

**IN THE UNITED STATES DISTRICT COURT
FOR THE DELAWARE**

MAGNACHARGE LLC

Plaintiff,

v.

T-MOBILE USA, INC.,

Defendant.

Civil Action No. _____

JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff Magnacharge LLC (“Magnacharge” or “Plaintiff”), for its Complaint against Defendant T-Mobile USA, Inc., (“T-Mobile” or “Defendant”), alleges the following:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the Patent Laws of the United States, 35 U.S.C. § 1 *et seq.*

THE PARTIES

2. Plaintiff Magnacharge is a limited liability company organized under the laws of the State of Texas with a place of business at 10 Ballingomingo Road, Bldg. P., Conshohocken, Pennsylvania.

3. Upon information and belief, T-Mobile is a corporation organized and existing under the laws of the State of Delaware, with a place of business at 824 N Market Street & E 9th Street, Wilmington, DE 19801, and can be served through its registered agent, Corporation Service Company at 251 Little Falls Drive, Wilmington, DE 19808.

4. Upon information and belief, Defendant sells and offers to sell products and services throughout the United States, including in this judicial district, and introduces products

and services that into the stream of commerce and that incorporate infringing technology knowing that they would be sold in this judicial district and elsewhere in the United States.

JURISDICTION AND VENUE

5. This is an action for patent infringement arising under the Patent Laws of the United States, Title 35 of the United States Code.

6. This Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

7. Venue is proper in this judicial district under 28 U.S.C. § 1400(b). On information and belief, Defendant is a legal entity formed and existing under the laws of the State of Delaware.

8. On information and belief, Defendant is subject to this Court's general and specific personal jurisdiction because Defendant has sufficient minimum contacts within the State of Delaware and this District, pursuant to due process and/or the Del. Code. Ann. Tit. 3, § 3104, because Defendant purposefully availed itself of the privileges of conducting business in the State of Delaware and in this District, because Defendant regularly conducts and solicits business within the State of Delaware and within this District, and because Plaintiffs' causes of action arise directly from each of Defendant's business contacts and other activities in the State of Delaware and this District. Further, this Court has personal jurisdiction over Defendant because it has purposely availed itself of the privileges and benefits of the laws of the State of Delaware.

BACKGROUND

The Invention

9. Jin-Sun Kim and Young-Jun Kim are the inventors (hereinafter "the Inventors") of U.S. Patent No. 7,417,402 ("the '402 patent"). A true and correct copy of the '402 patent is attached hereto as Exhibit A.

10. The '402 patent resulted from the pioneering efforts of the Inventors in the area of non-contact, magnetic field battery charging. These efforts resulted in the development of a novel method and apparatus for non-contact type battery pack charging for which a patent application was originally filed in Korea in 2002. At the time of these pioneering efforts, the most widely implemented technology used to address battery charging for rechargeable electronic devices was a technology in which the charging terminals of a battery pack come in electrical contact with the charging terminals of a battery pack charging apparatus. In that type of system, as explained in the '402 patent:

. . . the charging of the battery pack is possible only when the terminals of the battery pack and the battery pack charging apparatus come in correct electrical contact with each other, so that the use of the contact type battery pack charging apparatus is considerably inconvenient. Furthermore, the positions of the charging terminals of the battery pack and the battery pack charging apparatus must be changed according to the various designs of potable [*sic*] devices including potable [*sic*] terminals, so that a problem arises in that dedicated battery pack charging apparatuses corresponding to the locations of the charging terminals of the battery pack.

To solve the problems, a non-contact type battery pack charging apparatus using a magnetic field is provided, as disclosed in Korean Pat. Appl. No. 1999-53492 and Korean Utility Model No. 2001-27153.

However, in Korean Pat. Appl. No. 1999-53492 and Korean Utility Model No. 2001-27153, a provision for satisfactorily charging battery packs having different charge capacities for a set time is not made, so that a problem arises in that the battery pack charging apparatuses corresponding to the charge capacities must be provided.

Furthermore, even though an inductive load (conductive material) other than a capacitive load is installed on the battery pack charging apparatus, the conventional non-contact type battery pack charging apparatus regards the inductive load as a capacitive load and performs charging operations, so that a problem arises in that unnecessary power consumption is incurred.

