



## Test Report

Test Report No.:	KTI17EF01001		
Registration No.:	KR0023		
Applicant:	Invencia Co., Ltd		
Applicant Address:	717, PyongChon-Daero 239, Dongan-Gu, Anyang-Si, Gyonggi-Do, South Korea.		
Product:	Fast Wireless Charging Device		
FCC ID:	2AKZ6-IWC-100	Model No.	IWC-100
Receipt No.:	KTI-17EF01001	Date of Incoming:	Jan 02, 2017
Date of Issue:	April 05, 2017		
Testing location	Korea Technology Institute Co., Ltd. 51-19, Sanglim3-Ri, Docheok-Myeon, Gwangju-Shi, Gyeunggi-Do, Korea		
Test Standards:	ANSI C63.4-2014.		
Rule Parts: FCC	FCC CFR47 Part 15 Subpart C Section 15.207 and 15.209, 2.1049		
Method of Measurement	DCD – Part 15 Low Power Transmitter Below 1 705 kHz		
Test Result:	The above-mentioned product has been tested with compliance.		

Tested by: J.A.Kwon

/ Engineer

Approved by: S. H. Song

/ Technical Manager

Signature, Date April 03, 2017

Signature, Date April 03, 2017

Other Aspects:			
Abbreviations:	* OK, Pass=passed * Fail=failed * N/A=not applicable		
<p><input checked="" type="checkbox"/> - This test report is not permitted to copy partly without our permission.</p> <p>- This test result is dependent on only equipment to be used.</p> <p>- This test result is based on a single evaluation of one sample of the above mentioned.</p> <p>- This test report must not be used by the client to claim product endorsement by NVLAP or any agency of the U.S Government.</p> <p>- We certify this test report has been based on the measurement standards that is traceable to the national or international standards.</p>			

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**1. Verification of compliance**

Applicant : Invencia Co., Ltd

Address : 717(Bisandong), PyongChon-Daero 239, Dongan-Gu, Anyang-Si, Kyonggi-Do, Korea.

FCC ID : 2AKZ6-IWC-100

Model Name : IWC-100

Brand Name : N/A

Serial Number : N/A

Test Date : Apr 03, 2017

Equipment Class	DCD – Part 15 Low Power Transmitter Below 1 705 kHz
Kind of Equipment	Wireless Charging Pad
Measurement Procedures	ANSI C63.10: 2014
Type of Equipment Tested	Pre-Production
Kind of Equipment Authorization Requested	Certification
Equipment Will Be Operated Under FCC Rules Part(s)	FCC CFR 47 PART 1.1310
Modifications On The Equipment To Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

- The above equipment was tested by Korea Technology Institute Co., Ltd. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanation from equipment are within the compliance requirements.



## 2. General Information

### 2.1 Product Description

IWC-100 (referred to in this report as EUT) is used as a Smart Multi Card

The product specification described herein was obtained from product data sheet or user's manual.

Equipment Name	Wireless Charger
Operating Frequency	110 kHz ~ 205 MHz
Rated RF Output Power	-0.23 dBm
Modulation Type	ASK
Antenna Type / Gain	Coil Antenna
List of Each OSC. Or Crystal. Freq.	110 kHz ~ 205 MHz
Rated Supply Voltage	DC 5.0 V

### Alternative type(s)/model(s); also covered by this test report.

- None

### 2.2 List of Test and Measurement Equipment

Kind of Equipment	Model	Type	S/N	Calibrated until
Isotropic Electric Field Probe	AR FL7006	Amplifier research	F0016	2017.07.25
Exposure Level Meter	ELT-400	Narda	0344233	2017.10.10

## 3. EUT MODIFICATIONS

- None



## 4. RADIO FREQUENCY EXPOSURE

### 4.1 Environmental evaluation and exposure limit

According to FCC 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

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm <sup>2</sup> ]	Average Time [minutes]
<b>(A) Limits for Occupational / Control Exposures</b>				
0.3 – 3.0	614	1.63	*(100)	6
3.0 – 30	1 842/f	4.89/f	*(900/f <sup>2</sup> )	6
30 – 300	61.4	0.163	1.0	6
300 – 1 500			f/300	6
1 500 – 100 000			5	6
<b>(A) Limits for General Population / Uncontrolled Exposures</b>				
0.3 – 3.0	614	1.63	*(100)	30
3.0 – 30	842/f	2.19/f	*(180/f <sup>2</sup> )	30
30 – 300	61.4	0.073	0.2	30
300 – 1 500			f/1 500	30
1 500 – 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.

