

FCC

MPE

TEST REPORT

ISSUED BY
Shenzhen BALUN Technology Co., Ltd.



FOR
Wireless Phone Charger

ISSUED TO
Tesla Motors, Inc.

3500 Deer Creek Rd, Palo Alto, CA 94304, USA



Tested by: Zong Liyao

Zong Liyao

Date Jan. 15, 2020

Approved by: Wei Yanquan

Wei Yanquan
(Chief Engineer)

Date Jan. 15, 2020

Report No.: BL-EC19C0043-701

EUT Name: Wireless Phone Charger

Model Name: WC2

Brand Name: TESLA

Test Standard: 47 CFR Part 1.1307

47 CFR Part 1.1310

FCC ID: 2AEIM-WC2

Test Conclusion: Pass

Test Date: Jan. 14, 2020

Date of Issue: Jan. 15, 2020

NOTE: This test report can be duplicated completely for the legal use with the approval of the applicant; it shall not be reproduced except in full, without the written approval of Shenzhen BALUN Technology Co., Ltd. BALUN Laboratory. Any objections should be raised within thirty days from the date of issue. To validate the report, please visit BALUN website.

Revision History

<u>Version</u>	<u>Issue Date</u>	<u>Revisions Content</u>
<u>Rev. 01</u>	<u>Jan. 15, 2020</u>	<u>Initial Issue</u>

TABLE OF CONTENTS

1	GENERAL INFORMATION.....	4
1.1	Identification of the Testing Laboratory.....	4
1.2	Identification of the Responsible Testing Location.....	4
1.3	Test Environment Condition.....	4
1.4	Announce.....	5
2	PRODUCT INFORMATION.....	6
2.1	Applicant Information.....	6
2.2	Manufacturer Information.....	6
2.3	Factory Information.....	6
2.4	General Description for Equipment under Test (EUT).....	6
2.5	Ancillary Equipment.....	6
2.6	Technical Information.....	7
3	STANDARD INFORMATION.....	8
3.1	Test Standard.....	8
3.2	Radiofrequency Radiation Exposure Limit.....	8
3.3	Measurement Uncertainly.....	9
4	TEST SETUP.....	10
4.1	Test Setup Photo.....	10
4.2	Measurement procedure.....	10
4.3	Mobile Condition.....	10
4.4	Equipment Approval Considerations item 5.2 of KDB 680106 D01 v03.....	11
4.5	Test Equipment.....	11
4.6	Test Configuration.....	12
5	TEST RESULT.....	12
5.1	H-field.....	12
5.2	E-field.....	12
6	Test Conclusion.....	13

6.1 H-field.....	13
6.2 E-field.....	13

1 GENERAL INFORMATION

1.1 Identification of the Testing Laboratory

Company Name	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Phone Number	+86 755 6685 0100
Fax Number	+86 755 6182 4271

1.2 Identification of the Responsible Testing Location

Test Location	Shenzhen BALUN Technology Co., Ltd.
Address	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China.
Accreditation Certificate	<p>The laboratory has been listed by Industry Canada to perform electromagnetic emission measurements. The recognition numbers of test site are 11524A-1.</p> <p>The laboratory has been listed by US Federal Communications Commission to perform electromagnetic emission measurements. The recognition numbers of test site are 832625.</p> <p>The laboratory is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L6791.</p>
Description	All measurement facilities used to collect the measurement data are located at Block B, FL 1, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China 518055

1.3 Test Environment Condition

Ambient Temperature	21 to 23 °C
Ambient Relative Humidity	40 to 50%
Ambient Pressure	100 to 102 KPa

1.4 Announce

- (1) The test report reference to the report template version v1.2.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein.
- (5) This document may not be altered or revised in any way unless done so by BALUN and all revisions are duly noted in the revisions section.
- (6) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.

2 PRODUCT INFORMATION

2.1 Applicant Information

Applicant	Tesla Motors, Inc.
Address	3500 Deer Creek Rd, Palo Alto, CA 94304, USA

2.2 Manufacturer Information

Manufacturer	Tesla Motors, Inc.
Address	3500 Deer Creek Rd, Palo Alto, CA 94304, USA

2.3 Factory Information

Factory	N/A
Address	N/A

2.4 General Description for Equipment under Test (EUT)

EUT Name	Wireless Phone Charger
Model Name Under Test	WC2
Series Model Name	N/A
Description of Model name differentiation	N/A
Hardware Version	N/A
Software Version	N/A
Dimensions (Approx.)	N/A
Weight (Approx.)	N/A

2.5 Ancillary Equipment

Note: Not applicable.

2.6 Technical Information

Network and Wireless connectivity	QI
-----------------------------------	----

The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	110~125 kHz	
Antenna Type	Coil Antenna	
About Product	The EUT only support the QI technology.	
Exposure Category	General Population/Uncontrolled exposure	
EUT Stage	Mobile Device	
Product	Type	
	<input checked="" type="checkbox"/> Production unit	<input type="checkbox"/> Identical prototype

3 STANDARD INFORMATION

3.1 Test Standard

No.	Identity	Document Title
1	47 CFR Part 1	Practice and Procedure
2	KDB 680106 D01	RF Exposure Considerations for Low Power Consumer Wireless Power Transfer Applications

3.2 Radiofrequency Radiation Exposure Limit

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
<i>f = frequency in MHz * = Plane-wave equivalent power density</i>				

NOTE:

Limits: According KDB 680106 D01, 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.

