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Report On

FCC Testing of the
Crane Electronics Ltd
Torque Module

COMMERCIAL-IN-CONFIDENCE

FCC ID: TA6IQVT1

Document 75925573 Report 07 Issue 3

December 2014



Product Service

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PREPARED FOR

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DATED

09 December 2014

Note: Report Up-issued to show 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 CFR 47 Part 15B. The sample tested was found to comply with the requirements defined in the applied rules.

Test Engineer(s);


Tom Genders



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SECTION 1

REPORT SUMMARY

FCC Testing of the
Crane Electronics Ltd
Torque Module

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Crane Electronics Ltd, Torque Module to the requirements of FCC CFR 47 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)	Not Applicable
Serial Number(s)	93270
Software Version	Not Applicable
Hardware Version	101-452 issue B
Number of Samples Tested	1
Test Specification/Issue/Date	FCC CFR 47 Part 15B: 2012
Test Plan/Issue/Date	Not Applicable
Incoming Release Date	Declaration of Build Status 12 March 2014
Disposal Reference Number	Held Pending Disposal
Date	Not Applicable
Order Number	Not Applicable
Date	Not Applicable
Start of Test	044237 30 January 2014
Finish of Test	26 February 2014
Name of Engineer(s)	T Genders
Related Document(s)	ANSI C63.4: 2009



1.2 BRIEF SUMMARY OF RESULTS

A brief summary of results in accordance with FCC CFR 47 Part 15B is shown below.

Configuration 1 - 2.4GHz SRD						
Section	Spec Clause	Test Description	Mode	Mod State	Result	Base Standard
	15.107	Conducted Emissions (AC Power Port)	Idle		N/A	ANSI 63.4
2.1	15.109	Radiated Emissions (Enclosure Port)	Idle	0	Pass	ANSI 63.4

N/A – Not Applicable; N/R – Not Requested; N/T – Not Tested

1.3 DECLARATION OF BUILD STATUS

Manufacturer _____ Crane Electronics Ltd. _____

Country of Origin _____ UK _____

UK Agent _____ N/A _____

Description _____ Torque Module _____

Model Number _____ N/A _____

Declared Variants _____ No Variants _____

Part Number _____ IQVT1-0001-CRXxRX _____

Serial Number _____ 93270 _____

Drawing Number _____ N/A _____

Build Status _____ Iss.B _____

Software Issue _____ N/A _____

Firmware Issue _____ N/A _____

Highest Frequency _____ 16MHz _____
(Generated or used within EUT [FCC testing only])Signature _____
Representatives of _____
Customer _____ Neil McDonald _____

Date _____ 12th March 2014 _____

BSD Serial Number _____

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, Torque Module as shown in the photograph below. A full technical description can be found in the manufacturer's documentation.



Equipment Under Test

1.4.2 Test Configuration

Idle mode was set up with the transmitter disabled. The spectrum analyser was used to ensure there was not an unintended transmission. The EUT was also connected to a torque meter and displayed data received via the signal cable.

Configuration 1: 2.4GHz SRD

The EUT was configured in accordance with FCC CFR 47 Part 15B.

1.4.3 EUT Cable / Port Identification

Port	Max Cable Length specified	Usage	Type	Screened
Signal	0.5m	External Floppy Disk	Multicore	Yes
Signal	5.0m	Network	Cat 5	No
Earth	1.0m	Earth	Braid	No

1.4.4 Modes of Operation

Modes of operation of each EUT during testing were as follows:

Mode 1 - Idle

Information on the specific test modes utilised are detailed in the test procedure for each individual test.

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, test laboratories or an open test area as appropriate.

The EUT was powered from a Battery supply.

FCC Measurement Facility Registration Number
667968 Bearley, Test Laboratory

1.6 DEVIATIONS FROM THE STANDARD

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

1.7 MODIFICATION RECORD

No modifications were made to the EUT during testing.

