



Radio Frequency Exposure Evaluation Report

Brand:

Amphenol Tecvox

Model Number:

WC15ALa

Marketing Name:

Qi 1.3.3 15W Wireless Charger

Product Description:

Qi 1.3.3 15W Wireless Charger

FCC ID: 2AWLR-15WCS13

Per:

FCC KDB 680106 D01 Wireless Power Transfer v04

Report number: EMC_AMPHT_006_24001_FCC_RF_Exposure_Rev1

DATE: 2024-10-31



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1 Assessment

This RF Exposure evaluation report provides evidence for compliance of the below identified device with the RF Exposure limits for wireless power transfer devices as defined in FCC KDB 680106 D01 Wireless Power Transfer v04.

The device meets the limits as stipulated by the above given FCC rule parts based on available specifications.

Company	Description	Model #
Amphenol Tecvox	Qi 1.3.3 15W Wireless Charger	WC15ALa

Responsible for the Report:

2024-10-31 Compliance Cheng Song
(EMC Engineer)

Date	Section	Name	Signature
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2 Administrative Data

2.1 Identification of the Testing Laboratory Issuing the Test Report

Company Name:	CETECOM Inc.
Department:	Compliance
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EMC Engineer:	Cheng Song
Responsible Project Leader:	Shane Hao

2.2 Identification of the Client

Client's Name:	Amphenol Tecvox
Street Address:	25270 Will McComb Dr
City/Zip Code	Tanner, AL 35671
Country	USA

2.3 Identification of the Manufacturer

Manufacturer's Name:	Same as Client
Manufacturers Address:	
City/Zip Code	
Country	

3 Equipment under Assessment

Brand	Amphenol Tecvox
FCC ID	2AWLR-15WCS13
Model Number	WC15ALa
Marketing Name	Qi 1.3.3 15W Wireless Charger
HW Version	5
SW Version	6882
Product Description	Qi 1.3.3 15W Wireless Charger
Radio Information as declared	Qi v1.3 EPP + BPP
Antenna Information as declared	N/A
Max. declared Output Power:	15W
Modulation:	FSK
Frequency Range / number of channels (All Radios)	115-205 kHz Fixed 127.7 kHz
Power Supply/ Rated Operating Voltage Range	9 VDC – 16 VDC
Operating Temperature Range	Charging temp: -40°C – 55°C, Operating temp: -40°C – 85°C
Sample Revision	☐ Production ☒ Pre-production
EUT Diameter	n < 60cm
Note: Details about the Equipment Under Test (EUT) are provided by the client or applicant.	

4 RF Exposure Requirement

4.1 FCC KDB 680106 D01 Wireless Power Transfer v04, section 3.1

Mobile Device and Portable Device Configurations

Wireless power transfer devices must comply with RF exposure requirements for all design configurations in which they can operate. At a minimum, RF exposure must be evaluated for the worst-case scenario, typically when the transmitter, while delivering energy to a client device, is operating at maximum output power.

RF exposure compliance for equipment authorization must be determined following the guidance of KDB 447498, which includes consideration of the different test requirements for Mobile Device and Portable Device exposure categories, as defined in §§ 2.1091 and 2.1093 of the Rules.

Sometimes, a device may meet the RF exposure compliance requirements for a specified minimum distance for all but the most unlikely use conditions. For example, some typical desktop applications, such as wireless charging pads connected to household power, operate only when the active coil is covered and coupled with the target, and are characterized by a form factor that would discourage any on-body use because of size and/or weight. Thus, these devices may be considered to meet the § 2.1091-Mobile conditions ("generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the RF source's radiating structure(s) and [the nearest person]"), and may be tested for compliance according to the applicable procedures for Mobile devices that are less onerous than those for Portable devices. In other analogous cases, still for a Mobile device, RF Exposure compliance may be ensured only for a minimum separation distance that is greater than 20 cm, while use conditions at smaller distances can still be considered unlikely.

For these scenarios, the equipment authorization of the device may be allowed, on a case-by-case basis, only after receiving FCC concurrence. This procedure requires the submittal of a KDB Inquiry selecting "Equipment Compliance Review" (ECR) as the first category, and "Minimum RF Exposure Compliance Distance" as the second category.

4.2 FCC KDB 680106 D01 Wireless Power Transfer v04, section 3.2

Equipment Authorization Procedures for Devices Operating at Frequencies Below 4 MHz

The RF exposure limits, as set forth in § 1.1310, do not cover the frequency range below 100 kHz for Specific Absorption Rate (SAR) and below 300 kHz for Maximum Permitted Exposure (MPE). In addition, present limitations of RF exposure evaluation systems prevent an accurate evaluation of SAR below 4 MHz. For these reasons, a specific MPE-based RF Exposure compliance procedure for devices operating in the aforementioned low-frequency ranges has been set in place. This procedure is applicable to Equipment Authorization of all RF devices, thus including, but not limited to, Part 18 and WPT devices.

