

849 NW STATE ROAD 45
NEWBERRY, FL 32669 USA
PH: 888.472.2424 OR 352.472.5500
FAX: 352.472.2030
EMAIL: INFO@TIMCOENGR.COM
[HTTP://WWW.TIMCOENGR.COM](http://WWW.TIMCOENGR.COM)

FCC PART 87

TEST REPORT

APPLICANT	YAESU MUSEN CO., LTD.
	TENNOZU PARKSIDE BUILDING
	2-5-8 HIGASHI-SHINAGAWA,
	SHINAGAWA-KU, TOKYO 140-0002 JAPAN
FCC ID	K6650013X20
MODEL NUMBER	FTA-750, FTA-550
PRODUCT DESCRIPTION	PORTABLE AIRBAND TRANSCEIVER
DATE SAMPLE RECEIVED	10/22/2013
DATE TESTED	10/28/2013
TESTED BY	JOE SCOGLIO
APPROVED BY	JOE SCOGLIO
TIMCO REPORT NO.	1781AUT13TestReport.docx
TEST RESULTS	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

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



Testing Certificate # 0955-01



Certificate # 0955-01



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STATEMENT OF COMPLIANCE

This equipment has been tested in accordance with the standards identified in the referenced test report. To the best of my knowledge and belief, these tests were performed using the measurement procedures described in this report and demonstrate that the equipment complies with the appropriate standards. No modifications were made to the equipment during testing in order to demonstrate compliance with these standards.

I attest that the necessary measurements were made by me or under my supervision, at Timco Engineering, Inc. located at 849 N.W. State Road 45, Newberry, Florida 32669 USA.

Authorized by: JOE SCOGLIO



Signature:

Function: Engineering Project Manager

Date: 10/28/2013

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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-750, FTA-550, FTA-150
Operating Frequency	118.000 MHz 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)(.70A) = 5.18 Watts

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EMC EQUIPMENT LIST

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Analyzer Tan Tower Spectrum Analyzer	HP	8566B Opt 462	3138A07786 3144A20661	10/28/11	10/28/13
Analyzer Tan Tower Preamplifier	HP	8449B-H02	3008A00372	10/28/11	10/28/13
Analyzer Silver Tower Spectrum Analyzer	HP	8566B Opt 462	3552A22064 3638A08608	06/05/13	06/05/15
Antenna: Biconnical	Electro-Metrics	BIA-25	1171	06/13/12	06/13/14
Antenna: Biconnical	Eaton	94455-1	1096	05/10/13	05/10/15
Antenna: Log-Periodic	Electro-Metrics	LPA-25	1122	05/09/13	05/09/15
Frequency Counter	HP	5352B	2632A00165	06/26/13	06/26/15
Frequency Counter	HP	5385A	2730A03025	08/22/13	08/22/15
Signal Generator	HP	8640B	2308A21464	02/23/12	02/23/14
Hygro-Thermometer	Extech	445703	0602	06/20/13	06/20/15
Digital Multimeter	Fluke	77	35053830	08/22/13	08/22/15
Temperature Chamber	Thermotron Corp.	S1.2 Mini Max	25-1420-09	07/03/12	07/03/14

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TEST EQUIPMENT LIST CONTD.

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
Antenna: Double-Ridged Horn/ETS Horn 1	ETS-Lindgren	3117	00035923	12/07/11	12/07/13
Antenna: Double-Ridged Horn	Electro-Metrics	RGA-180	2319	06/19/12	06/19/14
Analyzer Tan Tower RF Preselector	HP	85685A	3221A01400	10/28/11	10/28/13
Analyzer Silver Tower RF Preselector	HP	85685A	2926A00983	06/05/13	06/05/15
Antenna: Passive Loop	EMC Test Systems	EMCO 6512	9706-1211	06/14/12	06/14/14
Antenna: Double-Ridged Horn/ETS Horn 2	ETS-Lindgren	3117	00041534	10/05/12	10/05/14
Analyzer Tan Tower Quasi-Peak Adapter	HP	85650A	3303A01690	10/28/11	10/28/13
Analyzer Silver Tower Quasi-Peak Adapter	HP	85650A	2811A01175	06/05/13	06/05/15
Temperature Chamber	Tenney Engineering	TTRC	11717-7	07/03/12	07/03/14
Frequency Counter	HP	5385A	3242A07460	06/16/13	06/16/15
3-Meter Semi-Anechoic Chamber	Panashield	N/A	N/A	12/31/11	12/31/13

