

TEST REPORT

Applicant: Particle Industries, Inc.
EUT Description: M-SoM LTE-M/2G/Satellite + Wi-Fi for Global
Model: M635e
Brand: Particle
FCC ID: 2AEMI-M635
Standards: FCC 47 CFR Part 2.1091
Date of Receipt: 2026/05/14
Date of Issue: 2026/06/17

TOWE. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

the results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of the model are manufactured with identical electrical and mechanical components. All sample tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise. without written approval of TOWE, the test report shall not be reproduced except in full.



Jim Huang
Approved By:



Carey Chen
Reviewed By:

Revision History

Rev.	Issue Date	Description	Revised by
01	2026/06/17	Original	Carey Chen

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1 General Description

1.1 Lab Information

1.1.1 Testing Location

These measurements tests were conducted at the Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. facility located at F401 and F101, Building E, Hongwei Industrial Zone, Liuxian 3rd Road, Bao'an District, Shenzhen, China. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014
Tel.: +86-755-27212361
Contact Email: info@towewireless.com

1.1.2 Test Facility / Accreditations

A2LA (Certificate Number: 7088.01)

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communiqué dated April 2017).

FCC Designation No.: CN1353

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized as an accredited testing laboratory.
Test Firm Registration Number: 684095
Designation Number: CN1353.

ISED CAB identifier: CN0152

Sushi TOWE Wireless Testing(Shenzhen) Co., Ltd. has been recognized by ISED as an accredited testing laboratory.
CAB identifier: CN0152
Company Number: 31000

1.2 Client Information

1.2.1 Applicant

Applicant:	Particle Industries, Inc.
Address:	548 Market St, PMB 34833, San Francisco, CA 94104, USA

1.2.2 Manufacturer

Manufacturer:	Particle Industries, Inc.
Address:	548 Market St, PMB 34833, San Francisco, CA 94104, USA

1.3 Product Information

EUT Description:	M-SoM LTE-M/2G/Satellite + Wi-Fi for Global		
Model:	M635e		
Brand:	Particle		
Hardware Version:	v0.2		
Software Version:	v6.4.1		
Frequency Bands:	Band	TX Frequency	RX Frequency
	GSM 850	824 ~ 849 MHz	869 ~ 894 MHz
	PCS 1900	1850 ~ 1910 MHz	1930 ~ 1990 MHz
	Cat M1 Band 2	1850 ~ 1910 MHz	1930 ~ 1990 MHz
	Cat M1 Band 4	1710 ~ 1755 MHz	2110 ~ 2155 MHz
	Cat M1 Band 5	824 ~ 849 MHz	869 ~ 894 MHz
	Cat M1 Band 12	699 ~ 716 MHz	729 ~ 746 MHz
	Cat M1 Band 13	777 ~ 787 MHz	746 ~ 756 MHz
	Cat M1 Band 25	1850 ~ 1915 MHz	1930 ~ 1995 MHz
	Cat M1 Band 26 (814 ~ 824 MHz)	814 ~ 824 MHz	859 ~ 869 MHz
	Cat M1 Band 26 (824 ~ 849 MHz)	824 ~ 849 MHz	869 ~ 894 MHz
	Cat M1 Band 66	1710 ~ 1780 MHz	2110 ~ 2180 MHz
	Cat M1 Band 85	698 ~ 716 MHz	728 ~ 746 MHz
	NTN Band 23	2000 ~ 2020 MHz	2180 ~ 2200 MHz
	NTN Band 255	1626.5 ~ 1660.5 MHz	1525 ~ 1559 MHz
	BLE	2402~2480 MHz	2402~2480 MHz
	Wi-Fi 2.4G	2412~2462 MHz	2412~2462 MHz
	Wi-Fi 5G	5150~5850 MHz	5150~5850 MHz
Power Class:	Class 3: All		
Antenna Type:	Internal: Dipole Antenna (For WWAN) External: Omnidirectional Antenna (For WWAN) PCB Antenna (For BLEWIFI)		
Antenna Gain:	Band	Ant1 Internal (dBi)	Ant4 External (dBi)
	GSM 850	1.78	2.01
	PCS 1900	5.3	1.26
	Cat M1 Band 2	5.3	1.26
	Cat M1 Band 4	3.74	1.15
	Cat M1 Band 5	1.78	2.01
	Cat M1 Band 12	2.17	1.77
	Cat M1 Band 13	2.74	1.51
	Cat M1 Band 25	5.3	1.26
	Cat M1 Band 26	1.18	2.01
	Cat M1 Band 66	3.74	1.15
	Cat M1 Band 85	2.17	1.75

	NTN Band 23	4.37	3
	NTN Band 255	3.91	1.2
	Band	Ant2 (dBi)	
	BLE	3	
	Wi-Fi 2.4G	3	
	U-NII-1:	6.8	
	U-NII-2A:	6.8	
	U-NII-2C:	6.8	
	U-NII-3:	6.8	
Remark: The above EUT's information was declared by applicant, please refer to the specifications or user manual for more detailed description.			

