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# FCC PART 15.249 TEST REPORT

# UNLICENSED INTENTIONAL RADIATOR

| | |
|---|---|
| **Applicant** | JL MARINE SYSTEMS INC. |
| **Address** | 9010 PALM RIVER RD |
| | TAMPA FL 33619 USA |
| **FCC ID** | A7FEA041 |
| **Model Number** | EA041 |
| **Product Description** | MICRO SHALLOW WATER ANCHOR |
| **Date Sample Received** | 9/30/2013 |
| **Date Tested** | 10/7/2013 |
| **Tested By** | NAM NGUYEN |
| **Approved By** | NAM NGUYEN |
| **Report Number** | 1684AUT13TestReport.docx |
| **Test Results** | ☒ PASS ☐ FAIL |



ACCREDITED

**Testing Certificate #0955-01**

**TABLE OF CONTENT**

**GENERAL REMARKS**

The attached report shall not be reproduced except in full without the written permission of Timco Engineering Inc.

**Summary**

The device under test does:
☒ fulfill the general approval requirements as identified in this test report
☐ not fulfill the general approval requirements as identified in this test report

**Attestations**

This equipment has been tested in accordance with the standards identified in this test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report.

All instrumentation and accessories used to test products for compliance to the indicated standards are calibrated regularly in accordance with ISO 17025 requirements.

A2LA ACCREDITED
Certificate # 0955-01

I attest that the necessary measurements were made, under my supervision, at:

Timco Engineering Inc.
849 NW State Road 45
Newberry, Fl 32669

**Authorized Signatory Name:**

Nam Nguyen
Project Manager/Testing Technician

**Date:** October 17, 2013

## GENERAL INFORMATION

### DUT Specification

| The test results relate only to the items tested. | | | |
|---|---|---|---|
| **Applicable Standard** | Part 15.249 | | |
| **DUT Description** | MICRO SHALLOW WATER ANCHOR | | |
| **FCC ID** | A7FEA041 | | |
| **Model Number** | EA041 | | |
| **Operating Frequency** | TX: 915.00 MHz | RX: Same | |
| **DUT Power Source** | ☐ 110–120Vac/50– 60Hz | | |
| | ☒ DC Power | | |
| | ☐ Battery Operated Exclusively | | |
| **Test Item** | ☐ Prototype | ☒ Pre-Production | ☐ Production |
| **Type of Equipment** | ☐ Fixed | ☒ Mobile | ☐ Portable |
| **Antenna Connector** | FCC Rules require that the antenna connector be unique. | | |
| **Test Facility** | Timco Engineering Inc. located at 849 NW State Road 45 Newberry, FL 32669 USA. | | |
| **Test Conditions** | Temperature: 26°C<br>Relative humidity: 50% | | |
| **Test Exercise** | The DUT was placed in continuous transmit mode of operation. | | |
| **Modifications** | | | |

### Test Supporting Equipment

| Supporting Device | Manufacturer | Model / FCC ID | Serial Number |
|---|---|---|---|
| N/A | | | |

**EMC EQUIPMENT LIST**

| Device | Manufacturer | Model | Serial Number | Cal/Char Date | Due Date |
|---|---|---|---|---|---|
| Antenna: Passive Loop | EMC Test Systems | EMCO 6512 | 9706-1211 | 06/14/12 | 06/14/14 |
| Frequency Counter | HP | 5385A | 2730A03025 | 08/22/13 | 08/22/15 |
| Digital Multimeter | Fluke | FLUKE-77-3 | 79510405 | 06/20/13 | 06/20/15 |
| DC Power Supply | Astron | VS-50M | 9001191 | 01/19/13 | 01/19/15 |
| LISN | Electro-Metrics | ANS-25/2 | 2604 | 10/28/11 | 10/28/13 |
| LISN | Electro-Metrics | EM-7820 | 2682 | 02/26/13 | 02/26/15 |
| DC Power Supply | HP | 6264B | | 05/06/13 | 05/06/15 |
| 3-Meter Semi-Anechoic Chamber | Panashield | N/A | N/A | 12/31/11 | 12/31/13 |
| Antenna: Log-Periodic | Electro-Metrics | LPA-25 | 1122 | 05/09/13 | 05/09/15 |
| Antenna: Biconnical | Eaton | 94455-1 | 1096 | 05/10/13 | 05/10/15 |
| Analyzer Tan Tower Preamplifier | HP | 8449B-H02 | 3008A00372 | 10/28/11 | 10/28/13 |
| Analyzer Tan Tower Quasi-Peak Adapter | HP | 85650A | 3303A01690 | 10/28/11 | 10/28/13 |
| Analyzer Tan Tower RF Preselector | HP | 85685A | 3221A01400 | 10/28/11 | 10/28/13 |
| Analyzer Tan Tower Spectrum Analyzer | HP | 8566B Opt 462 | 3138A07786<br>3144A20661 | 10/28/11 | 10/28/13 |
| EMI Receiver | Rohde & Schwarz | ESIB40 | 100274 | 3/16/12 | 3/16/14 |
| Notch Filter | Microlab | HA-10N | | 5/17/13 | 5/17/15 |
| Notch Filter | Microlab | HA-20N | | 5/17/13 | 5/17/15 |

