

RF Exposure Test Report

Report No.: SA190716C36

FCC ID: C3K1915

Test Model: 1915

Received Date: Jul. 3, 2019

Test Date: Jul. 9, 2019

Issued Date: Jul. 22, 2019

Applicant: MICROSOFT CORPORATION

Address: ONE MICROSOFT WAY REDMOND, WA 98052-6399

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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**FCC Registration /
Designation Number:** 198487 / TW2021



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Release Control Record

Issue No.	Description	Date Issued
SA190716C36	Original release.	Jul. 22, 2019

1 Certificate of Conformity

Product: Wireless charger

Brand: Microsoft

Test Model: 1915

Sample Status: Engineering sample

Applicant: MICROSOFT CORPORATION

Test Date: Jul. 9, 2019

Standards: FCC Part 2 (Section 2.1091)
FCC Part 1 (Section 1.1307(c) and (d), Section 1.1310)
KDB 680106 D01 RF Exposure Wireless Charging v03

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by :



Date: Jul. 22, 2019

Jessica Cheng / Senior Specialist

Approved by :



Date: Jul. 22, 2019

Rex Lai / Associate Technical Manager

2 General Information

2.1 General Description of EUT

Product	Wireless charger
Brand	Microsoft
Test Model	1915
Sample Status	Engineering sample
Rating	5Vdc , 200mA
Modulation Type	ASK
Operating Frequency	13.56MHz
Antenna Type	NFC FPC loop antenna
Field Strength	37.69dBuV/m
Dimensions	162.9mm*17mm *9.9 mm
Accessory Device	N/A
Data Cable Supplied	USB to type C shielded cable (0.45m)
Maximum Power Output from the Charging Coil	300mW

Note: The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3 RF Exposure

3.1 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.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	Lenovo	81A4	YD02TWDP	N/A	Provided by Lab
B.	Load	N/A	N/A	N/A	N/A	Supplied by client

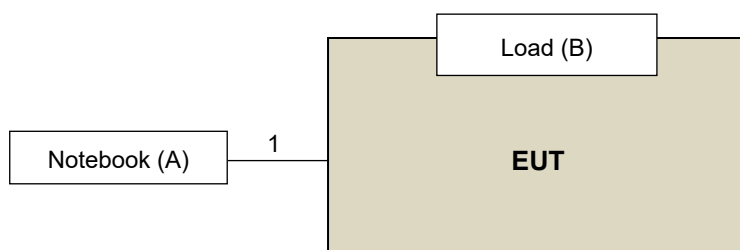
Note: All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB to Type C cable	1	0.45	Y	0	Supplied by client

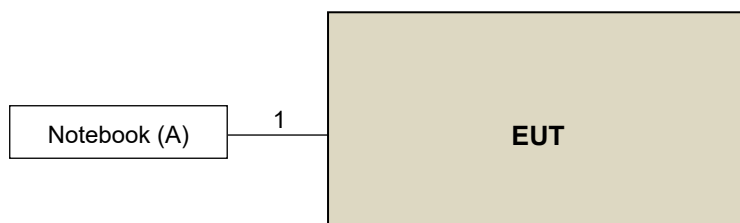
Note: The core(s) is(are) originally attached to the cable(s).

3.1.1 Configuration of System under Test

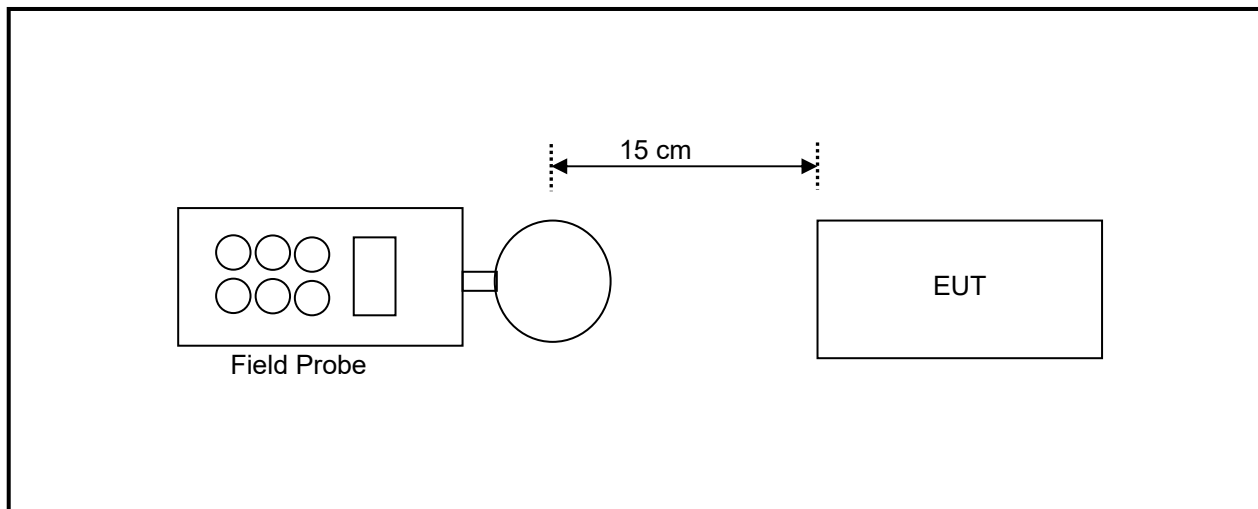
Charging Mode:



Standby Mode:



3.2 Test Setup



Note: Measurements should be made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device.

3.3 Test Instruments

Description	Brand	Model No.	Frequency Range	Calibrated Date	Calibrated Until
Broadband Field Meter	NARDA	NBM-550	-	Mar. 28, 2018	Mar. 27, 2020
Magnetic Field Meter	NARDA	ELT-400	1 – 400kHz	Apr. 12, 2018	Apr. 11, 2020
Magnetic Probe	NARDA	HF-3061	300kHz – 30MHz	Apr. 16, 2018	Apr. 15, 2020
Magnetic Probe	NARDA	HF-0191	27 – 1000MHz	Apr. 17, 2018	Apr. 16, 2020
Broadband Field Meter	NARDA	NBM-550	-	Mar. 28, 2018	Mar. 27, 2020
Electric Field Meter	COMBINOVA	EFM 200	5Hz – 400kHz	Dec. 6, 2017	Dec. 5, 2019
E-Field Probe	NARDA	EF-0391	100kHz – 3GHz	Mar. 28, 2018	Mar. 27, 2020
E-Field Probe	NARDA	EF-6091	100MHz – 60GHz	Mar. 29, 2018	Mar. 28, 2020

NOTE: 1. The calibration interval of the above test instruments is 12/24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in Chia Pau RF Chamber
 3. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

3.4 Limits for Maximum Permissible Exposure (MPE)

§ 1.1310 The criteria listed in table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency(RF) radiation as specified in § 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter.

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
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
1500–100,000			5	6
(B) 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
1500–100,000			1.0	30

f = frequency in MHz

* = Plane-wave equivalent power density

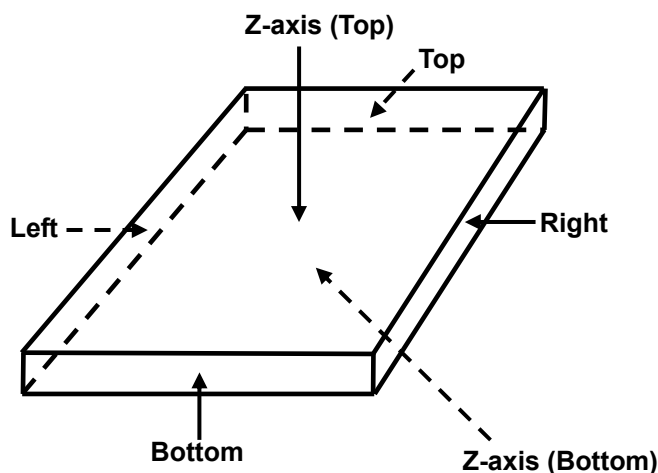
NOTE 1 TO TABLE 1: Occupational/controlled limits apply in situations in which persons are exposed as a consequence of their employment provided those persons are fully aware of the potential for exposure and can exercise control over their exposure. Limits for occupational/controlled exposure also apply in situations when an individual is transient through a location where occupational/controlled limits apply provided he or she is made aware of the potential for exposure.

NOTE 2 TO TABLE 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or can not exercise control over their exposure.

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The aggregate H-field strengths at 15 cm surrounding the device and 15 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.

