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## FCC PART 87 & RSS 141 i2

### C2PC TEST REPORT

|                      |                                                                        |
|----------------------|------------------------------------------------------------------------|
| APPLICANT            | YAESU MUSEN CO., LTD.                                                  |
|                      | TENNOZU PARKSIDE BUILDING                                              |
|                      | 2-5-8 HIGASHI-SHINAGAWA,                                               |
|                      | SHINAGAWA-KU, TOKYO 140-0002 JAPAN                                     |
| FCC ID               | K6650013X20                                                            |
| IC:                  | 511B-50013X20                                                          |
| MODEL NUMBER         | FTA-450                                                                |
| PRODUCT DESCRIPTION  | PORTABLE AIRBAND TRANSCEIVER                                           |
| DATE SAMPLE RECEIVED | 12/22/2016                                                             |
| DATE TESTED          | 2/14/2017                                                              |
| TESTED BY            | Tim Royer                                                              |
| APPROVED BY          | Cory Leverett                                                          |
| TEST RESULTS         | <input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL |

| Report Number      | Version Number | Description                                               | Issue Date |
|--------------------|----------------|-----------------------------------------------------------|------------|
| 2543IC16TestReport | Rev.1          | Initial Issue                                             | 2/15/2017  |
| 2543IC16TestReport | Rev.2          | Corrected o/p                                             | 2/17/2017  |
| 2543IC16TestReport | Rev.3          | Add spectrum plots for the transmitter unwanted emissions | 3/2/2017   |

THE ATTACHED REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL  
WITHOUT THE WRITTEN APPROVAL OF TIMCO ENGINEERING, INC.

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## 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 and was selected by the customer.
- ☐ 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.

I attest that the necessary measurements were made at:

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

A blue ink signature is written over a circular purple stamp. The stamp contains the text "TIMCO ENGINEERING, INC." around the perimeter.

#### Tested by:

Name and Title: Tim Royer, Project Manager/Testing Engineer

**Date: 2/ 14/ 2017**

A blue ink signature is written over a circular red stamp. The stamp contains the text "TIMCO ENGINEERING, INC." around the perimeter.

#### Reviewed and approved by:

Name and Title: Cory Leverett, Project Manager

**Date: 2/ 15/ 2017**

Applicant: YAESU MUSEN CO., LTD.  
FCC ID: K6650013X20  
IC: 511B-50013X20  
Report: 2543IC16TestReport\_Rev

## GENERAL INFORMATION

### DUT Specification

|                                                   |                                                       |
|---------------------------------------------------|-------------------------------------------------------|
| The test results relate only to the items tested. |                                                       |
| DUT Description                                   | PORTABLE AIRBAND TRANSCEIVER                          |
| FCC ID                                            | K6650013X20                                           |
| Model Number                                      | FTA-450                                               |
| Operating Frequency                               | 118 to 136.975 MHz                                    |
| No. of Channels                                   | 759                                                   |
| Type of Emission                                  | 6K00A3E                                               |
| Modulation                                        | AM                                                    |
| DUT Power Source                                  | <input type="checkbox"/> 110–120Vac/50– 60Hz          |
|                                                   | <input checked="" type="checkbox"/> DC Power 7.4 Vdc  |
|                                                   | <input type="checkbox"/> Battery Operated Exclusively |
| Test Item                                         | <input type="checkbox"/> Prototype                    |
|                                                   | <input checked="" type="checkbox"/> Pre-Production    |
|                                                   | <input type="checkbox"/> Production                   |
| Type of Equipment                                 | <input type="checkbox"/> Fixed                        |
|                                                   | <input type="checkbox"/> Mobile                       |
|                                                   | <input checked="" type="checkbox"/> Portable          |
| Antenna                                           | Rubber Duck                                           |
| Antenna Connector                                 | BNC                                                   |

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**Test Facility:** The test sites used by **Timco Engineering Inc.** for collecting radiated and conducted emission data are located at **849 NW State Road 45 Newberry, FL 32669 USA.**

**Test Condition:** The DUT was tested in the laboratory in an environment with normal temperature and humidity. The temperature was 26°C with a relative humidity of 50%.

**Modification to the DUT:** No modification was made to the DUT during testing.

**Test Exercise (e.g. software description, test signal, etc.):** The DUT was placed in continuous transmit mode of operation.

**Applicable Standards:** TIA 603  
FCC CFR 47 Part 87

**Part 2.1033(c) (4)** Type of Emission: 6K00A3E

$$\begin{aligned}B_n &= 2M \\M &= 3000 \\B_n &= 2(3000) = 6k\end{aligned}$$

The authorized bandwidth is 25 kHz.

