MPE TEST REPORT

OF

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID: PYADC-50

Equipment Under Test	: Nokia Portable Wireless Charging Plate
Model Name	: DC-50
Serial No.	: N/A
Applicant	: Nokia Corporation
Manufacturer	: Nokia Corporation
Date of Test(s)	: 2013.09.20 ~ 2013.09.22
Date of Issue	: 2013.09.24

In the configuration tested, the EUT complied with the standards specified above.

Tested By: Logan Lee **Date:** 2013.09.24

Approved By: Feel Jeong **Date:** 2013.09.24

INDEX

TABLE OF CONTENTS Page

1. General information

1.1. Testing laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
- 413-15, Gomae-dong, Giheung-gu, Yongin-si, Gyeonggi-do, Korea 446-901
- Wireless Div. 3FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at http://www.sgs.com/en/Terms-and-Conditions.aspx.

Phone No. : +82 31 428 5700
Fax No. : +82 31 427 2371

1.2. Details of applicant

Applicant : Nokia Corporation
Address : Keilalahdentie 4, ESPOO, FIN-02150, Finland
Contact Person : Hannu
Phone No. : +358-7180-8008000

1.3. Description of EUT

Kind of Product	Nokia Portable Wireless Charging Plate
Model Name	DC-50
Serial Number	N/A
Power Supply	AC 100 V ~ 240 V (Used adapter: DC 5 V / 1.5 A)
Frequency Range	112 ㎑ ~ 205 ㎑
Operating Conditions	0 ℃ ~ 45 ℃
Antenna Type	Inductive loop coil antenna
H/W version	1.2.2
S/W version	2.2.2.8

1.4. Declarations by the manufacturer

- Operation temperature: 0 ℃ ~ 45 ℃

1.5. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL006975	Initial
1	F690501/RF-RTL006975-1	H/W & S/W version change

1.6. Test Equipment List

Equipment	Manufacturer	Model	S/N	Cal Date	Cal Interval	Cal Due.
Spectrum Analyzer	R&S	FSV30	101004	Jul. 20, 2013	Annual	Jul. 20, 2014
Loop Antenna	Schwarzbeck Mess-Elektronik	FMZB 1519	1519-039	Jul. 29, 2013	Biennial	Jul. 29, 2015
E-Field Probe	Schaffner	HI-6005	00086968	Jul. 25, 2013	Annual	Jul. 25, 2014
B-Field Probe	Narda	BN 2300/90.10	J-0025	Jan. 21, 2013	Annual	Jan. 21, 2014
Exposure Level Meter	Narda	ELT-400	J-0015	Jan. 21, 2013	Annual	Jan. 21, 2014
Anechoic Chamber	WILL TECHNOLOGY	L × W × H (7.0 m × 4.0 m × 3.0 m)	N/A	N/A	N/A	N.C.R.
Mobile Test Unit	R&S	CMU200	109496	Feb. 13, 2013	Annual	Feb. 13, 2014

1.7. Worst case of test configurations

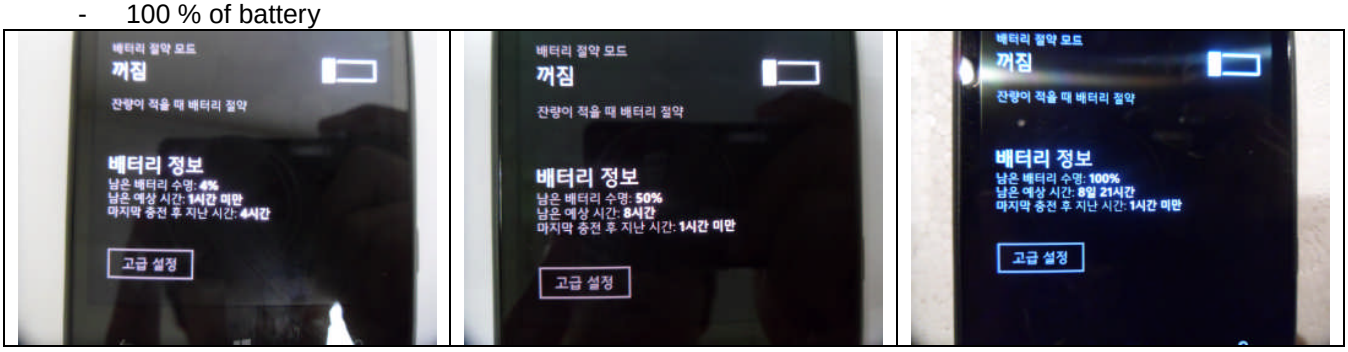
In order to check all kinds of possible configurations, EUT was evaluated with appropriate client and under each charging condition as below table.

