DEKRA Certification, Inc.
405 Glenn Dr. Suite 12,
Sterling, VA 20164
United States of America

Test report No:
3176ERM.002A2

Assessment report
RF EXPOSURE REPORT ACCORDING TO
FCC 47 CFR Part 2.1093
ISED RSS-102 Issue 5:2015

(*) Identification of item tested	Wireless Charger
(*) Trademark	FoMoCo
(*) Model and /or type reference tested	WACM3
Other identification of the product	FCC ID: L2C0084TR IC: 3432A-0084TR
(*) Features	Qi Baseline Power Profile (BPP) 5W
Manufacturer	Aptiv Services US, LLC 2151 Lincoln RD Kokomo, IN 46901, USA.
Test method requested, standard	FCC 47 CFR Part 2.1093. Radiofrequency radiation exposure evaluation: portable devices. ISED RSS-102 Issue 5 (2015-03) – Radio Frequency Exposure Compliance of Radiocommunication Apparatus (All Frequency Bands)
Summary	IN COMPLIANCE
Approved by (name / position & signature)	Domingo Galvez EMC&RF Lab Manager Digitally signed by Domingo Galvez DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US Date: 2021.06.24 23:42:54 -04'00'
Date of issue	06-24-2021
Report template No	FERMUSA_199 (*) "Data provided by the client"

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Uncertainties

Uncertainty (factor k=2) was calculated according to the DEKRA Certification internal document PODT000**.**

Frequency (MHz)	**Uncertainty (dB)**	**Uncertainty**	**Field**
0.03 – 0.09	3.87	1.56	Electric (V/m)
0.03 – 0.09	2.60	1.34	Magnetic (A/m)
0.09 - 10	0.85	1.10	Electric (V/m)
0.09 - 10	0.71	1.09	Magnetic (A/m)

Data provided by the client

The following data has been provided by the client:

The test sample consist of Qi Wireless Charger PTx, Baseline Power Profile (BPP) 5W, A32 PTx.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

Usage of samples

Samples undergoing test have been selected by the client

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
3176/04	Wireless charger 4	WACM3	210330100022	5/26/2021
3176/16	DC Harness 4	--	--	5/26/2021

Sample S/01 is composed of the following accessories

Control Nº	Description	Model	Serial Nº	Date of reception
3176/08	Load 3	--	--	5/26/2021
3176/12	WACM3 Charger stand 3	--	--	5/26/2021

1. Sample S/01 has undergone the test(s) specified in subclause “Test method requested”.

Identification of the client

APTIV SERVICES US, LLC.

2151 LINCOLN RD, KOKOMO, IN 46901, USA.

Testing period and place

Test Location	DEKRA Certification Inc.
Date (start)	05-27-2021
Date (finish)	06-24-2021

Document history

Report number	Date	Description
3176ERM.002	06-09-2021	First release
3176ERM.002A1	06-22-2021	Second release
3176ERM.002A2	06-24-2021	Third release

Modifications to the reference test report

It was introduced the following modification in respect to the test report number 3176ERM.002A1 related with the same samples:

Clauses/ Sub-Clauses	Modification	Justification
Page 8-10/FCC RF Exposure Assessment and Verdict	Measurements distance has been updated	As per TCB comments

This modification test report cancels and replaces the test report 3176ERM.002A1.

General description of the device under evaluation

The test sample consist of Qi Baseline Power Profile (BPP) 5W Wireless Charger.

In order to perform the assessment a conservative evaluation distance <=10cm has been used.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 ºC Max. = 35 ºC
Relative humidity	Min. = 30 % Max. = 75 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar

Remarks and comments

The tests have been performed by the technical personnel: Lakshmi Gollamudi, Victor Albrecht and Nasir Khan.

Testing verdicts

Not applicable :	N/A
Pass :	P
Fail :	F
Not measured :	N/M

FCC 47 CFR § 2.1093 & ISED RSS 102 ISSUE 5 & ISED RSS 102-SPR-002 ISSUE 1	VERDICT			
	N/A	P	F	NM
Qi Wireless Charger		P		

1: Technology not subject to testing. Verdict has been determined through RF Exposure assessment (see Appendix A).

List of equipment used during the test

CONTROL NUMBER	DESCRIPTION	MANUFACTURER	MODEL	LAST CALIBRATION	NEXT CALIBRATION
1324	Narda EHP-200A E and H Field Analyzer	NARDA	EHP-200A	2020/09	2022/09
1107	ETHERNET SNMP THERMOMETER	HW GROUP	HWg-STE Plain	2020/08	2021/08

Appendix A: FCC RF Exposure Evaluation

RF Exposure Assessment result and verdict

RF Exposure evaluation for the Qi wireless technology has been conducted through field measurements (see Qi Wireless Charger Evaluation section below).

Technology	Frequency (MHz)	Max. H-field (A/m)	Max. E-field (V/m)	Max Power Density (W/m^2)	H-Field Limit (A/m)	E-Field Limit (V/m)	Power Density Limit (W/m^2)	Verdict
Qi Charger	0.109			-	1.63	614	-	PASS

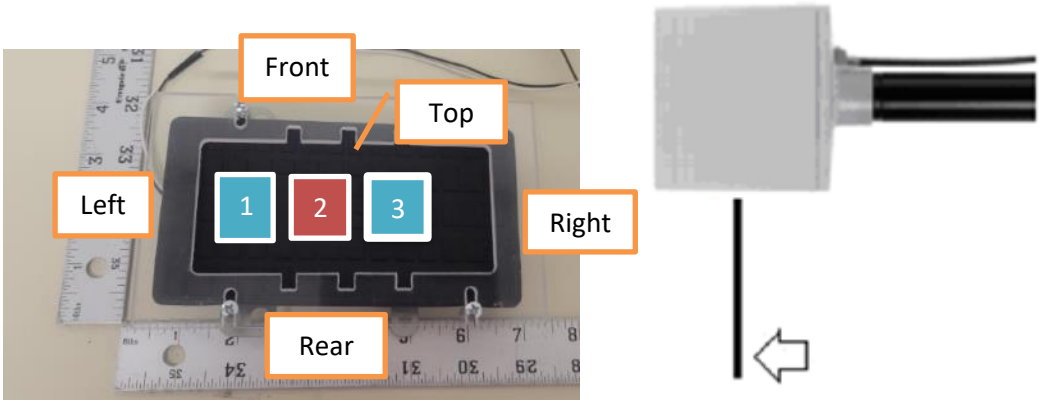
Table 1: Assessment result and Verdict

Qi Wireless Charger Evaluation

For low-power (<15W), in-vehicle applications perform H-field measurements for each edge/top surface of the host/client pair at every 2 cm, starting from as close as possible out to 10 cm. E and H field strength measurements or numerical modeling may be used to demonstrate compliance. Measurements should be made from all sides and the top of the primary/client pair, with the <=10 cm measured from the center of the probe(s) to the edge of the device. Emissions between 100 kHz to 300 kHz should be assessed versus the limits at 300 kHz in Table 1 of Section 1.1310: 614 V/m and 1.63 A/m