**Part 2.1033(c) (8)** DC Voltages and Current into Final Amplifier:  
POWER INPUT:

FINAL AMPLIFIER ONLY

INPUT POWER – HIGH: (7.4 Vdc) (0.7) = 5.18 Watts

## TEST PROCEDURE

**Power Output:** The RF power output was measured at the antenna feed point using a peak power meter.

**Radiation Interference:** The test procedures used were ANSI\TIA-603-D-2010 for FCC and ANSI C63.26-2015 for IC using a Rohde & Schwartz Spectrum Analyzer with pre-selector. The bandwidth (RBW) of the spectrum receiver was 100 kHz up to 1 GHz and 1 MHz above 1 GHz with an appropriate sweep speed. The VBW above 1 GHz was 3 MHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

## RF POWER OUTPUT

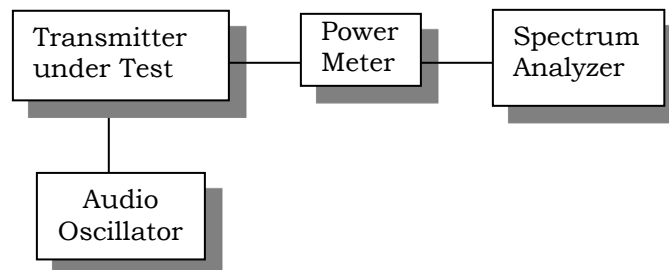
**Rule Part No.:** Part 2.1046(a), Part 87.131, RSS 141

### Test Requirements:

**Method of Measurement:** RF power is measured by connecting a 50-ohm, resistive wattmeter to the RF output connector. With a nominal battery voltage and the transmitter properly adjusted the RF output measures:

For the Device has a fixed antenna, RF power is measured as ERP as the antenna is permanently attached. The substitution method was used. With a nominal battery voltage and the transmitter properly adjusted the RF output measures:

### Test Setup Diagram :



### Test Data:

OUTPUT POWER:

| Frequency<br>(MHz) | Power<br>(W) | Power<br>(dBm) |
|--------------------|--------------|----------------|
| 118                | 1.38         | 31.4           |
| 127                | 1.50         | 31.8           |
| 136.9              | 1.48         | 31.7           |

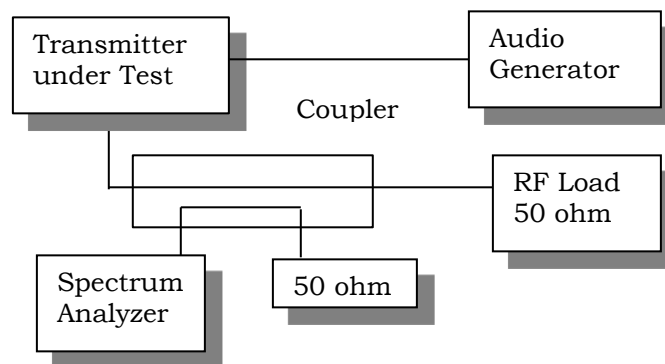
## OCCUPIED BANDWIDTH

**Rule Part No.:** Part 2.1049, Part 87.139(d), RSS-141

**Test Requirements:** Data in the plots show that on any frequency removed from the assigned frequency by more than 250% of the authorized bandwidth: At least  $43 + 10\log(P)$  dB.

