

**FCC PART 15 SUBPART B and C  
TEST REPORT***for***FLOOD SENSOR****Model: WPFS**

Prepared for

DYNAQUIP CONTROLS  
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DATE: NOVEMBER 17, 2009

	REPORT BODY	APPENDICES					TOTAL
		<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>	
PAGES	17	2	2	2	15	16	<b>54</b>

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**TABLE OF CONTENTS**

<b>Section / Title</b>	<b>PAGE</b>
<b>GENERAL REPORT SUMMARY</b>	<b>4</b>
<b>SUMMARY OF TEST RESULTS</b>	<b>4</b>
<b>1. PURPOSE</b>	<b>5</b>
<b>2. ADMINISTRATIVE DATA</b>	<b>6</b>
2.1 Location of Testing	6
2.2 Traceability Statement	6
2.3 Cognizant Personnel	6
2.4 Date Test Sample was Received	6
2.5 Disposition of the Test Sample	6
2.6 Abbreviations and Acronyms	6
<b>3. APPLICABLE DOCUMENTS</b>	<b>7</b>
<b>4. DESCRIPTION OF TEST CONFIGURATION</b>	<b>8</b>
4.1 Description of Test Configuration – EMI	8
4.1.1 Cable Construction and Termination	9
<b>5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT</b>	<b>10</b>
5.1 EUT and Accessory List	10
5.2 EMI Test Equipment	11
<b>6. TEST SITE DESCRIPTION</b>	<b>12</b>
6.1 Test Facility Description	12
6.2 EUT Mounting, Bonding and Grounding	12
6.3 Facility Environmental Characteristics	12
<b>7. TEST PROCEDURES</b>	<b>13</b>
7.1 RF Emissions	13
7.1.1 Conducted Emissions Test	13
7.1.2 Radiated Emissions (Spurious and Harmonics) Test	14
7.2 Bandwidth of the Fundamental	16
<b>8. CONCLUSIONS</b>	<b>17</b>

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**LIST OF APPENDICES**

<b>APPENDIX</b>	<b>TITLE</b>
A	Laboratory Recognitions
B	Modifications to the EUT
C	Additional Models Covered Under This Report
D	Diagram, Charts, and Photos <ul style="list-style-type: none"><li>• Test Setup Diagram</li><li>• Antenna and Amplifier Factors</li><li>• Radiated Emissions Photos</li></ul>
E	Data Sheets

**LIST OF FIGURES**

<b>FIGURE</b>	<b>TITLE</b>
1	Conducted Emissions Test Setup
2	Plot Map And Layout of Test Site – 3 Meters

## GENERAL REPORT SUMMARY

Compatible Electronics Inc. generates this electromagnetic emission test report, which is an independent testing and consulting firm. The test report is based on testing performed by Compatible Electronics personnel according to the measurement procedures described in the test specifications given below and in the "Test Procedures" section of this report.

The measurement data and conclusions appearing herein relate only to the sample tested and this report may not be reproduced without the written permission of Compatible Electronics, unless done so in full.

This report must not be used to claim product endorsement by NVLAP, NIST or any other agency of the U.S. Government.

Device Tested: Flood Sensor  
Model: WPFS  
S/N: N/A

Product Description: See Expository Statement

Modifications: The EUT was not modified in order to meet the specifications.

Customer: DynaQuip Controls  
10 Harris Industrial Park  
St. Clair, Missouri 63077

Test Date(s): October 26 and 30, 2009

Test Specifications: EMI requirements  
CFR Title 47, Part 15, Subpart B

Test Procedure: ANSI C63.4

Test Deviations: The test procedure was not deviated from during the testing.

## SUMMARY OF TEST RESULTS

TEST	DESCRIPTION	RESULTS
1	Conducted RF Emissions, 150 kHz – 30 MHz	Complies with the <b>Class B</b> limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, section 15.207 Highest reading in relation to spec limit: 40.07 dBuV @ 0.637 MHz (*U <sub>c</sub> = 0.43 dB)
2	Radiated RF Emissions 10 kHz – 4400 MHz (Transmitter Portion)	Complies with the limits of CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.231. Highest reading in relation to spec limit: 79.76 dBuV @ 433.92 MHz (*U <sub>c</sub> = 1.76 dB)
3	Radiated RF Emissions 10 kHz – 4400 MHz (Digital Portion)	Complies with the <b>Class B</b> limits of CFR Title 47, Part 15, Subpart B.

\*U<sub>c</sub> = combined standard uncertainty

**1. PURPOSE**

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Flood Sensor, Model: WPFS. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4. The tests were performed in order to determine whether the electromagnetic emissions from the equipment under test, referred to as EUT hereafter, are within the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B for the digital portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.231 for the transmitter portion.



## 2. ADMINISTRATIVE DATA

### 2.1 Location of Testing

The EMI tests described herein were performed at the test facility of Compatible Electronics, 114 Olinda Drive, Brea, California.

### 2.2 Traceability Statement

The calibration certificates of all test equipment used during the test are on file at the location of the test. The calibration is traceable to the National Institute of Standards and Technology (NIST).

### 2.3 Cognizant Personnel

DynaQuip Controls

Mike Purvis                      Design Engineer

Compatible Electronics Inc.

Kyle Fujimoto                  Test Engineer  
Michael Christensen          Lab Manager, Brea Division

### 2.4 Date Test Sample was Received

The test sample was received prior to the date of testing.

### 2.5 Disposition of the Test Sample

The test sample has not yet been returned as of the date of this report.

### 2.6 Abbreviations and Acronyms

The following abbreviations and acronyms may be used in this document.

FCC	Federal Communications Commission
RF	Radio Frequency
EMI	Electromagnetic Interference
EUT	Equipment Under Test
P/N	Part Number
S/N	Serial Number
ITE	Information Technology Equipment
LISN	Line Impedance Stabilization Network
NVLAP	National Voluntary Laboratory Accreditation Program
CFR	Code of Federal Regulations
N/A	Not Applicable
Ltd.	Limited
Inc.	Incorporated
IR	Infrared

### 3. APPLICABLE DOCUMENTS

The following documents are referenced or used in the preparation of this EMI Test Report.

<b>SPEC</b>	<b>TITLE</b>
CFR Title 47, Part 15	FCC Rules – Radio frequency devices (including digital devices)
ANSI C63.4: 2003	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz

#### **4. DESCRIPTION OF TEST CONFIGURATION**

##### **4.1 Description of Test Configuration – EMI**

The Flood Sensor, Model: WPFS (EUT) was connected to two water sensors via its water sensor port. The EUT was also connected to an AC Adapter via its power port. The EUT was continuously transmitting.

The EUT was also tested while powered by battery. While powered by battery, the EUT was still connected to the AC Adapter for termination purposes. However, the AC adapter was not connected to the AC mains.

The EUT's antenna is a PCB trace. The EUT stops transmitting within 5 seconds of being activated during normal operation.

It was determined that the emissions were at their highest level when the EUT was operating in the above configuration. The final emissions data was taken in this mode of operation and any cables were maximized. All initial investigations were performed with the measurement receiver in manual mode scanning the frequency range continuously. Photographs of the test setup are in Appendix D of this report.



#### **4.1.1 Cable Construction and Termination**

**Cable 1** This is a 3-meter unshielded cable connecting the EUT to the Class 2 Transformer. The cable is hard wired into a 6 pin terminal block at the EUT end and is hard wired into the Class 2 Transformer.