According to “FCC 47 CFR Part 2.1093”, portable devices that transmit at frequencies above 6 GHz are to be evaluated in terms of the MPE limits specified in §1.1310 of this chapter. Measurements and calculations to demonstrate compliance with MPE field strength or power density limits for devices operating above 6 GHz should be made at a minimum distance of 5 cm from the radiating source.

Limits for Maximum Permissible Exposure (MPE) to comply with FCC 47 CFR § 2.1091 are defined in “FCC 47 CFR Part 1.1310 Radiation Exposure limits, paragraph (e)”:



E Field = 4cm to 10 cm

H Field = 4cm to 10 cm

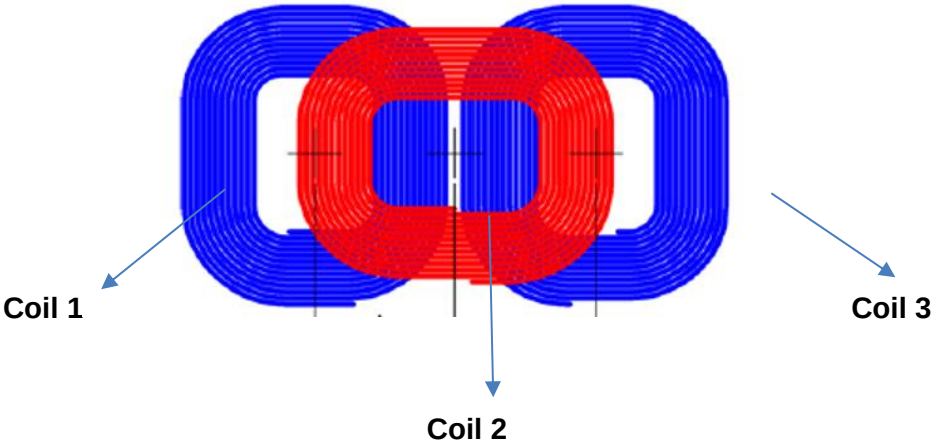


Figure 1: WPT measurement setup

The test sample Primary Coil is one from a linear array of partially overlapping Primary Coils, as appropriate for the position of the Power Receiver relative to the Primary Coils. Selection of the Primary Coil proceeds by the Power Transmitter attempting to establish communication with a Power Receiver using any of the Primary Coils. The array may consist of a single Primary Coil only.

The WPT device consists of different coils but only one coil will transmit based on the placement of load on charger.

The below testing setup has been measured in order to assess compliance for the device.

- Setup 1 – Charging setup with a Load

For the normal charging setup, measurements at every 2 cm starting from 4cm to 10 cm distance have been performed for all device sides, at different battery charge levels. With the customer provided load, measurements were performed on the 3 different coils by placing the load on each coil at different charging levels.

99% Battery Charge level

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	0.76	1.63	46.63	Pass
	6		0.38		23.31	Pass
	8		0.22		13.50	Pass
	10		0.13		7.98	Pass
Front 2	4		1.15		70.55	Pass
	6		0.68		41.72	Pass
	8		0.40		24.54	Pass
	10		0.04		2.45	Pass
Front 3	4		1.20		73.62	Pass
	6		0.72		44.17	Pass
	8		0.46		28.22	Pass
	10		0.27		16.56	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Rear 1	4	109	0.36		22.09	Pass
	6		0.31		19.02	Pass
	8		0.20		12.27	Pass
	10		0.09		5.52	Pass
Rear 2	4		1.17		71.78	Pass
	6		0.51		31.29	Pass
	8		0.33		20.25	Pass
	10		0.05		3.07	Pass
Rear 3	4		1.18		72.39	Pass
	6		0.65		39.88	Pass
	8		0.47		28.83	Pass
	10		0.22		13.50	Pass
Left 1	4		0.09		5.52	Pass
	6		0.08		4.91	Pass
	8		0.09		5.52	Pass
	10		0.05		3.07	Pass
Right 3	4		0.07		4.29	Pass
	6		0.08		4.91	Pass
	8		0.05		3.07	Pass
	10		0.09		5.52	Pass
Top 1	4		0.08		4.91	Pass
	6		0.11		6.75	Pass
	8		0.09		5.52	Pass
	10		0.07		4.29	Pass
Top 2	4		0.07		4.29	Pass
	6		0.05		3.07	Pass
	8		0.03		1.84	Pass
	10		0.23		14.11	Pass
Top 3	4		0.06		3.68	Pass
	6		0.05		3.07	Pass
	8		0.18		11.04	Pass
	10		0.14		8.59	Pass

Table 2: H-field measurement values

Test Side	Distance to DUT (cm)	Frequency (kHz)	E- Field (V/m)	Limit (V/m)	% Limit	Verdict
Front 1	4	109	5.52	614	338.65	Pass
	6		2.81		172.39	Pass
	8		1.23		75.46	Pass
	10		0.37		22.70	Pass
Front 2	4		14.13		2.30	Pass
	6		7.61		1.24	Pass
	8		3.70		0.60	Pass
	10		5.21		0.85	Pass
Front 3	4		15.89		2.59	Pass
	6		6.96		1.13	Pass
	8		7.25		1.18	Pass
	10		2.26		0.37	Pass
Rear 1	4		13.80		2.25	Pass
	6		6.96		1.13	Pass
	8		7.46		1.21	Pass
	10		2.78		0.45	Pass
Rear 2	4		12.12		1.97	Pass
	6		7.64		1.24	Pass
	8		3.48		0.57	Pass
	10		6.14		1.00	Pass
Rear 3	4		6.59		1.07	Pass
	6		3.11		0.51	Pass
	8		1.47		0.24	Pass
	10		0.39		0.06	Pass
Left 1	4		2.01		0.33	Pass
	6		1.16		0.19	Pass
	8		0.38		0.06	Pass
	10		4.45		0.72	Pass
Right 3	4		2.26		0.37	Pass
	6		1.26		0.21	Pass
	8		0.40		0.07	Pass
	10		5.35		0.87	Pass
Top 1	4		6.57		1.07	Pass
	6		5.10		0.83	Pass
	8		3.24		0.53	Pass
	10		2.38		0.39	Pass
Top 2	4		4.92		0.80	Pass
	6		3.94		0.64	Pass
	8		2.70		0.44	Pass
	10		8.16		1.33	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	E- Field (V/m)	Limit (V/m)	% Limit	Verdict
Top 3	4	109	10.71		1.74	Pass
	6		7.85		1.28	Pass
	8		5.20		0.85	Pass
	10		2.09		0.34	Pass

