

## RF Exposure Report

**Report No.:** SA160923E02

**FCC ID:** U8G-P1811AC

**Test Model:** MAX HD2 LTE

**Series Model:** MAX HD2 LTEA

**Received Date:** Sep. 23, 2016

**Test Date:** Oct. 28 to Nov. 01, 2016

**Issued Date:** Nov. 14, 2016

**Applicant:** Pismo Labs Technology Limited

**Address:** FLAT/RM A5, 5/F, HK SPINNERS IND BLDG PHASE 6, 481 CASTLE PEAK ROAD, CHEUNG SHA WAN, HONG KONG.

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

**Lab Address:** E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,  
Taiwan R.O.C.

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### Release Control Record

Issue No.	Description	Date Issued
SA160923E02	Original release.	Nov. 14, 2016

## 1 Certificate of Conformity

**Product:** Pepwave / Peplink / Pismo Labs Wireless Product

**Brand:** Pepwave

**Test Model:** MAX HD2 LTE

**Series Model:** MAX HD2 LTEA

**Sample Status:** ENGINEERING SAMPLE

**Applicant:** Pismo Labs Technology Limited

**Test Date:** Oct. 28 to Nov. 01, 2016


**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 :**

  
\_\_\_\_\_  
Wendy Wu / Specialist

**Date:**

Nov. 14, 2016

**Approved by :**

  
\_\_\_\_\_  
May Chen / Manager

**Date:**

Nov. 14, 2016

## 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 <sup>2</sup> )	Average Time (minutes)
Limits For General Population / Uncontrolled Exposure				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

### 2.2 MPE Calculation Formula

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

where

Pd = power density in mW/cm<sup>2</sup>

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 27cm away from the body of the user.

So, this device is classified as **Mobile Device**.

This product could be applied with 3G USB cellular device, and the safe distance is 50cm for collocated radio.

## 2.4 Antenna Gain

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 1 Diversity/Aux			2.8	2325~2690 MHz			

## 2.5 Calculation Result

### For WLAN:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412-2462	988.867	6.01	27	0.43072	1
5180-5240	197.885	8.51	27	0.15328	1
5745-5825	264.424	9.01	27	0.22981	1

#### NOTE:

2.4GHz: Directional gain = 3dBi + 10log(2) = 6.01dBi

5GHz: UNII-1: Directional gain = 5.5dBi + 10log(2) = 8.51dBi

UNII-3: Directional gain = 6dBi + 10log(2) = 9.01dBi

### For WLAN / WWAN(LTE) / 3G device coexistence mode:

Condition	Coexistence				
1	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7355)	WWAN(LTE) module (FCC ID: N7NMC7355)	-
2	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7355)	WWAN(LTE) module (FCC ID: N7NMC7355)	3G/LTE (USB cellular device)
3	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7455)	WWAN(LTE) module (FCC ID: N7NMC7455)	-
4	WLAN (2.4GHz)	WLAN (5GHz)	WWAN(LTE) module (FCC ID: N7NMC7455)	WWAN(LTE) module (FCC ID: N7NMC7455)	3G/LTE (USB cellular device)

Note: From the above conditions, the worst case was found in condition 1 and 2. Therefore only the test data of the condition were recorded in this report.

Condition 1					
Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412-2462	988.867	6.01	27	0.43072	1
5745-5825	264.424	9.01	27	0.22981	1
824-849	500	1.99	27	0.08630	0.5493
824-849	500	1.99	27	0.08630	0.5495
Condition 2					
Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
2412-2462	988.867	6.01	50	0.12560	1
5745-5825	264.424	9.01	50	0.06701	1
824-849	500	1.99	50	0.02517	0.5493
824-849	500	1.99	50	0.02517	0.5495
824-849	11480*	-	50	0.36542	0.5495

\* 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 :  $EIRP(W) = 1.64 \times ERP(W)$

$$EIRP = 1.64 \times 7 W = 11.48 W = 11480mW$$

**Conclusion:**

All of the WLAN / WWAN(LTE) / 3G device can transmit simultaneously, the formula of calculated the MPE is:

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

CPD = Calculation power density

LPD = Limit of power density

**Condition 1:**

Therefore, the worst-case situation is  $0.43072 / 1 + 0.22981 / 1 + 0.08630 / 0.5493 + 0.08630 / 0.5495 = 0.97469$ ,

which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

**Condition 2:**

Therefore, the worst-case situation is  $0.12560 / 1 + 0.06701 / 1 + 0.02517 / 0.5493 + 0.02517 / 0.5495 + 0.36542 / 0.5495 = 0.94929$ ,

which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

--- END ---



## Appendix

3G/LTE module

MPE Evaluation for FCC ID: N7NMC7355 Radio Module:

Mode	Equipment Category	Max Transmitter Duty Cycle	Transmitter Range (MHz)		Maximum		Antenna Gain (dBi)	Power Density (mW/cm <sup>2</sup> )		Ratio
			Start	Stop	(dBm)	(W)		Vaule	Limit	
GPRS	Class 10	25%	824	849	33	2	1.99	0.0863	0.54933	<b>0.15710</b>
		25%	1850	1910	30	1	4	0.06855	1	0.06855
EDGE	Class 10	25%	824	849	28	0.63	1.99	0.02719	0.54933	0.04950
		25%	1850	1910	27	0.5	4	0.03427	1	0.03427
	Class 11	37.50%	824	849	26.2	0.42	1.99	0.02719	0.54933	0.04950
		37.50%	1850	1910	25.2	0.33	4	0.03393	1	0.03393
	Class 12	50%	824	849	25	0.32	1.99	0.02762	0.54933	0.05028
		50%	1850	1910	24	0.25	4	0.03427	1	0.03427
CDMA	EvDo	100%	824	849	25	0.32	1.99	0.05523	0.54933	0.10054
		100%	1850	1910	25	0.32	4	0.08774	1	0.08774
		100%	817	824	25	0.32	1.99	0.05523	0.54466	0.10140
UMTS	HSDPA HSUPA	100%	824	849	24	0.25	1.99	0.04315	0.54933	0.07855
		100%	1710	1755	24	0.25	4	0.06855	1	0.06855
		100%	1850	1910	24	0.25	4	0.06855	1	0.06855
LTE	Band 17	100%	704	716	24	0.25	1.99	0.04315	0.46933	0.09194
	Band 13	100%	777	787	24	0.25	1.99	0.04315	0.518	0.08330
	Band 5	100%	824	849	24	0.25	1.99	0.04315	0.54933	0.07855
	Band 4	100%	1710	1755	24	0.25	4	0.06855	1	0.06855
	Band 2	100%	1850	1910	24	0.25	4	0.06855	1	0.06855
	Band 25	100%	1850	1915	24	0.25	4	0.06855	1	0.06855

Note: 1. Distance to Human Body: 27cm

2. The ratios which was indicated in bold type of the max ratio.

3G/LTE module

MPE Evaluation for FCC ID: N7NMC7455 Radio Module:

Operating Mode	TX Freq Range (MHz)		Max Time-Avg Cond Power		Antenna Gain (dBi)	Power Density (mW/cm <sup>2</sup> )		Ratio
	Start	Stop	(dBm)	(W)		Vaule	Limit	
WCDMA Band II LTE Band 2	1850	1910	24	0.25	4	0.0686	1	0.06855
WCDMA Band IV LTE Band 4	1710	1755	24	0.25	4	0.0686	1	0.06855
WCDMA Band V LTE Band 5	824	849	24	0.25	1.99	0.0432	0.54933	0.07855
LTE Band 7	2500	2570	23	0.2	2.8	0.0416	1	0.04160
LTE Band 12	699	716	24	0.25	1.99	0.0432	0.466	<b>0.09260</b>
LTE Band 13	777	787	24	0.25	1.99	0.0432	0.518	0.08330
LTE Band 25	1850	1915	24	0.25	4	0.0686	1	0.06855
LTE Band 26	814	849	24	0.25	1.99	0.0432	0.54266	0.07952
LTE Band 30	2305	2315	23	0.2	1	0.0275	1	0.02748
LTE Band 41	2496	2690	23	0.2	2.8	0.0416	1	0.04160

Note: 1. Distance to Human Body: 27cm

2. The ratios which was indicated in bold type of the max ratio.