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FCC Part 15, Subpart C Test Report
on

Avalanche Beacon
Model: Zoom+
Serial Number: 2606148518

Customer Name:	Ortovox
Customer P.O.:	Check #010188
Date of Report:	October 23, 2012
Test Report No.:	R-5655N
Test Start Date:	October 22, 2012
Test Finish Date:	October 22, 2012
Test Technician:	M. Seamans
Laboratory Supervisor:	T. Hannemann
Branch Manager:	S. Wentworth
Report Prepared By:	J. Ramsey
FCC ID:	KF5ORTOVOXZOOM

Certification and Signatures

We certify that these Test Results are true results obtained from the tests of the equipment stated, and relates only to the equipment tested. We further certify that the measurements shown in this Test Results package were made in accordance with the procedures indicated and vouch for the qualifications of all Retlif Testing Laboratories personnel taking them.

Scott Wentworth
Branch Manager
NVLAP Approved Signatory

Todd Hannemann
Laboratory Supervisor
iNARTE Certified Technician ATL-0255-T

Non-Warranty Provision
The testing services have been performed, findings obtained and reports prepared in accordance with generally accepted laboratory principles and practices. This warranty is in lieu of all others, either expressed or implied.

Non-Endorsement
This test report contains only findings and results arrived at after employing the specific test procedures and standards listed herein. It is not intended to constitute a recommendation, endorsement or certification of the product or material tested. This test report may not be used by the client to claim product endorsement by NVLAP, NIST or any agency of the U.S. Government.

Revision History

Revisions to this document are listed below; the latest revised document supersedes all previous issues of this document.

Revision	Date	Pages Affected
-	October 23, 2012	Original Release

Test Program Summary

Job Number:	R-5655N
Customer:	Ortovox
Address:	455 Irish Hill Road
	Hopkinton, NH 03229
Test Sample:	Avalanche Transceiver/Beacon
Model Number:	Zoom+
Serial Number:	2606148518
Type:	Avalanche Transceiver
Power Requirements:	1.5 VDC Internal Battery
Frequency Operation:	457 kHz
Application:	Locates avalanche victims
Manufacturer/Applicant:	Ortovox Sportartikel
Manufacturer Address:	Rotwandweg 5
	D-82024 Taufkirchen Germany

Test Specification:
FCC Rules and Regulations Part 15, Subpart C, Paragraph 15.209

Test Procedure:
ANSI C3.4:2003

Purpose:
The purpose of this test program was to demonstrate compliance of the Avalanche Beacon, Model: Zoom+ to the requirements of FCC Part 15.209.

Test Methods:
The following table depicts the test methods that were performed on the EUT and the corresponding test results:

Testing Date	Test Method	Test Results
October 22, 2012	15.209, Radiated Emissions (450 kHz to 1 GHz)	Complied

Test Sample Operation:
The Ortovox Zoom+ avalanche transceiver (avalanche beacon) is used to locate avalanche victims and is powered by 1.5 VDC via internal battery. It is comprised of a transmitter and a receiver, both fully controlled by a microcontroller (uC) integrating an arithmetic logic unit, random access memory, flash memory, analog-digital converters, counter and comparator units and clock generation circuitry.

During testing, the EUT was continuously transmitting a signal at 457 kHz and displaying the distance to beacons via a seven segment display. As the test sample operates at close to 100% duty cycle no duty cycle factor was applied.

Test Sample/Test Program:

- 15.203 Antenna Requirements -The device uses a permanently attached internal antenna. The antenna is totally enclosed inside the case.
- 15.205 Restricted Bands - No emissions were observed from the EUT in any restricted bands.
- 15.207 Conducted Emissions-Not applicable (battery operated device)
- 15.209 Radiated Emissions-Fundamental Frequency 457 kHz, Harmonic/Spurious Emissions 450 kHz to 1000MHz
- No harmonic or spurious emissions were observed within 10dB of the specified limit at test distances of 1 or 3 meters.
- Radiated Emissions from the EUT were measured in all three axis. The attached Radiated Emissions test data shows the maximized fundamental emission of each orientation.

Determination of Field Strength Limits:
The field strength limits shown below were calculated as instructed in Section 15.209.

Fundamental Frequency: 457 kHz

Where F is the frequency in kHz, the formula for calculating the maximum permitted fundamental field strength at 300 meters is:

2400/(F) = Field Strength Limit (uV/M @ 300 meters)

2400/(457) = 5.25uV/M

Field Strength Limit of 5.25uV/M = 14.4 dBuV/M

The maximum permitted unwanted emission level cannot exceed the level of the fundamental emission.

Distance Factor:
Testing was performed at a 3 meter distance and the field strength reading extrapolated to 300 meters for comparison to the 300 meter limit. The field strength reading was extrapolated using the extrapolation (distance) factor of 40dB/decade as specified in 15.31 (f) (2) for frequencies below 30MHz.

Distance Factor from 300 meters to 3 meters (2 decades) = -80dB

Test Methods:
15.209 Radiated Emissions

The test sample was placed on an 80cm high wooden test stand which was located 3 meters from the test antenna on an FCC listed open area test site. Emissions from the EUT were maximized by rotating the test sample and adjusting the test sample orientation and antenna polarization.