Table 3: E-field measurement values

50% Battery Charge level

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	0.09	1.63	5.52	Pass
	6		0.07		4.29	Pass
	8		0.06		3.68	Pass
	10		0.05		3.07	Pass
Front 2	4		0.06		3.68	Pass
	6		0.06		3.68	Pass
	8		0.05		3.07	Pass
	10		0.05		3.07	Pass
Front 3	4		0.07		4.29	Pass
	6		0.06		3.68	Pass
	8		0.03		1.84	Pass
	10		0.04		2.45	Pass
Rear 1	4		0.08		4.91	Pass
	6		0.07		4.29	Pass
	8		0.05		3.07	Pass
	10		0.06		3.68	Pass
Rear 2	4		0.09		5.52	Pass
	6		0.06		3.68	Pass
	8		0.07		4.29	Pass
	10		0.09		5.52	Pass
Rear 3	4		0.09		5.52	Pass
	6		0.08		4.91	Pass
	8		0.08		4.91	Pass
	10		0.08		4.91	Pass
Left	4		0.09		5.52	Pass
	6		0.07		4.29	Pass
	8		0.06		3.68	Pass
	10		0.08		4.91	Pass
Right 3	4		0.09		5.52	Pass
	6		0.07		4.29	Pass
	8		0.08		4.91	Pass
	10		0.09		5.52	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Top 1	4		0.83		50.92	Pass
	6		0.63		38.65	Pass
	8		0.59		36.20	Pass
	10		0.53		32.52	Pass
Top 2	4		0.53		32.52	Pass
	6		0.32		19.63	Pass
	8		0.23		14.11	Pass
	10		0.39		23.93	Pass
Top 3	4		0.92		56.44	Pass
	6		0.79		48.47	Pass
	8		0.63		38.65	Pass
	10		0.54		33.13	Pass

Table 4: H-field measurement values

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	12.20	614	1.99	Pass
	6		10.90		1.78	Pass
	8		9.80		1.60	Pass
	10		7.90		1.29	Pass
Front 2	4		13.20		2.15	Pass
	6		12.80		2.08	Pass
	8		10.50		1.71	Pass
	10		7.90		1.29	Pass
Front 3	4		11.99		1.95	Pass
	6		10.35		1.69	Pass
	8		8.90		1.45	Pass
	10		7.60		1.24	Pass
Rear 1	4		10.30		1.68	Pass
	6		9.80		1.60	Pass
	8		7.60		1.24	Pass
	10		6.50		1.06	Pass
Rear 2	4		10.39		1.69	Pass
	6		9.57		1.56	Pass
	8		8.39		1.37	Pass
	10		6.30		1.03	Pass
Rear 3	4		9.37		1.53	Pass
	6		8.32		1.36	Pass
	8		7.29		1.19	Pass
	10		5.39		0.88	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Left 1	4		8.97		1.46	Pass
	6		7.36		1.20	Pass
	8		6.21		1.01	Pass
	10		5.23		0.85	Pass
Right 3	4		10.46		1.70	Pass
	6		9.57		1.56	Pass
	8		8.36		1.36	Pass
	10		6.25		1.02	Pass
Top 1	4		12.35		2.01	Pass
	6		11.29		1.84	Pass
	8		10.77		1.75	Pass
	10		9.80		1.60	Pass
Top 2	4		15.39		2.51	Pass
	6		13.27		2.16	Pass
	8		11.64		1.90	Pass
	10		10.23		1.67	Pass
Top 3	4		17.38		2.83	Pass
	6		15.38		2.50	Pass
	8		11.26		1.83	Pass
	10		9.60		1.56	Pass

Table 5: E-field measurement values

1% Battery Charge level

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	0.50	1.63	30.67	Pass
	6		0.69		42.33	Pass
	8		0.34		20.86	Pass
	10		0.17		10.43	Pass
Front 2	4		0.26		15.95	Pass
	6		0.04		2.45	Pass
	8		0.02		1.23	Pass
	10		0.22		13.50	Pass
Front 3	4		0.87		53.37	Pass
	6		0.26		15.95	Pass
	8		0.17		10.43	Pass
	10		0.10		6.13	Pass
Rear 1	4		0.72		44.17	Pass
	6		0.61		37.42	Pass
	8		0.44		26.99	Pass
	10		0.34		20.86	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Rear 2	4		0.79		48.47	Pass
	6		0.68		41.72	Pass
	8		0.35		21.47	Pass
	10		0.21		12.88	Pass
Rear 3	4		0.52		31.90	Pass
	6		0.43		26.38	Pass
	8		0.35		21.47	Pass
	10		0.23		14.11	Pass
Left	4		0.69		42.33	Pass
	6		0.54		33.13	Pass
	8		0.47		28.83	Pass
	10		0.31		19.02	Pass
Right	4		0.73		44.79	Pass
	6		0.67		41.10	Pass
	8		0.45		27.61	Pass
	10		0.25		15.34	Pass
Top 1	6		0.54		33.13	Pass
	8		0.39		23.93	Pass
	10		0.25		15.34	Pass
Top 2	6		0.36		22.09	Pass
	8		0.20		12.27	Pass
	10		1.25		76.69	Pass
Top 3	6		0.31		19.02	Pass
	8		0.26		15.95	Pass
	10		0.19		11.66	Pass