SECTION 2

TEST DETAILS

FCC Testing of the
Crane Electronics Ltd
Torque Module

2.1 RADIATED EMISSIONS (ENCLOSURE PORT)

2.1.1 Specification Reference

FCC CFR 47 Part 15B

2.1.2 Equipment Under Test

Torque Module, S/N: 93270

2.1.3 Date of Test and Modification State

26 February 2014 - Modification State 0

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 Method and Operating Modes

The test was applied in accordance with the test method requirements of ANSI 63.4.

The test was performed with the EUT in the following configurations and modes of operation:

Configuration 1 - Mode 1

2.1.6 Environmental Conditions

26 February 2014

Ambient Temperature 17.4 to 19.5°C

Relative Humidity 40 to 44%

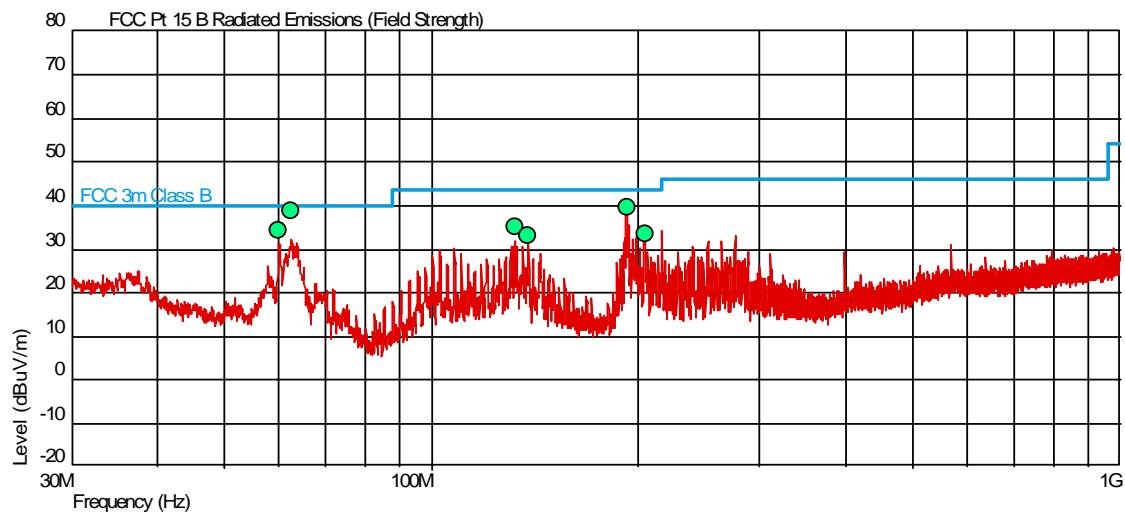
Atmospheric Pressure 1010mbar

2.1.7 Test Results

For the period of test the EUT met the requirements of FCC CFR 47 Part 15B for Radiated Emissions (Enclosure Port).

The test results are shown below.

