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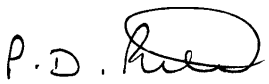
Test Report for T120 Wireless Wind Transducer

To 47 CFR Part 15 Subpart C and RSS 210

Model Number	T120		
Product Description	Wireless Wind Transducer		
Report Number	TP/823/1001		
Report Author Mike Thompson EMC Engineer		Date	20th March 2013
Paul Pitt Technical Check EMC Engineer		Date	4th April 2013
Approval Andrew Little Compliance Manager		Date	5th April 2013

Test Date Range	11/1/2013 – 27/2/2013

Product Status	PASS

1 47 CFR Part 15 and RSS-210 Test Summary

	CFR 47 Part 15	RSS-210	Section	Result
Transmitter Fundamental Field Strength	15.249(a)	A2.9(1)	5.1	Pass
20dB Bandwidth	CFR 47 FCC Part 2 2.1049	A8.1(a)	5.2	Pass
Transmitted Frequency Stability		RSS-GEN 4.7	5.3	Pass
Radiated/Spurious Emissions	15.209(a) 15.249(d)	A2.9(2) RSS-GEN 7.5.2	5.4 5.5	Pass

2 Attestations

This equipment has been tested in accordance with the standards identified in this report. To the best of *my* knowledge and belief, these tests were performed using the measurement procedures described in these reports.
All measuring instruments used to determine the status of the product's compliance to the identified standards are calibrated regularly in accordance with UKAS requirements.
A comprehensive system of traceable calibration in accordance with ISO9001 is maintained.

Name/Position	Signature	Date
Mike Thompson EMC Engineer		21/3/2013

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

Raymarine UK Ltd, Marine House, Cartwright Drive,
Fareham, PO15 5RJ.

Andy Little
Compliance Manager

Date: 5th April 2013

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3 Test Information

3.1 Test Facilities

Site 1	9m x 6m x 5.5m Semi Anechoic Chamber	FCC ID IC Certification	Reg 371673 Reg 4069B-2

3.2 Overall Test Conditions

Work Area	Relative Humidity (%)	Air Pressure (mbar)	Ambient Temperature (°C)
Site 1-5	62	1005	18.9
Sites 6-10	63	1015	21.1

3.3 Test Methods

The objective of the report is to perform testing according to 47 CFR Part 15 Subpart C for the EUT FCC ID Certification and RSS-210 for the Industry Canada certification:

Number	Standard Number	Document Title
1	47 CFR Part 15 (10-01-09 Edition)	Radio Frequency Devices
2	RSS-210 Issue 8 December 2010	Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

3.3.1 Deviations from Test Methods

None

4 EUT Information

4.1 Test Rationale

Full compliance

Additional units covered by this report

FCC ID	PJ5-T120916
IC ID	4069B-T120916
Unique Type Identification:	T120

4.2 Description of Equipment under Test (EUT)

Date of Receipt:	8/1/2013
Client:	Chris Hodgson
Brand Name:	Raymarine
Product Range:	Raymarine Wireless
Country of Manufacture:	Hungary
Operational voltage range:	N/A

Unit 1

Model Name or Number:	T120
FCC ID	PJ5-T120916
IC ID	4069B-T120916
Unique Type Identification:	T120
Serial Number:	EMC130108
CCT Diagram Number(s) & Issue:	1001405-2
PCB Assembly Number(s) & Issue:	1001408-2
Software Version:	
Modifications to Unit:	None

4.3 Additional information

4.4 Description of Auxiliary Equipment

Product Type	Part Number	Serial Number
TackTick Verifier Unit		

4.5 Test Configurations

4.5.1 EUT was placed on non conducting table with verifier unit immediately below. Data was constantly being sent to verifier unit, 5ms burst every second.

4.5.2 Photos

4.6 Operating Modes

For emissions tests EUT was running in normal mode of operation.
For Frequency stability tests EUT was in constant talking mode…i.e. not relying on feedback from a verifier unit to establish communication.

