RF Exposure Report

Report No.: SA16809E04

FCC ID: U8G-P1AC4

Test Model: MAX BR1 MK2

Received Date: Aug. 09, 2016

Test Date: Dec. 09, 2016

Issued Date: July 27, 2017

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
SA16809E04	Original release.	July 27, 2017

1 Certificate of Conformity

Product:	Pepwave / Peplink / Pismo Wireless Product
Brand:	Pepwave / Peplink / Pismo
Test Model:	MAX BR1 MK2
Sample Status:	ENGINEERING SAMPLE
Applicant:	Pismo Labs Technology Limited
Test Date:	Dec. 09, 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 : Cindy Hsin , **Date:** July 27, 2017

Cindy Hsin / Specialist

Approved by : , **Date:** July 27, 2017

May Chen / 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				
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^2

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 24cm 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	Ant. Gain (dBi)	Frequency range	Antenna Type	Connecter Type
1	NA	NA	3	2400 MHz - 2500 MHz	Dipole	R-SMA
			4~5.5	5150 MHz - 5350 MHz		
			6.5~6	5350 MHz - 5875 MHz		
2	NA	NA	3	2400 MHz - 2500 MHz	Dipole	R-SMA
			4~5.5	5150 MHz - 5350 MHz		
			5.5~6	5350 MHz - 5875 MHz		

For GPS						
Antenna No.	Brand	Model	Ant. Gain (dBi)	Frequency range	Antenna Type	Connecter Type
1	MASTER WAVE TECHNOLOGY CO., LTD.	98335KSAF000	4.5 ±0.5	1575.42MHz	Magnetic	SMA

For LTE						
Antenna No.	Brand	Model	Ant. Gain (dBi)	Frequency range	Antenna Type	Connecter Type
1	MASTER WAVE TECHNOLOGY CO., LTD.	98619ZSAX025	1.99	699~960 MHz	Dipole	SMA
			4	1575~2170 MHz		
			1	2300~2320MHz		
			2.8	2325~2690 MHz		
2	MASTER WAVE TECHNOLOGY CO., LTD.	98619ZSAX025	1.99	699~960 MHz	Dipole	SMA
			4	1575~2170 MHz		
			1	2300~2320MHz		
			2.8	2325~2690 MHz		

2.5 Calculation Result

For WLAN:

Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	789.828	6.01	24	0.43541	1
5180-5240	195.769	8.51	24	0.19192	1
5745-5825	181.276	9.01	24	0.19939	1

NOTE:
2.4GHz: Directional gain = 3dBi + 10log(2) = 6.01dBi i
5GHz: UNII-1: Directional gain = 5.5dBi + 10log(2) = 8.51dBi
UNII-3: Directional gain = 6dBi + 10log(2) = 9.01dBi

For WLAN & WWAN / LTE coexistence mode:

Condition	Technology		
1	WLAN (2.4GHz)	WLAN (5GHz)	WWAN / LTE module (FCC ID : N7NMC7455)
2	WLAN (2.4GHz)	WLAN (5GHz)	WWAN / LTE module (FCC ID : N7NMC7355)

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

Condition 2

Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2412-2462	789.828	6.01	24	0.43541	1
5745-5825	181.276	9.01	24	0.19939	1
824-849	500	1.99	24	0.10923	0.54933

* Maximum Power = 1959mw x 0.25=489.75mw

Conclusion:

All of the WLAN / WWAN (LTE / 3G) device can transmit simultaneously, the formula of calculated the MPE is:
CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1
CPD = Calculation power density
LPD = Limit of power density

Condition 2:

Therefore, the worst-case situation is 0.43541 / 1 + 0.19939 / 1 + 0.10923 / 0.5493 = 0.83365
which is less than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

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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^2)		Ratio
			Start	Stop	(dBm)	(W)		Vaule	Limit	
GPRS	Class 10	25%	824	849	33	2	1.99	0.10923	0.54933	**0.19884**
		25%	1850	1910	30	1	4	0.08676	1	0.08676
EDGE	Class 10	25%	824	849	28	0.63	1.99	0.03441	0.54933	0.06264
		25%	1850	1910	27	0.5	4	0.04338	1	0.04338
	Class 11	37.50%	824	849	26.2	0.42	1.99	0.03441	0.54933	0.06264
		37.50%	1850	1910	25.2	0.33	4	0.04294	1	0.04294
	Class 12	50%	824	849	25	0.32	1.99	0.03495	0.54933	0.06362
		50%	1850	1910	24	0.25	4	0.04338	1	0.04338
CDMA	EvDo	100%	824	849	25	0.32	1.99	0.06991	0.54933	0.12726
		100%	1850	1910	25	0.32	4	0.11105	1	0.11105
		100%	817	824	25	0.32	1.99	0.06991	0.54466	0.12836
UMTS	HSDPA HSUPA	100%	824	849	24	0.25	1.99	0.05461	0.54933	0.09941
		100%	1710	1755	24	0.25	4	0.08676	1	0.08676
		100%	1850	1910	24	0.25	4	0.08676	1	0.08676
LTE	Band 17	100%	704	716	24	0.25	1.99	0.05461	0.46933	0.11636
	Band 13	100%	777	787	24	0.25	1.99	0.05461	0.518	0.10542
	Band 5	100%	824	849	24	0.25	1.99	0.05461	0.54933	0.09941
	Band 4	100%	1710	1755	24	0.25	4	0.08676	1	0.08676
	Band 2	100%	1850	1910	24	0.25	4	0.08676	1	0.08676
	Band 25	100%	1850	1915	24	0.25	4	0.08676	1	0.08676

Note: 1. Distance to Human Body: 24cm
2. The ratio which was indicated in bold type of the max ratio.
3.This device has 5 MHz and 10 MHz bandwidth modes for LTE Bands 13 (700 MHz); 1.4 MHz, 3 MHz, 5 MHz and 10 MHz bandwidth modes for LTE Bands 5 and 12 (850 and 700 MHz); 1.4 MHz, 3 MHz, 5 MHz, 10 MHz, 15 MHz and 20 MHzbandwidth modes for LTE Bands 2, 25 and 4 (1900 and 1700 MHz); 5 MHz, 10 MHz, 15 MHz and 20 MHz bandwidth modes for LTE Bands 7 (2500 MHz).

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^2)		Ratio
	Start	Stop	(dBm)	(W)		Vaule	Limit	
WCDMA Band II LTE Band 2	1850	1910	24	0.25	4	0.087	1	0.08676
WCDMA Band IV LTE Band 4	1710	1755	24	0.25	4	0.087	1	0.08676
WCDMA Band V LTE Band 5	824	849	24	0.25	1.99	0.055	0.54933	0.09941
LTE Band 7	2500	2570	23	0.2	2.8	0.053	1	0.05265
LTE Band 12	699	716	24	0.25	1.99	0.055	0.466	**0.11719**
LTE Band 13	777	787	24	0.25	1.99	0.055	0.518	0.10542
LTE Band 25	1850	1915	24	0.25	4	0.087	1	0.08676
LTE Band 26	814	849	24	0.25	1.99	0.055	0.54266	0.10063
LTE Band 30	2305	2315	23	0.2	1	0.035	1	0.03479
LTE Band 41	2496	2690	23	0.2	2.8	0.053	1	0.05265

Note: 1. Distance to Human Body: 24cm
2. The ratio which was indicated in bold type of the max ratio.