EUT configuration	Charging current (㎃)	Mobile phone	Description
Charging Mode[1)] with resistive load	300		Minimum resistive load
	600		Medium resistive load
	1 000		Maximum resistive load
Charging Mode[3)] with client device		RM-825 [2)]	Less than 4 % of battery
		RM-825	Less than 50 % of battery
		RM-825	100 % full charging of battery

1) Test Jig was used during the test to satisfy each current status by using resistive loads.
Output voltage = 5 V, Output current = 300 ㎃ / 600 ㎃ / 1 000 ㎃
   - (Maximum load) 16.67 Ω = 5 V / 0.3 A
   - (Medium load) 8.33 Ω = 5 V / 0.6 A
   - (Minimum load) 5.00 Ω = 5 V / 1.0 A
2) FCC ID: PYARM-825 (Client device: RM-825)
3) WPC device with client device was investigated each battery status and compared in two operating configurations.

Battery status during charging condition

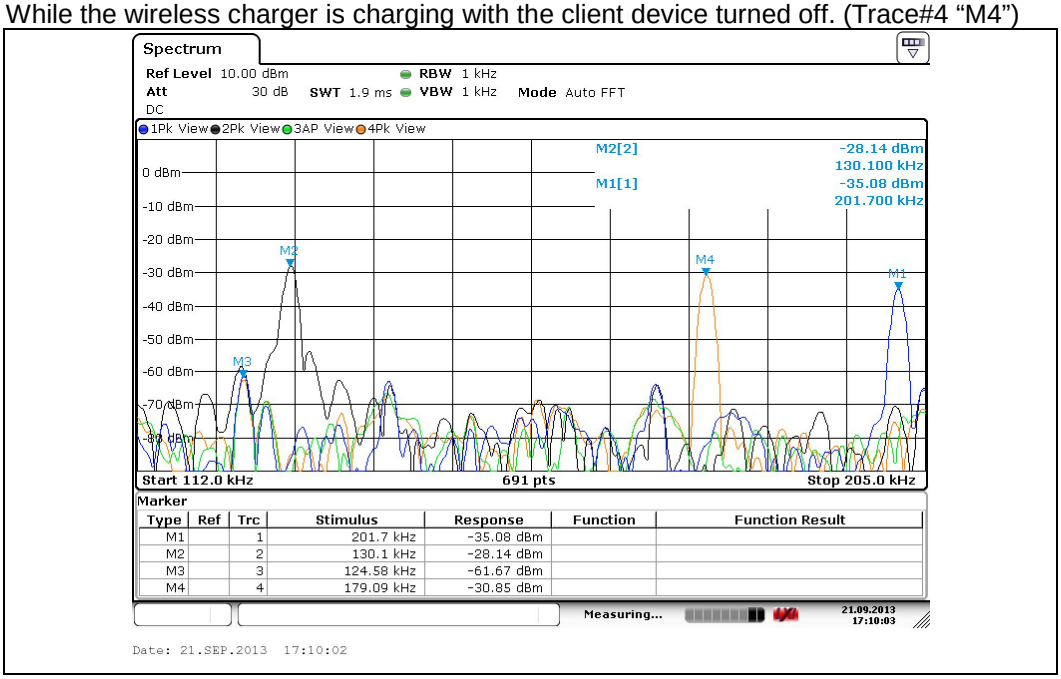
- Less than 4 % of battery
- Less than 50 % of battery
- 100 % of battery



Plot#1 – less than 4 % of battery Plot#2 – less than 50 % of battery Plot#3 – 100 % of battery

Operating configurations

- While the client device was in airplane mode (Trace#1 “M1”)
- While the client device was connected to an active data connection (Trace#2 “M2”)
  The device was tested under all modes and bands like 2G and 3G.
  In the result, **GSM850 / GPRS / 1 TX** was found in **Middle channel**.
- While the wireless charger is charging without the client device. (Trace#3 “M3”)
- While the wireless charger is charging with the client device turned off. (Trace#4 “M4”)