. . . Accordingly, the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a non-contact type battery pack charging apparatus, which is capable of satisfactorily charging various battery packs having different charge capacities for

an appropriate time and preventing unnecessary power consumption incurred by an inductive load.

(See Exhibit A, '402 patent at 1:23-50.)


11. The Inventors conceived of the inventions claimed in the '402 patent as a way to address the aforementioned drawbacks of the prior art. As explained in the '402 patent:

. . . the present invention has been made keeping in mind the above problems occurring in the prior art, and an object of the present invention is to provide a non-contact type battery pack charging apparatus, which is capable of satisfactorily charging various battery packs having different charge capacities for an appropriate time and preventing unnecessary power consumption incurred by an inductive load.

(See Exhibit A, '402 patent at 1:54:60.)

Commercial Adoption

12. Because of the significant advantages that can be achieved through the use of the claimed innovations, the '402 patent presents significant commercial value for, and usage by, companies like Defendant.

13. Indeed, the claimed innovations are so substantial that these ideas were implemented through an industry standard that evolved and gained widespread commercial use over the last decade and was adopted by Defendant for certain of its devices. This industry standard, known as “Qi” (), is an open, universal wireless charging standard for interoperability across rechargeable electronic devices (hereinafter “the Qi Standard”). (See Exhibit B, Wireless Power Consortium Press Release, “WIRELESS POWER CONSORTIUM ADDS LEADING TECHNOLOGY BRANDS, SIGNALS FURTHER MOMENTUM FOR GLOBAL ADOPTION OF QI STANDARD”, Published on Jul 16, 2010; also available online at: https://www.wirelesspowerconsortium.com/data/downloadables/1/7/9/wpc_pr7_3dec09_english.pdf.)

14. The Qi Standard is the result of an effort by the Wireless Power Consortium (“WPC”), “an open, collaborative standards development group of more than 570 company members around the globe,” established in 2008. (See Exhibit C, Wireless Power Consortium Press Release, “Consumer Adoption, Interest in Wireless Charging Continues to Surge, New International Survey Shows”, Published on June 19, 2018; also available online at: <https://www.wirelesspowerconsortium.com/data/downloadables/2/0/6/1/consumer-adoption-interest-in-wireless-charging-continues-to-surge-new-international-survey-shows.pdf>.) The WPC mission is to create and promote wide market adoption of the Qi Standard. (Exhibit B at p. 2.)

15. The Qi Standard parts applicable to this action are reflected in documents titled: (1) “The Qi Wireless Power Transfer System - Power Class 0 Specification - Parts 1 and 2: Interface Definitions,” as shown in Version 1.2.2, dated April 2016 (hereinafter “**Qi Parts 1 & 2**”; a PDF copy of which was available online at the time of filing at: <http://www.zoop-tech.com/download/info/31.html>); and (2) “The Qi Wireless Power Transfer System - Power Class 0 Specification – Part 4: Reference Designs,” as shown in Version 1.2.2, dated April 2016 (hereinafter “**Qi Part 4**”; a PDF copy of which was available online at the time of filing at: <http://gbtp.or.kr/wireless/upload//20171110025634271.pdf>).

COUNT I – INFRINGEMENT OF U.S. PATENT NO. 7,417,402

16. The allegations set forth in the foregoing paragraphs are incorporated into this First Claim for Relief.

17. On August 26, 2008, the ’402 patent was duly and legally issued by the United States Patent and Trademark Office under the title “Non-contact type battery pack charging apparatus.”

18. Magnacharge is the assignee and owner of the right, title and interest in and to the '402 patent, including the right to assert all causes of action arising under said patent and the right to any remedies for infringement of it.