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TEST PROCEDURE

Power Line Conducted Interference: The procedure used was TIA 603 using a 50uH LISN. Both lines were observed with the UUT transmitting. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

Bandwidth 20 dB: The measurements were made with the spectrum analyzer's resolution bandwidth (RBW) = 1 MHz and the video bandwidth (VBW) = 3 MHz and the span set as shown on plot.

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

Antenna Conducted Emissions: The RBW = 100 kHz, VBW = 300 kHz and the span set to 10.0 MHz and the spectrum was scanned from 30 MHz to the 10th Harmonic of the fundamental. Above 1 GHz the resolution bandwidth was 1 MHz and the VBW = 3 MHz and the span to 50 MHz.

Radiation Interference: The test procedure used was ANSI STANDARD C63.4-2003 using an Agilent spectrum receiver 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.

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RF POWER OUTPUT

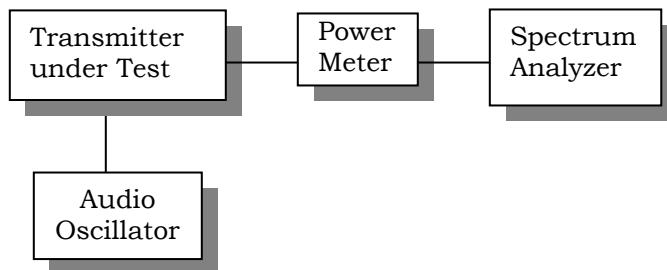
Rule Part No.: Part 2.1046(a), Part 87.131

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: 1.5 Watts



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MODULATION CHARACTERISTICS

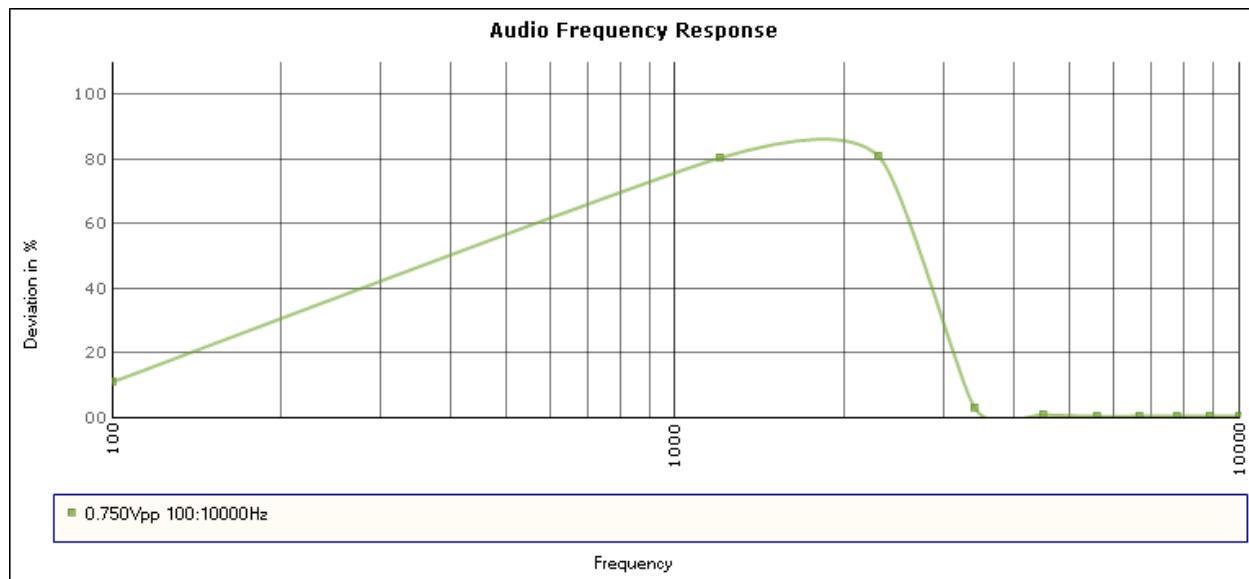
Rule Part No.: Part 2.1047(a)(b)

