Report On

RF Exposure Assessment of the
DEB Group Ltd
1135-300 Universal GMS PCB

FCC ID: YPHDEB1135-300
IC: 10648A-1135300

Document 75927312 Report 03 Issue 1 July 2014

Product Service

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

REPORT ON

RF Exposure Assessment of the
DEB Group Ltd
1135-300 Universal GMS PCB

Document 75927312 Report 03 Issue 1

July 2014

PREPARED FOR

DEB Group Ltd
Denby Hall Way
Denby
DE5 8JZ

PREPARED BY

Maggie Whiting
Project Manager

APPROVED BY

Simon Bennett
Authorised Signatory

DATED

18 July 2014

Product Service

CONTENTS

Product Service

SECTION 1

REPORT SUMMARY

RF Exposure Assessment of the
DEB Group Ltd
1135-300 Universal GMS PCB

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the RF Exposure Assessment of the DEB Group Ltd 1135-300 Universal GMS PCB 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 Group Ltd
Manufacturer	DEB Group Ltd
Manufacturing Description	Universal GMS PCB
Model Number(s)	1135-300
Test Specification/Issue/Date	EN 62311:2008 FCC KDB 447498D01 RSS-102 Issue 4 March 2010 Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard: 2003
Related Document(s)	Council Recommendation 1999/519/EC:1999 FCC CFR 47 Part 1: 2013 FCC CFR 47 Part 2: 2013 Health Canada's Safety Code 6 ARPANSA ICNIRP 1998 National Council on Radiation Protection and Measurements (NRPC) - Report No. 86(1986) EN 50383: 2002 IEEE Std C95.1-2005 Australian Standard 2772.2 – 1988

1.2 BRIEF SUMMARY OF RESULTS

1.2.1 General Public Exposure Levels

Antenna Gain (Numeric)	Peak Output Power (mW)	Field	Calculated RF Exposure at 0.2 m (20cm)	General Public Exposure Limit	Application
1.000	100	S	0.002 W/m^2	4.525 W/m^2	ICNIRP
		S	0.200 mW/cm^2	0.603 mW/cm^2	FCC 47 CFR § 1.1310
		S	0.002 W/m^2	6.033 W/m^2	Canada's RF Safety Code 6
		S	0.200 W/m^2	4.525 W/m^2	ARPANSA
		E	0.09 V/m	41.364 V/m	ICNIRP
		E	0.09 V/m	N/A V/m	FCC 47 CFR § 1.1310
		E	0.09 V/m	47.682 V/m	Canada's RF Safety Code 6
		E	0.09 V/m	41.214 V/m	ARPANSA
		H	0.0002 A/m	0.111 A/m	ICNIRP
		H	0.0002 A/m	N/A A/m	FCC 47 CFR § 1.1310
		H	0.0002 A/m	0.126 A/m	Canada's RF Safety Code 6
		H	0.0002 A/m	0.110 A/m	ARPANSA

The calculations have shown that they **meet** the General Public Exposure Levels described in the ICNIRP Guidelines, FCC 47 CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and the Australian ARPANSA limits at **20**cm, the point of investigation.

1.2.2 Occupational Exposure Levels

Antenna Gain (Numeric)	Peak Output Power (mW)	Field	Calculated RF Exposure at 0.2 m (20cm)	Occupational Exposure Limit	Application
1.000	100	S	0.002 W/m^2	22.625 W/m^2	ICNIRP
		S	0.200 mW/cm^2	3.017 mW/cm^2	FCC 47 CFR § 1.1310
		S	0.002 W/m^2	30.167 W/m^2	Canada's RF Safety Code 6
		S	0.200 W/m^2	22.625 W/m^2	ARPANSA
		E	0.09 V/m	90.250 V/m	ICNIRP
		E	0.09 V/m	N/A V/m	FCC 47 CFR § 1.1310
		E	0.09 V/m	106.495 V/m	Canada's RF Safety Code 6
		E	0.09 V/m	92.355 V/m	ARPANSA
		H	0.0002 A/m	0.241 A/m	ICNIRP
		H	0.0002 A/m	N/A A/m	FCC 47 CFR § 1.1310
		H	0.0002 A/m	0.283 A/m	Canada's RF Safety Code 6
		H	0.0002 A/m	0.245 A/m	ARPANSA

The calculations have shown that they **meet** the Occupational Exposure Levels described in the ICNIRP Guidelines, FCC 47 CFR § 1.1310 Guidelines, Health Canada's RF exposure guideline Safety Code 6 and the Australian ARPANSA limits at **20 cm,** the point of investigation.

1.3 PRODUCT INFORMATION

1.3.1 Attestation

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 the procedures specified in the applied test specification(s).

1.3.2 Technical Description

The Equipment under test was a DEB Group Ltd 1135-300 Universal GMS PCB. 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 1135-300 Universal GMS PCB to demonstrate compliance with the applied test specification(s) the sample assessed was found to comply with the requirements of the applied rules.

1.4 SUMMARY

The RF exposure assessment is based upon the following criteria:

The 1135-300 Universal GMS PCB operates on one frequency 905 MHz

Gain	0 dBi
Power	0.1 W
Distance	0.2 m (20 cm)
Duty Cycle	1%

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 EN50383:2002 Clause 5.2; E-field or H-field calculation. The method of calculation used is defined in EN50383:2002; Clause 8.2.2, 8.2.3 and 8.2.4.
The calculated values have been compared with limits provided in the ICNIRP guidelines.
Calculations can be made in three separate regions, based on distance from the antenna. These are called:

- far-field region,
- radiating near-field region,
- reactive near-field region.

