



TEST REPORT No.: (5217)088-0417

## FCC DoC TEST REPORT

To:	<b>PARTICLE INDUSTRIES, INC</b>	To:	-
Attn:	Eric Yuan	Attn:	-
Address:	1475 Folsom St, Suite 200, San Francisco CA 94103	Address:	-
Fax:	--	Fax:	-
E-mail:	--	E-mail:	-
Folder No.:	BVCZ17MA234ETHS-B		
Factory Name:	<b>ABO ELECTRONICS (SHENZHEN) CO., LTD</b>		
Location:	1475 Folsom St, Suite 200, San Francisco CA 94103		
Product:	ELECTRON Model No.: U260 (Brand Name: Particle)		
	Sample No:	HK170324/022	
	Date of Receipt:	March 15, 2017	
	Test Date(s):	March 16, 2017 to March 19, 2017	
	Test Requested:	FCC Part 15 - 2015	
	Test Method:	ANSI C63.4 - 2014	
	DoC No.:	17-011	
	<p>The results given in this report are related to the tested specimen of the described electrical apparatus.</p> <p><b>CONCLUSION:</b> The submitted sample was found to <u>COMPLY</u> with requirement of FCC Part 15 Subpart B.</p>		

Assistant Manager,  
EMC Department

Name: Law Man Kit  
Date: April 10, 2017



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### Equipment Under Test:

Product : ELECTRON  
Model No. : U260  
Power Supply : USB Input: 5Vd.c. /  
3.7Vd.c. ("Rechargeable battery" x 1)  
Data Cable : 0.5m shielded USB cable  
Power Line Cable : --  
Accessory Device : --

### Description of Adaptor

Adaptor : --  
Model : --  
Input : --  
Input power line cable : --  
Output : --  
Output power line cable : --

### Additional Product Name:

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### Additional Model No.:

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### Additional Model Information:

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### Description of Test modes:

Charging mode  
GPRS 850MHz link mode  
GRPS 1900MHz link mode  
Band V 850MHz link mode  
Band II 1900MHz link mode

### Report Revision & Sample Re-submit History:

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#### Remark: -

This report was basic on the report No.151201N010 to changing version number of the PCB and add one capacitance in the PCB. So we retest the radiation emission item only.



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## Test Result Summary

<b>EMISSION TEST</b>			
<b>Test requirement: FCC Part 15 – 2015</b>			
Test Condition	Test Method	Test Result	
		Pass	Failed
Conducted Emission Test, 0.15MHz to 30MHz	ANSI C63.4	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Radiated Emission Test, 30MHz to 1GHz	ANSI C63.4	<input checked="" type="checkbox"/>	<input type="checkbox"/>



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**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	NOTEBOOK	DELL	PP20L	FG034A02	CE & FCC DoC Approved
2	MOUSE	DELL	MOA8BO	H0T00H92	CE & FCC DoC Approved
3	PRINTER	EPSON	B163A	ELPK004488	CE & FCC DoC Approved

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Cable, Non-shielded, with core, 2m
2	DC Cable, Non-shielded, without core, 1.8m
3	USB Cable, Shielded, without core, 1.5m

**NOTE: All power cords of the above support units are non-shielded (1.8m).**



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## Test Laboratory & Test Instruments List

Radiated and Conducted emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2014. An Open Area Test Site and Full Anechoic Chamber are set up for investigation and located at:

### BUREAU VERITAS HONG KONG LIMITED, EMC CENTRE

No. 2106-2107, 21/F., Westin Centre,  
26 Hung To Road,  
Kwun Tong, Kowloon,  
Hong Kong

## Test Instrument List

### Radiated Emission

EQUIPMENT	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
EMI TEST RECEIVER	R&S	ESCI	100379	22-FEB-2017	21-FEB-2018
SIGNAL ANALYZER 40GHZ	R&S	FSV 40	100977	16-AUG-2016	15-AUG-2017
BILOG ANTENNA	SCHAFFNER	CBL6112D	25229	27-FEB-2016	26-FEB-2018
OPEN AREA TEST SITE	BVCPS	N/A	N/A	18-JUN-2016	17-JUN-2017
ANECHOIC CHAMBER	ALBATROSS	M-CDC	80374004499B	11-MAY-2016	10-MAY-2017
BICONICAL ANTENNA	R&S	HK116	100179	14-APR-2016	13-APR-2018
LOG-PERIODIC DIPOLE ARRAY ANTENNA	R&S	HL223	832369/001	07-APR-2016	06-APR-2018
HORN ANTENNA (1-18GHZ)	SCHWARZBECK	BBHA9120D	9120D-692	05-NOV-2016	04-NOV-2018
COAXIAL CABLE	SUHNER	N/A	N/A	06-JAN-2017	05-JAN-2018

