



EN62311:2008

TEST REPORT

For

Electron 2G/3G Global

MODEL NUMBER: E310D, ELC314

REPORT NUMBER: 4789723883.1-4

ISSUE DATE: December 25, 2020

Prepared for

Particle Industries, Inc.

26 Post St, 4th floor, San Francisco, CA 94108, USA

Prepared by

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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V0	12/25/2020	Initial Issue	

Note: This is a copy report base on 4788749548.1-4 which is issued by UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch on January 24, 2019. The customer need to add a new serial model ELC314 which is all the same with the original model E310D except for the manufacturer of the embedded SIM card. We update the test report directly without any test. For more informaton, please refer to the original report.



Test Report Certification

Applicant's name : Particle Industries, Inc.
Address : 26 Post St, 4th floor, San Francisco, CA 94108, USA

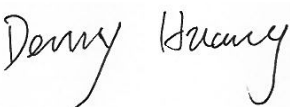
Manufacturer's Name..... : Particle Industries, Inc.
Address : 26 Post St, 4th floor, San Francisco, CA 94108, USA

Product description


Product Name..... : Electron 2G/3G Global
Brand Name : Particle
Model Name : E310D
Series Model..... : ELC314
Model Difference..... : Please refer to clause 1.1 GENERAL DESCRIPTION OF THE EUT

Standards..... : EN 62311: 2008


Date of Test..... :
Date (s) of performance of tests..... : 19 Nov. 2018 ~04 Dec. 2018
Date of Issue..... : 24 Jan. 2019
Test Result..... : **Pass**

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1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF THE EUT

Product Name	Electron 2G/3G Global	
Brand Name	Particle	
Model Name	E310D	
Series Model	ELC314	
Model Difference	<p>The schematic and PCB of the ELC314 is completely the same with E310D, and these two models of HW&SW is the same. Because changing the MVNO's E-SIM card (embedded SIM card) provider from Kore to Twilio.</p> <p>The differences are as follows: E310D uses eSIM of Kore. ELC314 uses eSIM of Twilio.</p>	
Product Description	The EUT is Electron 2G/3G Global	
	Operation Frequency:	GSM 900: 880 ~ 915 MHz(TX), 925 ~ 960 MHz (RX) GSM 1800: 1710 ~ 1785 MHz(TX), 1805 ~ 1880 MHz(RX) WCDMA2100: 1920-1980 MHz(TX), 2110-2170 MHz(RX) WCDMA900: 880-915 MHz(TX), 925-960 MHz(RX)
	Modulation Type:	GMSK, 8PSK, QPSK, 16QAM, BPSK
	Antenna gain:	0dBi
	Antenna Designation:	PIFA
RF output Power:	GSM 900:30.03dBm GSM1800:26.58dBm WCDMA 2100: 23.46dBm WCDMA 900: 22.93dBm	
Power Rating	Input: DC 5V 500mA Output:DC3.6V to 5.5V	
Battery	Battery(rating): Rated Voltage: 3.7V Capacity: 1800mAh	
Hardware Version	N/A	
Software Version	N/A	

Note: 1. For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

1.2 TEST FACTORY

Shenzhen STS Test Services Co., Ltd.

Add. : 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong,China

FCC Registration No.: 625569

IC Registration No.: 12108A; A2LA Certificate No.: 4338.01;

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch

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2. EN 62311 REQUIREMENTS

2.1 TEST STANDARDS

EN 62311: 2008	Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz - 300 GHz)
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2.2 HUMAN EXPOSURE TO THE ELECTROMAGNETIC FIELDS

LIMIT

According to EN62311:2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation as specified 1999/519/EC.

Reference levels for electric, magnetic and electromagnetic fields
(0 Hz to 300 GHz, unperturbed rms values)

Frequency range	E-field strength (V/m)	H-field strength (A/m)	B-field (μT)	Equivalent plane wave power density S_{eq} (W/m ²)
0-1 Hz	—	$3,2 \times 10^4$	4×10^4	—
1-8 Hz	10 000	$3,2 \times 10^4/f^2$	$4 \times 10^4/f^2$	—
8-25 Hz	10 000	$4\,000/f$	$5\,000/f$	—
0,025-0,8 kHz	$250/f$	$4/f$	$5/f$	—
0,8-3 kHz	$250/f$	5	6,25	—
3-150 kHz	87	5	6,25	—
0,15-1 MHz	87	$0,73/f$	$0,92/f$	—
1-10 MHz	$87/f^{1/2}$	$0,73/f$	$0,92/f$	—
10-400 MHz	28	0,073	0,092	2
400-2 000 MHz	$1,375 f^{1/2}$	$0,0037 f^{1/2}$	$0,0046 f^{1/2}$	$f/200$
2-300 GHz	61	0,16	0,20	10

Notes:

1. f as indicated in the frequency range column.
2. For frequencies between 100 kHz and 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any six-minute period.
3. For frequencies exceeding 10 GHz, S_{eq} , E^2 , H^2 , and B^2 are to be averaged over any $68/f^{1.05}$ -minute period (f in GHz).
4. No E-field value is provided for frequencies < 1 Hz, which are effectively static electric fields. For most people the annoying perception of surface electric charges will not occur at field strengths less than 25 kV/m. Spark discharges causing stress or annoyance should be avoided.



RESULT

No non-compliance noted

Since average output power is GSM 900: 30.03dBm(1.0069W), GSM 1800:26.58dBm(0.4550W), WCDMA 2100:23.46 dBm(0.2218W), WCDMA 900: 22.93dBm(0.1963W) which exceed the exempt condition in EN62311. RF exposure assessment has been performed below to prove that this unit will not generate the harmful EM emission above the reference level as specified in EC Council Recommendation.

Conclusion: PASS

2.3 HUMAN EXPOSURE ASSESSMENT		
EUT Parameter (data form the separate report)		
Max average out put power in Watt (TP)	GSM 900:30.03dBm+0dBi-Duty cycle100% =1.0069(W) GSM 1800:26.58dBm+0dBi-Duty cycle100% =0.4450(W) WCDMA 2100:23.46dBm+0dBi-Duty cycle100% =0.2218(W) WCDMA 900:22.93dBm+0dBi-Duty cycle100% =0.1963(W)	
Minimum distance in meter (r) (from transmitting structure to the human body)	20cm	
Exposure evaluation		
Given $S=E*H=E*H=P/4\pi r^2$ Yield:	Conclusion	Limit
$S1=(1.0069W)/(4*3.14*0.2*0.2)=2.0042W/m^2$	$S1=2.0042W/m^2$	4.575 W/m ²
$S2=(0.4450W)/(4*3.14*0.2*0.2)=0.9056W/m^2$	$S2=0.9056W/m^2$	8.925 W/m ²
$S3=(0.2218W)/(4*3.14*0.2*0.2)=0.4415W/m^2$	$S3=0.4415W/m^2$	9.900 W/m ²
$S4=(0.1963W)/(4*3.14*0.2*0.2)=0.3908W/m^2$	$S4=0.3908W/m^2$	4.575 W/m ²
Note: Asrequired in annex III table 2 of EC Council Recommendation.This proves that the unit complies with the EN62311 for RF exposure requirement.		

END OF THE REPORT