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# Report On

RF Exposure Assessment of the  
DEB IP Ltd  
Dispenser Telemetry Module, Model: 1135-400

FCC ID: YPHDEB1135-400  
IC: 10648A-1135400

Document 75937751 Report 03 Issue 1

October 2017



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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)

**REPORT ON**

RF Exposure Assessment of the  
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**PREPARED FOR**

DEB IP Ltd  
Denby Hall Way  
Denby  
DE5 8JZ  
United Kingdom

**PREPARED BY**

A handwritten signature in black ink that appears to read "David Smith".

**David Guyett-Smith**  
Chief Safety Engineer - Technical Solutions

**APPROVED BY**

A handwritten signature in blue ink that appears to read "Matthew Russell".

**Matthew Russell**  
Authorised Signatory

**DATED**

04 October 2017



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## **SECTION 1**

### **REPORT SUMMARY**

RF Exposure Assessment of the  
Dispenser Telemetry Module, Model: 1135-400



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## 1.1 INTRODUCTION

The information contained in this report is intended to show verification of the RF Exposure Assessment of the DEB IP Ltd 1135-400 Radio Module to the requirements of the applied test specifications.

|                               |  |
|-------------------------------|--|
| Objective                     | To perform RF Exposure Assessment to determine the Equipment Under Test's (EUT's) compliance of the applied rules. |
| Applicant                     | DEB IP Ltd   |
| Manufacturer                  | DEB IP Ltd   |
| Manufacturing Description     | Dispenser Telemetry Module   |
| Model Number(s)               | 1135-400   |
| Test Specification/Issue/Date | CFR 47 Pt1.1310 (2016)<br>Health Canada Safety Code 6  |



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## 1.2 REGIONAL REQUIREMENTS

The table below shows the regional requirements that are referenced in this test report. A full list of the requirements is shown in Annex A.

| Report Reference | Regional Requirement        |
|------------------|-----------------------------|
| FCC              | CFR 47 Pt1.1310 (2016)      |
| IC               | Health Canada Safety Code 6 |



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## 1.3 PRODUCT INFORMATION

### 1.3.1 Technical Description

The Equipment under test was a Dispenser Telemetry Module, Model: 1135-400. A full technical description can be found in the manufacturer's documentation.

All reported calculations were carried out on the relevant information supplied for the 1135-400, Dispenser Telemetry Module to demonstrate compliance with the applied test specification(s). The sample assessed was found to comply with the requirements of the applied rules.

### 1.3.2 Supported Features

The following radio access technologies and frequency bands are supported by the equipment under test.

|                         |          |
|-------------------------|----------|
| Radio Access Technology | 802.15.4 |
| Frequency Band          | 905      |

### 1.3.3 Antennas

The following antennas are supported by the equipment under test.

| No. | Model                   | Gain(dB) |
|-----|-------------------------|----------|
| 1   | N/A – (Type: PCB Trace) | 0        |

The wireless device described within this report has been shown to be capable of compliance with the basic restrictions related to human exposure to electromagnetic fields for both General Public and Occupational. The calculations shown in this report were made in accordance with the procedures specified in the applied test specification(s).

| Required Compliance Boundary (m) |                    |
|----------------------------------|--------------------|
| Occupational                     | General Population |
| 0.01                             | 0.01               |

**Table 1 – Compliance Boundary Results**



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| Regional Requirement | Calculated RF exposure level at compliance boundary of 0.01 m |         |               |         |               |        |
|----------------------|---|---------|---------------|---------|---------------|--------|
|                      | S Field (W/m <sup>2</sup> )                                   |         | E Field (V/m) |         | H Field (A/m) |        |
|                      | Result  | Limit   | Result        | Limit   | Result        | Limit  |
| FCC*                 | 0.0013  | 3.0167  | N/A           | N/A     | N/A           | N/A    |
| IC                   | 0.0129  | 19.4187 | 2.2032        | 85.5631 | 0.0058        | 0.2270 |

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 2 – Occupational Results**

The calculations show that the EUT complies with the occupational exposure levels described in the CFR 47 Pt1.1310 (2016) and Health Canada Safety Code 6 at the point of investigation, 0.01 m.

| Regional Requirement | Calculated RF exposure level at compliance boundary of 0.01 m |        |               |         |               |        |
|----------------------|---|--------|---------------|---------|---------------|--------|
|                      | S Field (W/m <sup>2</sup> )                                   |        | E Field (V/m) |         | H Field (A/m) |        |
|                      | Result  | Limit  | Result        | Limit   | Result        | Limit  |
| FCC*                 | 0.0013  | 0.6033 | N/A           | N/A     | N/A           | N/A    |
| IC                   | 0.0129  | 2.7461 | 2.2032        | 32.1731 | 0.0058        | 0.0853 |

\* Requirement and Result in mW/cm<sup>2</sup>

**Table 3 – General Population Results**

The calculations show that the EUT complies with the occupational exposure levels described in the CFR 47 Pt1.1310 (2016) and Health Canada Safety Code 6 at the point of investigation, 0.01 m.



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## **SECTION 2**

### **TEST DETAILS**



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## 2.1 RATIONALE FOR ASSESSMENT OF THE RF EXPOSURE

The aim of the assessment report is to evaluate the compliance boundary for a set of given input power(s) according to the basic restrictions (directly or indirectly via compliance with reference levels) related to human exposure to radio frequency electromagnetic fields.

The chosen assessment method to establish the compliance boundary in the far-field region is the reference method as defined in the relevant specifications.