Table 6: H-field measurement values

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	5.07	614	0.83	Pass
	6		4.00		0.65	Pass
	8		3.18		0.52	Pass
	10		2.70		0.44	Pass
Front 2	4		5.46		0.89	Pass
	6		4.31		0.70	Pass
	8		3.54		0.58	Pass
	10		3.67		0.60	Pass
Front 3	4		4.82		0.79	Pass
	6		4.02		0.65	Pass
	8		3.20		0.52	Pass
	10		2.67		0.43	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Rear 1	4		5.30		0.86	Pass
	6		3.90		0.64	Pass
	8		3.23		0.53	Pass
	10		2.63		0.43	Pass
Rear 2	4		5.40		0.88	Pass
	6		4.90		0.80	Pass
	8		3.60		0.59	Pass
	10		2.81		0.46	Pass
Rear 3	4		3.63		0.59	Pass
	6		2.39		0.39	Pass
	8		2.50		0.41	Pass
	10		2.20		0.36	Pass
Left	4		5.90		0.96	Pass
	6		4.80		0.78	Pass
	8		3.20		0.52	Pass
	10		2.28		0.37	Pass
Right	4		5.18		0.84	Pass
	6		4.70		0.77	Pass
	8		3.50		0.57	Pass
	10		2.60		0.42	Pass
Top 1	6		2.25		0.37	Pass
	8		1.54		0.25	Pass
	10		1.09		0.18	Pass
Top 2	6		3.57		0.58	Pass
	8		2.23		0.36	Pass
	10		9.04		1.47	Pass
Top 3	6		4.62		0.75	Pass
	8		2.93		0.48	Pass
	10		1.85		0.30	Pass

Table 7: E-field measurement values

All values are in compliance to 1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields reference levels for the frequency range used by the device.

Appendix B:
ISED RSS RF Exposure Information

RF Exposure Assessment result and verdict

RF Exposure evaluation for the Qi wireless technology has been conducted through field measurements (see Qi Wireless Charger Evaluation section below).

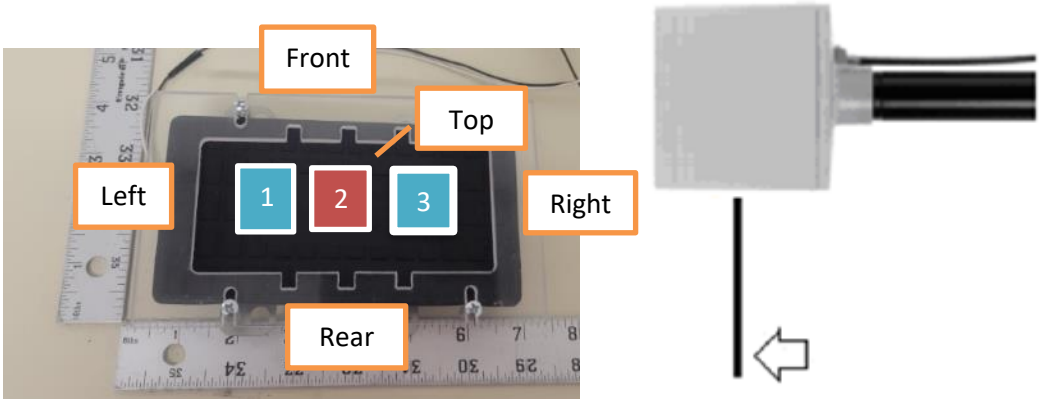
Technology	Frequency (MHz)	Max. H-field (A/m)	Max. E-field (V/m)	Max Power Density (W/m^2)	H-Field Limit (A/m)	E-Field Limit (V/m)	Power Density Limit (W/m^2)	Verdict
Qi Charger	0.109			-	90	83	-	PASS

Table 8: Assessment result and Verdict

Qi Wireless Charger Evaluation

Measurements at 10 cm test distance were performed using the equipment listed in the “Used Instrumentation” paragraph of this document to compare the measured E&H-Field values with the limits shown on table 4 of RSS-102 Issue 5, Paragraph “4.Exposure Limits”, Industry of Canada.

Measurements have been performed at a compliance distance of 10 cm from the probe edge to the device edge, placing the device in the edge of the table, using the equipment listed in the “Used Instrumentation” paragraph of this document:



E Field = 4cm to 10 cm

H Field = 4cm to 10 cm

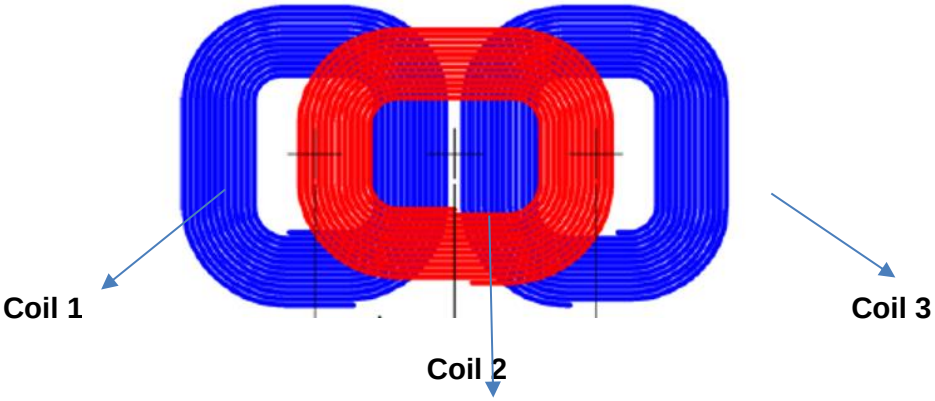


Figure 1: WPT measurement setup

The test sample Primary Coil is one from a linear array of partially overlapping Primary Coils, as appropriate for the position of the Power Receiver relative to the Primary Coils. Selection of the Primary Coil proceeds by the Power Transmitter attempting to establish communication with a Power Receiver using any of the Primary Coils. The array may consist of a single Primary Coil only.

The WPT device consists of different coils but only one coil will transmit based on the placement of load on charger.

The below testing setup has been measured in order to assess compliance for the device.

- Setup 1 – Charging setup with a Load

For the normal charging setup, measurements at every 2 cm starting from 4cm to 10 cm distance have been performed for all device sides, at different battery charge levels. With the customer provided load, measurements were performed on the 3 different coils by placing the load on each coil at different charging levels.

