



Product Service

---

**Choose certainty.  
Add value.**

# Report On

Limited FCC Testing of the  
Crane Electronics Ltd RF-m  
In accordance with FCC 47 CFR Part 15B

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA6RFMT1

Document 75928950 Report 03 Issue 1

March 2015



Product Service

TÜV SÜD Product Service, Octagon House, Concorde Way, Segensworth North,  
Fareham, Hampshire, United Kingdom, PO15 5RL  
Tel: +44 (0) 1489 558100. Website: [www.tuv-sud.co.uk](http://www.tuv-sud.co.uk)

COMMERCIAL-IN-CONFIDENCE

**REPORT ON**

Limited FCC Testing of the  
Crane Electronics Ltd RF-m  
In accordance with FCC 47 CFR Part 15B

Document 75928950 Report 03 Issue 1

March 2015

**PREPARED FOR**

Crane Electronics Ltd  
Watling Drive  
Sketchley Meadows  
Hinckley  
LE10 3EY

**PREPARED BY**

**Natalie Bennett**  
Senior Administrator, Project Support

**APPROVED BY**

**Ryan Henley**  
Authorised Signatory

**DATED**

03 March 2015

---

**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 47 CFR Part 15B. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);

  
T Guy

**CONTENTS**

| <b>Section</b> |                                                       | <b>Page No</b> |
|----------------|-------------------------------------------------------|----------------|
| <b>1</b>       | <b>REPORT SUMMARY .....</b>                           | <b>3</b>       |
| 1.1            | Introduction .....                                    | 4              |
| 1.2            | Brief Summary of Results .....                        | 5              |
| 1.3            | Declaration of Build Status .....                     | 6              |
| 1.4            | Product Information .....                             | 7              |
| 1.5            | Test Conditions .....                                 | 7              |
| 1.6            | Deviations from the Standard .....                    | 7              |
| 1.7            | Modification Record .....                             | 7              |
| <b>2</b>       | <b>TEST DETAILS .....</b>                             | <b>8</b>       |
| 2.1            | Radiated Emissions .....                              | 9              |
| <b>3</b>       | <b>TEST EQUIPMENT USED .....</b>                      | <b>13</b>      |
| 3.1            | Test Equipment Used .....                             | 14             |
| 3.2            | Measurement Uncertainty .....                         | 15             |
| <b>4</b>       | <b>ACCREDITATION, DISCLAIMERS AND COPYRIGHT .....</b> | <b>16</b>      |
| 4.1            | Accreditation, Disclaimers and Copyright .....        | 17             |



Product Service

## **SECTION 1**

### **REPORT SUMMARY**

Limited FCC Testing of the  
Crane Electronics Ltd RF-m  
In accordance with FCC 47 CFR Part 15B



## 1.1 INTRODUCTION

The information contained in this report is intended to show the verification of Limited FCC Testing of the Crane Electronics Ltd RF-m to the requirements of FCC 47 CFR Part 15B.

|                                |                                                                                                                                                             |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objective                      | To perform Limited FCC Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out. |
| Manufacturer                   | Crane Electronics Ltd                                                                                                                                       |
| Model Number(s)                | RF-m                                                                                                                                                        |
| Serial Number(s)               | 95336                                                                                                                                                       |
| Number of Samples Tested       | 1                                                                                                                                                           |
| Test Specification/Issue/Date  | FCC 47 CFR Part 15B (2014)                                                                                                                                  |
| Incoming Release Date          | Application Form<br>04 February 2015                                                                                                                        |
| Disposal Reference Number Date | Held Pending Disposal<br>Not Applicable<br>Not Applicable                                                                                                   |
| Order Number Date              | 046003<br>08 January 2015                                                                                                                                   |
| Start of Test                  | 19 February 2015                                                                                                                                            |
| Finish of Test                 | 19 February 2015                                                                                                                                            |
| Name of Engineer(s)            | T Guy                                                                                                                                                       |
| Related Document(s)            | ANSI C63.4 (2009)                                                                                                                                           |



Product Service

## 1.2 BRIEF SUMMARY OF RESULTS

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

| Section | Spec Clause | Test Description   | Result | Comments/Base Standard |
|---------|-------------|--------------------|--------|------------------------|
| Idle    |             |                    |        |                        |
| 2.1     | 15.109      | Radiated Emissions | Pass   | ANSI C63.4             |