19. Upon information and belief, Defendant has and continues to directly infringe one or more claims of the '402 patent by selling, offering to sell, making, and/or importing: (i) non-contact type battery pack chargers that operate according to the Qi Standard, which chargers by way of example include: the Belkin Boost Up 5W Pad <https://www.t-mobile.com/accessory/belkin-boost-up-5w-pad?sku=TMOM61272> (“...Qi Wireless Charging Pad . . . ”); mophie charge force desk mount <https://www.t-mobile.com/accessory/mophie-charge-force-desk-mount?sku=SUPM49312> (“...touch your mophie case with charge force wireless power to the mount...”); http://www.mophie.com/cms/files/support/3453_WRLS-DESK-BLK_Online-User-Manual_ENG_RevA_052716.pdf (“Do not attempt to use the charge force desk mount with wireless-charging devices that are not Qi-compatible”); Belkin Boost Up 10W Wireless Charging Stand <https://www.t-mobile.com/accessory/belkin-boost-up-10w-wireless-charging-stand?sku=TMOM61098>, (“Optimized for Qi smartphones”); as well as (ii) mobile devices configured to be chargeable by non-contact charging means according to the Qi Standard, which devices by way of example include: the Apple iPhone XS Max <https://www.t-mobile.com/cell-phone/apple-iphone-xs-max?sku=190198786401>; (“Wireless charging . . . works with Qi chargers”) <https://www.apple.com/iphone-xs/specs/>; Apple iPhone XS <https://www.t-mobile.com/cell-phone/apple-iphone-xs?sku=190198793911> (“Wireless charging . . . works with Qi chargers”) <https://www.apple.com/iphone-xs/specs/>; Apple iPhone XR <https://www.t-mobile.com/cell-phone/apple-iphone-xr?sku=190198778079> (“Wireless charging . . . works with Qi chargers”) <https://www.apple.com/iphone-xr/specs/>; LG G8 ThinQ™

<https://www.t-mobile.com/cell-phone/lg-g8-thinq?sku=610214660381>,
https://www.uscellular.com/uscellular/pdf/LG_G8_userManual.pdf (“This product supports wireless charging. Use a WPC (Qi) certified wireless charger (sold separately) to charge the product”); LG G7 ThinQ <https://www.t-mobile.com/cell-phone/lg-g7-thinq?sku=610214656797>, <https://support.t-mobile.com/docs/DOC-37576> (“This product supports wireless charging. Use a WPC (Qi) certified wireless charger (sold separately) to charge the product.”); Apple iPhone 8 <https://www.t-mobile.com/cell-phone/apple-iphone-8?sku=190198451972> (“Charges wirelessly”) <https://www.apple.com/iphone-8/specs/>, (“Wireless charging (works with Qi-certified chargers10)”); such chargers and mobile devices collectively referred to herein as the “Accused Instrumentalities”.

20. In view of the following, the Accused Instrumentalities infringed and continue to infringe claim 1 of the '402 patent during the pendency of the '402 patent.

21. Upon information and belief, the Accused Instrumentalities are non-contact type battery pack charging apparatuses.

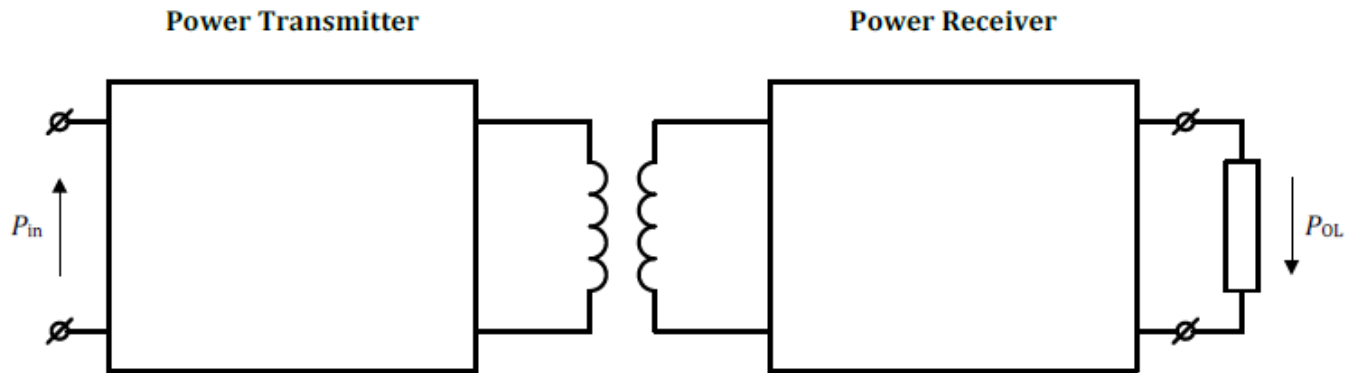
22. Upon information and belief, the Accused Instrumentalities include an apparatus with a power control unit for supplying Direct Current (DC) power to a main control unit and a variable-voltage frequency generation unit.