**Cable 2** This is a 2.5-meter unshielded cable connecting the water sensor #1 to the EUT. The cable is hard wired into a 6 pin terminal block at the EUT end and is hard wired into the water sensor #1. The cable was bundled to a length of 40-centimeters.

**Cable 3** This is a 2.5-meter unshielded cable connecting the water sensor #2 to the EUT. The cable is hard wired into a 6 pin terminal block at the EUT end and is hard wired into the water sensor #2. The cable was bundled to a length of 40-centimeters.

**5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT****5.1 EUT and Accessory List**

<b>EQUIPMENT</b>	<b>MANUFACTURER</b>	<b>MODEL NUMBER</b>	<b>SERIAL NUMBER</b>	<b>FCC ID</b>
FLOOD SENSOR (EUT)	DYNAQUIP CONTROLS	WPFS	N/A	ONCWPFS
(2) WATER SENSORS	DYNAQUIP CONTROLS	N/A	N/A	N/A
CLASS 2 TRANSFORMER	N/A	DB0060020	N/A	N/A

## 5.2 EMI Test Equipment

EQUIPMENT TYPE	MANUFACTURER	MODEL NUMBER	SERIAL NUMBER	CALIBRATION DATE	CALIBRATION DUE DATE
<b>GENERAL TEST EQUIPMENT USED FOR ALL RF EMISSIONS TESTS</b>					
Computer	Hewlett Packard	4530	US91912319	N/A	N/A
Spectrum Analyzer – Main Section	Hewlett Packard	8566B	3638A08784	May 29, 2009	May 29, 2010
Spectrum Analyzer – Display Section	Hewlett Packard	85662A	2648A14530	May 29, 2009	May 29, 2010
Quasi-Peak Adapter	Hewlett Packard	85650A	2430A00424	May 29, 2009	May 29, 2010
EMI Receiver	Rohde & Schwarz	ESIB40	100194	September 17, 2008	Sept. 17, 2010
Monitor	Hewlett Packard	D5258A	TW74500641	N/A	N/A
<b>RF RADIATED EMISSIONS TEST EQUIPMENT</b>					
Biconical Antenna	Com Power	AB-900	15250	February 23, 2009	Feb. 23, 2010
Log Periodic Antenna	Com Power	AL-100	16060	June 15, 2009	June 15, 2010
Preamplifier	Com-Power	PA-102	1017	January 12, 2009	Jan. 12, 2010
Loop Antenna	Com-Power	AL-130	17089	September 29, 2008	Sept. 29, 2010
Horn Antenna	Com-Power	AH-118	071175	June 27, 2008	June 27, 2010
Microwave Preamplifier	Com Power	PA-122	181921	March 12, 2009	March 12, 2010
Antenna Mast	Com Power	AM-100	N/A	N/A	N/A
<b>RF CONDUCTED EMISSIONS TEST EQUIPMENT</b>					
Emissions Program	Compatible Electronics	2.3 (SR19)	N/A	N/A	N/A
LISN	Com Power	LI-215	12078	September 29, 2008	1 Year
LISN	Com Power	LI-215	12082	September 29, 2008	1 Year
Transient Limiter	Seaward	252A910	1	September 26, 2008	1 Year

**6. TEST SITE DESCRIPTION****6.1 Test Facility Description**

Please refer to section 2.1 and 7.1.2 of this report for EMI test location.

**6.2 EUT Mounting, Bonding and Grounding**

The EUT was mounted on a 1.0 by 1.5 meter non-conductive table 0.8 meters above the ground plane.

The EUT was not grounded.

**6.3 Facility Environmental Characteristics**

When applicable refer to the data sheets in Appendix E for the relative humidity, air temperature, and barometric pressure.

## 7. TEST PROCEDURES

The following sections describe the test methods and the specifications for the tests. Test results are also included in this section.

### 7.1 RF Emissions

#### 7.1.1 Conducted Emissions Test

The measurement receiver was used as a measuring meter. The data was collected with the measurement receiver in the peak detect mode with the "Max Hold" feature activated. The quasi-peak was used only where indicated in the data sheets. A transient limiter was used for the protection of the measurement receiver's input stage, and the offset was adjusted accordingly to read the actual data measured. The LISN output was measured using the measurement receiver. The output of the second LISN was terminated by a 50-ohm termination. The effective measurement bandwidth used for this test was 9 kHz.

Please see section 6.2 of this report for mounting, bonding and grounding of the EUT. The EUT was powered through the LISN, which was bonded to the ground plane. The LISN power was filtered and the filter was bonded to the ground plane. The EUT was set up with the minimum distances from any conductive surfaces as specified in ANSI C63.4. The excess power cord was wrapped in a figure eight pattern to form a bundle not exceeding 0.4 meters in length.

The conducted emissions from the EUT were maximized for operating mode as well as cable placement. The final data was collected under program control by the Compatible Electronics conducted emissions software in several overlapping sweeps by running the spectrum analyzer at a minimum scan rate of 10 seconds per octave. The final qualification data is located in Appendix E.

#### **Test Results:**

The EUT Complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, section 15.207.

### 7.1.2 Radiated Emissions (Spurious and Harmonics) Test

The measurement receiver was used as a measuring meter. A preamplifier was used to increase the sensitivity of the instrument. The measurement receiver was used in the peak detect mode with the “Max Hold” feature activated. In this mode, the measurement receiver records the highest measured reading over all the sweeps.

The readings were averaged by a “duty cycle correction factor”, derived from  $20 \log$  (dwell time / one pulse train with blanking interval). The measurement bandwidths and transducers used for the radiated emissions test were:

<b>FREQUENCY RANGE</b>	<b>TRANSDUCER</b>	<b>EFFECTIVE MEASUREMENT BANDWIDTH</b>
9 kHz to 150 kHz	Active Loop Antenna	200 Hz
150 kHz to 30 MHz	Active Loop Antenna	9 kHz
30 MHz to 300 MHz	Biconical Antenna	120 kHz
300 MHz to 1000 MHz	Log Periodic Antenna	120 kHz
1000 MHz to 4400 MHz	Horn Antenna	1 MHz

The final data was taken with a frequency span of 1 MHz for frequencies below 1000 MHz. For frequencies above 1000 MHz, the final data was taken with a frequency span of 10 MHz. The frequency span was reduced during the preliminary investigations as deemed necessary to distinguish between emissions from the EUT and any ambient signals.

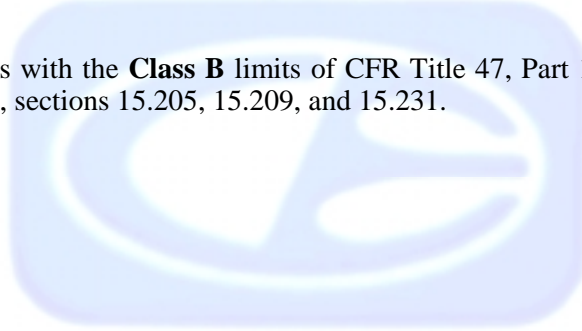
The open field test site of Compatible Electronics, Inc. was used for radiated emission testing. This test site is set up according to ANSI C63.4. Please see section 6.2 of this report for mounting, bonding, and grounding of the EUT. The turntable supporting the EUT is remote controlled using a motor. The turntable permits EUT rotation of 360 degrees in order to maximize emissions. Also, the antenna mast allows height variation of the antenna from 1 meter to 4 meters. Data was collected in the worst case (highest emission) configuration of the EUT. At each reading, the EUT was rotated 360 degrees and the antenna height was varied from 1 to 4 meters (for E field radiated field strength). The gunsight method was used when measuring with the horn antenna to ensure accurate results. The loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.