2 Maximum Permissible RF Exposure

2.1 RF Exposure Limit Introduction

§1.1310 the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to RF radiation as specified in §1.1307(b).

- (1) Table 1 to § 1.1310(e)(1) sets forth limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

Table 1 to § 1.1310(e)(1) - Limits for Maximum Permissible Exposure (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm)	Averaging time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3~3.0	614	1.63	*(100)	≤6
3.0~30	1842/f	4.89/f	*(900/f ²)	<6
30~300	61.4	0.163	1.0	<6
300~1500			f/300	<6
1500~100000			5	<6
(ii) Limits for General Population/Uncontrolled Exposure				
0.3~1.34	614	1.63	*(100)	<30
1.34~30	824/f	2.19/f	*(180/f ²)	<30
30~300	27.5	0.073	0.2	<30
300~1500			f/1500	<30
1500~100000			1.0	<30

Note: f = frequency in MHz. * = Plane-wave equivalent power density.

- (2) Occupational/controlled exposure limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. The phrase *fully aware* in the context of applying these exposure limits means that an exposed person has received written and/or verbal information fully explaining the potential for RF exposure resulting from his or her employment. With the exception of transient persons, this phrase also means that an exposed person has received appropriate training regarding work practices relating to controlling or mitigating his or her exposure. In situations when an untrained person is transient through a location where occupational/controlled limits apply, he or she must be made aware of the potential for exposure and be supervised by trained personnel pursuant to § 1.1307(b)(2) of this part where use of time averaging is required to ensure compliance with the general population exposure limit. The phrase exercise control means that an exposed person is allowed and also knows how to reduce or avoid exposure by administrative or engineering work practices, such as use of personal protective equipment or time averaging of exposure.
- (3) General population/uncontrolled exposure limits apply in situations in which the general public may be exposed, or in which persons who are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure. For example, RF sources intended for consumer use shall be subject to the limits for general population/uncontrolled exposure in this section.

The MPE was calculated at **20cm** to show compliance with the power density limit.

2.2 Equations

Power Density is given by:

$$S = \frac{\text{EIRP}}{4\pi R^2}$$

Where:

S = Power density in mW/cm²

EIRP= Equivalent isotropic Radiated power in mW

R = Distance from transmitting antenna in cm

Power density in units of mW/cm² is converted to units of W/m² by multiplying by 10.

Distance:

$$R = \sqrt{\frac{\text{EIRP}}{4\pi S}}$$

Where:

S = Power density in mW/cm²

EIRP= Equivalent isotropic Radiated power in mW

R = Distance from transmitting antenna in cm

EIRP:

$$\text{EIRP} = P + G$$

Where:

EIRP = Equivalent isotropic Radiated power in Mw

P = Output power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

Source-Based Duty Cycle:

Where applicable (for example, multi-slot cell phone applications) a duty cycle factor may be applied.

Source-based time-averaged EIRP = (DC / 100) * EIRP

Where:

DC = Duty Cycle in %, as applicable

EIRP= Equivalent isotropic Radiated power in mW

MIMO and collocated transmitters (identical limit for all transmitters):

For multiple chain devices, and collocated transmitters operating simultaneously in frequency bands where the limit is identical, the total power density is calculated using the total EIRP obtained by summing the PG (in linear units) of each transmitter.

Total EIRP = (EIRP 1) + (EIRP 2) + ... + (EIRP n)

MIMO and collocated transmitters:

For multiple collocated transmitters operating simultaneously in frequency bands where different limit apply:

The power density at the specified separation distance is calculated for each transmitter chain or transmitter.

The fraction of the exposure limit is calculated for each chain or transmitter as

Power density of chain or transmitter / limit applicable to the chain or transmitter.

The fractions are summed.

Compliance is established if the sum of the fractions is less than or equal to one.

3 RF Exposure Results

3.1 Standalone Exposure Calculations

For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.

The manufacturing configures output power so that the maximum power, after accounting for manufacturing tolerances, will never exceed the maximum power level measured.

The antenna gain in the tables below is the maximum antenna gain among various channels within the specified band.

