



Test Report

Product Name : Water Sensor
 Model No. : WS-LD
 FCC ID. : GX9WSLD

Applicant : CLIMAX TECHNOLOGY CO., LTD.
 Address : 5F., No.258, Sinhu 2nd Rd., Neihu District,
 Taipei City 114, Taiwan, R.O.C.

Date of Receipt : 2006/08/29
 Issued Date : 2006/09/12
 Report No. : 069L015-RF-US-P04V01

The test results relate only to the samples tested.
 The test report shall not be reproduced except in full without the written approval of QuieTek Corporation.
 This report must not be used to claim product endorsement by NVLAP any agency of the U.S. Government

Test Report Certification

Issued Date : 2006/09/12

Report No. : 069L015-RF-US-P04V01



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

Product Name : Water Sensor

Applicant : CLIMAX TECHNOLOGY CO., LTD.

Address : 5F., No.258, Sinhu 2nd Rd., Neihs District, Taipei City 114,
Taiwan, R.O.C.

Manufacturer : CLIMAX TECHNOLOGY CO., LTD.

Model No. : WS-LD

FCC ID. : GX9WSLD

Rated Voltage : AC 120V/ 60Hz

EUT Voltage : DC 9V

Trade Name : CLIMAX

Measurement Standard : FCC 15 Subpart C Section 15.231: 2005

Measurement Procedure : ANSI C63.4: 2003

Test Result : Complied

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Approved By : George Chen

(George Chen)

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1. General Information

1.1. EUT Description

Product Name	Water Sensor
Trade Name	CLIMAX
Model No.	WS-LD
FCC ID	GX9WSLD
Frequency Range	433.92MHz
Type of Modulation	AM
Number of Channels	1
Channel Control	N/A
Channel Separation	N/A
Antenna Type	Integrated
Antenna Gain	N/A

Frequency of Each Channel:

Channel	Frequency
Channel 1:	433.92 MHz

Note:

1. The EUT is a Water Sensor with a built-in 433.92 MHz transmitter.
2. The EUT will stop the transmission immediately when the test button is pressed and releases.
The EUT will stop the transmission within 5 seconds when the test button is pressed and held.
3. The EUT will start the transmission when the probe puts in the water or the button is pressed.
The worst case is when the button is pressed. Only the worst case is shown in the report.
4. These tests are conducted on a sample for the purpose of demonstrating compliance with Part 15 Subpart C Paragraph 15.231.
5. The radiation measurements are performed in X, Y, Z axis positioning. Only the worst case is shown in the report.

1.2. Operation Description

The EUT is a Water Sensor with a built-in 433.92 MHz transmitter. It is specially designed to detect if the water level is above a certain level that may damage your protected goods. It is a device that helps to manage your protected place and goods by keeping it nice and dry. The EUT operates in 433.92 MHz. The antenna type is dipole and the data modulation is AM.

1.3. Test Mode

QuietTek verified the construction and function in typical operation. All the test modes are performed in normal operation and are defined as:

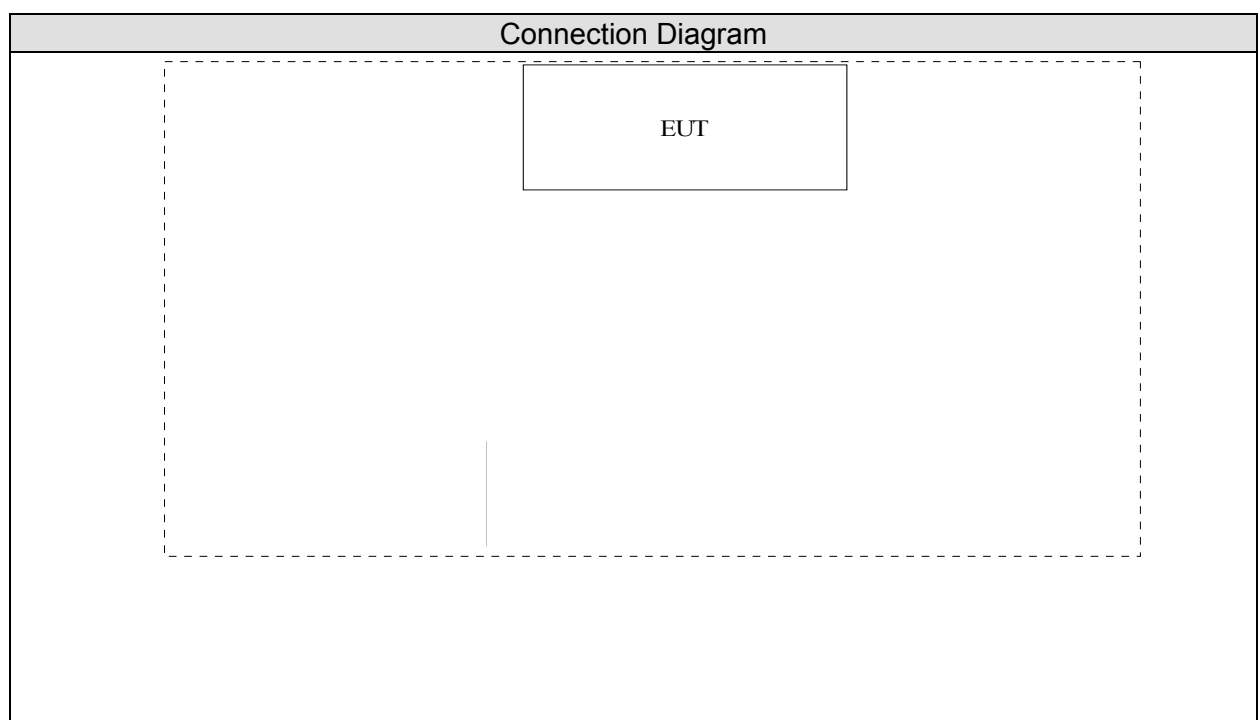
Pre-Test Mode	
TX	Mode 1: Transmit
Final Test Mode	
TX	Mode 1: Transmit

1.4. Tested System Details

The types for all equipments, plus descriptions of all cables used in the tested system (including inserted cards) are:

	Product	Manufacturer	Model No.	Serial No.	FCC ID	Power Cord
1	N/A	N/A	N/A	N/A	N/A	N/A

1.5. Configuration of tested System



1.6. EUT Exercise Software

1	Setup the EUT as shown in section 1.5.
2	Install the battery.
3	Press the test button of the EUT.
4	Verify that the EUT works properly.

1.7. Test Facility

Ambient conditions in the laboratory:

Items	Test Item	Required (IEC 68-1)	Actual
Temperature (°C)	FCC PART 15 C	15 - 35	22
Humidity (%RH)	15.207 Conducted Emission	25 - 75	55
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Duty Cycle	15 - 35	22
Humidity (%RH)		25 - 75	55
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Occupied Bandwidth	15 - 35	22
Humidity (%RH)		25 - 75	55
Barometric pressure (mbar)		860 - 1060	950-1000
Temperature (°C)	FCC PART 15 C 15.231 Radiated Emission	15 - 35	22
Humidity (%RH)		25 - 75	55
Barometric pressure (mbar)		860 - 1060	950-1000

Site Description: File on

Federal Communications Commission
FCC Engineering Laboratory
7435 Oakland Mills Road
Columbia, MD 21046
Reference 31040/SIT1300F2



Accredited by CNLA
Accreditation Number: 0914



Accredited by NVLAP
NVLAP Lab Code: 200533-0



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Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen,
Lin-Kou Shiang, Taipei,
Taiwan, R.O.C.
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2. Conducted Emission

