

**UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF MICHIGAN  
SOUTHERN DIVISION**

SCRAMOGE TECHNOLOGY LTD.,

Plaintiff,

v.

VOLKSWAGEN GROUP OF  
AMERICA, INC.,

Defendant.

Case No. 2:22-cv-10730-GAD-APP

**JURY TRIAL DEMANDED**

**AMENDED COMPLAINT FOR PATENT INFRINGEMENT AGAINST  
VOLKSWAGEN GROUP OF AMERICA, INC.**

This is an action for patent infringement arising under the Patent Laws of the United States of America, 35 U.S.C. § 1 *et seq.*, in which Plaintiff Scramoge Technology Limited (“Plaintiff” or “Scramoge”) makes the following allegations against Defendant Volkswagen Group of America, Inc. (“Defendant” or “Volkswagen”):

**INTRODUCTION**

1. This amended complaint arises from Volkswagen’s unlawful infringement of the following United States patents owned by Plaintiff, which relate to improvements in wireless charging of mobile devices: United States Patent Nos.

10,546,685 (“the ’685 Patent”), 10,193,392 (“the ’392 Patent”), 7,825,537 (“the ’537 Patent”), and 10,243,400 (“the ’400 Patent”) (collectively, the “Asserted Patents”).

## **PARTIES**

2. Plaintiff Scramoge Technology Ltd. is a limited liability company organized and existing under the law of Ireland, with its principal place of business at The Hyde Building, Suite 23, The Park, Carrickmines, Dublin 18, Ireland. Scramoge is the sole owner by assignment of all right, title, and interest in the Asserted Patents, including the right to recover damages for past, present, and future infringement.

3. On information and belief, Volkswagen is a corporation organized and existing under the laws of New Jersey, with a corporate headquarters located in Herndon, Virginia. Volkswagen also has a place of business at 3800 Hamlin Rd., Auburn Hills, MI 48326. On information and belief, Defendant Volkswagen of America, Inc. is a wholly owned subsidiary of Volkswagen AG and is responsible for importing, making, marketing, distributing, offering for sale, and selling automotive vehicles and components from Volkswagen-managed brands in the United States. Volkswagen is registered to do business in Michigan and may be served through its resident agent for service of process CSC-Lawyers Incorporating Service, 2900 West Road (Ste 500), East Lansing, MI 48823.

### **JURISDICTION AND VENUE**

4. This action arises under the patent laws of the United States, Title 35 of the United States Code. This Court has original subject matter jurisdiction pursuant to 28 U.S.C. §§ 1331 and 1338(a).

5. This Court has personal jurisdiction over Volkswagen in this action because Volkswagen has committed acts within this District giving rise to this action and has established minimum contacts with this forum such that the exercise of jurisdiction over Volkswagen would not offend traditional notions of fair play and substantial justice. Volkswagen, directly and through subsidiaries or intermediaries, has committed and continues to commit acts of infringement in this District by, among other things, importing, offering to sell, and selling products that infringe the Asserted Patents. Further, this Court has personal jurisdiction over Volkswagen because it is registered to do business in Michigan and has a corporate location in Auburn Hills, MI.

6. Venue is proper in this District under 28 U.S.C. §§ 1391 and 1400(b). Upon information and belief, Volkswagen has transacted business in this District and has committed acts of direct and indirect infringement in this District by, among other things, making, using, offering to sell, selling, and importing products that infringe the Asserted Patents. Volkswagen has a regular and established place of business in this District at 3800 Hamlin Rd., Auburn Hills, MI 48326. Volkswagen.

has also previously agreed that this District is a proper venue. *See StratisAudio, Inc. v. Volkswagen Grp. Of Am., Inc.*, No. 6:20-cv-1131-ADA, Dkt. No. 16 at 5 (W.D. Tex. Feb. 19, 2021).

## COUNT I

### INFRINGEMENT OF U.S. PATENT NO. 10,546,685

7. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

8. Plaintiff owns by assignment all rights, title, and interest, including the right to recover damages for past, present, and future infringement, in U.S. Patent No. 10,546,685, titled “Wireless power transmitting apparatus.” The ’685 Patent was duly and legally issued by the United States Patent and Trademark Office on January 28, 2020. A true and correct copy of the ’685 Patent is attached as Exhibit A.

