# RF EXPOSURE REPORT

| | |
|---|---|
| **Product:** | B Series B402 |
| **Model Name:** | B402,B402S |
| **FCC ID:** | 2AEMI-B402 |
| **Applicant:** | Particle Industries,Inc |
| **Address:** | 126 Post St,4th floor, San Francisco,CA 94108 USA |
| **Manufacturer:** | Particle Industries,Inc |
| **Address:** | 126 Post St,4th floor, San Francisco,CA 94108 USA |
| **Prepared by:** | BV 7Layers Communications Technology (Shenzhen) Co. Ltd |
| **Lab Location:** | No.B102, Dazu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, China |
| **TEL:** | +86 755 8869 6566 |
| **FAX:** | +86 755 8869 6577 |
| **E-MAIL:** | customerservice.dg@cn.bureauveritas.com |
| **Report No.:** | SA190606W003 |
| **Received Date:** | Jul. 19, 2019 |
| **Test Date:** | Jul. 20, 2019 ~ Jul. 21, 2019 |
| **Issued Date:** | Jul. 24, 2019 |

This report should not be used by the client to claim product certification, approval, or endorsement by A2LA or any government agencies.

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# RELEASE CONTROL RECORD

| ISSUE NO. | REASON FOR CHANGE | DATE ISSUED |
|---|---|---|
| SA190606W003 | Original release | Jul. 24, 2019 |

BV 7Layers Communications Technology (Shenzhen) Co. Ltd

No.B102, Dazu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industrial Park, Nanshan District, Shenzhen, Guangdong, China

Tel: +86 755 8869 6566
Fax: +86 755 8869 6577
Email: customerservice.dg@cn.bureauveritas.com

# 1 CERTIFICATION

| | |
|---|---|
| **PRODUCT:** | B Series B402 |
| **BRAND NAME:** | Particle |
| **MODEL NAME:** | B402,B402S |
| **APPLICANT:** | Particle Industries,Inc |
| **TESTED:** | Jul. 20, 2019 ~ Jul. 21, 2019 |
| **TEST SAMPLE:** | Identical Prototype |
| **STANDARDS:** | **FCC Part 2 (Section 2.1091)** |
| | **FCC OET Bulletin 65, Supplement C (01-01)** |
| | **KDB 447498 D01 General RF Exposure Guidance v06** |
| | IEEE C95.1 |

The above equipment has been tested by **BV 7Layers Communications Technology (Shenzhen) Co. Ltd** 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 :** _____ , **DATE:** Jul. 24, 2019
(Alex Chen/ Engineer)

**APPROVED BY :** _____ , **DATE:** Jul. 24, 2019
(Luke Lu / Manager)

# 2 GENERAL INFORMATION

## 2.1 GENERAL DESCRIPTION OF EUT

| | | |
|---|---|---|
| **PRODUCT** | B Series B402 | |
| **MODEL NAME** | B402,B402S | |
| **NOMINAL VOLTAGE** | Li+ PIN /Battery connector: DC 3.7V from Li-ion Battery or<br>VUSB PIN /USB connector :DC 5V from USB Host Unit | |
| **OPERATING TEMPERATURE RANGE** | -20 ~ 75℃ | |
| **MODULATION TYPE** | **LTE/BLE** | QPSK&16QAM, GFSK(1MHz, 2MHz) |
| **OPERATING FREQUENCY** | **LTE/BLE** | 1850.7MHz ~ 1909.3MHz (FOR LTE Band2)<br>1710.7MHz ~ 1754.3MHz (FOR LTE Band4)<br>824.7MHz ~ 848.3MHz (FOR LTE Band5)<br>699.7MHz ~ 715.3MHz (FOR LTE Band12)<br>779.5MHz ~ 784.5MHz (FOR LTE Band13)<br>2402MHz ~ 2480MHz (FOR BLE) |
| **ANTENNA GAIN** | **LTE Band 2** | Fixed External Antenna with 3.5dBi gain |
| | **LTE Band 4** | Fixed External Antenna with 3.5dBi gain |
| | **LTE Band 5** | Fixed External Antenna with 1.0dBi gain |
| | **LTE Band 12** | Fixed External Antenna with 1.0dBi gain |
| | **LTE Band 13** | Fixed External Antenna with 1.0dBi gain |
| | **BLE** | FPCB Antenna with 2.0dBi gain |
| **HW VERSION** | V1.00 | |
| **SW VERSION** | V1.2.1 | |
| **I/O PORTS** | Refer to user's manual | |
| **CABLE SUPPLIED** | N/A | |