Test Results: The maximized peak field strength at 457 kHz was 0.24uV/M and met the average limit specified in 15.209 therefore also meeting the peak emission requirement specified in 15.35. No harmonic/spurious emissions were observed at 3 or 1 meter test distances. The maximized corrected peak field strength was calculated as follows:

$R_C = M_R + C_F - D_F$

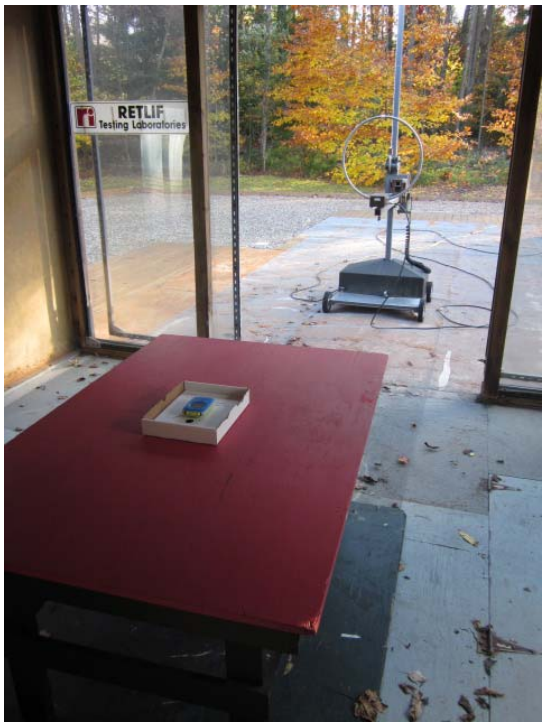
Where:
R_C = Corrected Reading in dBµV/M
M_R = Uncorrected Meter Reading in dBµV
C_F = Correction Factor in dB (Antenna Factor + Cable Loss)
D_F = Distance Factor in dB

M_R = 57.31 dBµV
C_F = 10.13 dB
D_F = 80 dB

R_C = 57.31dBuV + 10.13dB – 80dB = -12.56 dBµV/M = 0.24uV/M

Radiated Emissions
Test Setup Photographs

Test Photographs
Radiated Emissions



Test Setup, Fundamental and Spurious Emissions, 450 kHz to 30 MHz

Test Photographs
Radiated Emissions

Test Setup, Horizontal Antenna Polarization, 30 MHz to 1 GHz

Test Setup, Vertical Antenna Polarization, 30 MHz to 1 GHz

Test Photographs
Radiated Emissions

Test Setup, Fundamental and Spurious Emissions, Configuration X

Test Setup, Fundamental and Spurious Emissions, Configuration Y

Test Photographs
Radiated Emissions

Test Setup, Fundamental and Spurious Emissions, Configuration Z

Equipment List

Radiated Emissions

EN	Manufacturer	Description	Range	Model No.	Cal Date	Due Date
3207	EMCO	ACTIVE LOOP	10 KHZ - 30 MHZ	6502	9/17/2012	9/30/2013
4029	RETLIF	OPEN AREA TEST SITE	3 / 10 Meters	RNH	7/24/2012	7/24/2015
5053	EMCO	BICONILOG ANTENNA	26 MHz - 3 GHz	3142C	11/14/2011	11/14/2012
R444	AGILENT / HP	SPECTRUM ANALYZER	100 Hz - 26.5 GHz	E7405A;A	7/6/2012	7/6/2013

Radiated Emissions
Test Data

RETLIF TESTING LABORATORIES

EMISSIONS DATA SHEET

Test Method:	**Radiated Emissions 450 kHz to 1 GHz**		
Customer:	Ortovox	**Job No:**	R-5655N
Test Sample:	Zoom+ Avalanche Beacon		
Model No:	Zoom+	**Serial No:**	2606148518
Test Specification:	FCC Part 15, Subpart C Paragraph: 15.209		
Operating Mode:	Transmitting signal @ 457 kHz		
Technician:	M. Seamans	**Date:**	Oct. 22, 2012
Notes:	Test Distance: 3 Meters Detector used: Peak		

Test Frequency	Antenna Polarization	Uncorrected Reading	Correction Factor	Duty Cycle Factor	Corrected Reading	Distance Factor	Corrected Reading		Converted Reading	Average Limit at 300 Meters
MHz	/EUT Axis	dBuV	dB	dB	dBuV/m	dB	dBuV/m		uV/m	uV/m
Radiated Emission Limit (Per 15.209)										
0.45	-	-	-	-	-	-	-		-	-
|	-	-	-	-	-	-	-		-	-
0.457	V/X	57.16	10.13	0.00	67.29	-80.00	-12.71		0.23	5.25
0.457	V/Y	57.31	10.13	0.00	67.44	-80.00	-12.56		0.24	5.25
0.457	V/Z	57.01	10.13	0.00	67.14	-80.00	-12.86		0.23	5.25
|	-	-	-	-	-	-	-		-	-
|	-	-	-	-	-	-	-		-	-
|	-	-	-	-	-	-	-		-	-
|	-	-	-	-	-	-	-		-	-
1000.00	-	-	-	-	-	-	-		-	-
	The frequency range from 450 kHz to 1 GHz was scanned. No harmonic or spurious emissions were observed at 3 or 1 meter test distances.									

Data Sheet 1 of 1 R-5655N