HERMON LABORATORIES

ELECTRICAL TESTING
0839.01

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TEST REPORT

ACCORDING TO: FCC 47CFR part 1 section 1.1310,
KDB 680106 D01 v02, section 3(3)

FOR:

PowerMat Ltd.
Wireless Power Charging Spot
Model: Spot 3.0

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1 Applicant information

Client name:	PowerMat Ltd.
Address:	Neve Ilan, Kiryat Hatikshoret 90850, Israel
Telephone:	+972 2995 0530
E-mail:	dshaingurten@powermat.com
Contact name:	Mr. Daniel Shaingurten

2 Equipment under test attributes

Product name:	Wireless Power Charging Spot
Model(s):	Spot 3.0
Serial number:	616D6920313F
Hardware version:	PBA0000189 Rev.C, PBA0000190 Rev.C
Software release:	0.14
Receipt date	4-Mar-15

3 Manufacturer information

Manufacturer name:	PowerMat Ltd.
Address:	Neve Ilan, Kiryat Hatikshoret 90850, Israel
Telephone:	+972 2995 0530
E-Mail:	dshaingurten@powermat.com
Contact name:	Mr. Daniel Shaingurten

4 Test details

Project ID:	26831
Location:	Hermon Laboratories Ltd. Harakevet Industrial Zone, Binyamina 30500, Israel
Test started:	04-Mar-15
Test completed:	16-Mar-15
Test specification(s):	FCC 47CFR part 1: 2014, KDB 680106 D01 v02

5 Tests summary

Test	Status
B-field and H-field measurement	Pass

The test results relate only to the items tested. Pass/ fail decision was based on nominal values.

	Name and Title	Date	Signature
Tested by:	Mr. V. Einem, test engineer	March 16, 2015	
Reviewed by:	Mrs. M. Cherniavsky, certification engineer	April 29, 2015	
Approved by:	Mr. M. Nikishin, EMC and Radio group manager	April 30, 2015	

6 EUT description

6.1 General information

The EUT, Powermat's 3rd generation Wireless Charging Spot is the core of the Powermat Wireless Power Network. It enables users to wirelessly charge any PMA compatible device while simultaneously connected to a local network of wireless charging spots which communicates with Powermat's cloud services for remote control and maintenance.

The Charging Spots are an integral part of the venue wireless power infrastructure kit. This kit consists of the numerous products that comprise the entire infrastructure required to install a Wireless Power Network within a location/venue.

The EUT includes the Telegesis ZigBee module, FCC ID:S4GEM35XA.

The EUT was tested in operating modes shown in section 6.2 below. The device designed for typical desktop applications.

6.2 EUT options/configurations

Number	Operating mode description
1	PMA 5 WATT
2	PMA 15WATT
3	QI 5 WATT

6.3 Operating frequencies

Source	Frequency, MHz		
LO	0.11-0.205	0.205-0.3	2400-2483.5

7 RF exposure assessment

7.1 RF exposure

7.1.1 General

This test was performed to verify compliance with the relevant limits for general public exposure specified as basic restrictions or reference levels in the KDB 680106 D01 v02, section 3.3) & FCC sections 1.1307(b), 1.1310. Specification test limits are given in Table 7.1.1.

Table 7.1.1 Reference levels for electric, magnetic and electromagnetic fields

Frequency range, kHz	H-field, A/m	B-field, μT	Electric field strength, V/m
KDB 680106 D01 v02, section 3(3) & FCC section1.1310 Limits for general population/ uncontrolled exposure			
110-205	1.63	(2.05)	614
205-300			

7.1.2 Test procedure

7.1.2.1 The EUT was set up as shown in Figure 7.1.1 and the associated photographs. The RF exposure test was performed in free space conditions with isotropic magnetic field probe.

7.1.2.2 The ambient noise was measured and the result was recorded in Table 7.1.2.

7.1.2.3 The test was performed in charging mode with max and min load.

7.1.2.4 The Magnetic Field Tester (measurement probe) was placed at a 10 cm test distance, which is between the the edge of the charger and geometric center of the probe.