23. Specifically, Section 1.5 of **Qi Parts 1 & 2** defines a “Power Transmitter,” as “[t]he subsystem of a Base Station that generates near field inductive power and controls its transfer to a Power Receiver, as defined in The Qi Wireless Power Transfer System, Power Class 0 Specification.” (*Id.* at p. 13.) Moreover, Section 8 of the **Qi Parts 1 & 2** describes Figure 43 (reproduced below) as “a schematic diagram of a wireless power transfer System, consisting of a Power Transmitter coupled to a Power Receiver. As illustrated, P_{in} represents the DC input

power to the (inverter stage of the) Power Transmitter, and P_{OL} represents the amount of DC power that is consumed in the load that is connected to the output terminals of the Power Receiver. The system efficiency is defined as:”

$$\eta_{\text{system}} = \frac{P_{OL}}{P_{in}}$$

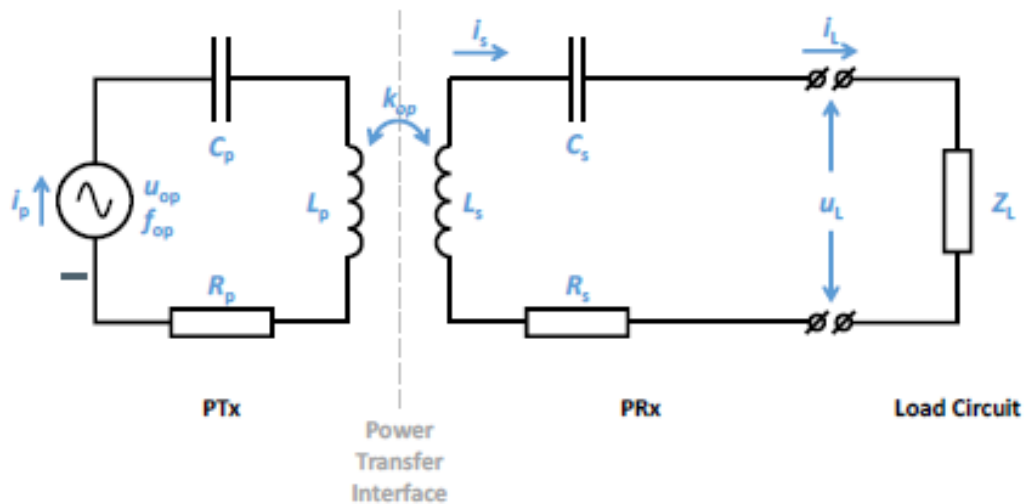
Figure 43. System efficiency



24. Upon information and belief, the Accused Instrumentalities include an apparatus wherein the variable-voltage frequency generation unit converts the DC power supplied from the power control unit into a frequency having an arbitrary voltage value and outputs the frequency to a magnetic field generation unit under the control of the main control unit.

25. Specifically, Section 3.2.4 of **Qi Parts 1 and 2** recites, that “[t] The Power Transmitter consists of a power source (u_{op} , f_{op}), a capacitance C_p , an inductance L_p , and a resistance R_p . The power source supplies a sinusoidal voltage u_{op} at a frequency f_{op} ”. (See **Qi Parts 1 and 2** at p. 36.) Section 3.2.4 also illustrates, through Figure 10 reproduced below, “a simplified model of the system” intended by the Qi Standard. (*Id.*)

Figure 10. Simplified system model



(*Id.*) As noted above, Section 1.5 of **Qi Parts 1 & 2** defines a “Power Transmitter,” as “[t]he subsystem of a Base Station that generates near field inductive power and controls its transfer to a Power Receiver . . .” (*Id.* at p. 13.)

26. Upon information and belief, the Accused Instrumentalities include an apparatus wherein the magnetic field generation unit receives the frequency output from the variable-voltage frequency generation unit and radiates a magnetic force corresponding to the frequency to the outside.