### Method of Measurement:

#### Test Setup Diagram:



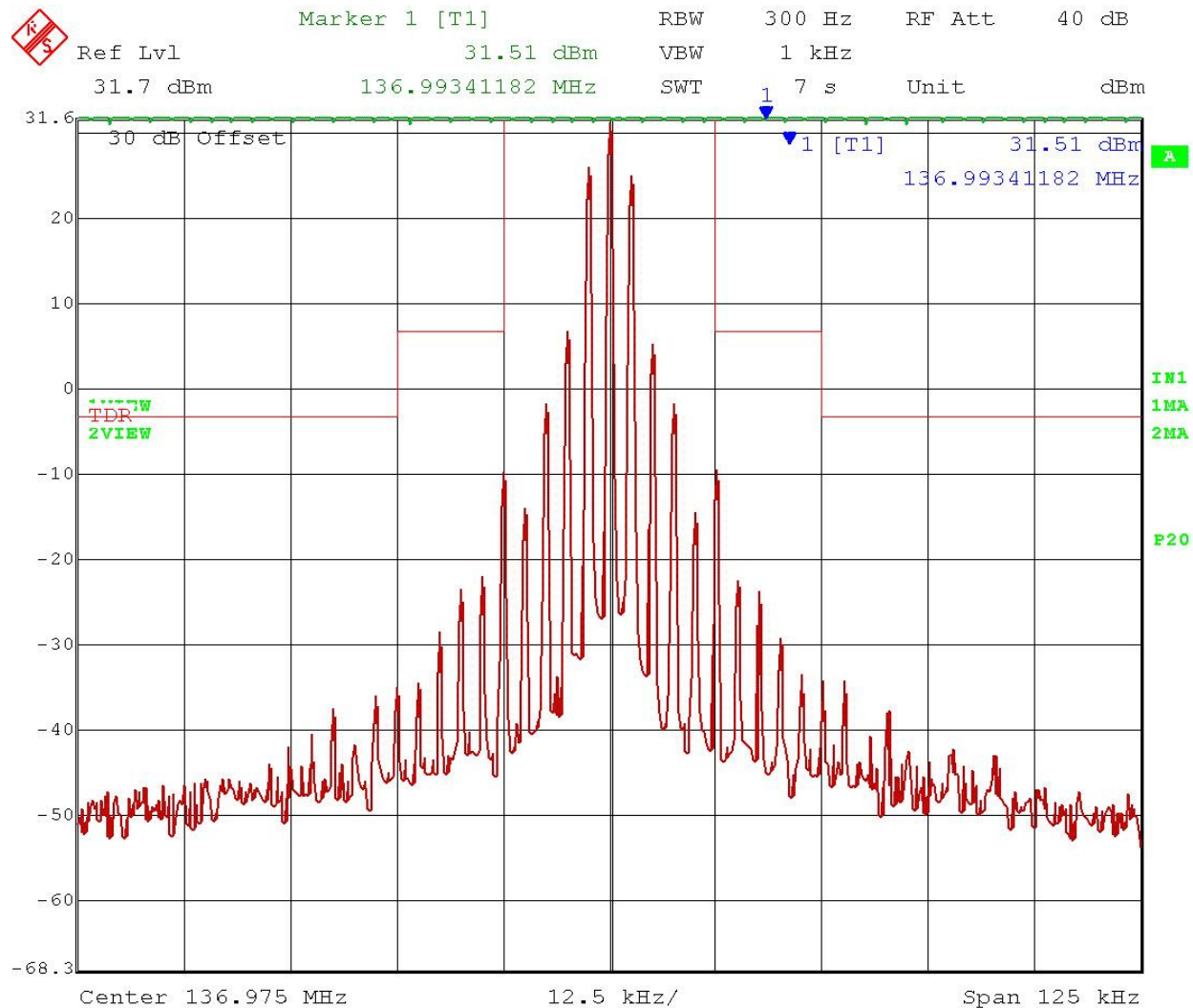
**Test Data:** See the plots below

The authorized BW is 25 kHz.



## OCCUPIED BANDWIDTH

### Test Data: High End of Band



Date: 1.MAR.2017 10:19:07

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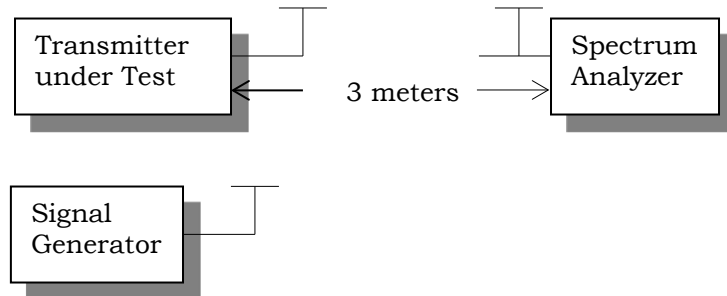
## FIELD STRENGTH OF SPURIOUS EMISSIONS

**Rule Parts. No.:** Part 2.1053, 87.139, RSS 141

**Test Requirements:**  $43 + 10 \log_{10} pY$

**Method of Measurements:** The spectrum was scanned from 9 KHz to at least the tenth harmonic of the fundamental. This test was conducted per TIA/EIA STANDARD 603 using the substitution method.

**Test Setup Diagram:**



**Test Data:**

| Emission Frequency (MHz) | Power Mode | ERP Power Output (dBm) | ERP Power Output (Watts) | FCC Requirement dB | Bandwidth - BW - kHz |
|--------------------------|------------|------------------------|--------------------------|--------------------|----------------------|
| 118.00                   | Hi         | 31.40                  | 1.38                     | 44.40              | 25.00                |

| Emission Frequency (MHz) | Ant. Polarity | Below Carrier (dBc) | Margin |
|--------------------------|---------------|---------------------|--------|
| 236.00                   | H             | 86.56               | 41.82  |
| 354.00                   | V             | 98.42               | 53.68  |
| 472.00                   | V             | 97.77               | 53.03  |
| 590.00                   | V             | 102.88              | 58.14  |
| 708.00                   | H             | 104.95              | 60.21  |
| 826.00                   | H             | 110.13              | 65.39  |
| 944.00                   | H             | 103.43              | 58.69  |
| 1,062.00                 | H             | 91.51               | 46.77  |
| 1,180.00                 | H             | 90.48               | 45.74  |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

