



CERTIFICATION TEST REPORT

Report Number. : 12743821-E2V2

Applicant : PI INC
1111 BAYHILL DR
SUITE 235
SAN BRUNO, CA 94066, U.S.A.

Model : SOURCE

FCC ID : 2ASP901EH1

EUT Description : WIRELESS CHARGER

Test Standard(s) : FCC 47 CFR PART 1 SUBPART I
FCC 47 CFR PART 2 SUBPART J

Date Of Issue:
May 17, 2019

Prepared by:
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Revision History

Rev.	Issue Date	Revisions	Revised By
V1	5/13/2019	Initial Issue	--
V2	5/17/2019	Updated report to address TCB's question	Tina Chu

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: PI INC
1111 BAYHILL DR
SUITE 235
SAN BRUNO, CA 94066, U.S.A.

EUT DESCRIPTION: WIRELESS CHARGER

MODEL NUMBER: SOURCE

SERIAL NUMBER: SNEH119030000044

DATE TESTED: APRIL 24 - 29, 2019

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 1 SUBPART I & PART 2 SUBPART J	Complies

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
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OPERATIONS LEAD
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Prepared By:



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UL Verification Services Inc.

Reviewed By:



TINA CHU
SENIOR PROJECT ENGINEER
UL Verification Services Inc. UL Verification

2. TEST METHODOLOGY

All calculations were made in accordance with FCC KDB 447498 D01 and KDB 447498 D03.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 47173 and 47266 Benicia Street, and 47658 Kato Road, Fremont, California, USA. Line conducted emissions are measured only at the 47173 address. The following table identifies which facilities were utilized for radiated emission measurements documented in this report. Specific facilities are also identified in the test results sections.

47173 Benicia Street	47266 Benicia Street	47658 Kato Rd.
☐ Chamber A (ISED:2324B-1)	☐ Chamber D (ISED:22541-1)	☐ Chamber I (ISED: 2324A-5)
☐ Chamber B (ISED:2324B-2)	☐ Chamber E (ISED:22541-2)	☐ Chamber J (ISED: 2324A-6)
☐ Chamber C (ISED:2324B-3)	☐ Chamber F (ISED:22541-3)	☐ Chamber K (ISED: 2324A-1)
☒ EMC conducted room	☐ Chamber G (ISED:22541-4)	☐ Chamber L (ISED: 2324A-3)
	☐ Chamber H (ISED:22541-5)	

The above test sites and facilities are covered under FCC Test Firm Registration # 208313. Chambers above are covered under Industry Canada company address and respective code

UL Verification Services Inc. is accredited by NVLAP, Laboratory Code 200065-0

4. EQUIPMENT UNDER TEST

4.1. DESCRIPTION OF EUT

The EUT is a Qi compatible wireless charger for cellphone. Up to 4 devices can be charged through wireless charging + 2 High Power USB charging ports. Total 8 coils (4 pairs of Tx/Rx). Operating Frequency = 113kHz-230kHz.

4.2. KDB 680106 D01 SECTION 5b EQUIPMENT APPROVAL CONSIDERATIONS

Requirement	Device
1. Power transfer frequency is less than 1 MHz.	Yes. Operating frequency is 113kHz to 230kHz.
2. Output power from each primary coil is less than or equal to 15 watts.	Yes. The system is designed to deliver 5W to each Wireless Power receiver device placed on the charging surface and input power to each coil will not exceed 9W at any time. Four coils can be active at any given time
3. The transfer system includes only single primary and secondary coils. This includes charging systems that may have multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils.	Yes. Each receiver device is always powered by a single transmitter coil, so there is always a 1:1 relationship between transmitter and receiver. Please refer to the operation manual for further elaboration on this topic, if necessary.
4. Client device is placed directly in contact with the transmitter.	Yes. Client devices are placed in direct contact (placed on top of) the charger.
5. Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).	Yes. This charger is intended for desktop use and therefore is considered to be a mobile device for the purposes of RF exposure evaluation.
6. The aggregate H-field strengths at 15 cm surrounding the device and 20 cm above the top surface from all simultaneous transmitting coils are demonstrated to be less than 50% of the MPE limit.	Yes. The magnetic field test result is less than 50% of the MPE limit, which is 36.44%.

