

RADIOFREQUENCY RADIATION EXPOSURE EVALUATION: MOBILE DEVICES

REPORT NUMBER: M2004026-3

TEST STANDARD: 47 CFR PART 2.1091

CLIENT: RUBICON GLOBAL PTY. LTD

DEVICE(S): FERIT NODE - LORA;

FERIT SOLAR NODE - LORA

MODEL: 81170; 81342

DATE OF ISSUE: 18 AUGUST 2020

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REVISION TABLE

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	18/08/2020

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RADIOFREQUENCY RADIATION EXPOSURE EVALUATION

Device(s): Ferit Node – LORA; Ferit Solar Node - LORA
Model Number: 81170; 81342
Serial Number: Prototype

Manufacturer: Rubicon Global Pty. Ltd.

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Standards: **47 CFR Part 2.1091**
"Radiofrequency radiation exposure evaluation: mobile devices"
47 CFR 1.1310
"Radiofrequency radiation exposure limits"
KDB 447498 D01 General RF Exposure Guidance v06
"RF exposure procedures and equipment authorization policies for mobile and portable devices".

Result: Based on an assessment of the documentation provided the VAR1 Ferit Node – LORA and VAR3 Ferit Solar Node - LORA, models 81170; 81342 comply with the RF exposure requirements of 47 CFR Part 2.1091, however an exclusion zone of 20 cm in front of the radiating elements applies, elsewhere the exposure level was below the MPE limits.. Refer to Report M2004026-3 for full details

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1 INTRODUCTION

This report is intended to demonstrate compliance of the Ferit Node – LORA (Model no. 81170) and Ferit Solar Node - LORA (Model no. 81342) with the RF exposure requirements of 47 CFR Part 2.1091. Evaluation was performed in accordance with FCC KDB 447498 D01.

The product sample was provided by the Client. The conclusion herein is based on the information 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 Testing and Calibration and ISO 17020 for Inspection – **NATA Accreditation Number 5292**.

1.2 Test Laboratory/Accreditations

Measurements 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)

FERIT NODE – LORA is Telemetry node that can burst sensor data over a LoRa network
Multiple IO and comms (RS485/I2C)

FERIT NODE – P400 Telemetry node that can burst sensor data over a 900MHz network
Multiple IO and comms (RS485/I2C)

Manufacturer: Rubicon Global Pty. Ltd.
Test Sample(s): Ferit Node – LORA; Ferit Solar Node - LORA
Model Number(s): 81170; 81342
Serial Number: Prototype

Both Ferit Node – LORA (Model no. 81170) and Ferit Solar Node - LORA (Model no. 81342) have the same combination of Transmitters installed in them. Each variant model has the following transmitters installed (Transmit parameters were provided by the customer and are shown below):

Table 2-1: Transmitter Parameters

Wireless Interface 1:	LoRa MTXDOT-NA1
Brand	Multitech
Frequency Band	915MHz
Bands Supported	900 MHz ISM Band
RF Output power	19.4 dBm
FCC ID	AU792U13A16858
Antenna Details	Monopole
Antenna Type	Omni-directional.
Peak Gain	3dBi

Wireless Interface 2:	Bluetooth Transceiver Nrf52840
Supported Frequencies:	2402MHz to 2480MHz
RF Output Power level:	0 dBm
Antenna Type Main & Div.(Rx)	PCB 2.4GHz-Inverted F Antenna
Max. Antenna Gain:	3dBi

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

Table 3-1: Occupational and General Public MPE Limits

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

Where f = Frequency in MHz, * = Plane-wave power density

4 UNCERTAINTY

EMC Technologies has evaluated the tools and methods used to perform Radiated Electromagnetic Field predictions. The estimated measurement uncertainties for the calculation 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.

Power tolerance added to the nominal output power.

6 EVALUATION RESULT

The MPE was evaluated at 20 cm to show compliance with the power density listed in table 2,

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: Evaluation Result

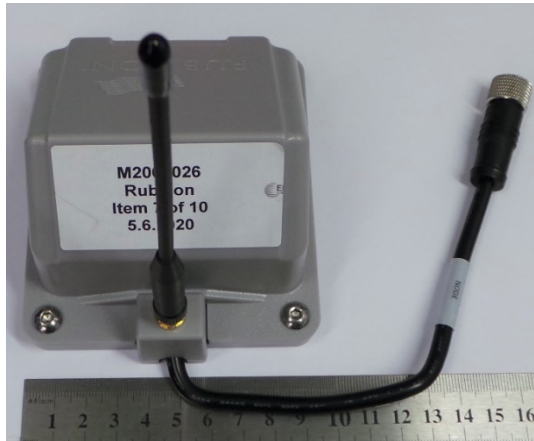
Technology	Frequency (MHz)	Power	Gain	Duty Cycle	EIRP	EIRP	Flux Density at 20 cm	Flux Density limit	Percentage of the limit
		<i>dBm</i>	<i>dBi</i>	%	<i>dBm</i>	<i>mW</i>	<i>mW/cm²</i>	<i>mW/cm²</i>	%
Bluetooth	2480	0	3	100%	3	2.00	0.0004	1.00	0.04%
LoRa	915	19.4	3	100%	22.40	173.78	0.0346	0.61	5.67%
Total percentage of the limit at 20 cm (Worst Case)									5.71%

7 CONCLUSION

Based on an assessment of the documentation provided the variant models Ferit Node – LORA (Model no. 81170) and Ferit Solar Node - LORA (Model no. 81342) comply with the RF exposure requirements of 47 CFR Part 2.1091. An exclusion zone of 20 cm in front of the radiating elements applies, elsewhere the exposure level was below the MPE limits.

8 APPENDIX – DUT PHOTOGRAPHS

Photograph 1: Ferit Node – LORA (Front)



Photograph 2: Ferit Node – LORA (Back)



Photograph 3: Ferit Solar Node - LORA



Photograph 4: Ferit Solar Node – LORA



END OF REPORT