



Report No.: HKEM190700072103

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FCC ID: 2ADLE-900UXSMT

IC: 24610-900UXSMT

TEST REPORT

Application No.:	HKEM1907000721AV
Applicant:	RFDESIGN PTY LTD
Product Name:	Modular Radio Modem
Model No.:	900ux-SMT
Standards:	47 CFR Part 1.1307 (2018) 47 CFR Part 1.1310 (2018) RSS102 Issue 5 March 2015
Date of Receipt:	2019-07-29
Date of Test:	2019-07-29 to 2019-08-29
Date of Issue:	2019-08-30
Test Result :	Pass*

- * In the configuration tested, the EUT detailed in this report complied with the standards specified above. Please refer to section 3 of this report for further detail



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Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2019-08-30		Original

Authorized for issue by:			
Tested by:			
	Vincent Chen /Project Engineer		
Checked by:			
	Eric Fu /Reviewer		



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2 General Information

2.1 Client Information

Applicant: RFDESIGN PTY LTD
Address of Applicant:
(FCC grantee registration address) 1/373 Bradman Street, Acacia Ridge, QLD 4110 Brisbane, Australia
Address of Applicant:
(IC Company registration address) U7, 1 Stockwell Place Archerfield 4108 Australia

2.2 Details of E.U.T.

Power supply: USB DC 5V VIA USB cable
Adapter: None
Cable: USB cable
Function: Wireless transmitter
Test Voltage: DC5V
Operation Frequency: Band 1: 902.250 – 914.750MHz
Band 2: 915.250 – 927.750MHz
Channel Numbers: Band 1: 51 Channels
Band 2: 51 Channels
Channel Separation: 250KHz
Type of Modulation: GFSK
Sample Type: Portable production
Antenna Type: Dipole RPSMA
Antenna Gain: Antenna 1: 3dBi
Antenna 2: 3dBi



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Frequency List

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
<u>1</u>	<u>902.25</u>	21	907.25	41	912.25
2	902.50	22	907.50	42	912.50
3	902.75	23	907.75	43	912.75
4	903.00	24	908.00	44	913.00
5	903.25	25	908.25	45	913.25
6	903.50	26	908.50	46	913.50
7	903.75	27	908.75	47	913.75
8	904.00	28	909.00	48	914.00
9	904.25	29	909.25	49	914.25
10	904.50	30	909.50	50	914.50
11	904.75	31	909.75	51	914.75
12	905.00	32	910.00	<u>52</u>	<u>915.25</u>
13	905.25	33	910.25	53	915.50
14	905.50	34	910.50	54	915.75
15	905.75	35	910.75	55	916.00
16	906.00	36	911.00	56	916.25
17	906.25	37	911.25	57	916.50
18	906.50	38	911.50	58	916.75
19	906.75	39	911.75	59	917.00
20	907.00	40	912.00	60	917.25



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Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
61	917.50	81	922.50	101	927.50
62	917.75	82	922.75	<u>102</u>	<u>927.75</u>
63	918.00	83	923.00		
64	918.25	84	923.25		
65	918.50	85	923.50		
66	918.75	86	923.75		
67	919.00	87	924.00		
68	919.25	88	924.25		
69	919.50	89	924.50		
70	919.75	90	924.75		
71	920.00	91	925.00		
72	920.25	92	925.25		
73	920.50	93	925.50		
74	920.75	94	925.75		
75	921.00	95	926.00		
76	921.25	96	926.25		
77	921.50	97	926.50		
78	921.75	98	926.75		
79	922.00	99	927.00		
80	922.25	100	927.25		

Test frequencies are the lowest channel:1 channel(902.25MHz), middle channel: 52 channel(915.25MHz) and highest channel: 102 channel(927.75MHz)



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2.3 Test Location

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2.4 Test Facility

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

- **CNAS (No. CNAS L2929)**

CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 3816.01.

- **VCCI**

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

- **FCC –Designation Number: CN1178**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1178. Test Firm Registration Number: 406779.

- **Innovation, Science and Economic Development Canada**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

2.5 Deviation from Standards

None

2.6 Abnormalities from Standard Conditions

None



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2.7 Deviation from Standards

None.

