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FCC PART 15, SUBPART B and C TEST REPORT

for

TA ABW TRANSMITTER UNIT

MODEL: TA ABW

Prepared for

SJE RHOMBUS 22650 COUNTY HIGHWAY 6 DETROIT LAKES, MINNESOTA 56501

Prepared by:

**KYLE FUJIMOTO** 

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DATE: DECEMBER 7, 2004

|       | REPORT |   | APPENDICES |   |    | TOTAL |    |
|-------|--------|---|------------|---|----|-------|----|
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#### 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 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:       | TA ABW Transmitter Unit<br>Model: TA ABW<br>S/N: N/A  |
|----------------------|---|
| Product Description: | The EUT is the transmitter for an alarm system that remotely monitors the level of a septic or holding tank and alerts the home owner if the level gets too high. |
| Modifications:       | The EUT was not modified during the testing in order to meet the specifications.  |
| Manufacturer:        | SJE Rhombus<br>22650 County Highway 6<br>Detroit Lakes, Minnesota 56501   |
| Test Dates:          | December 3, 4, and 6, 2004  |
| Test Specifications: | EMI requirements<br>CFR Title 47, Part 15 Subpart B; and Subpart C, Sections 15.205, 15.209, and 15.231   |
| Test Procedure:      | ANSI C63.4: 2003  |
| 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 | This test was not performed because the EUT operates on<br>batteries only and cannot be plugged into the AC public<br>mains.     |
| 2    | Radiated RF Emissions, 10 kHz - 4300 MHz | Complies with the <b>Class B</b> limits of CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231. |
| 3    | -20 dB Bandwidth of the Fundamental      | Complies with the limits of Subpart C, sections 15.231 [e].  |



#### 1. PURPOSE

This document is a qualification test report based on the Electromagnetic Interference (EMI) tests performed on the TA ABW Transmitter Unit Model: TA ABW. The EMI measurements were performed according to the measurement procedure described in ANSI C63.4: 2003. 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; and Subpart C, sections 15.205, 15.209, and 15.231.







#### 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

SJE Rhombus

Dan Muzzey

Design Engineer

Compatible Electronics, Inc.

Kyle FujimotoTest EngineerMichael ChristensenLab Manager

2.4 Date Test Sample was Received

The test sample was received on December 1, 2004.

2.5 Disposition of the Test Sample

The test sample has not been returned to SJE Rhombus as of the date of this report.

#### 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 |
| PCB  | Printed Circuit Board                |
| TX   | Transmit                             |
| RX   | Receive                              |





#### **3. APPLICABLE DOCUMENTS**

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

| SPEC                     | TITLE  |
|--------------------------|--|
| CFR Title 47,<br>Part 15 | FCC Rules – Radio frequency devices (including digital devices)  |
| ANSI C63.4:<br>2003      | Methods of measurement of radio-noise emissions from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz |





#### 4.1 Description of Test Configuration - EMI

Setup and operation of the equipment under test.

Specifics of the EUT and Peripherals Tested

The TA ABW Transmitter Unit Model: TA ABW (EUT) was connected to a float switch. The EUT was continuously transmitting.

Note: The float switch is also part of the EUT.

The antenna is hardwired to the PCB of the EUT.

The final radiated data was taken in the mode described above. Please see Appendix E for the data sheets.





#### 4.1.1 Cable Construction and Termination

<u>Cable 1</u> This is a 10 foot unshielded cable connecting the EUT (Transmitter) to the EUT (Float Switch). It is hard wired at each end. The cable was bundled to a length of 3 feet.







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

#### 5.1 EUT and Accessory List

| EQUIPMENT                           | MANUFACTURER | MODEL<br>NUMBER | SERIAL<br>NUMBER | FCC ID      |
|-------------------------------------|--------------|-----------------|------------------|-------------|
| TA ABW<br>TRANSMITTER UNIT<br>(EUT) | SJE RHOMBUS  | TA ABW          | N/A              | SCP-TAABW01 |
| FLOAT SWITCH (PART<br>OF THE EUT)   | SJE RHOMBUS  | TA ABW          | N/A              | SCP-TTABW01 |