27. Specifically, Section 1.3 of **Qi Parts 1 and 2** describes among the Main Features, “[a] method of contactless power transfer from a Base Station to a Mobile Device that is based on near field magnetic induction between coils”. (*See Qi Parts 1 and 2* at p. 9.) Section 1.5 of **Qi Parts 1 and 2** defines “Active Area” as “[t]he part of the Interface Surface of a Base Station or Mobile Device through which a sufficiently high magnetic flux penetrates when the Base Station is providing power to the Mobile Device,” and “Primary Cell” as “[a] single Primary Coil or a combination of Primary Coils that are used to provide a sufficiently high magnetic flux through the Active Area” and “Primary Coil” as “[a] component of a Power Transmitter that converts electric current to magnetic flux..” (*Id.* at pp. 11 and 13.)

28. Upon information and belief, the Accused Instrumentalities include an apparatus wherein a voltage comparison unit detects a voltage value input to the magnetic field generation unit and a voltage value of the magnetic field generation unit, to compare the voltage values with each other, and outputs a voltage comparison value to the main control unit.

29. Specifically, Section 5.1.1 of **Qi Parts 1 and 2** explains that:

[u]sing the desired Control Point and actual Control Point, the Power Receiver calculates a Control Error Value—for example, by simply taking the (relative) difference of the two output voltages or currents. . . . Subsequently, the Power Receiver transmits this Control Error Value to the Power Transmitter. . . . The Power Transmitter uses the Control Error Value and the actual Primary Cell current to determine a new Primary Cell current. After the system stabilizes from the communications of the Control Error Packet, the Power Transmitter has a short time window to control its actual Primary Cell current towards the new Primary Cell current. Within this window, the Power Transmitter reaches a new Operating Point: the amplitude, frequency, and duty cycle of the AC voltage that is applied to the Primary Cell.

(*Id* at p. 45-46.) The voltage comparison unit concept is illustrated in the functional block diagrams for the Baseline and Extended Power Profile Power Receivers of Figures 4 and 5 in **Qi Parts 1 and 2**, reproduced below.