General Population/Uncontrolled Exposure: Locations where there is the exposure of individuals who have no knowledge or control of their exposure. General population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

Occupational/Controlled Exposure: Locations where there is exposure that may be incurred by persons who are aware of the potential for exposure. In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

3.3 Measurement Uncertainty

Measurement uncertainty evaluation for electric filed strength and magnetic filed strength test

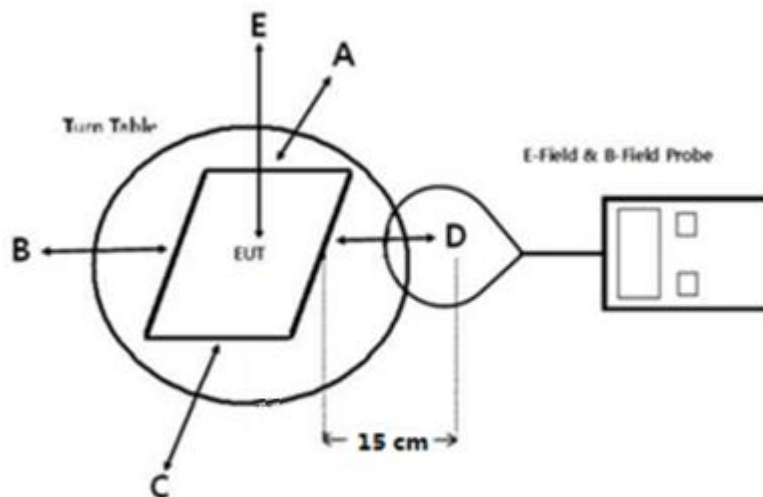
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Measurement	Value
Electric Filed Strength	1.13 dB
Magnetic Filed Strength	1.18 dB

4 TEST SETUP

4.1 Test Setup Photo

Maximum H-field and E-field measurements were made on each of five sides of the EUT that could come in contact with a user. The five sides are defined as follows: Top (A), Left (B), Bottom (C), Right (D), and Front (E). Refer to the test position diagram below.



4.2 Measurement procedure

1. The RF exposure test was performed in anechoic chamber.
2. The measurement probe was placed at test distance (15 cm) which is between the edge of the charger and the geometric center of probe. For top edge used test distance 15mm instead of test distance 20cm to measurement more conservation H-Filed and E-Filed values.
3. The highest emission level was recorded and compared with limit as soon as measurement of each points (A, B, C, D, E) were completed.
4. The EUT was measured according the dictates of KDB 680106 D01v03.

4.3 Mobile Condition

Probe	Condition	Test Distance (cm) A/B/C/D/E
H-field	Mobile	15
E-field	Mobile	15

4.4 Equipment Approval Considerations item 5.2 of KDB 680106 D01 v03.

1. Power transfer frequency is less than 1 MHz.
 - The device operates at a frequency 112.5 KHz
2. Output power from each primary coil is less than or equal to 15 watts.
 - Output power from primary coil 15 watts.
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.
 - The transfer system including a charging system with one primary and secondary coils is to detect and allow only between individual pairs of coils.
4. Client device is placed directly in contact with the transmitter.
 - Client device is placed directly in contact with the transmitter.
5. Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
 - On the normal use this EUT only support mobile exposure condition.
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.
 - Refer to following test results.
The EUT E-Field Strength levels at 15 cm < 50 % of the MPE E-Field Strength limit 614 V/m
9.560 V/m (Max. at 15 cm) < 307.0 V/m
The EUT H-Field Strength levels at 15 cm < 50 % of the MPE H-Field Strength limit 1.63 A/m
0.022 A/m (Max. at 15 cm) < 0.815 A/m

4.5 Test Equipment

Description	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
H-field Probe	SCHWARZBECK	FESP 5134-40	5134-40-242	2019.10.10	2020.10.09
E-field Probe	Narda	EP-602	611WX80276	2019.06.06	2020.06.05
Spectrum Analyzer	ROHDE&SCHWARZ	FSV-30	103118	2019.06.13	2020.06.12
Anechoic Chamber	RAINFORD	9m*6m*6m	N/A	2017.02.21	2020.02.20

4.6 Test Configuration

To check all kinds of possible modes, the EUT was evaluated with appropriate client and under each charging condition as the below table:

Test Mode NO.	Description	
1	Charging Mode	EUT + AC/DC Adapter + Artificial Load 1
2	Charging Mode	EUT + AC/DC Adapter + Artificial Load 2+3

5 TEST RESULT

5.1 H-field

Distance (cm)	Test Mode	EUT Edges					Limit (A/m)
		A (A/m)	B (A/m)	C (A/m)	D (A/m)	E (A/m)	
15	1	0.011	0.011	0.012	0.011	0.009	1.63
	2	0.022	0.018	0.018	0.019	0.019	

5.2 E-field

Distance (cm)	Test Mode	EUT Edges					Limit (V/m)
		A (V/m)	B (V/m)	C (V/m)	D (V/m)	E (V/m)	
15	1	5.136	5.102	4.395	4.828	5.428	614
	2	9.330	9.560	9.420	8.850	8.992	

6 Test Conclusion

6.1 H-field

Distance (cm)	Worst-case Test Mode	EUT Edge A	Limit (A/m)	50% Limit (A/m)	Verdict
		(A/m)			
15	2	0.022	1.63	0.815	Pass

6.2 E-field

Distance (cm)	Worst-case Test Mode	EUT Edge B	Limit (V/m)	50% Limit (V/m)	Verdict
		(V/m)			
15	2	9.560	614.0	307.0	Pass

According KDB 680106 D01v03, the EUT is compliant with the 50% of the MPE limits.

--END OF REPORT--