#### 5.2 EMI Test Equipment

| EQUIPMENT TYPE                             | MANU-<br>FACTURER         | MODEL<br>NUMBER | SERIAL<br>NUMBER | CAL. DATE         | CAL.<br>CYCLE |
|--|---------------------------|-----------------|------------------|-------------------|---------------|
| Radiated Emissions Data<br>Capture Program | Compatible<br>Electronics | 2.0             | N/A              | N/A               | N/A           |
| Spectrum Analyzer –<br>Main Section        | Hewlett Packard           | 8566B           | 3638A08768       | June 24, 2004     | 1 Year        |
| Spectrum Analyzer –<br>Display Section     | Hewlett Packard           | 85662A          | 3701A22262       | June 24, 2004     | 1 Year        |
| Quasi-Peak Adapter                         | Hewlett Packard           | 85650A          | 2811A01363       | June 24, 2004     | 1 Year        |
| EMI Receiver                               | Rohde & Schwarz           | ESIB40          | 100172           | October 28, 2004  | 1 Year        |
| Preamplifier                               | Com-Power                 | PA-102          | 1017             | January 6, 2004   | 1 Year        |
| Biconical Antenna                          | Com Power                 | AB-900          | 15227            | April 21, 2004    | 1 Year        |
| Log Periodic Antenna                       | Com Power                 | AL-100          | 16203            | February 18, 2004 | 1 Year        |
| 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           | 4530            | US91912319       | N/A               | N/A           |
| Monitor                                    | Hewlett Packard           | D5258A          | TW74500641       | N/A               | N/A           |
| Horn Antenna                               | Antenna Research          | DRG-118/A       | 1053             | January 16, 2004  | 1 Year        |
| Microwave Preamplifier                     | Com-Power                 | PA-122          | 25195            | August 19, 2004   | 1 Year        |
| Loop Antenna                               | Com-Power                 | AL-130          | 17089            | September 3, 2004 | 1 Year        |



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

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 and EMI Receiver were 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 and EMI Receiver record the highest measured reading over all the sweeps.

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

| FREQUENCY RANGE   | EFFECTIVE<br>MEASUREMENT<br>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 4.3 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: 2003. 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 loop antenna was also rotated in the horizontal and vertical axis in order to ensure accurate results.





#### 7.2 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 test distance to obtain final test data. The final qualification data sheets are located in Appendix E.

#### **Test Results:**

The EUT complies with the limits of CFR Title 47, Part 15, Subpart B; and Subpart C, section 15.205, 15.209 and 15.231 for radiated emissions.







#### 7.3 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. Data sheets 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 TA ABW Transmitter Unit Model: TA ABW meets all of the Class B specification limits defined in CFR Title 47, Part 15, Subpart B; and Subpart C, sections 15.205, 15.209, and 15.231.







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### **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 Radio-Frequency Technologies (Competent Body)



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**APPENDIX B** 

# **MODIFICATIONS TO THE EUT**





## **MODIFICATIONS TO THE EUT**

The modifications listed below were made to the EUT to pass FCC 15.231 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

TA ABW Transmitter Unit Model: TA ABW S/N: N/A

There were no additional models covered under this report.







