1250 Peterson Dr., Wheeling, IL 60090

Company: VenTek, LLC
Model Tested: WV1P
Report Number: 13930

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 Tilt Sensor
Kind of Equipment:	Wireless Sensor/Monitor
Test Configuration:	Standalone (Tested at 3.6 vdc)
Model Number(s):	WV1P
Model(s) Tested:	WV1P
Serial Number(s):	Test
Date of Tests:	January 2 & 3, 2007, December 20, 2007 & March 10, 2008
Test Conducted For:	VenTek, LLC 9470 Meridian Way West Chester, IL 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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Company: VenTek, LLC
Model Tested: WV1P
Report Number: 13930

SIGNATURE PAGE

Report By:

Arnom C. Rowe
Test Engineer
EMC-001375-NE

Reviewed By:

William Stumpf
OATS Manager

Approved By:

Brian Mattson
General Manager

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United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 100276-0

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

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

ELECTROMAGNETIC COMPATIBILITY AND TELECOMMUNICATIONS

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated 18 June 2005).

2007-10-01 through 2008-09-30
Effective dates

DEPARTMENT OF COMMERCE ★ UNITED STATES OF AMERICA ★

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

NVLAP-01C (REV. 2006-09-13)

1.0 SUMMARY OF TEST REPORT

It was found that the e-Guard Tilt Sensor, Model Number(s) WV1P, **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 AC Power Line conducted emissions test was not required because the e-Guard Tilt 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 January 2 & 3, 2007, December 20, 2007 & March 10, 2008, a series of radio frequency interference measurements was performed on e-Guard Tilt Sensor, Model Number(s) WV1P, Serial Number: Test. 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 Guide 17025. NVLAP Certificate and Scope can be viewed at http://www.dlsemc.com/certificate. Our facilities are registered with the FCC (Registration #90531), Industry Canada (Registration #2060A-1, 2060A-2, & 2060A-3), and VCCI. All Emission tests were performed by personnel of D.L.S. Electronic Systems, Inc. at the following location(s):

Main Test Facility:
D.L.S. Electronic Systems, Inc.
1250 Peterson Drive
Wheeling, Illinois 60090

O.A.T.S. Test Facility:
D.L.S. Electronic Systems, Inc.
166 S. Carter Street
Genoa City, Wisconsin 53128

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).

The conducted tests were performed with the test item placed on a non-conductive table (table top equipment), located in the test room. Equipment normally operated on the floor was tested by placing it on the metal ground plane. The ground plane has an electrical isolation layer over its surface approximately 7mm thick. The power line supplied was connected to a dual line impedance stabilization network electrically bonded to the ground plane, located on the floor. The networks were constructed per the requirements of the American National Standards Institute, ANSI C63.4-2003, Section 4, (Figure 2).

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.

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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 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 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 ANSI C63.4-2003.

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

7.1 Description:

VenTek's WV1P transmits status at random time intervals that are at least 10 seconds, but do not exceed 17 seconds. Data packets are transmitted at 418 MHz to receivers or repeaters. 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.

7.2 PHYSICAL DIMENSIONS OF EQUIPMENT UNDER TEST

Length: 3.5 x Width: 2.55 x Height: 1.70

7.3 LINE FILTER USED:

N/A

7.4 INTERNAL CLOCK FREQUENCIES:

Switching Power Supply Frequencies:

N/A

Clock Frequencies:

8 MHz & 418 MHz

7.5 DESCRIPTION OF ALL CIRCUIT BOARDS:

1. Radio board	PN: EM00369-00
2. Vibration V-Bus Board	PN: EA00138-0
3. Pressure V-Bus Board	PN: EA00134-0
4. Temperature V-Bus Board	PN: EA00133-0
5. Humidity V-Bus Board	PN: EA00136-0
6. Current V-Bus Board	PN: EA00137-0
7. Antenna	PN: ANT1N44SM

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

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

NOTES:

The WV1P transmitter was set in continuous transmit mode and used the ANT1N44SM antenna during testing.

Tested with 7 Sensors:

1) S1WP
2) S1WMA
3) S1WV01ES
4) S1WPD4ES
5) S1WHT01ES
6) S1WT01ZL
7) S1WC01ES

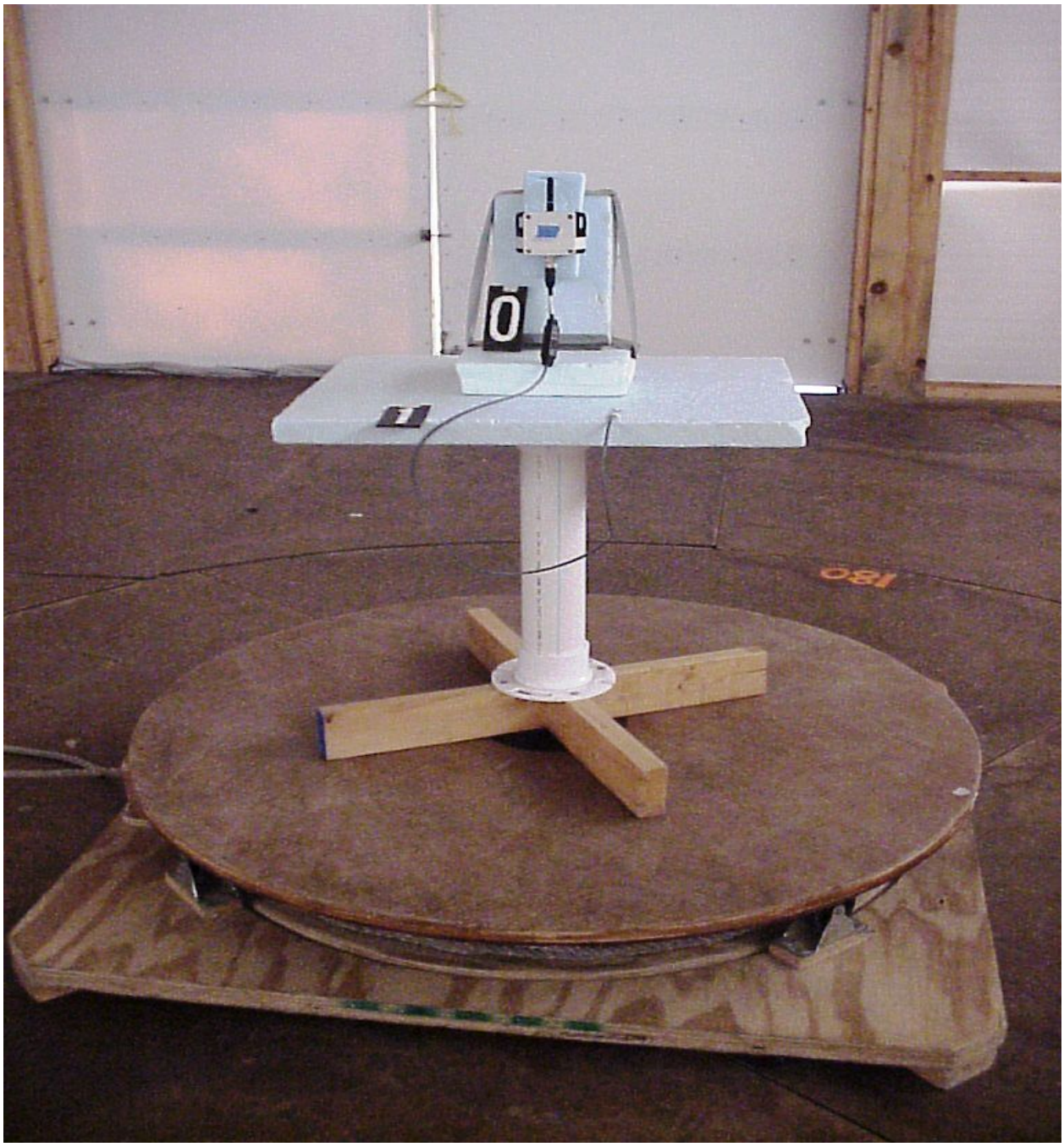
The S1WMA Sensor had the Worst Case Radiated Emissions.