4.3. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

SUPPORT EQUIPMENT & PERIPHERALS LIST			
Description	Manufacturer	Model	Serial Number
Phone	Apple	IPHONE 8	F4HWRUMYJC6C
Phone	Apple	IPHONE 8	C8PVJXCLJC6D
Phone	Apple	IPHONE XR	G0NXL08ZKXKT
Phone	Apple	IPHONE XS	DNQ94D9KPFR
AC Adapter	DELTA Electronics	ADP-65DWY	6IEW8CS000L-2C-S0

NOTE: Cell Phones were exchanged to ensure the EUT is at the maximum power transfer during testing.

I/O CABLES

N/A

TEST SETUP

The following configurations are tested:

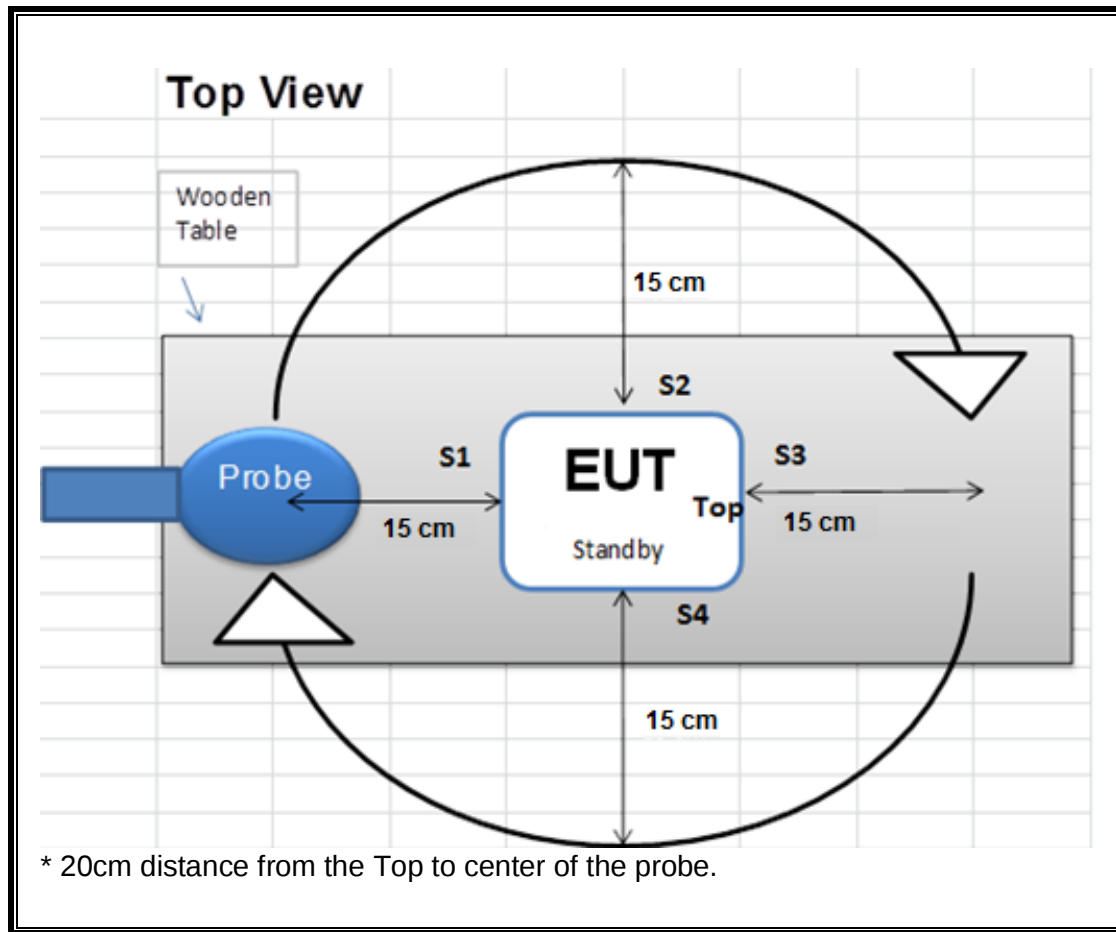
Configuration	Mode	Descriptions
1	Standby	EUT Alone powered by AC/DC adapter
2 1 cellphone WPT (with gap distance and shift)	Operating (power, <10% Power Charging)	EUT and phone powered by AC/DC adapter
	Operating (power, 20~50% Power Charging)	EUT and phone powered by AC/DC adapter
	Operating (power, >90% Power Charging)	EUT and phone powered by AC/DC adapter
3 2 cellphones WPT (with gap distance and shift)	Operating (power, <10% Power Charging)	EUT and phones powered by AC/DC adapter
	Operating (power, 20~50% Power Charging)	EUT and phones powered by AC/DC adapter
	Operating (power, >90% Power Charging)	EUT and phones powered by AC/DC adapter
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5 4 cellphones WPT (with gap distance and shift)	Operating (power, <10% Power Charging)	EUT and phones powered by AC/DC adapter
	Operating (power, 20~50% Power Charging)	EUT and phones powered by AC/DC adapter
	Operating (power, >90% Power Charging)	EUT and phones powered by AC/DC adapter

