

*FCC PART 15, SUBPART B AND C  
TEST REPORT*

*for*

**ULTRASONIC LEVEL MONITOR**

**Model: WU20**

Prepared for

BARTON INSTRUMENT SYSTEMS, LLC  
900 SOUTH TURNBULL CANYON ROAD  
CITY OF INDUSTRY, CALIFORNIA 91749-1882

Prepared by: *Kyle Fujimoto*  
KYLE FUJIMOTO

Approved by: *Scott McCutchan*  
SCOTT McCUTCHAN

COMPATIBLE ELECTRONICS INC.  
114 OLINDA DRIVE  
BREA, CALIFORNIA 92823  
(714) 579-0500

DATE: AUGUST 1, 2000

|       | REPORT<br>BODY | APPENDICES |   |   |    |   | TOTAL |
|-------|----------------|------------|---|---|----|---|-------|
|       |                | A          | B | C | D  | E |       |
| PAGES | 17             | 2          | 2 | 9 | 16 | 2 | 48    |

This report shall not be reproduced except in full, without the written approval of Compatible Electronics.



## TABLE OF CONTENTS

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



**LIST OF APPENDICES**

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

**LIST OF FIGURES**

| FIGURE | TITLE                            |
|--------|----------------------------------|
| 1      | Conducted Emissions Test Setup   |
| 2      | Plot Map And Layout of Test Site |



## GENERAL REPORT SUMMARY

This electromagnetic emission test report is generated by Compatible Electronics Inc., 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 in any form unless done so in full with the written permission of Compatible Electronics.

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

Device Tested: Ultrasonic Level Monitor  
Model: WU20  
S/N: N/A

Product Description: See Expository Statement.

Modifications: The EUT was not modified during the testing.

Manufacturer: Barton Instrument Systems, LLC  
900 South Turnbull Canyon Road  
City of Industry, California 91749-1882

Test Date: July 26, 2000

Test Specifications: EMI requirements  
CFR Title 47, Part 15, Subpart B  
CFR Title 47, Part 15 Subpart C, Sections 15.205 and 15.249

Test Procedure: ANSI C63.4: 1992

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



## SUMMARY OF TEST RESULTS

| TEST | DESCRIPTION                                                                         | RESULTS                                                                                                                 |
|------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| 1    | Conducted RF Emissions, 450 kHz - 30 MHz                                            | The EUT runs off batteries only and cannot be plugged into the AC public mains. Therefore, this test was not performed. |
| 2    | Radiated RF Emissions for the EUT in transmit mode, 10 kHz - 9300 MHz               | Complies with the limits of <b>CFR</b> Title 47, Part 15, Subpart C, sections 15.205 and 15.249                         |
| 3    | Radiated RF Emissions for the EUT in ultrasonic and receive mode, 10 kHz - 9300 MHz | Complies with the <b>Class B</b> limits of <b>CFR</b> Title 47, Part 15, Subpart B                                      |



## 1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the Ultrasonic Level Monitor Model: WU20. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 1992. 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 specification limits defined by CFR Title 47, Part 15, Subpart C, sections 15.205 and 15.249.



## 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 92823.

### 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

Barton Instrument Systems, LLC

|               |                         |
|---------------|-------------------------|
| Tanh T. Ngo   | Sr. Electronic Engineer |
| Brian Dearden | Staff Engineer          |

Compatible Electronics Inc.

|                 |               |
|-----------------|---------------|
| Kyle Fujimoto   | Test Engineer |
| Scott McCutchan | Lab Manager   |

### 2.4 Date Test Sample was Received

The test sample was received on July 26, 2000.

### 2.5 Disposition of the Test Sample

The test sample was returned to Barton Instrument Systems, LLC on July 26, 2000.

### 2.6 Abbreviations and Acronyms

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

|      |                                      |
|------|--------------------------------------|
| RF   | Radio Frequency                      |
| EMI  | Electromagnetic Interference         |
| EUT  | Equipment Under Test                 |
| P/N  | Part Number                          |
| S/N  | Serial Number                        |
| HP   | Hewlett Packard                      |
| ITE  | Information Technology Equipment     |
| CML  | Corrected Meter Limit                |
| LISN | Line Impedance Stabilization Network |
| TDR  | Time Domain Reflectometer            |



### 3. APPLICABLE DOCUMENTS

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

| SPEC                       | TITLE                                                                                                                                 |
|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| CFR Title 47,<br>Subpart C | FCC Rules – Radio frequency devices – Intentional Radiators                                                                           |
| ANSI C63.4<br>1992         | 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

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The Ultrasonic Level Monitor Model: WU20 (EUT) tested as a stand alone unit and placed on the wooden table. The EUT was operating was mentioned below.

The EUT was tested in 2 different modes:

1. Ultrasonic and Receive mode – The EUT is receiving and using ultrasonic technology (used to measure inside the tank) on a continuous basis.
2. Transmit mode – The EUT is continuously transmitting.

Note: only one of these modes can be active at a given time. The Ultrasonic and Receive mode was tested to the **Class B** specification limits defined by CFR Title 47, Part 15, Subpart B. The Transmit mode was tested to the specification limits defined by CFR Title 47, Part 15, Subpart C, sections 15.205 and 15.249.

The final radiated data was taken in all of the modes above. Please see Appendix D for the data sheets.



#### 4.1.1 Cable Construction and Termination

There were no external cables connected to the EUT.