Operating Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	EIRP/ERP (dBm)	EIRP/ERP Limit (dBm)	Maximum Power (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Gain According to EIRP/ERP (dBi)	Gain According to Pd (dBi)	Maximum Gain Allowed (dBi)	Results
GSM 850	824.2	2.01	35.00	34.86	38.45	381.0658	0.1976	0.5495	5.60	8.60	5.60	Pass
PCS 1900	1850.2	5.30	27.07	32.37	33.00	61.3762	0.0414	1.0000	5.93	19.13	5.93	Pass
Cat M1 Band 2	1850.7	5.3	25.00	30.30	33.00	316.2278	0.2132	1.0000	8.00	12.01	8.00	Pass
Cat M1 Band 4	1710.7	3.74	25.00	28.74	30.00	316.2278	0.1488	1.0000	5.00	12.01	5.00	Pass
Cat M1 Band 5	824.7	2.01	25.00	24.86	38.45	316.2278	0.1640	0.5498	15.60	9.41	9.41	Pass
Cat M1 Band 12	699.7	2.17	25.00	25.02	34.77	316.2278	0.1701	0.4665	11.92	8.70	8.70	Pass
Cat M1 Band 13	779.5	2.74	25.00	25.59	34.77	316.2278	0.1940	0.5197	11.92	9.16	9.16	Pass
Cat M1 Band 25	1850.7	5.3	25.00	30.30	33.00	316.2278	0.2132	1.0000	8.00	12.01	8.00	Pass
Cat M1 Band 26(814-824)	814.7	2.01	25.00	24.86	N/A	316.2278	0.1640	0.5431	N/A	9.36	9.36	Pass
Cat M1 Band 26(824-849)	824.7	2.01	25.00	24.86	38.45	316.2278	0.1640	0.5498	15.60	9.41	9.41	Pass
Cat M1 Band 66	1710.7	3.74	25.00	28.74	30.00	316.2278	0.1488	1.0000	5.00	12.01	5.00	Pass
Cat M1 Band 85	700.5	2.17	25.00	25.02	34.77	316.2278	0.1701	0.4670	11.92	8.70	8.70	Pass
NTN Band 23	2000.1	4.37	25.00	29.37	70.00	316.2278	0.1721	1.0000	45.00	12.01	12.01	Pass
NTN Band 255	1626.6	3.91	25.00	28.91	70.00	316.2278	0.1548	1.0000	45.00	12.01	12.01	Pass
BLE	2402	3	8.5	11.50	-	7.0795	0.0028	1.0000	NA			Pass
2.4GWIFI	2412	3	17	20.00	-	50.1187	0.0199	1.0000				Pass
WIFI 5G B1	5180.0	6.8	15	21.80	-	31.6228	0.0301	1.0000				Pass
WIFI 5G B2	5260.0	6.8	18.5	25.30	-	70.7946	0.0674	1.0000				Pass
WIFI 5G B3	5500.0	6.8	17	23.80	-	50.1187	0.0477	1.0000				Pass
WIFI 5G B4	5745.0	6.8	18.5	25.30	-	70.7946	0.0674	1.0000				Pass

Remark:

1. GSM Operating Band: Frame-average power=Burst power+ Division Factors (-9.19).
2. "Maximum Power" comes from the largest "Tune-up" provided by the customer.

3.2 Multiple Sources Exposure Calculations

When a number of sources at different frequencies, and/or broadband sources, contribute to the total exposure, it becomes necessary to weigh each contribution relative to the MPE in accordance with the provisions of Table(A) and Table(B). To comply with the MPE, the fraction of the MPE in terms of E2, H2 (or power density) incurred within each frequency interval should be determined and the sum of all such fractions should not exceed unity.

In order to ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity.

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	WWAN + 2.4G WIFI
2	WWAN + WIFI 5G
3	2.4G WIFI + BLE
4	WIFI 5G + BLE
5	WWAN + 2.4G WIFI + BLE
6	WWAN + WIFI 5G + BLE

TER (Total exposure ratio) = Power Density (mW/cm²) / Limit (mW/cm²)

Operating Band	Frequency (MHz)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	TER
GSM 850	824.2	0.1976	0.5495	0.3596
PCS 1900	1850.2	0.0414	1.0000	0.0414
Cat M1 Band 2	1850.7	0.2132	1.0000	0.2132
Cat M1 Band 4	1710.7	0.1488	1.0000	0.1488
Cat M1 Band 5	824.7	0.1640	0.5498	0.2982
Cat M1 Band 12	699.7	0.1701	0.4665	0.3647
Cat M1 Band 13	779.5	0.1940	0.5197	0.3733
Cat M1 Band 25	1850.7	0.2132	1.0000	0.2132
Cat M1 Band 26(814-824)	814.7	0.1640	0.5431	0.3019
Cat M1 Band 26(824-849)	824.7	0.1640	0.5498	0.2982
Cat M1 Band 66	1710.7	0.1488	1.0000	0.1488
Cat M1 Band 85	700.5	0.1701	0.4670	0.3643
NTN Band 23	2000.1	0.1721	1.0000	0.1721
NTN Band 255	1626.6	0.1548	1.0000	0.1548
BLE	2402	0.0028	1.0000	0.0028
2.4GWIFI	2412	0.0199	1.0000	0.0199
WIFI 5G B1	5180.0	0.0301	1.0000	0.0301
WIFI 5G B2	5260.0	0.0674	1.0000	0.0674
WIFI 5G B3	5500.0	0.0477	1.0000	0.0477
WIFI 5G B4	5745.0	0.0674	1.0000	0.0674

The product also has multiple transmitters. The Simultaneous Transmission Possibilities are as below:

The worst-case combination: **Mode 6: WWAN + WIFI 5G + BLE**

Combination	TER	Total TER	Limit	Conclusion
Cat M1 Band 13	0.3733	0.4435	<1	PASS
WIFI 5G	0.0674			
BLE	0.0028			

~The End~