### 1.3 DECLARATION OF BUILD STATUS

| MAIN EUT                                                                      |                                                                                                         |                        |           |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|------------------------|-----------|
| MANUFACTURING DESCRIPTION                                                     | RF Module                                                                                               |                        |           |
| MANUFACTURER                                                                  | Crane Electronics Ltd.                                                                                  |                        |           |
| TYPE                                                                          | RF-m                                                                                                    |                        |           |
| PART NUMBER                                                                   | CDWD1-0001-CRXXRX                                                                                       |                        |           |
| SERIAL NUMBER                                                                 | Not supplied                                                                                            |                        |           |
| HARDWARE VERSION                                                              | 101464 101465 iss.b                                                                                     |                        |           |
| SOFTWARE VERSION                                                              | Test version supplied                                                                                   |                        |           |
| TRANSMITTER OPERATING RANGE                                                   | 2400 MHz – 2480 MHz                                                                                     |                        |           |
| RECEIVER OPERATING RANGE                                                      | 2400 MHz – 2480 MHz                                                                                     |                        |           |
| COUNTRY OF ORIGIN                                                             | UK                                                                                                      |                        |           |
| INTERMEDIATE FREQUENCIES                                                      | None                                                                                                    |                        |           |
| EMISSION DESIGNATOR(S):<br>(i.e. G1D, GXW)                                    | 1M00F1D                                                                                                 |                        |           |
| MODULATION TYPES:<br>(i.e. GMSK, QPSK)                                        | GFSK                                                                                                    |                        |           |
| HIGHEST INTERNALLY GENERATED FREQUENCY                                        | 16MHz                                                                                                   |                        |           |
| OUTPUT POWER (W or dBm)                                                       | 0dBm                                                                                                    |                        |           |
| FCC ID                                                                        | TA6RFMT1                                                                                                |                        |           |
| INDUSTRY CANADA ID                                                            | Not supplied                                                                                            |                        |           |
| TECHNICAL DESCRIPTION (a brief description of the intended use and operation) | The RF-m takes torque and angle signals from a transducer and transmits the reading to a datacollector. |                        |           |
| BATTERY/POWER SUPPLY                                                          |                                                                                                         |                        |           |
| MANUFACTURING DESCRIPTION                                                     | Li-Ion battery                                                                                          |                        |           |
| MANUFACTURER                                                                  | INOV8                                                                                                   |                        |           |
| TYPE                                                                          | Li-Ion                                                                                                  |                        |           |
| PART NUMBER                                                                   | LI42B                                                                                                   |                        |           |
| VOLTAGE                                                                       | 3.7V                                                                                                    |                        |           |
| COUNTRY OF ORIGIN                                                             | CHINA                                                                                                   |                        |           |
| MODULES (if applicable)                                                       |                                                                                                         |                        |           |
| MANUFACTURING DESCRIPTION                                                     |                                                                                                         |                        |           |
| MANUFACTURER                                                                  |                                                                                                         |                        |           |
| TYPE                                                                          |                                                                                                         |                        |           |
| POWER                                                                         |                                                                                                         |                        |           |
| FCC ID                                                                        |                                                                                                         |                        |           |
| COUNTRY OF ORIGIN                                                             |                                                                                                         |                        |           |
| INDUSTRY CANADA ID                                                            |                                                                                                         |                        |           |
| EMISSION DESIGNATOR                                                           |                                                                                                         |                        |           |
| DHSS/FHSS/COMBINED OR OTHER                                                   |                                                                                                         |                        |           |
| ANCILLARIES (if applicable)                                                   |                                                                                                         |                        |           |
| MANUFACTURING DESCRIPTION                                                     | Rotary transducer                                                                                       | Torque module          | Laptop pc |
| MANUFACTURER                                                                  | Crane Electronics Ltd.                                                                                  | Crane Electronics Ltd. |           |
| TYPE                                                                          | 25Nm with angle                                                                                         | Torque Module          |           |
| PART NUMBER                                                                   |                                                                                                         | IQVT1-0001-CRXXRX      |           |
| SERIAL NUMBER                                                                 | 94495                                                                                                   | 94509                  |           |
| COUNTRY OF ORIGIN                                                             | UK                                                                                                      | UK                     |           |

Signature Date 4/2/15  
Declaration of Build Status Serial Number



Product Service

## **1.4 PRODUCT INFORMATION**

### **1.4.1 Technical Description**

The Equipment Under Test (EUT) was a Crane Electronics Ltd RF-m. 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 3.7 V battery.

FCC Measurement Facility Registration Number  
90987 Octagon House, Fareham Test Laboratory

## **1.6 DEVIATIONS FROM THE STANDARD**

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

## **1.7 MODIFICATION RECORD**

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



Product Service

## **SECTION 2**

### **TEST DETAILS**

Limited FCC Testing of the  
Crane Electronics Ltd RF-m  
In accordance with FCC 47 CFR Part 15B



Product Service

**2.1 RADIATED EMISSIONS****2.1.1 Specification Reference**

FCC 47 CFR Part 15B, Clause 15.109

**2.1.2 Equipment Under Test and Modification State**

RF-m S/N: 95336 - Modification State 0

**2.1.3 Date of Test**

19 February 2015

**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**

The test was performed in accordance with ANSI C63.4, Clause 8.

