



Test report No:  
2370297R-RF-US-P20V01

## FCC Exposure TEST REPORT

Product Name	Wireless Phone Charger
Trademark	Tesla
Model and /or type reference	WC6
FCC ID	2AEIM-WC6
Applicant's name / address	Tesla, Inc 3500 Deer Creek Road, Palo Alto, 94304 California, United State
Test method requested, standard	FCC Part 2.1091
Verdict Summary	IN COMPLIANCE
Documented by (name / position & signature)	Tim Cao/ Project Manager 
Approved by (name / position & signature)	Jack Zhang/ Manager 
Date of issue	2023-08-10
Report Version	V1.0
Report template No	Template_FCC MPE-RF-V1.0

## INDEX

	page
Competences and Guarantees.....	3
General conditions .....	3
Environmental conditions .....	3
Possible test case verdicts.....	4
Abbreviations .....	4
Document History .....	5
Remarks and Comments .....	5
1. General Information .....	6
1.1. EUT Description.....	6
1.2. Antenna information .....	7
1.3. Mode of Operation .....	8
1.4. Tested System Details .....	8
1.5. Configuration of Tested System .....	9
1.6. EUT Exercise Software .....	10
2. Technical Test .....	11
2.1. Test Environment.....	11
3. Electric Field Strength / Magnetic Field Strength.....	12
3.1. Test Equipment.....	12
3.2. Test Setup .....	12
3.3. Limit.....	13
3.4. Test Procedure .....	14
3.5. Uncertainty .....	14
3.6. Test Result .....	15
4. RF Exposure Evaluation.....	16

## COMPETENCES AND GUARANTEES

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

**IMPORTANT:** No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of DEKRA.

## GENERAL CONDITIONS

Test Location	No. 99, Hongye Road, Suzhou Industrial Park Suzhou, 215006, P.R. China
Date(receive sample)	July. 12, 2023
Date (start test)	July. 26, 2023
Date (finish test)	Aug. 02, 2023

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or Competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA.

## ENVIRONMENTAL CONDITIONS

The climatic conditions during the tests are within the limits specified by the manufacturer for the operation of the EUT and the test equipment. The climatic conditions during the tests were within the following limits:

Ambient temperature	15 °C – 35 °C
Relative Humidity air	30% - 60%

If explicitly required in the basic standard or applied product / product family standard the climatic values are recorded and documented separately in this test report.

## POSSIBLE TEST CASE VERDICTS

Test case does not apply to test object	N/A
Test object does meet requirement	P (Pass) / PASS
Test object does not meet requirement	F (Fail) / FAIL
Not measured	N/M

## ABBREVIATIONS

For the purposes of the present document, the following abbreviations apply:

EUT	: Equipment Under Test
QP	: Quasi-Peak
CAV	: CISPR Average
AV	: Average
CDN	: Coupling Decoupling Network
SAC	: Semi-Anechoic Chamber
OATS	: Open Area Test Site
BW	: Bandwidth
AM	: Amplitude Modulation
PM	: Pulse Modulation
HCP	: Horizontal Coupling Plane
VCP	: Vertical Coupling Plane
$U_N$	: Nominal voltage
Tx	: Transmitter
Rx	: Receiver
N/A	: Not Applicable
N/M	: Not Measured

## DOCUMENT HISTORY

Report No.	Version	Description	Issued Date
2370297R-RF-US-P20V01	V1.0	Initial issue of report.	2023-08-10

## REMARKS AND COMMENTS

1. The equipment under test (EUT) does meet the essential requirements of the stated standard(s)/test(s).
1. These test results on a sample of the device are for the purpose of demonstrating Compliance with KDB 680106, KDB 447498 and FCC Part 2.1091.
2. The measurement result is considered in conformance with the requirement if it is within the prescribed limit, It is not necessary to account the uncertainty associated with the measurement result.
3. The test results presented in this report relate only to the object tested.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification (Suzhou) Co., Ltd.
5. This report will not be used for social proof function in China market.
6. DEKRA declines any responsibility with the following test data provided by customer that may affect the validity of result:
  - Chapter 1.1 General Description of the Item(s);
  - Chapter 1.2 Antenna Informaion;

## 1. General Information

### 1.1. EUT Description

Product Name..... :	Wireless Phone Charger
Model No. .... :	WC6
Trademark .....	Tesla
FCC ID .....	2AEIM-WC6
Software Version .....	N/A
Hardware Version .....	N/A
Manufacturer .....	Tesla, Inc
Manufacturer Address..... :	3500 Deer Creek Road, Palo Alto, 94304 California, United State
Factory1 .....	Xuancheng Luxshare Precision Industry Co., Ltd
Factory1 Address..... :	No.5, Baishou Road, Xuanzhou District, Xuancheng City, An'hui Province, China
Factory2 .....	BCS Automotive Interface Solutions US LLC
Factory2 Address..... :	Carretera estatal 431 KM 2+200, Lote 1 y 2, Parque tecnológico innovacion queretaro, El Marques, CP 76246