9.0 PHOTO INFORMATION AND TEST SET-UP

Item 0 e-Guard Tilt Sensor
Model Number: WV1P, Serial Number: Test

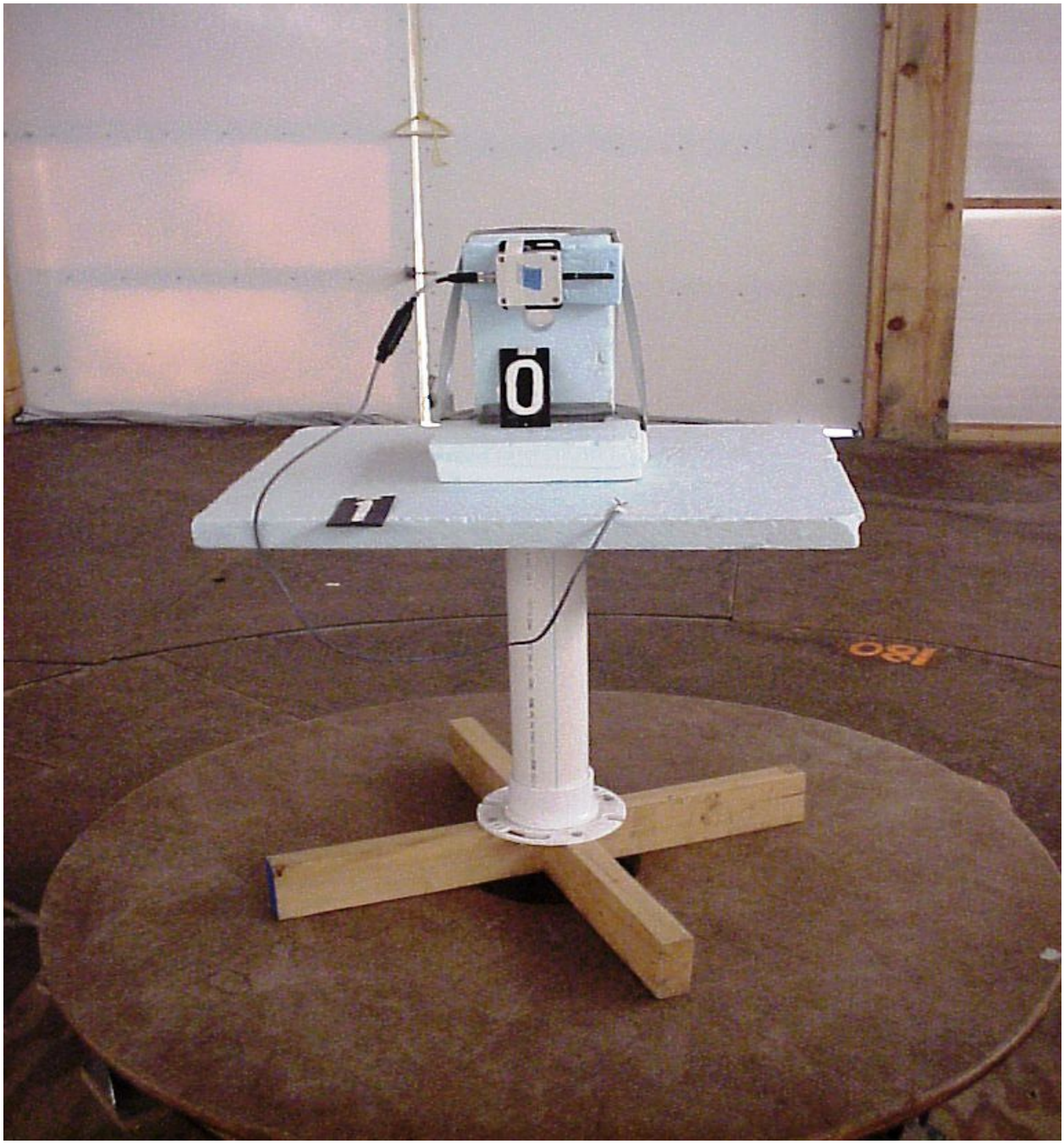
Item 1 S1WMA Sensor

10.0 RADIATED PHOTOS TAKEN DURING TESTING



POSITION 1

10.0 RADIATED PHOTOS TAKEN DURING TESTING



POSITION 2

11.0 RESULTS OF TESTS

The radio interference emission charts 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 e-Guard Tilt Sensor, Model Number(s) WV1P **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 Tilt Sensor is powered from a D.C. power source. It does not have a line cord to plug into the A.C. power line.

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	11/08
Receiver	Rohde & Schwarz	ESI 40	837808/006	20 Hz – 40 GHz	12/08
Receiver	Rohde & Schwarz	ESI 40	837808/005	20 Hz – 40 GHz	12/08
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	Rohde & Schwarz	HUF-Z1	829381001	20 MHz – 1 GHz	2/08
Antenna	Rohde & Schwarz	HUF-Z1	829381005	20 MHz – 1 GHz	8/08
Horn Antenna	EMCO	3116	2549	18 – 40GHz	5/08
Horn Antenna	ETS Lindgren	3116	00062917	18 – 40GHz	10/08

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

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Horn Antenna	A.H. Systems	SAS-574	221	18 - 40GHz	4/08
Horn Antenna	A.H. Systems	SAS-574	222	18 - 40GHz	4/08
Horn Antenna	Com Power	AH 118	071127	1-18GHz	5/08
Horn Antenna	EMCO	3115	4451	1-18GHz	5/08
Horn Antenna	EMCO	3115	6204	1-18GHz	5/08
Horn Antenna	EMCO	3115	5731	1-18GHz	6/08
Attenuator - 10dB Fixed	JFW	50FH-101-50N	50FH-010-10	DC-2GHz	9/08
Attenuator- 10dB Fixed	Pasternack	PE7014-10		DC-18GHz	9/08
Attenuator- 10dB Fixed	JFW	50FH-010-10		DC-2GHz	9/08
Attenuator- 20dB Fixed	Aeroflex Weinschel	75A-20-12	1071	DC – 40GHz	7/08
Attenuator- 20dB Fixed	Pasternack	PE7019-20		DC-18GHz	9/08
Attenuator- 40dB Fixed	JFW	50FHA0-040-200		DC-18GHz	4/08
Audio Analyzer	HP	8903A	2336A03043	20Hz-100kHz	12/08

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

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Attenuator-20dB fixed	MCE-WEIN	59955A-20		DC-40GHz	9/08
Filter- Band Reject Tunable	K&L	3TNF-500/1000-B/B		360MHz-1.25GHz	Cal when needed
Filter- Band Reject Tunable	K&L	3TNF-63/125-B/B		62MHz-200MHz	Cal when needed
Power Meter	Anritsu	ML2487A	6K00002069		10/08
Power Sensor	Anritsu	MA2411A	031563	300MHz-40GHz	10/08
Power Sensor	Anritsu	MA2490A		50MHz-8GHz	10/08
Power Sensor	Anritsu	MA2491A		50MHz-18GHz	10/08
Preamp	R&S	TS-PR40	032001/003	26GHz-40GHz	1/08
Preamp	Miteq	AMF-8B-180265-40-10P-H/S		18GHz-26GHz	9/08
Preamp	Miteq	MF-6D-010100-50 A	213976	10GHz-18GHz	5/08
Preamp	Miteq	AMF-6F-100200-50-10P	668382	10GHz-18GHz	1/08
Preamp	Miteq	AMF-6D-100200-50	313936	1GHz-10GHz	5/08
Preamp	Ciao	CA118-4010	----------	1GHz-18GHz	1/08