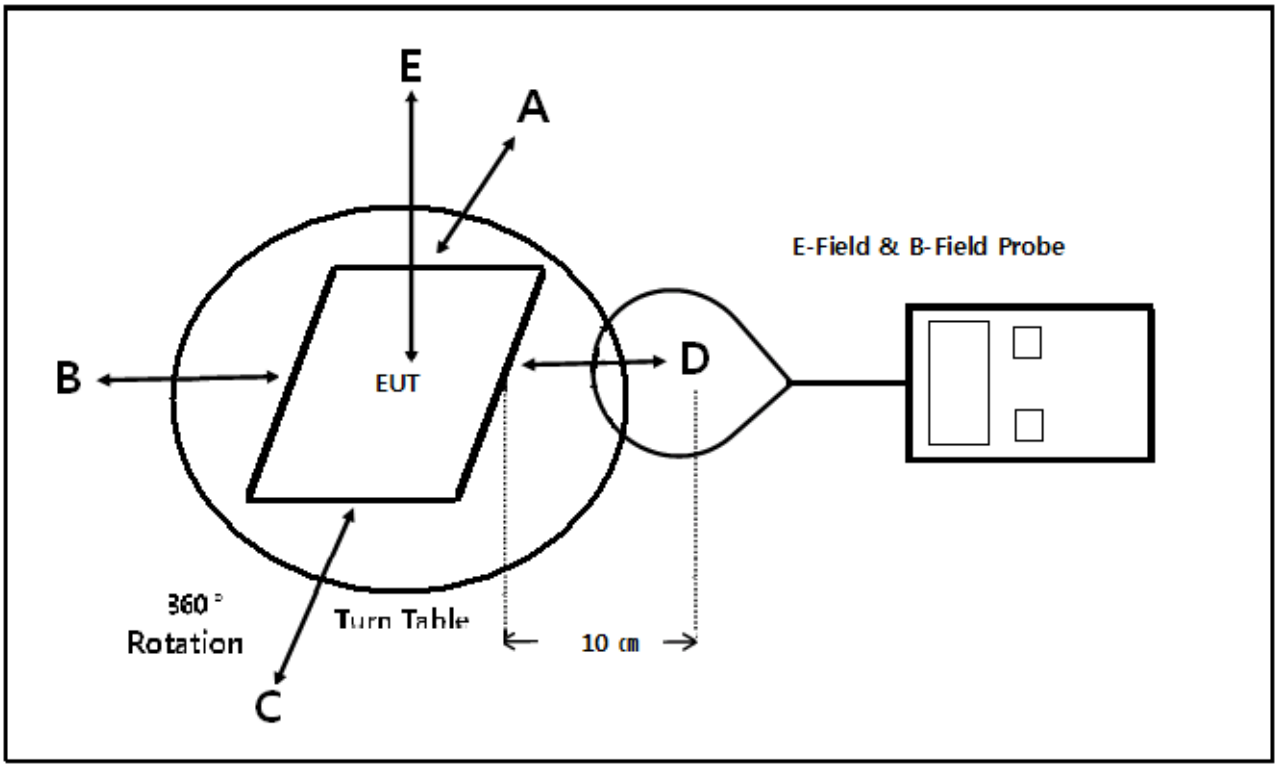


Plot#4 – fundamental emission comparison

- The level of Trace#2 was more than Trace#1, 3 and 4 so Trace#2 was selected.
- Trace#2 as **GSM850 / GPRS / 1 TX** which was found in **Middle channel** should be tested with the client device as a worst case.

2. Test Result

2.1. Test Setup



2.2. Measurement procedure

a) The RF exposure test was performed on 360 degree turn table in anechoic chamber.
b) The measurement probe was placed at test distance (10 ㎝) which is between the edge of the charger and the geometric center of probe.
c) The turn table was rotated 360 degree to search of highest strength
d) the highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E) were completed.

2.2. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

§1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of FCC part 2.1093 of this chapter

TABLE 1 - LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (㎒)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (㎽/㎠)	Average Time (minutes)
(A) Limits for Occupational /Control 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 – 1 500			f/300	6
1 500 – 100 000			5	6
(B) Limits for General Population / Uncontrol Exposures				
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 – 1 500			f/1 500	30
1 500 – 100 000			1.0	30

f = frequency in ㎒
* = 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.

2.3. E and H field strength

Test Mode : Charging mode with resistive loads

2.3.1. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (300 ㎃ status)

Frequency Range (㎑)	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Limits (V/m)
112 ~ 205	5.83	8.18	5.18	4.80	12.74	614.00

2.3.2. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (600 ㎃ status)

Frequency Range (㎑)	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Limits (V/m)
112 ~ 205	5.64	6.45	5.19	4.94	8.45	614.00

2.3.3. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (1 000 ㎃ status)

Frequency Range (㎑)	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Limits (V/m)
112 ~ 205	6.28	6.43	5.20	8.27	8.65	614.00

Test Mode : Charging mode with client device

2.3.4. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 4 % battery status)

Frequency Range (㎑)	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Limits (V/m)
112 ~ 205	13.30	7.41	11.93	12.71	9.32	614.00

2.3.5. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 50 % battery status)

