



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

## FCC PART 80 AND ISED RSS-238 C2PC TEST REPORT

<b>APPLICANT</b>	RAYMARINE UK LTD.
	MARINE HOUSE, CARTWRIGHT DRIVE SEGENSEWORTH FAREHAM, HAMPSHIRE PO15 5RJ UNITED KINGDOM
<b>FCC ID</b>	PJ5-QUANTUM
<b>IC</b>	4069B-QUANTUM
<b>MODEL NUMBER</b>	QUANTUM
<b>PRODUCT DESCRIPTION</b>	LIGHT MARINE NAVIGATIONAL RADAR WITH WLAN
<b>DATE SAMPLE RECEIVED</b>	2/22/2018
<b>DATE TESTED</b>	3/12/2018
<b>TESTED BY</b>	Tim Royer
<b>APPROVED BY</b>	Franklin Rose
<b>TEST RESULTS</b>	<input checked="" type="checkbox"/> PASS <input type="checkbox"/> FAIL

Report Number	Version Number	Description	Issue Date
281UT18TestReport	Rev1	Initial Report	03/20/2018

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

## Table of Contents

<b>GENERAL REMARKS.....</b>	<b>3</b>
<b>EUT SPECIFICATION.....</b>	<b>4</b>
<b>TEST SETUP INFORMATION .....</b>	<b>4</b>
<b>TEST RESULTS SUMMARY .....</b>	<b>4</b>
<b>FIELD STRENGTH OF SPURIOUS EMISSIONS.....</b>	<b>5</b>
<b>STATE OF THE MEASUREMENT UNCERTAINTY .....</b>	<b>6</b>
<b>EQUIPMENT LIST .....</b>	<b>7</b>

## 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**



Sr. EMC Engineer  
EMC-003838-NE



**Tested by:** Tim Royer, Project Manager/Testing Engineer

**Date:** 03/19/2018



**Reviewed and approved by:** Franklin Rose, Project Manager/EMC Testing Technician

**Date:** 03/20/2018

Applicant: RAYMARINE UK LTD.  
FCC ID: PJ5-QUANTUM  
IC: 4069B-QUANTUM  
Report: 281UT18TestReport\_Rev1

[Table of Contents](#)

**EUT SPECIFICATION**

<b>EUT Description</b>	LIGHT MARINE NAVIGATIONAL RADAR WITH WLAN	
<b>FCC ID</b>	PJ5-QUANTUM	
<b>IC</b>	4069B-QUANTUM	
<b>Model Number</b>	QUANTUM	
<b>Serial Number</b>	E70498	
<b>Operating Frequency</b>	9300-9500 MHz	
<b>Modulation</b>	Digital	
<b>EUT Power Source</b>	<input type="checkbox"/> 110–120Vac/50– 60Hz – Shipboard only	
	<input checked="" type="checkbox"/> DC Power (12 V)	
	<input type="checkbox"/> Battery Operated Exclusively	
<b>Test Item</b>	<input type="checkbox"/> Prototype	
	<input checked="" type="checkbox"/> Pre-Production	
	<input type="checkbox"/> Production	
<b>Type of Equipment</b>	<input type="checkbox"/> Fixed	
	<input checked="" type="checkbox"/> Mobile	
	<input type="checkbox"/> Portable	
<b>Antenna Gain</b>	0 dBi	

**TEST SETUP INFORMATION**

<b>Test facility</b>	Timco Engineering, Inc. 849 NW State Road 45 Newberry, FL 32669 Designation #: US1070
<b>Test Condition</b>	Temperature: 26°C Relative humidity: 50%. Barometer: 1012.5mb
<b>Modifications</b>	None
<b>Test Exercise</b>	The EUT was placed in continuous transmit mode of operation
<b>Applicable Standards</b>	ANSI/TIA 603-E: 2016, FCC CFR 47 Part 80, Part 90, ISED RSS-238, RSS-GEN

**TEST RESULTS SUMMARY**

Test	Regulatory Body	Rule	Result
Field Strength of Spurious Emissions	FCC	Part 80.211(f)	Pass
	ISED	RSS 238 4.3	Pass

## FIELD STRENGTH OF SPURIOUS EMISSIONS

**Rule Parts. No.:** FCC Part 2.1053, Part 80.211(f), RSS-238 4.3

### Requirements:

**Part 80.211(f):**  $43 + 10\log$  (mean power in watts)

**RSS 238 4.3:** The unwanted emission power in any 1 MHz bandwidth shall be attenuated below the transmitter peak power by at least 20 dB per decade from the edge of the 40 dB bandwidth and beyond. The unwanted emissions power shall not need to be attenuated more than 60 dB below the transmitter peak power.