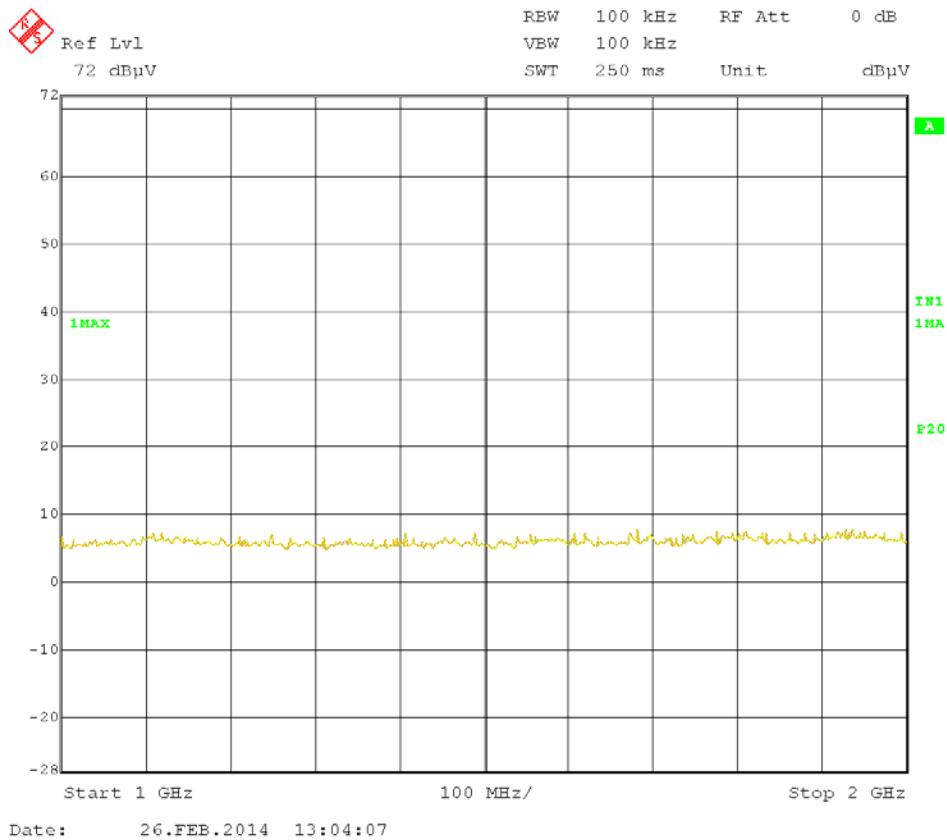
Configuration 1 - Mode 1



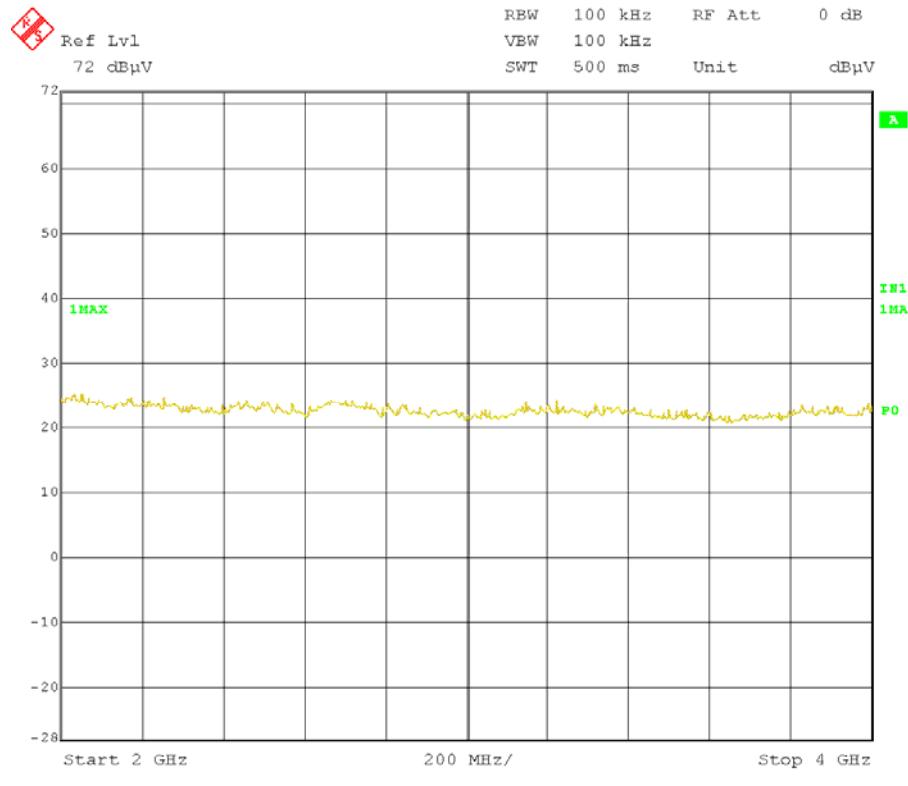
Frequency (MHz)	QP Level (dBuV)	QP Limit (dBuV)	QP Margin (dBuV)	Angle(Deg)	Height(m)	Polarity
60.052	34.2	40.0	-5.8	270.00	3.50	Vertical
62.701	38.8	40.0	-1.2	210.00	3.00	Horizontal
132.015	34.9	43.5	-8.6	140.00	2.00	Horizontal
137.739	33.0	43.5	-10.5	150.00	2.60	Horizontal
192.002	39.7	43.5	-3.8	300.00	1.00	Horizontal
204.003	33.5	43.5	-10.0	150.00	1.00	Horizontal

