



Report No.: HKEM220400040402

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## TEST REPORT

**Application No.:** HKEM2204000404AT  
**Applicant:** RFDesign Pty Ltd  
**Address of Applicant:** FCC: 1/373 Bradman Street, Acacia Ridge, QLD 4110, AUSTRALIA  
IC: U7, 1 Stockwell Pace Archerfield 4108 Australia  
**Equipment Under Test (EUT):**  
**EUT Name:** RFD900ux2  
**Model No.:** 900ux-US  
**Trade Mark:** RFDesign  
**FCC ID:** 2ADLE-900UX2  
**IC:** 24610-900UX2  
**HVIN:** RFD900ux-US  
**Standard(s) :** 47 CFR Part 1.1307; 47 CFR Part 2.1093  
KDB447498D01 General RF Exposure Guidance v06  
RSS102 Issue 5 March 2015  
**Date of Receipt:** 2022-05-05  
**Date of Test:** 2022-05-06 to 2022-05-13  
**Date of Issue:** 2022-05-16

|                     |                                                                    |
|---------------------|--------------------------------------------------------------------|
| <b>Test Result:</b> | The submitted sample was found to comply with the test requirement |
|---------------------|--------------------------------------------------------------------|

**Law Man Kit**  
EMC Manager

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Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

| Revision Record |         |            |          |          |
|-----------------|---------|------------|----------|----------|
| Version         | Chapter | Date       | Modifier | Remark   |
| 01              |         | 2022-05-16 |          | Original |
|                 |         |            |          |          |
|                 |         |            |          |          |

|                          |  |                                                                                     |  |
|--------------------------|--|-------------------------------------------------------------------------------------|--|
| Authorized for issue by: |  |                                                                                     |  |
|                          |  |    |  |
|                          |  | <b>Panny Leung</b><br>/Project Engineer                                             |  |
|                          |  |  |  |
|                          |  | <b>Law Man Kit</b><br>/Reviewer                                                     |  |



## 2 Test Summary

| Radio Spectrum Technical Requirement |                                                              |                          |                |        |
|--------------------------------------|--------------------------------------------------------------|--------------------------|----------------|--------|
| Item                                 | Standard                                                     | Method                   | Requirement    | Result |
| RF Exposure                          | 47 CFR Part 1.1307,<br>47 CFR Part 2.1093,<br>KDB 447498 D01 | KDB447498D01             | KDB447498D01   | PASS   |
| RF Exposure                          | RSS102 Issue 5                                               | RSS-102 Section<br>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.
-



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## 4 General Information

### 4.1 Details of E.U.T.

|                                                                                                                                                                          |                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|
| Power supply:                                                                                                                                                            | USB DC 5V VIA USB cable                   |
| Test voltage:                                                                                                                                                            | DC 5.0V                                   |
| Antenna Gain:                                                                                                                                                            | 3dBi                                      |
| Antenna Type:                                                                                                                                                            | Dipole RPSMA                              |
| Modulation Type:                                                                                                                                                         | GFSK                                      |
| Number of Channels:                                                                                                                                                      | 102 (Maximum active channel number is 51) |
| Operation Frequency:                                                                                                                                                     | 902.250 - 927.750MHz                      |
| Spectrum Spread Technology:                                                                                                                                              | Frequency Hopping Spread Spectrum (FHSS)  |
| Series number:                                                                                                                                                           | A1                                        |
| Hardware Version:                                                                                                                                                        | V2.0                                      |
| Software Version:                                                                                                                                                        | 3.57                                      |
| Remark:<br>1. Power level setting was not adjustable and is fixed for the SW Version.<br>2. Either channel 1-51 or channel 52-102 would be used once the power turns on. |                                           |

EUT channels and frequencies list:

Band 1:

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

Band 2:

| Channel   | Frequency (MHz) | Channel | Frequency (MHz) | Channel    | Frequency (MHz) |
|-----------|-----------------|---------|-----------------|------------|-----------------|
| <u>52</u> | <u>915.25</u>   | 69      | 919.50          | 86         | 923.75          |
| 53        | 915.50          | 70      | 919.75          | 87         | 924.00          |
| 54        | 915.75          | 71      | 920.00          | 88         | 924.25          |
| 55        | 916.00          | 72      | 920.25          | 89         | 924.50          |
| 56        | 916.25          | 73      | 920.50          | 90         | 924.75          |
| 57        | 916.50          | 74      | 920.75          | 91         | 925.00          |
| 58        | 916.75          | 75      | 921.00          | 92         | 925.25          |
| 59        | 917.00          | 76      | 921.25          | 93         | 925.50          |
| 60        | 917.25          | 77      | 921.50          | 94         | 925.75          |
| 61        | 917.50          | 78      | 921.75          | 95         | 926.00          |
| 62        | 917.75          | 79      | 922.00          | 96         | 926.25          |
| 63        | 918.00          | 80      | 922.25          | 97         | 926.50          |
| 64        | 918.25          | 81      | 922.50          | 98         | 926.75          |
| 65        | 918.50          | 82      | 922.75          | 99         | 927.00          |
| 66        | 918.75          | 83      | 923.00          | 100        | 927.25          |
| 67        | 919.00          | 84      | 923.25          | 101        | 927.50          |
| 68        | 919.25          | 85      | 923.50          | <u>102</u> | <u>927.75</u>   |

Remark:

1. Test frequencies are the lowest channel: 902.25MHz, middle channel: 915.25MHz and highest channel: 927.75MHz
2. Either channel 1-51 or channel 52-102 would be used once the power turns on.

## 4.2 Description of Support Units

The EUT has been tested with corresponding accessories as below:

Supplied by client

| Description  | Manufacturer | Model No. | SN/Certificate NO |
|--------------|--------------|-----------|-------------------|
| RFD900 Tools | RF Design    | V2.11     | N/A               |

Supplied by SGS:

| Description     | Manufacturer | Model No. | SN/Certificate NO |
|-----------------|--------------|-----------|-------------------|
| NoteBook (EMC4) | Dell         | P75F      | N/A               |

### 4.3 Measurement Uncertainty

RF

| No. | Item                                                   | Measurement Uncertainty   |
|-----|--------------------------------------------------------|---------------------------|
| 1   | Conduction emission                                    | 2.8dB (9kHz to 150kHz)    |
|     |                                                        | 2.8dB (150kHz to 30MHz)   |
| 2   | Radio Frequency                                        | $\pm 7.25 \times 10^{-8}$ |
| 3   | Duty cycle                                             | $\pm 0.37\%$              |
| 4   | Occupied Bandwidth                                     | $\pm 3\%$                 |
| 5   | RF conducted power (30MHz-40GHz)                       | 1.5dB                     |
| 6   | RF power density                                       | 1.5dB                     |
| 7   | Conducted Spurious emissions                           | 1.5dB                     |
| 8   | RF Radiated power &<br>Radiated Spurious emission test | 4.5dB (30MHz-1GHz)        |
|     |                                                        | 4.7dB (1GHz-6GHz)         |
|     |                                                        | 4.7dB (6GHz-18GHz)        |
|     |                                                        | 5.7dB (18GHz-40GHz)       |
| 9   | Temperature test                                       | $\pm 1^\circ\text{C}$     |
| 10  | Humidity test                                          | $\pm 3\%$                 |
| 11  | Supply voltages                                        | $\pm 1.5\%$               |
| 12  | Time                                                   | $\pm 3\%$                 |

Remark:

The  $U_{\text{lab}}$  (lab Uncertainty) is less than  $U_{\text{CISPR}}$  (CISPR Uncertainty), so the test results

- compliance is deemed to occur if no measured disturbance level exceeds the disturbance limit;
- non-compliance is deemed to occur if any measured disturbance level exceeds the disturbance limit.

According to decision rule based on Clause 4.2 of CISPR 16-4-2, the EUT complied with the standards specified above.

#### 4.4 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.

#### 4.5 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](http://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.

