Report On

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

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Product Service

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SECTION 1

REPORT SUMMARY

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

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) Health Canada Safety Code 6

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

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

Regional Requirement	Calculated RF exposure level at compliance boundary of 0.01 m					
	S Field (W/m^2)		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^2

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^2)		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^2

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.

SECTION 2

TEST DETAILS

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)
η_o = 377

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^2)	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^2)	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.

SECTION 3

DISCLAIMERS AND COPYRIGHT

3.1 DISCLAIMERS AND COPYRIGHT

This report relates only to the actual item/items tested.

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ANNEX A

REGIONAL REQUIREMENTS

Frequency Range (MHz)	Power Density (mW/cm^2)	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^2)	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^2)	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^2)	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