Report On

FCC and Industry Canada Testing of the
Raymarine Belgium BVBA Class D DSC
In accordance with FCC CFR 47 Part 15B and ICES-003

COMMERCIAL-IN-CONFIDENCE

FCC ID:PJ5-RAY260
IC ID: 4069B-RAY260

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REPORT ON

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Document 75920234 Report 04 Issue 1

April 2013

PREPARED FOR

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PREPARED BY

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APPROVED BY

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Authorised Signatory

DATED 19 April 2013

ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC CFR 47 Part 15B and ICES-003. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

G Lawler

UKAS TESTING 0141

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SECTION 1

REPORT SUMMARY

FCC and Industry Canada Testing of the
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1.1 INTRODUCTION

The information contained in this report is intended to show verification of the FCC and Industry Canada Testing of the Raymarine Belgium BVBA Class D DSC to the requirements of FCC CFR 47 Part 15B and ICES-003.

Objective	To perform FCC and Industry Canada Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	Raymarine Belgium BVBA
Model Number(s)	RAY260
Serial Number(s)	Base No.4
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B (2011) ICES-003 (2012)
Incoming Release Date	Application Form 21 December 2012
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	N6506 02 October 2012
Start of Test	3 December 2012
Finish of Test	3 December 2012
Name of Engineer(s)	G Lawler

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1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with FCC CFR 47 Part 15B and ICES-003 is shown below.

Section	Spec Clause		Test Description	Result	Comments/Base Standard
	FCC	ICES			
Idle					
2.1	15.109	6.2	Radiated Emissions	Pass	

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1.3 APPLICATION FORM

APPLICANT'S DETAILS			
COMPANY NAME :	Raymarine UK Ltd		
ADDRESS :	Cartwright Drive, Fareham, Hampshire, PO15 5RJ		
	.....		
	.....		
NAME FOR CONTACT PURPOSES : .Andy Little			
TELEPHONE NO: 01329 246897		FAX NO:	.....
		E-MAIL:	andy.little@raymarine.com

EQUIPMENT INFORMATION

AIS Version (Unit tested)

Model name/number	RAY260 VHF-AIS	Identification/Part number	E70088

Non-AIS Version (Identical transmitter, AIS receiver module removed)

Model name/number	RAY260 VHF	Identification/Part number	E70087
Hardware Version	T0	Software Version	0.4
Manufacturer	Raymarine	Country of Origin	China
FCC ID	PJ5-RAY260.....	Industry Canada ID	4069B-RAY260

Technical description (a brief description of the intended use and operation)

Class D marine VHF radio

Supply Voltage:

[ ]	AC mains	State AC voltage V	and AC frequency ..... Hz
[√]	DC (external)	State DC voltage 12 V	and DC current .....6.... A
[ ]	DC (internal)	State DC voltage V	and Battery type .....

Frequency characteristics:

Transmitter Frequency range	155.5 MHz to 161.425 MHz	Channel spacing 12.5kHz (if channelized)
Receiver Frequency range (if different)	155.5 MHz to 163.275 MHz	Channel spacing 12.5kHz (if channelized)

Designated test frequencies:

Bottom: ..... MHz Middle: ..... MHz Top: ..... MHz

Intermediate Frequencies : Working Chanel Receiver: 1st IF Freq.: 21.6MHz, 2nd IF Freq.: 455Hz
Dedicated CH70 Receiver: 1st IF Freq.: 45.1MHz, 2nd IF Freq.: 455Hz

Highest Internally Generated Frequency : 161.425MHz. Frequency of the Private channel M2.

Power characteristics:

Maximum transmitter power 25 W — Minimum transmitter power (if variable) 1 W

[ ]	Continuous transmission
[√]	Intermittent transmission — State duty cycle .....

If intermittent, can transmitter be set to continuous transmit test mode? Y/N

Antenna characteristics:

[√]	Antenna connector	State impedance 50 ohm
[ ]	Temporary antenna connector	State impedance ..... ohm
[ ]	Integral antenna	State gain ..... dBi

Modulation characteristics:

[ ]	Amplitude	[ ] Other
[√]	Frequency	Details: .....
[ ]	Phase	(GMSK, QSPK etc)

Can the transmitter operate un-modulated? Y

ITU Class of emission: .....

Battery/Power Supply

Model name/number	N/A.....	Identification/Part number	.....
Manufacturer	.....	Country of Origin	.....