**Radiated Emissions (Spurious and Harmonics) Test (Continued)**

The presence of ambient signals was verified by turning the EUT off. In case an ambient signal was detected, the measurement bandwidth was reduced temporarily and verification was made that an additional adjacent peak did not exist. This ensures that the ambient signal does not hide any emissions from the EUT. The EUT was tested at a 3-meter distance to obtain final test data. The final qualification data is located in Appendix E.

**Test Results:**

The EUT complies with the **Class B** limits of CFR Title 47, Part 15, Subpart B; and CFR Title 47, Part 15, Subpart C, sections 15.205, 15.209, and 15.231.



## 7.2 Bandwidth of the Fundamental

The -20 dB bandwidth was checked to see that it was within 0.25% of the fundamental frequency for the EUT. Plots of the -20 dB bandwidth are located in Appendix E.

### **Test Results:**

The EUT complies with the limits of CFR Title 47, Part 15, Subpart C, section 15.231(c).





**8. CONCLUSIONS**

The Flood Sensor, Model: WPFS, as tested, meets all of the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B for the digital portion; and the limits defined in Subpart C, sections 15.205, 15.209, and 15.231 for the transmitter portion.



**APPENDIX A**

***LABORATORY RECOGNITIONS***

## ***LABORATORY RECOGNITIONS***

**Compatible Electronics has the following agency accreditations:**

National Voluntary Laboratory Accreditation Program - Lab Code: 200528-0

Voluntary Control Council for Interference - Registration Numbers: R-983, C-1026, R-984 and C-1027

Bureau of Standards and Metrology Inspection - Reference Number: SL2-IN-E-1031

Conformity Assessment Body for the EMC Directive Under the US/EU MRA Appointed by NIST

**Compatible Electronics is recognized or on file with the following agencies:**

Federal Communications Commission

Industry Canada



**APPENDIX B**

***MODIFICATIONS TO THE EUT***

## **MODIFICATIONS TO THE EUT**

The modifications listed below were made to the EUT to pass FCC 15.231 and/or FCC **Class B** specifications.

All the rework described below was implemented during the test in a method that could be reproduced in all the units by the manufacturer.

No modifications were made to the EUT during the testing.



**APPENDIX C**

***ADDITIONAL MODELS COVERED  
UNDER THIS REPORT***

## **ADDITIONAL MODELS COVERED UNDER THIS REPORT**

USED FOR THE PRIMARY TEST

Flood Sensor  
Model: WPFS  
S/N: N/A

No additional models were covered under this report.

