Response to Inquiry to FCC (Tracking Number 145521)

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To: liepa@umich.edu

Wed, Aug 28, 2013 at 3:08 PM

Office of Engineering and Technology

Inquiry on 07/23/2012 :

Inquiry:

i.

Complete Product Description

The device being submitted, the Wireless Charging System (WCS)
is a transmitter base designed to be used as an OEM installed wireless charger
in a motor vehicle and uses magnetic inductive coupling to transfer energy from
itself to a compatible, portable receiving device, such as a cellular phone. The transmitting device is based upon the Powermat
Dual Mode wireless charging consumer product, but will work with both Powermat
and WPC (Wireless Power Consortium) compliant receivers. The receiver is a passive transponder that
does not produce power on its own. The WCS
is designed to work in close proximity to the receiving device (7 mm gap
between coils and 12 mm offset between coil centers). The gap between transmitter and receiver
coils will be occupied by housing or vehicle plastic material.

The charger is designed to be compatible with WPC protocols,
but WPC certification may not be applied for in the automotive applications.

Load detection is performed via a low amplitude pulse. The transmitter primary coil voltage/current is monitored to detect a change in the amplitude, indicating the presence of an object in proximity to the charging surface.

Once an object is detected, an identification burst of energy is radiated to charge the circuit in the receiver and a response is queried to determine if the object is a compatible device to be charged.

Client registration is determined and established either by WPC protocol for WPC compliant devices, or by recognition of response signature from Powermat compatible devices.
Communication is achieved by modulation of the reflected impedance by the receiver circuit.

Upon confirmation of compatible object, charging commences until the device terminates the charging mode or is removed. Power transfer is controlled through the receiver monitoring the voltage across the load and sending control error values (WPC) or power change requests (PM).

The charging pad enters standby upon application of 12V
input power and the absence of a device on the charging surface. The presence of a compatible device and input power will initiate charging mode.

Charging completion is determined via an End of Charge
message from the receiver to the transmitter.
The receivers monitor the charge state via different methods/algorithms
depending on WPC or Powermat architecture and OEM design. The charging power is variable, depending on the control point error message or power change request from the device.

ii.

Rule Part(s) the Device will Operate in and the Reasoning

for Rule Part(s);

15c: Device is an
intentional radiator for the purpose of transferring power to a compatible
receiver and uses unbounded
electromagnetic fields. Electromagnetic
field is adjusted to meet load demand as requested by the receiver, hence there is communication between the devices.

iii.

Planned Equipment Authorization Procedure

Certification under Part 15.209; testing and submission by University of Michigan.

iv.

Drawings, Illustrations

System Block Diagram:

WCS Module

v.

Frequencies

110k – 205k Hz

vi.

Radiated Power

The transmitter is designed to transfer up to 5W of charging power to the receiver; measured radiated field is 5dBµV/m at 300 m.

vii.

Operating Configurations

The transmitter is designed to work with a single receiver and may be oriented horizontally, with the receiver on top, or vertically, with the receiver held in place.

viii.

Conditions for Human Exposure

Effective EIRP is -50dBm. Hence, further consideration of human exposure limit is not applicable.

ix.

Operating Configurations for Different Charging Devices

The WCS is designed to work with only personal communication devices that use either Powermat or WPC protocols.

–-Reply from Customer on 07/25/2012-–

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FCC response on 08/01/2012

1) The Block Diagram and WCS Module exhibits are not accessible. Please upload the exhibits to the KDB system.

2) We are in the process of refining our policies on authorization of wireless chargers. Depending on the operating configurations, wireless charging devices may be approved under FCC Rule Parts 15, 18 or both. Systems that use load impedance changes or equivalent methods on the client device at the fundamental charging frequency for load management functions may be authorized under Part 18. The load modulation must be integral to charging system power management and control, and must be used only to the extent necessary to enable safe and efficient operation such as rapid shut-down in response to over-voltage conditions and identification of invalid devices. For devices authorized under Part 18 such load modulation may not be used to communicate any other information, such as prioritization of devices for charging and the transfer of data, for example images or music. For such designs, both Part 15 and Part 18 requirements must be satisfied for equipment approval. Similarly, devices that use a secondary frequency for load management and data functions must be authorized according to both Part 15 and Part 18 requirements.

3) You have indicated that the DUT is intended to be compatible with clients that use both WPC and Powermat protocols. The WPC protocols as presently defined meet the above criteria and, absent ancillary communications, a charging pad compliant with WPC can be authorized under Part 18.

4) Minimal information on the charging protocol employed by Powermat has been submitted to the FCC. Please provide a complete description of the charging protocol including:

a) The frequency range used for charging

b) The frequency range used for communication (if not it is not on the fundamental charging frequency)

c) How load detection is performed

d) How communication is established

e) How registration is determined and established

f) What conditions put the pad in standby and charging modes, how charging is monitored and controlled

g) How charging completion is determined and if the charging power is constant or variable.

5) Although categorically excluded from routine RF exposure evaluation, Part 18 devices are not exempted from RF exposure compliance. SAR and MPE limits do not cover the frequency range for this wireless charger; therefore, RF exposure compliance will need to be determined with

respect to 1.1307 (c) and (d) of the FCC rules. The emissions should be within the limits at 300 kHz in Table 1 of 1.1310 (using the 300 kHz limits for 100 kHz).

Based on the design and implementation of the wireless charging application, it must be clearly identified if mobile or portable RF exposure conditions apply. The installation location in vehicle applications will establish the separation distance between the device and the operator or passengers, and determine whether mobile or portable exposure conditions apply.

---Reply from Customer on 08/19/2013---

Our apologies for the delay in responding to the request in this inquiry. The client's production plans for the product were in question for many months. Please find attached a document from our client summarizing the inquiry and addressing the questions raised at the end of the document.

Thank you.

FCC response on 08/28/2013

Based upon the information submitted and prior correspondence with the FCC, your device would fall under guidance provided by the attached KDB 680106 D01 RF Exposure Wireless Charging Apps v02 and would qualify for approval under 47 CFR Part 18.

Furthermore, based upon the automotive application of the device, it is understood that such a configuration would not maintain a minimum separation distance of 20 cm between the user and the device. Devices conforming to such parameters are subject to the evaluation regulations described 47 CFR 2.1093. Per KDB 680106 Paragraph 3, such evaluations must be carried out under maximum power transfer conditions and may consist of a combination of analytical analysis, field strength, radiated and conducted power measurements, and limited numerical modeling. For the operational frequencies of this device, all emissions should be within the 300kHz limits shown in 47 CFR 1.1310.

Please note that the EUT may be excluded from submitting a RF exposure evaluation if the criteria described in KDB 680106 Paragraph 5.2 are met.

Attachment Details:

KDB680106 D01 RF Exposure Wireless Charging Apps v02

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pertaining to this inquiry.