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VERITAS

Test Report No: RE2008WDG0083-3



# TEST REPORT

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	Tracker One LTE CAT1/3G/2G
Brand Name	Particle
Model	ONE523M
Additional Models & Model Difference	ONE524M, ONE523M-NB, ONE524M-NB, see section 2.1 note
Date of tests	Aug. 18, 2020 ~ Sep. 10, 2020

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

EN 300 330 V2.1.1 (2017-02)

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

Tested by Breeze Jiang  
Senior Project Engineer / EMC Department

Approved by Glyn He  
Assistant Manager / EMC Department

Date: Dec. 21, 2020

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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RE2008WDG0083-3	Original release	Dec. 21, 2020



## 1. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

<b>APPLIED STANDARD: ETSI EN 300 330 V2.1.1 (2017-02)</b>			
<b>CLAUSE IN ETSI EN 300 330</b>	<b>TEST PARAMETER</b>	<b>TEST APPLICABILITY</b>	<b>PASS/FAIL</b>
	<b>TRANSMITTER PARAMETERS</b>		
4.3.4	Transmitter H-filed requirements	Applicable	N/A
4.3.1	Permitted range of operating frequency	Applicable	N/A
4.3.3	modulation bandwidth	Applicable	N/A
4.3.8	Transmitter radiated spurious domain emission limits<30MHz	Applicable	N/A
4.3.9	Transmitter radiated spurious domain emission limits>30MHz	Applicable	N/A
	<b>RECEIVER PARAMETERS</b>		
4.4.2	Receiver spurious radiation	Applicable(Note1)	PASS
4.4.4	Blocking or desensitization	Not Applicable(Note2)	N/A

Note: 1. NFC module is slave device, has receiving function only.

2. Receiver blocking or desensitization is only applicable for channelized systems where channel definitions are used.



### 1.1. TEST INSTRUMENTS

#### 9KHz~30MHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESR7	101564	Mar. 18,20	Mar. 17,21
Active Loop Antenna	SCHWARZBECK	FMZB 1519B	1519B-045	May 28,20	May 27,21
Amplifier	Burgeon	BPA-530	100210	Mar. 15,20	Mar. 14,21
Test Software	ADT	ADT_Radiated V8.7.07	N/A	N/A	N/A

- NOTE:**
1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
  2. The test was performed in 10m Chamber

#### 30MHz~1GHz

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
EMI Test Receiver	Rohde&Schwarz	ESU40	100449	Mar. 18,20	Mar. 17,21
Bilog Antenna	Teseq	CBL 6111D	30643	Jun. 23,20	Jun. 22,21
Amplifier	Burgeon	BPA-530	100220	Mar. 15,20	Mar. 14,21
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	NSEMC003	Apr. 21,20	Apr. 20,21
Test software	ADT	ADT_Radiated V7.6.15.9.2	N/A	N/A	N/A

**NOTE:**

1. The test was performed in 966 Chamber (a 3m Semi-anechoic chamber).
2. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
3. The horn antenna is used only for the measurement of emission frequency above1GHz if tested.



<b>Equipment</b>	<b>Manufacturer</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Next Cal.</b>
Power Sensor	Keysight	U2021XA	MY55060016	May 21,21
Power Sensor	Keysight	U2021XA	MY55060018	May 21,21
Digital Multimeter	FLUKE	15B	A1220009DG	Sep. 18,21
Humid & Temp Programmable Tester	Haida	HD-2257	110807201	Nov. 14,19
Oscilloscope	Agilent	DSO9254A	MY51260160	Sep. 17,21
Signal and Spectrum Analyzer	Rohde&Schwarz	FSV7	102331	May 21,21
Spectrum Analyzer	Keysight	N9020A	MY55400499	Mar. 17,21
Signal Generator	Agilent	N5183A	MY50140980	Sep. 18,21
MXG-B RF Vector Signal Generator	Keysight	N5182B	MY56200288	Sep. 11,21
Wireless Connectivity Tester	Rohde&Schwarz	CMW270	100908	Sep. 17,21
Vector Signal Generator	Rohde&Schwarz	SMBV100A	257579	Sep. 11,21
BLUETOOTH TESTER	Rohde&Schwarz	CBT32	100811	May 19,21
Attenuator	MINI	BW-S10W2+	S130129FGE2	N/A

**NOTE:**

1. The test was performed in RF Oven room.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.



### 1.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT:

PARAMETER	UNCERTAINTY
Radio frequency	$\pm 1.06 \times 10^{-8}$
RF power (Conducted)	$\pm 0.34$ dB
RF power (Radiated)	$\pm 3.294$ dB
Temperature	$\pm 0.23$ °C
Humidity	$\pm 0.3$ %

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 1.3. MAXIMUM MEASUREMENT UNCERTAINTY

For the test methods, according to ETSI EN 300 330 standard, the measurement uncertainty figures shall be calculated in accordance with TR 100 028 [5] and shall correspond to an expansion factor (coverage factor) k = 1.96 or k = 2 (which provide confidence levels of respectively 95 % and 95.45 % in the case where the distributions characterizing the actual measurement uncertainties are normal (Gaussian)).