Operating Frequency Range :	127.4~128.2kHz
Type of Modulation .....	ASK
Number of Channel..... :	1

Wireless specification .....	NFC
Operating frequency range(s) .....	13.56MHz
Type of modulation.....	ASK
Number of channel..... :	1

Rated power supply .....	Voltage and Frequency	
	<input type="checkbox"/>	AC: 220 – 240 Vac, 50 / 60 Hz,
	<input type="checkbox"/>	AC: 100 – 240 Vac, 50 / 60 Hz
	<input checked="" type="checkbox"/>	DC: 48 Vdc
	<input type="checkbox"/>	Battery: 12 Vdc
	<input type="checkbox"/>	Adapter:
Adapter..... :	N/A	
	N/A	
Mounting position..... :	<input type="checkbox"/>	Table top equipment
	<input type="checkbox"/>	Wall/Ceiling mounted equipment
	<input type="checkbox"/>	Floor standing equipment
	<input type="checkbox"/>	Hand-held equipment
	<input checked="" type="checkbox"/>	Other: Equipment for vehicular use

## 1.2. Antenna information

### WPT Antenna:

Antenna Model..... :	MP-A27		
Antenna Delivery .....	<input checked="" type="checkbox"/>	1TX + 1RX	
	<input type="checkbox"/>	2TX + 2RX	
	<input type="checkbox"/>	Others:.....	
Antenna technology .....	<input checked="" type="checkbox"/>	SISO	
	<input type="checkbox"/>	MIMO	<input type="checkbox"/> CDD
			<input type="checkbox"/> Beam-forming
Antenna Type .....	<input type="checkbox"/>	External	<input type="checkbox"/> Dipole
			<input type="checkbox"/> Sectorized
	<input checked="" type="checkbox"/>	Internal	<input type="checkbox"/> PIFA
			<input type="checkbox"/> PCB
			<input type="checkbox"/> Ceramic chip
			<input checked="" type="checkbox"/> Others: Coil antenna

### NFC Antenna:

Antenna Model..... :	WPC032 antenna		
Antenna Delivery .....	<input checked="" type="checkbox"/>	1TX + 1RX	
	<input type="checkbox"/>	2TX + 2RX	
	<input type="checkbox"/>	Others:.....	
Antenna technology .....	<input checked="" type="checkbox"/>	SISO	
	<input type="checkbox"/>	MIMO	<input type="checkbox"/> CDD
			<input type="checkbox"/> Beam-forming
Antenna Type .....	<input type="checkbox"/>	External	<input type="checkbox"/> Dipole
			<input type="checkbox"/> Sectorized
	<input checked="" type="checkbox"/>	Internal	<input type="checkbox"/> PIFA
			<input checked="" type="checkbox"/> PCB
			<input type="checkbox"/> Ceramic chip
			<input type="checkbox"/> Others: Coil antenna