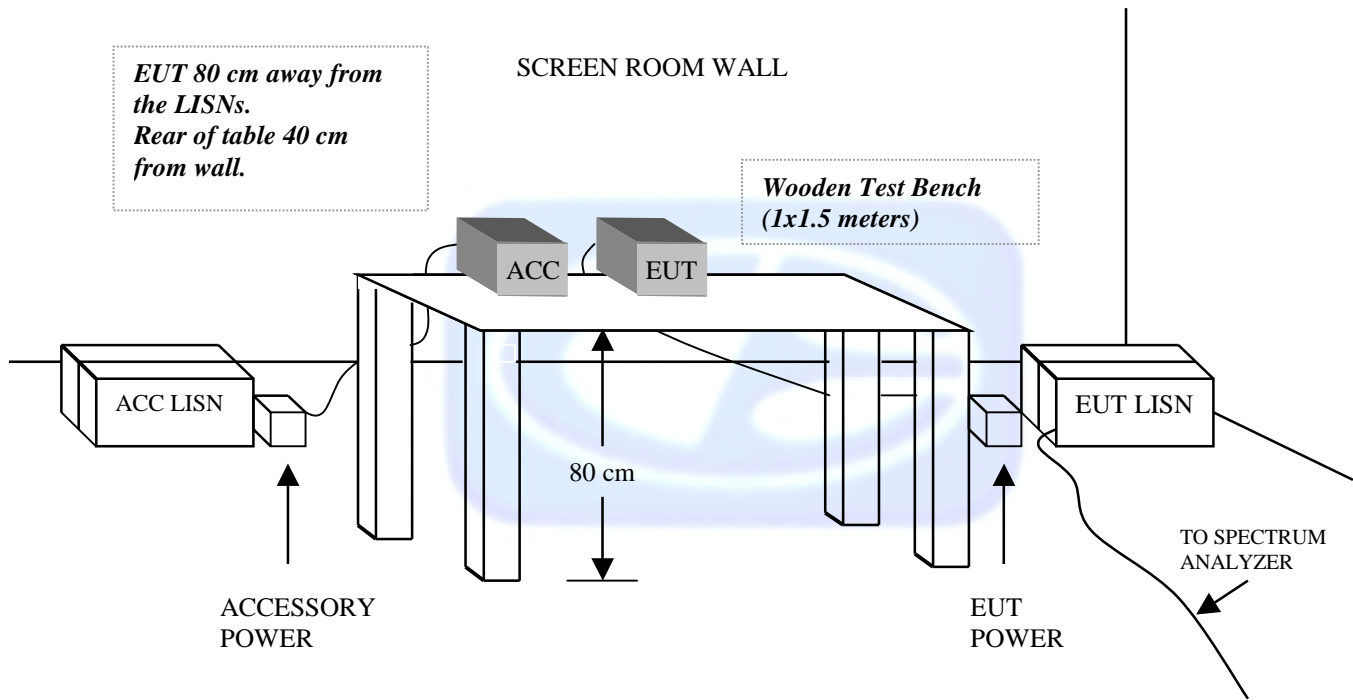


**APPENDIX D**

***DIAGRAMS, CHARTS, AND PHOTOS***

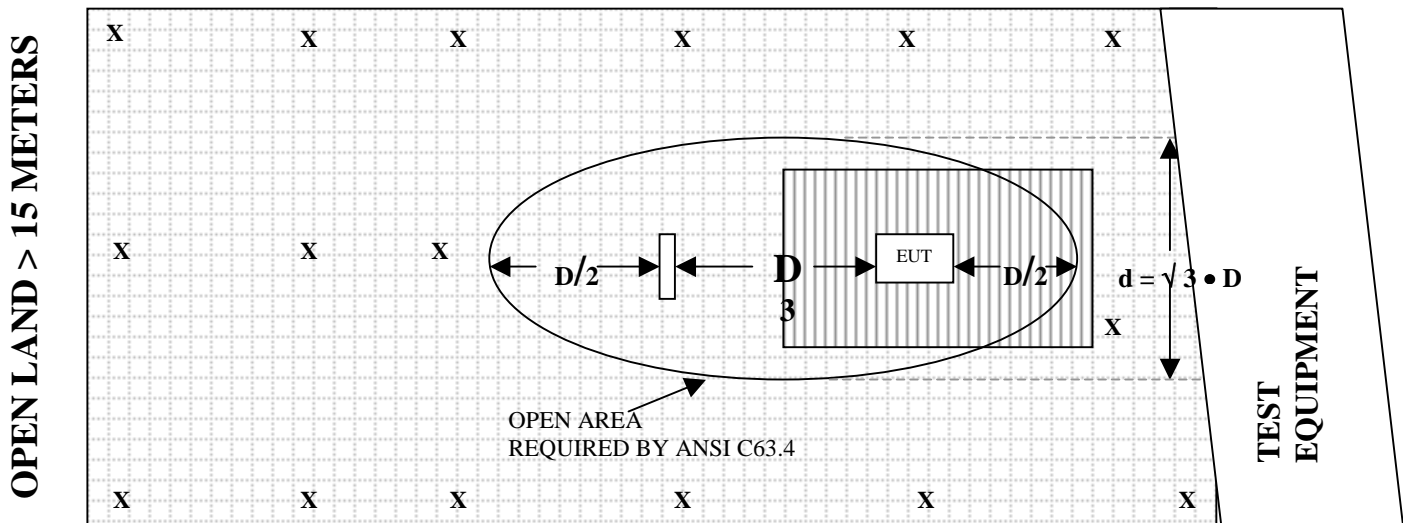


**FIGURE 1: CONDUCTED EMISSIONS TEST SETUP**



**FIGURE 2: PLOT MAP AND LAYOUT OF RADIATED SITE – 3 METERS**

**OPEN LAND > 15 METERS**



**OPEN LAND > 15 METERS**

- X** = GROUND RODS
- = GROUND SCREEN
- D** = TEST DISTANCE (meters)
- = WOOD COVER

**COM-POWER AB-900****BICONICAL ANTENNA****S/N: 15250****CALIBRATION DATE: FEBRUARY 23, 2009**

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
30	13.0	100	11.1
35	11.1	120	13.6
40	10.2	140	12.4
45	11.2	160	12.9
50	11.6	180	16.5
60	9.1	200	17.0
70	8.4	250	16.3
80	6.2	275	18.2
90	8.5	300	17.9

**COM-POWER AL-100****LOG PERIODIC ANTENNA**

S/N: 16060

CALIBRATION DATE: JUNE 15, 2009

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
300	14.2	700	20.1
400	15.9	800	21.2
500	17.1	900	21.3
600	18.8	1000	22.3

**COM POWER AH-118****HORN ANTENNA**

S/N: 071175

CALIBRATION DATE: JUNE 27, 2008

<b>FREQUENCY (GHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (GHz)</b>	<b>FACTOR (dB)</b>
1.0	24.5	10.0	39.4
1.5	25.4	10.5	39.7
2.0	28.3	11.0	39.0
2.5	28.9	11.5	40.0
3.0	29.7	12.0	39.7
3.5	30.8	12.5	41.7
4.0	31.4	13.0	42.7
4.5	32.6	13.5	41.2
5.0	33.7	14.0	41.6
5.5	34.4	14.5	43.2
6.0	34.7	15.0	42.3
6.5	35.4	15.5	39.3
7.0	37.0	16.0	41.7
7.5	37.4	16.5	39.6
8.0	37.6	17.0	43.0
8.5	37.6	17.5	47.1
9.0	38.5	18.0	46.2
9.5	38.6		

**COM-POWER PA-102****PREAMPLIFIER**

S/N: 1017

CALIBRATION DATE: JANUARY 12, 2009

<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (MHz)</b>	<b>FACTOR (dB)</b>
30	39.0	300	38.8
40	39.0	350	38.8
50	38.8	400	38.7
60	38.7	450	38.6
70	38.8	500	38.3
80	38.8	550	38.9
90	39.1	600	38.4
100	39.1	650	38.8
125	38.9	700	38.4
150	38.9	750	38.5
175	38.9	800	38.3
200	38.8	850	38.4
225	39.0	900	38.1
250	38.9	950	37.4
275	38.8	1000	38.1

**COM-POWER PA-122****PREAMPLIFIER**

S/N: 181921

CALIBRATION DATE: MARCH 12, 2009

<b>FREQUENCY (GHz)</b>	<b>FACTOR (dB)</b>	<b>FREQUENCY (GHz)</b>	<b>FACTOR (dB)</b>
1.0	36.46	10.0	35.06
1.5	35.36	10.5	34.82
2.0	34.76	11.0	33.12
2.5	34.94	11.5	34.33
3.0	34.59	12.0	34.75
3.5	34.55	12.5	33.94
4.0	34.25	13.0	35.50
4.5	33.89	13.5	34.89
5.0	34.22	14.0	36.56
5.5	34.81	14.5	36.06
6.0	35.74	15.0	36.67
6.5	36.51	15.5	36.84
7.0	36.66	16.0	34.31
7.5	35.72	16.5	35.11
8.0	33.28	17.0	35.35
8.5	33.11	17.5	34.11
9.0	34.71	18.0	33.88
9.5	35.50	18.5	32.20

**COM-POWER AL-130****LOOP ANTENNA**

S/N: 17089

CALIBRATION DATE: SEPTEMBER 29, 2008

<b>FREQUENCY (MHz)</b>	<b>MAGNETIC (dB/m)</b>	<b>ELECTRIC (dB/m)</b>
0.009	-41.57	9.93
0.01	-42.06	9.44
0.02	-42.43	9.07
0.05	-42.50	9.00
0.07	-42.10	9.40
0.1	-42.03	9.47
0.2	-44.50	7.00
0.3	-41.93	9.57
0.5	-41.90	9.60
0.7	-41.73	9.77
1	-41.23	10.27
2	-40.90	10.60
3	-41.20	10.30
4	-41.30	10.20
5	-40.70	10.80
10	-41.10	10.40
15	-42.17	9.33
20	-42.00	9.50
25	-42.20	9.30
30	-43.10	8.40





**FRONT VIEW**

**DYNAQUIP CONTROLS**

**FLOOD SENSOR**

**MODEL: WPFS**

**FCC SUBPART B AND C – BATTERY MODE – RADIATED EMISSIONS**

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400



**REAR VIEW**

DYNAQUIP CONTROLS

FLOOD SENSOR

MODEL: WPFS

FCC SUBPART B AND C – BATTERY MODE – RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**



**FRONT VIEW**

**DYNAQUIP CONTROLS**

**FLOOD SENSOR**

**MODEL: WPFS**

**FCC SUBPART B AND C – AC POWER MODE – RADIATED EMISSIONS**

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**

**Brea Division**  
114 Olinda Drive  
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20621 Pascal Way  
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(949) 587-0400



**REAR VIEW**

DYNAQUIP CONTROLS

FLOOD SENSOR

MODEL: WPFS

FCC SUBPART B AND C – AC POWER MODE – RADIATED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**



**FRONT VIEW**

**DYNAQUIP CONTROLS**

**FLOOD SENSOR**

**MODEL: WPFS**

**FCC SUBPART B AND C – AC POWER MODE – CONDUCTED EMISSIONS**

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

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Lake Forest, CA 92630  
(949) 587-0400

