



Test Report No.: SE200103W001



# RADIO TEST REPORT (EN 62311)

Applicant:	Particle Industries, Inc
Address:	126 Post St, 4th floor, San Francisco, CA 94108 USA

Manufacturer or Supplier:	Particle Industries, Inc
Address:	126 Post St, 4th floor, San Francisco, CA 94108 USA
Product:	B SOM
Brand Name:	Particle
Model Name:	B520, B523
Date of tests:	Jan. 04, 2020 ~ Mar. 30, 2020

The submitted sample of the above equipment has been tested for according to the requirements of the following standards:

EN 62311: 2008

**CONCLUSION: The submitted sample was found to COMPLY with the test requirement**

Prepared by Alex Chen Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
Date: Mar. 31, 2020	Date: Mar. 31, 2020
<small>This report is governed by, and incorporates by reference, CPS Conditions of Service as posted at the date of issuance of this report at <a href="http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions">http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions</a> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.</small>	



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### RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SE200103W001	Original release	Mar. 31, 2020

## 1 GENERAL INFORMATION

<b>PRODUCT</b>	B SOM	
<b>BRAND NAME</b>	Particle	
<b>MODEL NAME</b>	B520, B523	
<b>NOMINAL VOLTAGE</b>	3V3 : DC +3.3V VCC: DC +3.8V	
<b>MODULATION TYPE</b>	<b>GPRS/EDGE</b>	GMSK, 8PSK
	<b>BT_LE</b>	GFSK
	<b>WCDMA</b>	BPSK/QPSK
	<b>LTE</b>	QPSK,16QAM
<b>OPERATING FREQUENCY</b>	<b>BT_LE</b>	2402MHz ~ 2480MHz
	<b>GSM</b>	880.2MHz ~ 914.8MHz ( FOR GSM 900 ) 1710.2MHz ~ 1784.8MHz ( FOR DCS 1800)
	<b>WCDMA</b>	1922.6MHz~ 1977.4MHz (FOR WCDMA Band 1) 882.4MHz ~ 912.6MHz (FOR WCDMA Band 8)
	<b>LTE</b>	1922.5MHz~ 1977.5MHz (FOR LTE Band1) 1710.7MHz ~ 1784.3MHz (FOR LTE Band3) 2502.5MHz~ 2567.5MHz (FOR LTE Band7) 880.7MHz ~ 914.3MHz (FOR LTE Band8) 834.5MHz~ 859.5MHz (FOR LTE Band20) 704.5MHz ~ 731.5MHz (FOR LTE Band28A)
<b>ANTENNA TYPE</b>	External Antenna	
<b>Max. ANTENNA GAIN</b>	<b>GSM 900:</b>	1.42dBi
	<b>DCS 1800:</b>	3.77dBi
	<b>WCDMA Band I :</b>	3.77dBi
	<b>WCDMA Band VIII :</b>	1.42dBi
	<b>LTE Band 1</b>	3.77dBi
	<b>LTE Band 3</b>	3.77dBi
	<b>LTE Band 7</b>	4.71dBi
	<b>LTE Band 8</b>	1.42dBi
	<b>LTE Band 20</b>	1.42dBi
	<b>LTE Band 28A</b>	1.42dBi
	<b>BT_LE</b>	2dBi
<b>HW VERSION</b>	V1.00	
<b>SW VERSION</b>	V1.5.0	
<b>I/O PORTS</b>	Refer to user's manual	
<b>CABLE SUPPLIED</b>	N/A	
<b>ACCESSORY DEVICES</b>	Refer to note as below	



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**NOTE:**

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
2. B520 & B523 differences just E\_SIM, all other things are all the same.

Model name	E_SIM
B520	AT&T
B523	Vodafone

3. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

## 2 RF EXPOSURE MEASUREMENT

### 2.1 INTRODUCTION

This International Standard applies to electronic and electrical equipment for which no dedicated product- or product family standard regarding human exposure to electromagnetic fields applies.

The frequency range covered is 0 Hz to 300 GHz.

The object of this generic standard is to provide assessment methods and criteria to evaluate such equipment against basic restrictions or reference levels on exposure of the general public related to electric, magnetic and electromagnetic fields and induced and contact current.

### 2.2 LIMIT

According to EN 62311: 2008, the criteria listed in the following table shall be used to evaluate the environmental impact of human exposure to radio-frequency (RF) radiation.

FREQUENCY RANGE	E-FIELD STRENGTH (V/m)
400 ~ 2000MHz	1.375*F <sup>1/2</sup>
2 ~ 300GHz	61

Note: F= Operating frequency

### 3.3 CLASSIFICATION OF THE ASSESSMENT METHODS

The antenna of the product, under normal use condition is at least 20 cm away from the body of the user. Warning statement to the user for keeping at least 20cm separation distance and the prohibition of operating to a person has been printed on the WLAN easy install sheet. So, this product under normal use is located on electromagnetic far field between the human body.

#### Far Field Calculation Formula

$$E = \eta_0 H = \frac{\sqrt{30PG(\theta, \phi)}}{r}$$

G = antenna gain relative to an isotropic antenna  
 $\theta, \phi$  = elevation and azimuth angles to point of investigation  
 r = distance from observation point to the antenna  
 $\eta_0$  = Characteristic impedance of free space

### 3.4 TEST RESULTS

#### CALCULATION FOR MAXIMUM E.I.R.P.

##### GSM

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Average Conducted Power (dBm)	Tune-up Conducted Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
<b>GSM 900</b>	880.2~914.8	1.42	26.41	0.438	21.34	40.79	PASS
<b>PCS 1800</b>	1710.2~1784.8	3.77	25.81	0.381	26.09	56.86	PASS

##### WCDMA

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Conducted Power (dBm)	Tune-up Conducted Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
<b>WCDMA I</b>	1922.6~1977.4	3.77	22.49	0.177	17.78	60.29	PASS
<b>WCDMA VIII</b>	882.4~912.6	1.42	22.46	0.176	13.53	40.84	PASS

##### LTE

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Conducted Power (dBm)	Tune-up Conducted Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
<b>BAND 1</b>	1922.5~1977.5	3.77	22.20	0.166	17.22	60.29	PASS
<b>BAND 3</b>	1710.7~1784.3	3.77	23.00	0.200	18.9	56.87	PASS
<b>BAND 7</b>	2502.5~2567.5	4.71	22.80	0.191	20.58	61.00	PASS
<b>BAND 8</b>	880.7~ 914.3	1.42	23.00	0.200	14.42	40.81	PASS
<b>BAND 20</b>	834.5~859.5	1.42	22.90	0.195	14.24	39.72	PASS
<b>BAND 28A</b>	704.5~731.5	1.42	23.26	0.212	14.85	36.5	PASS



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**BT-LE**

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Average Conducted Power (dBm)	Tune-up Conducted Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
BT-LE 1M	2402~ 2480	2	7.33	0.005	2.44	61.00	PASS
BT -LE 2M	2402~ 2480	2	5.46	0.004	2.18	61.00	PASS

**CONCLUSION :**

According to Council Recommendation 1999/519/EC and RED (Directive2014/53/EU), the RF exposure analysis concludes that the RF Exposure is CE compliant.