TEST REPORT

Application No.:	HKEM2307000601PF
Applicant:	ECOLAB Inc.
Address of Applicant:	FCC: 1 Ecolab Place, St Paul, Minnesota, United States, 55102 IC: Ecolab Schuman Center-F6, 655 Lone Oak Drive, Eagan, MN United States, 55121
Equipment Under Test (EUT):	
EUT Name:	HHCM915 BDG2450 ASSY
Model No.:	53005389
FCC:	Z9O-53005389
IC:	10060A-53005389
HVIN:	53005389
Standard(s) :	47 CFR Part 1.1307; 47 CFR Part 2.1093 KDB447498D04 General RF Exposure Guidance v01 RSS102 Issue 5 March 2015
Date of Receipt:	2023-07-18
Date of Test:	2023-07-18 to 2023-07-25
Date of Issue:	2023-07-25
Test Result:	The submitted sample was found to comply with the test requirement

Law Man Kit
EMC Manager

Revision Record			
Revision No.	**Date**	**Report superseded**	**Remark**

Authorized for issue by:				
				
		Chan Chun Lok /Project Engineer		Date: 2023-07-25
				
		Law Man Kit /Reviewer		Date: 2023-07-25

2 Test Summary

Radio Spectrum Technical Requirement				
Item	**Standard**	**Method**	**Requirement**	**Result**
RF Exposure	47 CFR Part 1.1307, 47 CFR Part 2.1093, KDB 447498 D01	KDB447498D04	KDB447498D04	PASS
RF Exposure	RSS102 Issue 5	RSS-102 Section 2.5.1	RSS102 Issue 5	PASS

Declaration of EUT Family Grouping:

N/A

Abbreviation:

Tx: In this whole report Tx (or tx) means Transmitter.

Rx: In this whole report Rx (or rx) means Receiver.

RF: In this whole report RF means Radiated Frequency.

CH: In this whole report CH means channel.

Volt: In this whole report Volt means Voltage.

Temp: In this whole report Temp means Temperature.

Humid: In this whole report Humid means humidity.

Press: In this whole report Press means Pressure.

N/A: In this whole report not application.

3 Contents

4 General Information

4.1 Details of E.U.T.

Power supply:	DC 3 V ('CR2450' size battery x 1)
Test voltage:	DC 3 V
Cable:	N/A
Antenna Gain:	-1 dBi
Antenna Type:	Chip Antenna
Channel Separation:	N/A
Modulation Type:	2-FSK
Number of Channels:	1
Operation Frequency:	917MHz
Hardware Version:	A
Firmware Version:	2.06
Serial No.:	A1

Frequency Lists:

Channel	Frequency (MHz)
1	**917**

The frequencies under test are bolded.

4.2 Description of Support Units

The EUT has been tested as an independent unit.

4.3 Test Location

All tests were performed at:

SGS Hong Kong Limited

Unit 2 and 3, G/F, Block A, Po Lung Centre,

11 Wang Chiu Road, Kowloon Bay, Kowloon, Hong Kong

Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **IAS Accreditation (Lab Code: TL-817)**

SGS Hong Kong Limited has met the requirements of AC89, IAS Accreditation Criteria for Testing Laboratories, and has demonstrated compliance with ISO/IEC Standard 17025:2017, General requirements for the competence of testing and calibration laboratories. This organization is accredited to provide the services specified in the scope of accreditation maintained on the IAS website (www.iasonline.org).

The report must not be used by the client to claim product certification, approval, or endorsement by IAS, NIST, or any agency of the Federal Government.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 514599)**

SGS Hong Kong Limited has been accredited and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Designation Number: HK0015, Test Firm Registration Number: 514599.

- **Industry Canada (Site Registration No.: 26103; CAB Identifier No.: HK0015)**

SGS Hong Kong Limited has been recognized by Department of Innovation, Science and Economic Development (ISED) Canada as a wireless testing laboratory. The acceptance letter from the ISED is maintained in our files. CAB Identifier No: HK0015, Site Registration Number: 26103.

4.5 Deviation from Standards

None

4.6 Abnormalities from Standard Conditions

None

5 Radio Spectrum Technical Requirement

5.1 RF Exposure

5.1.1 Test Requirement:

CFR 47 Part 1.1310

Limit:

According to FCC Part1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in Part1.1307(b)

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

According to IEEE C95.3:2002 section 5.5.1.1, The power density S at a point on the axis at a distance d from a transmitting antenna is given by the Friis free-space transmission formula

$$S = \frac{PG}{4\pi d^2}$$

S = power density (mW/cm^2)
P = the net power delivered to the antenna (mW)
G = gain of the antenna in linear scale
d = distance between observation point and center of the radiator (cm)

5.1.1 EUT RF Exposure Evaluation

Output Power Into Antenna & RF Exposure Evaluation Distance:

For FCC;

Operation mode	Channel	Frequency (MHz)	E.I.R.P (dBm)	E.I.R.P (mW)	Power Density at R = 20 cm (mW/cm2)	Limit	Result
2-FSK	1	917	-31.4	0.0007	0.0000001	0.61	Pass

Remark:

The maximum EIRP[W] was 0.0007 mW is less than Limit and then the device exempt from the SAR evaluation.

Remark:

EIRP[dBm] = E[dBuV/m]– 95.2, for d = 3 m for E-field.

= 63.8 – 95.2

= -31.4 dBm

= 10^(-31.4/10)

= 0.0007 mW

Note: E[dBuV/m] is 63.8 dBµV/m as worse case was derived from test report HKEM230700060102.

5.2 RF Exposure

5.2.1 Test Requirement:

RSS-102

Limit:

According to RSS-102 Issue 5, section 2.5.2 Exemption.

RF exposure evaluation is required if the separation distance between the user and the device's radiating element is greater than 20 cm, except when the device operates as follows:

below 20 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1 W (adjusted for tune-up tolerance);

at or above 20 MHz and below 48 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 22.48/f0.5W (adjusted for tune-up tolerance), where f is in MHz;

at or above 48 MHz and below 300 MHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 0.6 W (adjusted for tune-up tolerance);

at or above 300 MHz and below 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 1.31 x 10-2 f0.6834 W (adjusted for tune-up tolerance), where f is in MHz;

at or above 6 GHz and the source-based, time-averaged maximum e.i.r.p. of the device is equal to or less than 5 W (adjusted for tune-up tolerance).

5.2.2 Conclusion

Channel	Frequency (MHz)	E.I.R.P (dBm)	E.I.R.P (W)	Limit (W)	Result
1	917	-31.4 dBm	0.0000007	1.39	PASS

Remark:

The maximum EIRP[W] was 0.0000007 W is less than Limit and then the device exempt from the SAR evaluation.

Remark:

EIRP[dBm] = E[dBuV/m]– 95.2, for d = 3 m for E-field.

= 63.8 – 95.2

= -31.4 dBm

= 10^(-31.4/10)

= 0.0007 mW

=0.0000007 W

Note: E[dBuV/m] is 63.8 dBµV/m as worse case was derived from test report HKEM230700060102.

6 Photographs

6.1 EUT Constructional Details (EUT Photos)

Refer to the appendices external, internal and setup photos.

- End of the Report -