99% Battery Charge level

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	0.76	90	46.63	Pass
	6		0.38		23.31	Pass
	8		0.22		13.50	Pass
	10		0.13		7.98	Pass
Front 2	4		1.15		70.55	Pass
	6		0.68		41.72	Pass
	8		0.40		24.54	Pass
	10		0.04		2.45	Pass
Front 3	4		1.20		73.62	Pass
	6		0.72		44.17	Pass
	8		0.46		28.22	Pass
	10		0.27		16.56	Pass
Rear 1	4		0.36		22.09	Pass
	6		0.31		19.02	Pass
	8		0.20		12.27	Pass
	10		0.09		5.52	Pass
Rear 2	4		1.17		71.78	Pass
	6		0.51		31.29	Pass
	8		0.33		20.25	Pass
	10		0.05		3.07	Pass
Rear 3	4		1.18		72.39	Pass
	6		0.65		39.88	Pass
	8		0.47		28.83	Pass
	10		0.22		13.50	Pass
Left 1	4		0.09		5.52	Pass
	6		0.08		4.91	Pass
	8		0.09		5.52	Pass
	10		0.05		3.07	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Right 3	4		0.07		4.29	Pass
	6		0.08		4.91	Pass
	8		0.05		3.07	Pass
	10		0.09		5.52	Pass
Top 1	4		0.08		4.91	Pass
	6		0.11		6.75	Pass
	8		0.09		5.52	Pass
	10		0.07		4.29	Pass
Top 2	4		0.07		4.29	Pass
	6		0.05		3.07	Pass
	8		0.03		1.84	Pass
	10		0.23		14.11	Pass
Top 3	4		0.06		3.68	Pass
	6		0.05		3.07	Pass
	8		0.18		11.04	Pass
	10		0.14		8.59	Pass

Table 9: H-field measurement values

Test Side	Distance to DUT (cm)	Frequency (kHz)	E- Field (V/m)	Limit (V/m)	% Limit	Verdict
Front 1	4	109	5.52	83	338.65	Pass
	6		2.81		172.39	Pass
	8		1.23		75.46	Pass
	10		0.37		22.70	Pass
Front 2	4		14.13		17.02	Pass
	6		7.61		9.17	Pass
	8		3.70		4.46	Pass
	10		5.21		6.28	Pass
Front 3	4		15.89		19.14	Pass
	6		6.96		8.39	Pass
	8		7.25		8.73	Pass
	10		2.26		2.72	Pass
Rear 1	4		13.80		16.63	Pass
	6		6.96		8.39	Pass
	8		7.46		8.99	Pass
	10		2.78		3.35	Pass
Rear 2	4		12.12		14.60	Pass
	6		7.64		9.20	Pass
	8		3.48		4.19	Pass
	10		6.14		7.40	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	E- Field (V/m)	Limit (V/m)	% Limit	Verdict
Rear 3	4		6.59		7.94	Pass
	6		3.11		3.75	Pass
	8		1.47		1.77	Pass
	10		0.39		0.47	Pass
Left 1	4		2.01		2.42	Pass
	6		1.16		1.40	Pass
	8		0.38		0.46	Pass
	10		4.45		5.36	Pass
Right 3	4		2.26		2.72	Pass
	6		1.26		1.52	Pass
	8		0.40		0.48	Pass
	10		5.35		6.45	Pass
Top 1	4		6.57		7.92	Pass
	6		5.10		6.14	Pass
	8		3.24		3.90	Pass
	10		2.38		2.87	Pass
Top 2	4		4.92		5.93	Pass
	6		3.94		4.75	Pass
	8		2.70		3.25	Pass
	10		8.16		9.83	Pass
Top 3	4		10.71		12.90	Pass
	6		7.85		9.46	Pass
	8		5.20		6.27	Pass
	10		2.09		2.52	Pass

Table 10: E-field measurement values

50% Battery Charge level

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	0.09	90	0.10	Pass
	6		0.07		0.08	Pass
	8		0.06		0.07	Pass
	10		0.05		0.06	Pass
Front 2	4		0.06		0.07	Pass
	6		0.06		0.07	Pass
	8		0.05		0.06	Pass
	10		0.05		0.06	Pass
Front 3	4		0.07		0.08	Pass
	6		0.06		0.07	Pass
	8		0.03		0.03	Pass
	10		0.04		0.04	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Rear 1	4		0.08		0.09	Pass
	6		0.07		0.08	Pass
	8		0.05		0.06	Pass
	10		0.06		0.07	Pass
Rear 2	4		0.09		0.10	Pass
	6		0.06		0.07	Pass
	8		0.07		0.08	Pass
	10		0.09		0.10	Pass
Rear 3	4		0.09		0.10	Pass
	6		0.08		0.09	Pass
	8		0.08		0.09	Pass
	10		0.08		0.09	Pass
Left 1	4		0.09		0.10	Pass
	6		0.07		0.08	Pass
	8		0.06		0.07	Pass
	10		0.08		0.09	Pass
Right 3	4		0.09		0.10	Pass
	6		0.07		0.08	Pass
	8		0.08		0.09	Pass
	10		0.09		0.10	Pass
Top 1	4		0.83		0.92	Pass
	6		0.63		0.70	Pass
	8		0.59		0.66	Pass
	10		0.53		0.59	Pass
Top 2	4		0.53		0.59	Pass
	6		0.32		0.36	Pass
	8		0.23		0.26	Pass
	10		0.39		0.43	Pass
Top 3	4		0.92		1.02	Pass
	6		0.79		0.88	Pass
	8		0.63		0.70	Pass
	10		0.54		0.60	Pass

Table 11: H-field measurement values

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	12.20	83	14.70	Pass
	6		10.90		13.13	Pass
	8		9.80		11.81	Pass
	10		7.90		9.52	Pass
Front 2	4		13.20		15.90	Pass
	6		12.80		15.42	Pass
	8		10.50		12.65	Pass
	10		7.90		9.52	Pass
Front 3	4		11.99		14.45	Pass
	6		10.35		12.47	Pass
	8		8.90		10.72	Pass
	10		7.60		9.16	Pass
Rear 1	4		10.30		12.41	Pass
	6		9.80		11.81	Pass
	8		7.60		9.16	Pass
	10		6.50		7.83	Pass
Rear 2	4		10.39		12.52	Pass
	6		9.57		11.53	Pass
	8		8.39		10.11	Pass
	10		6.30		7.59	Pass
Rear 3	4		9.37		11.29	Pass
	6		8.32		10.02	Pass
	8		7.29		8.78	Pass
	10		5.39		6.49	Pass
Left 1	4		8.97		10.81	Pass
	6		7.36		8.87	Pass
	8		6.21		7.48	Pass
	10		5.23		6.30	Pass
Right 3	4		10.46		12.60	Pass
	6		9.57		11.53	Pass
	8		8.36		10.07	Pass
	10		6.25		7.53	Pass
Top 1	4		12.35		14.88	Pass
	6		11.29		13.60	Pass
	8		10.77		12.98	Pass
	10		9.80		11.81	Pass
Top 2	4		15.39		18.54	Pass
	6		13.27		15.99	Pass
	8		11.64		14.02	Pass
	10		10.23		12.33	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Top 3	4		17.38		20.94	Pass
	6		15.38		18.53	Pass
	8		11.26		13.57	Pass
	10		9.60		11.57	Pass

