CERTIFICATION TEST REPORT
CLASS II PERMISSIVE CHANGE

Report Number. : 12216550-E3V3

Applicant	:	PEOPLENET COMMUNICATIONS CORPORATION 4400 BAKER ROAD, MINNETONKA, MN, 55344, U.S.A.
Model	:	PLS8-US R3
FCC ID	:	NKS-DV423-LTE
EUT Description	:	GSM, WCDMA, LTE MODULE
Test Standard(s)	:	FCC CFR47 PART 24E

Date Of Issue:
MAY 17, 2018

Prepared by:
UL Verification Services Inc.
47173 Benicia Street
Fremont, CA 94538, U.S.A.
TEL: (510) 771-1000
FAX: (510) 661-0888

NVLAP LAB CODE 200065-0

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	5/2/2018	Initial Review	--
V2	5/14/2018	Updated report to address TCB's questions	Tina Chu
V3	5/17/2018	Updated report to address TCB's questions	Tina Chu

UL VERIFICATION SERVICES INC. FORM NO: CCSUP4701i
47173 BENICIA STREET, FREMONT, CA 94538, USA TEL: (510) 771-1000 FAX: (510) 661-0888

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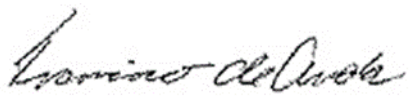
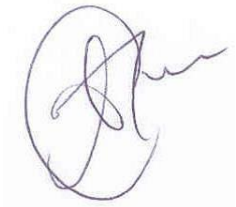
1. ATTESTATION OF TEST RESULTS

Applicant Name and Address	PEOPLENET COMMUNICATIONS CORPORATION 4400 BAKER ROAD, MINNETONKA, MN, 55344, U.S.A.
Model	PLS8-US R3
FCC ID	NKS-DV423-LTE
EUT Description	GSM, WCDMA, LTE MODULE
Serial Number	DVR1801000022
Date Tested	APRIL 20, 2017
Applicable Standards	FCC CFR 47 Part 24E
Test Results	COMPLIES

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by UL Verification Services Inc. based on interpretations and/or observations of test results. Measurement Uncertainties were not taken into account and are published for informational purposes only. The test results show that the equipment tested 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, any agency of the Federal Government, or any agency of any government (NIST Handbook 150, Annex A). This report is written to support regulatory compliance of the applicable standards stated above.

Approved & Released By:	Prepared By:
	
Francisco de Anda Operations Leader UL Verification Services Inc.	Tina Chu Senior Project Engineer UL Verification Services Inc.

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI/TIA-603-E-2016, FCC CFR 47 Part 2, Part 24, FCC KDB 971168 D01 v03/ D02 v02r01. ANSI C63.26:2015.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, Fremont, California, USA. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street
☐ Chamber A (IC:2324B-1)	☐ Chamber D (IC:22541-1)
☐ Chamber B (IC:2324B-2)	☐ Chamber E (IC:22541-2)
☐ Chamber C (IC:2324B-3)	☐ Chamber F (IC:22541-3)
	☐ Chamber G (IC:22541-4)
	☐ Chamber H (IC:22541-5)

The above test sites and facilities are covered under FCC Test Firm Registration # 208313.
UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0. The full scope of accreditation can be viewed at http://ts.nist.gov/standards/scopes/2000650.htm.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. SAMPLE CALCULATION

Where relevant, the following sample calculation is provided:
Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
36.5 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

4.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Conducted Disturbance, 9KHz to 0.15 MHz	3.84 dB
Conducted Disturbance, 0.15 to 30 MHz	3.65 dB
Radiated Disturbance, 9KHz to 30 MHz	3.15 dB
Radiated Disturbance, 30 to 1000 MHz	5.36 dB
Radiated Disturbance,1000 to 18000 MHz	4.32 dB
Radiated Disturbance,18000 to 26000 MHz	4.45 dB
Radiated Disturbance,26000 to 40000 MHz	5.24 dB
Occupied Channel Bandwidth	±0.39 %
Temperature	±0.9 °C
Supply voltages	±0.45 %
Time	±0.02 %

Uncertainty figures are valid to a confidence level of 95%.

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a GSM 850/1900, WCDMA 850/1900/1700, LTE 700/850/1900/1700MHz module.

5.2. DESCRIPTION OF CLASS II PERMISSIVE CHANGE

This Class II Permissive Change is to lower the output power of the GSM 1900MHz PCS band.