## TEST PROCEDURES

**Radiation Interference:** ANSI C63.4-2003 using a spectrum analyzer, a preselector, a quasi-peak adapter, and an appropriate antenna. The analyzer was calibrated in dB above a microvolt at the output of the antenna. The resolution bandwidth was 100 kHz with an appropriate sweep speed and the video bandwidth was 300 kHz up to 1 GHz and 1 MHz with a video BW of 3 MHz above 1 GHz. When an emission was found, the table was rotated to produce the maximum signal strength. The antenna was placed in both the horizontal and vertical planes and the worse case emissions were reported. The spectrum was searched to at least the tenth (10) harmonic of the fundamental.

**Formula Of Conversion Factors:** The field strength at 3m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dBμV) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB. The gain of the preselector was accounted for in the spectrum analyzer meter reading.

| Example: | | | |
|---|---|---|---|
| Freq (MHz) | Meter Reading | + ACF | + CL = FS |
| 33 | 20 dBμV | + 10.36 dB | + 0.5 = 30.86 dBμV/m @ 3m |

**Power Line Conducted Interference:** The procedure used was ANSI C63.4-2003 using a 50uH LISN. Both lines were observed. The bandwidth of the spectrum analyzer was 10kHz with an appropriate sweep speed. The spectrum was scanned from 0.15 to 30 MHz.

**Occupied Bandwidth**: A small sample of the transmitter output was fed into the spectrum analyzer and the attached plot was printed. The vertical scale is set to -10 dBm per division.

**ANSI C63.4-2003 10.1 Measurement Procedures:** The DUT was placed on a table 80 cm high and with dimensions of 1m by 1.5m. The DUT was placed in the center of the table (1.5m side). The table used for radiated measurements is capable of continuous rotation.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1m to 4m. The antenna was placed in both the horizontal and vertical planes. Emissions attenuated more than 20 dB below the permissible value are not reported.

**RADIATION INTERFERENCE**

**Rules Part No.:** 15.249, 15.209

**Requirements:**

| Frequency | Limits |
|---|---|
| Part 15.209 | |
| 9 to 490 kHz | 2400/F (kHz) µV/m @ 300 meters |
| 490 to 1705 kHz | 24000/F (kHz) µV/m @ 30 meters |
| 1705 kHz to 30 MHz | 29.54 dBµV/m @ 30 meters |
| 30 – 88 | 40.0 dBµV/m @ 3 meters |
| 80 – 216 | 43.5 dBµV/m @ 3 meters |
| 216 – 960 | 46.0 dBµV/m @ 3 meters |
| Above 960 | 54.0 dBµV/m @ 3 meters |
| Part 15.249 | |
| Fundamental 902 – 928 MHz | 94.0 dBµV/m @ 3 meters |
| Fundamental 2.4 – 2.4835 MHz | 94.0 dBµV/m @ 3 meters |
| Harmonics | 54.0 dBµV/m @ 3 meters |

**Test Data:** Radiated emissions were measured from the lowest frequency generated or 9 kHz to the 10th harmonic intentional emission. Measurements in the table are peak unless noted otherwise.

