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# RF EXPOSURE REPORT

**REPORT NUMBER: M2003018-4 V2**

**TEST STANDARD: EN 62311: 2008**

**CLIENT: SMART FOAL PTY LTD**

**DEVICE: SMART FOAL FOALING  
BASE STATION**

**MODEL: PROTOTYPE**

**DATE OF ISSUE: 14 JULY 2020**

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## REVISION TABLE

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	14/05/2020
2	2	Deleted reference to repeater unit	14/07/2020

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## RF EXPOSURE REPORT

<b>Device:</b>	SMART FOAL FOALING BASE STATION
<b>Model Number:</b>	PROTOTYPE
<b>Serial Number:</b>	Pre-production unit
<b>Part Number:</b>	N/A
<b>Manufacturer:</b>	Smart Foal
<b>Tested for:</b>	Smart Foal Pty Ltd
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<b>Standards:</b>	<b>EN 62311:2008</b> Assessment of electronics and electrical equipment related to human exposure restriction fields (0Hz-300GHz)
	<b>ICNIRP Guidelines:2020</b> Guideline for limiting exposure to time-averaging electric, magnetic and electromagnetic fields (100 kHz to 300 GHz)
<b>Result:</b>	Based on an assessment of the documentation provided the SMART FOAL FOALING BASE STATION PROTOTYPE complies with the RF exposure requirements of EN 62311. Refer to Report M2003018-4 V2 for full details
<b>Issue Date:</b>	14 July 2020
<b>Assessment Engineer:</b>	 Peter Jakubiec
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## 1 INTRODUCTION

This report details the RF exposure assessment performed on SMART FOAL FOALING BASE STATION PROTOTYPE.

This report is prepared in accordance with EN 62311:2008, “*Generic standard to demonstrate compliance with electronics and electrical apparatus with the basic restriction or reference level related to human exposure to electromagnetic fields (0Hz to 300 GHz)*”

The terms electromagnetic radiation (EMR) and electromagnetic energy (EME) and Electromagnetic Fields (EMF) have the same meaning when used in this report.

### 1.1 Laboratory Overview

EMC Technologies Pty. Ltd. is an independently owned Australian company that is NATA accredited to ISO 17025 for both testing and calibration and ISO 17020 for Inspection. – **Accreditation Number 5292.**

### 1.2 Test Laboratory/Accreditations

Inspection were performed at EMC Technologies' laboratory in Keilor Park, Victoria Australia.

Table 1-1: *Accreditations for Conformity Assessment*

Country/Region	Body	
Australia/New Zealand	NATA	Accreditation Number: 5292
Europe	European Union	Notified Body Number: 0819
USA	FCC	Designation Number: AU0001 (Melb)
Canada	ISED Canada	Company Number: 3569B(Melb)
Japan	VCCI	Company Number: 785
Taiwan	BSMI	Lab Code SL2-IN-E-5001R

## 2 DEVICE DETAILS

(Information supplied by the Client)

The SMART FOAL FOALING BASE STATION PROTOTYPE has Two RF modules, one for receiving and one for transmitting, each module is connected to an external monopole antenna.

Transmit parameters were provided by the customer and are shown below:

Table 2-1: *Transmitter Parameters*

<b>Wireless Interface (1):</b>	Proprietary (Receiver only)
<b>Module Brand and Model:</b>	CDEByte E01-ML01SP4
<b>Supported Frequencies:</b>	2476 MHz in the 2400~2525 MHz band
<b>RF Output Power level:</b>	20dBm (tune-up tolerance 20.2 dBm (104.7mW)
<b>Antenna Brand and Model:</b>	Siretta DELTA7A/x/SMAM/RP/S/11
<b>Max. Antenna Gain:</b>	1.5 dBi

<b>Wireless Interface (2):</b>	WiFi Module (Transmit – Receive)
<b>Module Brand and Model:</b>	Espressif ESP-WROOM-02U
<b>Supported Frequencies:</b>	2400 MHz - 2472 MHz
<b>RF Output Power level:</b>	20dBm (tune-up tolerance 20.5 dBm)
<b>Antenna Brand and Model:</b>	Siretta DELTA7A/x/SMAM/RP/S/11
<b>Max. Antenna Gain:</b>	1.5 dBi

Data provide by the customer via Customer Information Sheet “Form 005 v1.1.docx” and email

### 3 REFERENCE LEVELS ARE DEFINED IN TABLE 5 IN ICNIRP GUIDELINE

#### ICNIRP GUIDELINES

**Table 5.** Reference levels for exposure, averaged over 30 min and the whole body, to electromagnetic fields from 100 kHz to 300 GHz (unperturbed rms values).<sup>a</sup>

Exposure scenario	Frequency range	Incident E-field strength; $E_{inc}$ (V m <sup>-1</sup> )	Incident H-field strength; $H_{inc}$ (A m <sup>-1</sup> )	Incident power density; $S_{inc}$ (W m <sup>-2</sup> )
Occupational	0.1 – 30 MHz	$660/f_M^{0.7}$	$4.9/f_M$	NA
	>30 – 400 MHz	61	0.16	10
	>400 – 2000 MHz	$3f_M^{0.5}$	$0.008f_M^{0.5}$	$f_M/40$
	>2 – 300 GHz	NA	NA	50
General public	0.1 – 30 MHz	$300/f_M^{0.7}$	$2.2/f_M$	NA
	>30 – 400 MHz	27.7	0.073	2
	>400 – 2000 MHz	$1.375f_M^{0.5}$	$0.0037f_M^{0.5}$	$f_M/200$
	>2 – 300 GHz	NA	NA	10

<sup>a</sup>Note:

1. "NA" signifies "not applicable" and does not need to be taken into account when determining compliance.

2.  $f_M$  is frequency in MHz.

## 4 UNCERTAINTY

EMC Technologies has evaluated the tools and methods used to perform Radiated Electromagnetic Field predictions.

The estimated inspection uncertainties for the test shown within this report are as follows:

Electromagnetic Modelling

30 MHz to 100GHz                     $\pm 2.8$  dB

The above expanded uncertainties are based on standard uncertainties multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95%.

## 5 ASSUMPTIONS IN THIS ASSESSMENT

This assessment does not include accumulated RF fields from nearby sites/antennas or possible radio signal reflections or attenuation due to buildings or the general environment.

Antenna Parameters and power settings were supplied by the customer.

A 100% duty cycle is assumed.

The aperture of the radiating element assumed to be a point source in free space and far field conditions.

## 6 RF EXPOSURE CALCULATIONS

The reference level was evaluated at 20 cm to show compliance with the power density listed in Table 4 (Section3)

The following formula was used to calculate the power density at 20 cm:

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

$$S = \frac{EIRP}{4\pi R^2}$$

Where

(S): Power density (W/m<sup>2</sup>)

(P): Output power at antenna terminal (W)

(G): Gain (ratio)

(R): Minimum separation distance (0.2 m)

Table 6-1: Calculations

Technology	Frequency Band (MHz)	Power	Gain	Duty Cycle	EIRP	EIRP=P x G	Electric field at 20 cm	Electric field limit	Percentage of the limit
		dBm	dBi	%	dBm	W	V/m	V/m	%
WLAN	2400 - 2472	20.5	1.5	100%	22.00	0.16	10.90	61.00	3.19%
Total percentage of the limit at 20 cm								3.19%	

## 7 CONCLUSION

Based on an assessment of the documentation provided the SMART FOAL FOALING BASE STATION PrototypePROTOTYPE complies with the RF exposure requirements of EN 62311.