Table of results 1GHz - 12.5GHz

No table of results available as no emissions found within 10dB of the limit.

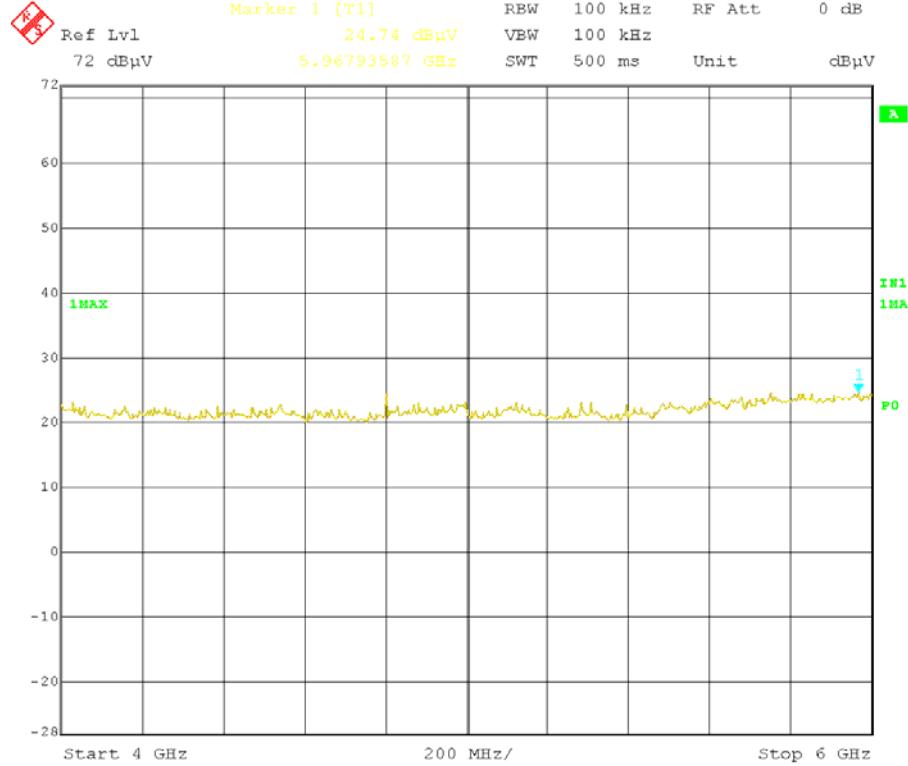
1 – 2 GHz

2 – 4 GHz

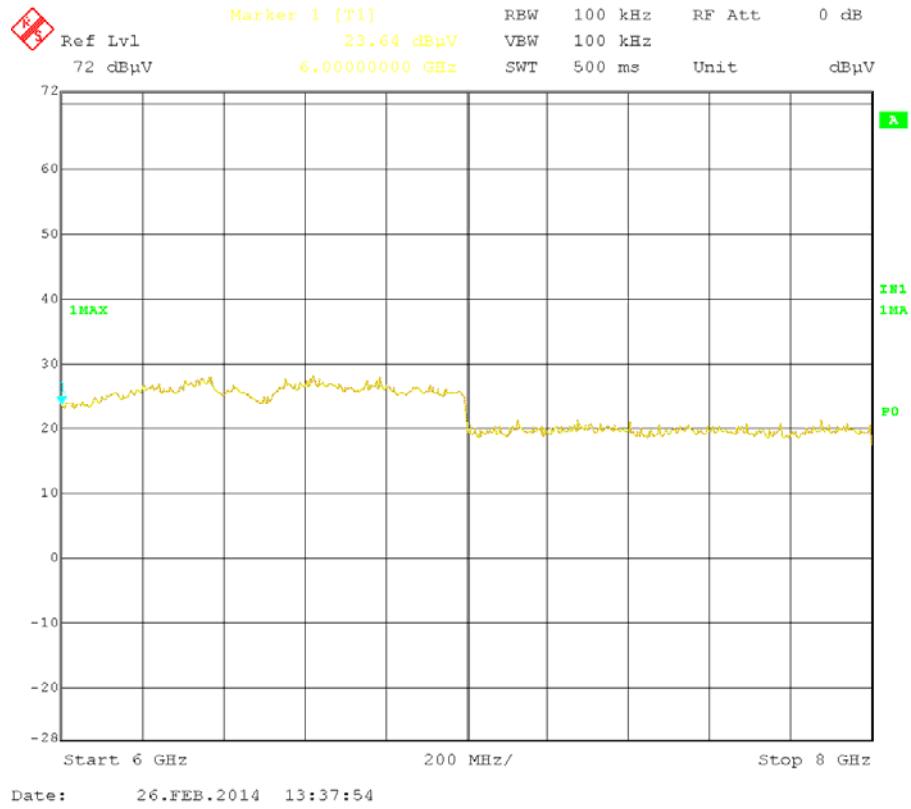
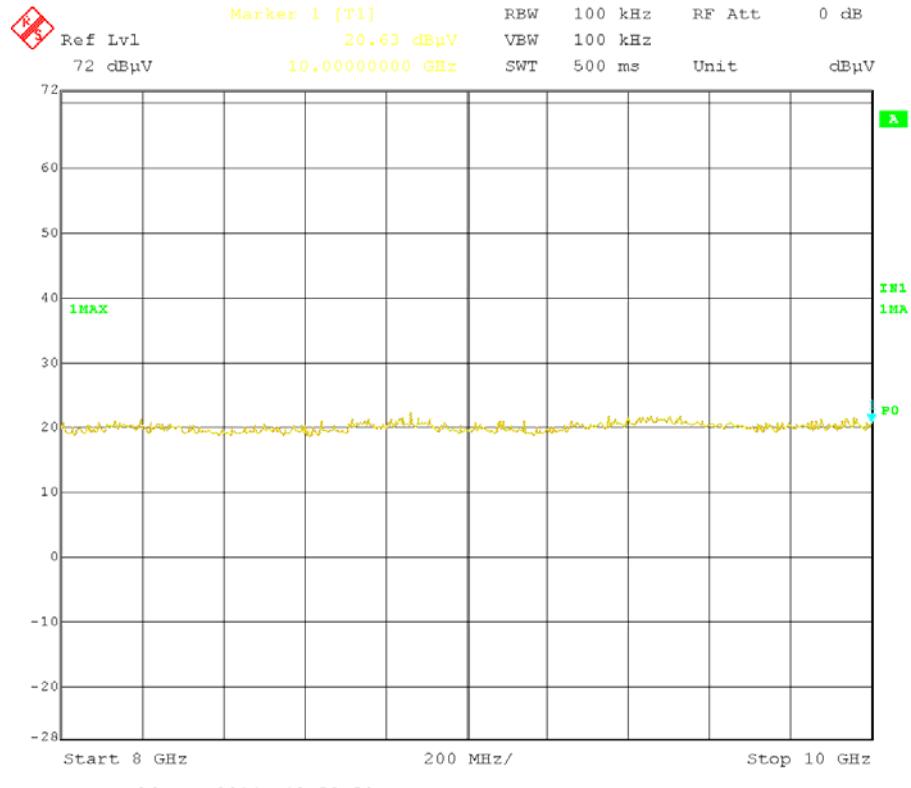