The theory that defines these regions is given in EN50383:2002 Annex A.

Far-field region

As shown in EN50383 Annex A, the far-field calculations are accurate when the distance, r, from an antenna of length D to a point of investigation is greater than

$$r = \frac{2D^2}{\lambda}$$

Where, r is the distance from the antenna to the point of investigation.

Radiating near-field region

The radiating near-field region of an antenna of length D as shown in EN50383 Annex A, this region is defined by

$$\frac{\lambda}{4} < r > \frac{2D^2}{\lambda}$$

Reactive near-field region

The reactive near-field region of an antenna as shown in EN50383 Annex A, this region is defined by

$$r \leq \frac{\lambda}{4}$$

Where, r is the distance from the antenna to the point of investigation.
Recommend λ/4 as the boundary between the radiated near-field and reactive near-field for RF exposure compliance assessment.

2.2 DEFINED LIMITS

Normative Reference: ICNIRP Advice on Limiting Exposure to Electromagnetic Fields (0-300GHz). Table A4, Reference Levels for General Public Exposure to Time Varying Electric & Magnetic Fields. Vol 15 No.2. 2004. The defined limits are in accordance with 47 CFR § 1.1310 Radiofrequency radiation exposure limits.

Reference levels for general public exposure to time-varying electric and magnetic fields (unperturbed rms values)

At 905 MHz

Power density (W/m^2)	= 4.525	ICNIRP
Power density (mW/cm^2)	= 0.603	FCC 47 CFR § 1.1310
Power density (W/m^2)	= 6.033	Canada's RF Safety Code 6
Power density (W/m^2)	= 4.525	Australian Radiation Protection Series Publication No. 3
E-Field (Vm-1)	= 41.364	ICNIRP
E-Field (Vm-1)	= N/A	FCC 47 CFR § 1.1310
E-Field (Vm-1)	= 47.682	Canada's RF Safety Code 6
E-Field (Vm-1)	= 41.214	Australian Radiation Protection Series Publication No. 3
H-Field (Am-1)	= 0.111	ICNIRP
H-Field (Am-1)	= N/A	FCC 47 CFR § 1.1310
H-Field (Am-1)	= 0.126	Canada's RF Safety Code 6
H-Field (Am-1)	= 0.110	Australian Radiation Protection Series Publication No. 3

Reference levels for occupational exposure to time-varying electric and magnetic fields (unperturbed rms values)

At 905 MHz

Power density (W/m^2)	= 22.625	ICNIRP
Power density (mW/cm^2)	= 3.017	FCC 47 CFR § 1.1310
Power density (W/m^2)	= 30.167	Canada's RF Safety Code 6
Power density (W/m^2)	= 22.625	Australian Radiation Protection Series Publication No. 3
E-Field (Vm-1)	= 90.250	ICNIRP
E-Field (Vm-1)	= N/A	FCC 47 CFR § 1.1310
E-Field (Vm-1)	= 106.495	Canada's RF Safety Code 6
E-Field (Vm-1)	= 92.355	Australian Radiation Protection Series Publication No. 3
H-Field (Am-1)	= 0.241	ICNIRP
H-Field (Am-1)	= N/A	FCC 47 CFR § 1.1310
H-Field (Am-1)	= 0.283	Canada's RF Safety Code 6
H-Field (Am-1)	= 0.245	Australian Radiation Protection Series Publication No. 3

2.3 ESTABLISHING WAVELENGTH AND 1/4 WAVELENGTH

Frequency (MHz)	$\lambda = \frac{3x10^8}{f}$		$\frac{\lambda}{4}$	
	m	cm	m	cm
905	0.331491712707182	33.1491712707182	0.0828729281767956	8.28729281767956
905	0.331491712707182	33.1491712707182	0.0828729281767956	8.28729281767956
905	0.331491712707182	33.1491712707182	0.0828729281767956	8.28729281767956

2.4 FAR FIELD CALCULATIONS

The following calculations are based on: 0 dBi gain antenna

P = 0.1 Watts or 100 milliwatts
G = 1.000 (Numeric Gain)
r = 20 centimetres or 0.2metres

The power flux:

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

S = 0.002 W/m2

S= 0.20 mW/cm^2

The electric field strength:

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

E = 0.09 V/m

The magnetic field strength:

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

H = 0.0002 A/m

The calculations meet the General Public Exposure Levels described in the ICNIRP Guidelines.
The calculations meet the General Public Exposure Levels described in the FCC 47CFR§1.1310.
The calculations meet the General Public Exposure Levels described in the Canada's RF Safety Code 6.
The calculations meet the General Public Exposure Levels described in the Australian Radiation Protection Series Publication No. 3

The calculations meet the Occupational Exposure Levels described in the ICNIRP Guidelines.
The calculations meet the Occupational Exposure Levels described in the FCC 47CFR§1.1310
The calculations meet the Occupational Exposure Levels described in the Canada's RF Safety Code 6
The calculations meet the Occupational Exposure Levels described in the Australian Radiation Protection Series Publication No. 3

SECTION 3

DISCLAIMERS AND COPYRIGHT

3.1 DISCLAIMERS AND COPYRIGHT

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