## 5. LISTS OF EUT, ACCESSORIES AND TEST EQUIPMENT

### 5.1 EUT and Accessory List

| EQUIPMENT                      | MANUFACTURER                   | MODEL NUMBER | SERIAL NUMBER | FCC ID   |
|--------------------------------|--------------------------------|--------------|---------------|----------|
| ULTRASONIC LEVEL MONITOR (EUT) | BARTON INSTRUMENT SYSTEMS, LLC | WU20         | N/A           | OKZ-WU20 |



## 5.2 EMI Test Equipment

| EQUIPMENT TYPE         | MANUFACTURER     | MODEL NUMBER | SERIAL NUMBER | CAL. DATE     | CAL. DUE DATE |
|------------------------|------------------|--------------|---------------|---------------|---------------|
| Spectrum Analyzer      | Hewlett Packard  | 8566B        | 3701A22262    | June 24, 2000 | June 24, 2001 |
| Preamplifier           | Com Power        | PA-102       | 1017          | Jan. 11, 2000 | Jan. 11, 2001 |
| Quasi-Peak Adapter     | Hewlett Packard  | 85650A       | 2811A01363    | June 24, 2000 | June 24, 2001 |
| RF Attenuator          | Sertek           | 412-10       | N/A           | Nov. 22, 1999 | Nov. 22, 2000 |
| LISN                   | Com Power        | LI-215       | 12075         | Nov. 13, 1999 | Nov. 13, 2000 |
| LISN                   | Com Power        | LI-215       | 12078         | Nov. 13, 1999 | Nov. 13, 2000 |
| Biconical Antenna      | Com Power        | AB-100       | 1548          | Oct. 14, 1999 | Oct. 14, 2000 |
| Log Periodic Antenna   | Com Power        | AL-100       | 16039         | Oct. 14, 1999 | Oct. 14, 2000 |
| Antenna Mast           | Com Power        | AM-100       | N/A           | N/A           | N/A           |
| Turntable              | Com Power        | TT-100       | N/A           | N/A           | N/A           |
| Computer               | Hewlett Packard  | D5251A 888   | US74458128    | N/A           | N/A           |
| Microwave Preamplifier | Com-Power        | PA-122       | 25195         | Jan. 13, 2000 | Jan. 13, 2001 |
| Horn Antenna           | Antenna Research | DRG-118/A    | 1053          | Dec. 8, 1995  | N/A           |
| Loop Antenna           | Com-Power        | AL-130       | 25309         | May 25, 2000  | May 25, 2001  |



## **6. TEST SITE DESCRIPTION**

### **6.1 Test Facility Description**

Please refer to section 2.1 and 7.1 of this report for EMI test location.

### **6.2 EUT Mounting, Bonding and Grounding**

The EUT was not grounded.



## 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 Radiated Emissions (Spurious and Harmonics) Test

The spectrum analyzer was used as a measuring meter along with the quasi-peak adapter. Amplifiers were used to increase the sensitivity of the instrument. The Com Power Preamplifier Model: PA-102 was used for frequencies from 30 MHz to 1 GHz, and the Com-Power Microwave Preamplifier Model: PA-122 was used for frequencies above 1 GHz. The spectrum analyzer was used in the peak detect mode with the "Max Hold" feature activated. In this mode, the spectrum analyzer records the highest measured reading over all the sweeps.

For the peak readings below 1000 MHz that were within 3 dB of the spec limit or higher, the quasi-peak adapter was used.

For the peak readings above 1000 MHz that were within 3dB of the spec limit or higher, the readings were averaged manually by narrowing the video filter down to 10 Hz and slowing the sweep time to keep the amplitude reading calibrated.

The measurement bandwidths and transducers used for the radiated emissions test were:

| FREQUENCY RANGE   | EFFECTIVE MEASUREMENT BANDWIDTH | TRANSDUCER           |
|-------------------|---------------------------------|----------------------|
| 9 kHz to 150 kHz  | 200 Hz                          | Active Loop Antenna  |
| 150 kHz to 30 MHz | 9 kHz                           | Active Loop Antenna  |
| 30 MHz to 300 MHz | 120 kHz                         | Biconical Antenna    |
| 300 MHz to 1 GHz  | 120 kHz                         | Log Periodic Antenna |
| 1 GHz to 9.3 GHz  | 1 MHz                           | Horn Antenna         |

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: 1992. 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 in order to ensure accurate results.



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 test distance to obtain final test data. The final qualification data sheets are located in Appendix D.



## 7.2 Band Edge Plots of the Low and High Channels

A spectral plot was taken of the EUT to show that the emissions at the band edges were attenuated by at least 50 dB below the level of the fundamental or to the general radiated emissions limits in FCC Title 47, Subpart C, section 15.209, whichever is the lesser attenuation. Please see Appendix D for the spectral plot.

The spectral plot was taken at a distance of 3 meters.



## 8. CONCLUSIONS

The Ultrasonic Level Monitor Model: WU20 meets all of the **Class B** specification limits defined in CFR Title 47, Part 15, Subpart B, and the specification limits defined in CFR Title 47, Part 15, Subpart C, sections 15.205 and 15.249.



**APPENDIX A**

***MODIFICATIONS TO THE EUT***



## MODIFICATIONS TO THE EUT

The modifications listed below were made to the EUT to pass FCC Subpart B and C 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 B**

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



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

USED FOR THE PRIMARY TEST

Ultrasonic Level Monitor  
Model: WU20  
S/N: N/A

There were no additional models covered under this report.