3.5 Test Point Description



4 Calculation Result of Maximum Conducted Power

Charging Mode with 90% Load

E-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max E-field (V/m)	0.5600	0.2500	0.1500	0.2200	0.2400	0.1900
Limit (V/m)	60.77	60.77	60.77	60.77	60.77	60.77
Margin (V/m)	-60.2100	-60.5200	-60.6200	-60.5500	-60.5300	-60.5800
50 % Limit (V/m)	30.385	30.385	30.385	30.385	30.385	30.385
50 % Margin (V/m)	-29.8250	-30.1350	-30.2350	-30.1650	-30.1450	-30.1950

H-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max H-field (A/m)	0.0231	0.0201	0.0202	0.0205	0.0229	0.0186
Limit (A/m)	0.16	0.16	0.16	0.16	0.16	0.16
Margin (A/m)	-0.1369	-0.1399	-0.1398	-0.1395	-0.1371	-0.1414
50 % Limit (A/m)	0.08	0.08	0.08	0.08	0.08	0.08
50 % Margin (A/m)	-0.0569	-0.0599	-0.0598	-0.0595	-0.0571	-0.0614

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

Charging Mode with 50% Load

E-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max E-field (V/m)	0.4900	0.2000	0.1300	0.1900	0.1900	0.1500
Limit (V/m)	60.77	60.77	60.77	60.77	60.77	60.77
Margin (V/m)	-60.2800	-60.5700	-60.6400	-60.5800	-60.5800	-60.6200
50 % Limit (V/m)	30.385	30.385	30.385	30.385	30.385	30.3850
50 % Margin (V/m)	-29.8950	-30.1850	-30.2550	-30.1950	-30.1950	-30.2350

H-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max H-field (A/m)	0.0201	0.0189	0.0194	0.0193	0.0227	0.0187
Limit (A/m)	0.16	0.16	0.16	0.16	0.16	0.16
Margin (A/m)	-0.1399	-0.1411	-0.1406	-0.1407	-0.1373	-0.1413
50 % Limit (A/m)	0.08	0.08	0.08	0.08	0.08	0.08
50 % Margin (A/m)	-0.0599	-0.0611	-0.0606	-0.0607	-0.0573	-0.0613

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

Charging Mode with 10% Load

E-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max E-field (V/m)	0.4100	0.1800	0.1100	0.1600	0.1600	0.1200
Limit (V/m)	60.77	60.77	60.77	60.77	60.77	60.77
Margin (V/m)	-60.3600	-60.5900	-60.6600	-60.6100	-60.6100	-60.6500
50 % Limit (V/m)	30.385	30.385	30.385	30.385	30.385	30.385
50 % Margin (V/m)	-29.9750	-30.2050	-30.2750	-30.2250	-30.2250	-30.2650

H-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max H-field (A/m)	0.0194	0.0181	0.0188	0.0186	0.0215	0.0174
Limit (A/m)	0.16	0.16	0.16	0.16	0.16	0.16
Margin (A/m)	-0.1406	-0.1419	-0.1412	-0.1414	-0.1385	-0.1426
50 % Limit (A/m)	0.08	0.08	0.08	0.08	0.08	0.08
50 % Margin (A/m)	-0.0606	-0.0619	-0.0612	-0.0614	-0.0585	-0.0626

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

Standby Mode

E-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max E-field (V/m)	0.2900	0.4400	0.1900	0.2200	0.0280	0.2400
Limit (V/m)	60.77	60.77	60.77	60.77	60.77	60.77
Margin (V/m)	-60.4800	-60.3300	-60.5800	-60.5500	-60.7420	-60.5300
50 % Limit (V/m)	30.385	30.385	30.385	30.385	30.385	30.385
50 % Margin (V/m)	-30.0950	-29.9450	-30.1950	-30.1650	-30.3570	-30.1450

H-Field Measurement						
Distance	15cm					
EUT Side	Left	Right	Top	Bottom	Z-axis Top	Z-axis Bottom
Max H-field (A/m)	0.0282	0.0183	0.0200	0.0195	0.0196	0.0153
Limit (A/m)	0.16	0.16	0.16	0.16	0.16	0.16
Margin (A/m)	-0.1318	-0.1417	-0.1400	-0.1405	-0.1404	-0.1447
50 % Limit (A/m)	0.08	0.08	0.08	0.08	0.08	0.08
50 % Margin (A/m)	-0.0518	-0.0617	-0.0600	-0.0605	-0.0604	-0.0647

Measurements were made from all sides and the top of the primary/client pair, with the 15 cm measured from the center of the probe(s) to the edge of the device. The highest emission level was recorded.

5 Photographs of the Test Configuration

Please refer to the attached file (Test Setup Photo).

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