Figure 4. Functional block diagram for a Baseline Power Profile Power Receiver

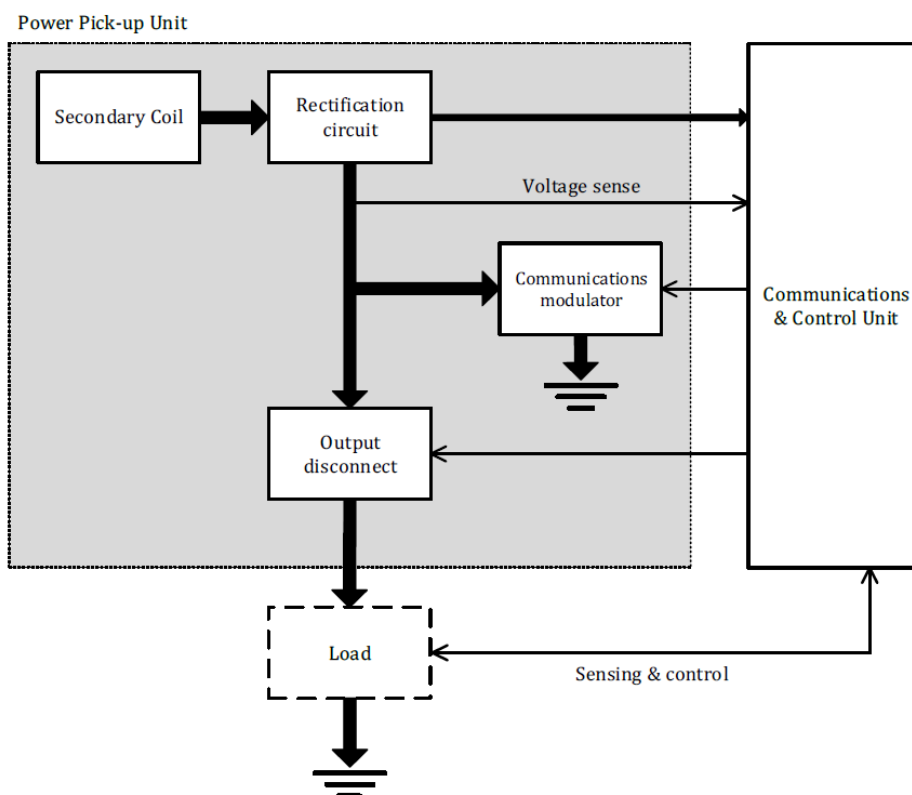
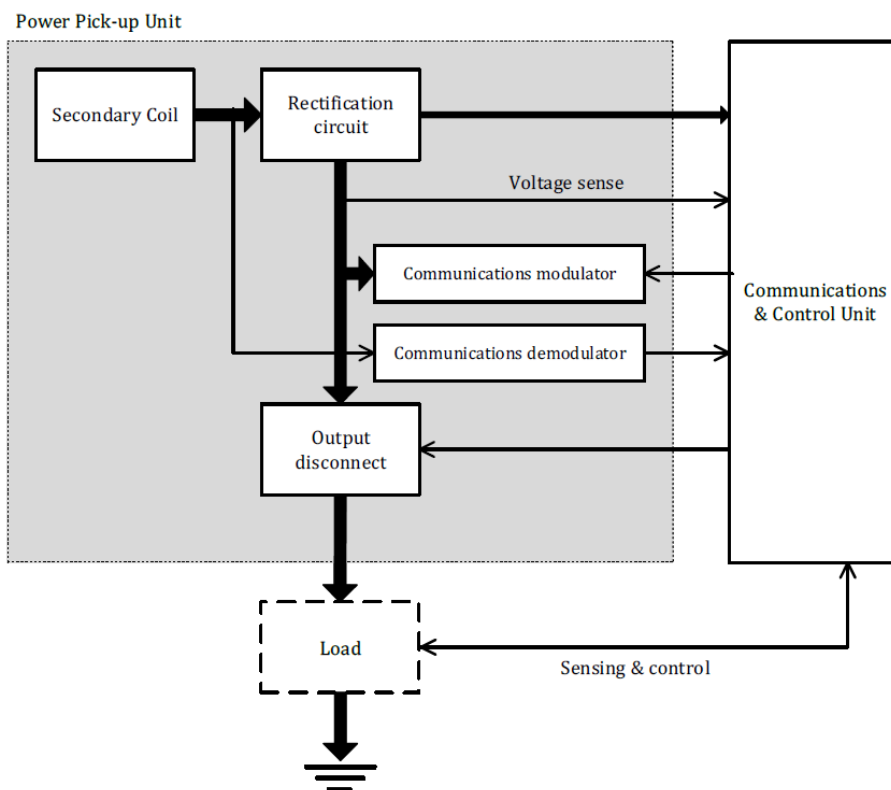
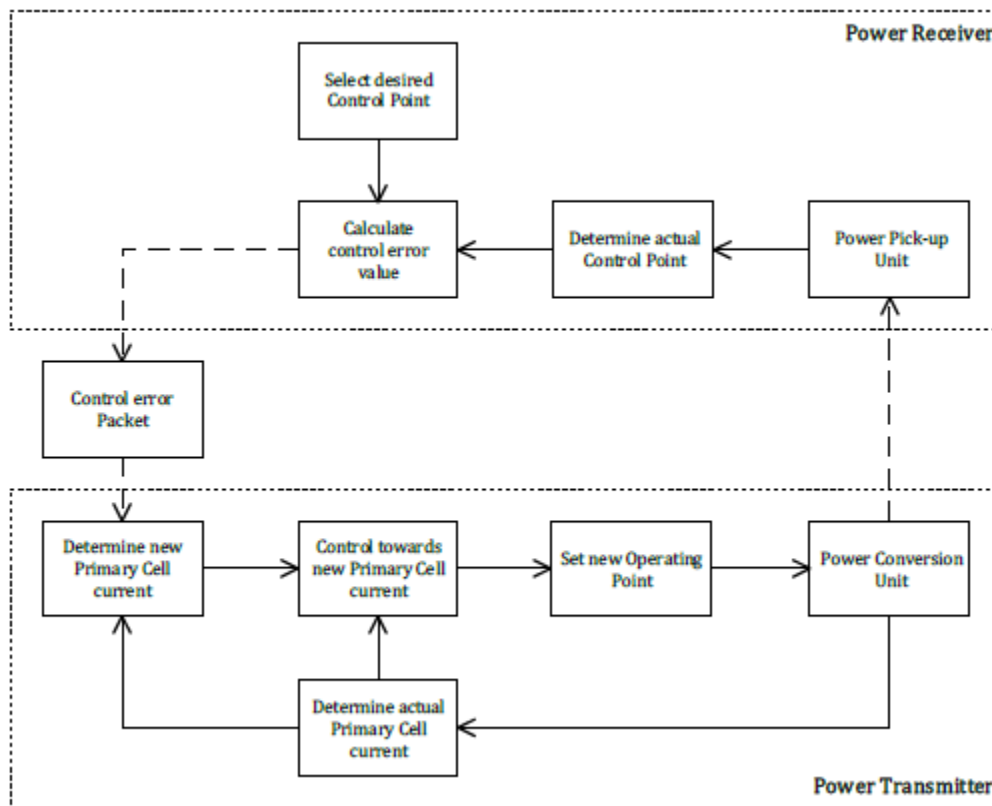