Frequency Range (㎑)	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Limits (V/m)
112 ~ 205	11.22	9.39	10.75	10.73	10.59	614.00

2.3.6. E-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (100 % battery status)

Frequency Range (㎑)	Probe Position A (V/m)	Probe Position B (V/m)	Probe Position C (V/m)	Probe Position D (V/m)	Probe Position E (V/m)	Limits (V/m)
112 ~ 205	4.77	9.66	9.31	11.37	12.03	614.00

Test Mode : Charging mode with resistive loads

2.3.7. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (300 ㎃ status)

Frequency Range (㎑)	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Limits (A/m)
112 ~ 205	0.18	0.24	0.20	0.22	1.01	1.63

2.3.8. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (600 ㎃ status)

Frequency Range (㎑)	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Limits (A/m)
112 ~ 205	0.18	0.29	0.21	0.28	0.98	1.63

2.3.9. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with resistive load (1 000 ㎃ status)

Frequency Range (㎑)	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Limits (A/m)
112 ~ 205	0.20	0.30	0.19	0.24	0.69	1.63

Test Mode : Charging mode with client device

2.3.10. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 4 % battery status)

Frequency Range (㎑)	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Limits (A/m)
112 ~ 205	0.18	0.18	0.19	0.18	0.19	1.63

2.3.11. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (less than 50 % battery status)

Frequency Range (㎑)	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Limits (A/m)
112 ~ 205	0.19	0.20	0.19	0.20	0.22	1.63

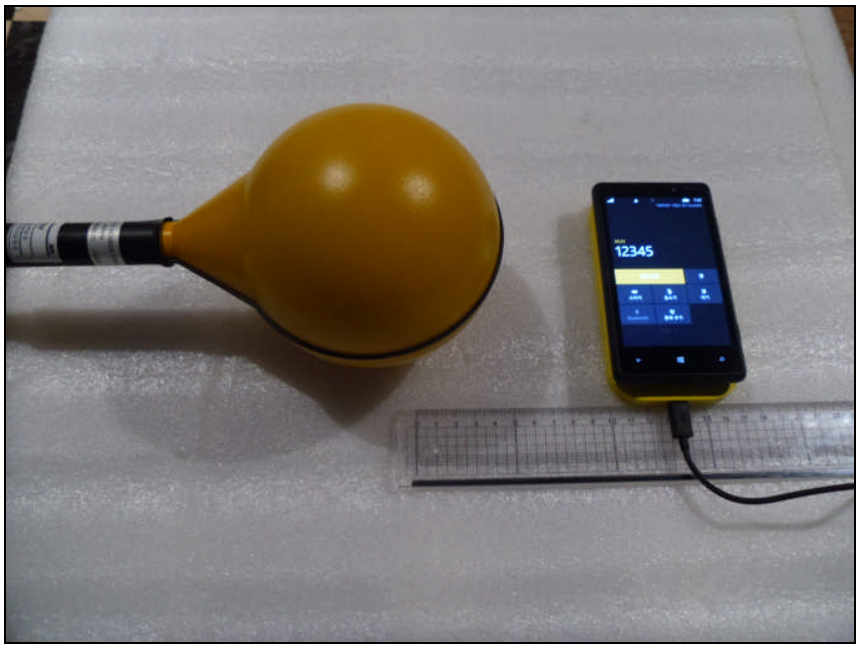
2.3.12. H-Field Strength at 10 ㎝ from the edges surrounding the EUT

Test condition: Charging mode with client (100 % battery status)

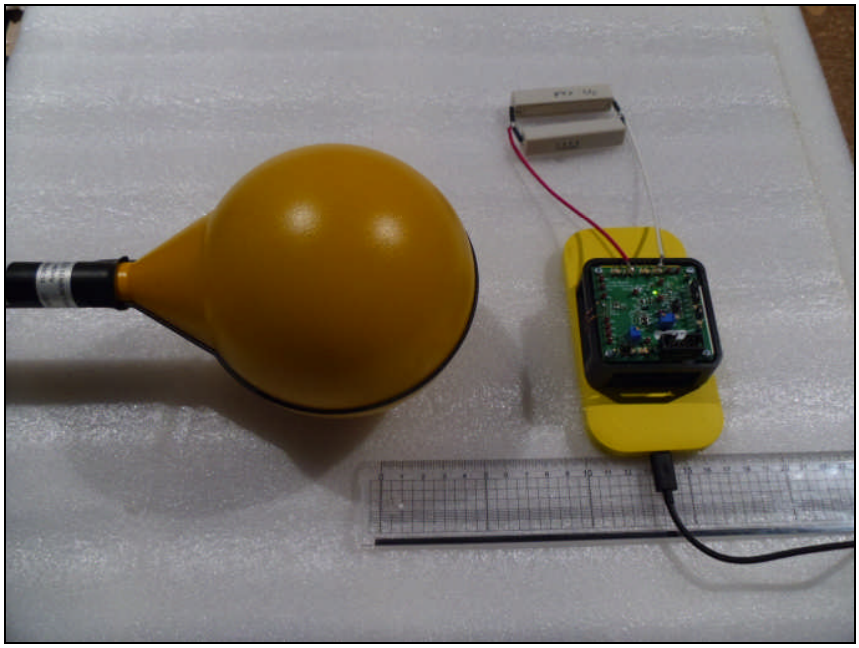
Frequency Range (㎑)	Probe Position A (A/m)	Probe Position B (A/m)	Probe Position C (A/m)	Probe Position D (A/m)	Probe Position E (A/m)	Limits (A/m)
112 ~ 205	0.19	0.18	0.18	0.18	0.19	1.63

