



HURSLEY  
**EMC**  
SERVICES

# EMC TEST REPORT

**No. 10R176A FR**

Issue#1: 19<sup>th</sup> April 2010

UKAS Accredited  
EU Notified Body  
FCC & VCCI Registered  
BSMI Lab ID: SL2-IN-E-3008

## FCC Part 15C Certification Report

for the

**Shearwell Data Ltd**  
**SDL 130 Race Reader**

Project Engineer: R. P. St John James

  
Approval Signatory

Approved signatories: S. M. Connolly ☐ I. P. Kenney ☐ J. A. Jones ☒ I. Kyle ☐

*The above named are authorised Hursley EMC Services engineers.*

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## 1.0 DECLARATION

### 1.1 FCC Part 15C and Industry Canada Statement

The Equipment Under Test (EUT), as described and reported within this document, complies with the parts 15.207 and 15.209 of the CFR 47:2009 FCC rules in accordance with ANSI C63.4:2003. The EUT operates at a transmit frequency of 134.2 kHz and complies with part 15C emission requirements. The EUT also complies with Industry Canada RSS-210 Issue 7.

Note: The EUT also contains a blue tooth module that was inactive during the test. The module is an FCC certified module and is not included within the scope of this report.

### 1.2 Related Submittal(s) Grants

The Blue tooth module carries the FCC ID: P1401B

### 1.3 EUT Manufacturer

Trade name:	Shearwell
Company name:	Shearwell Data Ltd
Company address:	Putham Farm Wheddon Cross Minehead Somerset TA24 7AS UK
Manufacturing address:	As above.
Company representative:	Mr Mark Tereszczak Tel: +44 (0) 1643 841611

## 2.0 EUT DESCRIPTION

### 2.1 Identity

EUT:	SDL 130 Race Reader & Static Antenna
Model:	SDL 130
Serial number:	060130007
Sample build:	Production

### 2.2 Product Operation

The SDL130 Intelligent Reader has been designed for reading microchips that are housed in ear tags, boluses or implants of livestock. Typically the antenna is placed over a parallel set of fences called a “race” and as the animal passes under it the Tag is energised and read.

### 2.3 Support Equipment

None.

### 2.4 Exerciser Program

The EUT was powered on and once on it continually transmitted.

### 3.0 MEASUREMENT PROCEDURE AND INSTRUMENTATION

#### 3.1 EMI Site Address & Test Date

EMI Company Offices	Hursley EMC Services Ltd Unit 16, Brickfield Lane, Chandlers Ford, Hampshire
EMI Measurement Site	Hursley EMC Services Ltd Hursley Park, Winchester; FCC Registered UK Designation number: UK0006
Test Dates	9 <sup>th</sup> and 12 <sup>th</sup> April 2010
HEMCS References:	10R176

#### 3.2 General Operating Conditions

Testing was performed according to the procedures in ANSI C63.4:2003. Final radiated testing was performed at a EUT to antenna distance of three metres (above 30 MHz).

Below 30 MHz the EUT was measured at an antenna distance of five and ten metres and the extrapolation factor calculated.

Instrumentation, including receiver and spectrum analyser bandwidth, comply with the requirements of ANSI C63.2:1996.

#### 3.3 Environmental Ambient

Test Type	Temperature	Humidity	Atmospheric Pressure
Radiated	20 to 21 degrees Celsius	34 to 35% relative	1012 to 1032 millibars

### 3.4 Radiated Emissions

#### Initial Scan

A radiated profile scan was taken at a three metre distance on eight azimuths of the system under test in both vertical and horizontal polarities of the antenna in a semi-anechoic chamber. Instrumentation used in the chamber as below:

#ID	CP	Manufacturer	Type	Serial No	Description	Calibration due date
006	1	HP	8568B	2841A04350	Spectrum analyser	08/01/2011
009	1	HP	8447D	1937A01808	Pre-amplifier (30-1000MHz)	15/07/2010
013	0	Schaffner	CBL6140A	1235	Antenna X-wing (20-2000MHz)	*12/12/2009
070	1	HP+short cable	8449B	3008A00481	Pre-amplifier (1.0-26.5GHz) + 0.5m cable	06/11/2010
071	1	Q-par Angus	WBH218HN	2895	Horn antenna (2-18GHz)	03/11/2010
099	1	HP	8596-EM	3911A00146	Spectrum analyser (9kHz-12.8GHz)	20/01/2011
127	1	Schwarzbeck	BBHA9120B	391	Horn antenna (1-10GHz)	15/12/2010
215	1	Sucoflex	106		Cable SMA (18GHz)	18/05/2010

The data obtained from the profile scan was used as a guide for the final Open Area Test Site (OATS) measurements.