### Conducted Emission

EQUIPMENT	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL. DATE	CAL. DUE DATE
EMI TEST RECEIVER	R&S	ESCI	100379	22-FEB-2017	21-FEB-2018
LISN	R&S	ENV216	100024	19-OCT-2016	18-OCT-2017

SOFTWARE	MANUFACTURER	VERSION	SERIAL NO.
EMC32-E	R&S	8.4	N/A

## Measurement Uncertainty

MEASUREMENT	FREQUENCY	UNCERTAINTY
Conducted emissions	9kHz to 30MHz	2.9dB
Radiated emissions	9kHz to 30MHz	4.2dB
	30MHz to 200MHz	4.5dB
	200MHZ to 1GHz	5.6dB
	1GHz to 18GHz	4.7dB

### Remarks: -

N/A: Not Applicable or Not Available

The measurement instrumentation uncertainty would be taking into consideration on each of the test result

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**Test Results**

**Conducted Emissions (150kHz to 30MHz)**

Test Requirement: FCC Part 15 Section 15.107  
 Test Method: ANSI C63.4  
 Test Limits: Class B  
 Test Date(s): 2017-3-20  
 Temperature: 20.0 °C  
 Humidity: 55.0 %  
 Atmospheric Pressure: 100.6 kPa  
 Mode of Operation: Charging mode  
 Tested Voltage: 117Va.c., 60Hz

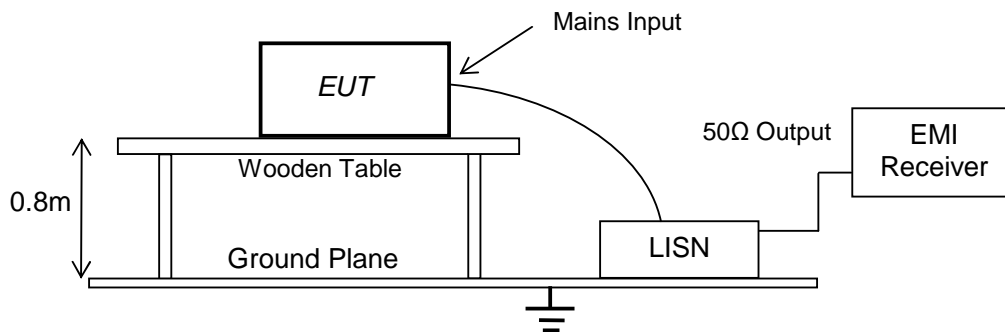
**Test Method:**

Conducted emissions measurements are investigated and also taken pursuant to the procedures of ANSI C63.4 – 2014. The EUT was setup as described in the procedures, and both lines were measured.

Initial measurements were performed in peak and average detection modes on the live and neutral line, any emissions recorded within 30dB of the relevant limit lines were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Location: No. 603, 6/F., Westin Centre, 26 Hung To Road, Kwun Tong, Kowloon, Hong Kong

