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Global Product Certification
EMC-EMF Safety Approvals

FCC RF Exposure Report

Test Sample:	Emberpulse In Home Display
Model:	BBSE
Radio Modules:	Ti Wi-Fi/Bluetooth Modules WL1831MODGB Telegesis ZigBee Module ETRX357-LRS
Report Number:	M150524A (supersedes Report M150524)
Issue Date:	20 July 2015

EMC-EMF Safety Approvals

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Report Number: M150524A

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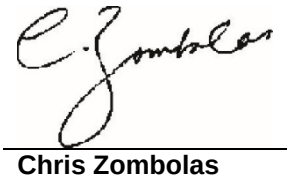
Model Number:	BBSE
Manufacturer:	Embertec Pty Ltd
Radio Modules:	Ti Wi-Fi/Bluetooth modules WL1831MODGB Telegesis ZigBee Module ETRX357-LRS
Radio Modules FCC ID:	FCC ID: Z64-WL18SBMOD FCC ID: S4GEM35XB
Emberpulse manufacturer:	Embertec Pty Ltd
Address:	182 Fullarton Road, Dulwich, SA 5065, Australia
Phone:	+61 8 8334 3300
Fax:	+61 8 8333 1844
Contact:	David Mudge
Email	davidm@embertec.com
Test Standard/s:	**FCC KDB 447498 D01 General RF Exposure Guidance v05r02** Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies. **FCC Title 47, Part 2.1091, Part 1.1310**
Result of Test:	**According to KDB 447498 D01 and FCC Title 47 Part 2.1091 and Part 1.1310, the RF exposure analysis concludes that RF exposure is FCC compliant**
Test Date:	26th June 2015

Test Engineer: **Emad Mansour**



Authorised Signature: **Chris Zombolas**
Technical Director
EMC Technologies Pty Ltd

1. INTRODUCTION

This report shows the Maximum Permissible Exposure (MPE) on the Emberpulse Home Display, Model No. BBSE, in accordance with the Federal Communications Commission (FCC) regulations as detailed in KDB 447498 D01 clause 7.1 and 7.2,

The test sample was provided by the Client. The conclusion herein is based on the information provided by the client.

2. EXPOSURE EVALUATION FOR MOBILE DEVICE

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons.

Radio frequency radiation exposure evaluation for mobile devices as defined by (47 CFR §2.1091).

3. GENERAL INFORMATION

(Information supplied by the Client)

The Equipment Under Test (EUT) was identified as follows:

Test Sample:	Ember Home Display
Model Number:	BBSE
Manufacturer:	Embertec Pty Ltd
Radio Module:	Wi-Fi/Bluetooth module
Operating frequency (MHz):	2400-2484
FCC ID:	Z64-WL18SBMOD
Supply to Transmitter unit:	1.8V 0.285A
Radio Module:	ZigBee module
Operating frequency (MHz):	low power 2.4GHz ZigBee
FCC ID:	S4GEM35XB
Supply to Transmitter unit:	2.1 to 3.6V

DESCRIPTION

(Information supplied by the Client)

The Emberpulse is designed for use in the home, connecting to the home router for internet cloud connection via WiFi. Emberpulse also connects to a smart meter via zigbee to read home energy consumption. Home automation devices connect to the Emberpulse via WiFI, zigbee and/or Bluetooth. The unit is used away from the body more than 20 cm, normally located next to the home router.

4. MAXIMUM PERMISSIBLE EXPOSURE (MPE) LIMITS

The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation

Table 1:

Frequency range(MHz)	Electric field strength(V/m)	Magnetic field strength(A/m)	Power density (mW/cm^2)	Averaging time (minutes)
A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1	30

f = frequency in MHz
* = Plane-wave equivalent power density

5. RF EXPOSURE EVALUATION

The MPE was evaluated at 20 cm to show compliance with the power density listed in table 1,

The following formula was used to calculate the power density

$$S = \frac{P * G}{4\pi R^2}$$

Where

(S): Power density (mW/cm^2)
(P): Output power at antenna terminal (mW)
(G): Gain (ratio)
(R): Minimum test separation distance (20 cm)

5.1 STANDALONE POWER DENSITY CALCULATION

Radio Module	Frequency (MHz)	Antenna Gain (ratio)	Maximum power (mW)	Power density at 20 cm $\mathbf{mW/cm^2}$	Limit $\mathbf{mW/cm^2}$	$\frac{\textbf{Power density}}{\textbf{limit}}$
Wi-Fi	2412	0.92**	79.4**	0.015	1	0.015
Bluetooth	2402	0.92**	20**	0.004	1	0.004
ZigBee	2402	1.58**	36.3**	0.011	1	0.011

*The lowest uplink frequency of each band is used to determine the MPE limit of that band
**For average power and gain refer to EA3N2752-01 and ZigBee MPE statement

5.2 SIMULTANEOUS TRANSMISSION EVALUATION

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated power density is ≤ 1.0.

$$\sum \frac{Power\ density}{limit} = 0.015 + 0.004 + 0.011 = \mathbf{0.03}\ mW/cm^2 < 1.0\ mW/cm^2$$

6. CONCLUSION

According to KDB 447498 D01 and FCC Title 47 Part 2.1091 and Part 1.1310, the RF exposure analysis concludes that RF exposure is FCC compliant.