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### **APPENDIX D**

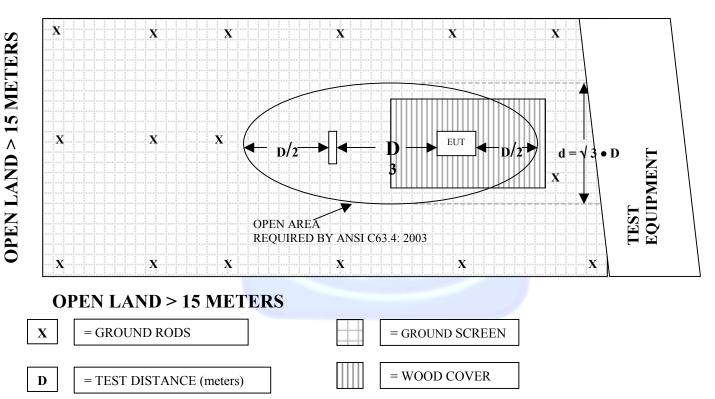
# DIAGRAMS, CHARTS, AND PHOTOS





# FIGURE 1: PLOT MAP AND LAYOUT OF RADIATED TEST SITE

### **OPEN LAND > 15 METERS**







### COM-POWER AB-900

### **BICONICAL ANTENNA**

### S/N: 15227

### CALIBRATION DATE: APRIL 21, 2004

| FREQUENCY | FACTOR | FREQUENCY | FACTOR |
|-----------|--------|-----------|--------|
| (MHz)     | (dB)   | (MHz)     | (dB)   |
| 30        | 11.20  | 120       | 12.50  |
| 35        | 10.90  | 125       | 12.90  |
| 40        | 11.40  | 140       | 12.40  |
| 45        | 8.90   | 150       | 12.10  |
| 50        | 11.40  | 160       | 12.40  |
| 60        | 10.30  | 175       | 15.80  |
| 70        | 8.20   | 180       | 15.70  |
| 80        | 6.00   | 200       | 17.40  |
| 90        | 7.60   | 250       | 14.60  |
| 100       | 10.50  | 300       | 19.50  |





### COM-POWER AL-100

### LOG PERIODIC ANTENNA

### S/N: 16203

## CALIBRATION DATE: FEBRUARY 18, 2004

| FREQUENCY | FACTOR | FREQUENCY | FACTOR |
|-----------|--------|-----------|--------|
| (MHz)     | (dB)   | (MHz)     | (dB)   |
| 300       | 13.00  | 700       | 19.40  |
| 400       | 15.10  | 800       | 21.30  |
| 500       | 16.70  | 900       | 20.70  |
| 600       | 18.70  | 1000      | 22.60  |





### COM-POWER PA-102

### PREAMPLIFIER

### S/N: 1017

### CALIBRATION DATE: JANUARY 6, 2004

| FREQUENCY | FACTOR | FREQUENCY | FACTOR |
|-----------|--------|-----------|--------|
| (MHz)     | (dB)   | (MHz)     | (dB)   |
| 30        | 37.8   | 300       | 37.6   |
| 40        | 37.5   | 350       | 37.5   |
| 50        | 37.7   | 400       | 37.5   |
| 60        | 37.5   | 450       | 37.0   |
| 70        | 37.5   | 500       | 37.1   |
| 80        | 37.5   | 550       | 37.3   |
| 90        | 37.5   | 600       | 37.1   |
| 100       | 37.5   | 650       | 37.4   |
| 125       | 37.8   | 700       | 37.1   |
| 150       | 37.5   | 750       | 37.1   |
| 175       | 37.5   | 800       | 36.8   |
| 200       | 37.6   | 850       | 36.2   |
| 225       | 37.6   | 900       | 36.7   |
| 250       | 37.5   | 950       | 36.2   |
| 275       | 37.6   | 1000      | 35.3   |





### COM-POWER PA-122

### MICROWAVE PREAMPLIFIER

### S/N: 25195

## CALIBRATION DATE: AUGUST 19, 2004

| FREQUENCY | FACTOR | FREQUENCY | FACTOR |
|-----------|--------|-----------|--------|
| (GHz)     | (dB)   | (GHz)     | (dB)   |
| 1.0       | 30.50  | 6.0       | 30.57  |
| 1.1       | 30.24  | 6.5       | 30.39  |
| 1.2       | 30.44  | 7.0       | 30.08  |
| 1.3       | 30.38  | 7.5       | 29.92  |
| 1.4       | 30.11  | 8.0       | 28.88  |
| 1.5       | 29.91  | 8.5       | 28.08  |
| 1.6       | 29.74  | 9.0       | 28.08  |
| 1.7       | 30.26  | 9.5       | 29.11  |
| 1.8       | 30.41  | 10.0      | 30.21  |
| 1.9       | 30.19  | 11.0      | 29.00  |
| 2.0       | 30.37  | 12.0      | 29.10  |
| 2.5       | 30.69  | 13.0      | 29.77  |
| 3.0       | 31.63  | 14.0      | 28.67  |
| 3.5       | 31.61  | 15.0      | 29.72  |
| 4.0       | 31.46  | 16.0      | 30.54  |
| 4.5       | 31.45  | 17.0      | 30.05  |
| 5.0       | 31.33  | 18.0      | 28.47  |
| 5.5       | 31.15  |           |        |