Table 12: E-field measurement values

1% Battery Charge level

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4	109	0.50	90	0.56	Pass
	6		0.69		0.77	Pass
	8		0.34		0.38	Pass
	10		0.17		0.19	Pass
Front 2	4		0.26		0.29	Pass
	6		0.04		0.04	Pass
	8		0.02		0.02	Pass
	10		0.22		0.24	Pass
Front 3	4		0.87		0.97	Pass
	6		0.26		0.29	Pass
	8		0.17		0.19	Pass
	10		0.10		0.11	Pass
Rear 1	4		0.72		0.80	Pass
	6		0.61		0.68	Pass
	8		0.44		0.49	Pass
	10		0.34		0.38	Pass
Rear 2	4		0.79		0.88	Pass
	6		0.68		0.76	Pass
	8		0.35		0.39	Pass
	10		0.21		0.23	Pass
Rear 3	4		0.52		0.58	Pass
	6		0.43		0.48	Pass
	8		0.35		0.39	Pass
	10		0.23		0.26	Pass
Left	4		0.69		0.77	Pass
	6		0.54		0.60	Pass
	8		0.47		0.52	Pass
	10		0.31		0.34	Pass
Right	4		0.73		0.81	Pass
	6		0.67		0.74	Pass
	8		0.45		0.50	Pass
	10		0.25		0.28	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Top 1	6		0.54		0.60	Pass
	8		0.39		0.43	Pass
	10		0.25		0.28	Pass
Top 2	6		0.36		0.40	Pass
	8		0.20		0.22	Pass
	10		1.25		1.39	Pass
Top 3	6		0.31		0.34	Pass
	8		0.26		0.29	Pass
	10		0.19		0.21	Pass

Table 13: H-field measurement values

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Front 1	4		5.07		6.11	Pass
	6		4.00		4.82	Pass
	8		3.18		3.83	Pass
	10		2.70		3.25	Pass
Front 2	4		5.46		6.58	Pass
	6		4.31		5.19	Pass
	8		3.54		4.27	Pass
	10		3.67		4.42	Pass
Front 3	4		4.82		5.81	Pass
	6		4.02		4.84	Pass
	8		3.20		3.86	Pass
	10		2.67		3.22	Pass
Rear 1	4		5.30		6.39	Pass
	6	109	3.90	83	4.70	Pass
	8		3.23		3.89	Pass
	10		2.63		3.17	Pass
Rear 2	4		5.40		6.51	Pass
	6		4.90		5.90	Pass
	8		3.60		4.34	Pass
	10		2.81		3.39	Pass
Rear 3	4		3.63		4.37	Pass
	6		2.39		2.88	Pass
	8		2.50		3.01	Pass
	10		2.20		2.65	Pass
Left	4		5.90		7.11	Pass
	6		4.80		5.78	Pass
	8		3.20		3.86	Pass
	10		2.28		2.75	Pass

Test Side	Distance to DUT (cm)	Frequency (kHz)	H- Field (A/m)	Limit (A/m)	% Limit	Verdict
Right	4		5.18		6.24	Pass
	6		4.70		5.66	Pass
	8		3.50		4.22	Pass
	10		2.60		3.13	Pass
Top 1	6		2.25		2.71	Pass
	8		1.54		1.86	Pass
	10		1.09		1.31	Pass
Top 2	6		3.57		4.30	Pass
	8		2.23		2.69	Pass
	10		9.04		10.89	Pass
Top 3	6		4.62		5.57	Pass
	8		2.93		3.53	Pass
	10		1.85		2.23	Pass

Table 14: E-field measurement values

All values are in compliance to 1999/519/EC Council Recommendation on the limitation of exposure of the general public to electromagnetic fields reference levels for the frequency range used by the device.

Appendix C : **FCC RF Exposure information**

FCC RF Exposure evaluation

When a device qualifies for the categorical exclusion provision of § 2.1091(c), the minimum test separation distance may be estimated, when applicable, by simple calculations according to plane-wave equivalent conditions, to ensure the transmitter and its antenna(s) can operate in manners that meet or exceed the estimated distance. The source-based time-averaged maximum radiated power, according to the maximum antenna gain, must be applied to calculate the field strength and power density required to establish the minimum test separation distance. When the estimated test separation distance becomes overly conservative and does not support compliance, MPE measurement or computational modeling may be used to determine the required minimum separation distance.

According to §1.1310 Radiofrequency radiation exposure limits, paragraph (e), the limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields are:

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 Exposure				
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/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
300–1,500	.....	.....	f/1500	30
1,500–100,000	.....	.....	1.0	30

f = frequency in MHz * = Plane-wave equivalent power density

FCC MPE Evaluation

Each supported transmission technology will be evaluated to determine if it is in compliance with limits for Maximum Permissible Exposure (MPE) to radiofrequency electromagnetic fields.

In order to perform the assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction:

Power density: $S[mW/cm^2] = \frac{P_{E.I.R.P.}[mW]}{4\Pi R[cm]^2}$

Where:

S = power density

$P_{E.I.R.P.}$ = Equivalent isotopically radiated power

R = distance to the center of radiation of the antenna (evaluation distance)

Simultaneous transmission assessment:

When multiple sources are introduced into an environment, it becomes necessary to address the sources interdependently, since each source will contribute some percentage of the maximum exposure toward the total exposure. The sum of the ratios of the exposure from each source to the corresponding maximum exposure for the frequency of each source must be evaluated.

The exposure complies with the maximum permissible exposure if the sum of the ratios is less than unity:

$$\sum_{i=1}^{n} \frac{Exp_i}{Limit_i} < 1$$

Where

Exp_i is the measured/calculated exposure value of each source;

$Limit_i$ is the applicable limit of each source.