5.3. MAXIMUM OUTPUT POWER

ERP/EIRP LIMIT

FCC: §2.1046, §24.232

EIRP/ERP TEST PROCEDURE

ANSI C63.26:2015/ TIA-603-E Clause 2.2.17
KDB 971168 Section 5.6

ERP/EIRP = PMeas + GT − LC
where: ERP/EIRP = effective or equivalent radiated power, respectively (expressed in the same units as PMeas, typically dBW or dBm);
PMeas = measured transmitter output power or PSD, in dBm or dBW;
GT = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);
LC = signal attenuation in the connecting cable between the transmitter and antenna, in dB.2

For devices utilizing multiple antennas, KDB 662911 provides guidance for determining the effective array transmit antenna gain term to be used in the above equation.

The transmitter has a maximum peak conducted and EIRP output powers as follows:

GSM MODES

Part 24							
Frequency range (MHz)	Modulation	Conducted (Peak) (dBm)	Antenna Gain (dBi)	EIRP		Limit (dBm)	Margin (dB)
				dBm	mW		
1850-1910	GPRS	28.08	2.64	30.72	1180.32	33.00	-2.28
	EGPRS	26.91	2.64	29.55	901.57	33.00	-3.45

5.4. SOFTWARE AND FIRMWARE

The test utility software used during testing was Tera Term 4.88.

The firmware installed in the EUT during testing was Version 2663.

5.5. MAXIMUM ANTENNA GAIN

Frequency Range (MHz)	Antenna Peak Gain(dBi)
1850 - 1910	2.64

5.6. WORST-CASE CONFIGURATION AND MODE

GSM 1900MHz output power was decreased. Only Antenna Port 1 GSM 1900MHz output power was measured and EIRP was recalculated. Antenna Port 2 is diversity receiving only.

Worst-case modes:
- GSM GPRS
- GSM EGPRS

5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Laptop AC/DC Adapter	HP	PPP016C	F1-1005096420C	NA
Laptop	HP	EliteBook 8530p	2CE947GWYF	NA
DC power supply	DuraComm	LP-25	RB1B139142	NA

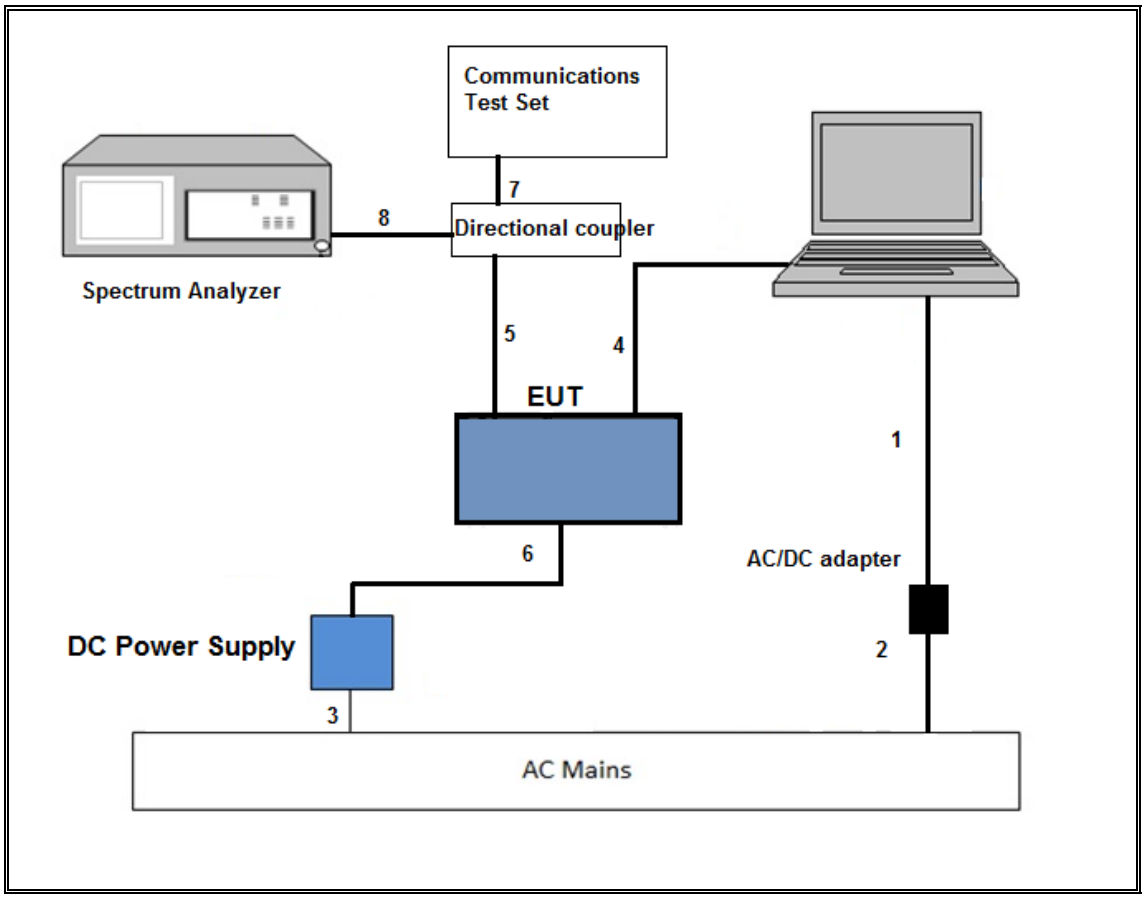
I/O CABLES (CONDUCTED TEST)