### ANTENNA RESEARCH DRG-118/A

### HORN ANTENNA

### S/N: 1053

## CALIBRATION DATE: JANUARY 16, 2004

| FREQUENCY | FACTOR | FREQUENCY | FACTOR |
|-----------|--------|-----------|--------|
| (GHz)     | (dB)   | (GHz)     | (dB)   |
| 1.0       | 24.4   | 10.0      | 38.7   |
| 1.5       | 25.2   | 10.5      | 39.0   |
| 2.0       | 28.2   | 11.0      | 38.9   |
| 2.5       | 28.5   | 11.5      | 41.3   |
| 3.0       | 30.1   | 12.0      | 40.5   |
| 3.5       | 31.0   | 12.5      | 40.0   |
| 4.0       | 31.2   | 13.0      | 40.2   |
| 4.5       | 31.9   | 13.5      | 40.5   |
| 5.0       | 33.2   | 14.0      | 41.6   |
| 5.5       | 33.7   | 14.5      | 44.8   |
| 6.0       | 34.3   | 15.0      | 41.4   |
| 6.5       | 35.0   | 15.5      | 39.2   |
| 7.0       | 36.7   | 16.0      | 39.4   |
| 7.5       | 37.3   | 16.5      | 40.9   |
| 8.0       | 37.1   | 17.0      | 42.6   |
| 8.5       | 37.3   | 17.5      | 45.1   |
| 9.0       | 37.7   | 18.0      | 41.7   |
| 9.5       | 38.6   |           |        |





### COM-POWER AL-130

### LOOP ANTENNA

### S/N: 17089

# CALIBRATION DATE: SEPTEMBER 3, 2004

| FREQUENCY | MAGNETIC | ELECTRIC |
|-----------|----------|----------|
| (MHz)     | (dB/m)   | (dB/m)   |
| 0.009     | -40.8    | 10.7     |
| 0.01      | -40.9    | 10.6     |
| 0.02      | -41.8    | 9.7      |
| 0.05      | -42.0    | 9.5      |
| 0.07      | -41.5    | 10.0     |
| 0.1       | -41.7    | 9.8      |
| 0.2       | -44.1    | 7.4      |
| 0.3       | -41.6    | 9.9      |
| 0.5       | -41.5    | 10.0     |
| 0.7       | -41.4    | 10.1     |
| 1         | -41.0    | 10.5     |
| 2         | -40.6    | 10.9     |
| 3         | -40.8    | 10.7     |
| 4         | -41.0    | 10.5     |
| 5         | -40.4    | 11.1     |
| 10        | -40.7    | 10.8     |
| 15        | -41.6    | 9.9      |
| 20        | -41.3    | 10.2     |
| 25        | -43.0    | 8.5      |
| 30        | -42.6    | 8.9      |







#### FRONT VIEW

SJE RHOMBUS TA ABW TRANSMITTER UNIT MODEL: TA ABW FCC SUBPART B AND C – LAB B – RADIATED EMISSIONS – 12-03-04

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS







#### **REAR VIEW**

SJE RHOMBUS TA ABW TRANSMITTER UNIT MODEL: TA ABW FCC SUBPART B AND C – LAB B – RADIATED EMISSIONS – 12-03-04

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS







#### FRONT VIEW

SJE RHOMBUS TA ABW TRANSMITTER UNIT MODEL: TA ABW FCC SUBPART B AND C – LAB D – RADIATED EMISSIONS – 12-06-04

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS







#### **REAR VIEW**

SJE RHOMBUS TA ABW TRANSMITTER UNIT MODEL: TA ABW FCC SUBPART B AND C – LAB D – RADIATED EMISSIONS – 12-06-04

PHOTOGRAPH SHOWING THE EUT CONFIGURATION FOR MAXIMUM EMISSIONS





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**APPENDIX E** 

# DATA SHEETS





# Page E2

# **RADIATED EMISSIONS**

## DATA SHEETS





FCC 15.231 SJE RHOMBUS TA ABW Transmitter Unit Model: TA ABW Configuration: Transmit Mode