Test Requirements:

Method of Measurement:

Audio frequency response

The audio frequency response was measured in accordance with TIA/EIA Specification 603 with the exception that for an AM modulated transmitter the input was varied for a constant modulation of 20%. A curve or equivalent data showing the frequency response of the audio modulating circuit over a range of 100 – 5000Hz shall be submitted. The audio frequency response curve is shown below.



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VOICE MODULATED COMMUNICATION EQUIPMENT

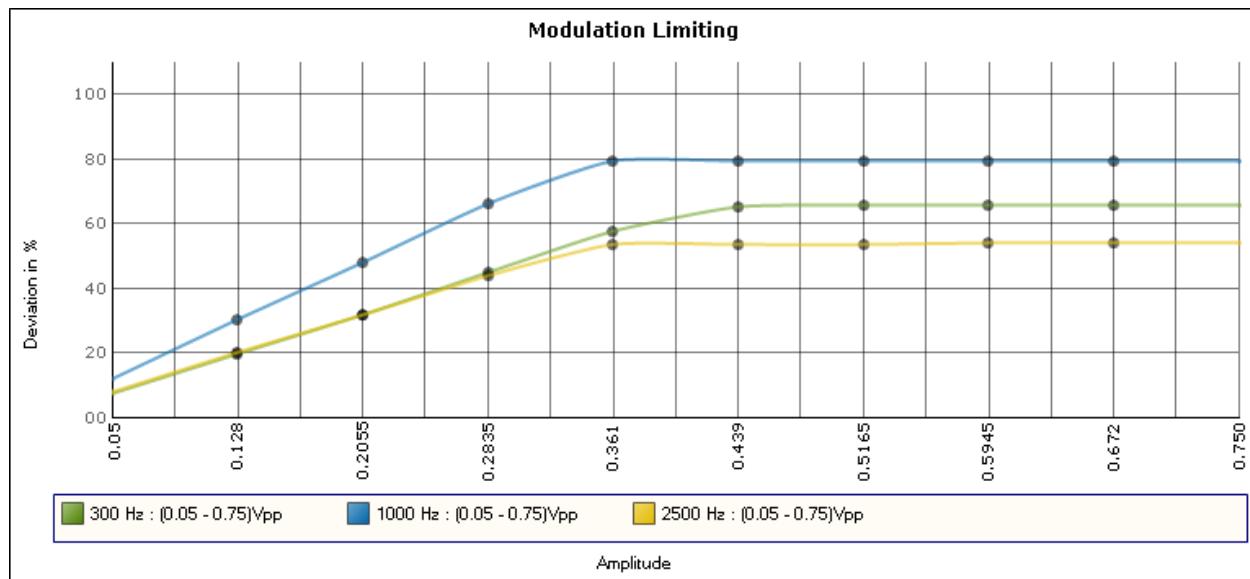
AUDIO INPUT VERSUS MODULATION

Rule Part No.: Part 2.1047(b) & 87.141

Test Requirements:

Method of Measurement: Modulation cannot exceed 100%. The audio input level needed for a particular percentage of modulation was measured in accordance with TIA/EIA Specification 603. The audio input curves versus modulation are shown below. Curves are provided for audio input frequencies of 300, 1000, and 2500 Hz.

Test data: Please see the plot below





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AUDIO LOW PASS FILTER

Rule Part No.: Part 2.1047(a), Part 87.141(F)

Test Requirements:

Method of Measurement:

Test Data: Not applicable. This rule part is only required for FM modulation.