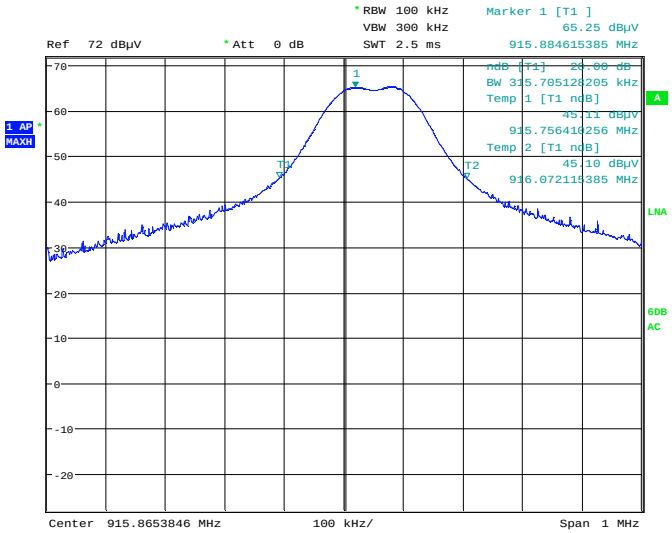
5 Test Results

5.1 Transmitter Fundamental Field Strength

Frequency	Quasi-Peak	Quasi-Peak Limit	Quasi-Peak Difference	Angle	Height	Polarization
915.86 MHz	92.66 dBµV/m	94 dBµV/m	-1.34 dB	225 Degree	1.5 m	Horizontal

5.2 20dB Channel Bandwidth

Transmitter 20dB Bandwidth = 315.7kHz



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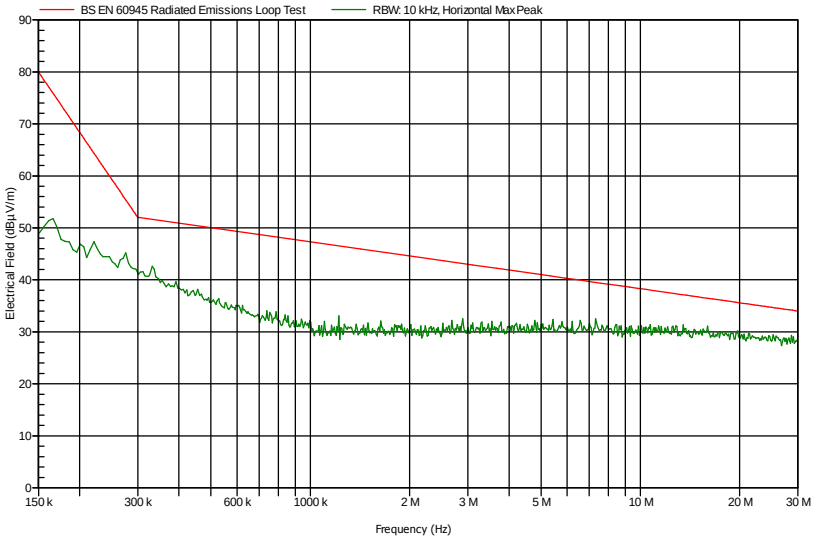
5.3 Transmitter Frequency Stability

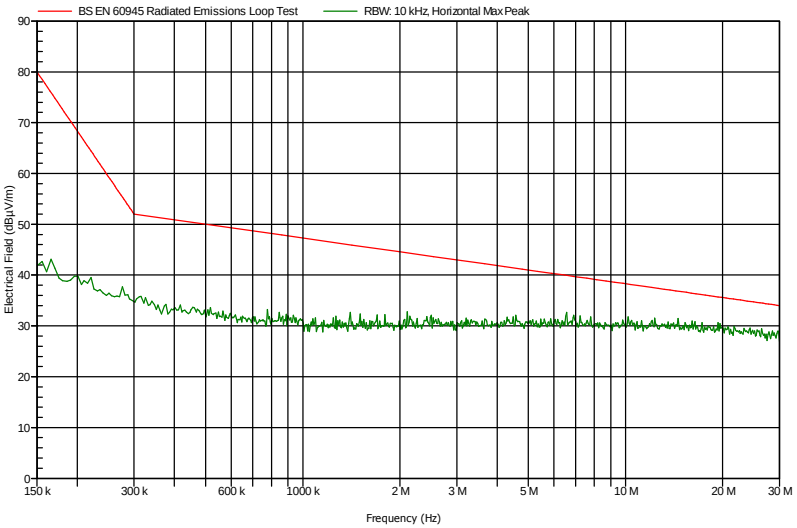
Test Condition		Carrier Frequency
T nom (21C)	V nom (3V)	915.912 MHz
T min (-20C)	V min	915.906 MHz
	V max	915.902 MHz
T max (50C)	V min	915.908 MHz
	V max	915.908 MHz