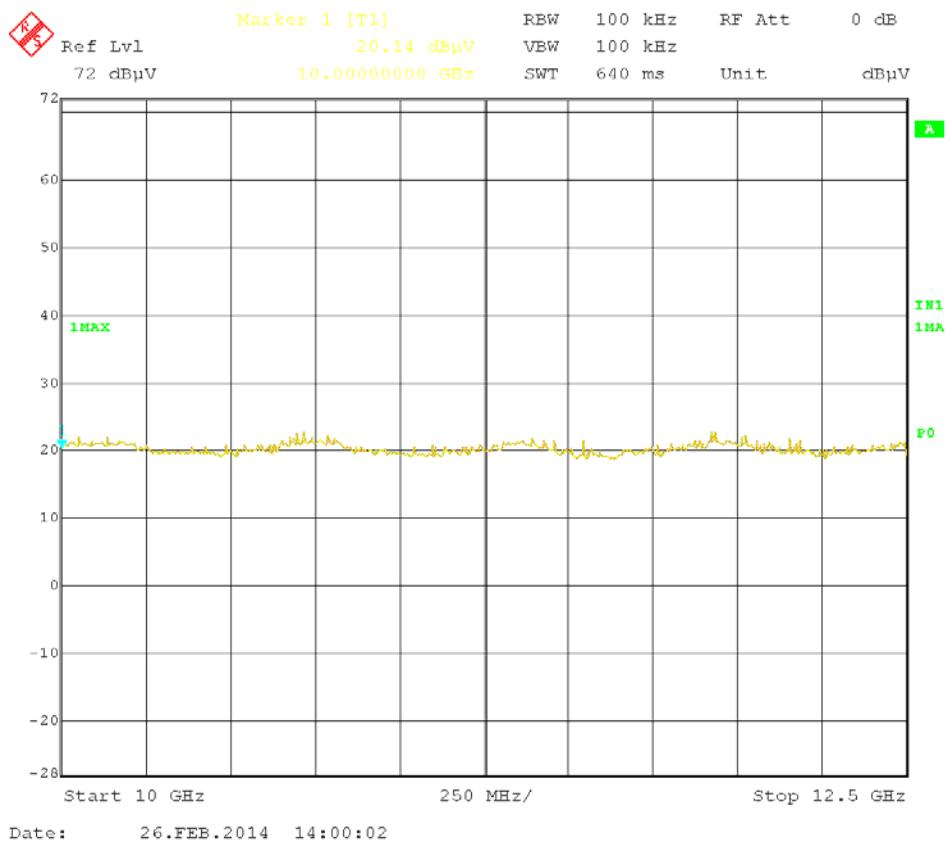
Date: 26.FEB.2014 13:20:03

4 – 6 GHz



Date: 26.FEB.2014 13:28:36

6 – 8 GHz8 – 10 GHz

10 – 12.5 GHz

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
Section 2.1 EMC - Radiated Emissions					
Turntable Controller	Various	RH253	1708	-	TU
Antenna (Double Ridge Guide)	EMCO	3115	1711	12	13-Dec-2014
Bilog Antenna	Schaffner	CBL6143	1858	24	05-Sep-2014
EMI Test Receiver	Rohde & Schwarz	ESIB26	3763	12	22-Mar-2014