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	DC	1	DC	Unshielded	1.5	AC/DC Adapter to Laptop
2	AC	1	3-prongs	Unshielded	1	AC Mains to AC/DC Adapter
3	AC	1	3-prongs	Unshielded	1.5	DC power supply to AC mains
4	USB	1	RS-232	Unshielded	1.3	USB Adapter to Laptop
5	Antenna	1	SMA	Unshielded	1	EUT to spectrum analyzer
6	DC	1	HF 4 pin	Unshielded	3.6	DC power supply to EUT
7	RF In/Out	1	EUT	Un-shielded	0.6	N/A
8	RF In/Out	1	Barrel	N/A	N/A	N/A

TEST SETUP-CONDUCTED TESTS

EUT powered by DC power supply. Test software exercised the EUT.

SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST				
Description	**Manufacturer**	**Model**	**Asset**	**Cal Due**
Spectrum Analyzer, PSA, 3Hz to 44GHz	Keysight	E4446A	T146	7/18/2018
Wideband Communication Test Set, Call Box	R&S GmbH & Co. KG	CMW500	T919	3/28/2019
Directional Coupler	Mini-Circuits	ZUDC10-183+	T1136	6/14/2018

NOTES:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

7. RF OUTPUT POWER VERIFICATION

7.1. GSM

Using CMW500 Communication Test Set
Function: Menu select > GSM Mobile Station > GSM 850/900/1800/1900

Press **Connection control** to choose the different menus
Press **RESET** > choose all to reset all settings

Connection	Press **Signal Off** to turn off the signal and change settings Network Support > GSM+GPRS or GSM+EGPRS Main Service > Packet Data Service selection > Test Mode A – Auto Slot Config. off	
MS Signal	Press Slot Config bottom on the right twice to select and change the number of time slots and power setting	
	> Slot configuration	> Uplink/Gamma > 33 dBm for GPRS 850/900 > 27 dBm for EGPRS 850/900 > 30 dBm for GPRS1800/1900 > 26 dBm for EGPRS1800/1900
BS Signal	Enter the same channel number for TCH channel (test channel) and BCCH channel	
	Frequency Offset >	+ 0 Hz
	Mode >	BCCH and TCH
	BCCH Level >	-85 dBm (May need to adjust if link is not stable)
	BCCH Channel >	choose desire test channel [Enter the same channel number for TCH channel (test channel) and BCCH channel]
	Channel Type >	Off
	P0>	4 dB
	Slot Config >	Unchanged (if already set under MS Signal)
	TCH >	choose desired test channel
	Hopping >	Off
	Main Timeslot >	3 (Default)
Network	Coding Scheme >	CS 4 (GPRS) and MCS5 (EGPRS)
	Bit Stream >	2E9-1PSR Bit Pattern
AF/RF	Enter appropriate offsets for Ext. Att. Output and Ext. Att. Input	
Connection	Press **Signal On** to turn on the signal and change settings	

RESULT

7.1.1. GSM 1900MHz

ID:	37290	Date:	4/20/18

GPRS (GMSK) - Coding Scheme: CS1

Band	Ch No.	Freq. (MHz)	Peak Output power (dBm)	Average Output Power (dBm)	Peak to Average Ratio
1900.0	512	1850.2	28.08	27.68	0.40
	661	1880.0	27.53	27.24	0.29
	810	1909.8	27.25	27.08	0.17

EGPRS (8PSK) - Coding Scheme: MCS5

Band	Ch No.	Freq. (MHz)	Peak Output power (dBm)	Average Output Power (dBm)	Peak to Average Ratio
1900.0	512	1850.2	26.91	23.46	3.45
	661	1880.0	26.69	23.29	3.40
	810	1909.8	26.48	22.63	3.85