

# Maximum Permissible Exposure

FCC ID : 2AEIM-WC4  
Equipment : Wireless Phone Charger  
Brand Name : Tesla  
Model Name : WC4  
Applicant : Tesla Motors, Inc.  
3500 Deer Creek Road Palo Alto,  
California US 94304 United States Of America  
Manufacturer : Tesla Motors, Inc.  
3500 Deer Creek Road Palo Alto,  
California US 94304 United States Of America  
Standard : 47 CFR Part 2.1091

The product was received on Sep. 25, 2020, and testing was started from Dec. 25, 2020 and completed on Feb. 05, 2021. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in 47 CFR Part 2.1091 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.



Approved by: Allen Lin

**SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory**

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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## History of this test report

[illegible]



## Summary of Test Result

| Report Clause | Ref Std. Clause | Test Items                   | Result (PASS/FAIL) | Remark |
|---------------|-----------------|------------------------------|--------------------|--------|
| 1.5           | -               | Maximum Permissible Exposure | PASS               | -      |

**Declaration of Conformity:**

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

**Comments and Explanations:**

None.

**Reviewed by: Sam Tsai**

**Report Producer: Ann Hou**

# 1 Human Exposure Assessment

## 1.1 Maximum Permissible Exposure

### 1.1.1 Limit of Maximum Permissible Exposure

| Wireless Power Transfer General Information                                                                           |                                     |                                      |                         |
|-----------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------|-------------------------|
| Frequency Range                                                                                                       | Modulation Mode                     | Charging Freq. (kHz)                 | Field Strength (dBuV/m) |
| 120-130 kHz                                                                                                           | FSK                                 | 123.94                               | -                       |
| Power Transfer Method                                                                                                 | Output power from each primary coil | That may have multiple primary coils | Charging Method         |
| Multiple primary coils and clients that are able to detect and allow coupling only between individual pairs of coils. | <15W                                | Yes<br>(2 primary coils)             | Client directly contact |
| Note 1: Field strength performed peak level at 3m.                                                                    |                                     |                                      |                         |

| 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 Time  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 <sup>2</sup> )*                 | 6                                                                 |
| 30-300                                                              | 61.4                              | 0.163                             | 1.0                                      | 6                                                                 |
| 300-1500                                                            | -                                 | -                                 | F/300                                    | 6                                                                 |
| 1500-100,000                                                        | -                                 | -                                 | 5                                        | 6                                                                 |
| 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 Time  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 <sup>2</sup> )*                   | 30                                                                |
| 30-300                                                              | 27.5                              | 0.073                             | 0.2                                      | 30                                                                |
| 300-1500                                                            | -                                 | -                                 | F/1500                                   | 30                                                                |
| 1500-100,000                                                        | -                                 | -                                 | 1.0                                      | 30                                                                |
| Note 1: f = frequency in MHz ; *Plane-wave equivalent power density |                                   |                                   |                                          |                                                                   |
| Note 2: For the applicable limit, see FCC 1.1310                    |                                   |                                   |                                          |                                                                   |

## 1.2 Testing Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ 47 CFR Part 2.1091

The following reference test guidance is not within the scope of accreditation of TAF:

- ♦ KDB680106 D01 RF Exposure Wireless Charging Apps v03

## 1.3 Testing Location Information

| Testing Location                           |        |                                                                           |               |                         |             |
|--------------------------------------------|--------|---------------------------------------------------------------------------|---------------|-------------------------|-------------|
| <input checked="" type="checkbox"/>        | HWA YA | ADD : No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) |               |                         |             |
|                                            |        | TEL : 886-3-327-3456 FAX : 886-3-327-0973                                 |               |                         |             |
| Test site Designation No. TW1190 with FCC. |        |                                                                           |               |                         |             |
| Test Condition                             |        | Test Site No.                                                             | Test Engineer | Test Environment        | Test Date   |
| RF Conducted<br>(Mode 1~4)                 |        | TH06-HY                                                                   | Alan          | 20.1~26.9°C /<br>50~60% | 25/Dec/2020 |
| RF Conducted<br>(Mode 5)                   |        | TH06-HY                                                                   | Alan          | 21.4~26.7°C /<br>52~59% | 05/Feb/2021 |

## 1.4 Support Equipment

| Support Equipment |                  |            |              |        |
|-------------------|------------------|------------|--------------|--------|
| No.               | Equipment        | Brand Name | Model Name   | FCC ID |
| 1                 | Battery          | Panasonic  | 46B24R(NS60) | -      |
| 2                 | Charging Phone*2 | Apple      | X max        | -      |