Accordingly, for § 2.1091-Mobile devices, the MPE limits between 100 kHz to 300 kHz are to be considered the same as those at 300 kHz in Table 1 of § 1.1310, that is, 614 V/m and 1.63 A/m, for the electric field and magnetic field, respectively. For § 2.1093-Portable devices below 4 MHz and down to 100 kHz, the MPE limits in § 1.1310 (with the 300 kHz limit applicable all the way down to 100 kHz) can be used for the purpose of equipment authorization in lieu of SAR evaluations.

Furthermore, consistent with FCC's equipment authorization RF exposure guidance, any device (both portable and mobile) operating at frequencies below 100 kHz is considered compliant for the purpose of equipment authorization when the external (unperturbed) temporal peak field strengths do not exceed the following reference levels:

83 V/m for the electric field strength (E) and 90 A/m for the magnetic field strength (H).

4.3 FCC KDB 680106 D01 Wireless Power Transfer v04, section 5.2

There might be situations where the WPT RF emissions are limited enough that even operations in a “crowded” environment, where many similar WPT devices are present, do not pose significant EMC and RF exposure concerns. In this scenario, and for devices operating within a one-meter distance from the receiver, as defined above, a manufacturer will not have to submit an “Equipment Compliance Review” KDB, and receive FCC concurrence before proceeding with equipment authorization. This exception to the requirement of submitting the ECR to obtain FCC concurrence only applies when all the following criteria (1) through (6) are met:

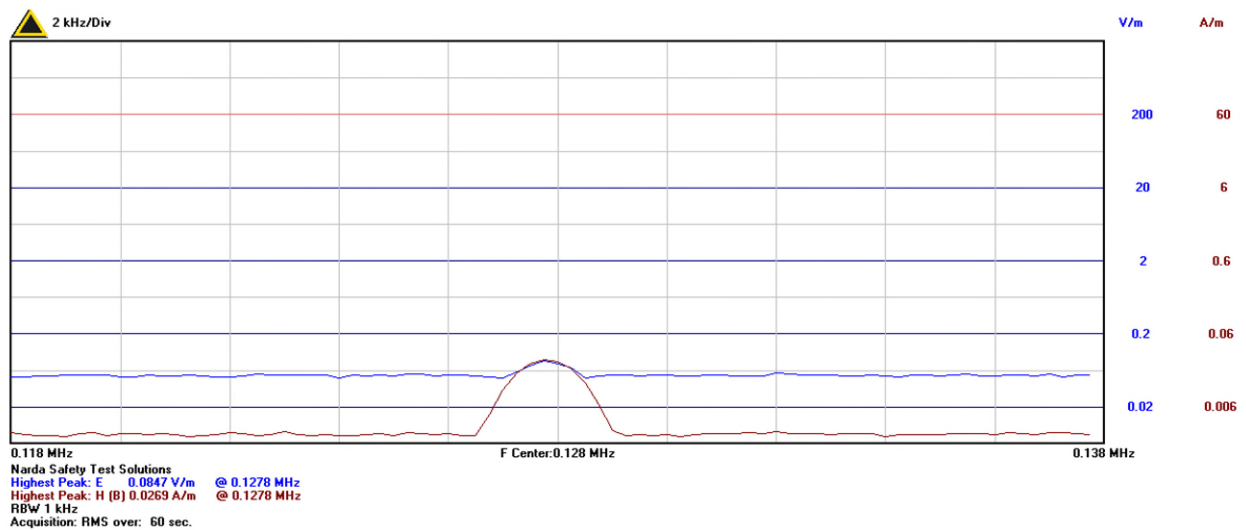
- (1) The power transfer frequency is below 1 MHz.
- (2) The output power from each transmitting element (e.g., coil) is less than or equal to 15 watts.
- (3) A client device providing the maximum permitted load is placed in physical contact with the transmitter (i.e., the surfaces of the transmitter and client device enclosures need to be in physical contact)
- (4) Only § 2.1091-Mobile exposure conditions apply (i.e., this provision does not cover § 2.1093-Portable exposure conditions).
- (5) The E-field and H-field strengths, at and beyond 20 cm surrounding the device surface, are demonstrated to be less than 50% of the applicable MPE limit, per KDB 447498, Table 1. These measurements shall be taken along the principal axes of the device, with one axis oriented along the direction of the estimated maximum field strength, and for three points per axis or until a 1/d (inverse distance from the emitter structure) field strength decay is observed. Symmetry considerations may be used for test reduction purposes. The device shall be operated in documented worst-case compliance scenarios (i.e., the ones that lead to the maximum field components), and while all the radiating structures (e.g., coils or antennas) that by design can simultaneously transmit are energized at their nominal maximum power.
- (6) For systems with more than one radiating structure, the conditions specified in (5) must be met when the system is fully loaded (i.e., clients absorbing maximum power available), and with all the radiating structures operating at maximum power at the same time, as per design conditions. If the design allows one or more radiating structures to be powered at a higher level while other radiating structures are not powered, then those cases must be tested as well. For instance, a device may use three RF coils powered at 5 W, or one coil powered at 15 W: in this case, both scenarios shall be tested.