Figure 5. Functional block diagram for an Extended Power Profile Power Receiver



(**Qi Parts 1 and 2** at pp. 23, 25.) The voltage comparison unit is also illustrated through the power transfer loop of Figure 17 in **Qi Parts 1 and 2**, reproduced here:



(**Qi Parts 1 and 2** at p. 46.)

30. Upon information and belief, the Accused Instrumentalities include an apparatus wherein a current comparison unit detects the voltage value input to the magnetic field generation unit and the voltage value of the magnetic field generation unit, converts the voltage values into current values, compares the current values with each other, and outputs a current comparison value to the main control unit.

31. Specifically, as noted above, Section 3.1.4 of **Qi Parts 1 and 2** explains the calculation of a “Control Error Value—for example, by simply taking the (relative) difference of the two output voltages or currents. . . . Subsequently, the Power Receiver transmits this Control Error Value to the Power Transmitter. . . . The Power Transmitter uses the Control Error

Value and the actual Primary Cell current to determine a new Primary Cell current.” (**Qi Parts 1 and 2** at pp. 45-46.)

32. Upon information and belief, the Accused Instrumentalities include an apparatus wherein a voltage detection unit detects a voltage value output from the variable-voltage frequency generation unit and outputs the voltage value to the main control unit.

33. Specifically, Section 5.1.1 of **Qi Parts 1 and 2** explains that “[t]he Power Transmitter uses the Control Error Value and the actual Primary Cell current to determine a new Primary Cell current.” (**Qi Parts 1 and 2** at p. 46.) Section 5.2.1 of **Qi Parts 1 and 2** further explains that “[t]he Power Transmitter detects this as a modulation of the current through and/or voltage across the Primary Cell.” (**Qi Parts 1 and 2** at p. 84.)

34. Upon information and belief, the Accused Instrumentalities include an apparatus wherein a current detection unit detects a voltage value of the magnetic field generation unit, converts the voltage value into a current value, and outputs the current value to the main control unit.

35. Specifically, as noted above, Section 5.1.1 of **Qi Parts 1 and 2** explains that “[t]he Power Transmitter uses the Control Error Value and the actual Primary Cell current to determine a new Primary Cell current.” (**Qi Parts 1 and 2** at p. 46.) Section 5.2.1 of **Qi Parts 1 and 2** further explains that “[t]he Power Transmitter detects this as a modulation of the current through and/or voltage across the Primary Cell.” (**Qi Parts 1 and 2** at p. 84.)

36. Upon information and belief, the Accused Instrumentalities include an apparatus wherein the main control unit receives signals output from the current comparison unit, the voltage comparison unit, the voltage detection unit and the current detection unit and controls the operations of the variable-voltage frequency generation unit.

37. Specifically, Section 1.5 (Definitions) of **Qi Parts 1 and 2** defines the “Communications and Control Unit” as “[t]he functional part of a Power Transmitter or Power Receiver that controls the power transfer,” and the “Power Transmitter” as “[t]he subsystem of a Base Station that generates near field inductive power and controls its transfer to a Power Receiver . . .” (**Qi Parts 1 and 2** at pp. 11, 13.) Moreover, Section 3.2.4 (Power Receiver over-voltage protection) explains that “[t]he Power Transmitter controls the amount of power it transfers by adjusting the amplitude of its voltage and frequency in the ranges given in Table 7.” (**Qi Parts 1 and 2** at p. 35.)

38. In view of the following, the Accused Instrumentalities infringed and continue to infringe claim 2 of the '402 patent during the pendency of the '402 patent.