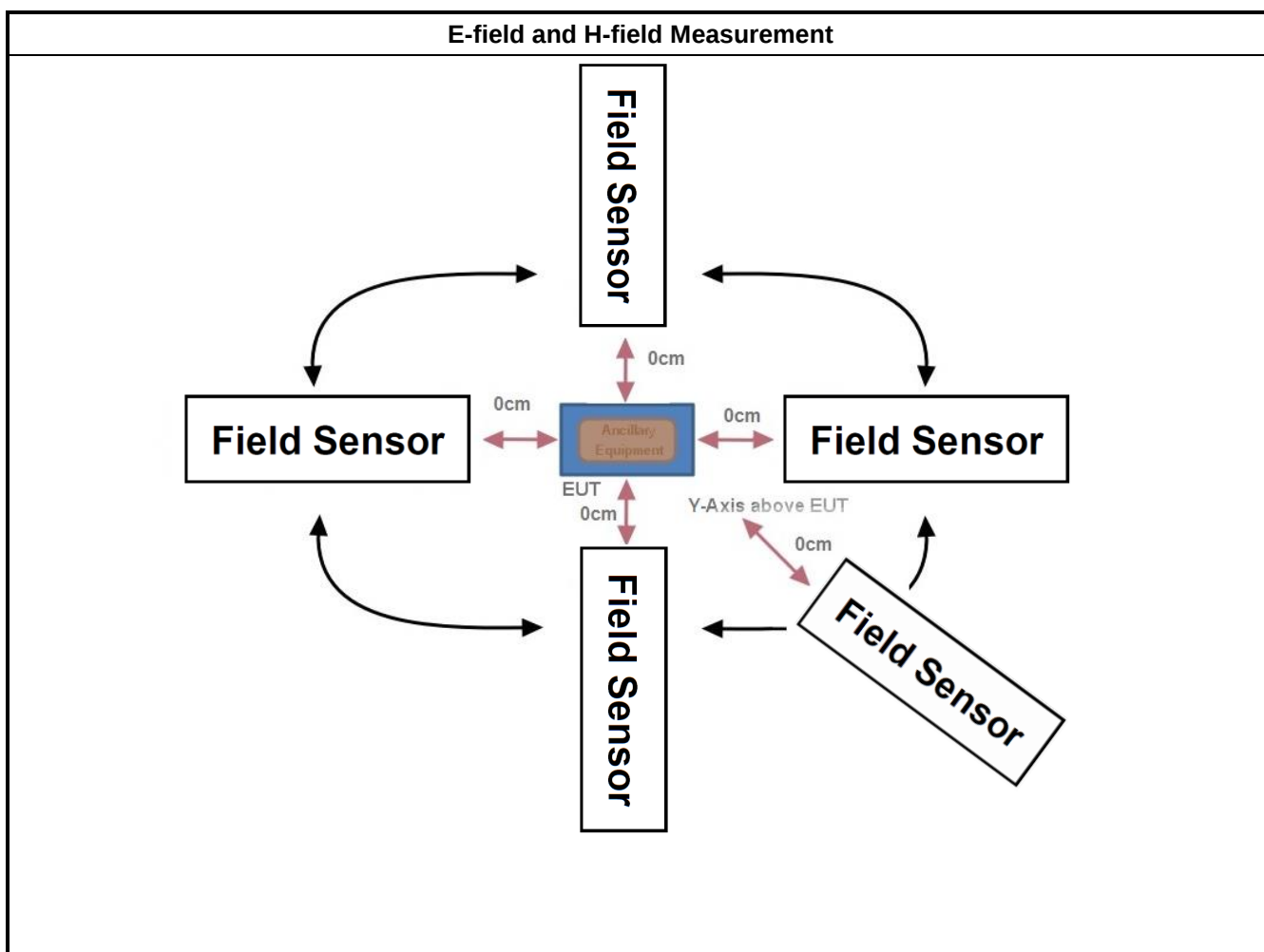
## 1.5 The Worst Condition

| Mode | Ancillary Equipment | Charging Condition                           | Remark |
|------|---------------------|----------------------------------------------|--------|
| 1    | Charging Phone*2    | Battery power <10% 0 cm                      | -      |
| 2    | Charging Phone*2    | Battery power <10%<br>Y-axis distance 2~15cm | -      |
| 3    | Charging Phone*2    | Battery power <50%                           | -      |
| 4    | Charging Phone*2    | Battery power <90%                           | -      |
| 5    | Charging Phone*2    | Battery power <10% 15 cm and 20cm            | -      |

### 1.5.1 Test Method

| Test Method                         |                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <input checked="" type="checkbox"/> | Performed aggregate both leakage E-field and H-field at surrounding the device from all simultaneous transmitting coils.                                                                                                                                                                                                                                                            |
| <input checked="" type="checkbox"/> | During testing, the EUT was placed on a non-conductive table top and the ancillary equipment (e.g., mobile phone) was placed on the EUT for charging. Maximum E-field and H-field measurements were tested 0 cm from each side of the EUT. Along the side of the EUT to center of E-field probe and H-field probe were positioned at the location to search maximum field strength. |
| <input checked="" type="checkbox"/> | E-field transfer to H-field                                                                                                                                                                                                                                                                                                                                                         |
| -                                   | $E\text{-field} = Z_0 \times H\text{-field}$<br>$H\text{-field} = E\text{-field} \div Z_0$<br>Where $Z_0$ = Free Space Impedance = $377\Omega$                                                                                                                                                                                                                                      |

### 1.5.2 Test Setup



Note 1: find worst position for each axis.