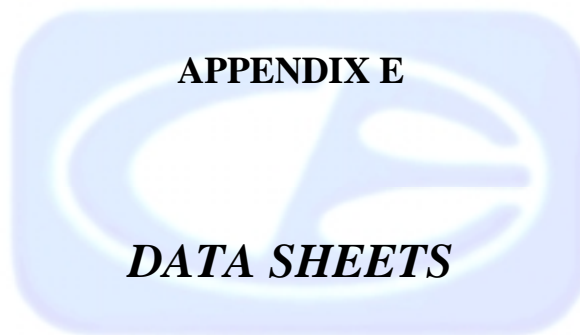


**REAR VIEW**

DYNAQUIP CONTROLS  
FLOOD SENSOR  
MODEL: WPFS

FCC SUBPART B AND C – AC POWER MODE – CONDUCTED EMISSIONS

**PHOTOGRAPH SHOWING THE EUT CONFIGURATION  
FOR MAXIMUM EMISSIONS**



***RADIATED EMISIONS***

***DATA SHEETS***



**FCC 15.231**

Dynaquip Controls  
 Flood Sensor  
 Model: WPFS

Date: 10/26/09  
 Labs: B and D  
 Tested By: Kyle Fujimoto

**Battery Mode**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	86.55	V	100.82	-14.27	Peak	1	180	
433.92	79.76	V	80.82	-1.06	Avg	1	180	
867.84	40.35	V	80.82	-40.47	Peak	1.25	90	
867.84	33.56	V	60.82	-27.26	Avg	1.25	90	
1301.76	45.99	V	74	-28.01	Peak	1.35	150	
1301.76	39.2	V	54	-14.8	Avg	1.35	150	
1735.68	44.45	V	74	-29.55	Peak	1.25	150	
1735.68	37.66	V	54	-16.34	Avg	1.25	150	
2169.6	44.41	V	74	-29.59	Peak	1.35	160	
2169.6	37.62	V	54	-16.38	Avg	1.35	160	
2603.52	41.29	V	74	-32.71	Peak	1.55	135	
2603.52	34.5	V	54	-19.5	Avg	1.55	135	
3037.44	45.36	V	74	-28.64	Peak	1.35	150	
3037.44	38.57	V	54	-15.43	Avg	1.35	150	
3471.36	39.78	V	74	-34.22	Peak	1.58	135	
3471.36	32.99	V	54	-21.01	Avg	1.58	135	
3905.28	41.41	V	74	-32.59	Peak	1.25	150	
3905.28	34.62	V	54	-19.38	Avg	1.25	150	
4339.2	40.89	V	74	-33.11	Peak	1.35	155	
4339.2	34.1	V	54	-19.9	Avg	1.35	155	

**FCC 15.231**

Dynaquip Controls  
 Flood Sensor  
 Model: WPFS

Date: 10/26/09  
 Labs: B and D  
 Tested By: Kyle Fujimoto

**Battery Mode**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	76.25	H	100.82	-24.57	Peak	1	180	
433.92	69.46	H	80.82	-11.36	Avg	1	180	
867.84	43.75	H	80.82	-37.07	Peak	1.25	90	
867.84	36.96	H	60.82	-23.86	Avg	1.25	90	
1301.76	44.99	H	74	-29.01	Peak	1.35	155	
1301.76	38.2	H	54	-15.8	Avg	1.35	155	
1735.68	48.51	H	74	-25.49	Peak	1.25	155	
1735.68	41.72	H	54	-12.28	Avg	1.25	155	
2169.6	48.88	H	74	-25.12	Peak	1.58	135	
2169.6	42.09	H	54	-11.91	Avg	1.58	135	
2603.52	39.85	H	74	-34.15	Peak	1.69	125	
2603.52	33.06	H	54	-20.94	Avg	1.69	125	
3037.44	47.02	H	74	-26.98	Peak	1.59	135	
3037.44	40.23	H	54	-13.77	Avg	1.59	135	
3471.36	40.61	H	74	-33.39	Peak	1.59	125	
3471.36	33.82	H	54	-20.18	Avg	1.59	125	
3905.28	43.07	H	74	-30.93	Peak	1.35	125	
3905.28	36.28	H	54	-17.72	Avg	1.35	125	
4339.2	41.61	H	74	-32.39	Peak	1.58	135	
4339.2	34.82	H	54	-19.18	Avg	1.58	135	

**FCC 15.231**

Dynaquip Controls  
 Flood Sensor  
 Model: WPFS

Date: 10/26/09  
 Labs: B and D  
 Tested By: Kyle Fujimoto

**AC Power Mode**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	85.59	V	100.82	-15.23	Peak	1.25	180	
433.92	78.8	V	80.82	-2.02	Avg	1.25	180	
867.84	40.15	V	80.82	-40.67	Peak	1.58	225	
867.84	33.36	V	60.82	-27.46	Avg	1.58	225	
1301.76	42.33	V	74	-31.67	Peak	1.25	135	
1301.76	35.54	V	54	-18.46	Avg	1.25	135	
1735.68	40.72	V	74	-33.28	Peak	1.35	155	
1735.68	33.93	V	54	-20.07	Avg	1.35	155	
2169.6	41.48	V	74	-32.52	Peak	1.55	165	
2169.6	34.69	V	54	-19.31	Avg	1.55	165	
2603.52	39.71	V	74	-34.29	Peak	1.35	175	
2603.52	32.92	V	54	-21.08	Avg	1.35	175	
3037.44	44.28	V	74	-29.72	Peak	1.55	135	
3037.44	37.49	V	54	-16.51	Avg	1.55	135	
3471.36	45.14	V	74	-28.86	Peak	1.25	135	
3471.36	38.35	V	54	-15.65	Avg	1.25	135	
3905.28	40.09	V	74	-33.91	Peak	1.35	125	
3905.28	33.3	V	54	-20.7	Avg	1.35	125	
4339.2	41.47	V	74	-32.53	Peak	1.25	155	
4339.2	34.68	V	54	-19.32	Avg	1.25	155	

**FCC 15.231**

Dynaquip Controls  
 Flood Sensor  
 Model: WPFS

Date: 10/26/09  
 Labs: B and D  
 Tested By: Kyle Fujimoto

**AC Power Mode**

Freq. (MHz)	Level (dBuV)	Pol (v/h)	Limit	Margin	Peak / QP / Avg	Ant. Height (m)	Table Angle (deg)	Comments
433.92	71.95	H	100.82	-28.87	Peak	1	180	
433.92	65.16	H	80.82	-15.66	Avg	1	180	
867.84	50.85	H	80.82	-29.97	Peak	1.35	135	
867.84	44.06	H	60.82	-16.76	Avg	1.35	135	
1301.76	44.37	H	74	-29.63	Peak	1.25	135	
1301.76	37.58	H	54	-16.42	Avg	1.25	135	
1735.68	43.62	H	74	-30.38	Peak	1.35	150	
1735.68	36.83	H	54	-17.17	Avg	1.35	150	
2169.6	44.89	H	74	-29.11	Peak	1.25	165	
2169.6	38.1	H	54	-15.9	Avg	1.25	165	
2603.52	41.08	H	74	-32.92	Peak	1.55	175	
2603.52	34.29	H	54	-19.71	Avg	1.55	175	
3037.44	43.69	H	74	-30.31	Peak	1.35	155	
3037.44	36.9	H	54	-17.1	Avg	1.35	155	
3471.36	39.95	H	74	-34.05	Peak	1.55	165	
3471.36	33.16	H	54	-20.84	Avg	1.55	165	
3905.28	39.13	H	74	-34.87	Peak	1.69	155	
3905.28	32.34	H	54	-21.66	Avg	1.69	155	
4339.2	40.01	H	74	-33.99	Peak	1.58	135	
4339.2	33.22	H	54	-20.78	Avg	1.58	135	