**Remarks**

All final measurements were assessed against the Class B emission limits in FCC 47 CFR Part 15, Clause 15.109.

**2.1.6 Environmental Conditions**

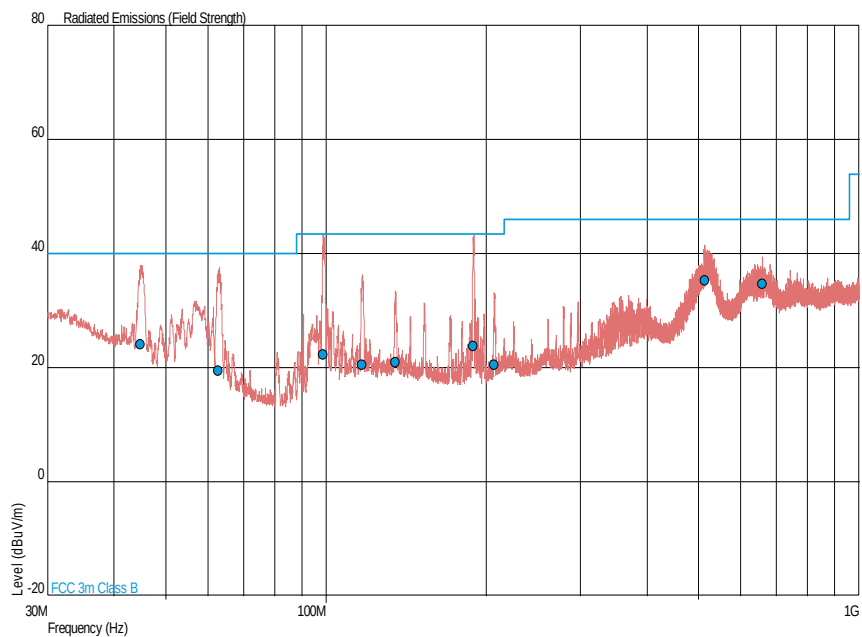
|                     |        |
|---------------------|--------|
| Ambient Temperature | 20.3°C |
| Relative Humidity   | 33.0%  |



## 2.1.7 Test Results

### Idle, 30 MHz to 1 GHz

| Frequency (MHz) | QP Level (dBμV/m) | QP Margin (dBμV/m) | QP Level (μV/m) | QP Margin (μV/m) | Angle (Deg) | Height (m) | Polarity   |
|-----------------|-------------------|--------------------|-----------------|------------------|-------------|------------|------------|
| 44.890          | 24.0              | -16.0              | 15.8            | -84.2            | 129         | 1.00       | Vertical   |
| 62.788          | 19.5              | -20.5              | 9.4             | -90.6            | 253         | 1.88       | Vertical   |
| 98.722          | 22.3              | -21.2              | 13.0            | -137.0           | 69          | 2.24       | Vertical   |
| 116.670         | 20.5              | -23.0              | 10.6            | -139.4           | 359         | 1.00       | Vertical   |
| 135.060         | 21.0              | -22.5              | 11.2            | -138.8           | 299         | 1.00       | Vertical   |
| 188.907         | 23.8              | -19.7              | 15.5            | -134.5           | 68          | 3.05       | Vertical   |
| 206.886         | 20.5              | -23.0              | 10.6            | -139.4           | 301         | 1.00       | Vertical   |
| 514.175         | 35.4              | -10.6              | 58.9            | -141.1           | 258         | 1.04       | Horizontal |
| 658.231         | 34.7              | -11.3              | 54.3            | -145.7           | 99          | 2.66       | Horizontal |





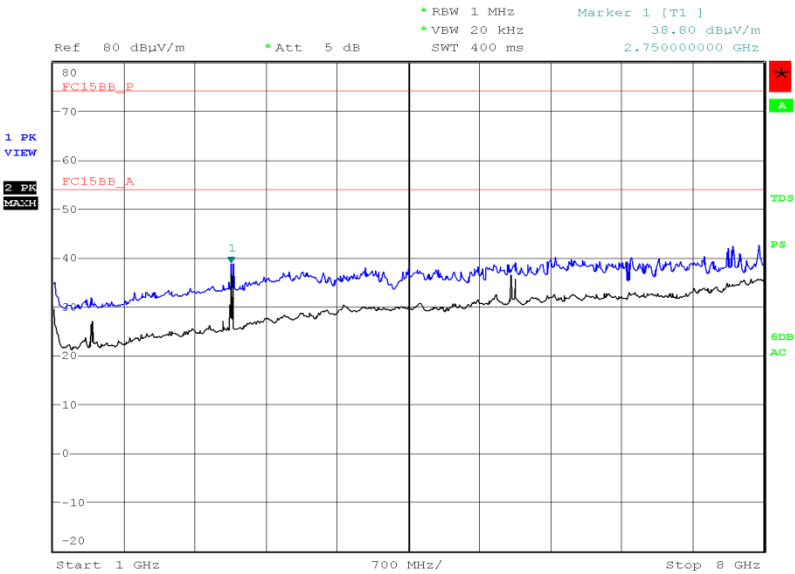
Product Service

Idle, 1 GHz to 13 GHz

| Frequency (MHz) | Average Level (dBμV/m) | Peak Level (dBμV/m) | Average Level (μV/m) | Peak Level (μV/m) | Angle (deg) | Height (m) | Polarisation |
|-----------------|------------------------|---------------------|----------------------|-------------------|-------------|------------|--------------|
| *               |                        |                     |                      |                   |             |            |              |