Date: 12/03/04 Lab: B Tested By: Kyle Fujimoto

Duty Cycle: 10.140280594%

|       |                |           |                |        | Peak /     | Ant.   | Table |          |
|-------|----------------|-----------|----------------|--------|------------|--------|-------|----------|
| Freq. | Level          |           |                |        | QP /       | Height | Angle |          |
| (MHz) | (dBuV)         | Pol (v/h) | Limit          | Margin | Avg        | (m)    | (deg) | Comments |
| 418   | 89.72          | V         | 100.2          | -10.48 | Peak       | 1      | 90    |          |
| 418   | 69.92          | V         | 80.2           | -10.28 | Avg        | 1      | 90    |          |
|       |                |           |                |        |            |        |       |          |
| 836   | 50.63          | V         | 80.2           | -29.57 | Peak       | 2      | 225   |          |
| 836   | 30.83          | V         | 60.2           | -29.37 | Avg        | 2      | 225   |          |
|       |                |           |                |        |            |        |       |          |
| 1254  | 40.52          | V         | 80.2           | -39.68 | Peak       | 2.76   | 45    |          |
| 1254  | 20.72          | V         | 60.2           | -39.48 | Avg        | 2.76   | 45    |          |
|       |                |           |                |        |            |        |       |          |
| 1672  | 45.34          | V         | 74             | -28.66 | Peak       | 3.15   | 135   |          |
| 1672  | 25.54          | V         | 54             | -28.46 | Avg        | 3.15   | 135   |          |
|       |                |           |                |        |            |        |       |          |
| 2090  | 59.33          | V         | 80.8           | -21.47 | Peak       | 1.69   | 180   |          |
| 2090  | 39.53          | V         | 60.8           | -21.27 | Avg        | 1.69   | 180   |          |
| 0.500 |                |           |                | 07.04  |            |        | 100   |          |
| 2508  | 45.19          | V         | 80.8           | -35.61 | Peak       | 3.06   | 180   |          |
| 2508  | 25.39          | V         | 60.8           | -35.41 | Avg        | 3.06   | 180   |          |
| 0000  | 40.50          |           | 00.0           | 07.00  | <b>D</b> 1 | 4 57   | 405   |          |
| 2926  | 43.52          | V         | 80.8           | -37.28 | Peak       | 1.57   | 135   |          |
| 2926  | 23.72          | V         | 60.8           | -37.08 | Avg        | 1.57   | 135   |          |
| 3344  | 45.67          | V         | 74             | -28.33 | Deak       | 1.89   | 225   |          |
| 3344  | 45.67<br>25.87 | V<br>V    | 74<br>54       | -28.33 | Peak       | 1.89   | 225   |          |
| 3344  | 20.07          | v         | 04             | -20.13 | Avg        | 1.09   | 220   |          |
| 3762  | 47.17          | V         | 74             | -26.83 | Peak       | 2.29   | 225   |          |
| 3762  | 27.37          | V         | 54             | -20.63 | Avg        | 2.29   | 225   |          |
| 5102  | 21.31          | v         | J <del>4</del> | -20.03 | ۸vy        | 2.23   | 225   |          |
| 4180  | 50.07          | V         | 74             | -23.93 | Peak       | 1.44   | 0     |          |
| 4180  | 30.27          | V         | 54             | -23.73 | Avg        | 1.44   | 0     |          |
| 1100  | 00.21          | v         | <b>V</b> T     | 20.70  | , wg       | 1.77   |       |          |
|       |                |           |                |        |            |        |       |          |





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#### FCC 15.231

SJE RHOMBUS TA ABW Transmitter Unit Model: TA ABW Configuration: Transmit Mode Date: 12/03/04 Lab: B Tested By: Kyle Fujimoto