Test setup photos of EUT

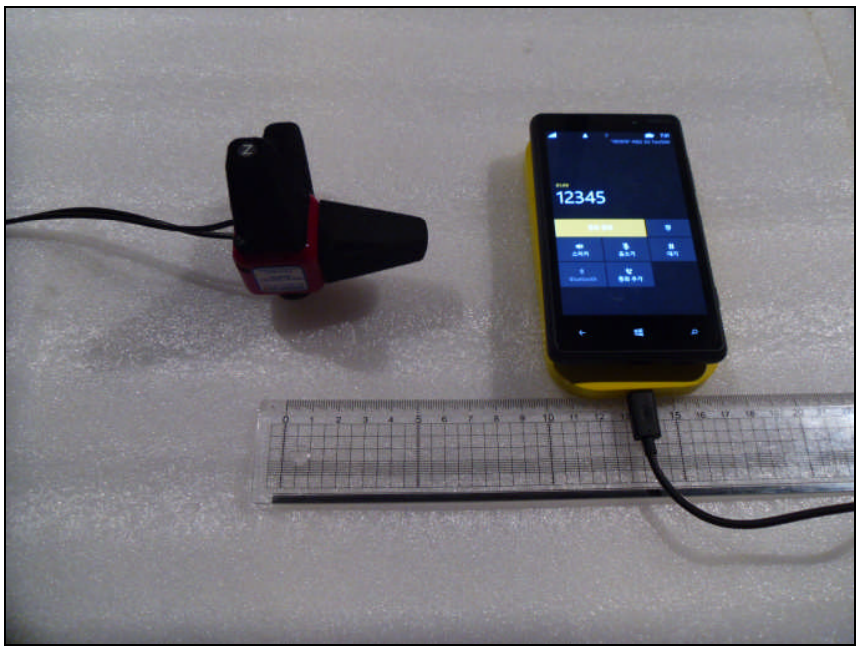
A. the photo of H-Field strength with client device



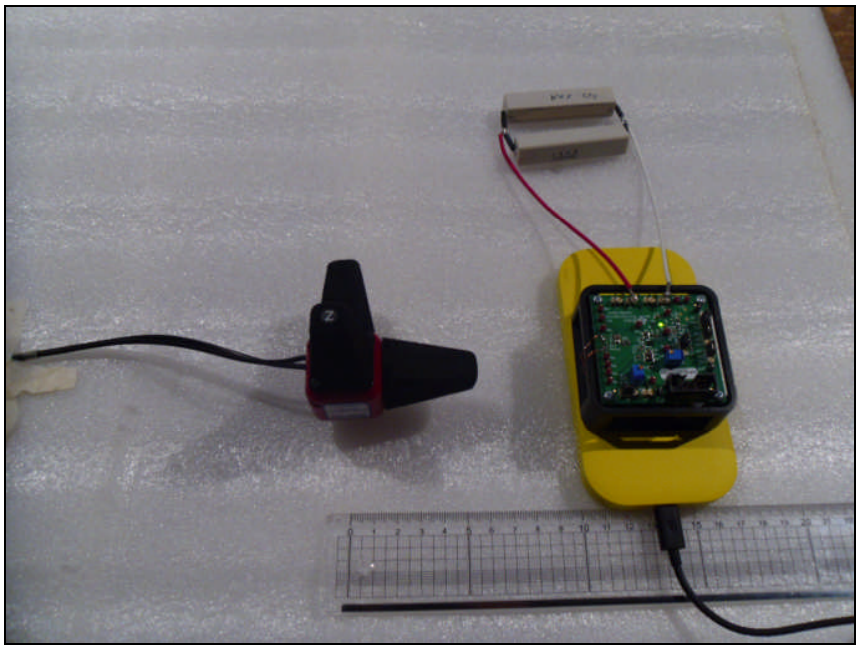
B. the photo of H-Field strength with load