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

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
50 Ohm Load-50W	Pasternack	PE6039	----------	DC-18GHz	Ref check
Modulation Analyzer	HP	8901B	2920A02096	150kHz-1.3GHz	11/08
Filter- High-Pass	Mini Circuits	NHP-600	438727	600MHz-7GHz	9/08
Filter- High-Pass	Mini Circuits	NHP-400	10433	400MHz-5GHz	9/08
Filter- High-Pass	Mini Circuits	NHP-900	----------	910MHz-8GHz	9/08
Filter- High-Pass	Q-Microwave	100460	----------	1.1GHz	5/08
Filter- High-Pass	Q-Microwave	100461	----------	2.9GHz	5/08
Filter- High-Pass	Q-Microwave	100462	----------	4.2GHz	5/08
Filter- High-Pass	Q-Microwave	100460	----------	1.1GHz	5/08
Filter- High-Pass	Q-Microwave	100461	----------	2.5GHz	5/08
Filter- High-Pass	Q-Microwave	100462	----------	4.6GHz	5/08
Filter- High-Pass	SOLAR	7930-10	921541	12kHz	3/08
Filter- High-Pass	SOLAR	7930-10	888809	11kHz	1/08

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

TABLE 1 – EQUIPMENT LIST

Test Equipment	Manufacturer	Model Number	Serial Number	Frequency Range	Cal Due Dates
Filter-Notch	K&L	4N45-2450/T100-0/0	----------	2.45GHz	5/08
Signal Generator	R&S	SMR-40	100092	1 – 40GHz	8/08
Filter- High-Pass	Planar	HP8G-7Q8-CD-SFF	PF1225/7728	f_c = 7.5GHz	7/08
Filter- High-Pass	Planar	HP8G-7Q8-CD-SFF	PF1226/7728	f_c = 7.5GHz	7/08
Filter- High-Pass	Planar	HP2G-1780-CD-SS	PF1227/7728	f_c = 1.5GHz	7/08
Filter- High-Pass	Planar	HP2G-1780-CD-SS	PF1228/7728	f_c = 1.5GHz	7/08
Filter- High-Pass	Planar	CL22600-9000-CD-SS	PF1230/7728	f_c = 16.2GHz	7/08
Filter- High-Pass	Planar	CL22600-9000-CD-SS	PF1229/7728	f_c = 16.2GHz	7/08
Signal Generator	Hewlet-Packard	HP8341B	2819A01017	10MHz – 20GHz	8/08
Directional Coupler	Mini-Circuits	ZDC-20-3	BF886600648	0.2 – 250MHz	New 8/08
Directional Coupler	Mini-Circuits	ZFDC-20-4-N	NF801600636	1 – 1000MHz	New 8/08
Bi-Directional Coupler	Mini-Circuits	ZX30-20-20BD-S+	SN350700724	500 – 2000MHz	New 8/08

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

APPENDIX A

TEST PROCEDURE

PART 15, SUBPART C, SECTION 15.231(e)

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 Tilt Sensor, Model Number WV1P, 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 than 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 usec/pulse on time * 1 pulses = 1.04208 msec (data word on time))

721.44 usec/pulse on time * 11 pulses = 7.93584 msec (data word on time)

400.8 msec/pulse on time * 5 pulses = 2.004 msec (data word on time)

280.56 usec/pulse on time * 10 pulses = 2.8056 msec (data word on time)

1.04208 msec + 7.93584 msec (data on time) + 2.004 msec (data on time) + 2.8056 msec = 13.78752 msec 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(e)

GRAPHS TAKEN OF THE PULSE TRAIN SHOWING THE FOLLOWING:

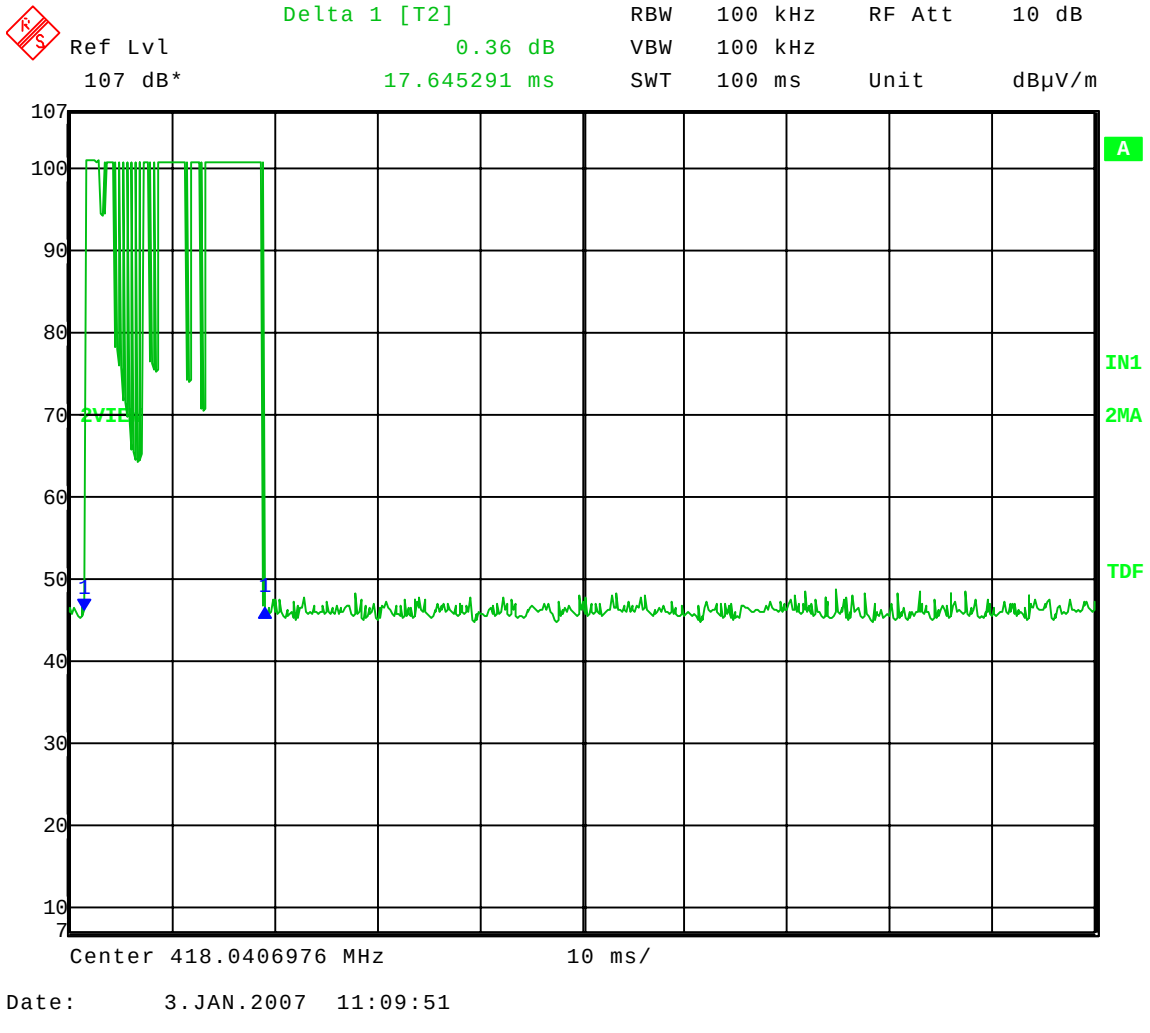
1. Number of Bits per Data Word
2. Number of Pulses per 100 msec
3. Data Word On Time