Duty Cycle: 10.140280594%

|       |        |           |       |        | Peak / | Ant.   | Table |          |
|-------|--------|-----------|-------|--------|--------|--------|-------|----------|
| Freq. | Level  |           |       |        | QP /   | Height | Angle |          |
| (MHz) | (dBuV) | Pol (v/h) | Limit | Margin | Avg    | (m)    | (deg) | Comments |
| 418   | 93.82  | Н         | 100.2 | -6.38  | Peak   | 1      | 90    |          |
| 418   | 74.02  | Н         | 80.2  | -6.18  | Avg    | 1      | 90    |          |
|       |        |           |       |        |        |        |       |          |
| 836   | 54.82  | Н         | 80.2  | -25.38 | Peak   | 1.25   | 180   |          |
| 836   | 35.02  | Н         | 60.2  | -25.18 | Avg    | 1.25   | 180   |          |
|       |        |           |       |        |        |        |       |          |
| 1254  | 41.75  | Н         | 74    | -32.25 | Peak   | 2.19   | 225   |          |
| 1254  | 21.95  | Н         | 54    | -32.05 | Avg    | 2.19   | 225   |          |
|       |        |           |       |        |        |        |       |          |
| 1672  | 47.08  | Н         | 74    | -26.92 | Peak   | 3.41   | 0     |          |
| 1672  | 27.28  | Н         | 54    | -26.72 | Avg    | 3.41   | 0     |          |
|       |        |           |       |        |        |        |       |          |
| 2090  | 59.06  | Н         | 80.8  | -21.74 | Peak   | 2.51   | 180   |          |
| 2090  | 39.26  | Н         | 60.8  | -21.54 | Avg    | 2.51   | 180   |          |
|       |        |           |       |        |        |        |       |          |
| 2508  | 45.65  | Н         | 80.8  | -35.15 | Peak   | 1.7    | 315   |          |
| 2508  | 25.85  | Н         | 60.8  | -34.95 | Avg    | 1.7    | 315   |          |
|       |        |           |       |        |        |        |       |          |
| 2926  | 43.4   | Н         | 80.8  | -37.4  | Peak   | 2.22   | 0     |          |
| 2926  | 23.6   | Н         | 60.8  | -37.2  | Avg    | 2.22   | 0     |          |
|       |        |           |       |        |        |        |       |          |
| 3344  | 45.49  | Н         | 80.8  | -35.31 | Peak   | 2.16   | 225   |          |
| 3344  | 25.69  | Н         | 60.8  | -35.11 | Avg    | 2.16   | 225   |          |
|       |        |           |       |        |        |        |       |          |
| 3762  | 50.01  | Н         | 74    | -23.99 | Peak   | 2.51   | 135   |          |
| 3762  | 30.21  | Н         | 54    | -23.79 | Avg    | 2.51   | 135   |          |
|       |        |           |       |        |        |        |       |          |
| 4180  | 44.48  | Н         | 74    | -29.52 | Peak   | 2.51   | 180   |          |
| 4180  | 24.68  | Н         | 54    | -29.32 | Avg    | 2.51   | 180   |          |
|       |        |           |       |        |        |        |       |          |



