280	Average	Vert	38.77	32.36	-36.9	34.3	N/A	34.3	54.00	19.7	1.0	225	Restricted Band
4180.280	Average	Horz	36.21	32.36	-36.9	31.7	N/A	31.7	54.00	22.3	1.5	0	Restricted Band
4180.280	Peak	Vert	52.05	32.36	-36.9	47.5	N/A	47.5	74.00	26.5	1.0	225	Restricted Band
4180.280	Peak	Horz	49.00	32.36	-36.9	44.5	N/A	44.5	74.00	29.5	1.5	0	Restricted Band



Company: VenTek, LLC
Model Tested: WVN05P
Report Number: 12974

1250 Peterson Dr., Wheeling, IL 60090

**Radiated Fundamental
Tested at a 3 Meter Distance**

EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Manufacturer: VenTek, LLC
Operating Condition: 72 deg F; 31% R.H.
Test Site: Site 3
Operator: Tim Lusha
Test Specification: FCC Part 15.231(e) and FCC Part 15.205
Date: 02/16/2007

Note:

Straight Monopole Antenna

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
418.028	Peak	Vert	66.70	15.35	4.6	86.7	17.21	69.5	72.32	2.8	1.00	45	Fundamental
418.028	Peak	Horz	63.72	15.35	4.6	83.7	17.21	66.5	72.32	5.8	2.60	170	Fundamental



1250 Peterson Dr., Wheeling, IL 60090

Company: VenTek, LLC
Model Tested: WVN05P
Report Number: 12974

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

EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Manufacturer: VenTek, LLC
Operating Condition: 72 deg F; 31% R.H.
Test Site: Site 3
Operator: Tim Lusha
Test Specification: FCC Part 15.231(e) and FCC Part 15.205
Date: 2/16/2007

Note: All other emissions at least 20 dB under the limit.

Dipole Antenna

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
418.028	Peak	Vert	56.35	15.35	4.6	76.3	17.21	59.1	72.32	13.2	1.00	315	Fundamental
418.028	Peak	Horz	62.35	15.35	4.6	82.3	17.21	65.1	72.32	7.2	1.00	180	Fundamental
836.056	Peak	Vert	49.07	21.93	-18.0	53.0	17.21	35.8	52.32	16.8	1.10	180	Harmonic
836.056	Peak	Horz	50.37	21.93	-18.0	54.3	17.21	38.0	52.32	14.3	1.00	325	Harmonic
1254.084	Peak	Vert	62.74	24.46	-37.9	49.3	17.21	32.1	52.32	20.2	1.20	180	Harmonic
1254.084	Peak	Horz	65.74	24.46	-37.9	52.3	17.21	35.1	52.32	17.2	1.20	190	Harmonic
1672.112	Average	Vert	39.28	25.72	-38.8	26.2	N/A	26.2	54.00	27.8	1.10	315	Restricted Band
1672.112	Average	Horz	39.58	25.72	-38.8	26.5	N/A	26.5	54.00	27.5	1.40	180	Restricted Band
1672.112	Peak	Vert	52.18	25.72	-38.8	39.1	N/A	39.1	74.00	34.9	1.10	315	Restricted Band
1672.112	Peak	Horz	51.78	25.72	-38.8	38.7	N/A	38.7	74.00	35.3	1.40	180	Restricted Band
2090.140	Peak	Vert	56.47	27.33	-39.3	44.5	17.21	27.3	52.32	25.0	1.20	180	Harmonic
2090.140	Peak	Horz	57.67	27.33	-39.3	45.7	17.21	28.5	52.32	23.8	1.10	30	Harmonic
2508.168	Peak	Vert	51.97	28.43	-39.4	41.0	17.21	23.8	52.32	28.5	1.00	180	Harmonic
2508.168	Peak	Horz	54.17	28.43	-39.4	43.2	17.21	26.0	52.32	26.3	1.10	180	Harmonic
2926.196	Peak	Vert	52.85	29.85	-39.0	43.7	17.21	26.5	52.32	25.8	1.00	75	Harmonic
2926.196	Peak	Horz	53.35	29.85	-39.0	44.2	17.21	27.0	52.32	25.3	1.20	135	Harmonic



Company: VenTek, LLC
Model Tested: WVN05P
Report Number: 12974

1250 Peterson Dr., Wheeling, IL 60090

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

EUT: Wireless Sensor Monitor Transmitter Model: WVN05P
Manufacturer: VenTek, LLC
Operating Condition: 72 deg F; 31% R.H.
Test Site: Site 3
Operator: Tim Lusha
Test Specification: FCC Part 15.231(e) and FCC Part 15.205
Date: 2/16/2007

Note: All other emissions at least 20 dB under the limit.

Dipole Antenna

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
3344.224	Peak	Vert	51.61	30.79	-38.6	43.8	17.21	26.6	52.32	25.7	1.00	225	Harmonic
3344.224	Peak	Horz	52.51	30.79	-38.6	44.7	17.21	27.5	52.32	24.8	1.10	80	Harmonic
3762.252	Average	Vert	41.47	31.83	-37.8	35.5	N/A	35.5	54.00	18.5	1.00	340	Restricted Band
3762.252	Average	Horz	43.77	31.83	-37.8	37.8	N/A	37.8	54.00	16.2	1.20	75	Restricted Band
3762.252	Peak	Vert	54.87	31.83	-37.8	48.9	N/A	48.9	74.00	25.1	1.00	340	Restricted Band
3762.252	Peak	Horz	56.17	31.83	-37.8	50.2	N/A	50.2	74.00	23.8	1.20	75	Restricted Band
4180.280	Average	Vert	36.74	32.36	-36.9	32.2	N/A	32.2	54.00	21.8	1.00	135	Restricted Band
4180.280	Average	Horz	36.84	32.36	-36.9	32.3	N/A	32.3	54.00	21.7	1.00	90	Restricted Band
4180.280	Peak	Vert	49.64	32.36	-36.9	45.1	N/A	45.1	74.00	28.9	1.00	135	Restricted Band
4180.280	Peak	Horz	49.34	32.36	-36.9	44.8	N/A	44.8	74.00	29.2	1.00	90	Restricted Band



Company: VenTek, LLC
Model Tested: WVN05P
Report Number: 12974

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APPENDIX A
TEST PROCEDURE
ELECTRIC FIELD RADIATED EMISSIONS TEST

4.0 RESTRICTED BANDS

As stated in Section 15.205a, the fundamental emission from the e-Guard Monitor 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	167.72 to 173.20	2483.5 to 2500	10.60 to 12.70
2.1735 to 2.1905	240.00 to 285.00	2655.0 to 2900	13.25 to 13.40
8.362 to 8.3660	322.20 to 335.40	3260.0 to 3267	14.47 to 14.50
13.36 to 13.410	399.90 to 410.00	3332.0 to 3339	15.35 to 16.20
25.50 to 25.670	608.00 to 614.00	3345.8 to 3358	17.70 to 21.40
37.50 to 38.250	960.00 to 1240.00	3600.0 to 4400	22.01 to 23.13
73.00 to 75.500	1300.00 to 1427.00	4500.0 to 5250	23.60 to 24.00
108.00 to 121.94	1435.00 to 1626.50	5350.0 to 5450	31.20 to 31.80
123.00 to 138.00	1660.00 to 1710.00	7250.0 to 7750	36.43 to 36.50
149.90 to 150.00	1718.80 to 1722.20	8025.0 to 8500	ABOVE 38.60
156.70 to 156.90	2200.00 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 the data taken on pages 20 – 25 of this test report for the restricted bands.