

RF Exposure Report

Report No.: SA160923E02G

FCC ID: U8G-P1811AC

Test Model: MAX HD2

Series Model: MAX HD2 LTEA, MAX HD1 LTEA, Pismo 811AC, Pismo 811ac with 4SIMs Piggy, MAX-HD2-LTEA-R-T, MAX-HD1-LTEA-R-T, MAX HD1, Pepwave MAX HD2, Pepwave MAX HD2 LTEA, Pepwave MAX HD1, Pepwave MAX HD1 LTEA, Peplink MAX HD2, Peplink MAX HD2 LTEA, Peplink MAX HD1, Peplink MAX HD1 LTEA

Received Date: Jan. 09, 2020

Test Date: Feb. 04, 2020

Issued Date: Mar. 11, 2020

Applicant: PISMO LABS TECHNOLOGY LIMITED

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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Test Location: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan.

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

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Release Control Record

Issue No.	Description	Date Issued
SA160923E02G	Original release.	Mar. 11, 2020

1 Certificate of Conformity

Product: PEPWAVE / peplink Wireless Product

Brand: PEPWAVE / peplink

Test Model: MAX HD2

Series Model: MAX HD2 LTEA, MAX HD1 LTEA, Pismo 811AC, Pismo 811ac with 4SIMs Piggy, MAX-HD2-LTEA-R-T, MAX-HD1-LTEA-R-T, MAX HD1, Pepwave MAX HD2, Pepwave MAX HD2 LTEA, Pepwave MAX HD1, Pepwave MAX HD1 LTEA, Peplink MAX HD2, Peplink MAX HD2 LTEA, Peplink MAX HD1, Peplink MAX HD1 LTEA

Sample Status: PROTOTYPE

Applicant: PISMO LABS TECHNOLOGY LIMITED

Test Date: Feb. 04, 2020

Standards: FCC Part 2 (Section 2.1091)

IEEE C95.3-2002

References Test Guidance: KDB 447498 D01 General RF Exposure Guidance v06

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 :  , **Date:** Mar. 11, 2020
Claire Kuan / Specialist

Approved by :  , **Date:** Mar. 11, 2020
Clark Lin / Technical Manager

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 50 cm away from the body of the user. So, this device is classified as **Mobile Device**.

2.4 Antenna Gain

Original							
For WLAN							
Antenna No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
WAN(2.4G)-1	SmartAnt	SAA06-220690	3	2400 ~ 2500 MHz	Dipole	R-SMA	150
WAN(2.4G)-2	SmartAnt	SAA06-220690	3	2400 ~ 2500 MHz	Dipole	R-SMA	150
AP(5G)-1	SmartAnt	SAA06-220690	5.5	5150 ~ 5350 MHz	Dipole	R-SMA	260
			6	5350 ~ 5875 MHz			260
AP(5G)-2	SmartAnt	SAA06-220690	5.5	5150 ~ 5350 MHz	Dipole	R-SMA	260
			6	5350 ~ 5875 MHz			260
For GPS							
Antenna No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	
1	MASTER WAVE TECHNOLOGY CO., LTD.	98335KSAF000	4.5 ±0.5	1575.42 MHz	Magnetic	SMA	
For WWAN(LTE)							
Antenna No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	
Cellular 1 Main	MASTER WAVE TECHNOLOGY CO., LTD.	98619ZSAX025	1.99	699~960 MHz	Dipole	SMA	
Cellular 1 Diversity/Aux			4	1575~2170 MHz			
Cellular 2 Main			1	2300~2320 MHz			
Cellular 2 Diversity/Aux			2.8	2325~2690 MHz			
Newly							
For WLAN							
Antenna No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	
WLAN(2.4G)	Master Wave Technology Co., Ltd.	98614PRSX000	2.44	2.4~2.4835 GHz	Omni-directional	R-SMA	
WLAN(5G)-1	Master Wave Technology Co., Ltd.	98614PRSX000	4.1	5.15~5.25 GHz	Omni-directional	R-SMA	
WLAN(5G)-2	Master Wave Technology Co., Ltd.	98614PRSX000	4.73	5.725~5.85 GHz	Omni-directional	R-SMA	

For GPS

Antenna No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type
GPS	Master Wave Technology Co., Ltd.	98335KSAF000	4.5	1575.42 MHz	Magnetic	SMA

For For WWAN(LTE)

Antenna No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type
Cellular 1 Main	Master Wave Technology Co., Ltd.	98619ZSAX052	2.77	699~960	Dipole	SMA
Cellular 1 Diversity/Aux			3.58	1575~2170	Dipole	SMA
Cellular 2 Main			4.38	2325~2690	Dipole	SMA
Cellular 2 Diversity/Aux			2.16	3400~3800	Dipole	SMA

Note: WLAN was test with original antenna

2.5 Calculation Result of Maximum Conducted Power

For WLAN:

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2.4GHz	2437	988.867	6.01	50	0.12560	1
5GHz	5785	264.424	9.01	50	0.06701	1

NOTE:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.
2. 2.4GHz: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 6.01\text{dBi}$
3. 5GHz: Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20})^2 / 2] = 9.01\text{dBi}$

For WWAN (LTE) module (FCC ID: N7NEM75S):

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
Cellular 1 LTE (EM7511)	790.5	230	2.77	50	0.01385	0.527
Cellular 2 LTE (EM7511)	790.5	230	2.77	50	0.01385	0.527

*Limit of Power Density = F/1500

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

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
USB cellular device	824.2	11480	0.00	50	0.36542	0.5495

*Limit of Power Density = F/1500

Conclusion:

The formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

$$\text{WLAN 2.4GHz} + \text{WLAN 5GHz} + \text{Cellular 1 LTE} + \text{Cellular 2 LTE} + \text{USB cellular device} = 0.12560 / 1 + 0.06701 / 1 + 0.01385 / 0.527 + 0.01385 / 0.527 + 0.36542 / 0.5495 = 0.91022$$

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

Appendix

WWAN (LTE) module (FCC ID: N7NEM75S)
 MPE Evaluation

Mode	Equipment Category	Transmitter Range (MHz)		Maximum		Antenna Gain (dBi)	Power Density (mW/cm ²)		Ratio
		Start	Stop	(dBm)	(W)		Valeur	Limit	
UMTS	Band II	1850	1910	22.57	0.181	3.58	0.01314	1	0.01314
	Band IV	1710	1755	22.83	0.192	3.58	0.01394	1	0.01394
	Band V	824	849	22.86	0.193	2.77	0.01163	0.54933	0.02117
LTE	Band 2	1850	1910	22.55	0.18	3.58	0.01307	1	0.01307
	Band 4	1710	1755	22.98	0.199	3.58	0.01444	1	0.01444
	Band 5	824	849	22.83	0.192	2.77	0.01157	0.54933	0.02106
	Band 7	2500	2570	22.98	0.199	4.38	0.01737	1	0.01737
	Band 12	699	716	22.76	0.189	2.77	0.01138	0.466	0.02442
	Band 13	777	787	22.85	0.193	2.77	0.01163	0.518	0.02245
	Band 14	788	798	23.61	0.23	2.77	0.01385	0.52533	0.02636
	Band 26	814	849	22.83	0.192	2.77	0.01157	0.54266	0.02132
	Band 30	2305	2315	21.43	0.139	4.38	0.01213	1	0.01213
	Band 41	2496	2690	22.98	0.199	4.38	0.01737	1	0.01737
	Band 48	3550	3700	22.81	0.191	2.48	0.01000	1	0.01000
	Band 66	1710	1780	22.98	0.199	3.58	0.01444	1	0.01444

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