The RF exposure assessment is based upon the following criteria:

The 1135-400 operates with the following transmitters active on the antenna ports shown in Section 1.3.3. For each transmitter, the Radio Access Technology (RAT), EIRP inclusive of antenna gain and duty cycle, gain of the antenna and lowest frequency of operation are shown as they contribute to the calculation of S Field, E field and H field values according to the following formulas.

The power flux (S Field):

$$S = \frac{PG_{(\theta, \phi)}}{4\pi r^2}$$

The electric field strength (E Field):

$$E = \frac{\sqrt{30PG_{(\theta, \phi)}}}{r}$$

The magnetic field strength (H Field):

$$H = \frac{E}{\eta_o}$$

Where:

P = Average Power (W)

G = Antenna Gain (dBi)

r = Distance (cm) or (m)

$\eta_o = 377$



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## 2.2 TEST RESULT DETAILS

The frequencies shown in the tables below have been chosen based on the lowest possible frequency that the EUT can transmit.

| Antenna Port | Tx No. | Ant No. | RAT      | EIRP (mW) | Duty Cycle (%) | Gain (dBi) | Frequency (MHz) | RF Exposure Level at compliance boundary of 0.01 m |               |               |
|--------------|--------|---------|----------|-----------|----------------|------------|-----------------|--|---------------|---------------|
|              |        |         |          |           |                |            |                 | S Field (W/m <sup>2</sup> )                        | E Field (V/m) | H Field (A/m) |
| 1            | 1      | 1       | 802.15.4 | 0.016*    | 0.5            | 0          | 905             | 0.0129   | 2.2032        | 0.0058        |

**Table 4 – Occupational Transmitter Summary**

| Antenna Port | Tx No. | Ant No. | RAT      | EIRP (mW) | Duty Cycle (%) | Gain (dBi) | Frequency (MHz) | RF Exposure Level at compliance boundary of 0.01 m |               |               |
|--------------|--------|---------|----------|-----------|----------------|------------|-----------------|--|---------------|---------------|
|              |        |         |          |           |                |            |                 | S Field (W/m <sup>2</sup> )                        | E Field (V/m) | H Field (A/m) |
| 1            | 1      | 1       | 802.15.4 | 0.016*    | 0.5            | 0          | 905             | 0.0129   | 2.2032        | 0.0058        |

**Table 5 – General Population Transmitter Summary**

\*EIRP calculated with duty cycle correction.



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## **SECTION 3**

### **DISCLAIMERS AND COPYRIGHT**



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### **3.1 DISCLAIMERS AND COPYRIGHT**

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## ANNEX A

### REGIONAL REQUIREMENTS



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| Frequency Range (MHz) | Power Density (mW/cm <sup>2</sup> ) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) |
|-----------------------|-------------------------------------|-------------------------------|-------------------------------|
| 0 - 0.3               | -                                   | -                             | -                             |
| 0.3 - 3               | 100                                 | 614                           | 1.63                          |
| 3 - 30                | $900/f^2$                           | $1842/f$                      | $4.89/f$                      |
| 30 - 300              | 1                                   | 61.4                          | 0.163                         |
| 300 - 1500            | $f/300$                             | -                             | -                             |
| 1500 - 100000         | 5                                   | -                             | -                             |

**Table A.1 – CFR 47 Pt1.1310 (2016) Occupational Limits**

| Frequency Range (MHz) | Power Density (mW/cm <sup>2</sup> ) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) |
|-----------------------|-------------------------------------|-------------------------------|-------------------------------|
| 0 - 0.3               | -                                   | -                             | -                             |
| 0.3 - 3               | 100                                 | 614                           | 1.63                          |
| 3 - 30                | $180/f^2$                           | $824/f$                       | $2.19/f$                      |
| 30 - 300              | 0.2                                 | 27.5                          | 0.073                         |
| 300 - 1500            | $f/1500$                            | -                             | -                             |
| 1500 - 100000         | 1                                   | -                             | -                             |

**Table A.2 – CFR 47 Pt1.1310 (2016) General Population Limits**

| Frequency Range (MHz) | Power Density (W/m <sup>2</sup> ) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) |
|-----------------------|-----------------------------------|-------------------------------|-------------------------------|
| 10 - 20               | 10                                | 61.4                          | 0.163                         |
| 20 - 48               | $44.72/f^{0.5}$                   | $129.8/f^{0.25}$              | $0.3444/f^{0.25}$             |
| 48 - 100              | 6.455                             | 49.33                         | 0.1309                        |
| 100 - 6000            | $0.6455*f^{0.5}$                  | $15.60*f^{0.25}$              | $0.04138*f^{0.25}$            |
| 6000 - 150000         | 50                                | 137                           | 0.364                         |

**Table A.3 – Health Canada Safety Code 6 Occupational Limits**

| Frequency Range (MHz) | Power Density (W/m <sup>2</sup> ) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) |
|-----------------------|-----------------------------------|-------------------------------|-------------------------------|
| 10 - 20               | 2                                 | 27.46                         | 0.0728                        |
| 20 - 48               | $8.944/f^{0.5}$                   | $58.07/f^{0.25}$              | $0.1540/f^{0.25}$             |
| 48 - 300              | 1.291                             | 22.06                         | 0.05852                       |
| 300 - 6000            | $0.02619*f^{0.6834}$              | $3.142*f^{0.3417}$            | $0.008335*f^{0.3417}$         |
| 6000 - 15000          | 10                                | 61.4                          | 0.163                         |

**Table A.4 – Health Canada Safety Code 6 General Population Limits**