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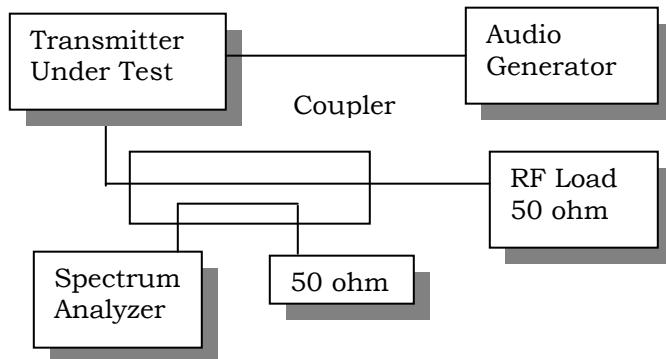
OCCUPIED BANDWIDTH

Rule Part No.: Part 2.1049, Part 87.139

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

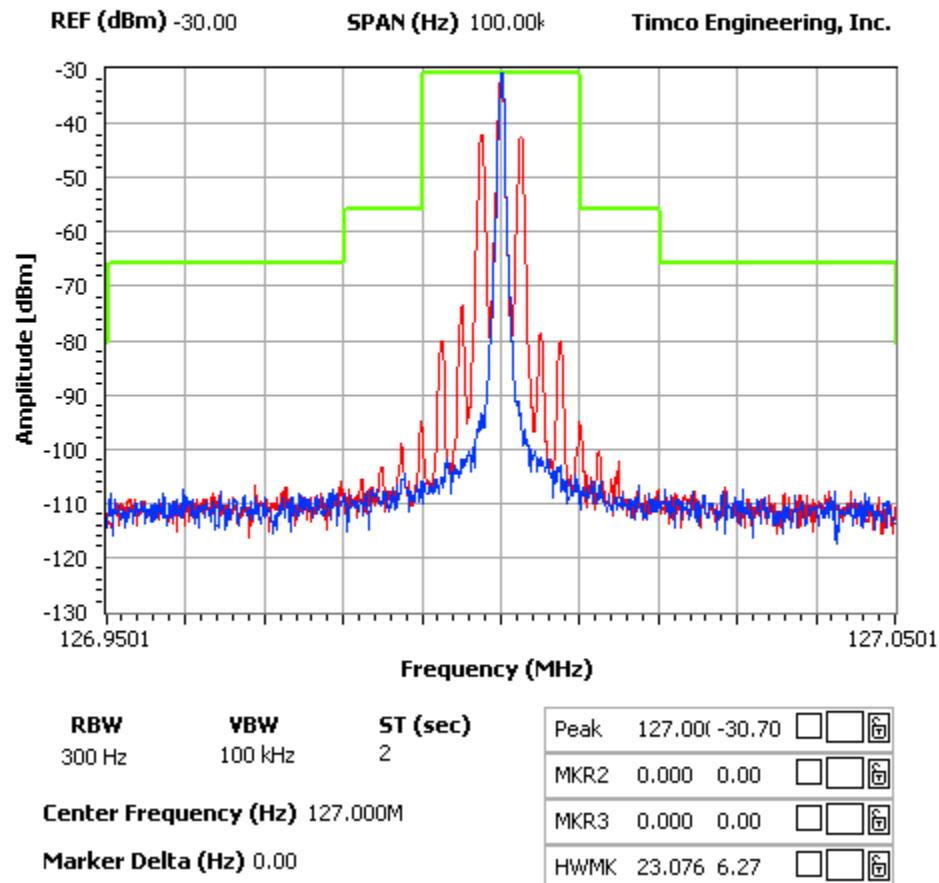
The authorized BW is 25 kHz.



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Occupied Bandwidth

NOTES:



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SPURIOUS EMISSIONS AT ANTENNA TERMINALS (CONDUCTED)

Rule Part No.: Part 2.1051(a)

Requirements: $43 + 10\log(pY) = 55 \text{ dB}$

Method of Measurement: The carrier was modulated 100% using a 2500 Hz tone. The spectrum was scanned from 0.4 to at least the 10th harmonic of the fundamental. The measurements were made in accordance with standard TIA/EIA-603.

