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Report On

FCC Testing of the
Crane Electronics Ltd Wrenchstar Multi
In accordance with FCC 47 CFR Part 15B

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA6WSM01

Document 75931034 Report 04 Issue 2 December 2015

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REPORT ON

FCC Testing of the
Crane Electronics Ltd Wrenchstar Multi
In accordance with FCC 47 CFR Part 15B

Document 75931034 Report 04 Issue 2

December 2015

PREPARED FOR

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Authorised Signatory

DATED 18 December 2015

This report has been up-issued to Issue 2 to amend the FCC ID.

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);

G Lawler

UKAS TESTING 0141

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SECTION 1

REPORT SUMMARY

FCC Testing of the
Crane Electronics Ltd Wrenchstar Multi
In accordance with FCC 47 CFR Part 15B

1.1 INTRODUCTION

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

Objective	To perform 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)	WrenchStar Multi
Serial Number(s)	Not Serialised (75931034_TSR0001)
Number of Samples Tested	1
Test Specification/Issue/Date	FCC 47 CFR Part 15B (2014)
Incoming Release Date	Declaration of Build Status 09 July 2015
Disposal Reference Number Date	Held Pending Disposal Not Applicable Not Applicable
Order Number Date	046910 25 June 2015
Start of Test	11 August 2015
Finish of Test	12 August 2015
Name of Engineer(s)	G Lawler
Related Document(s)	ANSI C63.4 (2014)

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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	Specification Clause	Test Description	Result	Comments/Base Standard
Idle				
2.1	15.109	Radiated Emissions	Pass	

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1.3 DECLARATION OF BUILD STATUS

MAIN EUT			
MANUFACTURING DESCRIPTION	Digital Torque Wrench		
MANUFACTURER	Crane Electronics Ltd		
TYPE	Wrenchstar Multi		
PART NUMBER	WS1KX-XXXX-C2DARX		
SERIAL NUMBER	Not supplied		
HARDWARE VERSION	101471 iss.B 101471 + 101473 iss.A		
SOFTWARE VERSION	Test version supplied		
TRANSMITTER OPERATING RANGE	2400 MHz – 2480MHz		
RECEIVER OPERATING RANGE	2400 MHz – 2480MHz		
INTERMEDIATE FREQUENCIES	none		
EMISSION DESIGNATOR(S): (i.e. G1D, GXW)	1M00F1D		
MODULATION TYPES: (i.e. GMSK, QPSK)	GFSK		
HIGHEST INTERNALLY GENERATED FREQUENCY	16MHz		
HIGHEST INTERNALLY GENERATED FREQUENCY IN RECEIVE IDLE MODE	16MHz		
OUTPUT POWER (W or dBm)	0.001W		
TECHNICAL DESCRIPTION (a brief description of the intended use and operation)	The Wrenchstar multi takes torque and angle signals and transmits them to a datacollector via RF.		
If unit is SRD being tested to ETS 301 489-3 please state Class of Equipment as defined in Section 6.1	3		
BATTERY/POWER SUPPLY			
MANUFACTURING DESCRIPTION	Li-Ion battery		
MANUFACTURER	Varta		
TYPE	Li-Ion		
PART NUMBER	1/LIC 18650-22 L		
VOLTAGE	3.7		
SERIAL NUMBER	N/A		
ANCILLARIES (if applicable)			
MANUFACTURING DESCRIPTION	Torque Module	Laptop Pc	
MANUFACTURER	Crane Electronics Ltd.		
TYPE	Torque Module		
PART NUMBER	IQVT1-0001-CRXXRX		
SERIAL NUMBER	94509		

Signature MBuk

Date 9/7/15

D of B S Serial No

Note: This document has been prepared to enable manufacturers with no mechanism for producing their own Declaration of Build Status, to declare the build state of the equipment submitted for test.

No responsibility will be accepted by TÜV SÜD Product Service as to the accuracy of the information declared in this document by the manufacturer.