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WP1P
Test: Duty Cycle
Operator: Craig Brandt

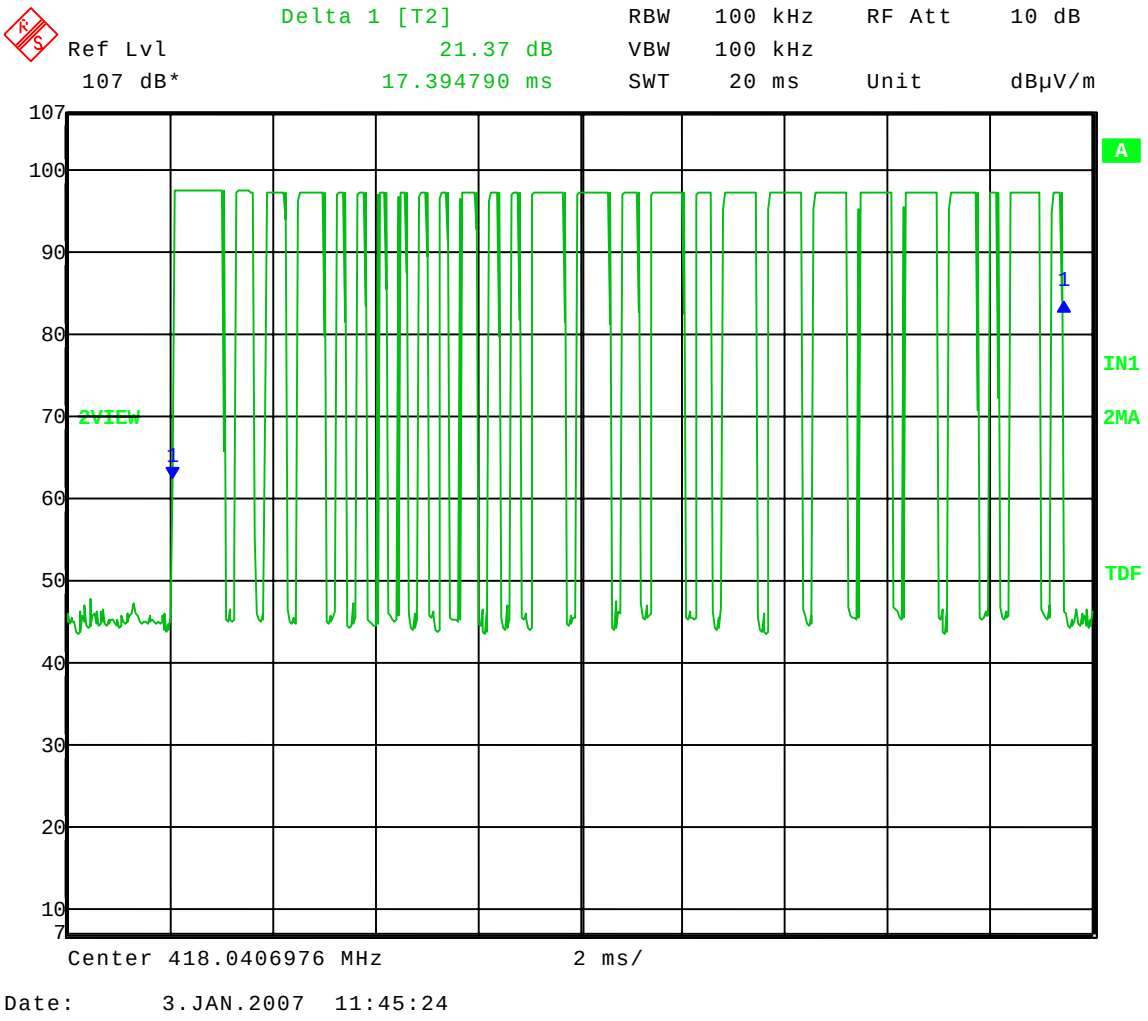
Comment: One pulse at 1.04208 ms
11 pulses at 721.44 µs each
Five pulses at 400.80 µs each
10 pulses at 280.56 µs each

Total on Time = 13.78752 ms during 100 ms Sweep
20 log (13.78752 / 100) = -17.21
Duty Cycle Correction Factor = 17.21 dB



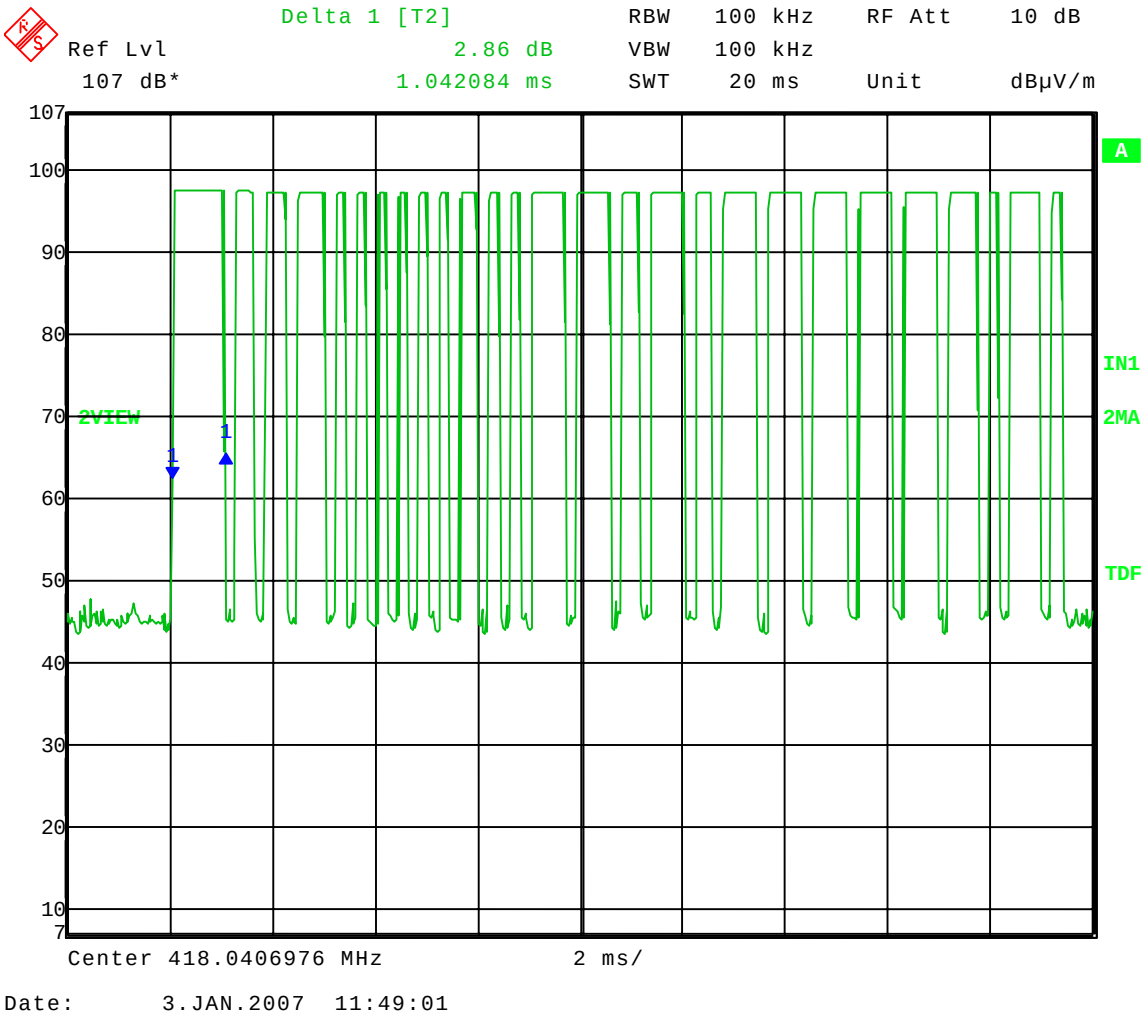
1250 Peterson Dr., Wheeling, IL 60090

Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WP1P
Test: Duty Cycle
Operator: Craig Brandt
Comment: One complete pulse train