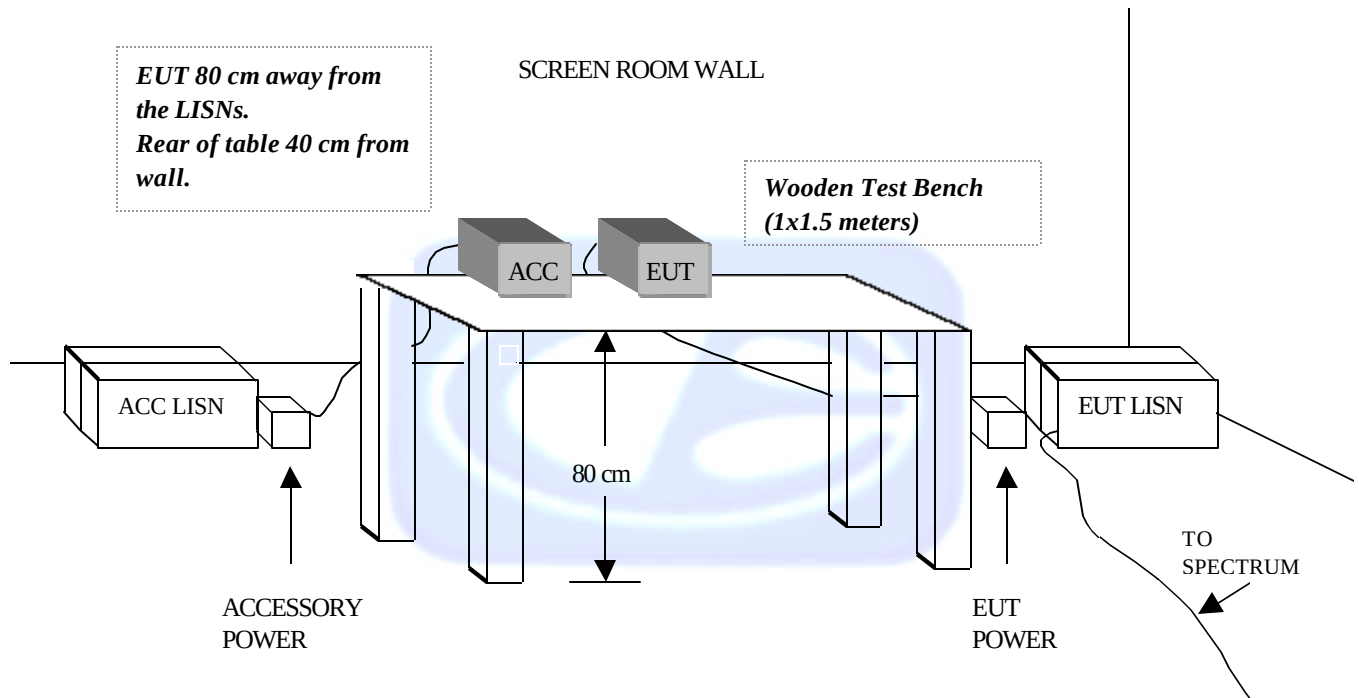




**APPENDIX C**

***DIAGRAMS, CHARTS AND PHOTOS***



**FIGURE 1: CONDUCTED EMISSIONS TEST SETUP**

## OPEN LAND > 15 METERS





**FRONT VIEW**

BARTON INSTRUMENT SYSTEMS, LLC

ULTRASONIC LEVEL MONITOR

MODEL: WU20

FCC SUBPART C - RADIATED EMISSIONS – 7-26-00

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





**REAR VIEW**

BARTON INSTRUMENT SYSTEMS, LLC

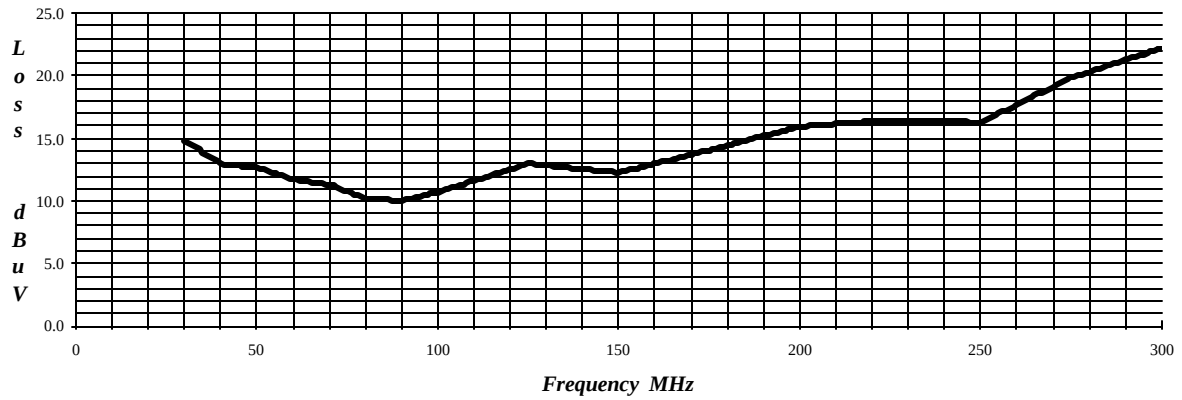
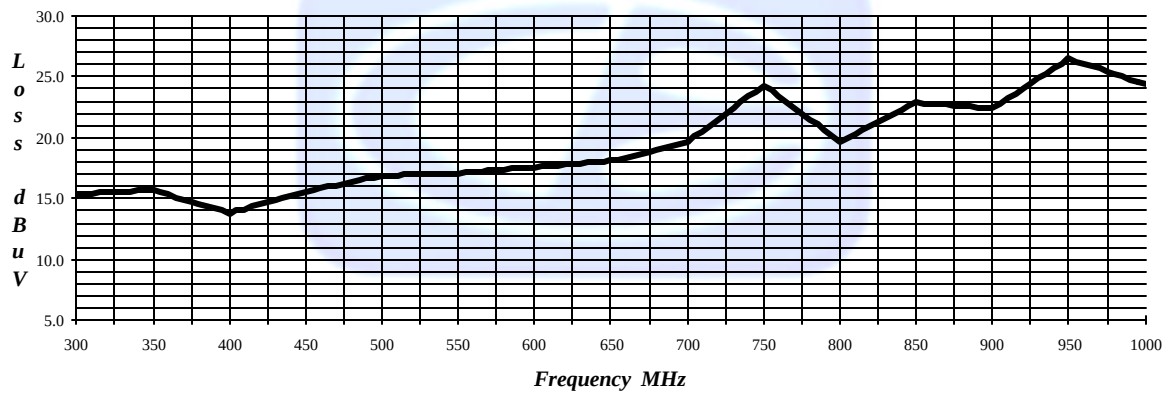
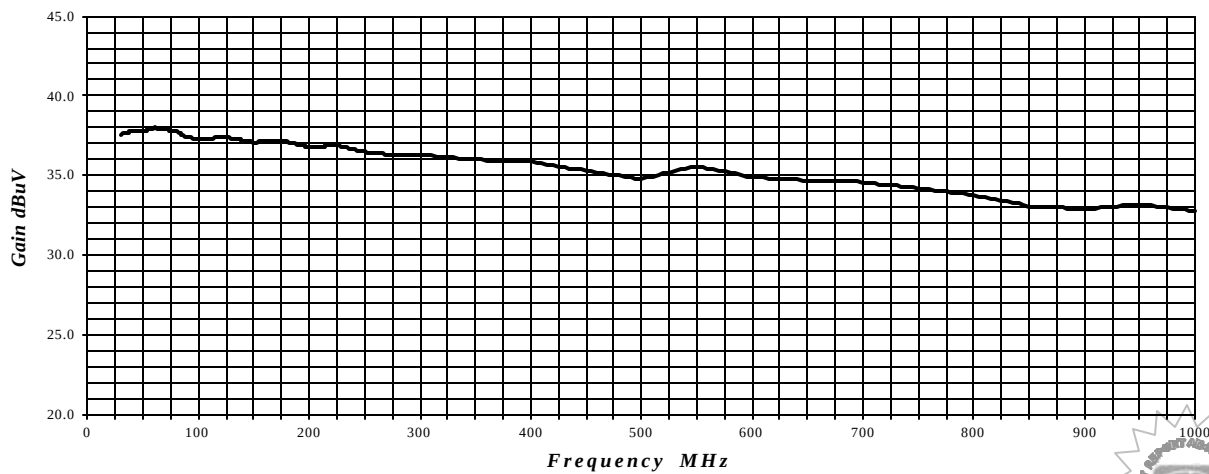
ULTRASONIC LEVEL MONITOR

