

47 CFR PART 2.1091

RADIOFREQUENCY RADIATION EXPOSURE EVALUATION: MOBILE DEVICES

REPORT NUMBER: M2302021-5**STANDARD: 47 CFR § 2.1091****CLIENT: REDARC TECHNOLOGIES
PTY LTD****DEVICE: SMART BATTERY MONITOR****MODEL: SU6****DATE OF ISSUE: 19 AUGUST 2023**

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REVISION TABLE

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	19/08/2023



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RADIOFREQUENCY RADIATION EXPOSURE EVALUATION REPORT – MPE

Device: Smart Battery Monitor
Model Number: SU6
Serial Number: S00937

Radio: Bluetooth Low Energy (Nordic nRF52833)
FCC ID: 2BAH6-SU601

Manufacturer: REDARC Technologies Pty Ltd

Inspected for: REDARC Technologies Pty Ltd
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Standards: **447498 D01 General RF Exposure Guidance v06**
RF exposure procedures and equipment authorization policies for mobile and portable devices.

47 CFR § 2.1091

Radiofrequency radiation exposure evaluation: mobile devices
(Transmitter is more than 20 cm from human body).

Result: Based on an assessment of the documentation provided and the declared separation distance from the human body under normal use, the Smart Battery Monitor, model SU6 complies with the RF exposure requirements of 47 CFR Part 2.1091. Refer to Report M2302021-5 for full details.

Assessment Date: 1 May 2023

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1 INTRODUCTION

This report is intended to demonstrate compliance of the SMART BATTERY MONITOR model SU6 with the RF exposure requirements of 47 CFR Part 2.1091. Evaluation was performed in accordance with FCC KDB 447498 D01.

The test sample was provided by the Client.

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 was 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 device is a Battery Management System Sensor.

Manufacturer:	REDARC Technologies Pty Ltd
Test Sample:	Smart Battery Monitor
Model Number:	SU6
Distance From human body in normal use:	Greater than 20cm

2.1 Transmitters Details

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

Table 2-1: *Transmitter Parameters*

Transmitter #1	
Wireless Interface 1 (ToF):	Nordic Semiconductor nRF52833
Operating Frequency:	Bluetooth Low Energy (BLE) BLE: 2.402 GHz to 2.480 GHz
RF Output Power Level	+8 dBm
Antenna Type:	Molex 479480001 monopole
Max Antenna gain:	3.7 dBi

3 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE), §1.1310

TABLE 1 - LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

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 Exposure				
0.3-3.0	614	1.63	* 100	6
3.0-30	1842/f	4.89/f	* 900/f ²	6
30-300	61.4	0.163	1.0	6
300-1,500			f/300	6
1,500-100,000			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/f ²	30
30-300	27.5	0.073	0.2	30
300-1,500			f/1500	30
1,500-100,000			1.0	30

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

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 ±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 (mW/cm^2)

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

(G): Gain (ratio)

(R): Minimum test separation distance (20 cm)

Table 6-1: Calculations

Technology	Frequency Band (MHz)	Power	Gain	Duty Cycle	EIRP	EIRP	Flux Density at 20 cm	Flux Density limit	Percentage of the GP limit
		<i>dBm</i>	<i>dB</i>	%	<i>dBm</i>	<i>mW</i>	mW/cm^2	mW/cm^2	%
BT/BLE	2402	8.00	3.7	100%	11.70	15	0.0030	1	0.30%
Worst case total percentage of the GP limit at 20 cm									0.30%

7 APPENDIX A

Referenced Documents

Document	Comments
REDARC_BSEN500_testplan_v1	Transmitter details
nRF52833_OPS_v0.7 - Datasheet	Peak Tx Power

-- END OF THE REPORT --



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