**Test Setup: Shielding Room**



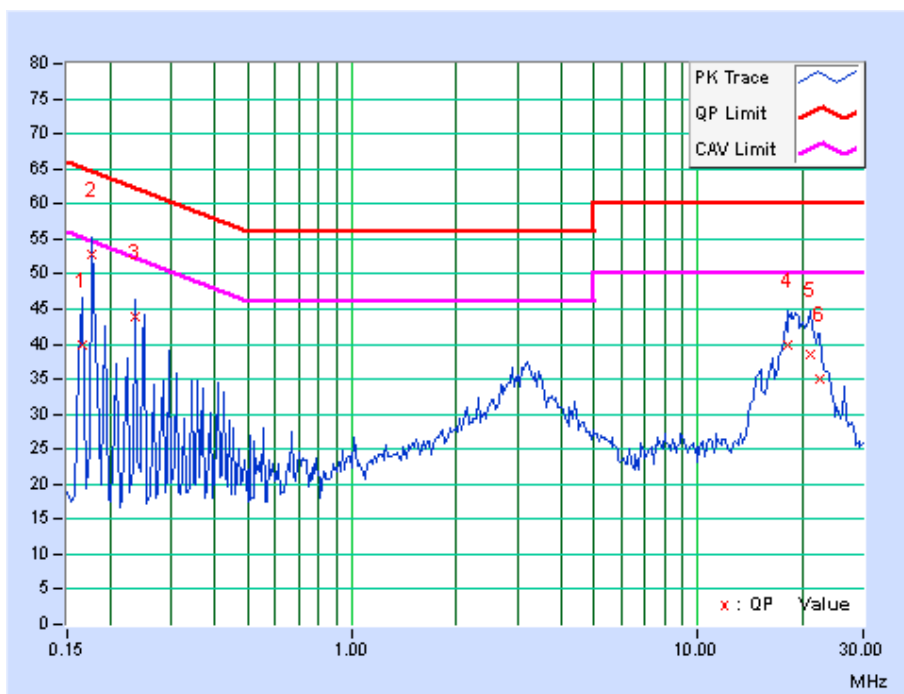
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**Measurement Data: Live**

**Test Result of (Charging mode): PASS**

**Results and limit lines for Conducted Emission:**

Limits for Conducted Emission Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.





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**Results and limit lines for Conducted Emission:**

Limits for Conducted Emission Test, please refer to limit lines (Quasi-Peak and Average) in the following tables.

Frequency (MHz)	Quasi Peak (dB $\mu$ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB $\mu$ V)
0.16562	39.94	9.000	L1	-25.24	65.18
0.17734	52.78	9.000	L1	-11.83	64.61
0.23594	44.01	9.000	L1	-18.23	62.24
18.26953	39.91	9.000	L1	-20.09	60
21.03125	38.48	9.000	L1	-21.52	60
22.52344	34.95	9.000	L1	-25.05	60

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB $\mu$ V)
0.16562	15.91	9.000	L1	-39.27	55.18
0.17734	37.42	9.000	L1	-17.19	54.61
0.23594	27.46	9.000	L1	-24.78	52.24
18.26953	33.32	9.000	L1	-16.68	50
21.03125	33.24	9.000	L1	-16.76	50
22.52344	29.77	9.000	L1	-20.23	50



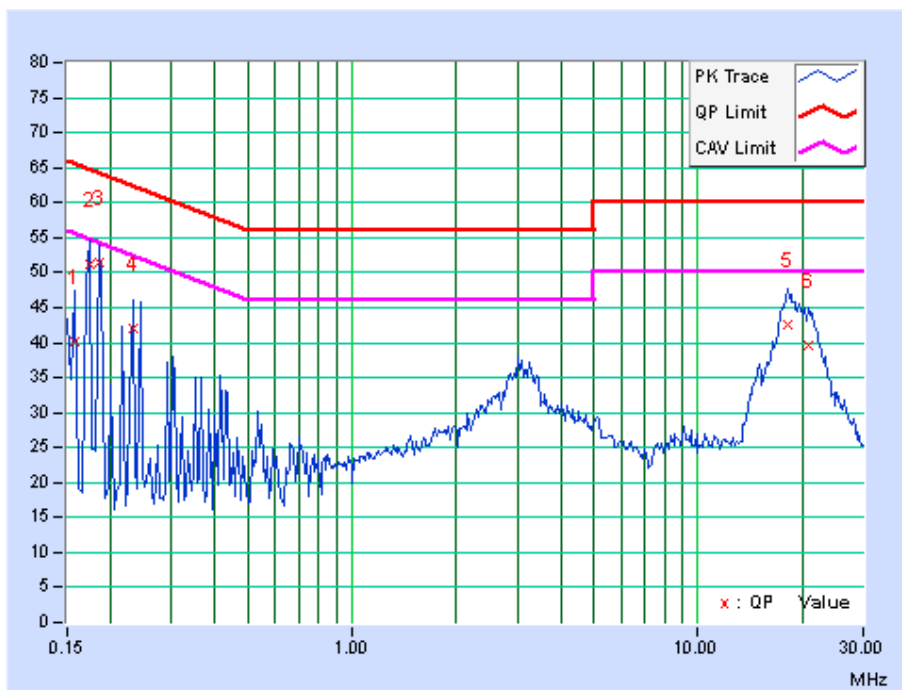
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Measurement Data: Neutral

Test Result of (Charging mode): PASS

**Results and limit lines for Conducted Emission:**

Limits for Conducted Emission Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.