MODEL: WU20

FCC SUBPART C - RADIATED EMISSIONS – 7-26-00

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



**LAB "D" BICONICAL ANTENNA AB-100 S/N 01548 Cal: 10-14-99****LAB "D" LOG PERIODIC ANTENNA AL-100 S/N 16039 Cal: 10-14-99****PREAMPLIFIER EFFECTIVE GAIN AT 3 METERS PA-102 S/N: 1017 Effective 1-13-00**

COM-POWER PA-122

MICROWAVE PREAMPLIFIER

S/N: 25195

CALIBRATION DATE: JANUARY 13, 2000

| FREQUENCY<br>(GHz) | FACTOR<br>(dB) | FREQUENCY<br>(GHz) | FACTOR<br>(dB) |
|--------------------|----------------|--------------------|----------------|
| 1.0                | 34.4           | 9.0                | 30.7           |
| 1.1                | 34.1           | 9.5                | 31.5           |
| 1.2                | 34.2           | 10.0               | 31.0           |
| 1.3                | 34.1           | 10.5               | 31.4           |
| 1.4                | 33.9           | 11.0               | 30.7           |
| 1.5                | 33.8           | 11.5               | 29.5           |
| 1.6                | 33.0           | 12.0               | 27.8           |
| 1.7                | 33.3           | 12.5               | 31.4           |
| 1.8                | 33.3           | 13.0               | 31.0           |
| 1.9                | 31.9           | 13.5               | 31.0           |
| 2.0                | 32.7           | 14.0               | 31.5           |
| 2.5                | 31.8           | 14.5               | 30.2           |
| 3.0                | 31.7           | 15.0               | 29.2           |
| 3.5                | 31.9           | 15.5               | 30.1           |
| 4.0                | 31.0           | 16.0               | 29.0           |
| 4.5                | 31.4           | 16.5               | 27.8           |
| 5.0                | 31.1           | 17.0               | 30.8           |
| 5.5                | 31.0           | 17.5               | 31.5           |
| 6.0                | 32.0           | 18.0               | 30.8           |
| 6.5                | 31.6           |                    |                |
| 7.0                | 32.3           |                    |                |
| 7.5                | 32.9           |                    |                |
| 8.0                | 32.1           |                    |                |
| 8.5                | 31.6           |                    |                |



# E-FIELD ANTENNA FACTOR CALIBRATION

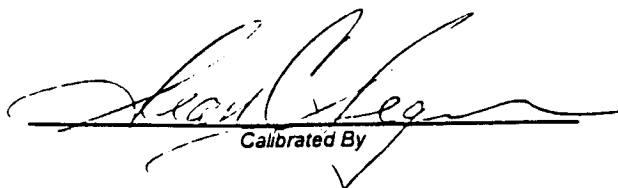
$$E(\text{dB V/m}) = V_o(\text{dB V}) + AFE(\text{dB/m})$$

Model number : DRG-118/A

| Frequency<br>GHz | AFE<br>dB/m | Gain<br>dBi |
|------------------|-------------|-------------|
| 1                | 22.3        | 8.0         |
| 2                | 26.7        | 9.5         |
| 3                | 29.7        | 10.1        |
| 4                | 29.5        | 12.8        |
| 5                | 32.3        | 12.0        |
| 6                | 32.4        | 13.4        |
| 7                | 36.1        | 11.0        |
| 8                | 37.4        | 10.9        |
| 9                | 36.8        | 12.5        |
| 10               | 39.5        | 10.7        |
| 11               | 39.6        | 11.5        |
| 12               | 39.8        | 12.0        |
| 13               | 39.7        | 12.8        |
| 14               | 41.8        | 11.3        |
| 15               | 41.9        | 11.9        |
| 16               | 38.1        | 16.3        |
| 17               | 41.0        | 13.9        |
| 18               | 46.5        | 8.9         |