### Test Data:

| Emission Frequency (MHz) | Power Mode | ERP Power Output (dBm) | ERP Power Output (Watts) | FCC Requirement dB | Bandwidth - BW - kHz |
|--------------------------|------------|------------------------|--------------------------|--------------------|----------------------|
| 136.90                   | Hi         | 31.80                  | 1.5                      | 44.80              | 25 KHz               |

| Emission Frequency (MHz) | Ant. Polarity | Below Carrier (dBc) | Margin |
|--------------------------|---------------|---------------------|--------|
| 273.80                   | V             | 100.55              | 55.59  |
| 410.70                   | V             | 101.37              | 56.41  |
| 547.60                   | V             | 106.08              | 61.12  |
| 684.50                   | V             | 110.15              | 65.19  |
| 821.40                   | V             | 109.79              | 64.83  |
| 958.30                   | H             | 103.44              | 58.48  |
| 1,095.20                 | V             | 91.80               | 46.84  |
| 1,232.10                 | V             | 90.20               | 45.24  |
| 1,369.00                 | V             | 89.32               | 44.36  |

## FIELD STRENGTH OF SPURIOUS EMISSIONS

### Test Data:

| Emission Frequency (MHz) | Power Mode | ERP Power Output (dBm) | ERP Power Output (Watts) | FCC Requirement dB | Bandwidth - BW - kHz |
|--------------------------|------------|------------------------|--------------------------|--------------------|----------------------|
| 127.00                   | Hi         | 31.70                  | 1.48                     | 44.70              | 25.00                |

| Emission Frequency (MHz) | Ant. Polarity | Below Carrier (dBc) | Margin |
|--------------------------|---------------|---------------------|--------|
| 128.70                   | H             | 107.37              | 62.27  |
| 254.00                   | V             | 97.46               | 52.36  |
| 381.00                   | V             | 103.13              | 58.03  |
| 508.00                   | H             | 105.66              | 60.56  |
| 635.00                   | V             | 106.71              | 61.61  |
| 762.00                   | V             | 107.74              | 62.64  |
| 889.00                   | V             | 103.22              | 58.12  |
| 1,016.00                 | V             | 92.09               | 46.99  |
| 1,143.00                 | V             | 90.44               | 45.34  |
| 1,270.00                 | V             | 90.27               | 45.17  |

## EMC EQUIPMENT LIST

| Device                                             | Manufacturer            | Model                           | Serial Number                                        | Cal/Char Date | Due Date |
|----------------------------------------------------|-------------------------|---------------------------------|------------------------------------------------------|---------------|----------|
| Antenna:<br>Biconical 1096<br>Chamber              | Eaton                   | 94455-1                         | 1096                                                 | 07/14/15      | 07/14/17 |
| Antenna: Log-<br>Periodic 1122                     | Electro-Metrics         | LPA-25                          | 1122                                                 | 07/14/15      | 07/14/17 |
| Coaxial Cable -<br>Chamber 3 cable<br>set (backup) | Micro-Coax              | Chamber 3 cable<br>set (backup) | KMKM-0244-02<br>; KMKM-0670-<br>01; KFKF-0197-<br>00 | N/A           | N/A      |
| CHAMBER                                            | Panashield              | 3M                              | N/A                                                  | 04/25/16      | 12/31/17 |
| Sweep/Signal<br>Generator                          | Anritsu                 | 68369B                          | 985112                                               | 10/28/15      | 10/28/17 |
| Antenna:<br>Double-Ridged<br>Horn/ETS Horn 2       | ETS-Lindgren<br>Chamber | 3117                            | 00041534                                             | 02/25/15      | 02/25/17 |
| EMI Test<br>Receiver R & S<br>ESU 40 Chamber       | Rohde &<br>Schwarz      | ESU 40                          | 100320                                               | 04/01/16      | 04/01/18 |
| Coaxial Cable -<br>BMBM-0130-00<br>Black           | Alpha Wire              |                                 | BMBM-0130-00                                         | 05/24/16      | 05/24/18 |
| Attenuator BNC<br>10dB                             | Pasternack              | PE7000-10                       | # 15                                                 | 09/10/15      | 09/10/15 |
| Bore-sight<br>Antenna<br>Positioning<br>Tower      | Sunol Sciences          | TLT2                            | N/A                                                  | N/A           | N/A      |
| Pre-amp                                            | RF-LAMBDA               | RLNA00M45GA                     | NA                                                   | 01/04/16      | 01/04/18 |
| RF Power Meter                                     | Boonton                 | 4531                            | 11793                                                | 1/12/17       | 1/12/19  |

### \* EMI RECEIVER SOFTWARE VERSION

The receiver firmware used was version 4.43 Service Pack 3

END OF TEST REPORT

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