Maximum measurement uncertainty

PARAMETER	UNCERTAINTY
RF frequency	$\pm 1 \times 10^{-7}$
RF power (Conducted)	$\pm 1.0$ dB
RF power (Radiated)	$\pm 6.0$ dB
Temperature	$\pm 1$ °C
Humidity	$\pm 5.0$ %



## 2. GENERAL INFORMATION

### 2.1. GENERAL DESCRIPTION OF EUT

<b>PRODUCT</b>	Tracker One LTE CAT1/3G/2G
<b>MODEL NO.</b>	ONE523M
<b>ADDITIONAL MODELS</b>	ONE524M, ONE523M-NB, ONE524M-NB
<b>POWER SUPPLY</b>	LI+ pin: DC+3.6v--4.2V or Vusb PIN: DC+4.5V--5.5V or Vin PIN: DC 6V--30V
<b>OPERATING TEMPERATURE RANGE</b>	-10 ~ +60°C
<b>MODULATION TYPE</b>	ASK
<b>OPERATING FREQUENCY</b>	13.56MHz for receiving only
<b>NUMBER OF CHANNEL</b>	1
<b>ANTENNA TYPE</b>	Loop Antenna
<b>CABLE</b>	N/A
<b>I/O PORTS</b>	Refer to user's manual

**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. Please refer to the EUT photo document (Reference No.: 2008WDG0083) for detailed product photo.
4. Additional models ONE524M, ONE523M-NB, ONE524M-NB are identical with the test model ONE523M except the model number for marketing purpose.
5. The EUT has two version: V1.0 and V1.1, the V1.1 version sample based on V1.0 version sample added switch IC, the difference test in CE2008WDG0083 report, this report test the worst sample (V1.0 version sample).





## 2.2. DESCRIPTION OF TEST MODES

The EUT only have 1 channel.

CHANNEL	FREQUENCY (MHz)
1	13.56

## 2.3. TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO						DESCRIPTION
	THFR	PROF	MBW	TSE	RSE	RB	
1	-	-	-	-	√	-	-

Where **THFR**: Transmitter H-filed requirements      **TSE**: Transmitter Spurious Emissions  
**PROF**: Permitted range of operating frequency      **RSE**: Receiver Spurious Emissions  
**MBW**: Modulation Bandwidth  
**RB**: Receiver Blocking

### RECEIVER SPURIOUS EMISSIONS TEST:

- Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations and antenna ports (if EUT with antenna diversity architecture).
- Following channel(s) was (were) selected for the final test as listed below.

EUT CONFIGURE MODE	AVAILABLE CHANNEL	OPERATING FREQUENCY (MHz)	MODULATION TYPE
-	1	13.56	ASK

### TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
THFR	N/A	N/A	N/A
PROF	N/A	N/A	N/A
MBW	N/A	N/A	N/A
TSE	N/A	N/A	N/A
RSE	21deg. C, 58%RH	DC 5V form Adapter	Vincent
RB	N/A	N/A	N/A



## 2.4. GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standard:

### **EN 300 330 V2.1.1 (2017-02)**

All test items have been performed and recorded as per the above standard.

## 2.5. DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	Adapter	N/A	DC 5V 2A	N/A	N/A
2	Adapter	PHICOMM	YH-AD-120A200-CH	N/A	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	USB-C Line: Unshielded detachable 2.0m.
2	DC Line: Unshielded detachable 2.0m.



### 3. TEST PROCEDURES AND RESULTS

#### RECEIVER PARAMETERS

##### 3.1 RECEIVER SPURIOUS RADIATION

###### 3.1.1 LIMITS OF RECEIVER SPURIOUS RADIATION (<30MHz)

FREQUENCY RANGE	9 kHz ≤ f < 10MHz	10MHz ≤ f < 30MHz
Limit	5.5 dBμA/m descending 3 dB/oct	-25 dBμA/m
	57 dBμV/m descending 3 dB/oct	26.5 dBμV/m

###### 3.1.2 LIMITS OF RECEIVER SPURIOUS RADIATION (>30MHz)

FREQUENCY RANGE	FREQUENCIES BELOW 1GHz
Limit	2nW or -57dBm

###### 3.1.3 TEST PROCEDURES

Please refer to Subclause 6.3.1 of EN 300 330 V2.1.1 (2017-02)

###### 3.1.4 DEVIATION FROM TEST STANDARD

No deviation.