9. On information and belief, Volkswagen makes, uses, offers for sale, sells, and/or imports certain automobiles with a wireless charger, including without limitation the Volkswagen Antenna Booster (5NA980611) included in the Volkswagen Golf R, Volkswagen Golf GTI, Volkswagen ID.4, Volkswagen Atlas, Volkswagen Atlas Cross Sport, Volkswagen Tiguan, Volkswagen Jetta, Volkswagen Arteon, and Volkswagen Taos (“Accused Products”), that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of

the '685 Patent. Identification of the accused products will be provided in Plaintiff's infringement contentions pursuant to the Court's scheduling order.

10. The Accused Products satisfy all claim limitations of one or more claims of the '685 Patent. A claim chart comparing exemplary independent claim 1 of the '685 Patent to representative Accused Products is attached as Exhibit B.

11. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Volkswagen has injured Plaintiff and is liable for infringement of the '685 Patent pursuant to 35 U.S.C. § 271(a).

12. As a result of Volkswagen's infringement of the '685 Patent, Plaintiff is entitled to monetary damages (past, present, and future) in an amount adequate to compensate for Volkswagen's infringement, but in no event less than a reasonable royalty for the use made of the invention by Volkswagen, together with interest and costs as fixed by the Court.

## COUNT II

### INFRINGEMENT OF U.S. PATENT NO. 10,193,392

13. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

14. Plaintiff owns by assignment all rights, title, and interest, including the right to recover damages for past, present, and future infringement, in U.S. Patent No. 10,193,392, titled "Wireless power transfer device and wireless power transfer

system.” The ’392 Patent was duly and legally issued by the United States Patent and Trademark Office on January 29, 2019. A true and correct copy of the ’392 Patent is attached as Exhibit C.

15. On information and belief, Volkswagen makes, uses, offers for sale, sells, and/or imports certain automobiles with a wireless charger, including without limitation the Volkswagen Antenna Booster (5NA980611) included in the Volkswagen Golf R, Volkswagen Golf GTI, Volkswagen ID.4, Volkswagen Atlas, Volkswagen Atlas Cross Sport, Volkswagen Tiguan, Volkswagen Jetta, Volkswagen Arteon, and Volkswagen Taos (“Accused Products”), that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the ’392 Patent. Identification of the accused products will be provided in Plaintiff’s infringement contentions pursuant to the Court’s scheduling order.

16. The Accused Products satisfy all claim limitations of one or more claims of the ’392 Patent. A claim chart comparing exemplary independent claim 1 of the ’392 Patent to representative Accused Products is attached as Exhibit D.

17. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Volkswagen has injured Plaintiff and is liable for infringement of the ’392 Patent pursuant to 35 U.S.C. § 271(a).

18. As a result of Volkswagen’s infringement of the ’392 Patent, Plaintiff is entitled to monetary damages (past, present, and future) in an amount adequate to

compensate for Volkswagen's infringement, but in no event less than a reasonable royalty for the use made of the invention by Volkswagen, together with interest and costs as fixed by the Court.

### **COUNT III**

#### **INFRINGEMENT OF U.S. PATENT NO. 7,825,537**

19. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

20. Plaintiff owns by assignment all rights, title, and interest, including the right to recover damages for past, present, and future infringement, in U.S. Patent No. 7,825,537, entitled "Inductive power transfer system and method." The '537 Patent was duly and legally issued by the United States Patent and Trademark Office on November 2, 2010. A true and correct copy of the '537 Patent is attached as Exhibit E.

21. On information and belief, Volkswagen makes, uses, offers for sale, sells, and/or imports certain automobiles with a wireless charger, including without limitation the Volkswagen Antenna Booster (5NA980611) included in the Volkswagen Golf R, Volkswagen Golf GTI, Volkswagen ID.4, Volkswagen Atlas, Volkswagen Atlas Cross Sport, Volkswagen Tiguan, Volkswagen Jetta, Volkswagen Arteon, and Volkswagen Taos ("Accused Products"), that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of