Ancillaries (if applicable)

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Handset			
Model name/number	RAYMIC260 Handset	Identification/Part number	A80196
Country of Origin: China			
Active Speaker			
Model name/number	RAY260 Active Speaker	Identification/Part number	A80199
Country of Origin: China			
Passive Speaker			
Model name/number	RAY260 Speaker	Identification/Part number	A80198
Country of Origin: China			
Extreme conditions:			
Maximum temperature	60 °C	Minimum temperature	-20 °C
Maximum supply voltage	15.6 V	Minimum supply voltage	10.8 V

I hereby declare that I am entitled to sign on behalf of the applicant and that the information supplied is correct and complete.

Signature : Andy Little

Name : Andy Little

Position held : Compliance Manager

Date : 21st December 2012

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1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Raymarine Belgium BVBA Class D DSC. A full technical description can be found in the manufacturer's documentation.

1.5 TEST CONDITIONS

For all tests the EUT was set up in accordance with the relevant test standard and to represent typical operating conditions. Tests were applied with the EUT situated in a shielded enclosure.

The EUT was powered from a 12 V DC supply.

FCC Accreditation
90987 Octagon House, Fareham Test Laboratory

Industry Canada Accreditation
IC2932B-1 Octagon House, Fareham Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standard or test plan were made during testing.

1.7 MODIFICATION RECORD

Modification 0 - No modifications were made to the test sample during testing.

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SECTION 2

TEST DETAILS

FCC and Industry Canada Testing of the
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In accordance with FCC CFR 47 Part 15B and ICES-003

2.1 RADIATED EMISSIONS

2.1.1 Specification Reference

FCC CFR 47 Part 15B and ICES-003, Clause 15.109 and 6.2

2.1.2 Equipment Under Test and Modification State

RAY260 S/N: Base No.4 - Modification State 0

2.1.3 Date of Test

3 December 2012

2.1.4 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.5 Test Procedure

A preliminary profile of the Spurious Radiated Emissions is obtained up to the 5th harmonic of the EUT's highest internally generated fundamental frequency. For frequencies from 30MHz to 18GHz the EUT is placed on a test table 800mm above the ground plane. For frequencies above 18GHz, the EUT height is increased by 200mm to a height of 1000mm. This is to ensure the beam width of the measuring antenna gives sufficient vertical coverage of the EUT.

During characterisation the turntable azimuth is adjusted from 0 to 360 degrees with the measuring antenna in one polarity. It is then repeated for the other polarity. Any frequencies of interest are noted for formal measuring later. The distance from the measuring antenna to the boundary of the EUT is 3m. Above 18GHz this distance may be reduced to 1m.

During formal measurement the spectrum analyser is tuned to the frequency of the emission. The turntable azimuth is adjusted from 0 to 360 degrees to determine the point at which the maximum emission level occurs. Then the height of the measuring antenna is adjusted from a height of 1m to 4m to determine the height at which the maximum emission level occurs. Once the point of maximum emission has been determined the emission is measured. Emissions in the 30MHz to 1GHz range are measured using a CISPR Quasi – Peak detector function in a 120kHz bandwidth. Emissions in the range 1GHz to 40GHz require Peak and Average measurements. The Peak measurements are made using a peak detector with 1MHz Resolution and Video bandwidths. The average measurements employ a peak detector with a Resolution bandwidth of 1MHz and a Video bandwidth of 10Hz. If measurements are made at a 1m measuring distance, then 10dB is added to the specification limit.