1250 Peterson Dr., Wheeling, IL 60090

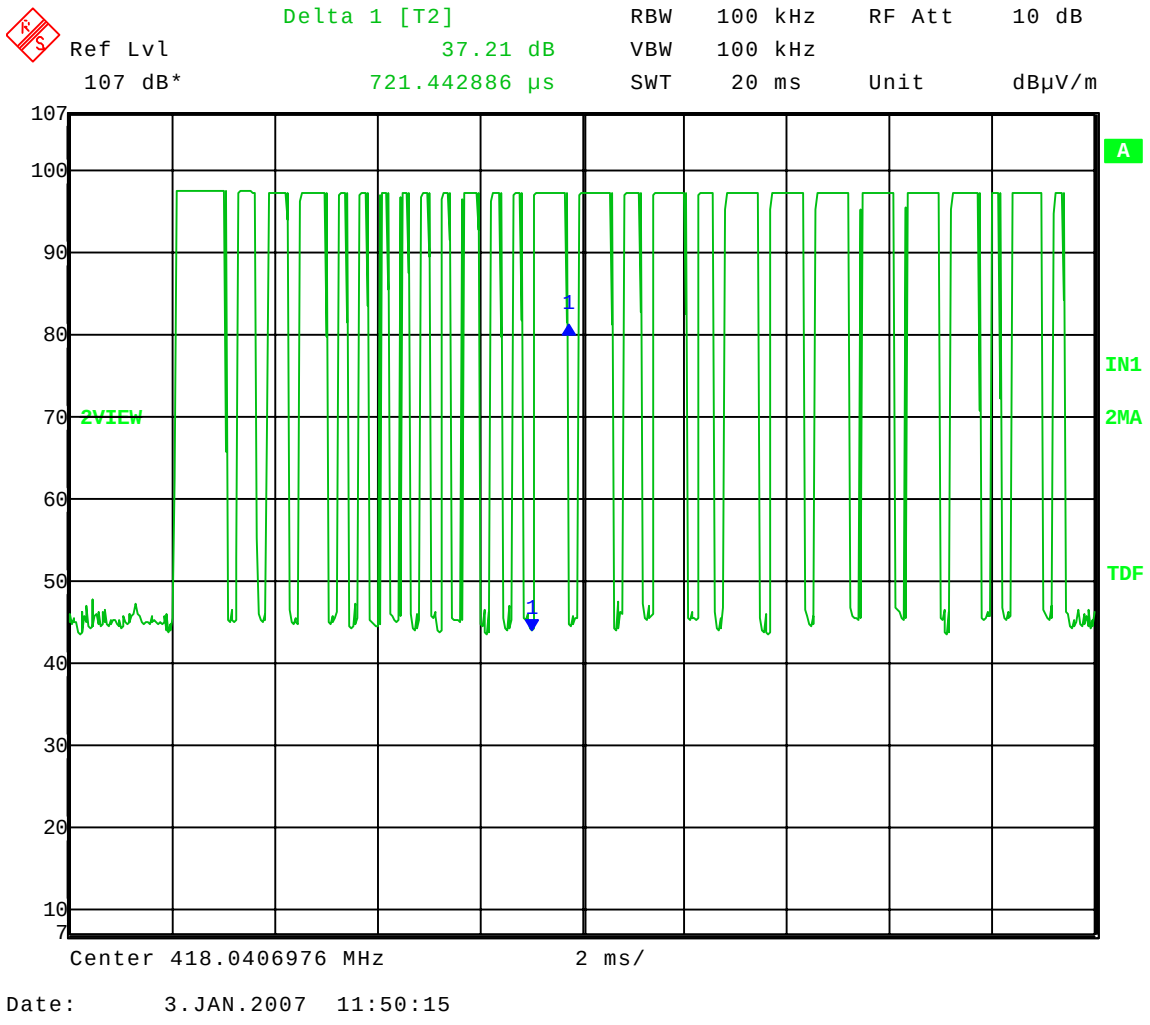
Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WP1P
Test: Duty Cycle
Operator: Craig Brandt
Comment: Pulse = 1.04208 ms pulse



1250 Peterson Dr., Wheeling, IL 60090

Company: VenTek, LLC
Model Tested: WV1P
Report Number: 13930

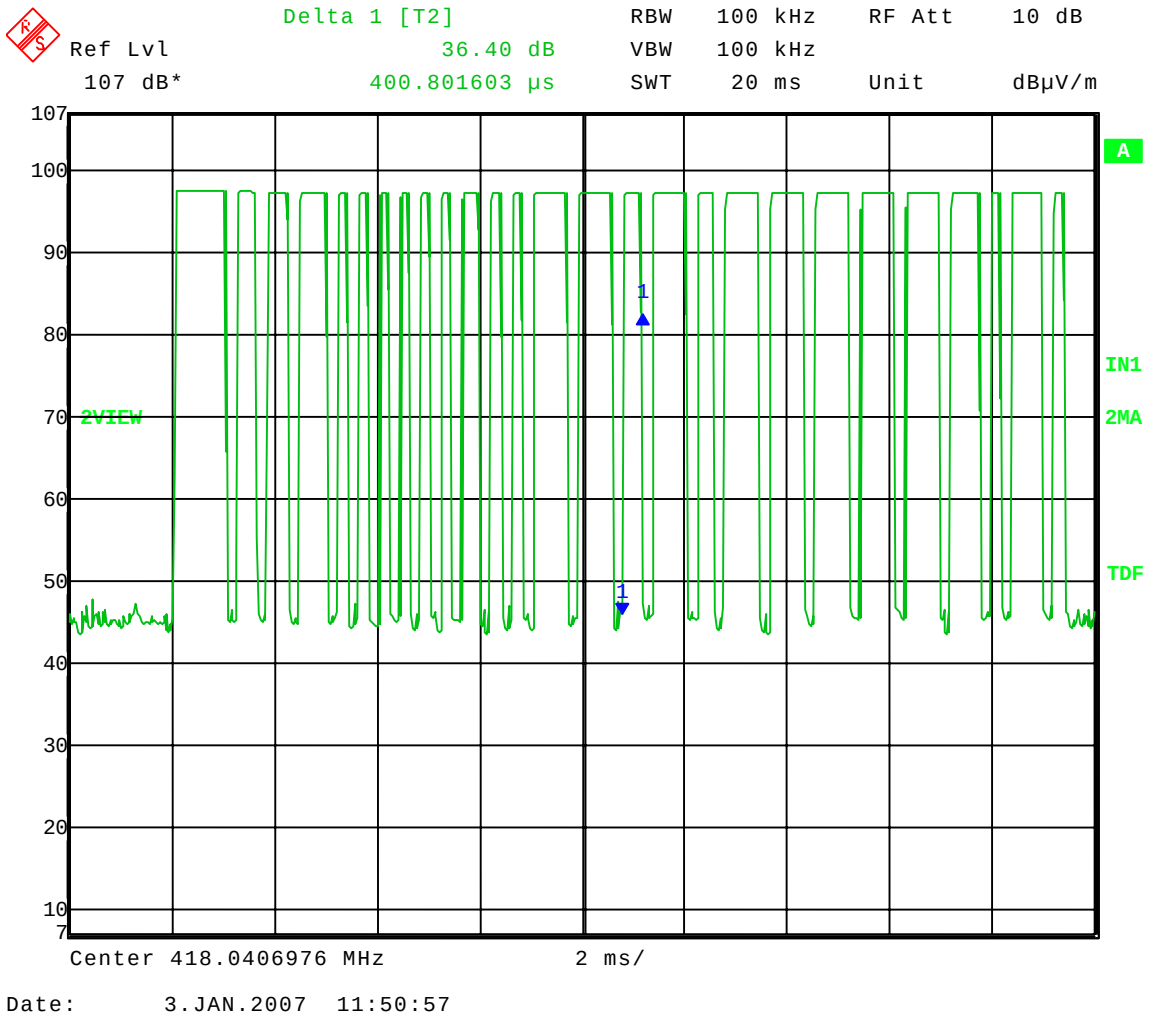
Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WP1P
Test: Duty Cycle
Operator: Craig Brandt
Comment: 721.44 µs pulse