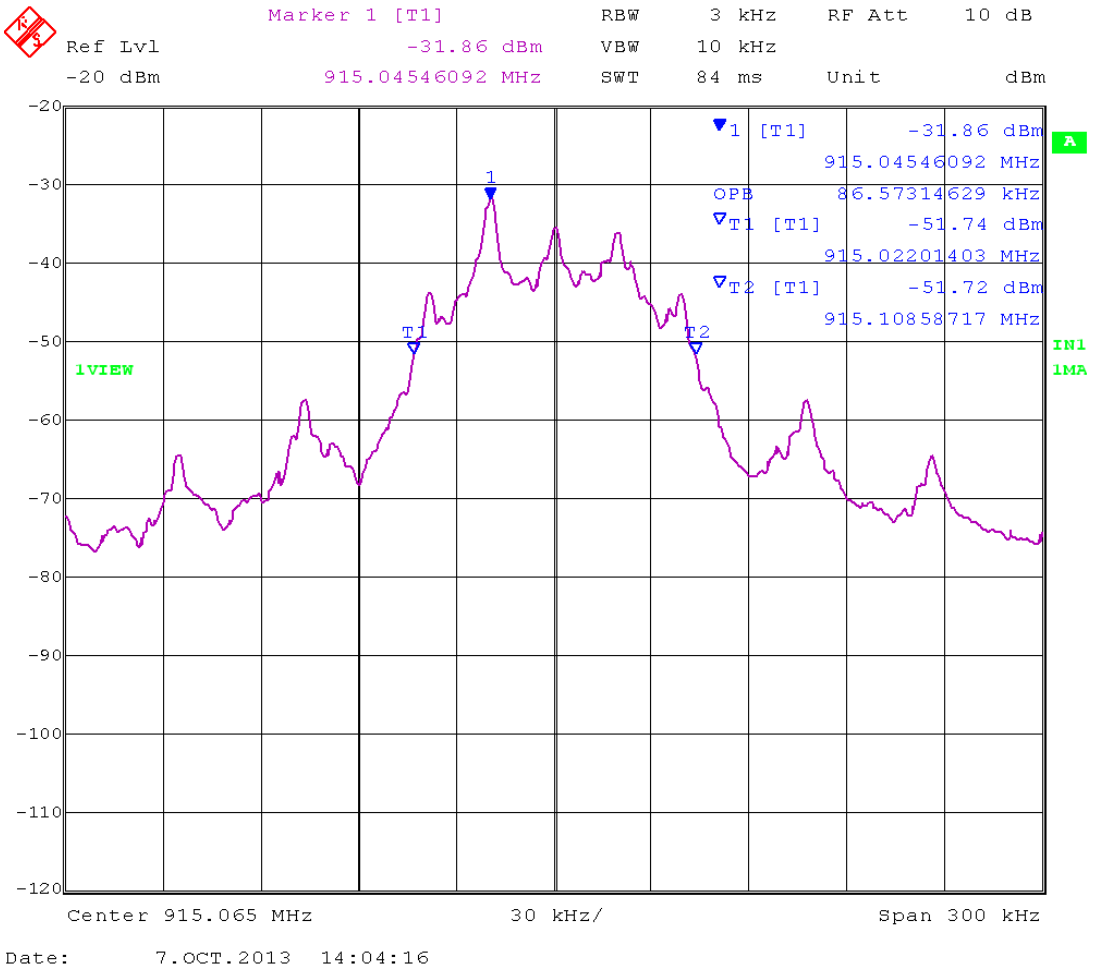
| Tuned Frequency MHz | Emission Frequency MHz | Meter Reading dBµV | Ant. Polarity | Coax Loss dB | Correction Factor dB/m | Field Strength dBµV/m | Margin dB |
|---|---|---|---|---|---|---|---|
| 915.0 | 915.00 | 62.8 | V | 1.97 | 22.45 | 87.22 | 6.78 |
| 915.0 | 915.00 | 64.3 | H | 1.97 | 22.45 | 88.72 | 5.28 |
| 915.0 | 1,830.00 | 18.1 | V | 2.76 | 30.61 | 51.47 | 2.53 |
| 915.0 | 1,830.00 | 19.5 | H | 2.76 | 30.61 | 52.87 | 1.13 |
| 915.0 | 2,745.00 | 10.1 | H | 3.42 | 32.80 | 46.32 | 7.68 |
| 915.0 | 2,745.00 | 10.7 | V | 3.42 | 32.80 | 46.92 | 7.08 |
| 915.0 | 3,660.00 | 10.7 | H | 4.19 | 33.26 | 48.15 | 5.85 |
| 915.0 | 5,490.00 | 9.1 | H | 5.15 | 34.79 | 49.04 | 4.96 |
| 915.0 | 6,405.00 | 11.1 | V | 5.42 | 35.84 | 52.36 | 1.64 |
| 915.0 | 6,405.00 | 12.4 | H | 5.42 | 35.84 | 53.66 | 0.34 |
| 915.0 | 7,320.00 | 10.7 | V | 5.79 | 36.14 | 52.63 | 1.37 |
| 915.0 | 7,320.00 | 11.1 | H | 5.79 | 36.14 | 53.03 | 0.97 |

## OCCUPIED BANDWIDTH

**Rules Part No.:** 15.249 (d)

**Requirements**: The field strength of any emissions appearing outside the specified frequency bands, except harmonics shall be attenuated at least 50 dB below the level of the carrier or to the general limits of 15.209 whichever is the lesser.

**Test Data:**



## BAND EDGE COMPLIANCE

**Rules Part No.:** 15.249 (d)

**Requirements**: 40 dBc or in the case of restricted bands 54 dBµV/m.

**Test Data: N/A**

**NOTE TRANSMITTER OPERATES ONLY AT 915 MHz. CENTER OF BAND**

**POWER LINE CONDUCTED INTERFERENCE**

**Rules Part No.:** 15.207

**Requirements:**

| Frequency (MHz) | Quasi Peak Limits (dBµV) | Average Limits (dBµV) |
|---|---|---|
| 0.15 – 0.5 | 66 – 56 | 56 – 46 |
| 0.5 – 5.0 | 56 | 46 |
| 5.0 – 30 | 60 | 50 |

**Test Data:** N/A
Battery or vehicle powered DUT.