1.4 PRODUCT INFORMATION

1.4.1 Technical Description

The Equipment Under Test (EUT) was a Crane Electronics Ltd Wrenchstar Multi. 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 DC integral battery supply.

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.

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SECTION 2

TEST DETAILS

FCC Testing of the
Crane Electronics Ltd Wrenchstar Multi
In accordance with FCC 47 CFR Part 15B

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

WrenchStar Multi S/N: Not Serialised (75931034_TSR0001) - Modification State 0

2.1.3 Date of Test

11 August 2015 & 12 August 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	18.7 - 21.1°C
Relative Humidity	40.0 - 69.0%

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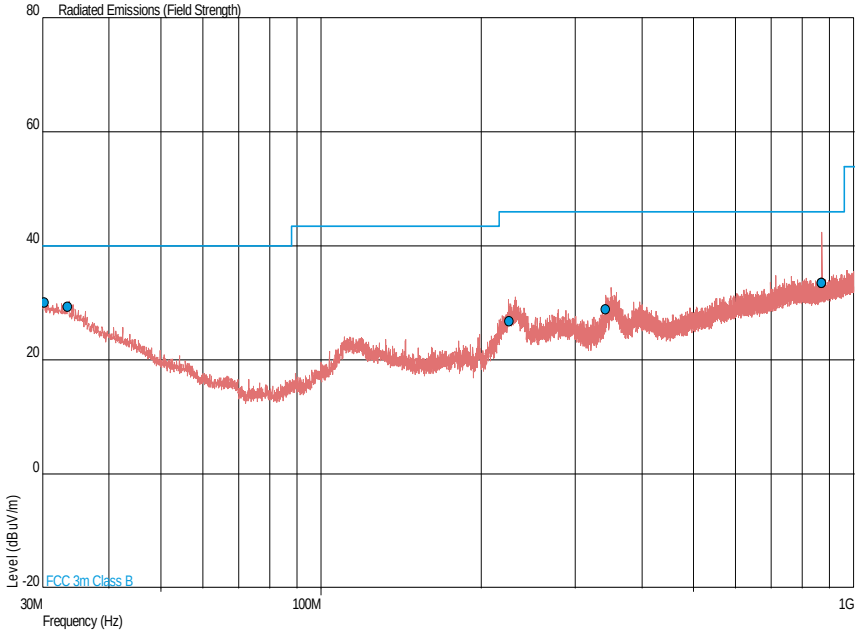
2.1.7 Test Results

Idle, 30 MHz to 1 GHz Results

Frequency (MHz)	Quasi-Peak Level (dBµV/m)	Quasi-Peak Level (µV/m)	Quasi-Peak Margin (dµV/m)	Quasi-Peak Margin (µV/m)	Angle (°)	Height (m)	Polarisation
30.288	30.0	31.6	-10.0	-68.4	225	1.00	Horizontal
33.489	29.3	29.2	-10.7	-70.8	266	1.00	Horizontal
225.255	26.7	21.6	-19.3	-178.4	1	1.02	Horizontal
341.959	28.9	27.9	-17.1	-172.1	8	1.00	Horizontal
869.295	33.5	47.3	-12.5	-152.7	233	1.00	Vertical
869.495	33.5	47.3	-12.5	-152.7	59	1.23	Horizontal