C. the photo of E-Field strength with client device



D. the photo of E-Field strength with load

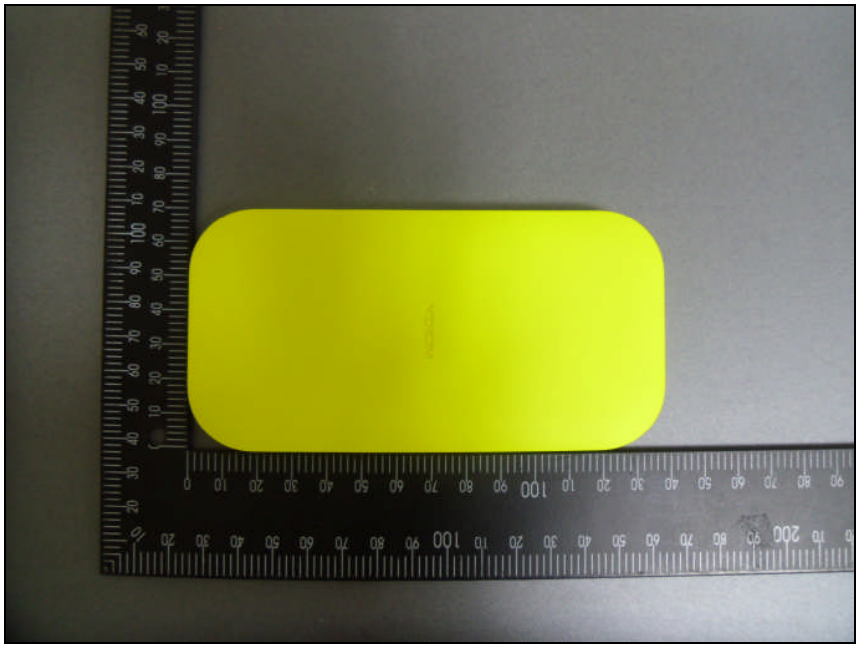


Model : DC-50

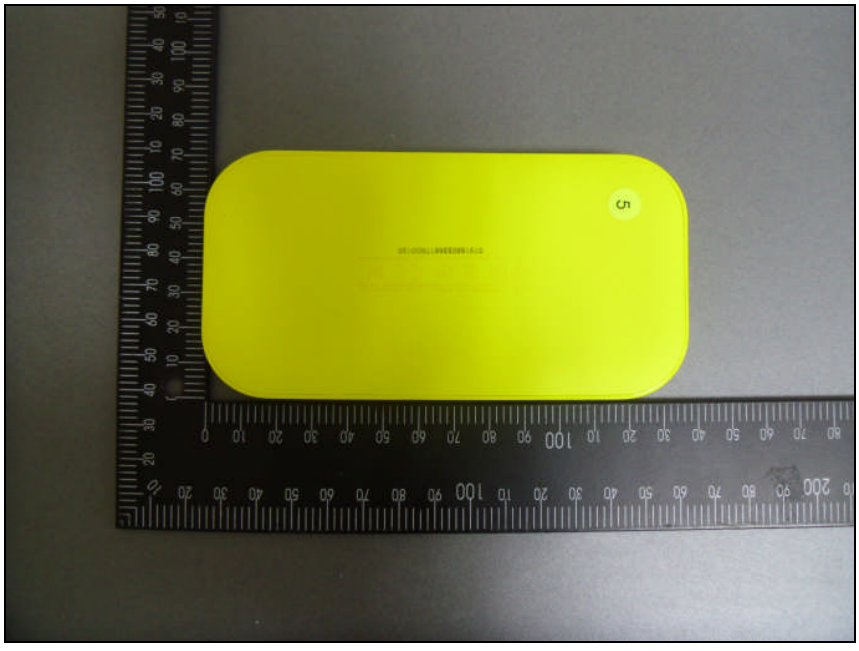
External photos of EUT

Model : DC-50

Top view of EUT



Bottom view of EUT



