

RF Exposure Report

Report No.: SA160923E02E

FCC ID: U8G-P1811ACPRO

Test Model: Balance 30 Pro

Series Model: Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro

Received Date: Mar. 20, 2019

Test Date: Apr. 24 to 27, 2019

Issued Date: May 21, 2019

Applicant: PISMO LABS TECHNOLOGY LIMITED

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**FCC Registration /
Designation Number:** 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
SA160923E02E	Original release.	May 21, 2019

1 Certificate of Conformity

Product: PEPWAVE / peplink Wireless Product

Brand: PEPWAVE / peplink

Test Model: Balance 30 Pro

Series Model: Peplink Balance 30 Pro, BPL-031-LTEA-W-T, Pismo 811AC, B30 Pro

Sample Status: PROTOTYPE

Applicant: PISMO LABS TECHNOLOGY LIMITED

Test Date: Apr. 24 to 27, 2019

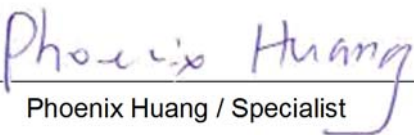
Standards: FCC Part 2 (Section 2.1091)

KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

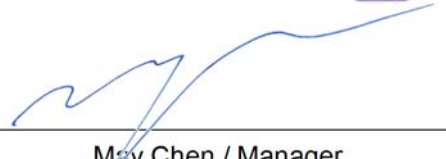
Prepared by :


Phoenix Huang / Specialist

Date:

May 21, 2019

Approved by :


May Chen / Manager

Date:

May 21, 2019

2 RF Exposure

2.1 Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time (minutes)
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 ; *Plane-wave equivalent power density

2.2 MPE Calculation Formula

$$Pd = (Pout * G) / (4 * \pi * r^2)$$

where

Pd = power density in mW/cm²

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

2.3 Classification

The antenna of this product, under normal use condition, is at least 49 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

For WLAN						
Antenna No.	Brand	Model	Antenna Net Gain (dBi)	Frequency Range (MHz)	Antenna Type	Connector Type
2.4GHz	Master Wave Technology Co., Ltd	98614PRSX000	2.44	2400 ~ 2500	Dipole	R-SMA
5GHz			4.10	5150 ~ 5350	Dipole	R-SMA
			4.73	5725 ~ 5850		
For WWAN(LTE)						
Brand	Model	Antenna Net Gain(dBi)	Frequency Range (MHz)	Antenna Type	Connector Type	
Master Wave Technology Co., Ltd	98642ZSAX001	2.5	1920~1980	Dipole	SMA	
		1.82	880~915			
		1.48	1710~1785			
		3.42	2500~2570			
		2	832~862			
		3.52	2570~2620			
		3.02	2300~2400			
		2.39	1850~1910			
		1.69	699~716			
		2.12	777~787			
		2.39	1850~1915			
		3.52	2496~2690			

2.5 Calculation Result

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
WLAN 2.4GHz	2437	997.839	5.45	49	0.11600	1
WLAN 5GHz (U-NII-1)	5230	511.334	7.11	49	0.08712	1
WLAN 5GHz (U-NII-3)	5795	410.933	7.74	49	0.08094	1

Note:

- 2.4GHz: The directional gain = 2.44dBi + 10log(2) = 5.45dBi.
- 5GHz (U-NII-1): The directional gain = 4.1dBi + 10log(2) = 7.11dBi.
- 5GHz (U-NII-3): The directional gain = 4.73dBi + 10log(2) = 7.74dBi.

WWAN (LTE Band 12) <WWAN (LTE) Worst Case> (FCC ID: N7NMC7455)

Frequency Band (MHz)	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
698-716	699.7	251	1.69	49	0.01228	0.4665

Note: Limit of Power Density = F/1500

WWAN (2G) <USB cellular device Worst Case>

Frequency Band (MHz)	Evaluation Frequency (MHz)	Max. EIRP (mW)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
824-849	824.2	11480	49	0.38049	0.5495

Note:

- This product can operate with plug-in USB cellular device which has maximum of 7W(ERP) output power. ERP is then converted to EIRP as follows:
Formula: $EIRP(W) = 1.64 \times ERP(W)$
 $EIRP = 1.64 \times 7 W = 11.48 W = 11480mW$
- Limit of Power Density = F/1500

Conclusion:

The formula of calculated the MPE is:

$$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density

$$WLAN\ 2.4GHz + WLAN\ 5GHz + WWAN\ (LTE) + WWAN\ (2G) = 0.11600 / 1 + 0.08712 / 1 + 0.01228 / 0.4665 + 0.38049 / 0.5495 = 0.92187$$

Therefore the maximum calculations of above situations are less than the “1” limit.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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Appendix

MPE Evaluation for MC7455 Radio Module (FCC ID: N7NMC7455)

Mode	Equipment Category	Transmitter Range (MHz)		Maximum Output Power		Antenna Gain (dBi)	Power Density (mW/cm ²)		Ratio
		Start	Stop	(dBm)	(W)		Vaule	Limit	
WCDMA	Band 2	1850	1910	24	0.25	2.39	0.01437	1	0.01437
	Band 4	1710	1755	24	0.25	1.48	0.01165	1	0.01165
	Band 5	824	849	24	0.25	2	0.01313	0.5493*	0.02390
LTE	Band 2	1850	1910	24	0.25	2.39	0.01437	1	0.01437
	Band 4	1710	1755	24	0.25	1.48	0.01165	1	0.01165
	Band 5	824	849	24	0.25	2	0.01313	0.5493*	0.02390
	Band 7	2500	2570	23	0.2	3.42	0.01457	1	0.01457
	Band 12	699	716	24	0.251	1.69	0.01228	0.4665*	0.02633
	Band 13	777	787	24	0.25	2.12	0.01350	0.5180*	0.02606
	Band 25	1850	1915	24	0.25	2.39	0.01437	1	0.01437
	Band 26	814	849	24	0.25	2	0.01313	0.5426*	0.02420
	Band 30	2305	2315	23	0.2	3.02	0.01329	1	0.01329
	Band 41	2496	2690	23	0.2	3.52	0.01491	1	0.01491

Note: *Limit of Power Density = F/1500