Idle, 30 MHz to 1 GHz Plot

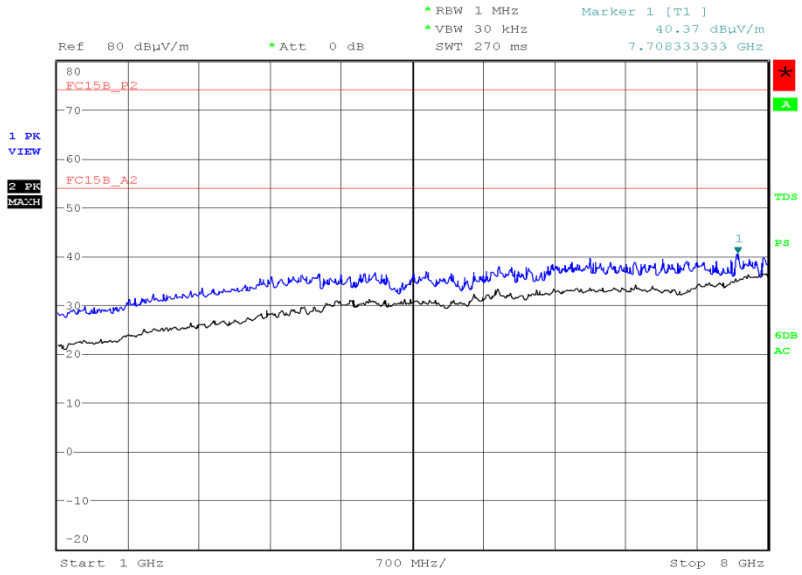


Idle, 1 GHz to 13 GHz Results

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

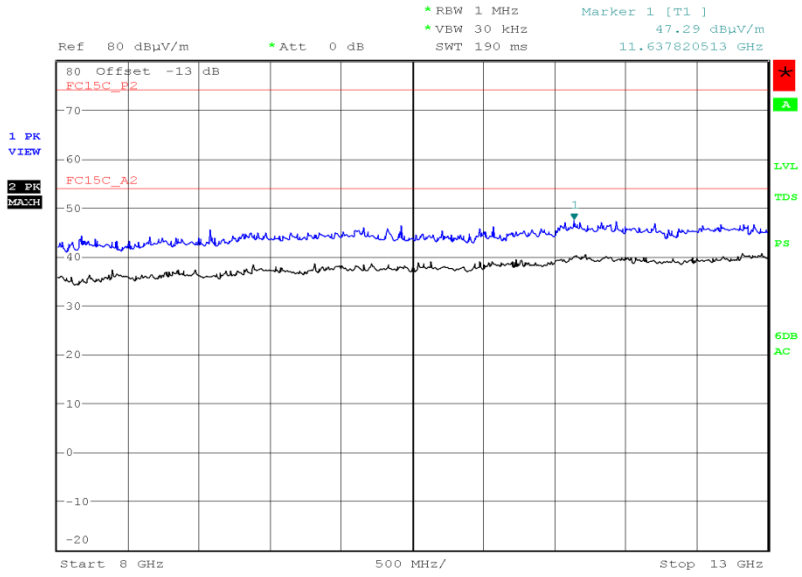
*No emissions were detected within 10 dB of the limit.

Idle, 1 GHz to 8 GHz Plot



Date: 11.AUG.2015 20:53:14

Idle, 8 GHz to 13 GHz Plot



Date: 12.AUG.2015 21:04:12

FCC 47 CFR Part 15, Limit Clause 15.109

Class B

Frequency of Emission (MHz)	Field Strength (µV/m)
30 to 88	100
88 to 216	150
216 to 960	200
Above 960	500

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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 - Radiated Emissions					
Antenna (Double Ridge Guide, 1GHz-18GHz)	EMCO	3115	234	12	29-Apr-2016
Antenna (Bilog)	Schaffner	CBL6143	287	24	3-Feb-2016
Screened Room (5)	Rainford	Rainford	1545	0	20-Dec-2017
Turntable Controller	Inn-Co GmbH	CO 1000	1606	-	TU
Amplifier (8 - 18GHz)	Phase One	PS06-0061	3176	12	11-Aug-2016
EMI Test Receiver	Rohde & Schwarz	ESU40	3506	12	27-Oct-2015
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
1 Metre SMA Cable	Rhophase	3PS-1801A-1000-3PS	4100	12	9-Jun-2016
1GHz to 8GHz Low Noise Amplifier	Wright Technologies	APS04-0085	4365	12	1-Oct-2015
Hygropalm Temperature and Humidity Meter	Rotronic	HP21	4410	12	15-Apr-2016
2m K-Type Cable (Rx)	Scott Cables	KPS-1501-2000-KPS	4527	-	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	30 MHz to 1 GHz: ± 5.1 dB 1 GHz to 40 GHz: ± 6.3 dB

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).