Test Data:

Frequency		
MHz	dBm	dBc
118	31.6	0
236	-47.6	79.2
354	-58.3	89.9
472	-50.3	81.9
590	-70.5	102.1
708	-71.3	102.9
826	-73.5	105.1
944	-74.2	105.8
1062	-75	106.6
1180	-75.1	106.7

Frequency		
MHz	dBm	dBc
127	31.7	0
254	-52.8	84.5
381	-63.6	95.3
508	-56.1	87.8
635	-69.9	101.6
762	-73.9	105.6
889	-74.2	105.9
1016	-75.1	106.8
1143	-75.6	107.3
1270	-75.9	107.6

Frequency		
MHz	dBm	dBc
136.9	31.5	0
273.8	-55.4	86.9
410.7	-67.8	99.3
547.6	-62.3	93.8
684.5	-71.1	102.6
821.4	-74	105.5
958.3	-74.3	105.8
1095.2	-74.9	106.4
1232.1	-75.5	107
1369	-75.8	107.3

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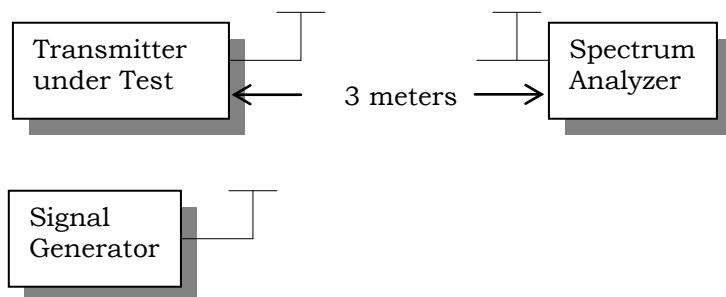
FIELD STRENGTH OF SPURIOUS EMISSIONS

Rule Parts. No.: Part 2.1053

Test Requirements: The FCC limits for radiated emissions are the same as previously stated for the conducted emissions.

Method of Measurements: The spectrum was scanned from 30 MHz 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	Ant. Pol	dB Below Carrier (dBc)
118.00	V	0
236.00	H	96.3
354.00	V	102.0
472.00	V	98.7
590.00	V	99.9
708.00	V	99.2
826.00	V	100.7
944.00	V	98.9

Emission Frequency MHz	Ant. Pol	dB Below Carrier (dBc)
127.00	V	0
254.00	H	91.0
381.00	V	107.6
508.00	V	104.3
635.00	V	104.4
762.00	V	104.7
889.00	V	103.2

Emission Frequency MHz	Ant. Polarity	dB Below Carrier (dBc)
136.90	V	0
273.80	H	93.4
410.70	H	102.5
547.60	V	99.8
684.50	V	100.1
821.40	H	103.2
958.30	H	102.1

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FREQUENCY STABILITY

Rule Parts. No.: Part 2.1055, Part 87.133

Requirements: Temperature range requirements: -30 to +50° C.
Voltage Variation +, -15% ±20 PPM

Method of Measurements: TIA/EIA Specification 603

Test Data:

Assigned Frequency (Ref. Frequency) (MHz)		Frequency Stability (PPM)
Temperature (°C)	Frequency (MHz)	
-30	126.999958	-0.13
-20	126.999924	-0.40
-10	126.999932	-0.34
0	126.999955	-0.16
+10	126.999971	-0.03
+20	126.999972	-0.02
+30	126.999969	-0.05
+40	126.999963	-0.09
+50	126.999957	-0.14

Assigned Frequency (Ref. Frequency) (MHz)		Frequency Stability (PPM)
Battery %	Frequency (MHz)	
-15%	126.999975	0
0	126.999975	0
+15%	126.999975	0

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POWER LINE CONDUCTED INTERFERENCE

Rules Part No.: Part 15.207

Requirements:

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

Test Procedure: ANSI Standard C63.4-2003.
The spectrum was scanned from 0.15 to 30 MHz.

Test Data: The attached graphs represent the emissions read for power line conducted for this device. Both lines were observed.

Not Applicable