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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
25431C16TestReport	Rev.1	Initial Issue	2/15/2017
25431C16TestReport	Rev.2	Corrected o/p	2/17/2017
25431C16TestReport	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



Tested by:

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

Date: 2/ 14/ 2017



Reviewed and approved by:

Name and Title: Cory Leverett, Project Manager

Date: 2/ 15/ 2017

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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

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

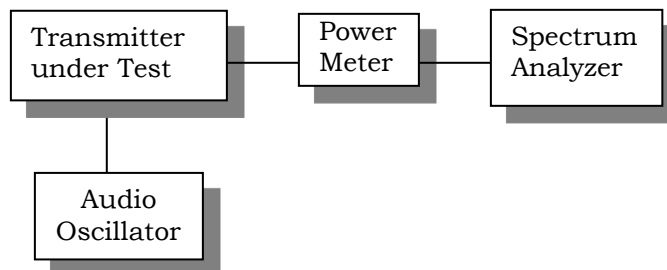
Rule Part No.: Part 2.1046(a), Part 87.131, RSS 141

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 (MHz)	Power (W)	Power (dBm)
118	1.38	31.4
127	1.50	31.8
136.9	1.48	31.7

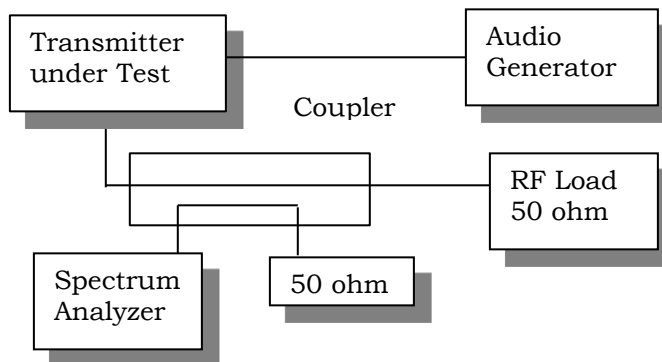
OCCUPIED BANDWIDTH

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:




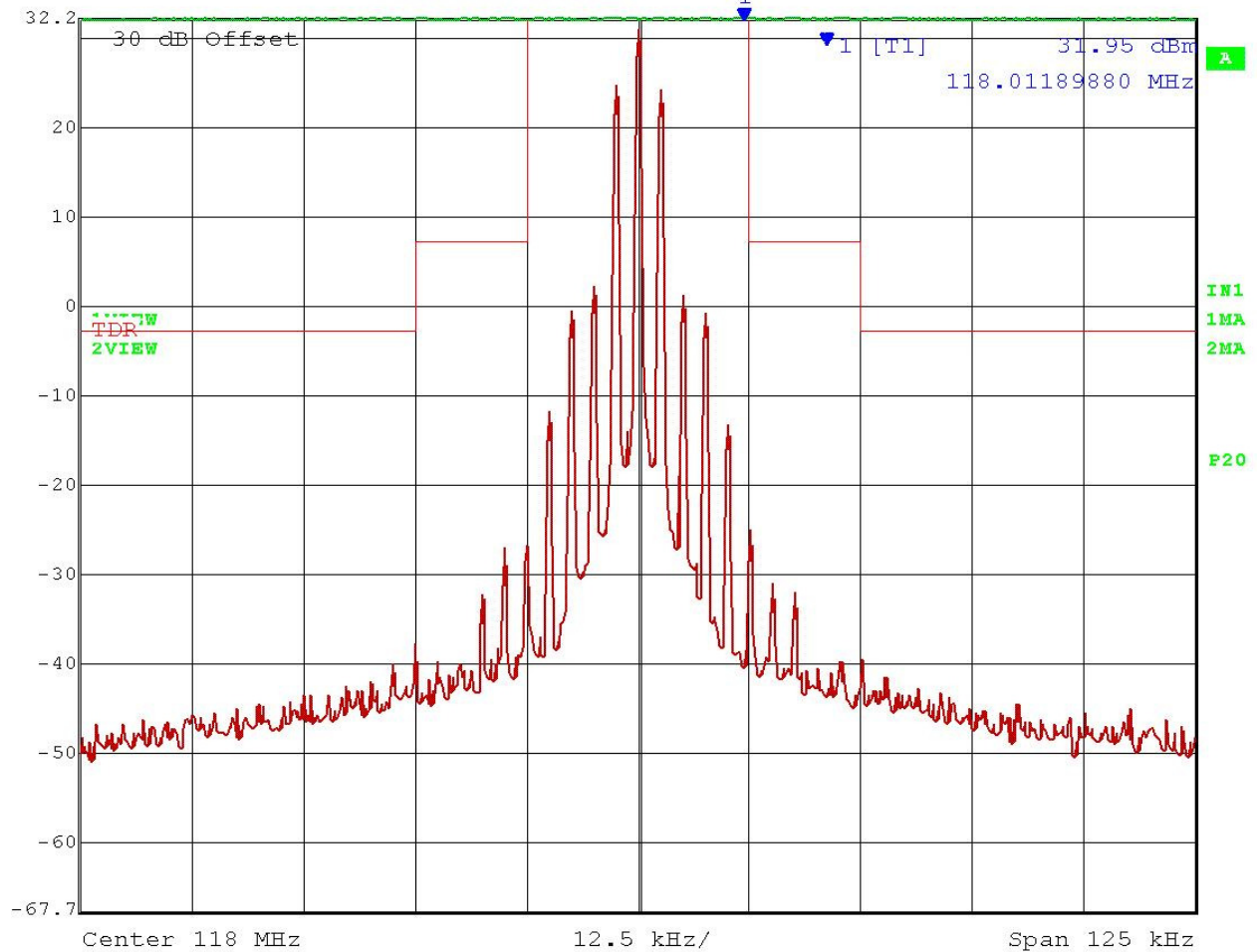
Test Data: See the plots below

The authorized BW is 25 kHz.

OCCUPIED BANDWIDTH

Test Data: Low End of Band

	Marker 1 [T1]	RBW	300 Hz	RF Att	40 dB
Ref Lvl	31.95 dBm	VBW	1 kHz		
32.2 dBm	118.01189880 MHz	SWT ₁	7 s	Unit	dBm