Appendix D: **ISED RF Exposure information**

ISED RF Exposure evaluation for mobile devices

According to RSS-102 Issue 5, Paragraph “4. Exposure Limits”, Industry of Canada has adopted the RF field strength limits established in Health Canada’s RF exposure guideline, Safety code 6:

Table 4: RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[21]	83	90	-	Instantaneous*
0.1-10	-	$0.73/f$	-	6**
1.1-10	$87/f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	$58.07/f^{0.25}$	$0.1540/f^{0.25}$	$8.944/f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	$3.142 f^{0.3417}$	$0.008335 f^{0.3417}$	$0.02619 f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	$616000/f^{1.2}$
150000-300000	$0.158 f^{0.5}$	$4.21 \times 10^{-4} f^{0.5}$	$6.67 \times 10^{-5} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Table 6: RF Field Strength Limits for Controlled Use Devices (Controlled Environment)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m^2)	Reference Period (minutes)
0.003-10[23]	170	180	-	Instantaneous*
0.1-10	-	$1.6/f$	-	6**
1.29-10	$193/f^{0.5}$	-	-	6**
10-20	61.4	0.163	10	6
20-48	$129.8/f^{0.25}$	$0.3444/f^{0.25}$	$44.72/f^{0.5}$	6
48-100	49.33	0.1309	6.455	6
100-6000	$15.60 f^{0.25}$	$0.04138 f^{0.25}$	$0.6455 f^{0.5}$	6
6000-15000	137	0.364	50	6
15000-150000	137	0.364	50	$616000/f^{1.2}$
150000-300000	$0.354 f^{0.5}$	$9.40 \times 10^{-4} f^{0.5}$	$3.33 \times 10^{-4} f$	$616000/f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

ISED MPE Evaluation

Each supported transmission technology will be evaluated to determine if it is in compliance with RSS-102 Issue 5, RF Field Strength Limits for devices used by the General Public.

In order to perform the assessment, the following equations have been used for the calculations; these equations are accurate in the far-field of an antenna and will over-predict power density in the near field, where they could be used for making a "worst case" or conservative prediction:

Power density: $S[W/m^2] = \frac{P_{E.I.R.P.}[W]}{4\Pi R[m]^2}$

Where:

S = power density

$P_{E.I.R.P.}$ = Equivalent isotopically radiated power

R = distance to the center of radiation of the antenna (evaluation distance)

Simultaneous transmission assessment:

When multiple sources are introduced into an environment, it becomes necessary to address the sources interdependently, since each source will contribute some percentage of the maximum exposure toward the total exposure. The sum of the ratios of the exposure from each source to the corresponding maximum exposure for the frequency of each source must be evaluated.

The exposure complies with the maximum permissible exposure if the sum of the ratios is less than unity:

$$\sum_{i=1}^{n} \frac{Exp_i}{Limit_i} < 1$$

Where

Exp_i is the measured/calculated exposure value of each source;

$Limit_i$ is the applicable limit of each source.

