

RF EXPOSURE 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	Boron 2G/3G
Brand Name	Particle Industries, Inc
Model	BRN310
Additional Model & Model Difference	N/A
Date of tests	Sep. 03, 2018 ~ Nov. 08, 2018

☒ **FCC Part 2 (Section 2.1091)**

☒ **KDB 447498 D01**

☒ **IEEE C95.1**

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

Tested by Breeze Jiang Project Engineer / EMC Department	Approved by Glyn He Supervisor / EMC Department
	
	Date: Dec. 10, 2018

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
FM180831N010	Original release	Dec. 10, 2018

1. CERTIFICATION

FCC ID:	2AEMI-BRN310
PRODUCT:	Boron 2G/3G
BRAND NAME:	Particle Industries, Inc
MODEL NO.:	BRN310
ADDITIONAL NO.:	N/A
TEST SAMPLE:	Engineering Sample
APPLICANT:	Particle Industries, Inc
STANDARDS:	FCC Part 2 (Section 2.1091)
	KDB 447498 D01
	IEEE C95.1

2. RF EXPOSURE LIMIT

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. MPE CALCULATION FORMULA

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

4. 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**.

5. TARGET POWER AND TOLERANCE

Technology/Band	Mode	Target Power and Tolerance (dBm)
GSM 850	GSM (GMSK, 1Tx-slot)	32±1.0 dBm
	GPRS (GMSK, 1Tx-slot)	32±1.0 dBm
	GPRS (GMSK, 2Tx-slot)	31±1.0 dBm
	GPRS (GMSK, 3Tx-slot)	29±1.0 dBm
	GPRS (GMSK, 4Tx-slot)	28±1.0 dBm
	EDGE (8PSK, 1Tx-slot)	26±1.0 dBm
	EDGE (8PSK, 2Tx-slot)	23±1.0 dBm
	EDGE (8PSK, 3Tx-slot)	22±1.0 dBm
	EDGE (8PSK, 4Tx-slot)	20±1.0 dBm
GSM 1900	GSM (GMSK, 1Tx-slot)	29±1.0 dBm
	GPRS (GMSK, 1Tx-slot)	29±1.0 dBm
	GPRS (GMSK, 2Tx-slot)	28±1.0 dBm
	GPRS (GMSK, 3Tx-slot)	26±1.0 dBm
	GPRS (GMSK, 4Tx-slot)	25±1.0 dBm
	EDGE (8PSK, 1Tx-slot)	25±1.0 dBm
	EDGE (8PSK, 2Tx-slot)	23±1.0 dBm
	EDGE (8PSK, 3Tx-slot)	21±1.0 dBm
	EDGE (8PSK, 4Tx-slot)	19±1.0 dBm
WCDMA Band II	RMC 12.2K	21±1.0 dBm
WCDMA Band V	RMC 12.2K	22±1.0 dBm
DSSS(802.15.4)	OQPSK	-1±1.0 dBm

6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

Band	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
GSM 850 (1 Tx slot)	1.0	33.0	34.000	2.512	316.228	0.063	0.549	0.115
GPRS 850 (1 Tx slot)	1.0	33.0	34.000	2.512	316.228	0.063	0.549	0.115
GPRS 850 (2 Tx slots)	1.0	32.0	33.000	1.995	501.187	0.100	0.549	0.182
GPRS 850 (3 Tx slots)	1.0	30.0	31.000	1.259	472.063	0.094	0.549	0.171
GPRS 850 (4 Tx slots)	1.0	29.0	30.000	1.000	501.187	0.100	0.549	0.182
EGPRS 850 (1 Tx slot)	1.0	27.0	28.000	0.631	79.433	0.016	0.549	0.029
EGPRS 850 (2 Tx slots)	1.0	24.0	25.000	0.316	79.433	0.016	0.549	0.029
EGPRS 850 (3 Tx slots)	1.0	23.0	24.000	0.251	94.189	0.019	0.549	0.034
EGPRS 850 (4 Tx slots)	1.0	21.0	22.000	0.158	79.433	0.016	0.549	0.029
GSM 1900 (1 Tx slot)	3.5	30.0	33.500	2.239	281.838	0.056	1.000	0.056
GPRS 1900 (1 Tx slot)	3.5	30.0	33.500	2.239	281.838	0.056	1.000	0.056
GPRS 1900 (2 Tx slots)	3.5	29.0	32.500	1.778	446.684	0.089	1.000	0.089
GPRS 1900 (3 Tx slots)	3.5	27.0	30.500	1.122	420.727	0.084	1.000	0.084
GPRS 1900 (4 Tx slots)	3.5	26.0	29.500	0.891	446.684	0.089	1.000	0.089
EGPRS 1900 (1 Tx slot)	3.5	26.0	29.500	0.891	112.202	0.022	1.000	0.022
EGPRS 1900 (2 Tx slots)	3.5	24.0	27.500	0.562	141.254	0.028	1.000	0.028
EGPRS 1900 (3 Tx slots)	3.5	22.0	25.500	0.355	133.045	0.026	1.000	0.026
EGPRS 1900 (4 Tx slots)	3.5	20.0	23.500	0.224	112.202	0.022	1.000	0.022
WCDMA Band 5	1.0	23.0	24.000	0.251	251.189	0.050	0.551	0.091
WCDMA Band 2	3.5	22.0	25.500	0.355	354.813	0.071	1.000	0.071
DSSS(802.15.4)	0	0	0	0.001	-	0.000199	1.000	0.000199

7. CONCLUSION OF SIMULTANEOUS TRANSMITTER

Both of the WLAN and plug-in device can transmit simultaneously, the formula of calculated the MPE is:

$$CPD1/LPD1 + CPD2/LPD2 + \dots \text{etc.} < 1$$

CPD = Calculation power density

LPD = Limit of power density



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Therefore the worst-case situation is $0.182 + 0.000199 = 0.182199$, which is less than "1", This confirmed that the device comply with FCC 1.1310 MPE limit.

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