Serial number : 1053  
Job number : 96-092  
Remarks : 3 meter calibration  
Standards : LPD-118/A, TE-1000

Temperature : 72° F  
Humidity : 56 %  
Traceability : A01887  
Date : December 08, 1995

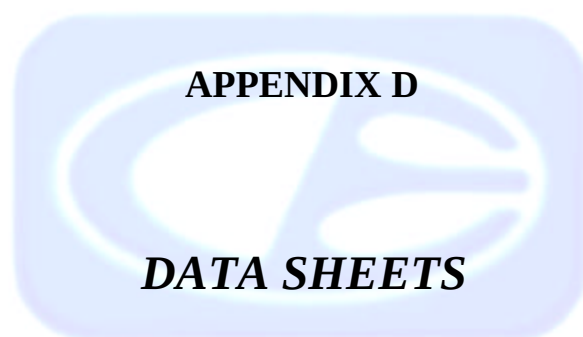
  
Calibrated By

# Com-Power Corporation

(949) 587-9800

## Antenna Calibration

| Antenna Type:            |                    | Loop Antenna     |
|--------------------------|--------------------|------------------|
| Model:                   |                    | AL-130           |
| Serial Number:           |                    | 25309            |
| Calibration Date:        |                    | 05/25/00         |
| Frequency<br>MHz         | Magnetic<br>(dB/m) | Electric<br>dB/m |
|                          |                    |                  |
| 0.009                    | -41.0              | 10.5             |
| 0.01                     | -41.0              | 10.5             |
| 0.02                     | -41.9              | 9.6              |
| 0.05                     | -41.9              | 9.6              |
| 0.075                    | -41.8              | 9.7              |
| 0.1                      | -42.2              | 9.3              |
| 0.15                     | -42.2              | 9.3              |
| 0.25                     | -40.7              | 10.8             |
| 0.5                      | -42.1              | 9.4              |
| 0.75                     | -40.9              | 10.6             |
| 1                        | -41.3              | 10.2             |
| 2                        | -40.8              | 10.7             |
| 3                        | -41.1              | 10.4             |
| 4                        | -41.2              | 10.3             |
| 5                        | -40.7              | 10.8             |
| 10                       | -40.6              | 10.9             |
| 15                       | -42.0              | 9.5              |
| 20                       | -42.0              | 9.5              |
| 25                       | -42.9              | 8.6              |
| 30                       | -42.3              | 9.2              |
| Trans. Antenna Height    |                    | 2 meter          |
| Receiving Antenna Height |                    | 2 meter          |



***TRANSMITTER MODE***

***DATA SHEETS***



# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

**PAGE 1**

## RADIATED EMISSIONS (FCC SECTION 15.205 AND 15.249)

|               |                                |             |          |
|---------------|--------------------------------|-------------|----------|
| COMPANY       | BARTON INSTRUMENT SYSTEMS, LLC | DATE        | 7/26/00  |
| EUT           | ULTRASONIC LEVEL MONITOR       | DUTY CYCLE  | 0.00 %   |
| MODEL         | WU20                           | PEAK TO AVG | 0 dB     |
| S/N           | N/A                            | TEST DIST.  | 3 METERS |
| TEST ENGINEER | KYLE FUJIMOTO                  | LAB         | D        |

[illegible]

\* CORRECTED READING = METER READING + ANTENNA FACTOR + CABLE LOSS - AMPLIFIER GAIN

\*\* DELTA = SPEC LIMIT - CORRECTED READING

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

**COMPATIBLE  
ELECTRONICS**

**COMPATIBLE  
ELECTRONICS**

**COMPATIBLE  
ELECTRONICS**

**PAGE 5**

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

# COMPATIBLE ELECTRONICS

**Note: NO Emmissions nor harmonics found after the 6th Harmonic for the EUT**

**PAGE 6**

Test location: Compatible Electronics  
Customer : BARTON INSTRUMENT SYSTEMS, LLC Date : 7/26/2000  
Manufacturer : BARTON INSTRUMENT SYSTEMS, LLC Time : 15.47  
EUT name : ULTRASONIC LEVEL MONITOR Model: WU20  
Specification: Fcc\_B Test distance: 3.0 mtrs Lab: D  
Distance correction factor( $20 \cdot \log(\text{test}/\text{spec})$ ) : 0.00  
Test Mode :  
TRANSMITTER MODE - 10 kHz TO 9300 MHz VERTICAL AND HORIZONTAL  
TEMPERATURE 71 DEGREES F.  
RELATIVE HUMIDITY 68%  
TESTED BY: Kyle Fujimoto  
KYLE FUJIMOTO

NO SPURIOUS EMISSIONS FOUND FOR THE TRANSMITTER MODE  
IN EITHER POLARIZATION

***ULTRASONIC AND RECEIVE MODE***

***DATA SHEETS***



Test location: Compatible Electronics  
 Customer : BARTON INSTRUMENT SYSTEMS, LLC Date : 7/26/2000  
 Manufacturer : BARTON INSTRUMENT SYSTEMS, LLC Time : 10.55  
 EUT name : ULTRASONIC LEVEL MONITOR Model: WU20  
 Specification: Fcc\_B Test distance: 3.0 mtrs Lab: D  
 Distance correction factor( $20 \cdot \log(\text{test}/\text{spec})$ ) : 0.00  
 Test Mode :  
 RECEIVER AND ULTRASONIC MODE - 30 MHz TO 300 MHz VERTICAL  
 TEMPERATURE 71 DEGREES F.  
 RELATIVE HUMIDITY 68%  
 TESTED BY: Kyle Fujimoto