**METHOD OF MEASUREMENT:** The tabulated data shows the results of the radiated field strength emissions test. The spectrum was scanned from 30 MHz to at least the tenth harmonic of the fundamental or 40 GHz. This test was conducted per the standard listed above using the substitution method.

### Test Data:

Power Output		Limit		
dBm	Watts		dBc	dBm
39.82	9.59		52.82	-13.00
Emission Frequency MHz	Meter Reading dBu V	Antenna Polarity	ERP (dBm)	Margin (dB)
187.5	26.1	V	-56.085	43.08
179.6	26.1	H	-55.609	42.61
57.0	27.0	H	-60.814	47.81
260.3	28.1	H	-54.526	41.53
201.2	26.8	V	-57.756	44.76
8800.0	32.2	V	-18.087	5.09
8800.0	31.4	H	-18.817	5.82
28200.0	7.8	H	-46.217	33.22
28200.0	6.8	V	-47.207	34.21
37600.0	16.3	V	-33.907	20.91
37600.0	16.2	H	-34.067	21.07

### Results Meet Requirements

## STATE OF THE MEASUREMENT UNCERTAINTY

The data and results referenced in this document are true and accurate. The measurement uncertainty was calculated for all measurements listed in this test report according To CISPR 16-4 or ENTR 100-028 Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: “Uncertainty in EMC Measurements” and is documented in the Timco Engineering, Inc. quality system according to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Timco Engineering, Inc. is reported:

Test Items	Measurement Uncertainty	Notes
RF Frequency Accuracy	± 49.5 Hz	(1)
RF Conducted Power	±0.93dB	(1)
Conducted spurious emission of transmitter valid up to 40GHz	±1.86dB	
Occupied Bandwidth	±2.65%	
Audio Frequency Response	±1.86dB	
Modulation limiting	±1.88%	
Radiated RF Power	±1.4dB	
Maximum frequency deviation: Within 300 Hz and 6kHz of audio freq. Within 6kHz and 25kHz of audio Freq.	±1.88% ±2.04%	
Rad Emissions Sub Meth up to 26.5GHz	±2.14dB	
Rad Emissions Sub Meth up to 18-40 GHz	±2.04%	
Adjacent channel power	±1.47dB	(1)
Transient Frequency Response	±1.88%	
Temperature	±1.0°C	(1)
Humidity	±5.0%	

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=1.96.

**EQUIPMENT LIST**

Device	Manufacturer	Model	Serial Number	Cal/Char Date	Due Date
24 Volt Power Supply	Astron	VLS-25M	9510040	N/A	N/A
Antenna: Log-Periodic 1122	Electro-Metrics	LPA-25	1122	07/26/17	07/26/19
Software: Field Strength Program	Timco	N/A	Version 4.10.7.0	N/A	N/A
USB Peak Power Sensor 50 MHz to 18 GHz	Boonton	55318	9224	09/13/16	09/13/18
EMI Test Receiver R & S ESU 40 Chamber	Rohde & Schwarz	ESU 40	100320	04/01/16	04/01/18
LPA	Electro-Metrics	LPA-25	1122	07/26/2017	07/26/2019
Double Ridged Horn 2	ETS- Lindgren	3117	00041534	03/01/2017	03/01/2019
DOUBLE-RIDGE HORN ANTENNA	EMCO	3116	9011-2145	12/08/2017	12/08/2019
Active Loop	ETS – LINDGREN	6502	00062529	12/11/2017	12/11/2019

**\*EMI RECEIVER SOFTWARE VERSION**

The receiver firmware used was version 4.43 Service Pack 3

**END OF REPORT**