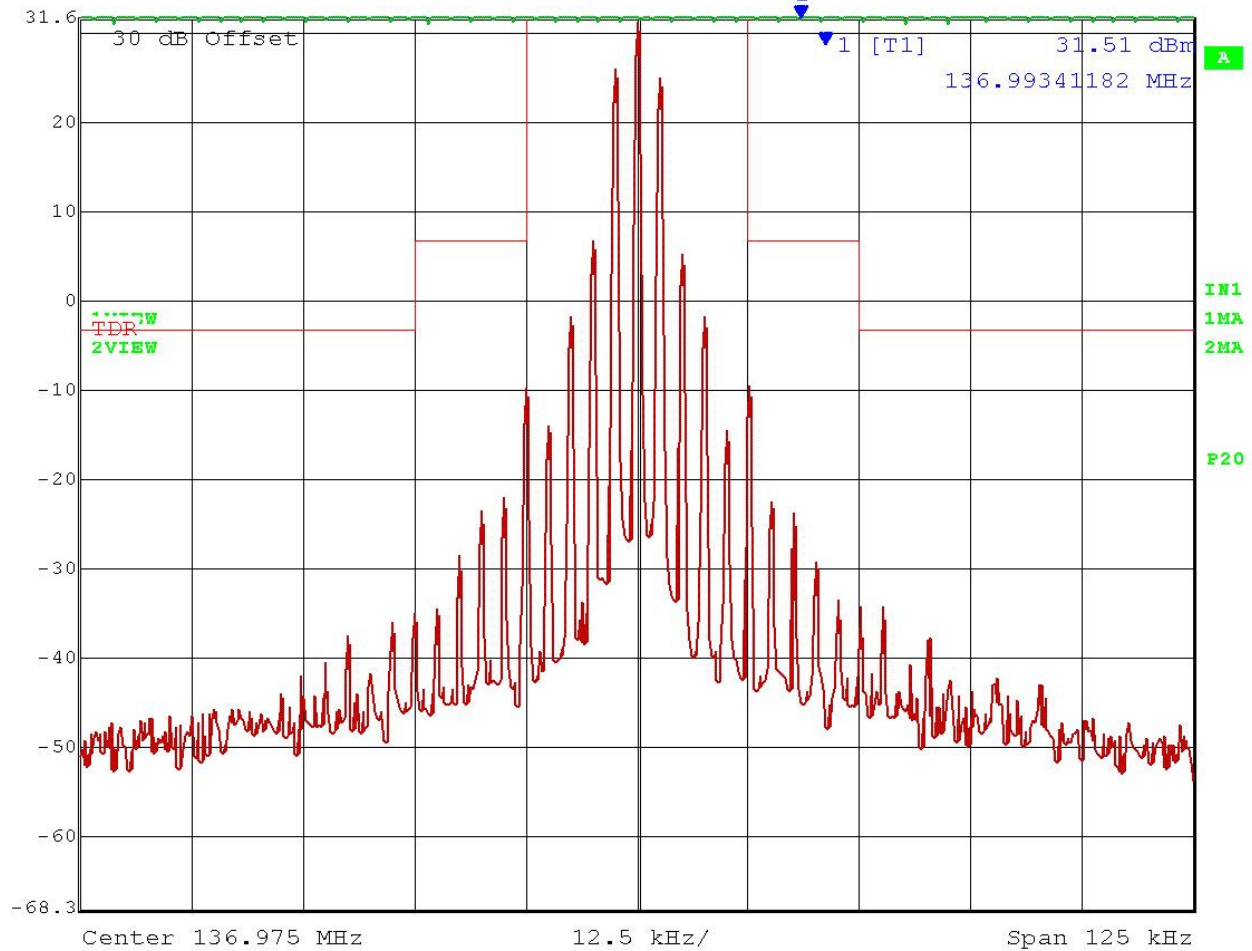
Date: 1.MAR.2017 10:17:14

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OCCUPIED BANDWIDTH

Test Data: High End of Band

	Ref Lvl	31.7 dBm	Marker 1 [T1]	31.51 dBm	RBW	300 Hz	RF Att	40 dB
					VBW	1 kHz		
					SWT	7 s	Unit	cBm



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

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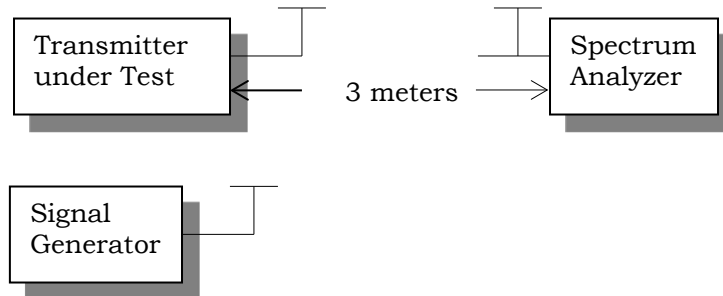
FIELD STRENGTH OF SPURIOUS EMISSIONS

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

Test Requirements: $43 + 10 \log_{10} \mu\text{V}$

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: Biconical 1096 Chamber	Eaton	94455-1	1096	07/14/15	07/14/17
Antenna: Log- Periodic 1122	Electro-Metrics	LPA-25	1122	07/14/15	07/14/17
Coaxial Cable - Chamber 3 cable set (backup)	Micro-Coax	Chamber 3 cable set (backup)	KMKM-0244-02 ; KMKM-0670- 01; KFKF-0197- 00	N/A	N/A
CHAMBER	Panashield	3M	N/A	04/25/16	12/31/17
Sweep/Signal Generator	Anritsu	68369B	985112	10/28/15	10/28/17
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren Chamber	3117	00041534	02/25/15	02/25/17
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
Coaxial Cable - BMBM-0130-00 Black	Alpha Wire		BMBM-0130-00	05/24/16	05/24/18
Attenuator BNC 10dB	Pasternack	PE7000-10	# 15	09/10/15	09/10/15
Bore-sight Antenna Positioning 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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