**1.5.3 Result of Maximum Permissible Exposure**

| Maximum Permissible Exposure (Mode 1) |            |                     |               |               |
|---------------------------------------|------------|---------------------|---------------|---------------|
| Charging Condition                    | Separation | Probe from EUT Side | E-field (V/m) | H-field (A/m) |
| battery power<10%                     | 0cm        | Left                | 0.3531        | 0.9563        |
|                                       | 0cm        | Right               | 0.1438        | 0.3206        |
|                                       | 0cm        | Top                 | 0.275         | 1.0931        |
|                                       | 0cm        | Bottom              | 0.1719        | 0.9506        |
|                                       | 0cm        | Y-axis above EUT    | 0.4344        | 0.7575        |
| Limit                                 |            |                     | 614           | 1.63          |
| Margin Limit (%)                      |            |                     | 0.07%         | 67.06%        |

| Maximum Permissible Exposure (Mode 2) |            |                     |               |               |
|---------------------------------------|------------|---------------------|---------------|---------------|
| Charging Condition                    | Separation | Probe from EUT Side | E-field (V/m) | H-field (A/m) |
| battery power<10%                     | 0cm        | Y-axis above EUT    | 0.9844        | 1.0930        |
|                                       | 2cm        | Y-axis above EUT    | 0.1906        | 1.0800        |
|                                       | 4cm        | Y-axis above EUT    | 0.2063        | 0.3694        |
|                                       | 6cm        | Y-axis above EUT    | 0.1969        | 0.3150        |
|                                       | 8cm        | Y-axis above EUT    | 0.2563        | 0.1650        |
|                                       | 10cm       | Y-axis above EUT    | 0.3125        | 0.1125        |
|                                       | 12cm       | Y-axis above EUT    | 0.3531        | 0.0769        |
|                                       | 14cm       | Y-axis above EUT    | 0.2313        | 0.0450        |
|                                       | 15cm       | Y-axis above EUT    | 0.15          | 0.0469        |
| Limit                                 |            |                     | 614           | 1.63          |
| Margin Limit (%)                      |            |                     | 0.16%         | 67.06%        |

| Maximum Permissible Exposure (Mode 3) |            |                     |               |               |
|---------------------------------------|------------|---------------------|---------------|---------------|
| Charging Condition                    | Separation | Probe from EUT Side | E-field (V/m) | H-field (A/m) |
| battery power<50%                     | 0cm        | Y-axis above EUT    | 1.2344        | 0.6844        |
| Limit                                 |            |                     | 614           | 1.63          |
| Margin Limit (%)                      |            |                     | 0.20%         | 41.99%        |

| Maximum Permissible Exposure (Mode 4) |            |                     |               |               |
|---------------------------------------|------------|---------------------|---------------|---------------|
| Charging Condition                    | Separation | Probe from EUT Side | E-field (V/m) | H-field (A/m) |
| battery power<90%                     | 0cm        | Y-axis above EUT    | 0.344         | 0.3281        |
| Limit                                 |            |                     | 614           | 1.63          |
| Margin Limit (%)                      |            |                     | 0.06%         | 20.13%        |

| <b>Maximum Permissible Exposure (Mode 5)</b> |                   |                            |                      |                      |
|----------------------------------------------|-------------------|----------------------------|----------------------|----------------------|
| <b>Charging Condition</b>                    | <b>Separation</b> | <b>Probe from EUT Side</b> | <b>E-field (V/m)</b> | <b>H-field (A/m)</b> |
| battery power<10%                            | 15cm              | Left                       | 0.49                 | 0.2363               |
| battery power<10%                            | 15cm              | Right                      | 0.81                 | 0.1930               |
| battery power<10%                            | 15cm              | Top                        | 0.72                 | 0.2267               |
| battery power<10%                            | 15cm              | Bottom                     | 0.49                 | 0.2156               |
| battery power<10%                            | 20cm              | Y-axis above EUT           | 0.4344               | 0.2283               |
| <b>Limit</b>                                 |                   |                            | 614                  | 1.63                 |
| <b>Margin Limit (%)</b>                      |                   |                            | 0.13%                | 14.50%               |



## **2 Test Equipment and Calibration Data**

### **Instrument for Conducted Test**

| <b>Instrument</b>                            | <b>Manufacturer</b> | <b>Model No.</b> | <b>Serial No.</b> | <b>Spec.</b> | <b>Calibration Date</b> | <b>Calibration Due Date</b> |
|----------------------------------------------|---------------------|------------------|-------------------|--------------|-------------------------|-----------------------------|
| Electric and Magnetic field Probe - Analyzer | Narda S.T.S. / PMM  | EHP 200AC        | 170WX80309        | 3kHz~30MHz   | 08/May/2019             | 07/May/2021                 |