39. Upon information and belief, the Accused Instrumentalities include a non-contact type battery pack charging apparatus meeting the limitations of claim 1 as described above.

40. Upon information and belief, the Accused Instrumentalities include an apparatus wherein the main control unit is connected with a battery pack detection unit for detecting whether the battery pack is installed.

41. Specifically, Section 5.1.1 (Information interface - Overview) of **Qi Parts 1 and 2** explains a “selection” phase in which “the Power Transmitter typically monitors the Interface Surface for the placement and removal of objects. The Power Transmitter may use a variety of methods for this purpose. See Section 10, Object Detection (Informative) for some examples. If the Power Transmitter discovers one or more objects, it should attempt to locate those objects—in particular if it supports Free Positioning. In addition, the Power Transmitter may attempt to differentiate between Power Receivers and Foreign Objects, such as keys, coins, etc.” (*See Qi Parts 1 and 2* at p. 44.)

42. In view of the following, the Accused Instrumentalities infringed and continue to infringe claim 4 of the '402 patent during the pendency of the '402 patent.

43. Upon information and belief, the Accused Instrumentalities include a non-contact type battery pack charging apparatus meeting the limitations of claim 1 as described above.

44. Upon information and belief, the Accused Instrumentalities include an apparatus wherein the main control unit is connected with an operational status display unit for allowing a user to be aware of operational status of the battery pack charging apparatus.

45. Specifically, Section 5.2.3.5 (Charge Status Packet) of **Qi Parts 1 and 2** explains a "Charge Status Value" wherein, "[i]f the Mobile Device contains a rechargeable energy storage device, the unsigned integer contained in this field indicates the charging level of that energy storage device as a percentage of the fully charged level." (See **Qi Parts 1 and 2** at p. 93.)

46. In view of the following, the Accused Instrumentalities infringed and continue to infringe claim 5 of the '402 patent during the pendency of the '402 patent.

47. Upon information and belief, the Accused Instrumentalities include a non-contact type battery pack charging apparatus meeting the limitations of claim 4 as described above.

48. Upon information and belief, the Accused Instrumentalities include an apparatus wherein the operational status display unit includes an abnormal status display unit for displaying operating errors of the battery pack charging apparatus and a charging status display unit for displaying whether charging of the battery pack is being performed or is complete when the battery pack charging apparatus is normally performed.

49. Specifically, Section 5.2.3.5 (Charge Status Packet) of **Qi Parts 1 and 2** further clarifies, with respect to a "Charge Status Value," that "the value 0 means an empty energy storage device and the value 100 means a fully charged energy storage device." (See **Qi Parts 1**

and 2 at p. 93.) Qi Parts 1 and 2 further explains, in Section 5.1.2.3, that “if the Power Transmitter does not receive a Packet correctly (see Section 5.2.2.4, Packet structure), the Power Transmitter shall remove the Power Signal within $t_{\text{terminate}}$ after detecting the error.” (**Qi Parts 1 and 2** at p. 53.) In addition, Section 5.2.3.2 of **Qi Parts 1 and 2** provides Table 29 – End Power Transfer values, wherein the “Charge Complete” reason is recommended for usage with Value 0x01 “if it determines that the battery of the Mobile Device is fully charged. On receipt of an End Power Transfer Packet containing this value, the Transmitter should set any ‘charged’ indication on its user interface that is associated with the Receiver.” (**Qi Parts 1 and 2** at p. 91.)

50. Magnacharge has been harmed by the Defendant’s infringing activities.

JURY DEMAND

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, Magnacharge demands a trial by jury on all issues triable as such.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff Magnacharge demands judgment for itself and against Defendant as follows:

- A. An adjudication that the Defendant has infringed the ’402 patent;
- B. An award of damages to be paid by Defendant adequate to compensate Magnacharge for Defendant’s past infringement of the ’402 patent, and any continuing or future infringement through the date such judgment is entered, including interest, costs, expenses and an accounting of all infringing acts including, but not limited to, those acts not presented at trial;
- C. A declaration that this case is exceptional under 35 U.S.C. § 285, and an award of Magnacharge’s reasonable attorneys’ fees; and
- D. An award to Magnacharge of such further relief at law or in equity as the Court deems just and proper.

Dated: August 23, 2019

DEVLIN LAW FIRM LLC

/s/ James M. Lennon

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