5.4 Transmitter Spurious Emissions

5.4.1 Radiated Emissions 9kH-150kHz

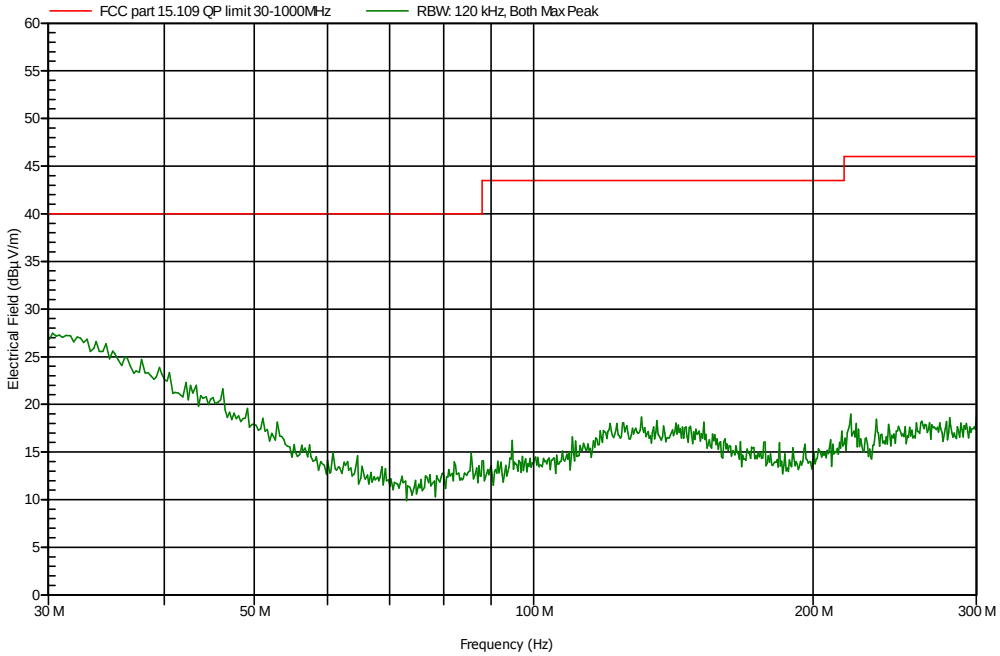


Loop Face On

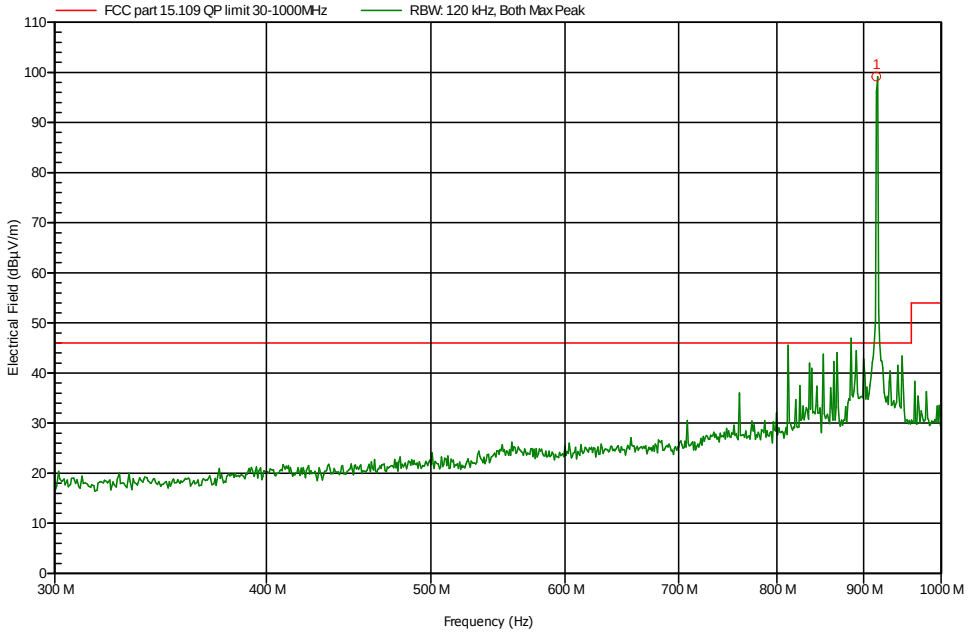


Loop Side On

5.4.2 Radiated Emissions 30MHz – 300MHz

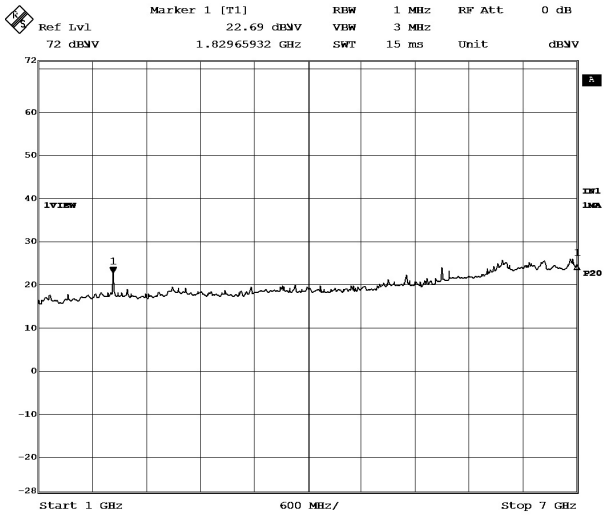


5.4.3 Radiated Emissions 300MHz-1GHz



Emissions between 800M-900M due to transients and not EUT

5.4.4 Radiated Emissions 1GHz-7GHz



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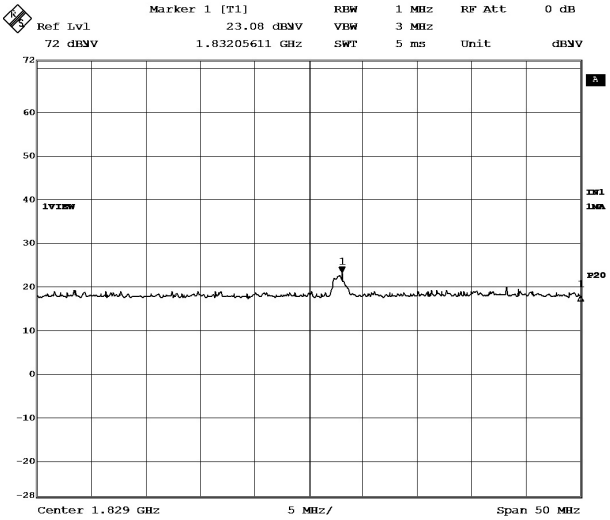