**Customer** : DynaQuip Controls, Inc. **Date** : 10/30/2009  
**Manufacturer** : DynaQuip Controls, Inc. **Time** : 10:08:08  
**Eut name** : Flood Sensor (Battery Powered Mode) **Lab** : D  
**Model** : WPFS **Test Distance** : 3 Meters  
**Serial #** : N/A  
**Specification** : FCC Class B  
**Distance correction factor (20 \* log(test/spec))** : 0.00

**Test Type:** Radiated Emissions Qualification  
**Test Range:** 9 kHz to 1 GHz (Vertical and Horizontal)  
**Test Engineer:** James Ross  
**AC Adapter:** WaterCop, Model DBU060020 (*for termination only*)

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	Limit = L dBuV/m	Delta R-L dB
V	217.003	46.00	2.27	16.74	38.94	26.07	46.00	-19.93
H	217.020	43.70	2.27	16.74	38.94	23.77	46.00	-22.23
V	420.421	47.70	3.38	16.17	38.66	28.59	46.00	-17.41
V	447.521	47.30	3.49	16.50	38.60	28.69	46.00	-17.31
V	867.863	52.40	4.37	21.27	38.29	39.75	46.00	-6.25
H	420.400	42.00	3.38	16.17	38.66	22.89	46.00	-23.11
H	447.544	43.10	3.49	16.50	38.60	24.49	46.00	-21.51
H	867.866	51.70	4.37	21.27	38.29	39.05	46.00	-6.95

<b>Test Location</b>	: Compatible Electronics	<b>Page</b>	: 1/1
<b>Customer</b>	: DynaQuip Controls, Inc.	<b>Date</b>	: 10/30/2009
<b>Manufacturer</b>	: DynaQuip Controls, Inc.	<b>Time</b>	: 8:03:00
<b>Eut name</b>	: Flood Sensor (AC Powered Mode)	<b>Lab</b>	: D
<b>Model</b>	: WPFS	<b>Test Distance</b>	: 3 Meters
<b>Serial #</b>	: N/A		
<b>Specification</b>	: FCC Class B		
<b>Distance correction factor (20 * log(test/spec))</b>			: 0.00

**Test Type:** Radiated Emissions Qualification  
**Test Range:** 9 kHz to 1 GHz (Vertical and Horizontal)  
**Test Engineer:** James Ross  
**AC Adapter:** WaterCop, Model: DBU060020

Pol	Freq MHz	Rdng dBuV	Cable loss dB	Ant factor dB	Amp gain dB	Cor'd rdg = R dBuV	Limit = L dBuV/m	Delta R-L dB
V	217.000	53.70	2.27	16.74	38.94	33.77	46.00	-12.23
H	217.020	41.60	2.27	16.74	38.94	21.67	46.00	-24.33
V	420.462	46.00	3.38	16.17	38.66	26.90	46.00	-19.10
V	447.519	52.50	3.49	16.50	38.60	33.89	46.00	-12.11
V	867.866	58.20	4.37	21.27	38.29	45.55	46.00	-0.45
V	867.863Qp	57.08	4.37	21.27	38.29	44.43	46.00	-1.57
H	420.404	46.00	3.38	16.17	38.66	26.89	46.00	-19.11
H	447.521	45.90	3.49	16.50	38.60	27.29	46.00	-18.71
H	867.860	57.50	4.37	21.27	38.29	44.85	46.00	-1.15
H	867.861Qp	55.95	4.37	21.27	38.29	43.30	46.00	-2.70



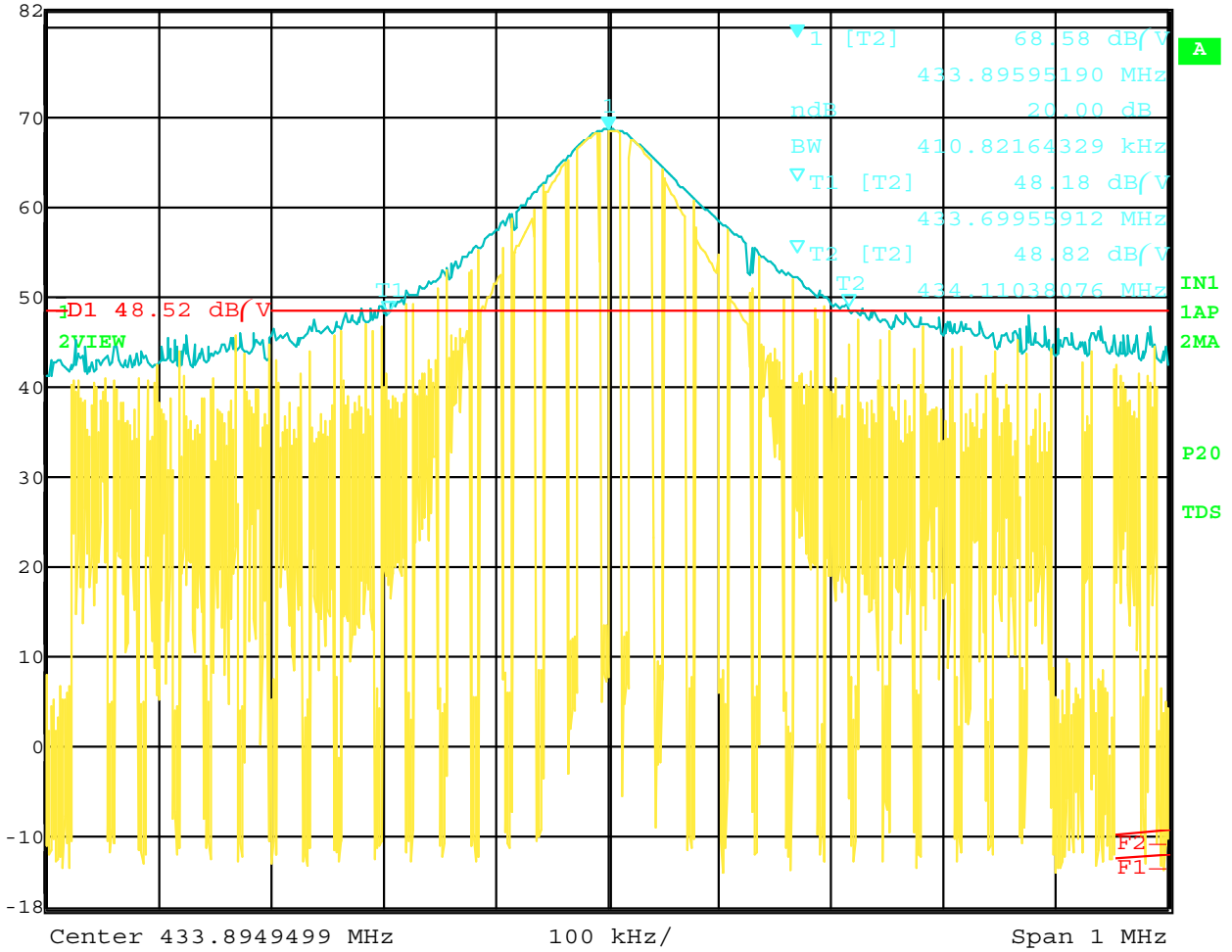
***-20 dB BANDWIDTH***

***DATA SHEET***





Ref Lvl	82 dB/V	Marker 1 [T2 ndB]	ndB	20.00 dB	RBW	100 kHz	RF Att	10 dB
		BW	410.82164329 kHz		VBW	300 kHz		
		SWT	5.5 ms		Unit			dB/V