7.1.2.5 The upper side of the charging spotand nearby area at the edges were searched for the maximum probe reading while keeping 10 cm distance beween the center of the probe and the closest EUT surface.

7.1.2.6 The highest emission level was recorded in Table 7.1.3 and compared with the limit.

7.1.2.7 The test was repeated at the rest of test points (top, A, B, C, D) according to Table 7.1.3.

7.1.2.8 The highest emission was additionally investigated under the different charge statuses of the receiver battery as reported in Table 7.1.4.

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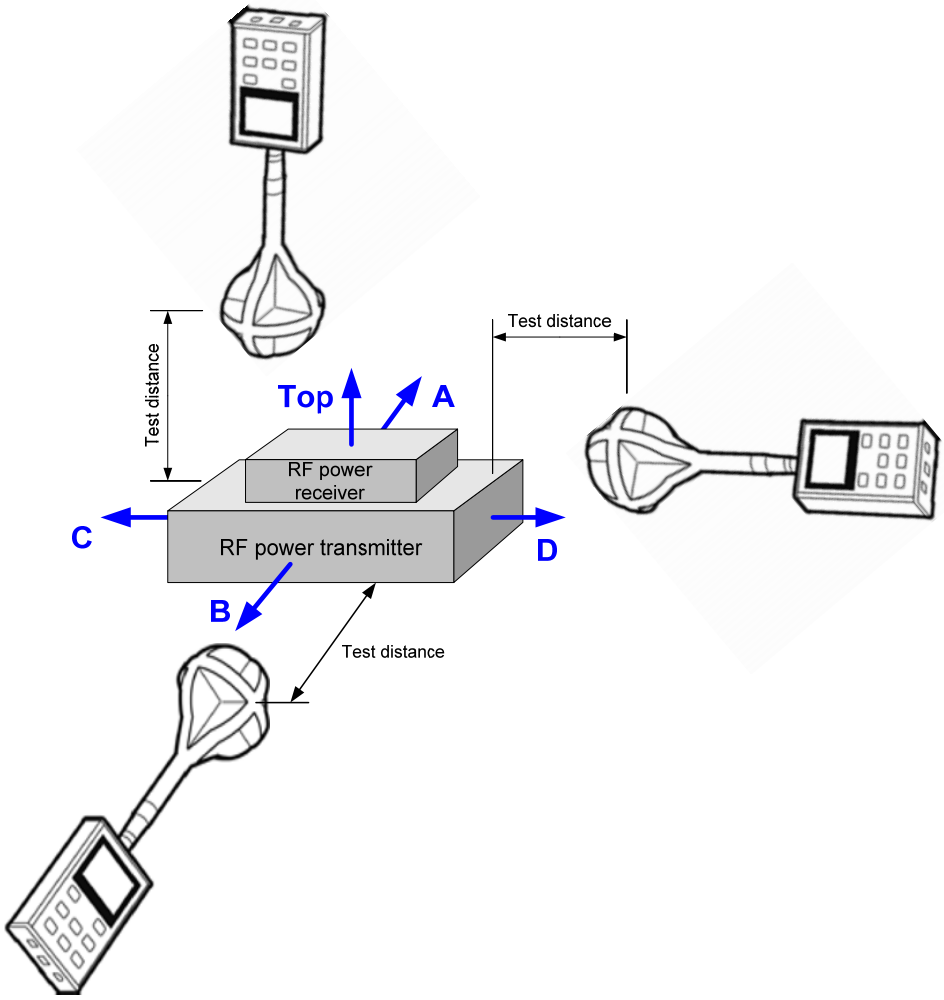
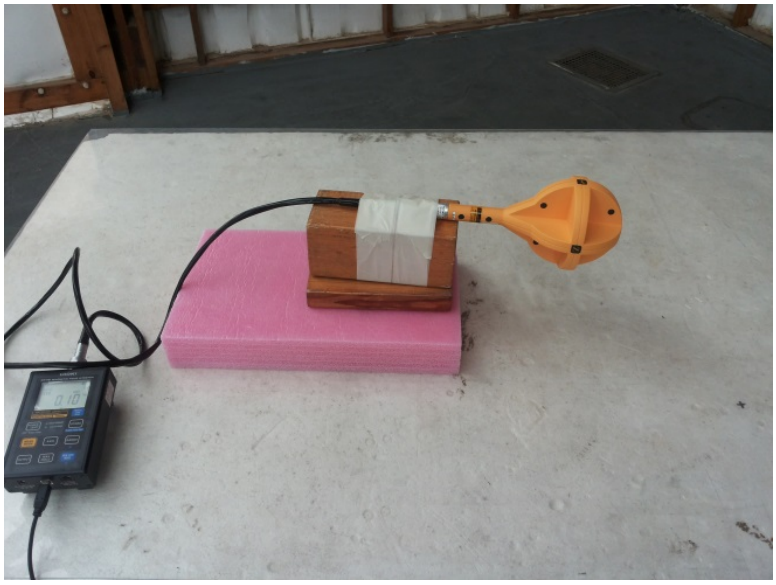
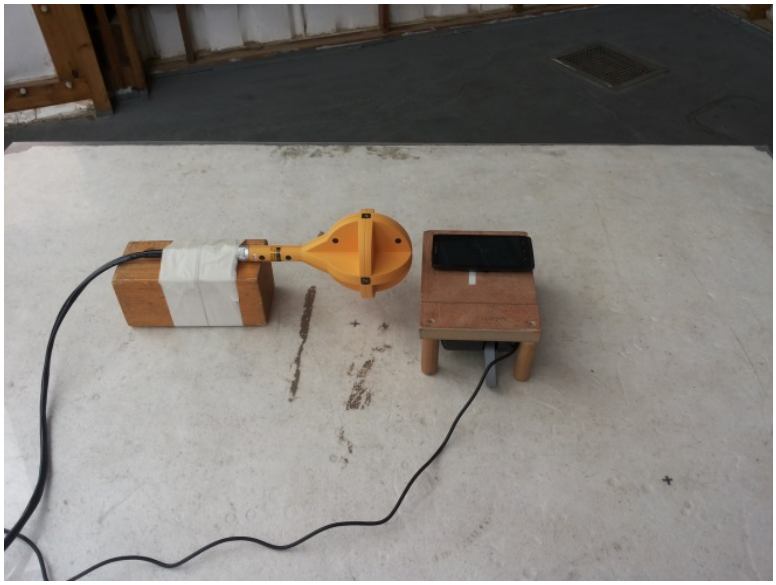
Figure 7.1.1 Setup for RF exposure measurements