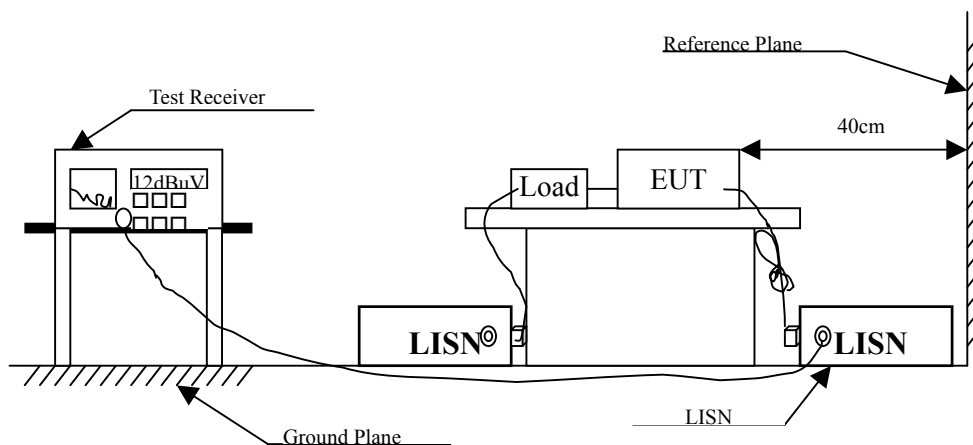
2.1. Test Equipment

The following test equipment are used during the test:

Item	Instrument	Manufacturer	Type No./Serial No	Last Cal.	Remark
1	Test Receiver	R & S	ESCS 30/825442/17	May, 2006	
2	L.I.S.N.	R & S	ESH3-Z5/825016/6	May, 2006	EUT
3	L.I.S.N.	Kyoritsu	KNW-407/8-1420-3	May, 2006	Peripherals
4	Pulse Limiter	R & S	ESH3-Z2	May, 2006	
5	No.1 Shielded Room			N/A	

Note: All instruments are calibrated every one year.

2.2. Test Setup



2.3. Limits

FCC Part 15 Subpart C Paragraph 15.207 Limits (dBuV)		
Frequency MHz	QP	AV
0.15 - 0.50	66-56	56-46
0.50-5.0	56	46
5.0 - 30	60	50

Remarks : In the above table, the tighter limit applies at the band edges.

2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

2.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.207: 2005

2.6. Uncertainty

± 2.26 dB

2.7. Test Result

The power of the EUT is supplied by battery. This test is not performed.

3. Radiated Emission

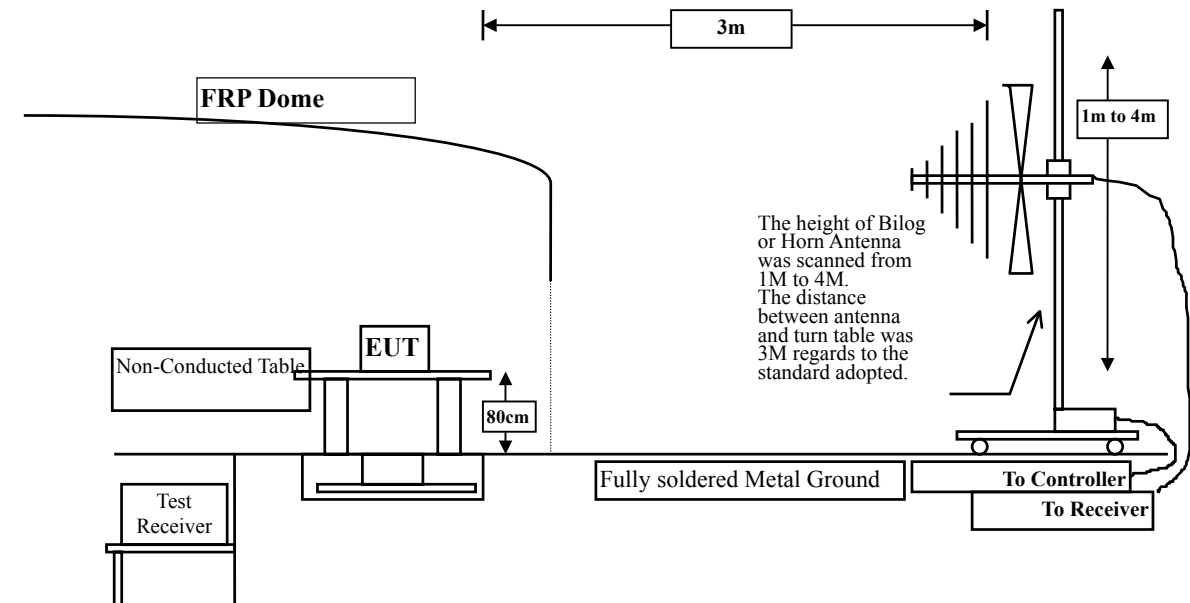
3.1. Test Equipment

The following test equipment are used during the test:

Test Site		Equipment	Manufacturer	Model No./Serial No.	Last Cal.
☐ Site # 1		Test Receiver	R & S	ESVS 10 / 834468/003	May, 2006
		Spectrum Analyzer	Advantest	R3162/ 00803480	May, 2006
		Pre-Amplifier	Advantest	BB525C/ 3307A01812	May, 2006
		Bilog Antenna	SCHAFFNER	CBL6112B / 2697	Sep., 2006
☐ Site # 2		Test Receiver	R & S	ESCS 30 / 836858 / 022	May, 2006
		Spectrum Analyzer	Advantest	R3162 / 100803466	May, 2006
		Pre-Amplifier	Advantest	BB525C/3307A01814	May, 2006
		Bilog Antenna	SCHAFFNER	CBL6112B / 2705	May, 2006
		Horn Antenna	ETS	3115 / 0005-6160	Sep., 2006
		Pre-Amplifier	QTK	QTK-AMP-01/ 0001	May, 2006
☒ Site # 3	X	Test Receiver	R & S	ESI 26 / 838786/004	May, 2006
	X	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006
	X	Bilog Antenna	SCHAFFNER	CBL6112B / 2697	May, 2006
	X	Horn Antenna	Schwarzbeck	BBHA9120D / 305, 306	July, 2006
	X	Horn Antenna	Schwarzbeck	BBHA9170 / 208, 209	July, 2006
	X	Pre-Amplifier	QTK	QTK-AMP-03 / 0003	May, 2006
	X	Pre-Amplifier	HP	8449B / 3008A01123	July, 2006

Note: 1. All instruments are calibrated every one year.
2. The test instruments marked by "X" are used to measure the final test results.

3.2. Test Setup



3.3. Limits

➤ Fundamental and Harmonics Emission Limits

FCC Part 15 Subpart C Paragraph 15.231 Limits				
Fundamental Frequency MHz	Field Strength of Fundamental		Field Strength of Harmonics	
	uV/m	dBuV/m	uV/m	dBuV/m
40.66-40.70	2250	67.0	225	47.0
70-130	1250	62.0	125	42.0
130-174	1250-3750	62.0-71.5	125-375	42.0-51.5
174-260	3750	71.5	375	51.5
260-470	3750-12500	71.5-82.00	375-1250	51.5-62.0
above 470	12500	82.00	1250	62.0

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)

2. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3. The emission limit in this paragraph is based on measurement instrumentation employing an average detector.

➤ Spurious electric field strength limits

FCC Part 15 Subpart C Paragraph 15.209 Limits			
Frequency MHz	uV/m	dBuV/m	Measurement distance (meter)
0.009-0.490	2400/F(kHz)	See Remark ¹	300
0.490-1.705	24000/F(kHz)	See Remark ¹	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Remarks : 1. RF Voltage (dBuV) = 20 log RF Voltage (uV)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

3.4. Test Procedure

The EUT and its simulators are placed on a turn table which is 0.8 meter above ground. The turn table can rotate 360 degrees to determine the position of the maximum emission level. The antenna can move up and down between 1 meter and 4 meters to find out the maximum emission level.

Both horizontal and vertical polarization of the antenna are set on measurement. In order to find the maximum emission, all of the interface cables must be manipulated according to ANSI C63.4:2003 on radiated measurement.

On the field strength of fundamental and harmonics, the limits shown are based on measuring equipment employing a average detector function. As an alternative, compliance with the limits may be based on the use of measurement instrumentation with a CISPR quasi-peak detector.

On the field strength of spurious electric, on any frequency or frequencies below or equal to 1000 MHz, the limits shown are based on measuring equipment employing a quasi-peak detector function and on any frequency or frequencies above 1000 MHz the radiated limits shown are based upon the use of measurement instrumentation employing an average detector function.

When average radiated emission measurement are included emission measurement below 1000 MHz, there also is a limit on the radio frequency emissions, as measured using

instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.

The bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

3.5. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231: 2005

3.6. Uncertainty

± 3.8 dB below 1GHz

± 3.9 dB above 1GHz

3.7. Test Result

Product	Water Sensor		
Test Item	Fundamental Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2006/09/07	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Fundamental Radiated Emission					
Horizontal					
Peak					
433.930	19.140	50.160	69.300	-31.526	100.826

Peak = 69.300 dBuV/m

Average= 69.300 + Duty cycle correct factor = 68.72 dBuV/m

Average Limit = $20 * \log (41.6667 * 433.930 - 7083.3333) = 80.826 \text{ dBuV/m}$

Peak Limit = $80.826 + 20 = 100.826 \text{ dBuV/m}$

Note:

1. The emissions of the EUT in three axes are tested. Only the worst-case data is presented.
2. Measurement Level = Reading Level +Correct Factor.
3. Test Receiver Setting: RBW=120kHz

Product	Water Sensor		
Test Item	Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2006/09/07	Test Site	No.3 OATS

Frequency	Correct	Reading	Measurement	Margin	Limit
	Factor	Level	Level		
MHz	dB	dBuV	dBuV/m	dB	dBuV/m
Fundamental Radiated Emission					
Vertical					
Peak					
433.930	20.676	50.400	71.076	-29.766	100.826

Peak = 71.076 dBuV/m

Average= 71.076 + Duty cycle correct factor = 70.496 dBuV/m

Average Limit = $20 * \log (41.6667 * 433.930 - 7083.3333) = 80.826 \text{ dBuV/m}$

Peak Limit = $80.826 + 20 = 100.826 \text{ dBuV/m}$

Note:

1. The emissions of the EUT in three axes are tested. Only the worst-case data is presented.
2. Measurement Level = Reading Level +Correct Factor.
3. Test Receiver Setting: RBW=120kHz

Product	Water Sensor		
Test Item	Harmonic Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2006/09/07	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Peak Limit dBuV/m	Average Limit dBuV/m
Harmonic Radiated Emission						
Horizontal						
Peak						
867.867	24.059	6.800	30.859	-49.967	80.826	60.826
1301.850	-5.985	35.714	29.729	-51.097	80.826	60.826
1735.800	-5.140	35.851	30.711	-50.115	80.826	60.826
2169.750	-2.183	35.182	32.999	-47.827	80.826	60.826
2603.700	-2.142	35.397	33.254	-47.572	80.826	60.826
3037.650	-1.219	35.551	34.332	-46.494	80.826	60.826
3471.600	-0.692	35.491	34.799	-46.027	80.826	60.826
3905.550	0.486	35.744	36.229	-44.597	80.826	60.826
4339.500	1.683	35.611	37.294	-43.532	80.826	60.826

Note:

1. All Readings Levels are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level +Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	Water Sensor		
Test Item	Harmonic Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2006/09/07	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Peak Limit dBuV/m	Average Limit dBuV/m
Harmonic Radiated Emission						
Vertical						
Peak						
867.867	24.266	6.200	30.466	-50.360	80.826	60.826
1301.850	-5.985	34.965	28.980	-51.546	80.826	60.826
1735.800	-5.140	36.238	31.098	-49.728	80.826	60.826
2169.750	-2.183	35.040	32.857	-47.969	80.826	60.826
2603.700	-2.142	35.168	33.025	-47.801	80.826	60.826
3037.650	-1.219	35.498	34.279	-46.547	80.826	60.826
3471.600	-0.692	35.195	34.503	-46.323	80.826	60.826
3905.550	0.486	35.752	36.237	-44.589	80.826	60.826
4339.500	1.683	34.932	36.615	-44.211	80.826	60.826

Note:

1. All Readings Levels are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level +Correct Factor.
3. The average measurement was not performed when the peak measured data under the limit of average detection. If the readings given are average, peak measurement should also be supplied.

Product	Water Sensor		
Test Item	General Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2006/09/07	Test Site	No.3 OATS

Frequency	Correct	Reading	Measurement	Margin	Limit
MHz	Factor	Level	Level		
	dB	dBuV	dBuV/m	dB	dBuV/m
Horizontal					
Quasi-Peak					
371.925	15.919	8.021	23.940	-22.060	46.000
604.725	20.211	9.377	29.588	-16.412	46.000
701.725	20.632	5.993	26.625	-19.375	46.000
774.475	21.450	7.284	28.734	-17.266	46.000
888.450	22.560	7.341	29.901	-16.099	46.000
934.525	22.806	7.650	30.457	-15.543	46.000

Note:

1. All Reading Levels are quasi-peak values.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

Product	Water Sensor		
Test Item	General Radiated Emission		
Test Mode	Mode 1: Transmit		
Date of Test	2006/09/07	Test Site	No.3 OATS

Frequency MHz	Correct Factor dB	Reading Level dBuV	Measurement Level dBuV/m	Margin dB	Limit dBuV/m
Vertical					
Quasi-Peak					
257.950	14.277	5.651	19.928	-26.072	46.000
544.100	20.532	3.801	24.333	-21.667	46.000
689.600	20.441	6.774	27.215	-18.785	46.000
803.575	21.793	6.543	28.336	-17.664	46.000
869.050	22.110	7.578	29.688	-16.312	46.000
966.050	22.938	9.884	32.822	-21.178	54.000

Note:

1. All Reading Levels are quasi-peak values.
2. " " means the worst emission level.
3. Measurement Level = Reading Level + Correct Factor.

4. Occupied Bandwidth

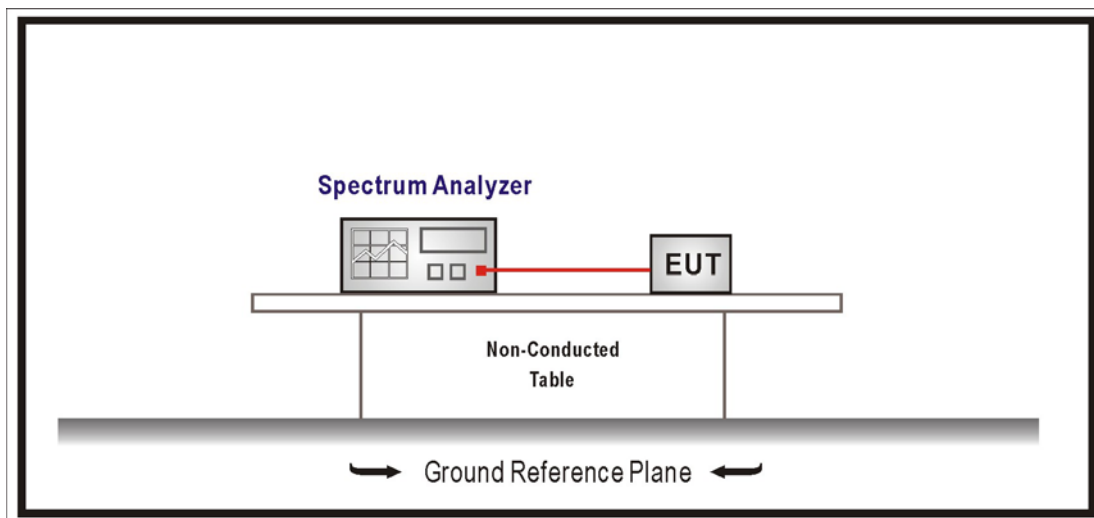
4.1. Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: All instruments are calibrated every one year.

4.2. Test Setup



4.3. Limits

The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70MHz and below 900MHz. For devices operating above 900MHz, the emission shall be no wider than 0.5% of the center frequency. Bandwidth is determined at the points 20 dB down from the modulated carrier

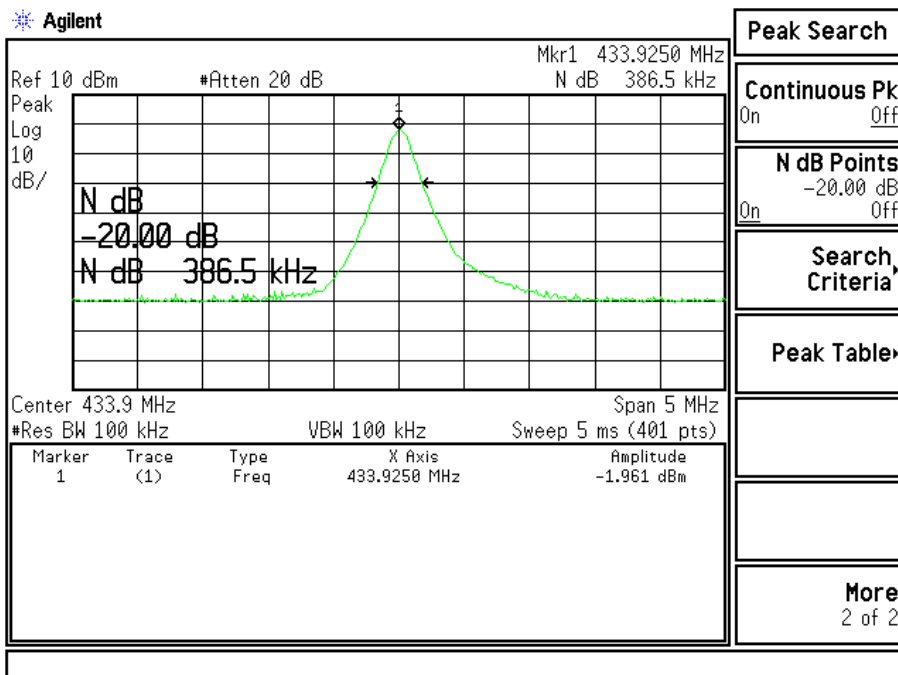
4.4. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231: 2005