MEASUREMENT SETUP

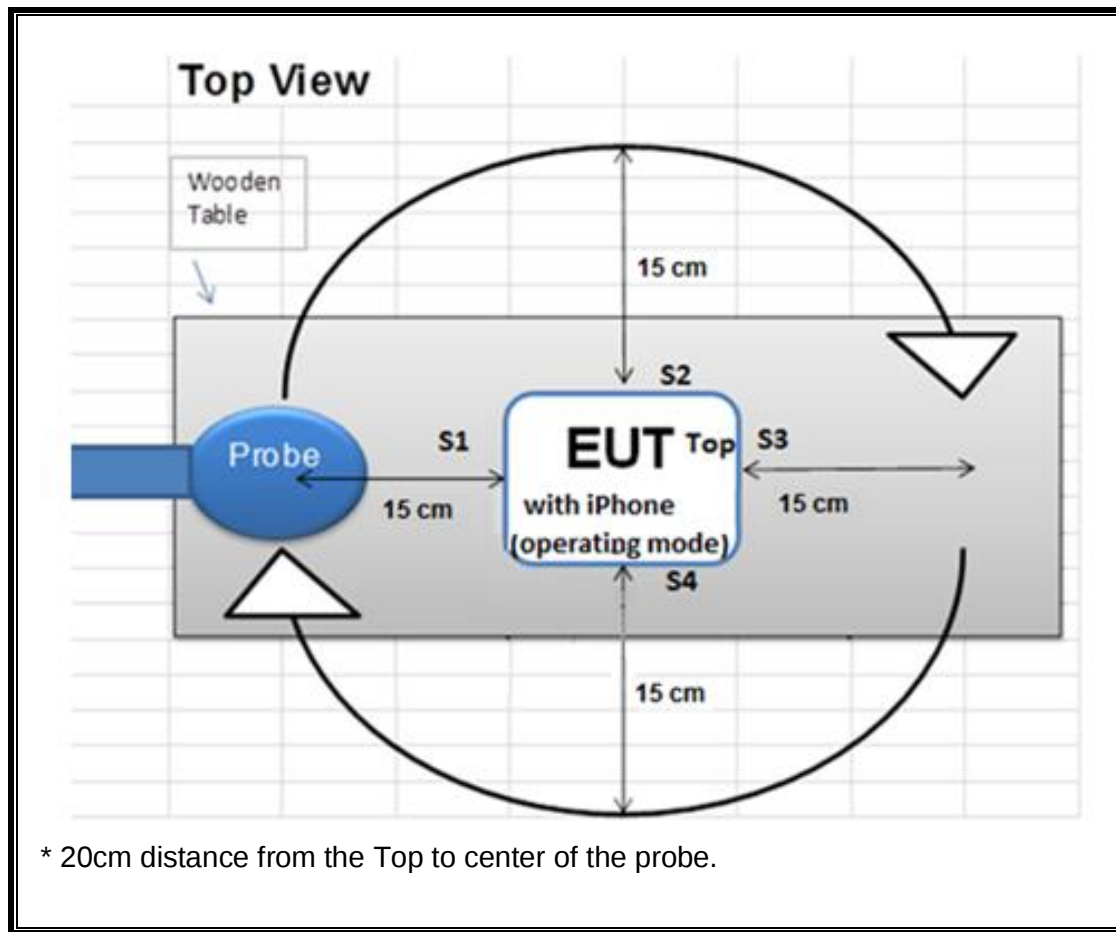
The measurement was taken using a probe placed 15 cm surrounding the device and 20 cm above the top surface of the EUT. Measurements were taken from the top and all sides of the EUT per KDB680106 D01 v03.

The charger is a desktop device, all the phones charged by the WPT must be at upright position (vertical orientation). Worst case RF exposure configuration was investigated among different coil combinations; with/without USB phones loaded; phones were shifted at various positions/fixed position; with/without gap (either a cellphone case at 3 mm or a cellphone pop socket at 6mm was used to represent the cellphone case). The worst case configuration was EUT without USB phones loaded, phones were shifted away from the charging coil with gap distance from the EUT surface after investigation.