2.8 Abnormalities from Standard Conditions

None.

2.9 Other Information Requested by the Customer

None.



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3 RF Exposure Evaluation

3.1 RF Exposure Compliance Requirement

3.1.1 FCC Radiofrequency radiation Limits

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 Exposures				
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
300–1500			f/300	6
1500–100,000			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
300–1500			f/1500	30
1500–100,000			1.0	30

F= Frequency in MHz

Friis Formula

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm^2

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

$$P_i = 3.1416$$

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm² . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



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3.1.2 IC Radiofrequency radiation

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 $1.31 \times 10^{-2} f0.6834 W$ (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).

3.1.3 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.



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3.1.4 EUT RF Exposure Evaluation

Antenna Gain: 3dBi

The maximum Gain measured in fully anechoic chamber is 1.995 in linear scale.

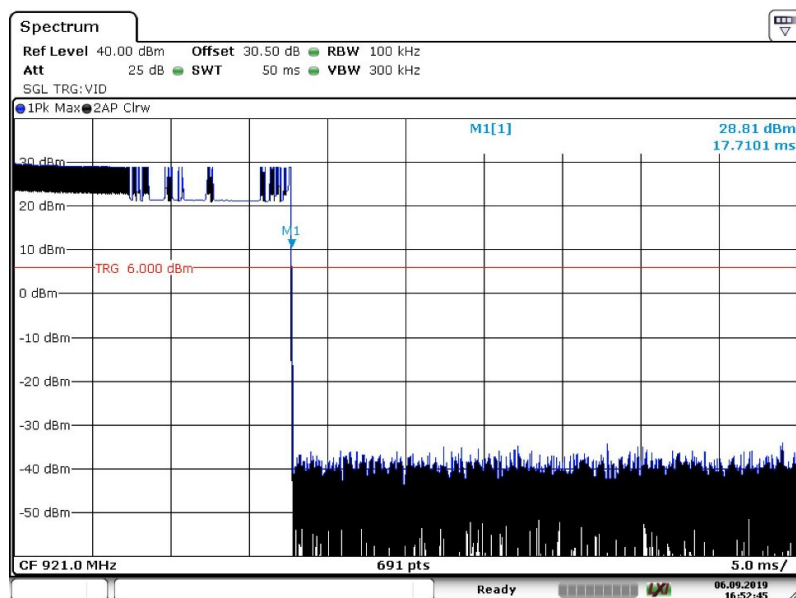
Output Power Into Antenna & RF Exposure Evaluation Distance: 20cm

For FCC

Worst case (antenna 1)

Channel	Frequency (MHz)	Conduct power (including Tune-up tolerance) (dBm)	E.I.R.P (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Result
Lowest	902.250	29.46	1949.844	0.351	0.6015	PASS
Middle	915.250	<u>29.50</u>	1967.886	0.354	0.6102	PASS
Highest	927.750	29.47	1927.525	0.351	0.6185	PASS

For IC



Date: 6.SEP.2019 16:52:45

Duty cycle (in 100ms) =0.2

Average correction factor:

$$\delta(dB) = 20\log(\Delta)$$



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Where

δ is the duty cycle correction factor (dB)

Δ is the duty cycle during 0.1s

Thus

$$\delta = 20\log(0.2)$$

$$= -13.98 \text{ (dB)}$$

Worst case (antenna 1)

Channel	Frequency (MHz)	Conduct power (including Tune-up tolerance) (dBm)	Duty cycle	Average Correction factor (dB)	time-averaged output power (dBm)	E.I.R.P (W)	Limit (W)	Result
Lowest	902.250	29.46	0.2	-13.98	15.48	0.035	1.37	PASS
Middle	915.250	29.5	0.2	-13.98	15.52	0.036	1.38	PASS
Highest	927.750	29.47	0.2	-13.98	15.49	0.035	1.40	PASS

Remark:

Antenna 1 and Antenna 2 cannot transmitt simultaneously

Concusion:

The device is excluded from SAR test.

- End of the Report -



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