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### Results and limit lines for Conducted Emission:

Limits for Conducted Emission Test, please refer to limit lines (Quasi-Peak and Average) in the following tables.

Frequency (MHz)	Quasi Peak (dB $\mu$ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB $\mu$ V)
0.15781	40.26	9.000	N	-25.32	65.58
0.17344	51.08	9.000	N	-13.71	64.79
0.18516	51.53	9.000	N	-12.72	64.25
0.23203	42.00	9.000	N	-20.38	62.38
18.09375	42.57	9.000	N	-17.43	60
20.85938	39.52	9.000	N	-20.48	60

Frequency (MHz)	Average (dB $\mu$ V)	Bandwidth (kHz)	Line	Margin (dB)	Limit (dB $\mu$ V)
0.15781	13.34	9.000	N	-42.24	55.58
0.17344	32.45	9.000	N	-22.34	54.79
0.18516	34.48	9.000	N	-19.77	54.25
0.23203	22.24	9.000	N	-30.14	52.38
18.09375	34.04	9.000	N	-15.96	50
20.85938	34.74	9.000	N	-15.26	50

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**Radiated Emissions (30MHz to 1GHz)**

Test Requirement: FCC Part 15 Section 15.109  
 Test Method: ANSI C63.4  
 Test Date(s): 2017-3-20  
 Temperature: 20.0 °C  
 Humidity: 55.0 %  
 Atmospheric Pressure: 100.3 kPa  
 Mode of Operation: Band II 1900MHz link mode  
 Tested Voltage: 3.7Vd.c. ("Rechargeable battery" x 1)

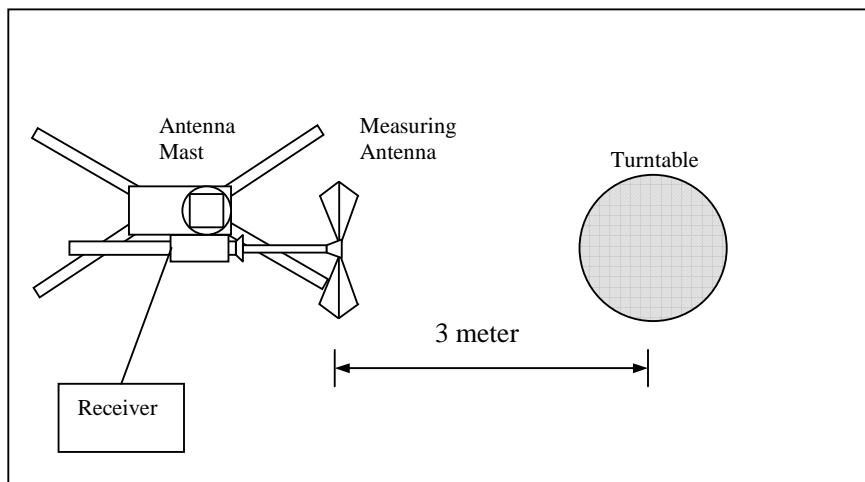
**Test Method:**

Radiated emissions measurements are investigated and taken pursuant to the procedures of ANSI C63.4 – 2014.

The equipment under test (EUT) was placed on a non-conductive turntable with dimensions of 1.5m x 1m and 0.8m high above the ground. 3m from the EUT, a broadband antenna mounting on the mast received the signal strength. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, For battery operated equipment, the equipment tests shall be perform using new battery. The turntable was rotated to maximize the emission level. The antenna was then moving along the mast from 1m up to 4m until no more higher value was found. Both horizontal and vertical polarization of the antenna were placed and investigated.