5 Evaluations

5.1 Analysis of RF Exposure

The EUT is classified as an automotive wireless charging pad, categorized as a mobile device necessitating a minimum separation distance exceeding 20 cm. In compliance with section 3.2 of FCC KDB 680106 D01 v04, the EUT must adhere to the stipulated limits of 614 V/m for the electric field and 1.63 A/m for the magnetic field, applicable to devices operating with a fundamental radio frequency range between 100 kHz and 300 kHz.

The field strength measurements were carried out using a field probe, which was placed 20 cm from the device's edge.



The EUT meets the RF exposure limits of 614 V/m for the electric field and 1.63 A/m for the magnetic field, as outlined in Table 1 of Section 1.1310.

5.2 Verdict

The Equipment Under Test (EUT) meets all six criteria necessary for an Equipment Compliance Review (ECR) exemption as outlined in Section 5.2 of FCC KDB 680106 D01 Wireless Power Transfer v04. For further details on the EUT, please refer to the document titled **Wireless Charger Assembly 12V Automotive System Application Qi 1.3 Wireless Charger Specification**, issued by Amphenol Tecvox.

(1) Power Transfer Frequency:

The EUT is designed in compliance with the Wireless Power Consortium (WPC) Qi 1.3.3 standard, which includes power transfer operations in a frequency range below 1 MHz.

(2) Output Power:

As stated in the functional specifications, the EUT provides a maximum output power of 15W to client devices, meeting the $\leq 15W$ per transmitting element requirement.

(3) Physical Contact:

The EUT is specified for use with Qi-compatible devices such as mobile phones, which are placed in direct physical contact with the charging pad during operation.

(4) Mobile Exposure Conditions:

The operational description specifies that the EUT is intended for installation in the lower center console of a vehicle's dash. This location is expected to maintain a 20 cm separation from users under typical use, aligning with Mobile exposure conditions per 47 CFR § 2.1091.

(5) Field Strength Limits:

The Equipment Under Test (EUT) includes built-in safety features, including hardware-based over-current and over-temperature protection, as well as Foreign Object Detection (FOD), which collectively help to regulate field strengths. Testing verifies that E-field and H-field strengths at 20 cm and beyond remain below 50% of the applicable Maximum Permissible Exposure (MPE) limit, as specified in FCC KDB 447498, Table 1.

The MPE limits are determined according to the guidelines in FCC KDB 447498. For frequencies between 100 kHz and 300 kHz, the MPE limits are consistent with those at 300 kHz. Specifically, these limits are as follows:

- **Electric Field Strength (E): 614 V/m**
- **Magnetic Field Strength (H): 1.63 A/m**

These values are derived from Table 1 of Section 1.1310(e)(1) of the FCC rules. (As per FCC §2.1091 – MAXIMUM PERMISSIBLE EXPOSURE (MPE), the MPE limits between 100 kHz and 300 kHz are the same as those at 300 kHz, i.e., 614 V/m and 1.63 A/m.)

For detailed measurement results, please refer to Section 5.1, **Analysis of RF Exposure** in this report, which fulfills the necessary requirements.

(6) Testing for Multiple Radiating Structures:

The EUT features a wireless charging triple-coil design with ferrite backing, specified as a 15W structure in the operational description. Testing was conducted with one of the coils operating at maximum power, including worst-case scenarios, to verify compliance with the specified limits for multiple radiating structures, as required.

6 Revision History

Date	Report Name	Changes to report	Prepared by
2024-10-21	EMC_AMPHT_006_24001_FCC_RF_Exposure	Initial Release	Cheng Song
2024-10-31	EMC_AMPHT_006_24001_FCC_RF_Exposure_Rev1	- Added section 4.3 - Added section 5.2	Cheng Song

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