CONFIGURATION 1



CONFIGURATIONS 2&3&4&5



5. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was used for the tests documented in this report:

Test Equipment List					
Description	Manufacturer	Model	Local ID T No.)	Cal Date	Cal Due
Electric and Magnetic Field Probe	Narda	EHP-200A	T1085	10/24/2018	10/24/2019

6. DUTY CYCLE

LIMITS

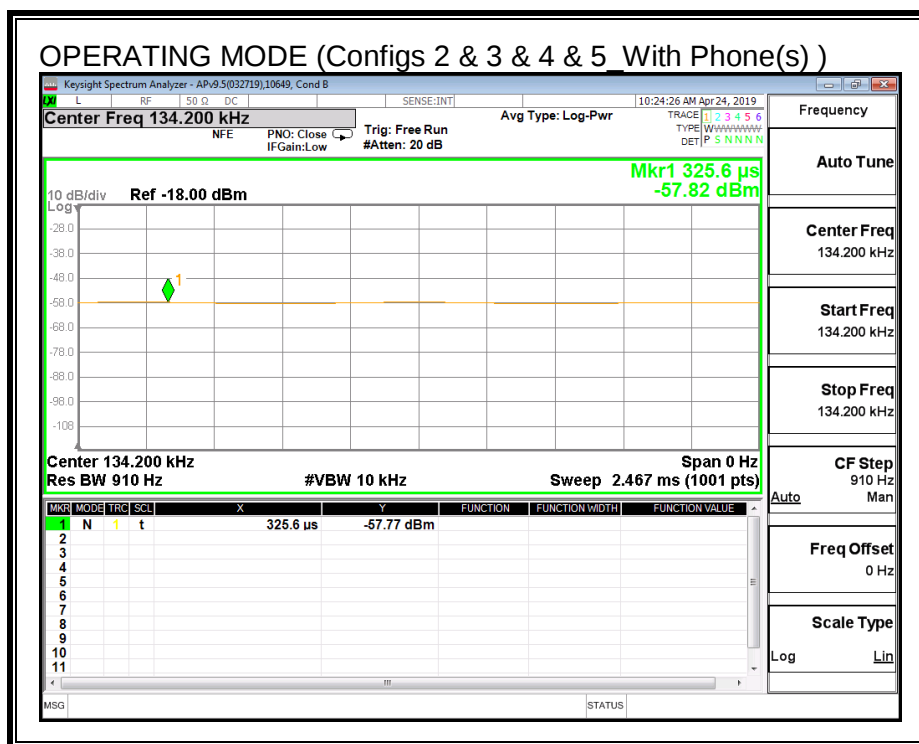
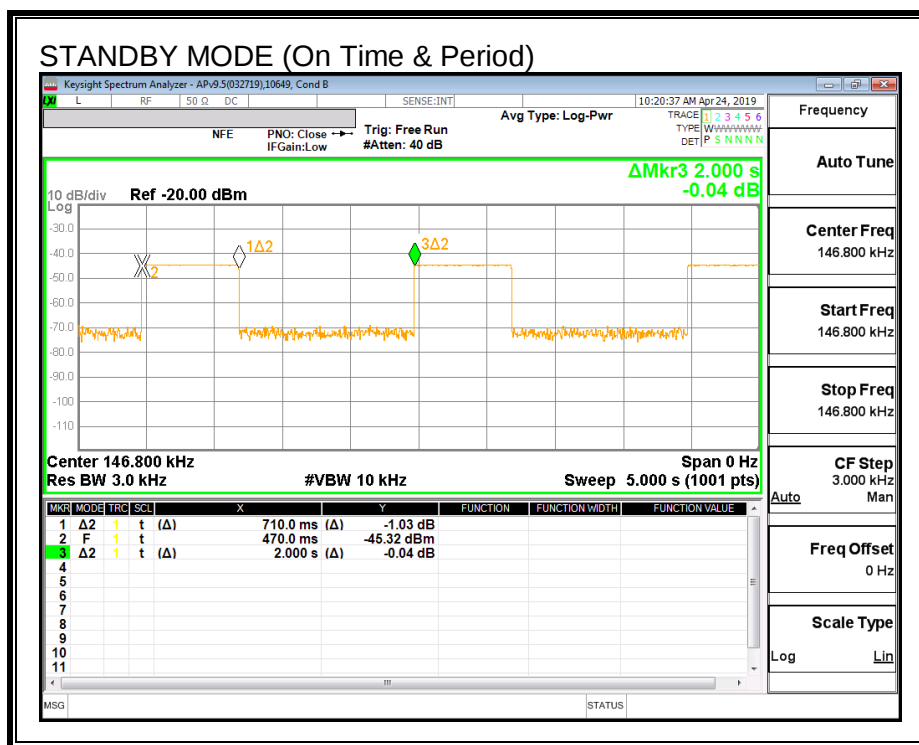
None; for reporting purposes only.

