



Test Report No.: W7L-P22080018SA01



VARIANT RADIO TEST REPORT (EN 62311)

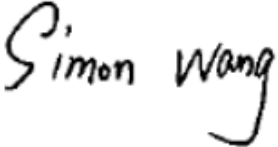

Applicant:	Particle Industries, Inc
Address:	325 9th St, San Francisco, CA 94103 USA, 415-319-1553

Manufacturer or Supplier:	Particle Industries, Inc
Address:	325 9th St, San Francisco, CA 94103 USA, 415-319-1553
Product:	Tracker One LTE CAT1/3G/2G
Brand Name:	Particle
Model Name:	ONE523M, ONE524M, ONE523M-NB, ONE524M-NB
Date of tests:	Oct. 10, 2020 ~ Oct. 28, 2020

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

EN IEC 62311: 2020

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

Prepared by Simon Wang Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
	
Date: Aug. 17, 2022	Date: Aug. 17, 2022

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> 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. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. 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.



Test Report No.: W7L-P22080018SA01

TABLE OF CONTENTS

RADIO TEST REPORT	1
(EN 62311)	1
RELEASE CONTROL RECORD	3
1 GENERAL INFORMATION	4
2 RF EXPOSURE MEASUREMENT	6
2.1 INTRODUCTION	6
2.2 LIMIT	6
3.3 CLASSIFICATION OF THE ASSESSMENT METHODS	6
3.4 TEST RESULTS	7



Test Report No.: W7L-P22080018SA01

RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SE201009W001	Original release	Oct. 28, 2020
W7L-P22080018SA01	Based on the original report SE201009W001 change the address, all the data is copied from the original report	Aug. 17, 2022

1 GENERAL INFORMATION

PRODUCT	Tracker One LTE CAT1/3G/2G	
BRAND NAME	Particle	
MODEL NAME	ONE523M, ONE524M, ONE523M-NB, ONE524M-NB	
NOMINAL VOLTAGE	LI+ pin : DC+3.6v--4.2V or Vusb PIN : DC+4.5V--5.5V or Vin PIN : DC 6V--30V	
MODULATION TYPE	WLAN	DSSS, OFDM
	BT_LE	GFSK
	Bluetooth	GFSK, $\pi/4$ -DQPSK, 8DPSK
	GPS/ GLONASS / BDS/ GALILEO	BPSK
	NFC	ASK/FSK
	GSM/GPRS/EDGE	GMSK, 8PSK
	WCDMA	BPSK/QPSK
	LTE	QPSK/16QAM
OPERATING FREQUENCY	WLAN	2412 ~ 2472MHz for 11b/g/n(HT20/HT40)
	Bluetooth/BT_LE	2402MHz ~ 2480MHz
	GPS/ GLONASS/ BDS/ GALILEO	1559MHz ~ 1610MHz
	NFC	13.56MHz
	GSM	880.2MHz ~ 914.8MHz (FOR GSM 900) 1710.2MHz ~ 1784.8MHz (FOR DCS 1800)
	WCDMA	1922.6MHz~ 1977.4MHz (FOR WCDMA Band 1) 882.4MHZ ~ 912.6MHz (FOR WCDMA Band 8)
	LTE	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 ~ 746.5MHz (FOR LTE Band28)



MAX. ANTENNA GAIN	GSM 900: 1.98dBi PCS 1800: 1.94dBi WCDMA Band I : 2.27dBi WCDMA Band VIII : 1.98dBi LTE Band 1 : 2.27dBi LTE Band 3 : 1.94dBi LTE Band 7 : 2.14dBi LTE Band 8 : 1.98dBi LTE Band 20 : 1.98dBi LTE Band 28: 1.98dBi
HW VERSION	V1.0 Product HW Version: V1.0 V1.1 Product HW Version: V1.1
SW VERSION	V1.5.4
I/O PORTS	Refer to user's manual
CABLE SUPPLIED	USB cable: non-shielded, detachable, 2.0meter

NOTE:

- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The difference of V1.0 and V1.1 is V1.1 update PCBA and add some components, which not affect RF function. At the same time, we add three product models on v1.1, ONE524M, ONE523M-NB, ONE524M-NB, please see the table below for the differences of different model.

Product name	e-SIM company	Built-in LiPo battery
ONE523M	Kore	Yes
ONE524M	Twilio	Yes
ONE523M-NB	Kore	No
ONE524M-NB	Twilio	No

- The EUT was powered by the following Battery:

BATTERY	
BRAND:	Zhaoneng
MODEL:	113450
MANUFACTURER	Zhaoneng Battery Industrial Co., Ltd
POWER RATING:	3.7V, 2000mAh

- The EUT matched the following USB cable:

USB CABLE	
BRAND:	KAWEEI
MODEL:	CBUSB31-AM-CM-2000
SIGNAL LINE:	2.0 METER

- 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 IEC 62311: 2020, 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 ^{1/2}
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
 θ, ϕ = elevation and azimuth angles to point of investigation
 r = distance from observation point to the antenna
 η_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 Conducted Time Average Power (dBm)	Tune-up Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
GSM 900	880.2	1.98	23.50	0.028	5.76	40.79	PASS
DCS 1800	1710.2	1.94	20.50	0.112	11.46	56.86	PASS

WCDMA

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Power (dBm)	Tune-up Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
WCDMA B1	1922.6	2.27	23.50	0.224	16.83	60.29	PASS
WCDMA B8	882.4	1.98	23.50	0.224	16.28	40.84	PASS

LTE

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Power (dBm)	Tune-up Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
Band 1	1922.5	2.27	24.00	0.251	17.82	60.29	PASS
Band 3	1710.7	1.94	23.50	0.224	16.21	56.87	PASS
Band 7	2502.5	2.14	23.50	0.224	16.58	61.00	PASS
Band 8	880.7	1.98	24.00	0.251	17.23	40.81	PASS
Band 20	834.5	1.98	23.50	0.224	16.28	39.72	PASS
Band 28	704.5	1.98	23.50	0.224	16.28	36.50	PASS



BUREAU
VERITAS

Test Report No.: W7L-P22080018SA01

BT

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Power (dBm)	Tune-up Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
BLUETOOTH	2402	1.71	17.5	0.056	7.89	61.00	PASS

WIFI 2.4G

OPERATING BAND(MHz)	Frequency (MHz)	Antenna Gain (dBi)	Tune-up Power (dBm)	Tune-up Power (W)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	PASS / FAIL
WIFI 2.4G	2412	1.71	16.5	0.045	7.07	61.00	PASS

COLLOCATED EXPOSURE FIELD STRENGTHS CALCULATION

Band	Frequency (MHz)	(E-Field Strength) ² / (Limit) ²	Σ((E-Field Strength) ² / (Limit) ²) of WWAN+WLAN	PASS / FAIL
Band 1	1922.5	0.087	0.104	PASS
BLUETOOTH	2402	0.017		

Note:

- For collocation analysis, LTE Band 1 is chosen for summation due to the highest(E-Field Strength) among all WWAN Band;
- Simultaneous Transmitter requirements: $\sum ((E\text{-Field Strength})^2 / (\text{Limit})^2) \leq 1$

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.