###### 3.1.5 TEST SETUP

For the actual test configuration, please refer to the related Item in this test report (Photographs of the Test Configuration).



### 3.1.6 TEST RESULTS

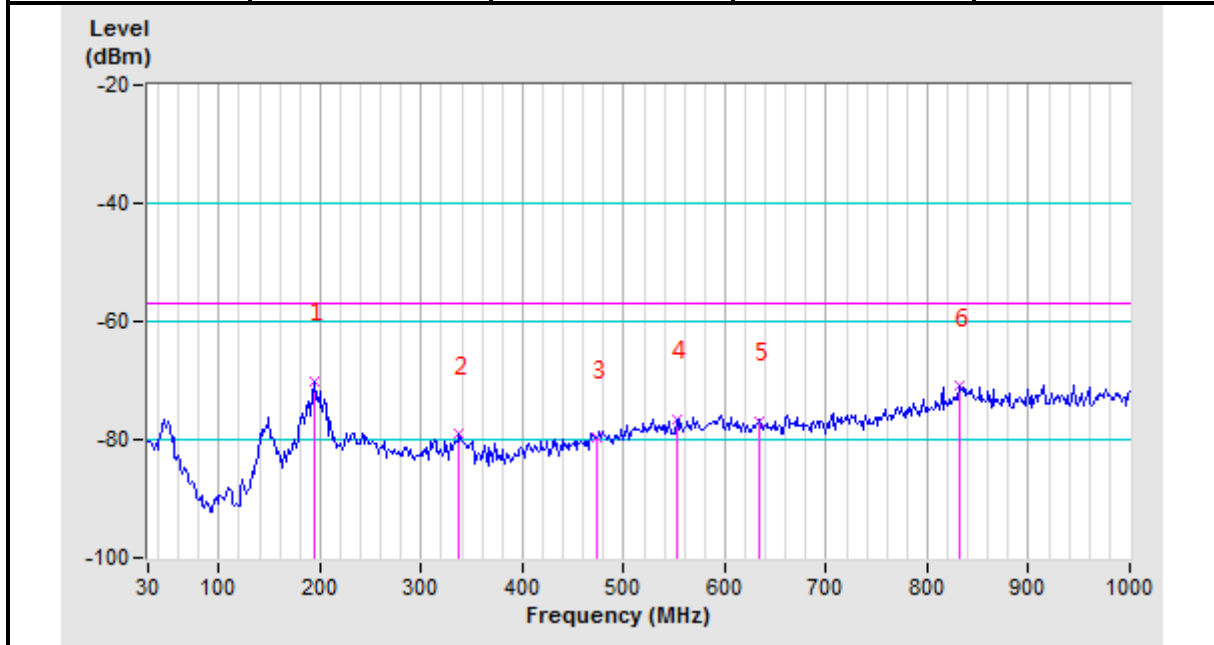
<b>SPURIOUS EMISSION FREQUENCY RANGE</b>	9kHz ~ 30MHz	<b>OPERATING STATE</b>	Receiving
--	--------------	------------------------	-----------

SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Angle (°)	Level (dBμA/m)	Limit (dBμA/m)	Margin (dB)
0.0128	180	-2.22	3.99	-6.21
0.0205	180	-6.42	1.94	-8.36
0.0351	180	-14.75	-0.39	-14.36
0.0638	180	-20.82	-2.98	-17.84
0.0840	180	-19.94	-4.17	-15.77
0.1084	180	-25.90	-5.27	-20.63
0.1530	180	-16.77	-6.78	-9.99
2.9262	180	-31.61	-19.53	-12.08
6.8830	180	-33.91	-23.24	-10.67
11.8592	180	-34.17	-25.00	-9.17
15.1981	180	-34.19	-25.00	-9.19
21.6505	180	-34.62	-25.00	-9.62
0.0103	90	-3.60	4.93	-8.53
0.0376	90	-16.09	-0.68	-15.41
0.0628	90	-20.88	-2.91	-17.97
0.0841	90	-20.02	-4.17	-15.85
0.0994	90	-24.82	-4.90	-19.92
0.1175	90	-26.95	-5.62	-21.33
0.1530	90	-19.02	-6.78	-12.24
2.9023	90	-34.13	-19.50	-14.63
7.1920	90	-34.61	-23.43	-11.18
11.6145	90	-34.53	-25.00	-9.53
15.2414	90	-35.02	-25.00	-10.02
20.6565	90	-35.24	-25.00	-10.24



