DEKRA Certification, Inc.
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United States of America

Test report No:
4086ERM.003

Assessment report
RF EXPOSURE REPORT ACCORDING TO
FCC 47 CFR Part 2.1091; FCC 47 CFR Part 1.1307
FCC 47 CFR Part 1.1310

(*) Identification of item under evaluation	Mode 3 EV charging station. 120V AC
(*) Trademark	Teltonika Energy
(*) Model and /or type reference	TeltoCharger / EVC1310P1000
(*) Other identification of the product	FCC ID: 2BBR8-EVC131
(*) Features	Bluetooth, Wi-Fi, LAN, NFC reader
(*) Manufacturer	UAB Teltonika EMS Ditvos str. 6, LT-02121 Vilnius Lithuania
Test method requested, standard	FCC 47 CFR Part 2.1091 Radiofrequency radiation exposure evaluation: mobile devices. FCC 47 CFR Part 1.1307: Actions that may have a significant environmental effect, for which Environmental Assessments (EAs) must be prepared. FCC 47 CFR Part 1.1310: Radiofrequency radiation exposure limits.
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 of issue	07-20-2023
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Competences and guarantees

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Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item under evaluation", "Trademark", "Model and/or type reference", “General description of the device”, “Other identification of the product”).
2. Maximum output power, antenna gain and Use distance information.
3. The device under evaluation consists of a Mode 3 EV charging station. 120V AC.

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

Identification of the client

Teltonika Energy UAB

Ditvos str. 6, LT-02121 Vilnius

Lithuania.

Document history

Report number	Date	Description
4086ERM.003	07-20-2023	First release

Appendix A: FCC RF Exposure assessment result

General description of the device under evaluation

The device under evaluation consists of a Mode 3 EV charging station. 120V AC.

According to the manufacturer, during its normal use, the separation distance between the radiating structures of the device and nearby users will be greater than 20 cm. In order to perform the assessment a conservative evaluation distance of 20 cm has been used.

The equipment specifications for each supported technology are shown in Table 1. Values corresponding to BTLE and Wi-Fi 2.4 GHz Conducted output power and gain have been declared by the manufacturer. Values corresponding to NFC have been measured and stated into DEKRA Certification Inc. test report num. 4086ERM.002.

BTLE and Wi-Fi 2.4GHz

Technology / Mode	Operating Band	Frequency under evaluation (MHz)	Maximum Conducted Output Power (dBm)	Antenna peak gain (dBi)	Maximum E.R.P. (dBm)	Maximum E.R.P. (mW)	Maximum E.I.R.P. (dBm)	Maximum E.I.R.P. (mW)
802.11b/g/n	2.4 GHz	2412 - 2484	18.01	3.70	19.56	90.36	21.71	148.25
BTLE	2.4 GHz	2400 - 2483.5	-0.05	3.70	1.50	1.41	3.65	2.32

NFC

Technology / Mode	Operating Band	Frequency under evaluation (MHz)	Maximum measured E field strength (dbuV/m)	Maximum E.I.R.P. (dBm)	Maximum E.I.R.P. (mW)
RFID / NFC	13.56	13.56	70.00	-25.20	0.00

Table 1: Equipment specifications

Evaluation Results

The device fails to comply with applicable §1.1307(b)(3).i. exemption limits, so Maximum Permissible Exposure (MPE) evaluation is necessary to demonstrate compliance.

RF Exposure MPE evaluation:

Technology / Mode	Operating Band	Frequency under evaluation (MHz)	Distance (cm)	Power density (mW/cm²)	FCC General Population Limit (mW/cm²)	Verdict
802.11b/g/n	2.4 GHz	2412 - 2484	20.00	0.03	1.00	Pass
BTLE	2.4 GHz	2400 - 2483.5	20.00	0.00	1.00	Pass
RFID / NFC	13.56	13.56	20.00	0.00	0.98	Pass

Table 2: FCC Evaluation Results

The computed value(s) are below the limit(s), so these modes meet the requirements stated in FCC 47 CFR Part 1.1310.

Simultaneous transmission assessment:

The device under evaluation is able to transmit simultaneously using Bluetooth, Wi-Fi 2.4 GHz and NFC transmitters, therefore the most conservative approach for the evaluation of the simultaneous transmission will be:

Simultaneous technologies and modes	Result (∑ of Pout/Pmax ratios)	Verdict (∑ ≤ 1)
802.11b/g/n 2.4 GHz + RFID / NFC 13.56	0.03	Pass
BTLE 2.4 GHz + RFID / NFC 13.56	0.00046	Pass

Table 3: Simultaneous Transmission assessment

Appendix B: FCC RF Exposure information

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RF Exposure determination of exemption

According to FCC 47 CFR §1.1307 (b)(3) Determination of exemption:

(i) For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph (b)(2), a single RF source is exempt if:

(A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph (b)(3)(ii)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(ii)(A);

(B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold Pth (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by:

$$P_{th}\ (\text{mW}) = \begin{cases} ERP_{20\ cm}(d/20\ \text{cm})^x & d \le 20\ \text{cm} \\ ERP_{20\ cm} & 20\ \text{cm} < d \le 40\ \text{cm} \end{cases}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20\ cm}\sqrt{f}}\right) \text{ and } f \text{ is in GHz;}$$

and

$$ERP_{20\ cm}\ (\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases}$$

d = the separation distance (cm);

(C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least λ/2π, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of λ/4 or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).

TABLE 1 TO §1.1307(b)(3)(i)(C)—SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1,920 R^2.
1.34-30	3,450 R^2/f^2.
30-300	3.83 R^2.
300-1,500	0.0128 R^2f.
1,500-100,000	19.2R^2.

(ii) For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \leq 1$$

Where:

a = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(B) of this section for Pth, including existing exempt transmitters and those being added.

b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

Pi = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

Pth,i = the exemption threshold power (Pth) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

ERPj = the ERP of fixed, mobile, or portable RF source j.

ERPth,j = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least λ/2π according to the applicable formula of paragraph (b)(3)(i)(C) of this section.

Evaluated,k = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit,k = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.

RF Exposure evaluation

Limits for Maximum Permissible Exposure (MPE) for RF sources are defined in FCC 47 CFR "§1.1310 Radiation Exposure limits, paragraph (e)":

TABLE 1 TO §1.1310(E)(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)
(i) 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
(ii) 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.

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 isotropically radiated power

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

$P_{E.I.R.P.}$ = $P_T + G_T - L_C$

Where:

P_T= transmitter time-averaged output power (including Duty Cycle and tune-up tolerance, if applicable)

G_T= gain of the transmitting antenna

L_C = signal attenuation in the connecting cable between the transmitter and the antenna if applicable

NFC output power calculation

As stated into DEKRA Certification Inc. test report num. 4086ERM.002, the maximum measured field strength value for each technology at the operating frequency is:

Operation Mode	Frequency (MHz)	Maximum E-field strength (dBµV/m) measured at 3 m
NFC	13.56	70

Table 4: Measurement Results

Using Field Strength Approach formula (linear terms):
$E.I.R.P = Pt \times Gt = (E \times d)^2 / 30$

Where:
Pt = transmitter output power in watts
Gt = numeric gain of the transmitting antenna (unitless)
E = electric field strength in V/m = $10^{((dB\mu V/m)/20)}/10^6$.
d = measurement distance in meters (m) = 3
So, $P_t = (E \times d)^2 / (30 \times G_t) = -25.20$ dBm