### 1.3. Mode of Operation

DEKRA has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

Test Mode
Mode 1: Transmit

### 1.4. Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

Product	Manufacturer	Model No.	Serial No.	Power Cord
N/A	N/A	N/A	N/A	N/A

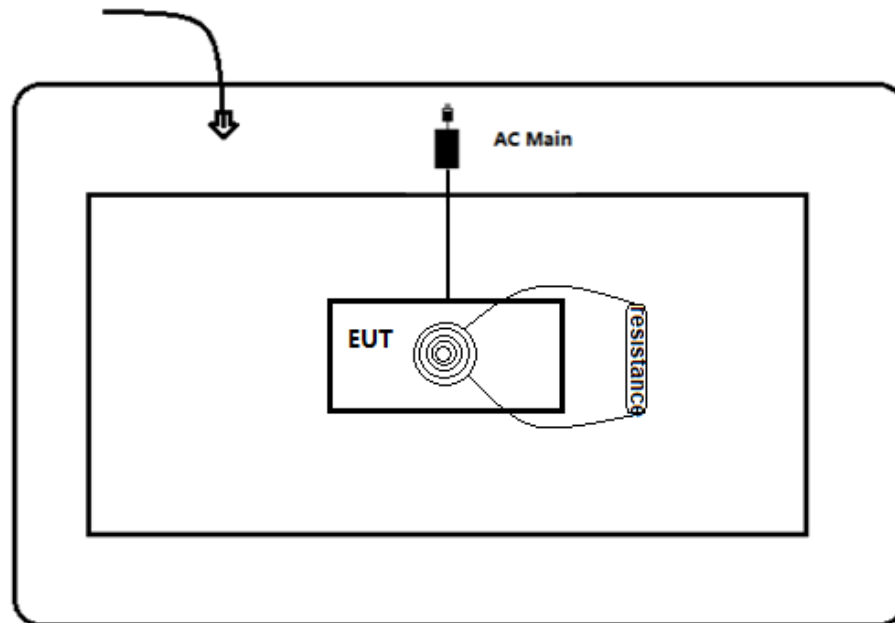


## 1.5. Configuration of Tested System

### Test setup Diagram- Radiated Emission

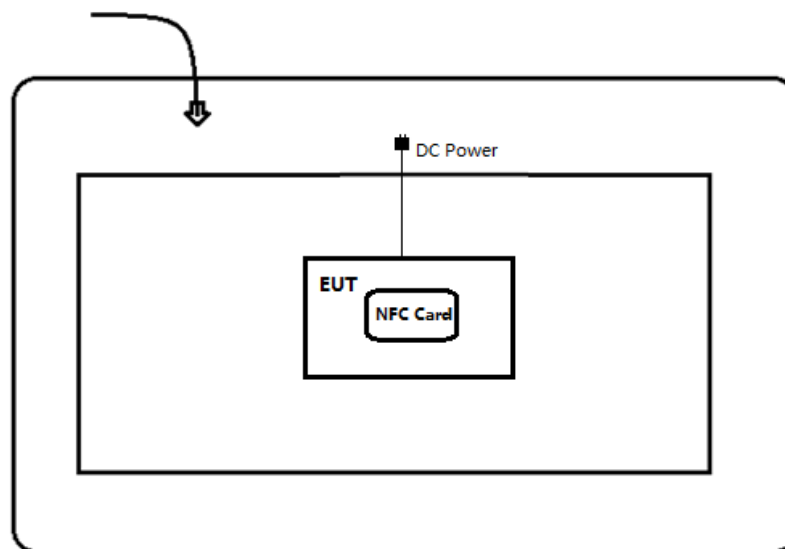
#### WPT

Chamber



#### NTC

Chamber



## 1.6. EUT Exercise Software

1	Setup the EUT and simulators as shown on above.
2	Turn on the power of equipment.
3	Start to continue transmit.

**2. Technical Test**

**2.1. Test Environment**

Items	Required (IEC 68-1)	Actual
Temperature (°C)	15-35	22
Humidity (%RH)	25-75	56
Barometric pressure (mbar)	860-1060	950-1000

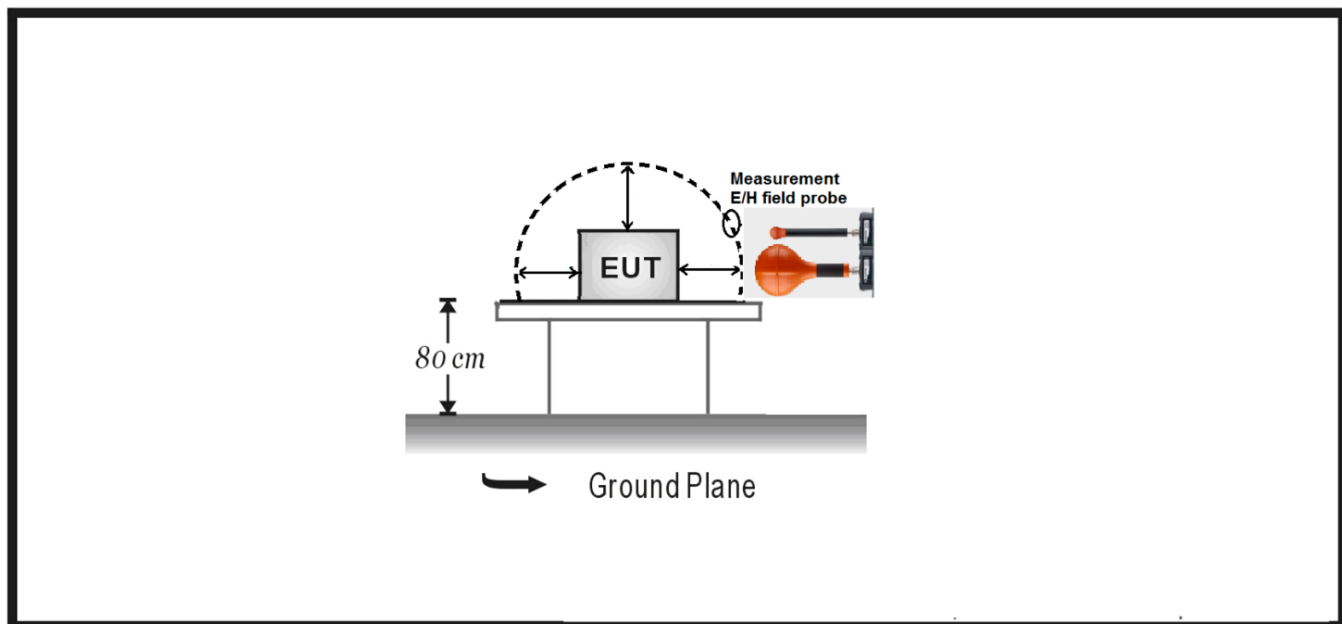
### 3. Electric Field Strength / Magnetic Field Strength