<b>SPURIOUS EMISSION FREQUENCY RANGE</b>	30MHz ~ 1GHz	<b>OPERATING STATE</b>	Receiving
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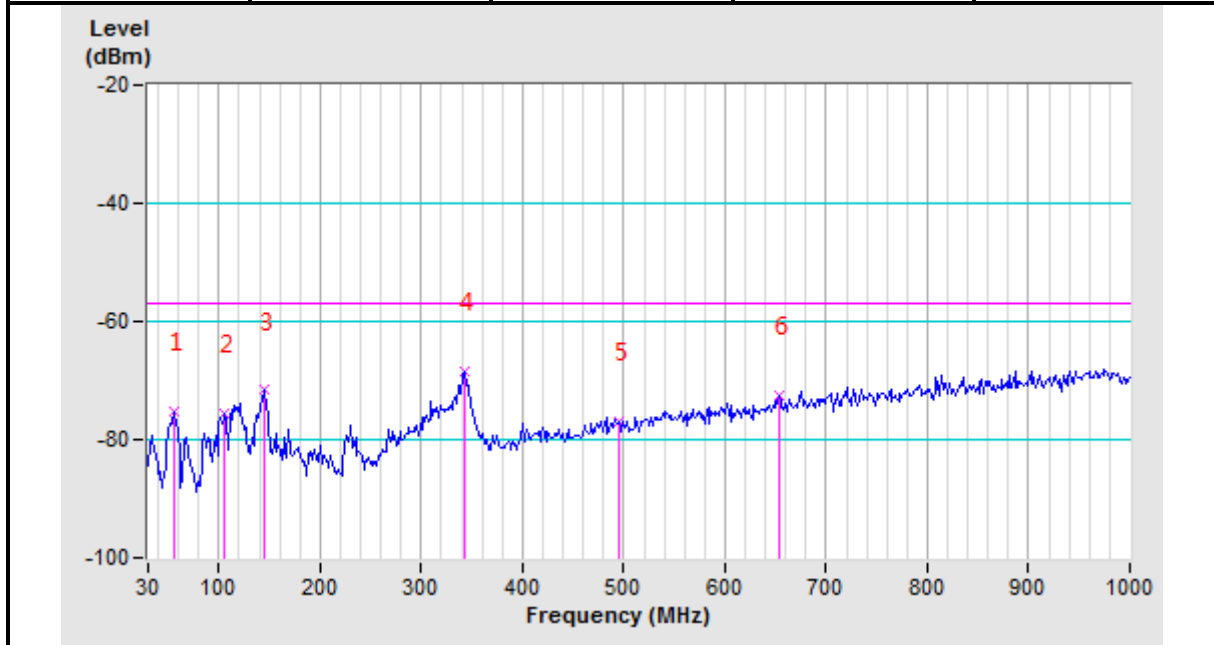
SPURIOUS EMISSION LEVEL				
Frequency (MHz)	Antenna Polarization	Level (dBm)	Limit (dBm)	Margin (dB)
194.78	H	-70.16	-57.00	-13.16
337.79	H	-79.13	-57.00	-22.13
473.03	H	-79.83	-57.00	-22.83
552.31	H	-76.59	-57.00	-19.59
633.14	H	-76.94	-57.00	-19.94
832.12	H	-70.96	-57.00	-13.96





<b>SPURIOUS EMISSION FREQUENCY RANGE</b>	30MHz ~ 1GHz	<b>OPERATING STATE</b>	Receiving
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<b>SPURIOUS EMISSION LEVEL</b>				
<b>Frequency (MHz)</b>	<b>Antenna Polarization</b>	<b>Level (dBm)</b>	<b>Limit (dBm)</b>	<b>Margin (dB)</b>
54.87	V	-75.16	-57.00	-18.16
106.17	V	-75.51	-57.00	-18.51
145.03	V	-71.68	-57.00	-14.68
342.45	V	-68.47	-57.00	-11.47
494.79	V	-76.86	-57.00	-19.86
653.35	V	-72.46	-57.00	-15.46





## 4. PHOTOGRAPHS OF THE TEST CONFIGURATION

SPURIOUS EMISSION (9KHz-30MHz)



SPURIOUS EMISSION (30MHz-1GHz)





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## **5. APPENDIX A – MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB**

No any modifications were made to the EUT by the lab during the test.

**--- END ---**