1250 Peterson Dr., Wheeling, IL 60090

Company: VenTek, LLC
Model Tested: WV1P
Report Number: 13930

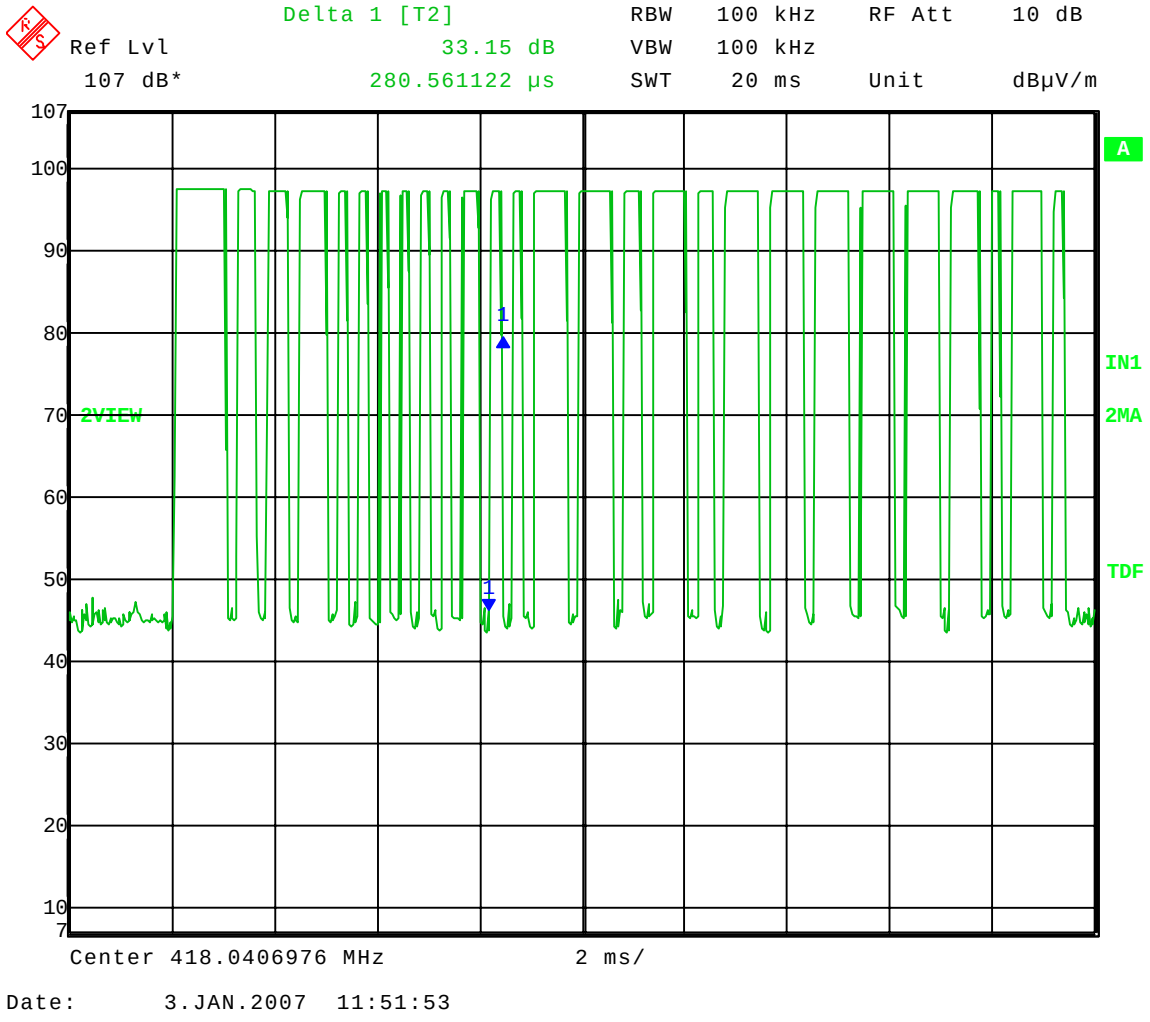
Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WP1P
Test: Duty Cycle
Operator: Craig Brandt
Comment: 400.80 µs pulse



1250 Peterson Dr., Wheeling, IL 60090

Company: VenTek, LLC
Model Tested: WV1P
Report Number: 13930

Test Date: 01-03-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WP1P
Test: Duty Cycle
Operator: Craig Brandt
Comment: 280.56 µs pulse



