



HURSLEY  
**EMC**  
SERVICES

# EMC TEST REPORT

**No. 10R176B FR**

Issue#3: 17<sup>th</sup> December 2010

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

## FCC Part 15C & Industry Canada Certification Report

for the

**Shearwell Data Ltd**  
**Data Stick Reader**  
**SDL 400S**

Project Engineer: R. P. St John James

Approval Signatory

Approved signatories: S. M. Connolly ☐ J. A. Jones ☒

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

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### Document History

Issue#1: 19<sup>th</sup> April 2010 was withdrawn and replaced by Issue#2: Results corrected on page 8.

Issue#2: 2<sup>nd</sup> July 2010 was withdrawn and replaced by Issue#3: Occupied bandwidth details added.

## 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 400S Data Stick Reader
Model:	SDL 400S
Serial numbers:	060130007
Sample build:	Production

### **2.2 Product Operation**

The SDL 400S Reader has been designed for reading microchips that are housed in ear tags of livestock. To operate, the SDL 400S is held close to the tag (within 20cm) and the read button is then depressed.

### **2.3 Support Equipment**

None.

### **2.4 Exerciser Program**

The EUT was placed in a mode where once powered 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 & 15<sup>th</sup> December 2010\*

HEMCS References:      10R176

\*The EUT was with the customer between 12<sup>th</sup> April and 15<sup>th</sup> December 2010.

#### 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 EUT was measured in three orthogonal axes to determine which produced the highest emissions.

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
021	1	Rohde Schwarz	ESIB	100192	Test receiver (40GHz)	22/02/2011
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**

**The EUT is battery powered therefore the conducted emissions test does not apply.**

## 4.0 TEST DATA

### 4.1 FCC – Radiated Emissions (Transmitting)

A search was made of the frequency spectrum from 9 kHz to 26.5 GHz and the measurements reported are the highest emissions relative to the 'FCC CFR 47 Section 15.209 and 15.249 Limits' at a measuring distance of three metres. Below 30 MHz the results have been extrapolated from measurements made at a distance of three and six metres to the limit distance set at 300m.

Below 30 MHz the EUT was connected to the laptop via a 5m USB extension lead so that only the emission from the EUT was measured. Above 30 MHz the EUT was tested together with the laptop. 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 30 MHz

MHz	Measured amplitude (E <sub>1</sub> )	Measured amplitude (E <sub>2</sub> )	Extrapolation Factor (x)	Calculated amplitude @ 300m		Specified limit @ 300m	
	dBµV/m @ 3m (d <sub>1</sub> )	dBµV/m @ 6m (d <sub>2</sub> )		dBµV/m	µV/m	dBµV/m	µV/m
0.1342	73.0	56.3	2.77	-25.5	0.05	25.1	18

The limit at 134.2 kHz is calculated from FCC 15.209 as  $\frac{2400}{134.2} = 18 \mu\text{V/m}$ .

The extrapolation factor is calculated as  $\frac{73.0 - 56.3}{20 \log(10/5)} = 2.77$

The calculated amplitude is  $73.0 (20 \times 2.77 \times \log(300/5)) = -25.5 \text{ dB}\mu\text{V/m}$



**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
85.90	15.7	8.5	0.8	25.0	40.0	100
163.20	18.4	19.4	1.3	29.1	43.5	150
197.56	18.5	11.0	1.4	30.9	43.5	150
199.71	13.3	11.0	1.4	25.7	43.5	150
231.92	23.7	11.2	1.5	36.4	46.0	20.0
249.10	22.3	11.8	1.5	35.6	46.0	200
566.98	8.2	18.0	2.5	28.7	46.0	200

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.