| Report Number: B40805D1 Page E5   FCC Part 15 Subpart B and FCC Section 15.231 Test Report TA ABW Transmitter Unit   Model: TA ABW Model: TA ABW |  |              |                     |                       |                   |                          |                        |                    |  |  |
|--|--|--------------|---------------------|-----------------------|-------------------|--------------------------|------------------------|--------------------|--|--|
| Test<br>Custo<br>Manuf<br>Eut n<br>Model<br>Seria<br>Speci<br>Dista<br>Test  | 1/1<br>12/06/2004<br>13:53:15<br>D<br>3.0 Meters<br>0.00 |              |                     |                       |                   |                          |                        |                    |  |  |
|  |  |              | BY: Kyle            | IZONTAL P<br>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   | 42.000   | 46.90        | 0.58                | 10.36                 | 37.54             | 20.30                    | 40.00                  | -19.70             |  |  |
| 2V   | 48.400   | 49.10        | 0.51                | 10.63                 | 37.67             | 22.57                    | 40.00                  | -17.43             |  |  |
| 3V   | 52.771   | 50.50        | 0.56                | 11.07                 | 37.64             | 24.49                    | 40.00                  | -15.51             |  |  |
| 4V   | 60.246   | 50.60        | 0.70                | 10.24                 | 37.50             | 24.05                    | 40.00                  | -15.95             |  |  |
| 5H   | 74.898   | 50.30        | 0.85                | 7.09                  | 37.50             | 20.74                    | 40.00                  | -19.26             |  |  |
| 6V   | 83.890   | 50.90        | 0.86                | 6.64                  | 37.50             | 20.90                    | 40.00                  | -19.10             |  |  |
| 7H   | 85.422   | 45.30        | 0.84                | 6.89                  | 37.50             | 15.54                    | 40.00                  | -24.46             |  |  |
| 8H   | 86.608   | 41.90        | 0.83                | 7.08                  | 37.50             | 12.31                    | 40.00                  | -27.69             |  |  |
| 9H   | 110.793  | 44.40        | 0.99                | 11.62                 | 37.64             | 19.38                    | 43.50                  | -24.12             |  |  |
| 10V  | 117.334  | 51.60        | 1.04                | 12.25                 | 37.71             | 27.18                    | 43.50                  | -16.32             |  |  |
| 11H  | 117.405  | 43.30        | 1.04                | 12.26                 | 37.72             | 18.89                    | 43.50                  | -24.61             |  |  |
| 12V  | 122.020  | 41.50        | 1.08                | 12.66                 | 37.77             | 17.47                    | 43.50                  | -26.03             |  |  |
| 13V  | 130.164  | 44.20        | 1.12                | 12.72                 | 37.73             | 20.31                    | 43.50                  | -23.19             |  |  |
| 14V  | 139.773  | 51.00        | 1.16                | 12.41                 | 37.62             | 26.95                    | 43.50                  | -16.55             |  |  |
| 15V  | 143.413  | 43.10        | 1.18                | 12.30                 | 37.57             | 19.00                    | 43.50                  | -24.50             |  |  |
| 16V  | 146.027  | 47.60        | 1.19                | 12.22                 | 37.54             | 23.46                    | 43.50                  | -20.04             |  |  |
| 17V  | 154.755  | 39.50        | 1.20                | 12.25                 | 37.50             | 15.45                    | 43.50                  | -28.05             |  |  |
| 18V  | 171.454  | 38.00        | 1.20                | 15.02                 | 37.50             | 16.72                    | 43.50                  | -26.78             |  |  |
| 19H  | 260.649  | 43.90        | 1.60                | 16.18                 | 37.54             | 24.13                    | 46.00                  | -21.87             |  |  |
| 20V  | 295.311  | 36.20        | 1.68                | 19.27                 | 37.60             | 19.55                    | 46.00                  | -26.45             |  |  |
| 21V  | 305.128  | 42.60        | 1.70                | 13.12                 | 37.59             | 19.83                    | 46.00                  | -26.17             |  |  |
| 22V  | 311.016  | 44.70        | 1.70                | 13.26                 | 37.58             | 22.09                    | 46.00                  | -23.91             |  |  |
| 23V  | 391.061  | 38.70        | 2.03                | 14.94                 | 37.50             | 18.17                    | 46.00                  | -27.83             |  |  |
| 24V  | 429.219  | 41.10        | 2.10                | 15.61                 | 37.20             | 21.60                    | 46.00                  | -24.40             |  |  |
| 25V  | 507.641  | 39.30        | 2.30                | 16.87                 | 37.13             | 21.33                    | 46.00                  | -24.67             |  |  |
| 26H  | 534.337  | 36.20        | 2.30                | 17.43                 | 37.24             | 18.69                    | 46.00                  | -27.31             |  |  |



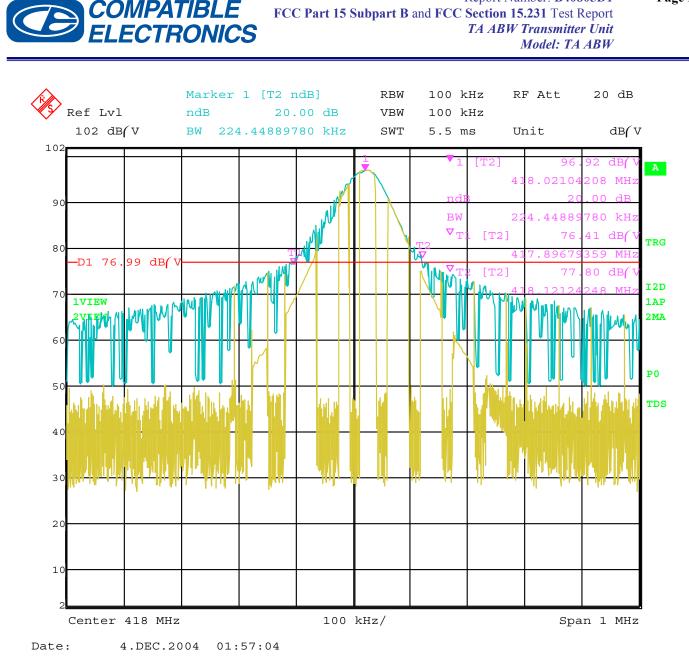


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# -20 dB BANDWIDTH

# DATA SHEET





-20 dB Bandwidth of the Fundamental



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