4.5. Test Result

Product	Water Sensor		
Test Item	Occupied Bandwidth		
Test Mode	Mode 1: Transmit		
Date of Test	2005/09/07	Test Site	No.3 OATS

Center Frequency	433.925 MHz
Allowable Bandwidth (70-900 MHz: 0.25%, Above 900MHz: 0.5%)	1084.81 kHz
Bandwidth at 20dB down (Max)	386.5kHz
Result	PASS



5. Duty Cycle

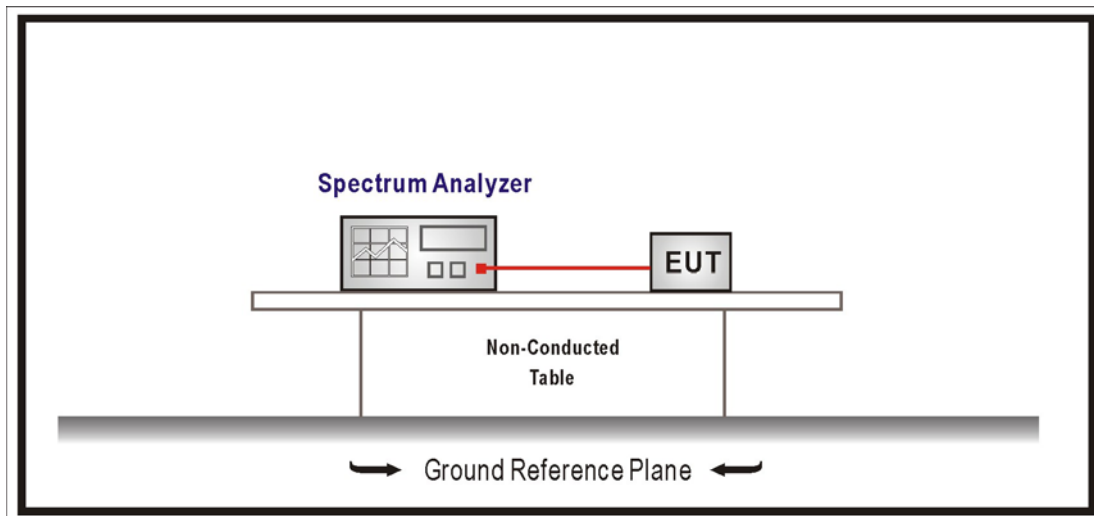
5.1. Test Equipment

The following test equipment are used during the test:

Item	Equipment	Manufacturer	Model No. / Serial No.	Last Cal.
1	Spectrum Analyzer	Agilent	E4407B / US39440758	May, 2006

Note: 1. All instruments are calibrated every one year.

5.2. Test Setup



5.3. Test Specification

According to FCC Part 15 Subpart C Paragraph 15.231: 2005

5.4. Test Result

Product	Water Sensor		
Test Item	Duty Cycle		
Test Mode	Mode 1: Transmit		
Date of Test	2006/09/07	Test Site	No.3 OATS

Each packet period = 30.75ms

The transmit time = 28.75ms

Duty cycle = $28.75 / 30.75 = 0.93$

Duty cycle correct factor = $20\log(0.93) = -0.58 \text{ dB}$

Result	Duty Cycle Correct Factor = -0.58 dB
--------	--------------------------------------

