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RADIOFREQUENCY RADIATION EXPOSURE EVALUATION: MOBILE DEVICES

REPORT NUMBER: S210610-4

TEST STANDARD: 47 CFR PART 2.1091 AND RSS-102

FCC ID: S7R-CK2T1

IC ID: 25706-CK2T1

CLIENT: TAGGLE SYSTEMS PTY LTD

DEVICE: COCKATOO

MODEL: CK2-T1-I-EX-S12-0-WXT530-AU

DATE OF ISSUE: 22 DECEMBER 2021

REVISION TABLE

Version	Sec/Para Changed	Change Made	Date
1		Initial issue of document	22/12/2021

CONTENTS

RADIOFREQUENCY RADIATION EXPOSURE EVALUATION

Device:	Cockatoo
Model Number:	CK2-T1-I-EX-S12-0-WXT530-AU
Serial Number:	113188
Variant Model:	CK2-T1-C-1B-0-0-FL2-AU
Serial Number:	113195
FCC ID:	S7R-CK2T1
IC ID:	25706-CK2T1
Manufacturer:	Taggle Systems Pty Ltd
Tested for:	Taggle Systems Pty Ltd
Address:	Level 1, 101 Sussex Street, Sydney NSW 2000
Phone Number:	+61 2 8999 1919
Contact:	Richard Keaney
Email:	rkeaney@taggle.com.au

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".
RSS-102, Issue 5, March 2015
"Radio Frequency (RF) Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)"
Safety Code 6 (SC6): 2015
"Limits of Human Exposure to Radiofrequency Electromagnetic Energy in the Frequency Range from 3 KHz to 300 GHz

Result: Based on an assessment of the documentation provided the Cockatoo, model CK2-T1-I-EX-S12-O-WXT530-AU complies 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 and SC6 limits. Refer to Report S210610-4 for full details

Assessment Date: 11 November 2021

Issue Date: 22 December 2021

Assessment Engineer: **Dong Feng**

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1 INTRODUCTION

This report is intended to demonstrate compliance of the testsample, model modelnumber with the RF exposure requirements of 47 CFR Part 2.1091 and RSS-102. 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 both testing and calibration and ISO 17020 for Inspection. – **Accreditation Number 5292.**

1.2 Test Laboratory/Accreditations

Measurements were performed at EMC Technologies' laboratory in Seven Hills, NSW, 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: AU0002 (Syd)
Canada	ISED Canada	Company Number: 4207A (Syd)
Japan	VCCI	Company Number: 785
Taiwan	BSMI	Lab Code SL2-IN-E-5001R

2 DEVICE DETAILS

(Information supplied by the Client)

Manufacturer:	Taggle Systems Pty Ltd
Device under Test:	Cockatoo
Model Number:	CK2-T1-I-EX-S12-0-WXT530-AU
Serial Number:	113188
Antenna type and gain:	2 dBi monopole
Highest Internal Frequency:	1844MHz Switching Power Adapter
Power Supply unit:	FSP Group Inc. Model No.: FSP060-DIBAN2 AC Input: 100-240V~, 1.5A, 50-60Hz DC Output: 12.0Vdc, 5.0A Max (60W Max)
Variant Device	
Model Number:	CK2-T1-C-1B-0-0-FL2-AU
Serial Number:	113195
Antenna type and gain:	1 dBi Patch
Power Supply unit:	3.6V 14Ah 50.4Wh DC Non-rechargeable battery

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

Table 2-1: Transmitter Parameters

Frequency Band:	902-928MHz
Modulation:	BPSK
Number of Channels:	1
Operating Frequency:	922 MHz
Nominal Bandwidth:	9.6MHz
Antenna type and gain:	2 dBi monopole

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 LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE), SC6

Table 3-2: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142f^{0.3417}$	$0.008335f^{0.3417}$	$0.02619f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

5 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%.

6 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.

7 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 of §1.1310

Frequency (MHz)	Power	Gain	Duty Cycle	EIRP	EIRP	Flux Density at 20 cm	Flux Density limit	Percentage of the limit
	dBm	dBi	%	dBm	mW	mW/cm^2	mW/cm^2	%
922	26.6	2	100%	28.6	725.0	0.14	0.61	23.00%

Table 6-2: Evaluation Result of SC6

Frequency (MHz)	Power	Gain	Duty Cycle	EIRP	EIRP	Flux Density at 20 cm	Flux Density limit	Percentage of the limit
	dBm	dBi	%	dBm	W	W/m^2	W/m^2	%
922	26.6	2	100%	28.6	0.725	1.44	2.78	51.8%

8 CONCLUSION

Based on an assessment of the documentation provided the Cockatoo, model CK2-T1-I-EX-S12-0-WXT530-AU complies with the RF exposure requirements of 47 CFR Part 2.1091 and RSS-102. An exclusion zone of 20 cm in front of the radiating elements applies, elsewhere the exposure level was below the MPE limits.