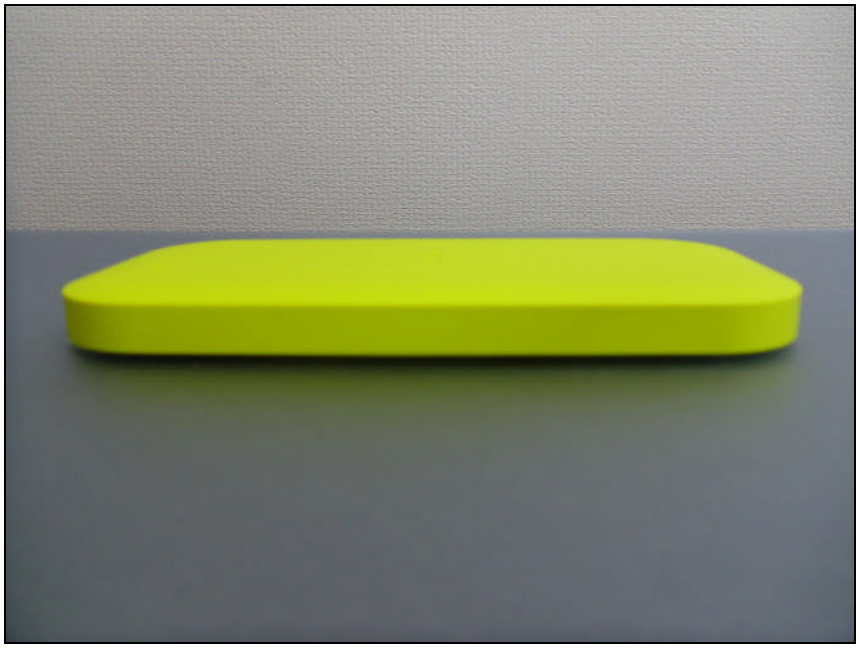
Model : DC-50

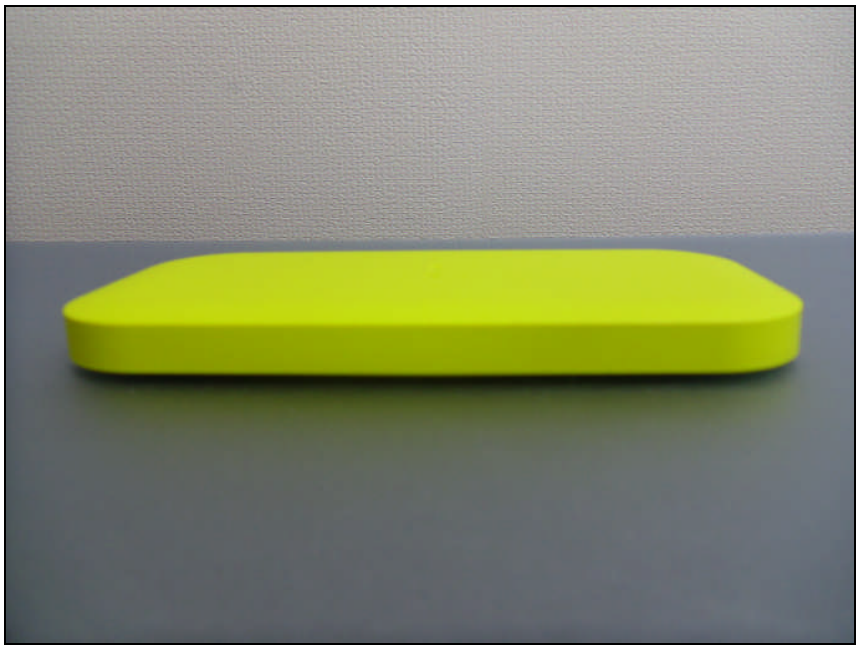
Front view of EUT

Rear view of EUT

Model : DC-50

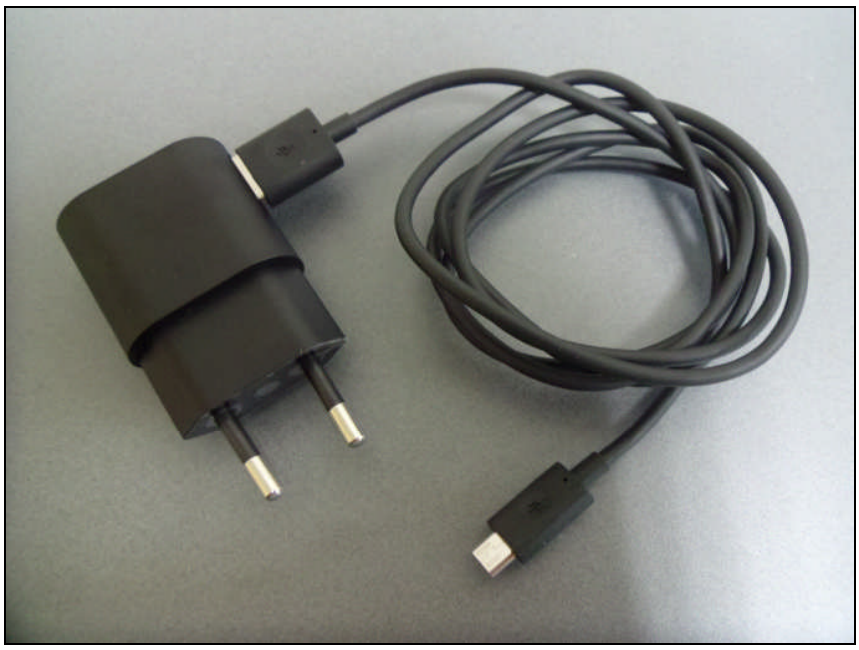
Side view of EUT





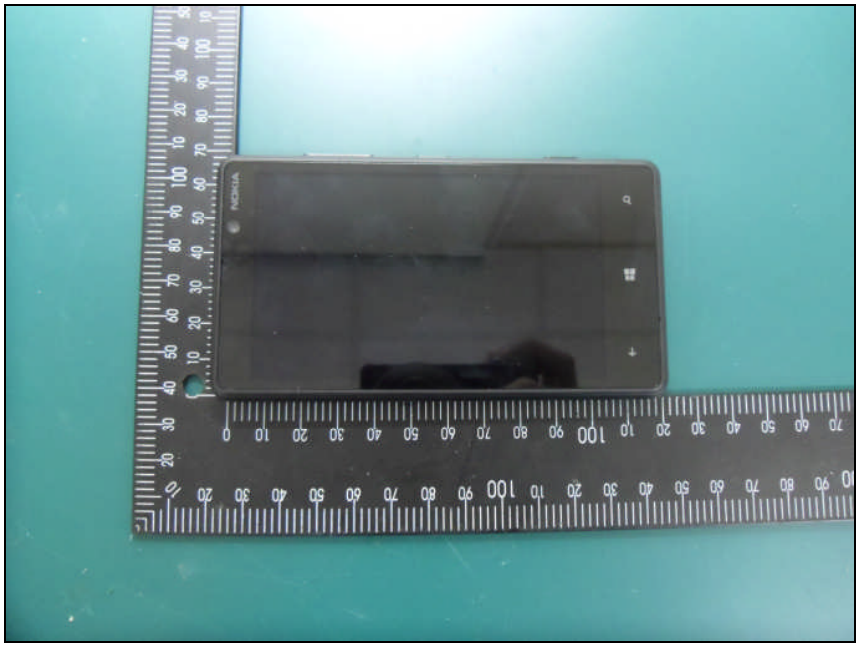
Model : DC-50

External view of adapter



Model : DC-50

