RF Exposure Evaluation Declaration

FCC ID:	2AQ8LPPA1
Applicant:	Parsyl
Product:	Parsyl Passport
Model No.:	PPA1
Brand Name:	Parsyl
FCC Rule Part(s):	FCC Part 2.1091
Result:	Complies

Reviewed By: Sunny Sun

Approved By: Robin Wu

Revision History

Report No.	Version	Description	Issue Date	Note
2203RSU047-U4	Rev. 01	Initial Report	2022-07-31	Valid

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1. General Information

1.1. Applicant

Parsyl

2825 Larimer Street, Denver CO 80205 USA

1.2. Manufacturer

Parsyl

2825 Larimer Street, Denver CO 80205 USA

1.3. Testing Facility

☒	**Test Site – MRT Suzhou Laboratory**				
	Laboratory Location (Suzhou - Wuzhong) D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China **Laboratory Location (Suzhou - SIP)** 4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China				
	Laboratory Accreditations				
	A2LA: 3628.01		CNAS: L10551		
	FCC: CN1166		ISED: CN0001		
	VCCI:	☐R-20025	☐G-20034	☐C-20020	☐T-20020
		☐R-20141	☐G-20134	☐C-20103	☐T-20104
☐	**Test Site – MRT Shenzhen Laboratory**				
	Laboratory Location (Shenzhen) 1G, Building A, Junxiangda Building, Zhongshanyuan Road West, Nanshan District, Shenzhen, China				
	Laboratory Accreditations				
	A2LA: 3628.02		CNAS: L10551		
	FCC: CN1284		ISED: CN0105		
☐	**Test Site – MRT Taiwan Laboratory**				
	Laboratory Location (Taiwan) No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)				
	Laboratory Accreditations				
	TAF: L3261-190725				
	FCC: 291082, TW3261		ISED: TW3261		

1.4. Product Information

Product Name	Parsyl Passport
Model No.	PPA1
IMEI	864200052679751; 864200052648236
GSM Specification	GSM850, PCS1900
Cat M Specification	Band 2, 4, 5, 12, 13, 25, 26, 66
NB-IoT Specification	Band 2, 4, 5, 12, 13, 25, 66, 71
Wi-Fi Specification	802.11b/g/n
Bluetooth Specification	v5.0 single mode for BLE only
Antenna Information	Refer to section 1.6
Operating Temperature	-30°C ~ +55°C
Accessories	
AC/DC Adapter	Model: MKE-1202000DEXD Input: 100-240V ~ 50/60Hz, 0.8A Output: 12.0V⎓2A, 24W
Integrated License Modular Information	
Manufacturer	Quectel Wireless Solutions Co., Ltd
FCC ID	XMR201910BG95M3
Model No.	BG95-M3
Integrated Wi-Fi Modular Information	
Manufacturer	ESPRESSIF SYSTEMS (SHANGHAI) PTE LTD
FCC ID	2AC7Z-ESPWROOM32
Model No.	ESP-WROOM-32

Remark:

1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

1.5. Antenna Details

Radio Spec.	Antenna Type	Frequency Band (MHz)	Antenna Gain (dBi)
2.4G Wi-Fi	PCB Antenna	2400 ~ 2483.5	2
Bluetooth	Dipole Antenna	2400 ~ 2483.5	2.5
CAT M / NB-IoT Band 2/25	Dipole Antenna	1850 ~ 1915	2.8
CAT M / NB-IoT Band 4/66	Dipole Antenna	1710 ~ 1780	0.4
CAT M / NB-IoT / GSM Band 5	Dipole Antenna	824 ~ 849	-0.2
CAT M Band 26	Dipole Antenna	814 ~ 849	-0.2
CAT M / NB-IoT Band 12	Dipole Antenna	699 ~ 716	-4.5
CAT M / NB-IoT Band 13	Dipole Antenna	746 ~ 756	-4.5
NB-IoT Band 71	Dipole Antenna	617 ~ 652	-4.5

1.6. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 2.1091 & KDB 447498 D04 Interim General RF Exposure Guidance v01

2. RF Exposure Evaluation

2.1. Test Limits

According to FCC §1.1310: 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 §1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Average Time (Minutes)
(A) Limits for Occupational/ Control 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
300-1,500	--	--	f/300	<6
1,500-100,000	--	--	5	<6
(B) Limits for General Population/ Uncontrolled Exposures				
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.

