



CERTIFICATION TEST REPORT

Report Number. : 12234189-E5V3

Applicant : SATELLITE TRACKING OF PEOPLE LLC
1212 NORTH POST OAK RD, SUITE 100,
HOUSTON, TX 77055, U.S.A.

Model : PLS8-US R4

FCC ID : S5EBHV4PLS8

IC : 9086A-BHV4PLS8

EUT Description : GSM, WCDMA, LTE MODULE

Test Standard(s) : FCC 47 CFR PART 1 SUBPART I
FCC 47 CFR PART 1 SUBPART J
ISED RSS – 102 ISSUE 5

Date Of Issue:
September 14, 2018

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NVLAP LAB CODE 200065-0 (FREMONT)

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	7/9/2018	Initial Issue	--
V2	8/28/2018	Updated model number	Tina Chu
V3	9/14/2018	Updated Section 6 to address TCB's question	Tina Chu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: SATELLITE TRACKING OF PEOPLE LLC
1212 NORTH POST OAK RD, SUITE 100,
HOUSTON, TX 77055, U.S.A.

EUT DESCRIPTION: GSM, WCDMA, LTE MODULE

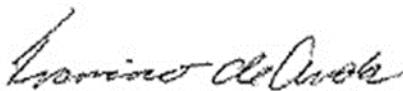
MODEL: PLS8-US R4

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 1 SUBPART I & PART 2 SUBPART J	Complies
ISED RSS 102 ISSUE 5	Complies

UL Verification Services Inc. calculated the RF Exposure of the above equipment in accordance with the requirements set forth in the above standards, using test results reported in the test report documents referenced below and/or documentation furnished by the applicant. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations of these calculations. The results show that the equipment is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

Approved & Released For
UL Verification Services Inc. By:



FRANCISCO DE ANDA
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UL Verification Services Inc.

Prepared By:



TINA CHU
SENIOR PROJECT ENGINEER
UL Verification Services Inc.

2. TEST METHODOLOGY

All calculations were made in accordance with FCC OET Bulletin 65 Edition 97-01 and IC Safety Code 6.

3. REFERENCES

GSM 1900MHz EIRP measurements were made as documented in test report UL Verification Services Inc. document 12234189-E4V1. All other Output power and Duty cycle data is excerpted from the original certification MPE test report No.: 6-0744-15-3-1b (FCC ID:QIPALS3-USR3).

Antenna gain data is excerpted from product documentation provided by the applicant.

4. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA.

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at [UL Verification Services Inc.](#)

5. MAXIMUM PERMISSIBLE RF EXPOSURE

5.1. FCC RULES

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of §2.1093 of this chapter.

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

NOTES:

- (1) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when a person is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.
- (2) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure

5.2. IC RULES

For the purpose of this standard, Industry Canada has adopted the SAR and RF field strength limits established in Health Canada's RF exposure guideline, Safety Code 6.

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m ²)	Reference Period (minutes)
0.003-10 ²¹	83	90	-	Instantaneous*
0.1-10	-	0.73/ f	-	6**
1.1-10	87/ $f^{0.5}$	-	-	6**
10-20	27.46	0.0728	-2	6
20-48	58.07/ $f^{0.25}$	0.1540/ $f^{0.25}$	8.944/ $f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619 $f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/ $f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x 10 ⁻⁴ $f^{0.5}$	6.67 x 10 ⁻⁵ f	616000/ $f^{1.2}$

Note: f is frequency in MHz.

* Based on nerve stimulation (NS).

** Based on specific absorption rate (SAR).

5.3. EQUATIONS

POWER DENSITY

Power density is given by:

$$S = \text{EIRP} / (4 * \pi * D^2)$$

Where

S = Power density in mW/cm²

EIRP = Equivalent Isotropic Radiated Power in mW

D = Separation distance in cm

Power density in units of mW/cm² is converted to units of W/m² by multiplying by 10.

DISTANCE

Distance is given by:

$$D = \text{SQRT} (\text{EIRP} / (4 * \pi * S))$$

Where

D = Separation distance in cm

EIRP = Equivalent Isotropic Radiated Power in mW

S = Power density in mW/cm²

SOURCE-BASED DUTY CYCLE

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

$$\text{Source-based time-averaged EIRP} = (\text{DC} / 100) * \text{EIRP}$$

Where

DC = Duty Cycle in %, as applicable

EIRP = Equivalent Isotropic Radiated Power in W

MIMO AND COLOCATED TRANSMITTERS (IDENTICAL LIMIT FOR ALL TRANSMITTERS)

For multiple chain devices, and colocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the EIRP (in linear units) of each transmitter.

$$\text{Total EIRP} = (\text{EIRP1}) + (\text{EIRP2}) + \dots + (\text{EIRPn})$$

where

EIRPx = Source-based time-averaged EIRP of chain x or transmitter x

The total EIRP is then used to calculate the Power Density or the Distance as applicable.

MIMO AND COLOCATED TRANSMITTERS

For multiple colocated transmitters operating simultaneously in frequency bands where different limits apply:

The Power Density at the specified separation distance is calculated for each transmitter chain or transmitter.

The fraction of the exposure limit is calculated for each chain or transmitter as
(Power Density of chain or transmitter) / (Limit applicable to that chain or transmitter).

The fractions are summed.

Compliance is established if the sum of the fractions is less than or equal to one.

5.4. IC EXEMPTION

INDUSTRY CANADA EXEMPTION

RF exposure evaluation is required if the separation distance between the user and/or bystander 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 $4.49/f^{0.5}$ 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).

In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the e.i.r.p. was derived.

6. RF EXPOSURE RESULTS

In the table(s) below, Power and Gain are entered in units of dBm and dBi respectively and conversions to linear forms are used for the calculations.