#### 3.1. Test Equipment

Electric Field Strength / Magnetic Field Strength / AC-6					
Instrument	Manufacturer	Type No.	Serial No.	Cal. Date	Cal. Due Date
Field Meter	WAVECONTROL	SMP2	20SN1286	2022.09.01	2023.08.31
E&H Field Probe	WAVECONTROL	WP400	20WP100630	2022.09.01	2023.08.31
E Field Probe	WAVECONTROL	WPF3	20WP030374	2022.09.01	2023.08.31
Temperature/Humidity Meter	RTS	RTS-8S	RF06	2023.05.19	2024.05.18
Note: All equipment are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.					

#### 3.2. Test Setup

3kHz~10MHz Test Setup:



### 3.3. Limit

According to KDB 680106 D01v03r01 Clause 3.c: For devices designed for typical desktop applications, such a wireless charging pads, RF exposure evaluation should be conducted assuming a user separation distance of 15 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 15 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 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)

#### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

##### (a) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm <sup>2</sup> )	Averaging Times  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500	--	--	F/300	6
1500-100000	--	--	5	6

##### (b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S)(mW/cm <sup>2</sup> )	Averaging Times  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500	--	--	F/1500	30
1500-100000	--	--	1.0	30

Note: f=frequency in MHz; \*Plane-wave equivalent power density

Friis Formula

Friis transmission formula:  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

$R$  = distance between observation point and center of the radiator in cm

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance  $r$  where the MPE limit is reached.

### 3.4. Test Procedure

- a. Set the measurement frequency of the measurement probe to the fundamental frequency of the device under test.
- b. Set the span to encompass the entire emission bandwidth.
- c. Set the RBW greater than the 99% OBW of the fundamental emission.

Note: This step is not required for a broadband measurement probe that integrates the entire frequency range.

- d. Set the detector to Peak and trace display to Max-Hold.
- e. Allow the spectrum to fill; for pulsing devices this may require an increased monitoring period.
- f. Using a marker, set it to the maximum level of the spectral envelope.
- g. Repeat steps (b) to (f) while scanning a parallel plane at the measurement distance of 10cm on each side of the device to find the peak level.
- h. Repeat steps (b) to (g) for any frequencies where the field value is greater than -20 dBc below the maximum level identified.
- i. If there are multiple frequencies transmitted by the device under test, use equations (2) and (3) to determine compliance.

Note: When scanning around the entire device, the location found to be the maximum for the E- or H-field may not be the same location as the opposite field.

### 3.5. Uncertainty

The measurement uncertainty is defined as  $\pm 3.10$  dB

### 3.6. Test Result

#### Wireless charging

Test Location	Test Separation Distance (cm)	Maximum Electric Field Level (V/m)	Maximum Magnetic Field Level (A/m)	Electric Field Limit (V/m)	Magnetic Field Limit (A/m)	Result
Top	15	0.683	0.463	83	1.63	Pass
Front	20	4.867	0.470	83	1.63	Pass
Back	20	0.229	0.694	83	1.63	Pass
Left	20	0.639	0.192	83	1.63	Pass
Right	20	0.890	0.341	83	1.63	Pass

#### NFC:

Axial	Test Separation Distance (cm)	Maximum Freq. (MHz)	Maximum Level (V/m)	Limit (V/m)	Result
X	15	13.56	2.049	60.77	Pass
Y	15	13.56	1.773	60.77	Pass
Z	15	13.56	1.574	60.77	Pass
Axial	Test Separation Distance (cm)	Maximum Freq. (MHz)	Maximum Level (A/m)	Limit (A/m)	Result
X	15	13.56	0.008	0.16	Pass
Y	15	13.56	0.006	0.16	Pass
Z	15	13.56	0.007	0.16	Pass

Note: WPT and NFC will not be transmitted simultaneously during normal use of the product.

#### 4. RF Exposure Evaluation

WPT Device requirement	
<input checked="" type="checkbox"/>	Wireless power transfer frequency is below 1 MHz.
<input checked="" type="checkbox"/>	Output power from each primary coil is less than or equal to 15 watts.
<input checked="" type="checkbox"/>	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.
<input checked="" type="checkbox"/>	Client device is placed directly in contact with the transmitter.
<input checked="" type="checkbox"/>	Mobile exposure conditions only (portable exposure conditions are not covered by this exclusion).
<input checked="" type="checkbox"/>	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.

Note: The WPT device can meet all the six requirements above.

\_\_\_\_\_ The End \_\_\_\_\_