EMC Technologies Pty Ltd
ABN 82 057 105 549
176 Harrick Road,
Keilor Park, VIC, 3042
Tel: +61 3 9365 1000
Fax: +61 3 9331 7455
Email: emc-general@emctech.com.au
www.emctech.com.au

ACMA RF Exposure Report

Report Number: M190411-1

Product: Long Range RFID Integrated Reader

Model Number: CL7206B5A

Assessed for: Timing Solutions

Date of Issue: 15 July 2019

Accredited for compliance with ISO/IEC 17020-Inspection.
NATA is a signatory to the ILAC Mutual Recognition Arrangement for the mutual recognition of the equivalence of testing, medical testing, calibration and inspection reports.

RF Exposure Evaluation Report

Report Number: M190411-1

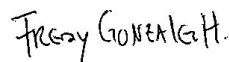|	
Product Sample:	Long Range RFID Integrated Reader
Model Number:	Model CL7206B5A
Serial Number:	-
Manufacturer:	Timing Solutions
Assessed for:	Timing Solutions
Address:	28 Bull Street, Castlemaine, Vic 3450, Australia
Phone:	Phone: +61 (0)4 2700 7021
Fax:	-
Contact:	Nick Frederiksen
Email:	nick@timingsolutions.com.au

Standard/s:

1. Australian Communications and Media Authority (ACMA) Radio communications (Electromagnetic Radiation – Human Exposure) Standard 2014 – known as the EMR standard
2. Australian Communications and Media Authority (ACMA) Radio communications (Compliance Labelling – Electromagnetic Radiation) Notice 2014 – known as the EMR Labelling Notice
3. Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) Radiation Protection Standard for Maximum Exposure Levels to Radiofrequency Fields – 3 kHz to 300 GHz (2016) – known as the ARPANSA standard
4. AS/NZS 2772.2:2016 Radio Frequency Radiation- Part 2: Principles and Methods of Measurement and computation – 3kHz – 300GHz

Result of Assessment:

Based on an assessment of the documentation provided the Long Range RFID Integrated Reader, model CL7206B5A should be installed at least 0.42 cm from any person to prevent involuntary RF exposure in excess of the ARPANSA – RPS3 General Public limit. Provided that this condition is met the device complies with the applicable limits of the ACMA EMR Standard 2014.
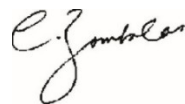
Assessment Date: 15 July 2019

Assessment Officer:

_____
Fredy Gonzalez
EME/EMR Test Engineer

Authorised Signatory:

_____
Chris Zombolas
Technical Director

1   INTRODUCTION

The transmitter was assessed against the Australian Communications and Media Authority (ACMA) requirements of the ACMA EMR Standard. The normal position of use is more than 20 cm from the user's body (Human Body does not include limbs*) and the transmitted power is greater than 20 mW hence it is a Category B Level 2 device. An assessment of the Power Density levels in accordance with AS/NZS 2772.2 is required. The device must not exceed the ARPANSA non-occupational/uncontrolled user exposure limits when used as intended. The antenna must not be closer than 20 cm to the nearest person otherwise it becomes a device that is Category B Level 3. Level 3 devices require Specific Absorption Rate (SAR) evaluation

*Refer to human body definition in Radiocommunications (Compliance Labelling – Electromagnetic Radiation) Notice 2014, part 1 clause 4

2   DESCRIPTION OF DEVICE (Provided by Customer)

Wireless and battery powered integrated RFID reader. It also integrates a Wi-Fi transmitter to transfer data to Laptop.

Product Sample:	Long Range RFID Integrated Reader
Model Number:	CL7206B5A

1.	**Wireless Interface:**	RFID
	Supported Frequencies:	920 - 925 MHz
	Max. Output Power:	30 dBm, ±1dBm
	Antenna Type:	Built-in circular antenna
	Max. Antenna Gain:	9 dBic

2.	**Wireless Interface:**	Wi-Fi (DIGI, XBee-PRO Zigbee S2C)
	Supported Frequencies:	2.4 – 2.5 GHz
	Max. Output Power:	18 dBm
	Antenna Type:	Dipole antenna (Jaycar, Cat No: AR3273)
	Max. Antenna Gain:	5 dBi

3   EXPOSURE LIMITS

The exposure limits are defined in Table 7 Section 2 of the ARPANSA Standard.

Frequency Range	E-field strength (V/m rms)	H-field strength (A/m rms)	Equivalent plane wave power flux density S_{eq} (W/m^2)
ARPANSA General Public Exposure Limits			
400 MHz – 2 GHz	$1.37 \times f^{0.5}$	$0.00364 \times f^{0.5}$	$f/200$
2 GHz – 300 GHz	61.4	0.163	10
ARPANSA Occupational Exposure Limits			
400 MHz – 2 GHz	$3.07 \times f^{0.5}$	$0.00814 \times f^{0.5}$	$f/40$
2 GHz – 300 GHz	137	0.364	50

f is frequency in MHz

4   UNCERTAINTY

EMC Technologies has evaluated the tools and methods used to perform Radiated Electromagnetic Field predictions.
The estimated measurement 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   ASSUMPTION 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   CALCULATIONS

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^2)
(P): Output power at antenna terminal (W)
(G): Gain (ratio)
(R): Minimum test separation distance (20 cm)

Technology	Frequency Band (MHz)	Power	Gain	Duty Cycle	EIRP	EIRP	Flux Density at 20 cm	Flux Density limit	Percentage of the limit
		dBm	dBi	%	dBm	W	W/m²	W/m²	%
RFID	920 - 925	31	9	100%	40.00	10.00	19.90	4.6	432.71%
Wi-Fi	2400	18	5	100%	23.00	0.20	0.40	10	3.97%
	Worst case total percentage of the GP limit at 20 cm								433.68%

Now,
In order to prevent involuntary RF exposure in excess of the ARPANSA – RPS3 General Public limit, the minimum distance from the device (R) is calculated to be at 0.42cm

Technology	Frequency Band (MHz)	Power	Gain	Duty Cycle	EIRP	EIRP	Flux Density at 20 cm	Flux Density limit	Percentage of the limit
		dBm	dBi	%	dBm	W	W/m²	W/m²	%
RFID	920 -925	31	9	100%	40.00	10.00	4.51	4.6	98.12%
Wi-Fi	2400	18	5	100%	23.00	0.20	0.09	10	0.90%
	Worst case total percentage of the GP limit at 0.42 cm								99.02%

7   CONCLUSION

Based on an assessment of the documentation provided the Long Range RFID Integrated Reader, model CL7206B5A should be installed at least 0.42 cm from any person to prevent involuntary RF exposure in excess of the ARPANSA – RPS3 General Public limit. Provided that this condition is met the device complies with the applicable limits of the ACMA EMR Standard 2014.