Appendix E: Photographs

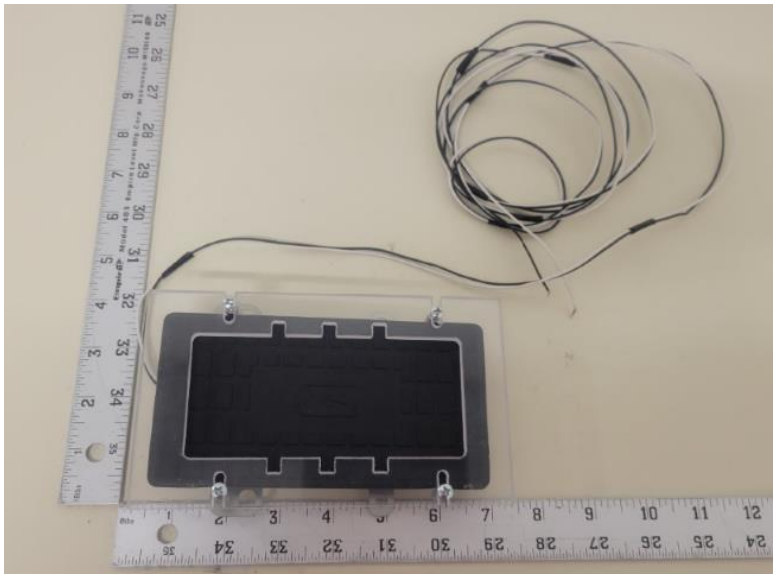


Figure E1. DUT Top view

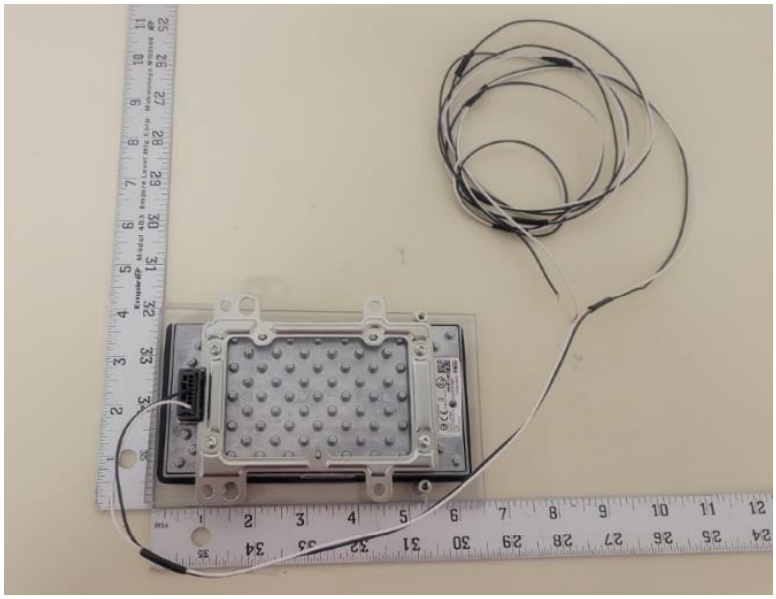


Figure E2. DUT rear view

Figure E3. DUT Test setup 1

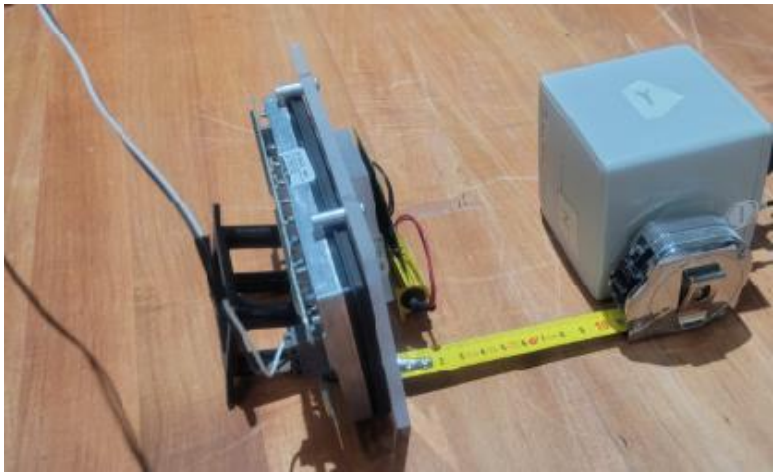


Figure E4. DUT Test setup 2

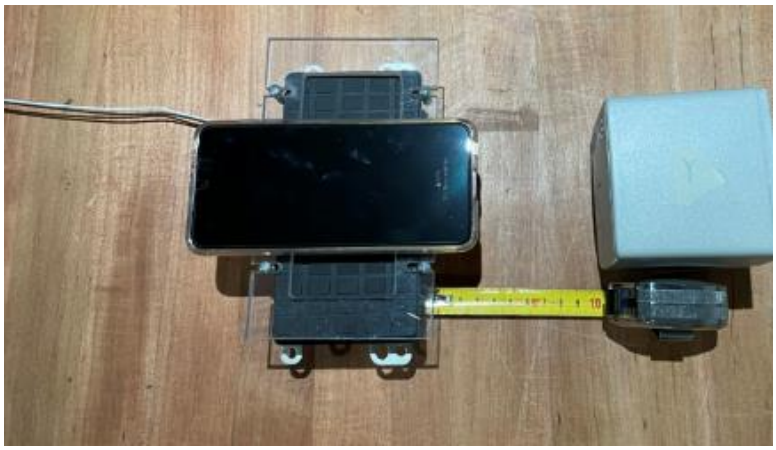


Figure E5. DUT Test setup 3

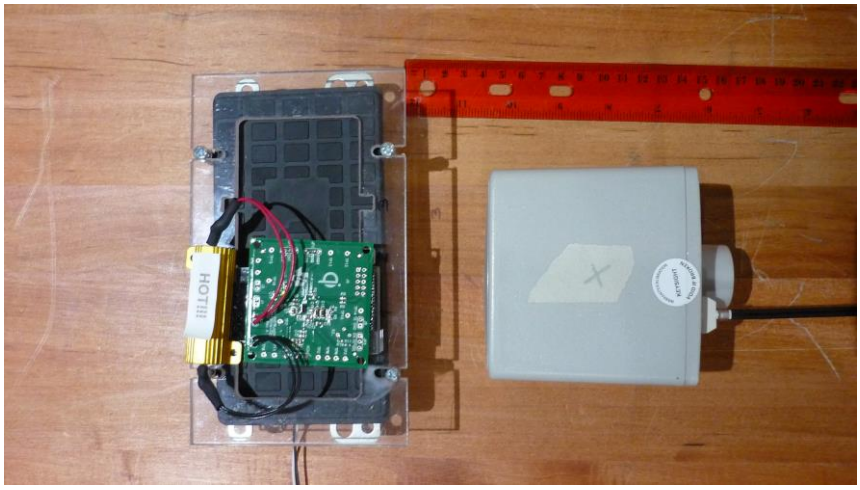


Figure E6. DUT Test setup 4

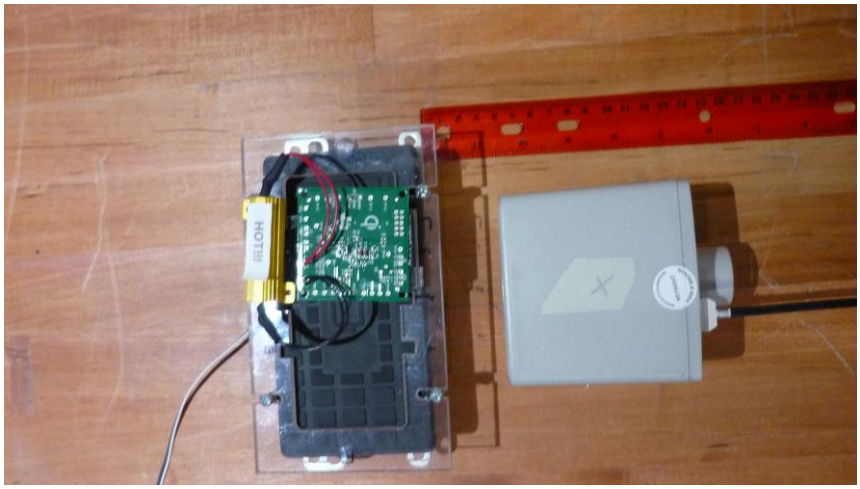


Figure E7. DUT Test setup 5

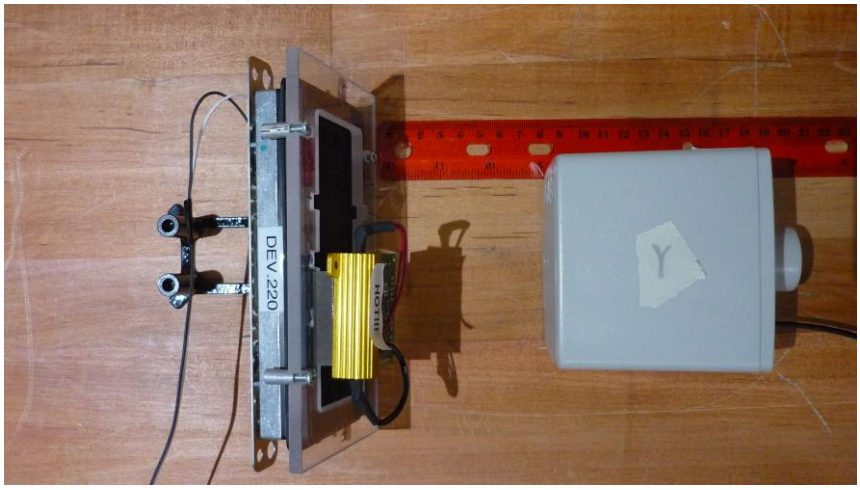


Figure E8. DUT Test setup 6