Location: The Roof, Westin Centre, 26 Hung To Road, Kwun Tong, Kowloon, Hong Kong

**Test Setup: Open Area Test Site**





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**Limits for Radiated Emission: FCC Part 15.109**

Frequency Range [MHz]	Limits [dB $\mu$ V/m @ 3m]
30-88	40.0
88-216	43.5
216-960	46.0
Above 960	54.0

**Measurement Data**

**Test Result of (Band II 1900MHz link mode): PASS**

**Detection mode: Quasi-Peak**

Frequency (MHz)	Polarity (H/V)	Field Strength at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
30.00	H	18.35	40.00	-21.65
134.15	H	17.45	43.50	-26.05
162.13	H	23.16	43.50	-20.34
255.40	H	35.78	46.00	-10.22
263.17	H	27.75	46.00	-18.25
424.84	H	27.54	46.00	-18.46

Frequency (MHz)	Polarity (H/V)	Field Strength at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
31.55	V	19.39	40.00	-20.61
99.95	V	22.42	43.50	-21.08
134.15	V	22.59	43.50	-20.91
162.13	V	26.54	43.50	-16.96
188.56	V	23.30	43.50	-20.20
255.40	V	26.74	46.00	-19.26

Note: Field Strength includes Antenna Factor and Cable Loss.



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**Measurement Data (1-18GHz)**

**Test Result of (Band II 1900MHz link mode): PASS**

**Detection mode: Peak**

Frequency (MHz)	Polarity (H/V)	Field Strength at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
1511.00	H	56.22	74.00	-17.78
1844.70	H	53.53	74.00	-20.47
3850.00	H	61.03	74.00	-12.97
1395.00	V	57.45	74.00	-16.55
1599.00	V	58.01	74.00	-15.99
3328.80	V	60.14	74.00	-13.86

**Detection mode: Average**

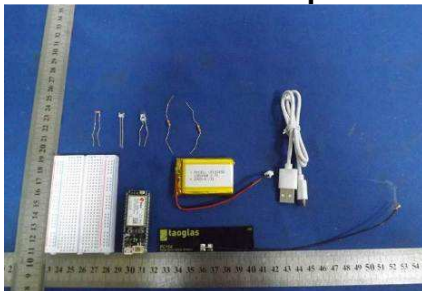
Frequency (MHz)	Polarity (H/V)	Field Strength at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
1511.00	H	35.01	54.00	-18.99
1844.70	H	35.24	54.00	-18.76
3850.00	H	36.89	54.00	-17.11
1395.00	V	33.12	54.00	-20.88
1599.00	V	33.86	54.00	-20.14
3328.80	V	36.45	54.00	-17.55

Note: Field Strength includes Antenna Factor and Cable Loss.

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**Photographs of EUT**

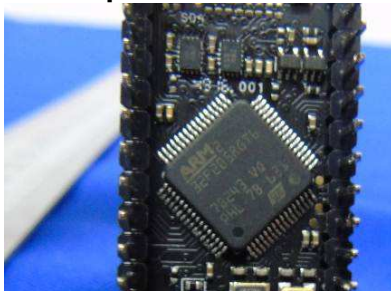
**External View of the product**



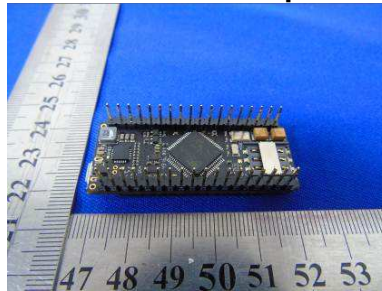
**Top View of the product**



**Top View of the IC**



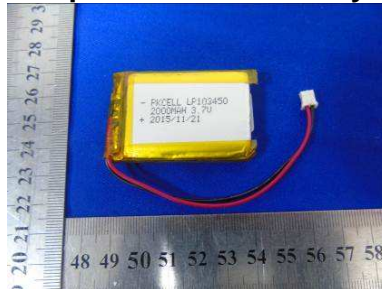
**Bottom View of the product**



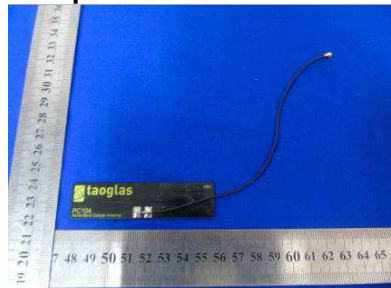
**Top View of the Battery**



**Top View of the Battery**



**Top View of the Antenna**



**Top View of the Antenna**



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### **Measurement of Conducted Emission Test Set Up**



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**Measurement of Radiated Emission Test Set Up**



**\*\*\*\*\* End of Test Report \*\*\*\*\***