



CERTIFICATE OF COMPLIANCE

This is to certify that the equipment listed below was (were) tested in the BTL Laboratory and shown compliance with the applicable technical standard(s) according to the Radio Equipment Directive (RED) 2014/53/EU.

Equipment PHOTON
Model Name PHOTONH
Brand Name Particle
Applicant Particle Industries, Inc
Address 1475 Folsom Street, Suite 200, San Francisco, CA 94103

Standard(s) EN 301 489-1 V2.2.0 (2017-03) Draft
EN 301 489-17 V3.2.0 (2017-03) Draft
EN 300 328 V2.1.1 (2016-11)
EN 62311: 2008

Report(s) BTL-ETSE-1-1504C213C
BTL-ETSP-1-1504C213C
BTL-ETSP-2-1504C213C

The test data, data evaluation, and equipment configuration contained in our test report(s) above was(were) obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s). The test data contained in the referenced test report relate only to the EUT sample and item(s) tested.

Steven Lu
Authorized Signatory



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EN 62311 Test Report

Project No. : 1504C213C
Equipment : PHOTON
Model Name : PHOTONH
Applicant : Particle Industries, Inc
Address : 1475 Folsom Street, Suite 200, San Francisco, CA
94103

Date of Receipt : Aug. 29, 2016
Date of Test : Aug. 29, 2016 ~ Jan. 13, 2017
Issued Date : Jul. 13, 2017
Tested by : BTL Inc.

Testing Engineer : Shawn Xiao
(Shawn Xiao)

Technical Manager : David Mao
(David Mao)

Authorized Signatory : Steven Lu
(Steven Lu)

B T L I N C .

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REPORT ISSUED HISTORY

Issued No.	Description	Issued Date
BTL-ETSP-2-1504C213	Original report.	May 22, 2015
BTL-ETSP-2-1504C213B	<p>Compared with the previous report (BTL-ETSP-2-1504C213),</p> <ol style="list-style-type: none"> 1. The changes of components <ol style="list-style-type: none"> (a) Replace the USB connection Encapsulation. (b) The model of the power controlling IC U2 changes from RT8008-3V3 to RT8059. (c) Add two 0201 resistances R9 and R10. (d) Add one 0201 capacitance C18. (e) change the resistor R4's encapsulation from 0402 to 0201. 2. Layout changes. 3. Standard version is updated to the latest. 4. Applicant and address are updated. 5. Brand name (Particle) is added. <p>All test results has been re-evaluated and recorded in the test report.</p>	Jan. 16, 2017
BTL-ETSP-2-1504C213C	<p>Compared with previous report (BTL-ETSP-2-1504C213B), the standards EN 300 328 updated to the latest which does not affect this report.</p>	Jul. 13, 2017

1. CERTIFICATION

Equipment : PHOTON
Brand Name : Particle
Test Model : PHOTONH
Applicant : Particle Industries, Inc
Date of Test : Aug. 29, 2016 ~ Jan. 13, 2017
Test Sample : Engineering Sample
Standard(s) : EN 62311: 2008

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

The test data, data evaluation, and equipment configuration contained in our test report (Ref No. BTL-ETSP-2-1504C213C) were obtained utilizing the test procedures, test instruments, test sites that has been accredited by the Authority of TAF according to the ISO-17025 quality assessment standard and technical standard(s).

2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Equipment	PHOTON	
Brand Name	Particle	
Model Name	PHOTONH	
Model Difference	N/A	
Power Source	Supplied from PC USB port.	
Power Rating	DC 5V	
Product Description	Operation Frequency	2412~2472MHz
	Modulation Technology	802.11b: DSSS 802.11g: OFDM 802.11n: OFDM
	Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n: up to 65 Mbps
	EIRP Power (Max.) - Chip antenna	802.11b: 18.72 dBm 802.11g: 17.58 dBm 802.11n (20MHz): 17.32 dBm
	E.I.R.P. Power (Max.) - Dipole antenna	802.11b: 18.51 dBm 802.11g: 17.72 dBm 802.11n (20MHz): 16.49 dBm

Note:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- Channel List:

CH01 - CH13 for 802.11b, 802.11g, 802.11n(20MHz)					
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
01	2412	06	2437	11	2462
02	2417	07	2442	12	2467
03	2422	08	2447	13	2472
04	2427	09	2452		
05	2432	10	2457		

3. Table for Filed Antenna:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	ACX	AT7020 -E3R0HBA	Chip	N/A	1.30
2	CRMXTM	104-1001	Dipole	RP-TNC	2.15

Note: EUT has two types of antenna, one with chip antenna, another one with dipole antenna. Only 1 antenna active at any moment in time.

3. MAXIMUM PERMISSIBLE EXPOSURE

According to its specifications, the EUT must comply with the requirements of the following standards:

EN 62311 –Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)

LIMIT

For frequency range 10 MHz to 10 GHz

The basic restriction at frequencies between 10 MHz and 100 GHz is on localized SAR in the head. Any device with output power below 20 mW cannot produce an exposure exceeding this restriction under the most pessimistic exposure conditions. The basic restriction is 2 W/kg so any unit which supplies less than 20 mW ($=2/100W$) from its antenna port, averaged over 6 minutes, will meet the basic restriction.

For frequency range 10 GHz to 300 GHz

The most conservative assumption is that all the transmitted power is absorbed within the specified area, therefore any device which supplies less than 20 mW will meet the basic restriction. The average time is equal to $68/f_{1.05}$ minutes (where f is in GHz) In the frequency range 10 GHz to 300 GHz, the basic restriction is 10 Wm^{-2} averaged over any 20 cm^2 of exposed area with a spatial maximum of 200 Wm^{-2} averaged over 1 cm^2

2 MPE Calculation Method

$$E \text{ (V/m)} = (30 \cdot P \cdot G)^{0.5} / d$$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

From the peak EUT RF output power, the minimum mobile separation distance, $d=0.2\text{m}$, as well as the gain of the used antenna, the RF power density can be obtained.

4. EUT OPERATING CONDITION

The software provided by Manufacturer enabled the EUT to transmit data at lowest, middle and highest channel individually.

5. CALCULATED RESULT AND LIMIT

For Chip antenna:

EN 300 328 MAX. EIRP Power (dBm)	E.I.R.P. Power (mW)	Electric Field (V/m)	Limit of Electric Field(V/m)	Result
18.72	74.473	7.474	61	Pass

For Dipole antenna:

EN 300 328 MAX. EIRP Power (dBm)	E.I.R.P. Power (mW)	Electric Field (V/m)	Limit of Electric Field(V/m)	Result
18.51	70.958	7.295	61	Pass

A = EIRP Power (dBm), B = EIRP Power (mW), C = Electric Field (V/m)

$B = 10^{(A/10)}$

$C = \text{SQRT}(30 \cdot (10^{(A/10)} / 1000)) / 0.2$

RF exposure assessment has been performed above to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation (1999/519/EC)

ATTACHMENT

PHOTOGRAPHS OF EUT