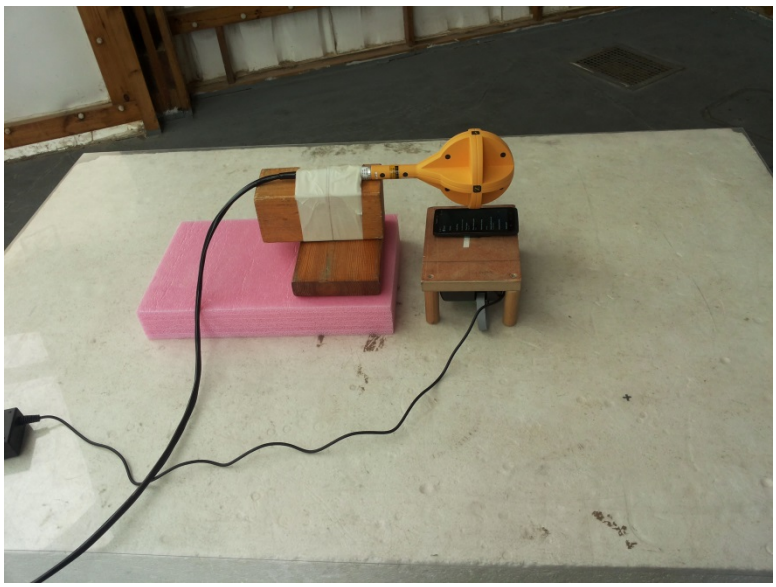
Photograph 7.1.1 Setup for RF exposure measurements, noise measurements