KYLE FUJIMOTO

| Pol | Freq<br>MHz | Rdng<br>dBuV | Cable<br>loss<br>dB | Ant<br>factor<br>dB | Amp<br>gain<br>dB | Cor'd<br>rdg = R<br>dBuV | limit<br>= L<br>dBuV/m | Delta<br>R-L<br>dB |
|-----|-------------|--------------|---------------------|---------------------|-------------------|--------------------------|------------------------|--------------------|
| 1V  | 39.98       | 53.30        | 0.80                | 12.96               | 38.60             | 28.46                    | 40.00                  | -11.54             |
| 2V  | 48.05       | 52.60        | 0.88                | 12.73               | 38.68             | 27.53                    | 40.00                  | -12.47             |
| 3V  | 61.31       | 52.90        | 0.83                | 11.67               | 38.81             | 26.58                    | 40.00                  | -13.42             |
| 4V  | 63.93       | 49.50        | 0.88                | 11.57               | 38.84             | 23.11                    | 40.00                  | -16.89             |
| 5V  | 109.13      | 56.80        | 1.34                | 11.57               | 38.67             | 31.03                    | 43.50                  | -12.47             |
| 6V  | 113.37      | 59.30        | 1.35                | 11.95               | 38.71             | 33.90                    | 43.50                  | -9.60              |
| 7V  | 116.59      | 57.10        | 1.37                | 12.25               | 38.73             | 31.98                    | 43.50                  | -11.52             |
| 8V  | 121.13      | 56.10        | 1.38                | 12.66               | 38.77             | 31.37                    | 43.50                  | -12.13             |
| 9V  | 125.90      | 63.40        | 1.41                | 12.98               | 38.80             | 38.99                    | 43.50                  | -4.51              |
| 10V | 138.57      | 62.30        | 1.51                | 12.60               | 38.75             | 37.66                    | 43.50                  | -5.84              |
| 11V | 145.42      | 59.10        | 1.56                | 12.39               | 38.72             | 34.33                    | 43.50                  | -9.17              |
| 12V | 150.47      | 61.90        | 1.60                | 12.28               | 38.70             | 37.08                    | 43.50                  | -6.42              |
| 13V | 152.07      | 59.60        | 1.60                | 12.40               | 38.71             | 34.89                    | 43.50                  | -8.61              |
| 14V | 168.09      | 51.80        | 1.60                | 13.57               | 38.77             | 28.19                    | 43.50                  | -15.31             |
| 15V | 197.41      | 51.70        | 1.78                | 15.75               | 38.62             | 30.61                    | 43.50                  | -12.89             |
| 16V | 200.54      | 57.50        | 1.80                | 15.96               | 38.60             | 36.66                    | 43.50                  | -6.84              |
| 17V | 214.88      | 46.40        | 1.86                | 16.24               | 38.72             | 25.78                    | 43.50                  | -17.72             |
| 18V | 225.53      | 42.70        | 1.90                | 16.44               | 38.80             | 22.24                    | 46.00                  | -23.76             |
| 19V | 251.76      | 50.70        | 2.11                | 16.52               | 38.59             | 30.73                    | 46.00                  | -15.27             |
| 20V | 276.99      | 48.70        | 2.21                | 20.02               | 38.51             | 32.42                    | 46.00                  | -13.58             |

Test location: Compatible Electronics  
Customer : BARTON INSTRUMENT SYSTEMS, LLC Date : 7/26/2000  
Manufacturer : BARTON INSTRUMENT SYSTEMS, LLC Time : 11.15  
EUT name : ULTRASONIC LEVEL MONITOR Model: WU20  
Specification: Fcc\_B Test distance: 3.0 mtrs Lab: D  
Distance correction factor( $20 \cdot \log(\text{test}/\text{spec})$ ) : 0.00  
Test Mode :  
RECEIVER AND ULTRASONIC MODE - 30 MHz TO 300 MHz HORIZONTAL  
TEMPERATURE 71 DEGREES F.  
RELATIVE HUMIDITY 68%  
TESTED BY: Kyle Fujimoto

KYLE FUJIMOTO

| Pol | Freq<br>MHz | Rdng<br>dBuV | Cable<br>loss<br>dB | Ant<br>factor<br>dB | Amp<br>gain<br>dB | Cor'd<br>rdg = R<br>dBuV | limit<br>= L<br>dBuV/m | Delta<br>R-L<br>dB |
|-----|-------------|--------------|---------------------|---------------------|-------------------|--------------------------|------------------------|--------------------|
| 1H  | 38.54       | 51.30        | 0.79                | 13.24               | 38.56             | 26.77                    | 40.00                  | -13.23             |
| 2H  | 41.94       | 53.50        | 0.82                | 12.91               | 38.62             | 28.61                    | 40.00                  | -11.39             |
| 3H  | 56.65       | 38.90        | 0.83                | 12.04               | 38.77             | 13.01                    | 40.00                  | -26.99             |
| 4H  | 68.51       | 43.10        | 0.97                | 11.40               | 38.89             | 16.58                    | 40.00                  | -23.42             |
| 5H  | 83.30       | 54.70        | 1.07                | 10.16               | 38.73             | 27.19                    | 40.00                  | -12.81             |
| 6H  | 85.96       | 46.30        | 1.12                | 10.11               | 38.68             | 18.85                    | 40.00                  | -21.15             |
| 7H  | 108.91      | 47.50        | 1.34                | 11.55               | 38.67             | 21.71                    | 43.50                  | -21.79             |
| 8H  | 112.91      | 47.80        | 1.35                | 11.91               | 38.70             | 22.36                    | 43.50                  | -21.14             |
| 9H  | 125.91      | 60.40        | 1.41                | 12.98               | 38.80             | 35.99                    | 43.50                  | -7.51              |
| 10H | 133.91      | 51.50        | 1.47                | 12.74               | 38.76             | 26.95                    | 43.50                  | -16.55             |
| 11H | 150.44      | 60.40        | 1.60                | 12.28               | 38.70             | 35.58                    | 43.50                  | -7.92              |
| 12H | 162.60      | 51.80        | 1.60                | 13.17               | 38.75             | 27.82                    | 43.50                  | -15.68             |
| 13H | 176.42      | 43.50        | 1.61                | 14.18               | 38.79             | 20.50                    | 43.50                  | -23.00             |
| 14H | 194.73      | 48.50        | 1.76                | 15.55               | 38.64             | 27.17                    | 43.50                  | -16.33             |
| 15H | 210.73      | 45.20        | 1.84                | 16.16               | 38.69             | 24.52                    | 43.50                  | -18.98             |
| 16H | 229.47      | 48.70        | 1.94                | 16.41               | 38.76             | 28.28                    | 46.00                  | -17.72             |