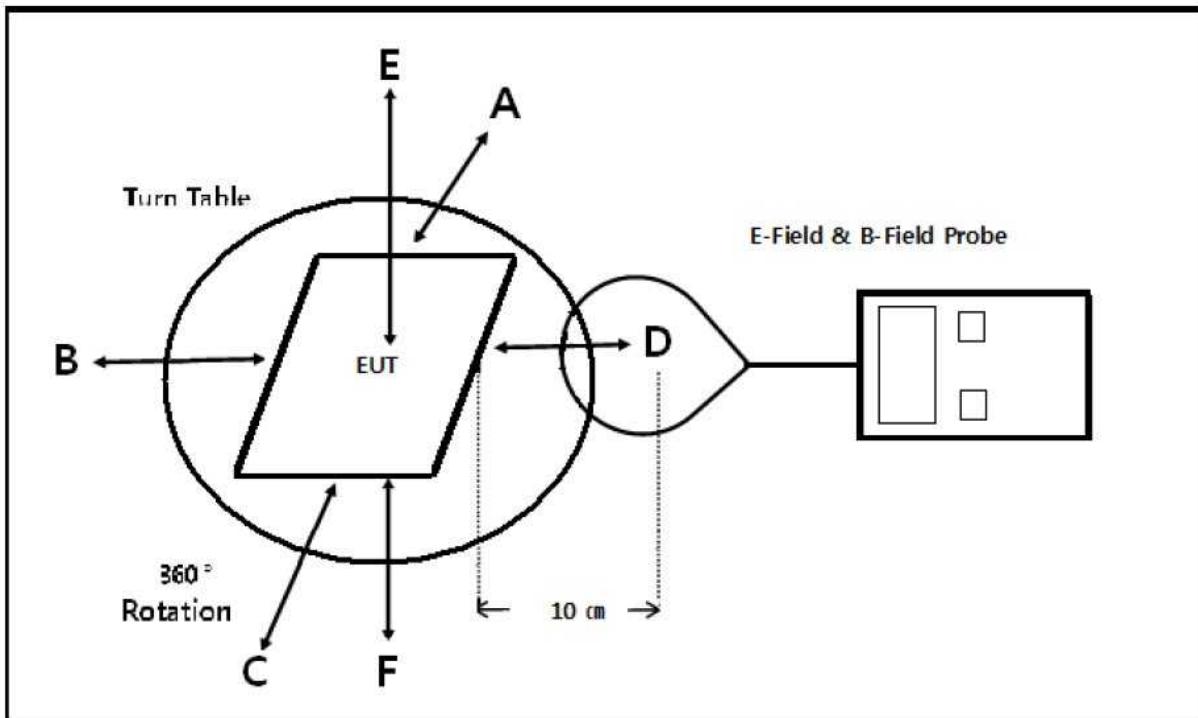
Note 2 to Table 1: General population/uncontrolled exposures apply in situations in which the general public may be exposed, or in which persons that are exposed as a consequence of their employment may not be fully aware of the potential for exposure or cannot exercise control over their exposure.



## 4.2 H/E field strength

### 4.2.1 EUT Operating condition

Mode	Charging resistance	Description
Charging Mode With load	2.5 $\Omega$	Using Max load
	12 $\Omega$	Using Max load
	54 $\Omega$	Using Max load



### 4.2.2 Measurement procedure

- The RF exposure test was performed on 360 degree turn table in anechoic chamber.
- The measurement probe was placed at test distance (10 cm) which is between the edge of the charger and the geometric center of probe.
- The turn table was rotated 360 degree to search of highest strength
- The highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E, F) were completed.
- The EUT were measured according to the dictates of KDB 680106 D01v02.



#### 4.2.3.1 Test Results

The EUT does comply with item 5.2 of KDB 680106 D01v02

a) Power transfer frequency is less than 1MHz

Yes; the device operate in the frequency range from 110 kHz to 205 kHz

b) Output power from each primary coil is less than 5 watts

Yes; the maximum output power of the primary coil is 4.5W<5W.

c) The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that able to detect and allow coupling only between individual pair of coils.

Yes; the client device includes only single primary coils.

d) Client device is inserted in or placed directly in contact with the transmitter.

Yes; Client device is placed directly in contact with the transmitter.

e) The maximum coupling surface area of the transmit (charging) device is between 60cm<sup>2</sup> and 400cm<sup>2</sup>

Yes; The maximum effective coupling surface area:  $75\text{cm}^2 = \{(7.5\text{cm} + 5\text{cm}) * 12\text{cm}\}/2$

f) Aggregate leakage fields at 10cm surrounding the device from all simultaneous transmitting coils are demonstrated to be less than 30% of the MPE limit.

Yes; The EUT field strength levels are 30% x MPE limit.

These 1 Coils can't transmitted simultaneous.



#### 4.2.3.1 E-field strength at 10 cm from each edges the EUT

Mode	Position A [V/m]	Position B [V/m]	Position C [V/m]	Position D [V/m]	Position E [V/m]	Position F [V/m]	Reference Limit [V/m]	Limit [V/m]
Charging Mode With Max. load	3.89	3.31	3.03	2.16	2.22	2.61	184.2	614.00
Charging Mode With Mid. load	3.80	3.00	3.11	2.09	2.31	2.81	184.2	614.00
Charging Mode With Min. load	3.89	3.06	2.89	2.06	2.41	2.74	184.2	614.00

#### 4.2.3.2 H-field strength at 10 cm from each edges the EUT

Mode	Position A [V/m]	Position B [V/m]	Position C [V/m]	Position D [V/m]	Position E [V/m]	Position F [V/m]	Reference Limit [V/m]	Limit [V/m]
Charging Mode With Max. load	0.31	0.12	0.13	0.15	0.10	0.11	0.489	1.63
Charging Mode With Mid. load	0.36	0.10	0.17	0.14	0.12	0.14	0.489	1.63
Charging Mode With Min. load	0.29	0.11	0.16	0.13	0.12	0.19	0.489	1.63