External view of client device with receiver



Model : DC-50

External view of client device with receiver

Model : DC-50

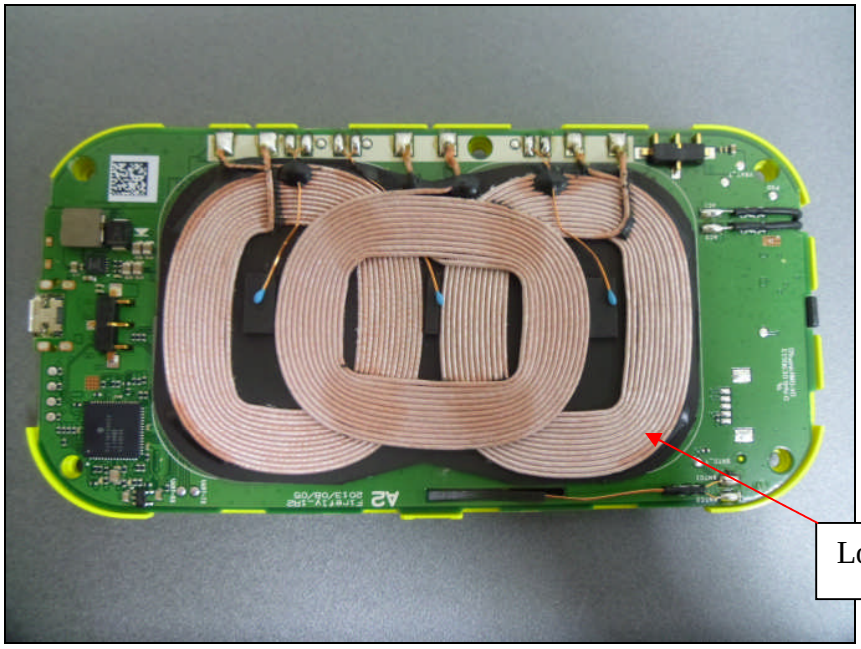
Internal photos of EUT

Model : DC-50

Internal view of EUT

Model : DC-50

Top view of main board



Bottom view of main board