#### Final Measurements

The system under test was transferred to the OATS from the semi-anechoic chamber. The data obtained from the chamber profile-scan was used to guide the test engineer. Above 30 MHz, each emission from the transmitter was maximised by revolving the system on the turntable and moving the antennae in height and azimuth. Below 30 MHz the loop antenna was set at a height of 1m, the EUT was measured with the antenna in the vertical and horizontal polarity and each emission was maximised by revolving the system on the turntable. The worst-case data is presented in this report. Test instrumentation used in the OAT's measurements was as follows:

#ID	CP	Manufacturer	Type	Serial No	Description	Calibration due date
092	1.5	Schwarzbeck	VULB 9163	232 (grey)	Trilog antenna (30-3000MHz)	03/02/2011
139	1	Rohde Schwarz	ESVP	861736/021	Test receiver (30-1300MHz)	12/06/2010
176	1	Rohde Schwarz	ESS	831852/003	EMI test receiver (5Hz-1GHz)	14/09/2010
242	0	Rohde Schwarz	HFH2-Z2	879.9545455	Loop antenna (9kHz-30MHz)	10/06/2009

CP = Interval period [year] prescribed for external calibrations

**Note:** 'Calibration due date' means that the instrument is certified with a UKAS or traceable calibration certificate.  
 '\*\*' denotes that the calibration, as defined by Hursley EMC Services quality system, remains valid whilst within four calendar months of the due date.

### 3.5 Conducted Emissions

#### Test Configuration

A filtered 115V/60Hz supply was fed to the system under test, via a 50 $\Omega$ /50 $\mu$ H Line Impedance Stabilisation Network (LISN). The LISN was directly bonded to a conductive ground plane.

#### Test Measurement

The worst-case emissions were identified on both the neutral and phase(s) with a spectrum analyser set to scan from 0.15 MHz to 30 MHz.

The worst-case peaks were then identified and measured using an RF receiver using a quasi-peak detector and compared to the frequency range and limits of CISPR 22 as specified by ANSI C63.4-2003. Quasi-peak values that exceeded the average limit were then re-measured using the average signal detector.

The worst-case results are presented in this report.

Test instrumentation used in the conducted test was as follows:

#ID	CP	Manufacturer	Type	Serial No	Description	Calibration due date
004	1	Rohde Schwarz	ESH-3	893607/002	Test receiver (9kHz-30MHz)	*18/02/2010
006	1	HP	8568B	2841A04350	Spectrum analyser	08/01/2011
116	1	Rohde Schwarz	ESH-3 Z2	M458	Pulse limiter BNC type	22/07/2010
147	1	Rohde Schwarz	ESH3 Z5	846695/011	AMN - single phase	01/03/2011

**CP = Interval period [year] prescribed for external calibrations**

**Note:** 'Calibration due date' means that the instrument is certified with a UKAS or traceable calibration certificate.  
'\*' denotes that the calibration, as defined by Hursley EMC Services quality system, remains valid whilst within two calendar months of the due date.

## 4.0 TEST DATA

### 4.1 Power Line Conducted Emissions

#### 4.1.1 Data

A search was made of the frequency spectrum between 0.15 MHz to 30 MHz and the measurements reported here are the highest emissions relative to the CISPR 22 Class B limits. Emissions that meet the average limit on a quasi-peak measurement are deemed to meet both the average and quasi-peak specification.

#### MAINS – LINE

Frequency (MHz)	Quasi-peak value (dB $\mu$ V)		Average value (dB $\mu$ V)		Status
	Measured	Limit	Measured	Limit	
0.337	50.8	59.2	8.4	49.2	Pass
10.874	42.1	60.0	39.1	50.0	Pass
11.678	43.4	60.0	40.8	50.0	Pass

#### MAINS – NEUTRAL

Frequency (MHz)	Quasi-peak value (dB $\mu$ V)		Average value (dB $\mu$ V)		Status
	Measured	Limit	Measured	Limit	
0.338	50.8	59.2	8.4	49.2	Pass
12.216	41.8	60.0	39.3	50.0	Pass
14.362	43.7	60.0	41.6	50.0	Pass

Uncertainty of measurement:  $\pm 3.22$ dB $\mu$ V for a 95% confidence level.

Measurements made according to the FCC rules and Hursley EMC Services test procedure CON-02.

TEST ENGINEER: Rob St John James

## 4.2 FCC – Radiated Emissions (Transmitting)

A search was made of the frequency spectrum from 9 kHz to 12.8 GHz and the measurements reported are the highest emissions relative to the 'FCC CFR 47 Section 15.209 Limits' at a measuring distance of three metres. Below 30 MHz the results have been extrapolated from measurements made at a distance of five and ten metres to the limit distance set at 300m or 30m.