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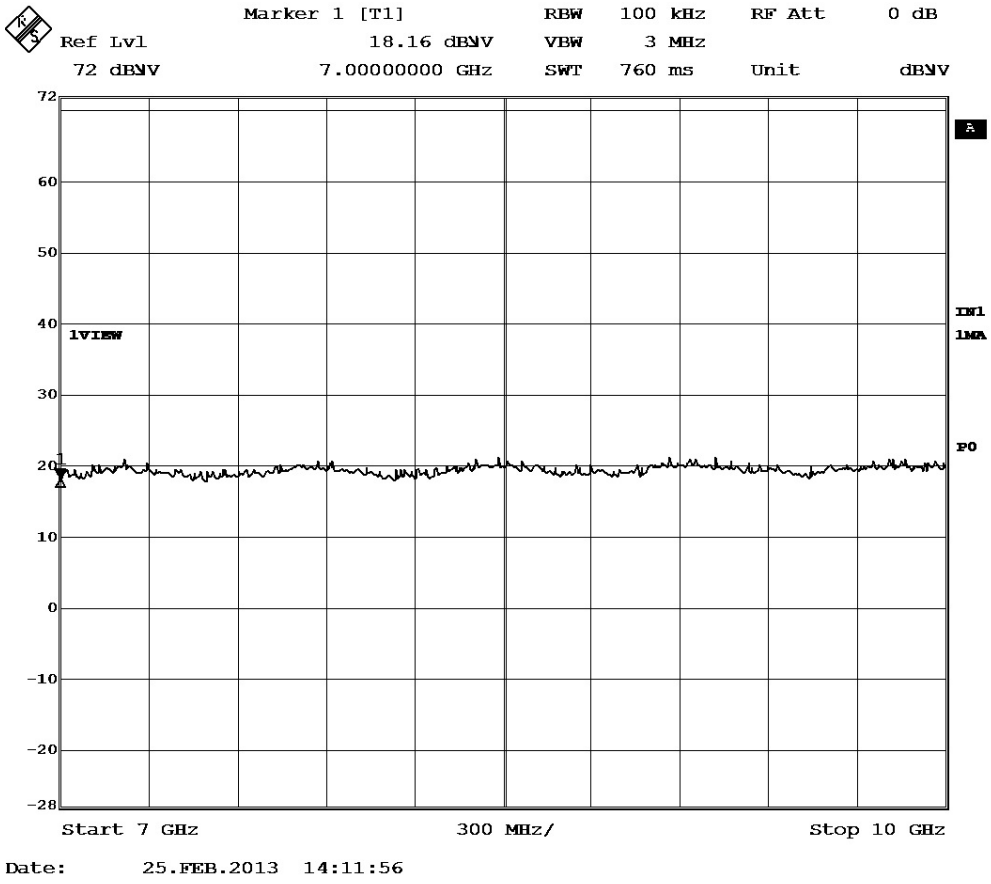
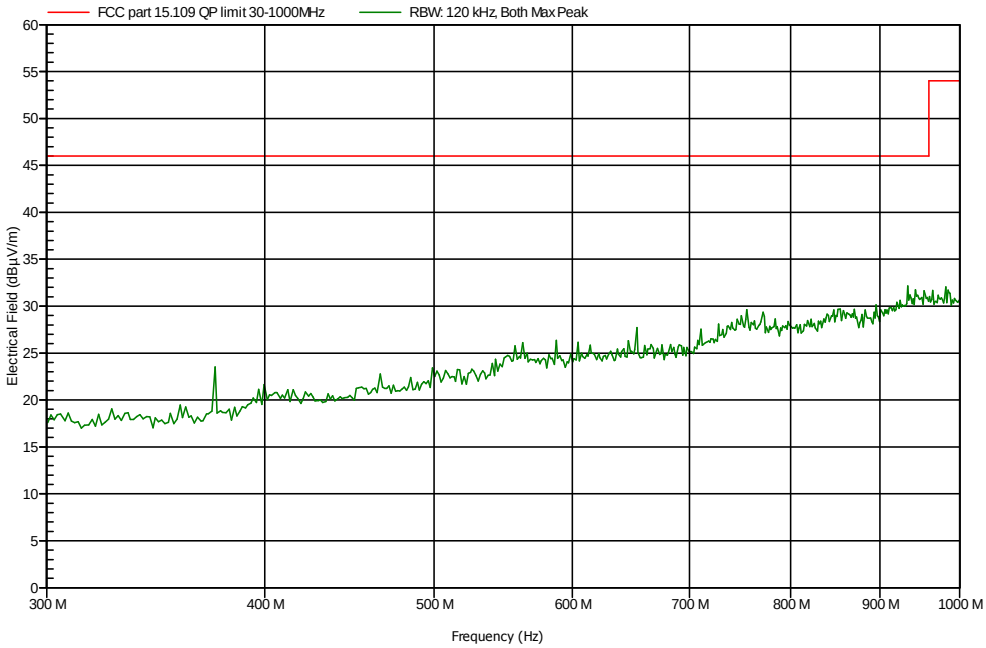
Frequency	Max Detected Level	Antenna + Cable Correction	Actual Measured Level	5ms pulse correction (Note 1)	Corrected Average Level	Limit	
1832MHz	23.08dBuV	36.3dB	59.38dBuV/m	-26dB	33.38dBuV/m	54dBuV/m	PASS

Note 1: EUT employs pulsed operation with a duty cycle of 5ms on time per second. According to FCC maximum duty cycle is measured over 100ms

5.4.5 Radiated Emissions 7GHz-10GHz



5.5 Receiver Spurious Emissions



Whilst the EUT was in receive mode the only recorded difference in emissions was between 300MHz-1GHz, where the fundamental Tx frequency was no longer present. Harmonics above 1GHz were not observed.

6 List of Test Equipment

Test Equipment Type	Manufacturer and Type Number	Serial Number	Cal No.	Cal Due
Digital Multimeter	Fluke 175	97460092	2248	7/11/2013
EMI Receiver 20Hz to 26.5GHz	Rohde & Schwarz ESI26	832692/006	00886	22/08/2013
Active Loop Antenna 9kHz - 30MHz	Chase EMC HLA6120	1122	00442	14/2/2014
Loop Antenna PSU/Charger	Chase EMC CBP9721	N/A	02671	N/A
Antenna Horn 1-18GHz	Chase BBHA9120D	9120D-578	01719	2/11/2014
Antenna 30MHz-3GHz	Chase CBL6141	22932	01802	23/07/2014
Antenna Mast (Site 1)	Inn-co GmbH MM4000	MM4000/056/13750 806/L	02075	N/A
Turntable (Site 1)	Inn-co GmbH DS1200S	DS1200S/175/1375 0806/L	02076	N/A
Mast/Turntable Controller (Site 1)	Inn-co GmbH Co 2000	CO/2000/359/137/5 0806/L	02077	N/A
EMI Receiver 9KHz to 3GHz	Rohde & Schwarz ESCI	100416	001692	17/01/2014
Power Supply Unit	Palstar PS30M	G290775401	2020	N/A

In accordance with UKAS requirements, all measuring equipment is on a calibration cycle.