Date: 26.OCT.2009 08:45:59

-20 dB Bandwidth of the Fundamental

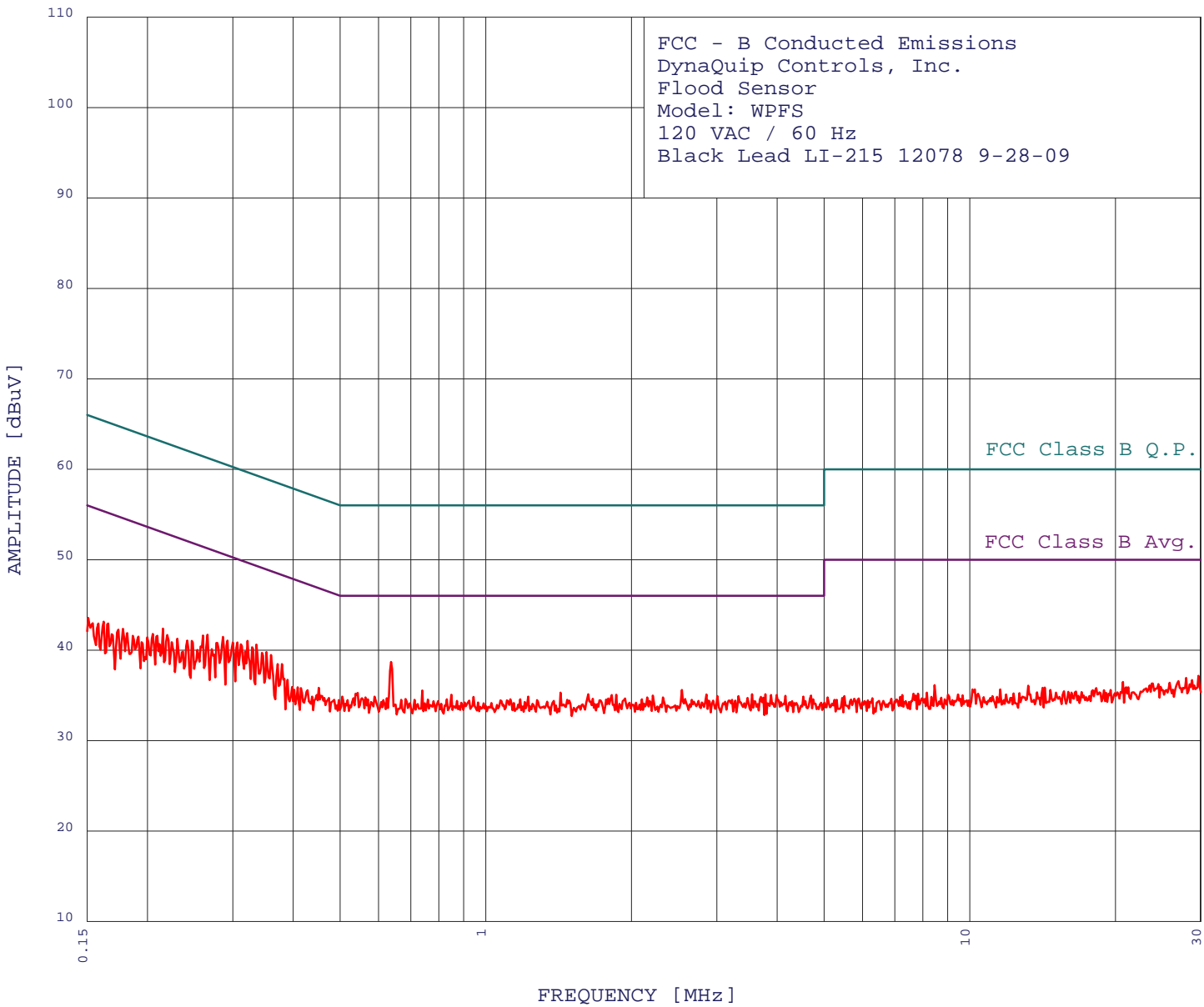
***CONDUCTED EMISSIONS***

***DATA SHEETS***



10/30/2009 15:31:16

EMISSION LEVEL [dBuV] PEAK  
Graph for **Peak**



FCC - B Conducted Emissions  
DynaQuip Controls, Inc.  
Flood Sensor  
Model: WPFS  
120 VAC / 60 Hz  
Black Lead LI-215 12078 9-28-09

**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

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**FCC - B Conducted Emissions**

