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FCC RF Exposure Report				
Test Sample: Model:	Emberpulse In Home Display BBBA			
Radio Modules:	Ti Wi-Fi/Bluetooth Modules WL1831MODGB Telegesis ZigBee Module ETRX357-LRS			
Report Number:	M150524-1A (supersedes Report M150524-1)			
Issue Date:	20 July 2015			

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# FCC RF Exposure Evaluation Report Model: BBBA

### Report Number: M150524-1A

Test Sample: Model Number: Manufacturer:	Emberpulse Home Display BBBA Embertec Pty Ltd
Radio Modules: Radio Modules FCC ID:	Ti Wi-Fi/Bluetooth modules WL1831MODGB Telegesis ZigBee Module ETRX357-LRS FCC ID: Z64-WL18SBMOD FCC ID: S4GEM35XB
Emberpulse manufacturer: Address: Phone: Fax: Contact: Email	Embertec Pty Ltd 182 Fullarton Road, Dulwich, SA 5065, Australia +61 8 8334 3300 +61 8 8333 1844 David Mudge 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 Dates	7 <sup>th</sup> July 2015

**Test Engineer:** 

Emad Mansour

Authorised Signature:

2. Jombola

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. BBBA, 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:	BBBA		
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

Та	ble	1	:

Frequency range(MHz)	Electric field strength(V/m)	Magnetic field strength(A/m)	Power density( <i>mW/cm</i> <sup>2</sup> )	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	
- frequency in MH	7	1		1	

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)



Radio Module	Frequency (MHz)	Antenna Gain (ratio)	Maximum power (mW)	Power density at 20 cm <i>mW/cm</i> <sup>2</sup>	Limit mW/cm <sup>2</sup>	Power density 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

#### 5.1 STANDALONE POWER DENSITY CALCULATION

\*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  $\leq$  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.