Single Chain and non-colocated transmitters								
Band	Mode	FCC Limit (mW/cm ²)	Output AVG (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (mW)	Separation Distance (cm)
850 MHz	GSM	0.55	33.50	1.80	35.30	50.0	1694.2	15.66
1900 MHz	GSM ^{Note 4}	1.00	30.50	3.80	30.70	50.0	587.4	6.84
850 MHz	WCDMA Band 5	0.55	24.50	1.80	26.30	100.0	426.6	7.86
1900 MHz	WCDMA Band 2	1.00	24.50	3.80	28.30	100.0	676.1	7.34
1700 MHz	WCDMA Band 4	1.00	24.50	3.90	28.40	100.0	691.8	7.42
700 MHz	LTE Band 17	0.47	23.50	1.10	24.60	100.0	288.4	6.98
850 MHz	LTE Band 5	0.55	23.50	1.80	25.30	100.0	338.8	7.00
1700 MHz	LTE Band 4	1.00	23.50	3.90	27.40	100.0	549.5	6.61
1900 MHz	LTE Band 2	1.00	23.50	3.80	27.30	100.0	537.0	6.54

Single Chain and non-colocated transmitters								
Band	Mode	IC Limit (W/m ²)	Output AVG (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (W)	Separation Distance (m)
850 MHz	GSM	2.58	33.50	1.80	35.30	50.0	1.7	0.23
1900 MHz	GSM ^{Note 4}	4.48	30.50	3.80	30.70	50.0	0.6	0.10
850 MHz	WCDMA Band 5	2.58	24.50	1.80	26.30	100.0	0.4	0.11
1900 MHz	WCDMA Band 2	4.48	24.50	3.80	28.30	100.0	0.7	0.11
1700 MHz	WCDMA Band 4	4.25	24.50	3.90	28.40	100.0	0.7	0.11
700 MHz	LTE Band 17	2.32	23.50	1.10	24.60	100.0	0.3	0.10
850 MHz	LTE Band 5	2.58	23.50	1.80	25.30	100.0	0.3	0.10
1700 MHz	LTE Band 4	4.24	23.50	3.90	27.40	100.0	0.5	0.10
1900 MHz	LTE Band 2	4.48	23.50	3.80	27.30	100.0	0.5	0.10

Single Chain and non-colocated transmitters										
Band	Mode	Separation Distance (cm)	Output AVG Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (mW)	FCC Power Density Limit (mW/cm ²)	FCC Power Density (mW/cm ²)	FCC Power Density Margin (mW/cm ²)
850 MHz	GSM	23.00	33.50	1.80	35.30	50.0	1694.2	0.55	0.25	-0.30
1900 MHz	GSM ^{Note 4}	23.00	30.50	3.80	30.70	50.0	587.4	1.00	0.09	-0.91
850 MHz	WCDMA Band 5	23.00	24.50	1.80	26.30	100.0	426.6	0.55	0.06	-0.49
1900 MHz	WCDMA Band 2	23.00	24.50	3.80	28.30	100.0	676.1	1.00	0.10	-0.90
1700 MHz	WCDMA Band 4	23.00	24.50	3.90	28.40	100.0	691.8	1.00	0.10	-0.90
700 MHz	LTE Band 17	23.00	23.50	1.10	24.60	100.0	288.4	0.47	0.04	-0.43
850 MHz	LTE Band 5	23.00	23.50	1.80	25.30	100.0	338.8	0.55	0.05	-0.50
1700 MHz	LTE Band 4	23.00	23.50	3.90	27.40	100.0	549.5	1.00	0.08	-0.92
1900 MHz	LTE Band 2	23.00	23.50	3.80	27.30	100.0	537.0	1.00	0.08	-0.92

Band	Mode	Separation Distance (m)	Output AVG Power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Duty Cycle (%)	EIRP (W)	IC Power Density Limit (W/m ²)	IC Power Density (W/m ²)	IC Power Density Margin (W/m ²)
850 MHz	GSM	0.23	33.50	1.80	35.30	50.0	1.69	2.58	2.58	0.00
1900 MHz	GSM ^{Note 4}	0.23	30.50	3.80	30.70	50.0	0.59	4.48	0.89	-3.58
850 MHz	WCDMA Band 5	0.23	24.50	1.80	26.30	100.0	0.43	2.58	0.65	-1.93
1900 MHz	WCDMA Band 2	0.23	24.50	3.80	28.30	100.0	0.68	4.48	1.03	-3.45
1700 MHz	WCDMA Band 4	0.23	24.50	3.90	28.40	100.0	0.69	4.25	1.05	-3.19
700 MHz	LTE Band 17	0.23	23.50	1.10	24.60	100.0	0.29	2.32	0.44	-1.88
850 MHz	LTE Band 5	0.23	23.50	1.80	25.30	100.0	0.34	2.58	0.52	-2.06
1700 MHz	LTE Band 4	0.23	23.50	3.90	27.40	100.0	0.55	4.24	0.84	-3.41
1900 MHz	LTE Band 2	0.23	23.50	3.80	27.30	100.0	0.54	4.48	0.82	-3.66

NOTES:

- 1) EUT should be installed at a minimum distance of 23 cm away from end user.
- 2) A tolerance value of +0.5 dB was included in the output power values above to cover the output power tolerance of +/-0.5 dB under extreme conditions in the real filed as declared by the client.
- 3) Listed GSM output power on above table is peak output power.
- 4) All EIRP was calculated except GSM 1900 EIRP which was measured according to KDB 971168 D01 v03r01 Section 5.8.
- 5) The antenna gain in the tables above is the maximum antenna gain.

END OF REPORT