1250 Peterson Dr., Wheeling, IL 60090

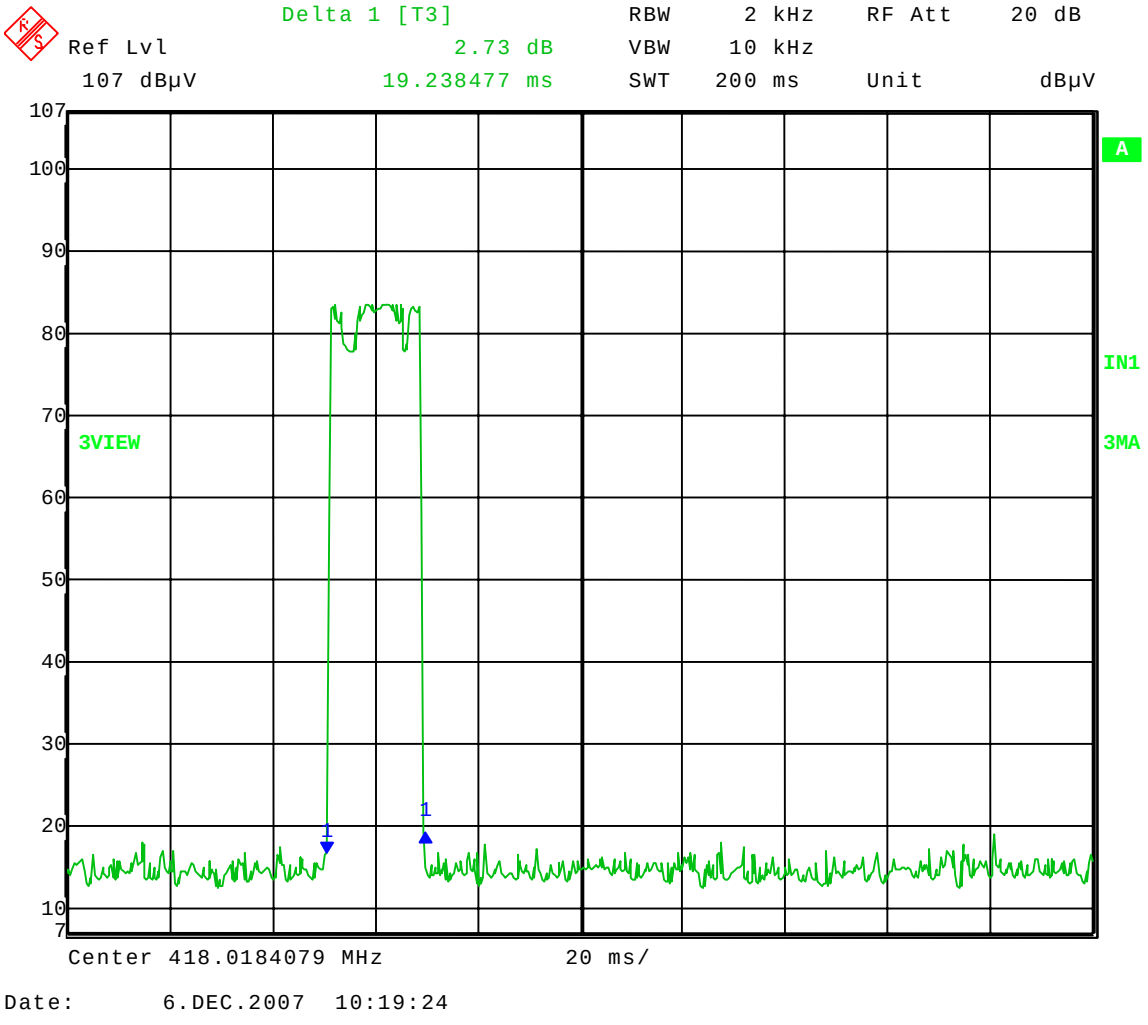
GRAPH(S) TAKEN OF THE

TRANSMIT DURATION

1250 Peterson Dr., Wheeling, IL 60090

Test Date: 12-06-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WP1P
Test: Transmit duration
Operator: Craig Brandt
Comment: Frequency: 418 MHz

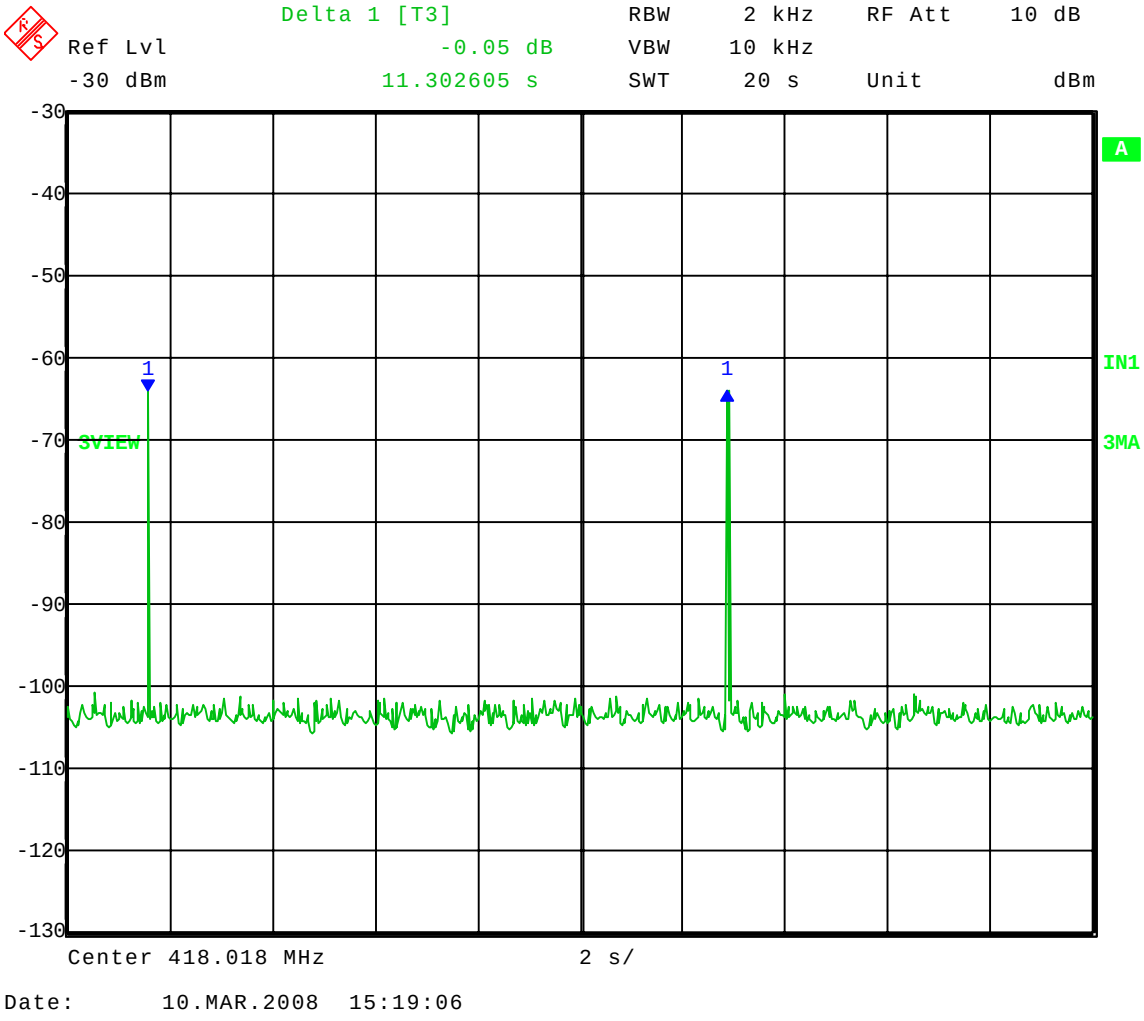
Transmission lasts 19.24 ms



1250 Peterson Dr., Wheeling, IL 60090

Test Date: 03-10-2008
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WV1P
Test: Silent period between transmissions
Operator: Craig B
Comment: Frequency: 418 MHz

Silent period between transmissions: 11.3 seconds



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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	±.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 Tilt Sensor 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 0.0025%, with a margin of 1031.41 kHz.