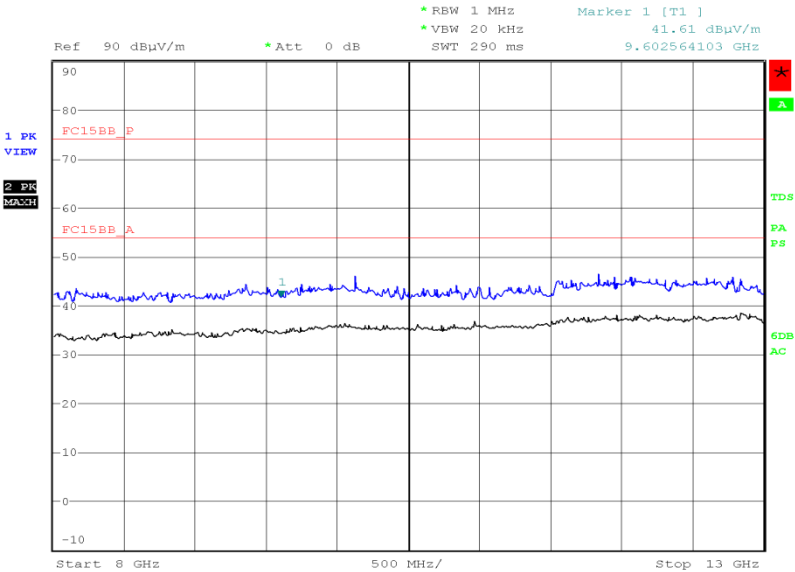
\*No emissions were detected within 10 dB of the limit.

Idle, 1 GHz to 8 GHz



Date: 19.FEB.2015 23:38:59

Idle, 8 GHz to 13 GHz



Date: 19.FEB.2015 23:24:33



Product Service

FCC 47 CFR Part 15, Limit Clause 15.109Class B

| Frequency of Emission (MHz) | Field Strength ( $\mu\text{V/m}$ ) |
|-----------------------------|------------------------------------|
| 30 to 88                    | 100                                |
| 88 to 216                   | 150                                |
| 216 to 960                  | 200                                |
| Above 960                   | 500                                |



Product Service

### **SECTION 3**

#### **TEST EQUIPMENT USED**



### 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 |
|------------------------------------------|---------------------|------------|--------|-----------------------------|-----------------|
| <b>Section 2.1 - Radiated Emissions</b>  |                     |            |        |                             |                 |
| Antenna (Double Ridge Guide, 1GHz-18GHz) | EMCO                | 3115       | 234    | 12                          | 2-May-2015      |
| Dual Power Supply Unit                   | Thurlby             | PL320      | 288    | -                           | TU              |
| Pre-Amplifier                            | Phase One           | PS04-0086  | 1533   | 12                          | 23-Dec-2015     |
| Turntable Controller                     | Inn-Co GmbH         | CO 1000    | 1606   | -                           | TU              |
| Antenna (Bilog)                          | Chase               | CBL6143    | 2904   | 24                          | 10-Jun-2015     |
| EMI Test Receiver                        | Rohde & Schwarz     | ESU40      | 3506   | 12                          | 27-Oct-2015     |
| Tilt Antenna Mast                        | maturo GmbH         | TAM 4.0-P  | 3916   | -                           | TU              |
| Mast Controller                          | maturo GmbH         | NCD        | 3917   | -                           | TU              |
| 1GHz to 8GHz Low Noise Amplifier         | Wright Technologies | APS04-0085 | 4365   | 12                          | 1-Oct-2015      |

TU – Traceability Unscheduled



Product Service

### 3.2 MEASUREMENT UNCERTAINTY

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

|                    |                                                                |
|--------------------|----------------------------------------------------------------|
| Test Discipline    | MU                                                             |
| Radiated Emissions | 30 MHz to 1 GHz: $\pm 5.1$ dB<br>1 GHz to 40 GHz: $\pm 6.3$ dB |



Product Service

## **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).

This report must not be reproduced, except in its entirety, without the written permission of  
TÜV SÜD Product Service

© 2015 TÜV SÜD Product Service