PROCEDURE

Zero-Span Spectrum Analyzer Method.

ON TIME AND DUTY CYCLE RESULTS

Mode	ON Time B (msec)	Period (msec)	Duty Cycle x (linear)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
Standby	710.00	2000.00	0.36	35.50%	4.50
Operating	100.00	100.00	1.00	100.00%	0.00



7. MAXIMUM PERMISSIBLE RF EXPOSURE

7.1. FCC LIMITS AND SUMMARY

7.1.1. FCC LIMITS

§1.1310 The criteria listed in Table 1 shall be used to evaluate the environmental 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 §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

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)—Continued

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
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.

7.1.2. FCC SUMMARY OF RESULTS

RESULTS

ID:	29435	Date:	4/30/19
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Note: Both magnetic and electric field strengths have been investigated from 9 kHz to 30 MHz at 15cm to find that the EUT operation frequency is at 113 kHz to 230kHz.

FCC RF Exposure Summary of Results

Electric Field Limit			Magnetic Field Limit		
FCC	Maximum RMS (V/m)	Percentage (%)	FCC	Maximum RMS (A/m)	Percentage (%)
614	12.247	1.99%	1.63	0.594	36.44%

7.2. TEST RESULTS

7.2.1. FCC RF EXPOSURE

E- FIELD AND H- FIELD MEASUREMENTS

Note: Peak measurements were performed.

Configuration	Test Mode	Measuring Distance (cm)	Electric Field Limit	Electric Field Reading		Magnetic Field Limit	Magnetic Field	
			(V/m) FCC	Location	Peak	(A/m) FCC	Location	Peak
(1)	Standby	15 cm surrounding the device (S1-S4) and 20 cm above the top surface of the EUT	614			1.63	S1	0.486
							S2	0.251
							S3	0.133
							S4	0.114
							Top	0.234
							Max	0.486
(2) 1 cellphone WPT (with gap distance and shift)	Operating (power < 10% charging)						S1	0.186
							S2	0.287
							S3	0.153
							S4	0.256
							Top	0.109
							Max	0.361
	Operating (power 20%~50% charging)						S1	0.303
							S2	0.461
							S3	0.203
							S4	0.249
							Top	0.232
							Max	0.461
	Operating (power > 90% charging)						S1	0.206
							S2	0.219
							S3	0.261
							S4	0.495
							Top	0.165
							Max	0.495
(3) 2 cellphones WPT (with gap distance and shift)	Operating (power < 10% charging)	S1	0.098					
		S2	0.314					
		S3	0.148					
		S4	0.349					
		Top	0.138					
		Max	0.510					
	Operating (power 20%~50% charging)	S1	0.239					
		S2	0.445					
		S3	0.157					
		S4	0.394					
		Top	0.155					
		Max	0.445					
	Operating (power > 90% charging)	S1	0.208					
		S2	0.455					
		S3	0.280					
		S4	0.448					
		Top	0.198					
		Max	0.455					
(4) 3 cellphones WPT (with gap distance and shift)	Operating (power < 10% charging)	S1	0.168					
		S2	0.321					
		S3	0.185					
		S4	0.504					
		Top	0.215					
		Max	0.504					
	Operating (power 20%~50% charging)	S1	0.260					
		S2	0.391					
		S3	0.476					
		S4	0.574					
		Top	0.149					
		Max	0.476					
	Operating (power > 90% charging)	S1	0.224					
		S2	0.411					
		S3	0.270					
		S4	0.507					
		Top	0.156					
		Max	0.507					
(5) 4 cellphones WPT (with gap distance and shift)	Operating (power < 10% charging)	S1	0.250					
		S2	0.380					
		S3	0.205					
		S4	0.594					
		Top	0.178					
		Max	0.594					
	Operating (power 20%~50% charging)	S1	0.174					
		S2	0.549					
		S3	0.248					
		S4	0.456					
		Top	0.361					
		Max	0.549					
	Operating (power > 90% charging)	S1	0.169					
		S2	0.446					
		S3	0.155					
		S4	0.260					
		Top	0.138					
		Max	0.484					