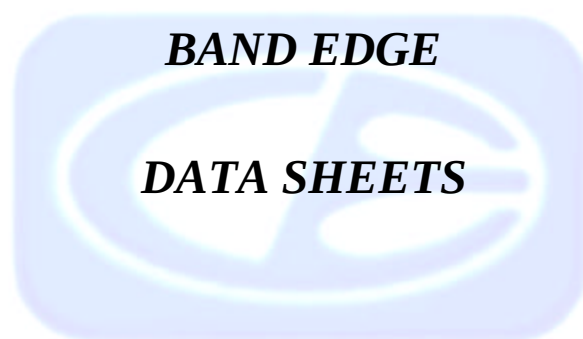
Test location: Compatible Electronics  
Customer : BARTON INSTRUMENT SYSTEMS, LLC Date : 7/26/2000  
Manufacturer : BARTON INSTRUMENT SYSTEMS, LLC Time : 9.47  
EUT name : ULTRASONIC LEVEL MONITOR Model: WU20  
Specification: Fcc\_B Test distance: 3.0 mtrs Lab: D  
Distance correction factor( $20 \cdot \log(\text{test}/\text{spec})$ ) : 0.00  
Test Mode :  
RECEIVER AND ULTRASONIC MODE - 300 MHz TO 9300 MHz VERTICAL  
TEMPERATURE 71 DEGREES F.  
RELATIVE HUMIDITY 68%  
TESTED BY: Kyle Fujimoto