To calculate the extrapolation factor (see FCC Part 15.31) measurements were made at three metres and six metres from the EUT. The extrapolation factor (x) was then calculated as follows:

$$x = \frac{E_1 - E_2}{20 \log(d_2 / d_1)}$$

Where (E) is the receiver reading at the distance (d) from the EUT. The extrapolation factor (x) is then used to calculate the extrapolated result at the limit distance.

Between 110 and 490 kHz measurements were made using an average detector with a 200 Hz bandwidth.

### RESULTS - 9 kHz to 490 kHz

	Measured amplitude (E <sub>1</sub> )	Measured amplitude (E <sub>2</sub> )	Extrapolation	Calculated amplitude @ 300m		Specified limit @ 300m	
MHz	dBµV/m @ 5m (d <sub>1</sub> )	dBµV/m @ 10m (d <sub>2</sub> )	Factor (x)	dBµV/m	µV/m	dBµV/m	µV/m
0.1342	97.5	82.3	2.53	7.53	2.38	25.1	17.9
0.2694	27.0	17.2	1.63	-31.0	0.028	19.0	8.9
0.4036	38.4	23.9	2.42	-47.7	0.004	15.4	5.9

### RESULTS – 490 kHz to 30 MHz

	Measured amplitude (E <sub>1</sub> )	Measured amplitude (E <sub>2</sub> )	Extrapolation	Calculated amplitude @ 30m		Specified limit @ 30m	
MHz	dBµV/m @ 5m (d <sub>1</sub> )	dBµV/m @ 10m (d <sub>2</sub> )	Factor (x)	dBµV/m	µV/m	dBµV/m	µV/m
0.5369	38.2	20.7	2.92	-7.2	0.44	33.0	44.7
0.6731	39.9	26.3	2.30	-4.1	0.63	31.0	35.8
0.8056	40.3	26.2	2.35	3.7	1.53	29.5	29.8
1.7465	47.2	33.3	2.32	11.1	8.6	29.5	30.0

For example:

The limit at 134.2 kHz is calculated from FCC 15.209 as  $\frac{2400}{134.2} = 17.9 \mu\text{V/m}$ .

The extrapolation factor is calculated as  $\frac{97.5 - 82.3}{20 \log(10/5)} = 2.53$

The calculated amplitude is  $44.8 - (20 \times 2.4 \times \log(300 / 3)) = 51.2 \text{ dB}\mu\text{V/m}$

**Radiated emissions (continued)****RESULTS - 30 MHz to 1000 MHz**

Frequency MHz	Receiver amplitude dB $\mu$ V	Antenna factor dB	Cable loss dB	Actual quasi-peak value @ 3m	Specified limit @ 3m	
				dB $\mu$ V/m	dB $\mu$ V/m	$\mu$ V/m
30.18	11.0	10.8	0.6	22.4	40.0	100
31.96	13.7	11.0	0.6	25.3	40.0	100
32.97	12.1	11.1	0.6	23.8	40.0	100
58.70	12.4	12.7	0.7	25.8	40.0	100
77.57	12.2	7.2	0.8	20.2	40.0	100
82.50	7.9	7.4	0.8	16.1	40.0	100
116.77	7.7	9.8	1.0	18.5	43.5	150
136.17	8.5	8.4	1.1	18.0	43.5	150

Note: Above 1.0 GHz no significant emissions were detected.

Procedure: In accordance with ANSI C63.4:2003

Measurements below 1.0 GHz performed with a quasi-peak detector. Measurements above 1.0 GHz performed with an average and peak detector.

TEST ENGINEERS: Rob St John James & Andy Jones

## 5.0 FCC DETAILS

### FEDERAL COMMUNICATIONS COMMISSION

Laboratory Division  
7435 Oakland Mills Road  
Columbia, MD 21046

February 13, 2006

Hursley EMC Services Ltd.  
Unit 16  
Brickfield Lane  
Chandlers Ford - Hampshire, SO53 4DB  
United Kingdom  
Attention: R P St John James

Re: Accreditation of Hursley EMC Services Ltd.  
Designation Number: UK0006

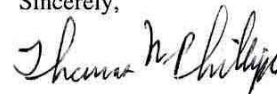
Dear Sir or Madam:

We have been notified by Department of Trade and Industry (DTI) that Hursley EMC Services Ltd. has been accredited as a Conformity Assessment Body (CAB).

At this time your organization is hereby designated to perform compliance testing on equipment subject to Declaration Of Conformity (DOC) and Certification under Parts 15 and 18 of the Commission's Rules.

This designation will expire upon expiration of the accreditation or notification of withdrawal of designation.

Sincerely,



Thomas Phillips  
Electronics Engineer