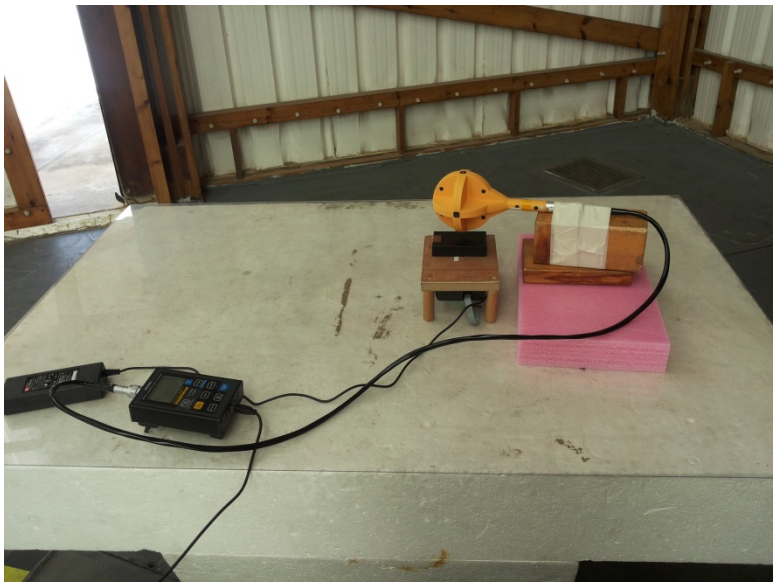
Photograph 7.1.2 Setup for RF exposure measurements, EUT of 5 Watt power



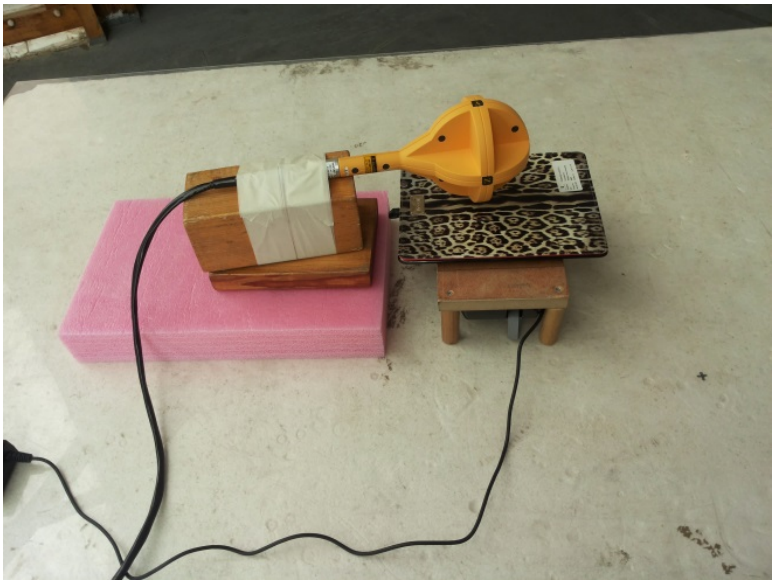
Photograph 7.1.3 Setup for RF exposure measurements, EUT of 5 Watt power