## 4.1 Occupied Bandwidth

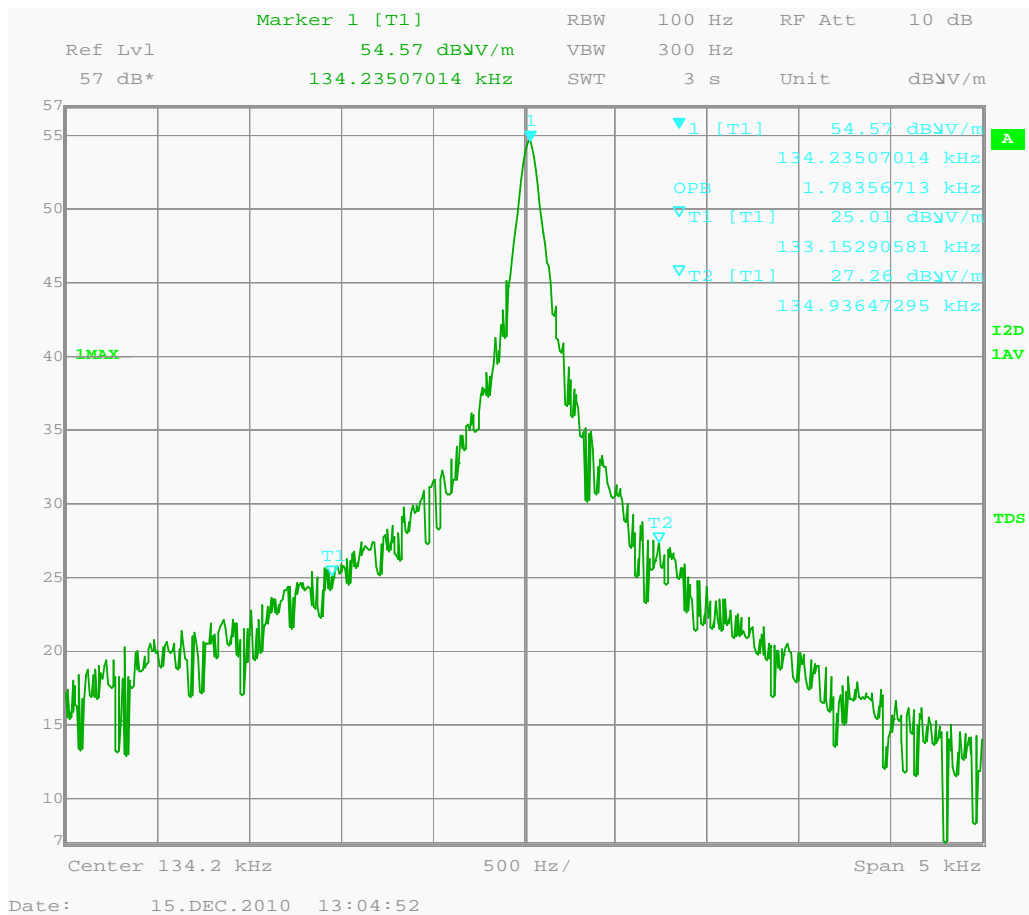
Section 4.6 of RSS-GEN

A small loop antenna was placed in a jig under the Transmitter; the output from the loop antenna was fed via a 10 dB attenuator into the input of the spectrum analyzer. The bandwidth of the transmitter was measured with an ESIB receiver set to 99% Occupied Bandwidth with a sampling detector on max hold. The resolution bandwidth, span and video bandwidth are indicated on the occupied bandwidth plot (modulated) included with this report.

The bandwidth of the Transmitter was measured as 1.8 kHz modulated and 220Hz un-modulated.

TEST ENGINEERS: Rob St John James & Andy Jones

## 4.2 Bandwidth Plot



## 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

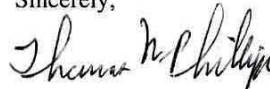
Dear Sir or Madam:

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

## 6.0 INDUSTRY CANADA LETTER



September 24, 2010

OUR FILE: 46405-7104

Submission No: 142641

**Hursley EMC Services Ltd.**  
Unit 16, Brickfield Lane, Eastleigh  
Hampshire, SO53 4DP  
Great Britain

*Attention:* Rob St. John James

Dear Sir/Madame:

The Bureau has received your application for the renewal of a 3/10m OATS. Be advised that the information received was satisfactory to Industry Canada. The following number(s) is now associated to the site(s) for which registration / renewal was sought ( **7104A-1** ). Please reference the appropriate site number in the body of test reports containing measurements performed on the site. In addition, please keep for your records the following information;

- The company address code associated to the site(s) located at the above address is: **7104A**

Furthermore, to obtain or renew a unique site number, the applicant shall demonstrate that the site has been accredited to ANSI C63.4-2003 or later. A scope of accreditation indicating the accreditation by a recognized accreditation body to ANSI C63.4-2003 or later shall be accepted. Please indicate in a letter the previous assigned site number if applicable and the type of site (example: 3 metre OATS or 3 metre chamber). If the test facility is not accredited to ANSI C63.4-2003 or later, the test facility shall submit test data demonstrating full compliance with the ANSI standard. The Bureau will evaluate the filing to determine if recognition shall be granted.

The frequency for re-validation of the test site and the information that is required to be filed or retained by the testing party shall comply with the requirements established by the accrediting organization. However, in all cases, test site re-validation shall occur on an interval not to exceed two years. There is no fee or form associated with an OATS filing. OATS submissions are encouraged to be submitted electronically to the Bureau using the following URL;  
[http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h\\_tt00052e.html](http://strategis.ic.gc.ca/epic/internet/inceb-bhst.nsf/en/h_tt00052e.html).

If you have any questions, you may contact the Bureau by e-mail at [certification.bureau@ic.gc.ca](mailto:certification.bureau@ic.gc.ca) Please reference our file and submission number above for all correspondence.

Yours sincerely,

A handwritten signature in black ink, appearing to read "Dalwinder Gill".

Dalwinder Gill  
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