TU – Traceability Unscheduled

OP MON – Output Monitored with Calibrated Equipment

3.2 MEASUREMENT UNCERTAINTY

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

Test Discipline	Frequency / Parameter	MU
Radiated Emissions, Bilog Antenna, AOATS	30MHz to 1GHz Amplitude	5.2dB*
Radiated Emissions, Horn Antenna, AOATS	1GHz to 40GHz Amplitude	6.3dB*
Conducted Emissions, LISN	150kHz to 30MHz Amplitude	3.2dB*
Conducted Emissions, ISN	150kHz to 30MHz Amplitude	2.1dB
Substitution Antenna, Radiated Field	30MHz to 18GHz Amplitude	2.6dB
Discontinuous Interference	150kHz to 30MHz Amplitude	3.0dB*
Interference Power	30MHz to 300MHz Amplitude	3.0dB*
Radiated E-Field Susceptibility	10MHz to 6GHz Test Amplitude	2.0dB†
Conducted Susceptibility RF	50kHz to 1000MHz Amplitude	3.1dB•
	EM Clamp Method of Test	1.2dB•
	CDN Method of Test	1.1dB•
	BCI Clamp Method of Test	1.2dB•
	Direct Injection Method of Test	
Conducted Susceptibility LF	DC to 150kHz	1.0%†
Power Frequency Magnetic Field	50Hz/60Hz Amplitude	0.45%
Magnetic Emissions	9kHz to 30MHz Amplitude	3.4dB*
Magnetic Field/Flux iaw EN 50366	10Hz to 400kHz	2.64%
Harmonics and Flicker	The test was applied using proprietary equipment that meets the requirements of EN 61000-3-2 and EN 61000-3-3	—
Mains Voltage Variations and Interrupts	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-11	—
Fast Transient Burst	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-4	—
Electrostatic Discharge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-2	—
Surge	The test was applied using proprietary equipment that meets the requirements of EN 61000-4-5	—
Vehicle Transients	The test was applied using proprietary equipment that meets the requirements of ISO 7637-1 and 2	—
Compass Safe Distance	Azimuth Accuracy	0.10°

Worst case error for both Time and Frequency measurement 12 parts in 10^6 .

* In accordance with CISPR 16-4-2

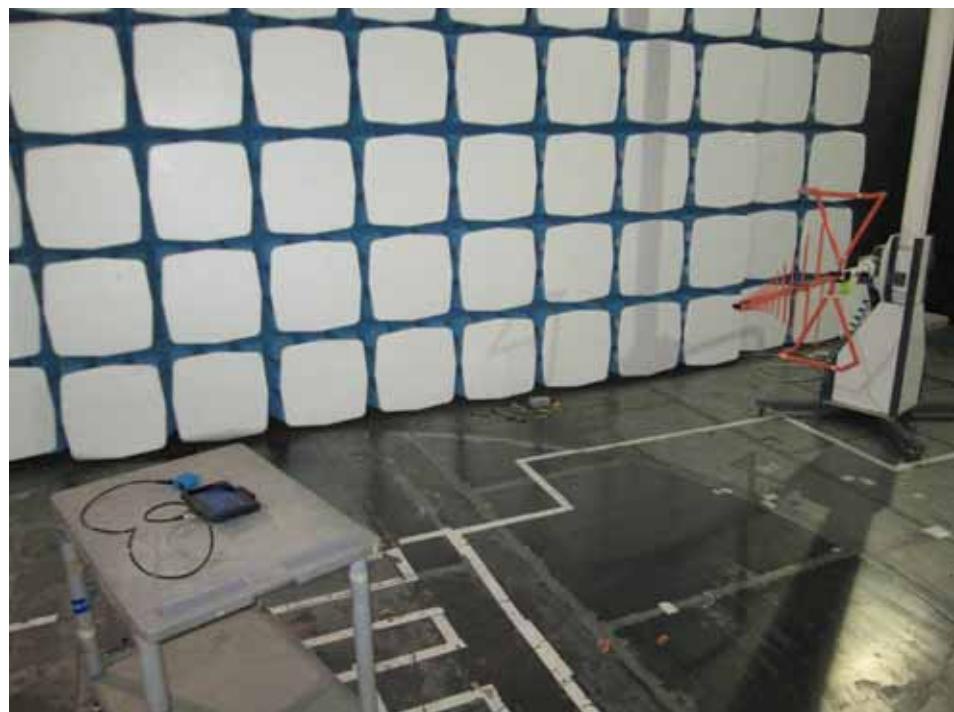
† In accordance with UKAS Lab 34

• In accordance with EN 61000-4-6: 2009

SECTION 4

PHOTOGRAPHS

4.1 TEST SET UP PHOTOGRAPHS



Radiated Emissions (Enclosure Port)

SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 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).

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