**NOTE**:

1. For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.

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

# 3 RF EXPOSURE

## 3.1 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

## 3.2 MPE CALCULATION FORMULA

Pd = (Pout*G) / (4*pi*r2)

where

Pd = power density in mW/cm2

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

## 3.3 CLASSIFICATION

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as **Mobile Device**.

## 3.4 CONDUCTED POWER

### TUNE-UP POWER TABLE

| Band | Frequency (MHz) | Operating Mode | Tune-Up Power And Tolerance (dBm) |
|---|---|---|---|
| **BLE** | 2402 | GFSK(1MHz) | -4.0 |
| **BLE** | 2480 | GFSK(2MHz) | -9.0 |
| **LTE 2** | 1880 | QPSK | 24.8 |
| **LTE 4** | 1732.5 | QPSK | 25.0 |
| **LTE 5** | 836.5 | QPSK | 25.0 |
| **LTE 12** | 707.5 | QPSK | 25.0 |
| **LTE 13** | 782 | QPSK | 25.0 |

## 3.5 CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

**BT**

| Band | Frequency (MHz) | Operating Mode | Antenna Gain (dBi) | Tune-up Power (dBm) | E.I.R.P Power (mW) | Power Density (mW/cm^2) | limit (mW/cm^2) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| **BLE** | 2402 | GFSK(1MHz) | 2 | -4 | 0.631 | 0.000126 | 1.00 | PASS |
| **BLE** | 2480 | GFSK(2MHz) | 2 | -9 | 0.199 | 0.000040 | 1.00 | PASS |

**LTE**

| Band | Frequency (MHz) | Operating Mode | Antenna Gain (dBi) | Tune-up Power (dBm) | E.I.R.P Power (mW) | Power Density (mW/cm^2) | limit (mW/cm^2) | PASS / FAIL |
|---|---|---|---|---|---|---|---|---|
| **Band 2** | 1880 | QPSK | 3.50 | 24.80 | 676.083 | 0.135 | 1.00 | PASS |
| **Band 4** | 1720 | QPSK | 3.50 | 25.00 | 707.946 | 0.141 | 1.00 | PASS |
| **Band 5** | 829 | QPSK | 1.00 | 25.00 | 398.107 | 0.079 | 0.56 | PASS |
| **Band 12** | 707.5 | QPSK | 1.00 | 25.00 | 398.107 | 0.079 | 0.47 | PASS |
| **Band 13** | 782.0 | QPSK | 1.00 | 25.00 | 398.107 | 0.079 | 0.52 | PASS |

## 3.6 CONCLUSION OF SIMULTANEOUS TRANSMITTER

Both of the BT and plug-in 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

Therefore the worst-case situation is, which is less than “1”, This confirmed that the device comply with FCC 1.1310 MPE limit.

| Band | Frequency ( MHz ) | Power Density (mW/cm^2) | limit (mW/cm^2) | Power Density / Limit | MPE Limit | PASS / FAIL |
|---|---|---|---|---|---|---|
| **BLE(1MHz)** | 2402 | 0.000126 | 1 | 0.000126 | 1.000 | PASS |
| **LTE BAND 4** | 1720 | 0.141 | 1 | 0.141 | | |

**--END--**