Photograph 7.1.4 Setup for RF exposure measurements, EUT of 5 Watt power



Photograph 7.1.5 Setup for RF exposure measurements, EUT of 15 Watt power



Photograph 7.1.6 Setup for RF exposure measurements, EUT of 15 Watt power

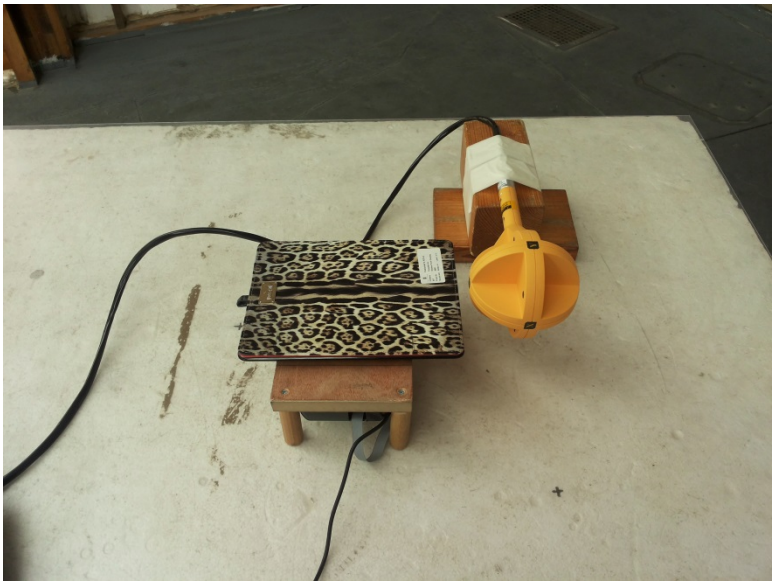


Table 7.1.2 Magnetic flux density measurement according to FCC section 1.1310 limits, noise measurement

Frequency, kHz	Operating mode	Test distance, m	B-Field, µT	H-Field result, A/m*	Limit, A/m	Margin, A/m	Verdict
Noise	Without EUT	0.10	0.04	0.03	1.63	-1.60	Pass

* - The measurements in µT were converted into A/m as follows: $H=B/\mu_o$,
where $\mu_o = 4\pi \times 10^{-7}$ is a Magnetic Field Constant (Vacuum Permeability, H/m)

Table 7.1.3 Magnetic flux density measurement according to FCC section 1.1310 limits

Frequency, kHz	Aux receiver antenna	B-Field measurement, µT						H-Field result, A/m*	Limit, A/m	Margin, A/m	Verdict
		Side A	Side C	Side D	Side B	Top	Max				
PMA 5 Watt											
205 – 300	Backup Battery 8800	0.19	0.59	0.97	0.43	1.09	1.09	0.87	1.63	-0.76	Pass
205 – 300	Asus Pad Phone Embedded Receiver	0.08	0.35	0.38	0.16	0.41	0.41	0.33	1.63	-1.30	Pass
205 – 300	Samsung S5 Backdoor	0.15	0.43	0.92	0.44	0.78	0.92	0.73	1.63	-0.90	Pass
QI 5 Watt											
110 – 205	Motorola Droid Max Embedded Receiver	0.08	0.38	0.36	0.22	0.40	0.4	0.32	1.63	-1.31	Pass
110 – 205	Nokia Embedded Receiver	0.24	0.70	1.49	1.13	0.99	1.49	1.19	1.63	-0.44	Pass
110 – 205	Samsung S5 Back Door	0.12	0.32	0.61	0.31	0.58	0.61	0.49	1.63	-1.14	Pass
PMA 15 Watt											
205 – 300	IPAD 4 Case	0.16	0.08	0.15	0.16	0.20	0.2	0.16	1.63	-1.47	Pass

* - The max results of measurements in µT were converted into A/m as follows: $H=B/\mu_o$

Table 7.1.4 Magnetic flux density measurement according to FCC section 1.1310 limits

Frequency, kHz	Battery charge status	B-Field measurement, µT						H-Field result, A/m*	Limit, A/m	Margin, A/m	Verdict
		Side A	Side C	Side D	Side B	Top	Max				
PMA 5 Watt, Backup Battery 8800											
205 – 300	Low	0.15	0.53	1.26	0.54	1.17	1.26	1.00	1.63	-0.63	Pass
205 – 300	Mid	0.20	0.6	1.09	0.58	1.05	1.09	0.87	1.63	-0.76	Pass
205 – 300	Full	0.2	0.55	1.01	0.48	0.91	1.01	0.80	1.63	-0.83	Pass
QI 5 Watt, Nokia Embedded Receiver											
110 – 205	Low	0.11	0.34	0.80	0.48	0.48	0.8	0.64	1.63	-0.99	Pass
110 – 205	Mid	0.12	0.37	0.74	0.53	0.44	0.74	0.59	1.63	-1.04	Pass
110 – 205	Full	0.10	0.26	0.54	0.38	0.39	0.54	0.43	1.63	-1.20	Pass
PMA 15 Watt, IPAD 4 Case											
205 – 300	Low	0.17	0.11	0.26	0.13	0.21	0.26	0.21	1.63	-1.42	Pass
205 – 300	Mid	0.12	0.09	0.11	0.09	0.21	0.21	0.17	1.63	-1.46	Pass
205 – 300	Full	1.18	0.11	0.20	0.17	0.14	1.18	0.94	1.63	-0.69	Pass

* - The max results of measurements in µT were converted into A/m as follows: $H=B/\mu_o$

Reference numbers of test equipment used

HL 4963							

Full description is given in Appendix A.