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GRAPH(S) TAKEN OF THE

20 dB BANDWIDTH EMISSIONS

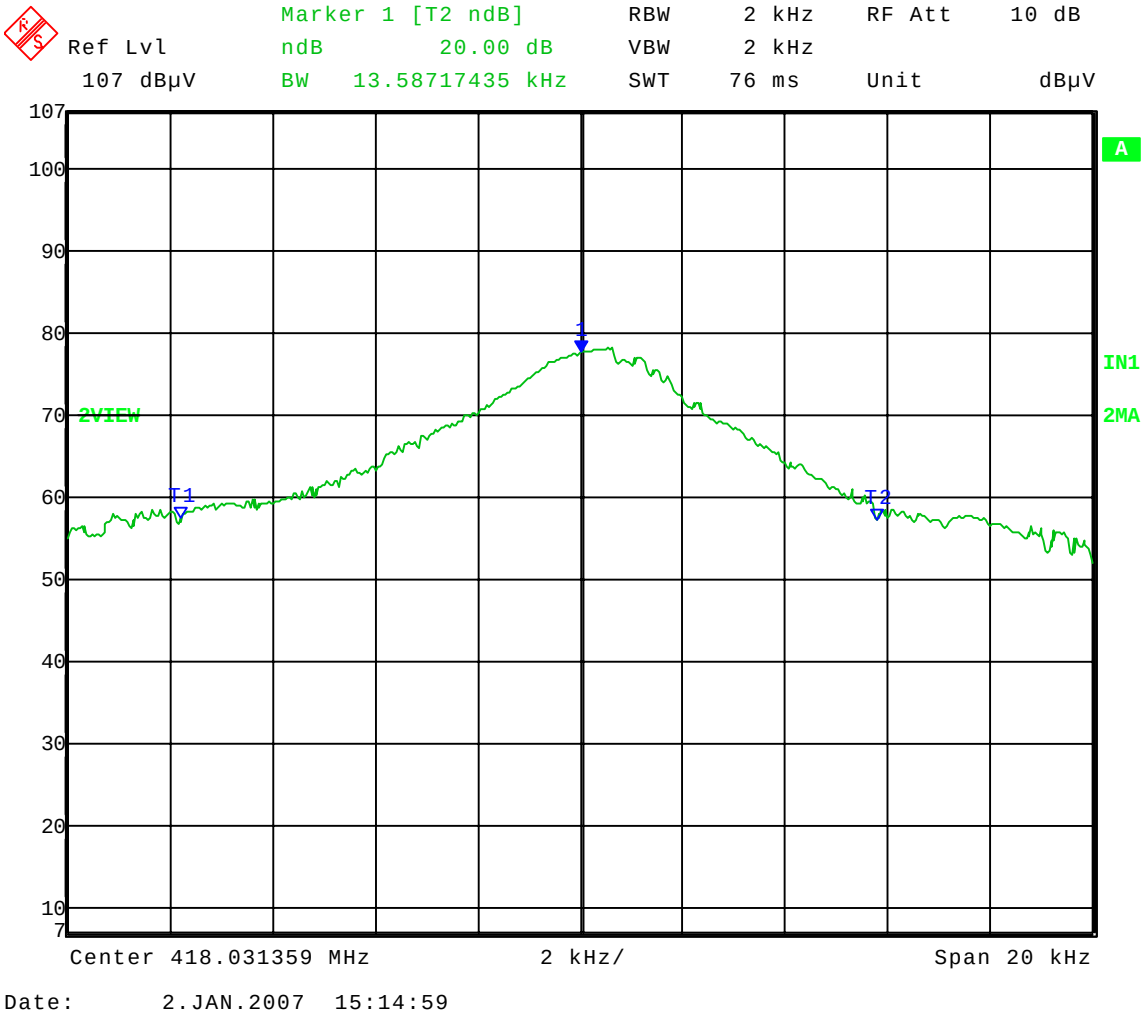
PART 15.231c & d

1250 Peterson Dr., Wheeling, IL 60090

Company: VenTek, LLC
Model Tested: WV1P
Report Number: 13930

Test Date: 01-02-2007
Company: VenTek, LLC
EUT: Wireless Sensor Monitor Transmitter Model: WV1P
Test: 20 dB Bandwidth - Radiated
Operator: Craig B
Comment: Frequency: 418 MHz

20 dB Bandwidth = 13.59 kHz



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APPENDIX A

TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

3.0 RESTRICTED BANDS

As stated in Section 15.205a, the fundamental emission from the e-Guard Tilt 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	167.72 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 data taken on pages 38 to 39 of this test report

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APPENDIX A

TEST PROCEDURE

ELECTRIC FIELD RADIATED EMISSIONS TEST

4.0 FIELD STRENGTH OF FUNDAMENTAL AND 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 10 meter test distance. The frequency range from 30 MHz to 5000 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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ELECTRIC FIELD RADIATED EMISSIONS TEST

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

PART 15.231e

Company: VenTek, LLC
Model Tested: WV1P
Report Number: 13930

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: WV1P
Manufacturer: VenTek, LLC
Operating Condition: 70 deg F; 32% R.H.
Test Site: Site 3
Operator: Craig B
Test Specification: FCC Part 15.231(e) and FCC Part 15.205
Date: 12/20/2007

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

Antenna: ANT1N44SM

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
418.013	Peak	Vert	68.53	15.84	4.3	88.67	17.21	71.46	72.32	0.86	1.10	90	Fundamental
418.013	Peak	Horz	67.53	15.84	4.3	87.67	17.21	70.46	72.32	1.86	1.80	315	Fundamental
836.026	Peak	Vert	35.57	21.90	-15.3	42.17	17.21	24.96	52.32	27.36	1.10	190	Harmonic
836.026	Peak	Horz	35.86	21.90	-15.3	42.46	17.21	25.25	52.32	27.05	1.20	200	Harmonic
1254.039	Peak	Vert	59.33	24.81	-36.4	47.74	17.21	30.53	52.32	21.79	1.10	180	Harmonic
1254.039	Peak	Horz	60.91	24.81	-36.4	49.32	17.21	32.11	52.32	20.21	1.00	40	Harmonic
1672.052	Average	Vert	50.41	26.25	-36.4	40.26	N/A	40.26	54	13.74	1.10	0	Restricted Band
1672.052	Average	Horz	51.85	26.25	-36.4	41.70	N/A	41.70	54	12.30	1.00	200	Restricted Band
1672.052	Peak	Vert	55.36	26.25	-36.4	45.21	N/A	45.21	74	28.79	1.10	0	Restricted Band
1672.052	Peak	Horz	56.31	26.25	-36.4	46.16	N/A	46.16	74	27.84	1.00	200	Restricted Band
2090.065	Peak	Vert	54.73	27.81	-35.8	46.74	17.21	29.53	52.32	22.79	1.10	0	Harmonic
2090.065	Peak	Horz	54.6	27.81	-35.8	46.61	17.21	29.40	52.32	22.92	1.00	30	Harmonic
2508.078	Peak	Vert	NF	28.71	-35.8	NF	17.21	NF	52.32	NF	NF	NF	Harmonic
2508.078	Peak	Horz	NF	28.71	-35.8	NF	17.21	NF	52.32	NF	NF	NF	Harmonic
2926.091	Peak	Vert	51.36	29.80	-35.0	46.16	17.21	28.95	52.32	23.37	1.10	20	Harmonic
2926.091	Peak	Horz	51.49	29.80	-35.0	46.29	17.21	29.08	52.32	23.24	1.30	110	Harmonic

NF = Noise Floor

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Antenna: ANT1N44SM (CON'T)

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
3344.104	Peak	Vert	57.08	31.03	-34.4	53.71	17.21	36.50	52.32	15.82	1.10	280	Harmonic
3344.104	Peak	Horz	57.34	31.03	-34.4	53.97	17.21	36.76	52.32	15.56	1.30	170	Harmonic
3762.117	Average	Vert	NF	32.03	-33.9	NF	N/A	NF	54	NF	NF	NF	Restricted Band
3762.117	Average	Horz	NF	32.03	-33.9	NF	N/A	NF	54	NF	NF	NF	Restricted Band
3762.117	Peak	Vert	NF	32.03	-33.9	NF	N/A	NF	74	NF	NF	NF	Restricted Band
3762.117	Peak	Horz	NF	32.03	-33.9	NF	N/A	NF	74	NF	NF	NF	Restricted Band
4180.130	Average	Vert	NF	32.39	-34.3	NF	N/A	NF	54	NF	NF	NF	Restricted Band
4180.130	Average	Horz	NF	32.39	-34.3	NF	N/A	NF	54	NF	NF	NF	Restricted Band
4180.130	Peak	Vert	NF	32.39	-34.3	NF	N/A	NF	74	NF	NF	NF	Restricted Band
4180.130	Peak	Horz	NF	32.39	-34.3	NF	N/A	NF	74	NF	NF	NF	Restricted Band

NF = Noise Floor