2.2. MPE Exemptions

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

(Option A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A) of this section.
Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

(Option B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P is given by:

$P\,th(mW) = \{ERP_{20cm}(d\ /\ 20cm)^{x}$ d ≤ 20cm

$P\,th(mW) = \{ERP_{20cm}$ 20cm < d ≤ 40cm

Where

$x = -log_{10}\left(\frac{60}{ERP_{20cm}\sqrt{f}}\right)$ and f is in GHz;

and

$ERP_{20cm}(mW) = \{2040f$ 0.3GHz ≤ f < 1.5GHz

$ERP_{20cm}(mW) = \{3060$ 1.5GHz ≤ f ≤ 6GHz

(Option C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

Table 1 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	$1920R^2$
1.34-30	$3450R^2/f^2$
30-300	$3.83R^2$
300-1,500	$0.0128R^2/f$
1,500-100,000	$19.2R^2$

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P_{th}, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

$\boldsymbol{P_i}$ = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source *i* at a distance between 0.5 cm and 40 cm (inclusive).

$\boldsymbol{P_{th,i}}$ = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source *i*.

$\boldsymbol{ERP_j}$ = the ERP of fixed, mobile, or portable RF source *j*.

ERP$_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source *j*, at a distance of at least λ/2π according to the applicable formula of paragraph §1.1307(b)(3)(i)(C) of this section.

Evaluated$_k$ = the maximum reported SAR or MPE of fixed, mobile, or portable RF source *k* either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit$_k$ = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source *k*, as applicable from §1.1310 of this chapter.

2.3. Device Classification

According to the user manual, the antenna of this device is at least 20cm away from the body of the user, this device is classified as a Mobile Device. So, the RF exposure evaluation requirements of § 2.1091 for mobile device exposure conditions subject to MPE limits.

2.4. Calculated Result

Product	Parsyl Passport
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Max ERP (dBm)
802.11b/g/n	2412 ~ 2462	19.70	2	19.55
Bluetooth	2402 ~ 2480	4.92	2.5	4.27
GSM 850	824 ~ 849	25.97	-0.2	23.62
PCS 1900	1850 ~ 1910	22.97	2.8	23.62
CAT M / NB-IoT Band 2/25	1850 ~ 1915	22.00	2.8	22.65
CAT M / NB-IoT Band 4/66	1710 ~ 1780	22.00	0.4	20.25
CAT M / NB-IoT Band 5	824 ~ 849	22.00	-0.2	19.65
CAT M Band 26	814 ~ 849	22.00	-0.2	19.65
CAT M / NB-IoT Band 12	699 ~ 716	22.00	-4.5	15.35
CAT M / NB-IoT Band 13	746 ~ 756	22.00	-4.5	15.35
NB-IoT Band 71	617 ~ 652	22.00	-4.5	15.35

Remark:

1. The Max Conducted power was extracted from the 2.4G & Bluetooth Report and Modular tune-up power.
2. The Max ERP (dBm) = Max Conducted Total Power (dBm) + Antenna Gain (dBi) - 2.15.

For single RF source, Option C

Test Mode	Frequency Band (MHz)	λ / 2 π (m)	R (m)	Max ERP (W)	Threshold ERP (W)
802.11b/g/n	2412 ~ 2462	0.0198	0.20	0.0902	3.0600
Bluetooth	2402 ~ 2480	0.0199	0.20	0.0027	3.0600
GSM 850	824 ~ 849	0.0579	0.20	0.2301	1.6810
PCS 1900	1850 ~ 1910	0.0258	0.20	0.2301	3.0600
CAT M / NB-IoT Band 2/25	1850 ~ 1915	0.0258	0.20	0.1841	3.0600
CAT M / NB-IoT Band 4/66	1710 ~ 1780	0.0279	0.20	0.1059	3.0600
CAT M / NB-IoT Band 5	824 ~ 849	0.0579	0.20	0.0923	1.6810
CAT M Band 26	814 ~ 849	0.0587	0.20	0.0923	1.6606
CAT M / NB-IoT Band 12	699 ~ 716	0.0683	0.20	0.0343	1.4260
CAT M / NB-IoT Band 13	746 ~ 756	0.0640	0.20	0.0343	1.5218
NB-IoT Band 71	617 ~ 652	0.0774	0.20	0.0343	1.2587
Remark: R is from user manual.					

For multiple RF sources

The EUT supports Wi-Fi 2.4GHz + Bluetooth + License simultaneous transmissions.

The Max Simultaneous Transmission = 0.0902/3.0600 (2.4G) + 0.0027/3.0600 (Bluetooth) + 0.2301/1.6810 (GSM)= 0.17 < 1

Therefore, the device qualifies for RF exposure test exemption.

The End