# *TEST REPORT*

| | |
|---|---|
| **Application No.**: | HKEM1811000884AV |
| **Applicant:** | RFDESIGN PTY LTD |
| **Address of Applicant:** | 7/1 STOCKWELL PLACE, ARCHERFIELD QLD 4108,Australia |
| **Equipment Under Test (EUT):** | |
| **EUT Name:** | RFD 900x |
| **Model No.:** | 900X |
| **Standard(s)**: | 47 CFR Part 1.1307 (2018) |
| | 47 CFR Part 1.1310 (2018) |
| | RSS102 Issue 5 March 2015 |
| **Date of Receipt**: | 2018-11-01 |
| **Date of Test**: | 2018-11-17 to 2018-11-29 |
| **Date of Issue**: | 2018-12-06 |

| **Test Result :** | **Pass*** |
|---|---|

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

**Ivan Toa**

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report. If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.

| Revision Record | | | | |
|---|---|---|---|---|
| **Version** | **Chapter** | **Date** | **Modifier** | **Remark** |
| *01* | | 2018-11-21 | | *Original* |
| | | | | |
| | | | | |

# 1 Contents

# 2 General Information

## 2.1 Details of E.U.T.

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

Frequency List

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| **1** | **902.25** | 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 | **52** | **915.25** |
| 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 |

| Channel | Frequency (MHz) | Channel | Frequency (MHz) | Channel | Frequency (MHz) |
|---|---|---|---|---|---|
| 61 | 917.50 | 81 | 922.50 | 101 | 927.50 |
| 62 | 917.75 | 82 | 922.75 | **102** | **927.75** |
| 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)

## 2.2 Test Location

All tests were performed at:

SGS IECC Limited (Member of the SGS Group (SGS SA))
No. 16-B, Yip Wo Street, On Lok Tsuen, Fanling, N.T., Hong Kong
Tel: +852 2305 2570 Fax: +852 2756 4480

No tests were sub-contracted.

## 2.3 Test Facility

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

- **HOKLAS (Lab Code: 125)**

SGS IECC Limited has been accepted by HKAS Executive, on the recommendation of the Accreditation Advisory Board, as a HOKLAS Accredited Laboratory, this laboratory meets the requirements of ISO/IEC 17025:2005 an it has been accredited for performing specific test as listed in the scope of accreditation within the test category of Electrical and Electronic Products.

- **FCC Recognized Accredited Test Firm(CAB Registration No.: 446297)**

SGS IECC 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: HK0010, Test Firm Registration Number: 446297.

- **Industry Canada (Registration No.: 5193A-2)**

The 3m Alternative Semi-anechoic chamber of SGS IECC Limited has been registered by Certification and Engineering of Industry Canada for radio equipment testing with Registration No. 5193A-2..

## 2.4 Deviation from Standards

None

## 2.5 Abnormalities from Standard Conditions

None

## 2.6 Deviation from Standards

None.

## 2.7 Abnormalities from Standard Conditions

None.

## 2.8 Other Information Requested by the Customer

None.

# 3 RF Exposure Evaluation

## 3.1 RF Exposure Compliance Requirement

### 3.1.1 FCC Radiofrequncy 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: $Pd = (Pout*G)/(4* Pi * R^2)$

Where

Pd = power density in $mW/cm^2$

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 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.

### 3.1.2 IC Radiofrequncy 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$0.5W (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 $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).

### 3.1.3 Test Procedure

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

### 3.1.4 EUT RF Exposure Evaluation

**For 2.4G WiFi**

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 | 29.90 | 1949.844 | 0.388 | 0.6015 | PASS |
| Middle | 915.250 | **29.94** | 1967.886 | 0.392 | 0.6102 | PASS |
| Highest | 927.750 | 29.85 | 1927.525 | 0.384 | 0.6185 | PASS |

**For IC**

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 (mW) | Limit (W) | Result |
|---|---|---|---|---|---|---|---|---|
| Lowest | 902.250 | 29.90 | 0.02 | -33.98 | -4.08 | 0.780 | 1.37 | PASS |
| Middle | 915.250 | **29.94** | 0.02 | -33.98 | -4.04 | 0.787 | 1.38 | PASS |
| Highest | 927.750 | 29.85 | 0.02 | -33.98 | -4.13 | 0.771 | 1.40 | PASS |

Remark: Antenna 1 and Antenna 2 cannot transmitt simultaneously

Concusion:

The device is exclusion from SAR test.

- End of the Report -