#### 4.6 Deviation from Standards

None

#### 4.7 Abnormalities from Standard Conditions

None

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## 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 <sup>2</sup> ) | Averaging time (minutes) |
|----------------------------------------------------------------|-------------------------------|-------------------------------|-------------------------------------|--------------------------|
| <b>(A) Limits for Occupational/Controlled Exposure</b>         |                               |                               |                                     |                          |
| 0.3-3.0                                                        | 614                           | 1.63                          | *100                                | 6                        |
| 3.0-30                                                         | 1842/f                        | 4.89/f                        | *900/f <sup>2</sup>                 | 6                        |
| 30-300                                                         | 61.4                          | 0.163                         | 1.0                                 | 6                        |
| 300-1,500                                                      |                               |                               | f/300                               | 6                        |
| 1,500-100,000                                                  |                               |                               | 5                                   | 6                        |
| <b>(B) Limits for General Population/Uncontrolled Exposure</b> |                               |                               |                                     |                          |
| 0.3-1.34                                                       | 614                           | 1.63                          | *100                                | 30                       |
| 1.34-30                                                        | 824/f                         | 2.19/f                        | *180/f <sup>2</sup>                 | 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<sup>2</sup>)  
*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 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  $22.48/f^{0.5}W$  (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  $1.31 \times 10^{-2} f^{0.6834} W$  (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).



### 5.1.2 EUT RF Exposure Evaluation

Antenna Gain: 3 dBi

The maximum Gain measured in fully anechoic chamber is 2.0

Output Power Into Antenna & RF Exposure Evaluation Distance:

For FCC;

FHSS:

| Channel | Frequency (MHz) | Conduct power (including Tune-up tolerance) (dBm) | Conduct power (mW) | Power Density at R = 20 cm (mW/cm <sup>2</sup> ) | Limit (mW/cm <sup>2</sup> ) | Result |
|---------|-----------------|---------------------------------------------------|--------------------|--------------------------------------------------|-----------------------------|--------|
| Low     | 902.25          | 28.6                                              | 724.436            | 0.2876                                           | 0.6015                      | PASS   |
| Middle  | 915.25          | 28.5                                              | 707.946            | 0.2810                                           | 0.6102                      | PASS   |
| High    | 927.75          | 28.4                                              | 691.831            | 0.2746                                           | 0.6185                      | PASS   |

Note: 1. Refer to report No. HKEM22040040401 for EUT test conducted power value;  
2. Two working bands couldn't transmit simultaneously.

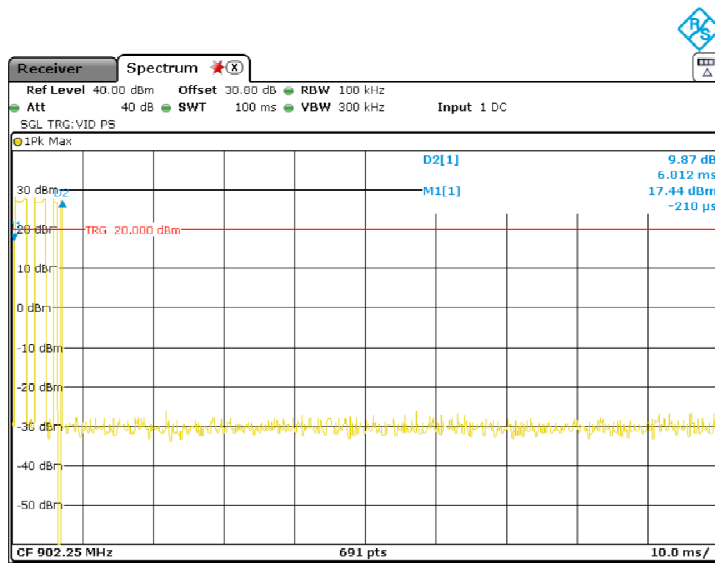
For IC:

Correction factor for average power:

On time= 6.812ms

Duty cycle within 100ms =  $6.812/100=0.068$

Average factor =  $20\log 0.068 = -23.3\text{dB}$



| Channel | Frequency (MHz) | Conduct power (dBm) | E.I.R.P (dBm) | time-averaged output power (dBm) | E.I.R.P (W) | Limit (W) | Result |
|---------|-----------------|---------------------|---------------|----------------------------------|-------------|-----------|--------|
| Low     | 902.25          | 28.6                | 31.6          | 8.3                              | 0.007       | 1.37      | PASS   |
| Middle  | 915.25          | 28.5                | 31.5          | 8.2                              | 0.007       | 1.38      | PASS   |
| High    | 927.75          | 28.4                | 31.4          | 8.1                              | 0.006       | 1.40      | PASS   |

Note: 1. Refer to report No. HKEM220400040401 for EUT test conducted power value and On time;  
2. Two working bands couldn't transmit simultaneously.



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## 6 Photographs

Remark: Photos refer to Appendix: External Photo, Internal Photo and setup Photo.

- End of the Report -