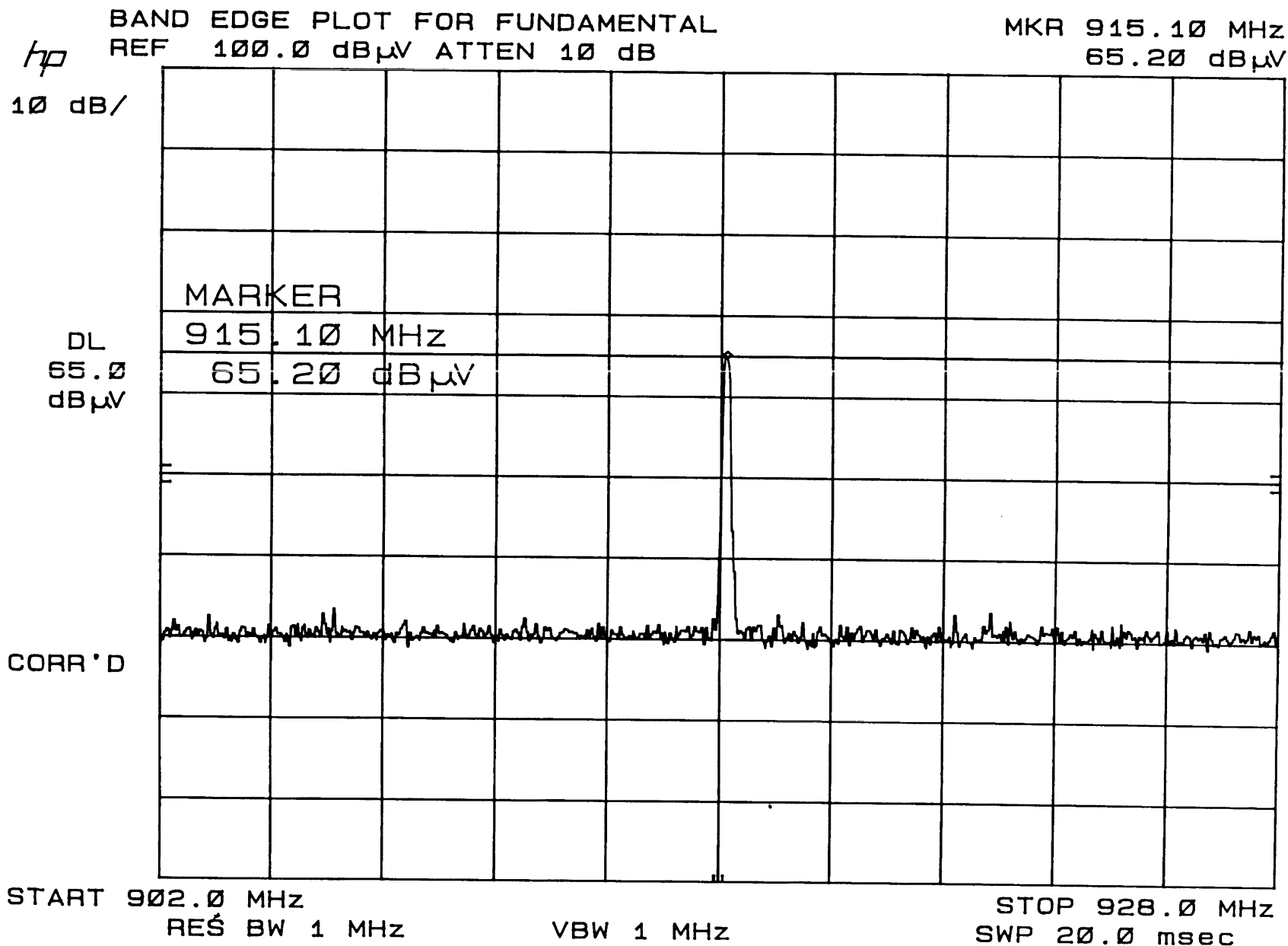
KYLE FUJIMOTO

| Pol | Freq<br>MHz | Rdng<br>dBuV | Cable<br>loss<br>dB | Ant<br>factor<br>dB | Amp<br>gain<br>dB | Cor'd<br>rdg = R<br>dBuV | limit<br>= L<br>dBuV/m | Delta<br>R-L<br>dB |
|-----|-------------|--------------|---------------------|---------------------|-------------------|--------------------------|------------------------|--------------------|
| 1V  | 300.78      | 49.60        | 2.30                | 15.41               | 38.60             | 28.72                    | 46.00                  | -17.28             |
| 2V  | 302.14      | 49.40        | 2.31                | 15.42               | 38.60             | 28.53                    | 46.00                  | -17.47             |
| 3V  | 325.86      | 47.80        | 2.46                | 15.55               | 38.60             | 27.20                    | 46.00                  | -18.80             |
| 4V  | 350.99      | 40.70        | 2.60                | 15.64               | 38.60             | 20.34                    | 46.00                  | -25.66             |
| 5V  | 372.95      | 41.70        | 2.65                | 14.80               | 38.60             | 20.54                    | 46.00                  | -25.46             |
| 6V  | 384.15      | 49.70        | 2.67                | 14.37               | 38.60             | 28.14                    | 46.00                  | -17.86             |
| 7V  | 401.04      | 53.00        | 2.70                | 13.80               | 38.59             | 30.91                    | 46.00                  | -15.09             |
| 8V  | 406.92      | 49.90        | 2.71                | 14.01               | 38.53             | 28.10                    | 46.00                  | -17.90             |
| 9V  | 453.33      | 42.60        | 2.82                | 15.69               | 38.09             | 23.02                    | 46.00                  | -22.98             |
| 10V | 472.15      | 47.00        | 2.93                | 16.17               | 38.01             | 28.09                    | 46.00                  | -17.91             |
| 11V | 549.33      | 39.40        | 3.59                | 17.09               | 39.18             | 20.90                    | 46.00                  | -25.10             |
| 12V | 753.28      | 32.70        | 3.99                | 20.44               | 38.17             | 18.96                    | 46.00                  | -27.04             |
| 13V | 870.06      | 47.70        | 4.48                | 22.70               | 37.50             | 37.38                    | 46.00                  | -8.62              |
| 14V | 1740.00     | 40.70        | 3.20                | 24.50               | 33.30             | 35.10                    | 54.00                  | -18.90             |
| 15V | 1870.70     | 54.50        | 3.50                | 24.50               | 33.30             | 49.20                    | 54.00                  | -4.80              |

Test location: Compatible Electronics  
 Customer : BARTON INSTRUMENT SYSTEMS, LLC Date : 7/26/2000  
 Manufacturer : BARTON INSTRUMENT SYSTEMS, LLC Time : 10.25  
 EUT name : ULTRASONIC LEVEL MONITOR Model: WU20  
 Specification: Fcc\_B Test distance: 3.0 mtrs Lab: D  
 Distance correction factor( $20 \cdot \log(\text{test/spec})$ ) : 0.00  
 Test Mode :  
 RECEIVER AND ULTRASONIC MODE - 300 MHz TO 9300 MHz HORIZONTAL  
 TEMPERATURE 71 DEGREES F.  
 RELATIVE HUMIDITY 68%  
 TESTED BY: Kyle Fujimoto  
 KYLE FUJIMOTO

| Pol | Freq<br>MHz | Rdng<br>dBuV | Cable<br>loss<br>dB | Ant<br>factor<br>dB | Amp<br>gain<br>dB | Cor'd<br>rdg = R<br>dBuV | limit<br>= L<br>dBuV/m | Delta<br>R-L<br>dB |
|-----|-------------|--------------|---------------------|---------------------|-------------------|--------------------------|------------------------|--------------------|
| 1H  | 300.74      | 59.80        | 2.30                | 15.41               | 38.60             | 38.92                    | 46.00                  | -7.08              |
| 2H  | 302.10      | 58.60        | 2.31                | 15.42               | 38.60             | 37.73                    | 46.00                  | -8.27              |
| 3H  | 317.73      | 51.10        | 2.41                | 15.51               | 38.60             | 30.41                    | 46.00                  | -15.59             |
| 4H  | 325.85      | 60.10        | 2.46                | 15.55               | 38.60             | 39.50                    | 46.00                  | -6.50              |
| 5H  | 330.65      | 49.70        | 2.48                | 15.58               | 38.60             | 29.16                    | 46.00                  | -16.84             |
| 6H  | 350.91      | 50.80        | 2.60                | 15.65               | 38.60             | 30.45                    | 46.00                  | -15.55             |
| 7H  | 401.04      | 54.70        | 2.70                | 13.80               | 38.59             | 32.61                    | 46.00                  | -13.39             |
| 8H  | 451.13      | 47.80        | 2.81                | 15.63               | 38.10             | 28.14                    | 46.00                  | -17.86             |
| 9H  | 503.93      | 37.20        | 3.14                | 16.90               | 38.00             | 19.23                    | 46.00                  | -26.77             |
| 10H | 543.93      | 35.90        | 3.54                | 17.06               | 39.04             | 17.46                    | 46.00                  | -28.54             |
| 11H | 799.78      | 41.10        | 3.90                | 19.67               | 37.70             | 26.97                    | 46.00                  | -19.03             |
| 12H | 870.06      | 45.70        | 4.48                | 22.70               | 37.50             | 35.38                    | 46.00                  | -10.62             |







## ***LAB RECOGNITIONS***

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

National Voluntary Laboratory Accreditation Program - Lab Code: 200063-0

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

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

Federal Communications Commission

Industry Canada

Radio-Frequency Technologies (Competent Body)

Technology International (Europe) Ltd.