8 APPENDIX A Test equipment and ancillaries used for tests

HL No	Description	Manufacturer	Model	Ser. No.	Last Cal./ Check	Due Cal./ Check
4963	Magnetic Field HiTester, with 100 cm² and 3 cm² probes, ICNIRP 1998	Hioki	3470	070314648	13-Feb-15	13-Feb-16

9 APPENDIX B Measurement uncertainties

Expanded uncertainty at 95% confidence in Hermon Labs EMC measurements

Test description	Expanded uncertainty
B-field H-field	± 5.5 %

Hermon Laboratories is accredited by A2LA for calibration according to present requirements of ISO/IEC 17025 and NCSL Z540-1. The accreditation is granted to perform calibration of parameters that are listed in the Scope of Hermon Laboratories Accreditation.
Hermon Laboratories calibrates its reference and transfer standards by calibration laboratories accredited to ISO/IEC 17025 by a mutually recognized Accreditation Body or by a recognized national metrology institute. All reference and transfer standards used in the calibration system are traceable to national or international standards.
In-house calibration of all test and measurement equipment is performed on a regular basis according to Hermon Laboratories calibration procedures, manufacturer calibration/verification procedures or procedures defined in the relevant standards. The Hermon Laboratories test and measurement equipment is calibrated within the tolerances specified by the manufacturers and/or by the relevant standards.

10 APPENDIX C Test laboratory description

Tests were performed at Hermon Laboratories Ltd., which is a fully independent, private, EMC, safety, environmental and telecommunication testing facility.
Hermon Laboratories is listed by the Federal Communications Commission (USA) for all parts of Code of Federal Regulations 47 (CFR 47), Registration Numbers 90624 for OATS and 90623 for the anechoic chamber; by Industry Canada for electromagnetic emissions (file numbers IC 2186A-1 for OATS, certified by VCCI, Japan (the registration numbers are R-808 for OATS, R-1082 for anechoic chamber, G-27 for full-anechoic chamber for RE measurements above 1 GHz, C-845 for conducted emissions site, T-1606 for conducted emissions at telecommunication ports), has a status of a Telefication - Listed Testing Laboratory, Certificate No. L138/00. The laboratory is accredited by American Association for Laboratory Accreditation (USA) according to ISO/IEC 17025 for electromagnetic compatibility, product safety, telecommunications testing and environmental simulation (for exact scope please refer to Certificate No. 839.01). The FCC Designation Number is US1003.

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11 APPENDIX D Specification references

FCC 47CFR part 1:2014	Subpart I—Procedures Implementing the National Environmental Policy Act of 1969
KDB 680106 D01 v02	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications

12 APPENDIX E Abbreviations and acronyms

A	ampere
A/m	ampere per meter
AVRG	average (detector)
cm	centimeter
dB	decibel
dBm	decibel referred to one milliwatt
dB(μV)	decibel referred to one microvolt
dB(μV/m)	decibel referred to one microvolt per meter
dB(μA)	decibel referred to one microampere
DC	direct current
EIRP	equivalent isotropically radiated power
ERP	effective radiated power
EUT	equipment under test
F	frequency
GHz	gigahertz
GND	ground
H	height
HL	Hermon laboratories
Hz	hertz
k	kilo
kHz	kilohertz
LO	local oscillator
m	meter
MHz	megahertz
min	minute
mm	millimeter
ms	millisecond
μs	microsecond
NA	not applicable
OATS	open area test site
Ω	Ohm
PS	power supply
ppm	part per million (10^{-6})
QP	quasi-peak
RE	radiated emission
RF	radio frequency
rms	root mean square
Rx	receive
s	second
T	temperature
Tx	transmit
V	volt

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