2.1.6 Environmental Conditions

Ambient Temperature	19.6°C
Relative Humidity	34.0%

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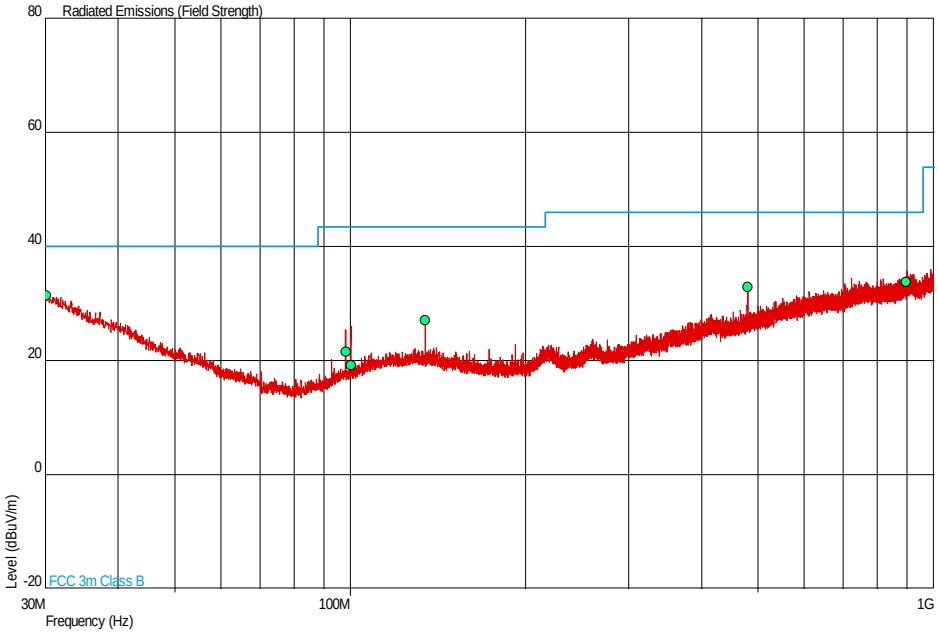
2.1.7 Test Results

Channel 1

30 MHz to 1 GHz



Frequency (MHz)	QP Level (dBµV/m)	QP Limit (dBµV/m)	QP Margin (dBµV/m)	Angle(Deg)	Height(m)	Polarity
30.179	31.4	40.0	-8.6	360	1.00	Vertical
98.209	21.6	43.5	-21.9	63	1.00	Vertical
100.298	19.2	43.5	-24.3	82	1.00	Vertical
134.392	27.0	43.5	-16.5	328	1.00	Vertical
479.992	32.9	46.0	-13.1	93	1.00	Vertical
897.808	33.8	46.0	-12.2	26	1.00	Vertical

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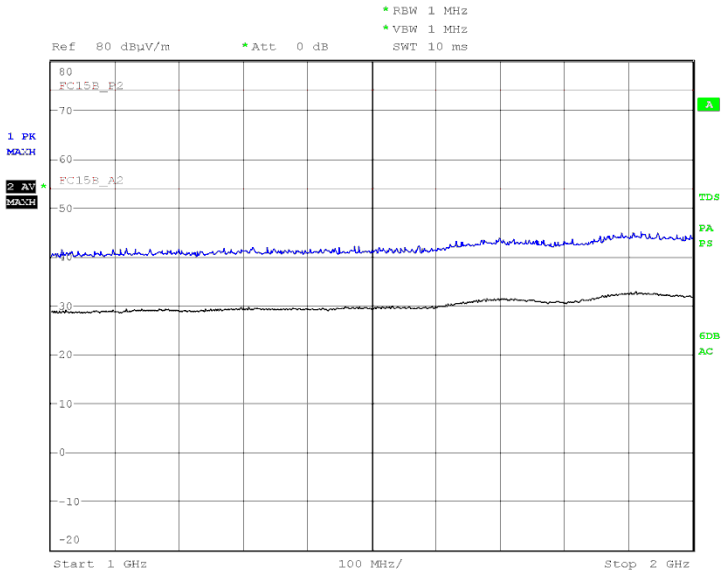
1 GHz to 2 GHz



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SECTION 3

TEST EQUIPMENT USED

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3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

Instrument	Manufacturer	Type No.	TE No.	Calibration Period (months)	Calibration Due
Section 2.1 - Receiver Emissions					
Screened Room (5)	Rainford	Rainford	1545	36	25-Dec-2013
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Antenna (Bilog)	Chase	CBL6143	2904	24	12-May-2013
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	11-Oct-2013
9m RF Cable (N Type)	Rhophase	NPS-2303-9000-NPS	3791	-	TU
Tilt Antenna Mast	maturo Gmbh	TAM 4.0-P	3916	-	TU
Mast Controller	maturo Gmbh	NCD	3917	-	TU

TU – Traceability Unscheduled

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:-

Test Discipline	MU
Radiated Emissions	30MHz to 1GHz: ± 5.1 dB 1GHz to 40GHz: ± 6.3 dB

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SECTION 4

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

4.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

Our UKAS Accreditation does not cover opinions and interpretations and any expressed are outside the scope of our UKAS Accreditation.

Results of tests not covered by our UKAS Accreditation Schedule are marked NUA (Not UKAS Accredited).