DynaQuip Controls

Flood Sensor

Model: WPFS

120 VAC / 60 Hz

Black Lead LI-215 12078 9-28-09

Test Engineer: James Ross

-----  
49 highest peaks above -50.00 dB of FCC Class B Avg. limit line

Peak criteria : 1.00 dB, Curve : Peak

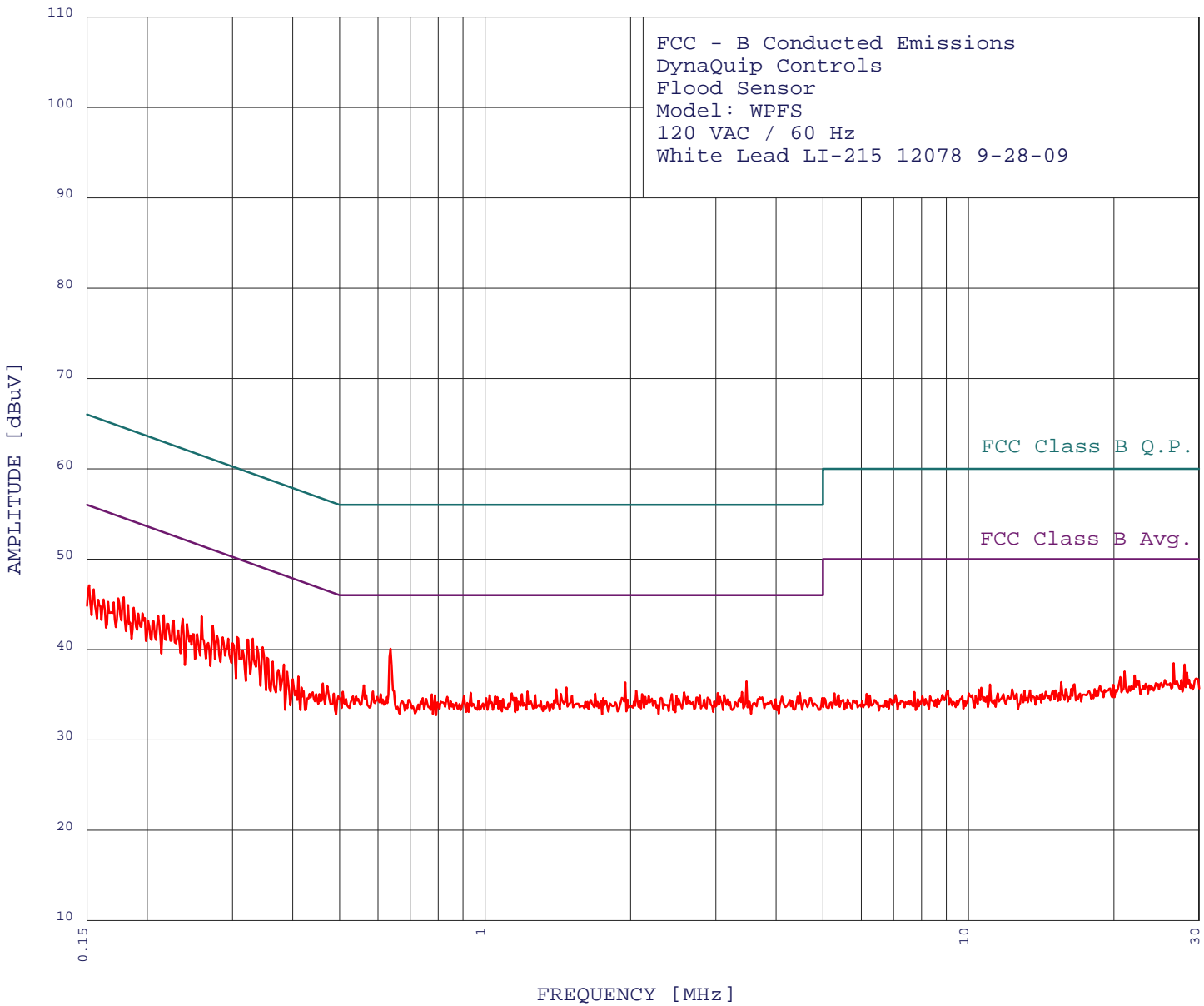
Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.637	38.68	46.00	-7.32
2	0.322	41.02	49.66	-8.64
3	0.336	40.60	49.31	-8.71
4	0.352	39.78	48.91	-9.13
5	0.286	41.47	50.63	-9.16
6	0.329	40.31	49.48	-9.17
7	0.307	40.84	50.05	-9.21
8	0.360	39.47	48.73	-9.27
9	0.312	40.63	49.92	-9.29
10	0.300	40.85	50.23	-9.38
11	0.293	41.06	50.45	-9.39
12	0.345	39.69	49.09	-9.40
13	0.266	41.70	51.24	-9.54
14	0.260	41.61	51.42	-9.82
15	0.379	38.44	48.29	-9.86
16	0.318	39.82	49.75	-9.92
17	0.371	38.45	48.47	-10.02
18	0.277	40.78	50.89	-10.11
19	2.540	35.58	46.00	-10.42
20	0.739	35.52	46.00	-10.48
21	0.215	42.37	53.00	-10.63
22	1.426	35.29	46.00	-10.71
23	0.544	35.27	46.00	-10.73
24	0.247	41.03	51.86	-10.83
25	3.781	35.13	46.00	-10.87
26	3.547	35.12	46.00	-10.88
27	1.629	35.12	46.00	-10.88
28	2.855	35.10	46.00	-10.90
29	0.849	35.07	46.00	-10.93
30	1.859	35.05	46.00	-10.95
31	1.820	35.04	46.00	-10.96
32	3.987	35.03	46.00	-10.97
33	3.882	35.03	46.00	-10.97
34	0.272	40.09	51.07	-10.98
35	0.242	41.03	52.04	-11.00
36	0.452	35.84	46.85	-11.01
37	2.214	34.97	46.00	-11.03
38	4.696	34.96	46.00	-11.04
39	4.159	34.94	46.00	-11.06
40	3.328	34.91	46.00	-11.09
41	3.011	34.90	46.00	-11.10
42	0.505	34.87	46.00	-11.13
43	0.589	34.86	46.00	-11.14
44	1.223	34.86	46.00	-11.14
45	4.528	34.85	46.00	-11.15
46	0.220	41.66	52.83	-11.16
47	3.702	34.82	46.00	-11.18
48	0.230	41.25	52.43	-11.18
49	0.944	34.81	46.00	-11.19

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10/30/2009 15:36:22

EMISSION LEVEL [dBuV] PEAK  
Graph for **Peak**



**Brea Division**  
114 Olinda Drive  
Brea, CA 92823  
(714) 579-0500

**Agoura Division**  
2337 Troutdale Drive  
Agoura, CA 91301  
(818) 597-0600

**Silverado Division**  
19121 El Toro Road  
Silverado, CA 92676  
(949) 589-0700

**Lake Forest Division**  
20621 Pascal Way  
Lake Forest, CA 92630  
(949) 587-0400

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**FCC - B Conducted Emissions**

DynaQuip Controls

Flood Sensor

Model: WPFS

120 VAC / 60 Hz

White Lead LI-215 12078 9-28-09

Test Engineer: James Ross

-----  
49 highest peaks above -50.00 dB of FCC Class B Avg. limit line

Peak criteria : 1.00 dB, Curve : Peak

Peak#	Freq(MHz)	Amp(dBuV)	Limit(dB)	Delta(dB)
1	0.637	40.07	46.00	-5.93
2	0.259	43.68	51.47	-7.78
3	0.331	41.18	49.44	-8.26
4	0.273	42.61	51.02	-8.41
5	0.322	41.09	49.66	-8.57
6	0.307	41.36	50.05	-8.70
7	0.179	45.76	54.54	-8.78
8	0.347	40.26	49.04	-8.78
9	0.237	43.41	52.21	-8.80
10	0.152	47.11	55.91	-8.80
11	0.338	40.27	49.26	-8.99
12	0.155	46.65	55.73	-9.08
13	0.174	45.64	54.77	-9.12
14	0.216	43.80	52.96	-9.16
15	0.294	41.20	50.41	-9.20
16	0.242	42.81	52.04	-9.22
17	0.286	41.35	50.63	-9.27
18	0.279	41.50	50.85	-9.35
19	0.227	43.20	52.57	-9.37
20	0.183	44.90	54.37	-9.47
21	0.211	43.71	53.18	-9.47
22	3.474	36.49	46.00	-9.51
23	0.187	44.62	54.15	-9.53
24	0.300	40.68	50.23	-9.55
25	1.950	36.34	46.00	-9.66
26	0.170	45.20	54.94	-9.74
27	0.196	43.99	53.80	-9.81
28	0.162	45.53	55.34	-9.81
29	0.354	39.06	48.87	-9.81
30	0.383	38.33	48.21	-9.88
31	0.166	45.27	55.16	-9.89
32	0.254	41.69	51.64	-9.95
33	0.561	36.04	46.00	-9.96
34	0.220	42.84	52.83	-9.99
35	0.363	38.65	48.65	-10.00
36	0.192	43.96	53.97	-10.01
37	0.158	45.50	55.56	-10.06
38	0.248	41.69	51.82	-10.13
39	1.472	35.78	46.00	-10.22
40	0.205	43.12	53.40	-10.28
41	0.232	42.11	52.39	-10.28
42	0.201	43.20	53.58	-10.37
43	0.461	36.25	46.67	-10.41
44	1.404	35.58	46.00	-10.42
45	0.267	40.72	51.20	-10.48
46	0.471	35.94	46.49	-10.55
47	2.055	35.45	46.00	-10.55
48	0.389	37.52	48.08	-10.55
49	0.411	37.00	47.63	-10.63

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