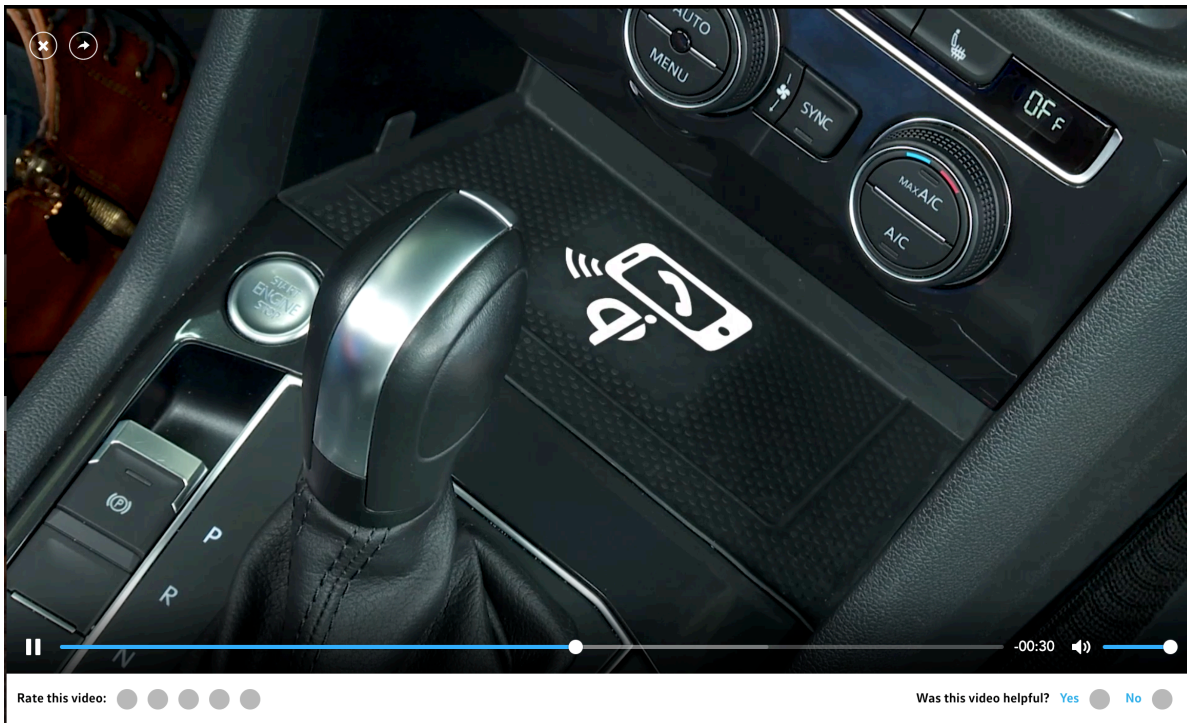
the '537 Patent, including through Volkswagen's own use and/or testing of the Accused Products. Identification of the accused products will be provided in Plaintiff's infringement contentions pursuant to the Court's scheduling order.

22. The Accused Products satisfy all claim limitations of one or more claims of the '537 Patent. A claim chart comparing exemplary independent claim 1 of the '537 Patent to representative Accused Products is attached as Exhibit F.

23. Volkswagen also knowingly and intentionally induces infringement of one or more claims of the '537 Patent in violation of 35 U.S.C. § 271(b). At least as of April 8, 2022 (when Volkswagen was served with the original complaint), Volkswagen has knowledge of the '537 Patent and the infringing nature of the Accused Products through, for example, the '537 Patent claim chart served therewith. Dkt. No. 6. Despite this knowledge of the '537 Patent, Volkswagen continues to actively encourage and instruct its customers and end users (for example, through user manuals and online instruction materials on its website) to use the Accused Products in ways that directly infringe the '537 Patent. For example, Volkswagen advertises that the Accused Products contain a “[w]ireless smartphone charger” to transfer power to compatible devices. *See, e.g.,* Ex. I ([https://www.vw.com/en/models/golf-r.html?modelId=CD1RMT&modelYear=2022&modelVersion=4&exteriorId=F14+2T2T&interiorId=F56++++OB&---=%7B%22models\\_golf-](https://www.vw.com/en/models/golf-r.html?modelId=CD1RMT&modelYear=2022&modelVersion=4&exteriorId=F14+2T2T&interiorId=F56++++OB&---=%7B%22models_golf-)



[r\\_sectiongroup\\_9747253\\_featureappsection\\_1921718042%22%3A%22%2F%3Fzip%3D%22%7D](#)). Volkswagen also teaches its customers and end users how to use the wireless phone charger in the exemplary 2021 Tiguan SEL model to inductively charge a target unit, *i.e.*, smartphone, in a manner that infringes one or more claims of the '537 Patent:





See Ex. J (<https://knowyourvw.com/model/143/asset=7107>). Specifically, through its “Wireless Phone Charging” tutorial video, Volkswagen provides detailed instructions its customers and end users of, *inter alia*, (1) the location of the accused wireless charger in the exemplary 2021 Tiguan SEL (or other models), (2) how to prepare a smartphone for charging (for example, by removing objects that may “interfere with the device’s placement on the charging surface”), (3) that a “phone symbol” on the charger represents the “center position” for the wireless charging function, (4) that to charge a smartphone, a user should place a compatible handset “flat in the center of the charging shelf facing up,” and (5) other recommendations for customers and end users for optimal use of the accused wireless charging functionality. See Ex. J (<https://knowyourvw.com/model/143/asset=7107>). Despite

Scramoge's prior allegations in its original complaint that Volkswagen's instructional "Wireless Phone Charging" tutorial provides customers and end users with detailed instructions on how to use the accused wireless charging functionality in an infringing manner, Volkswagen continues to make this video widely accessible on its website and elsewhere on the Internet. *See* Dkt. No. 1 at ¶ 24. Volkswagen provides these instructions, user manuals, and other materials knowing and intending (or with willful blindness to the fact) that its customers and end users will commit these infringing acts. Volkswagen also continues to make, use, offer for sale, sell, and/or import the Accused Products, despite its knowledge of the '537 Patent, thereby specifically intending for and inducing its customers to infringe the '537 Patent through the customers' normal and customary use of the Accused Products.

24. Volkswagen has also infringed, and continues to infringe, one or more claims of the '537 Patent by selling, offering for sale, or importing into the United States, the Accused Products, knowing that the Accused Products constitute a material part of the inventions claimed in the '537 Patent, are especially made or adapted to infringe the '537 Patent, and are not staple articles or commodities of commerce suitable for non-infringing use. At least as of April 8, 2022 (when Volkswagen was served with the original complaint), Volkswagen has knowledge of the '537 Patent and the infringing nature of the Accused Products through, for example, the '537 Patent claim chart served therewith. Dkt. No. 6. Volkswagen has

been, and currently is, contributorily infringing the '537 Patent in violation of 35 U.S.C. §§ 271(c) and/or (f). For example, Volkswagen advertises that the Accused Products contain a “[w]ireless smartphone charger” to transfer power to compatible devices. *See, e.g.,* Ex. I ([https://www.vw.com/en/models/golf-r.html?modelId=CD1RMT&modelYear=2022&modelVersion=4&exteriorId=F14+2T2T&interiorId=F56++++OB&---=%7B%22models\\_golf-r\\_sectiongroup\\_9747253\\_featureappsection\\_1921718042%22%3A%22%2F%3Fzip%3D%22%7D](https://www.vw.com/en/models/golf-r.html?modelId=CD1RMT&modelYear=2022&modelVersion=4&exteriorId=F14+2T2T&interiorId=F56++++OB&---=%7B%22models_golf-r_sectiongroup_9747253_featureappsection_1921718042%22%3A%22%2F%3Fzip%3D%22%7D)). Volkswagen also provides its customers and end users with a detailed instructional video that provides step-by-step instructions on how to use the accused wireless charging functionality in an infringing manner. *See* Ex. J (<https://knowyourvw.com/model/143/asset=7107>). Volkswagen’s wireless chargers are base units that constitute a material part of the inventions claimed in the '537 Patent, are especially made or adapted to infringe the '537 Patent, and are not staple articles or commodities of commerce suitable for non-infringing use. For example, there are no non-infringing uses for the wireless charging functionality in the Accused Products other than to inductively transfer power to a target unit in an infringing manner.

25. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Volkswagen has injured Plaintiff and is liable

for infringement of the '537 Patent pursuant to 35 U.S.C. § 271(a), (b), (c), and/or (f).

26. As a result of Volkswagen's direct infringement of the '537 Patent, Plaintiff is entitled to monetary damages (past, present, and future) in an amount adequate to compensate for Volkswagen's infringement, but in no event less than a reasonable royalty for the use made of the invention by Volkswagen, together with interest and costs as fixed by the Court.

27. As a result of Volkswagen's indirect infringement of the '537 Patent, Plaintiff is entitled to monetary damages (present and future) in an amount adequate to compensate for Volkswagen's infringement, but in no event less than a reasonable royalty for the use made of the invention by Volkswagen, together with interest and costs as fixed by the Court, accruing as of the time Volkswagen obtained knowledge of the '537 Patent on or before April 8, 2022.

#### **COUNT IV**

#### **INFRINGEMENT OF U.S. PATENT NO. 10,243,400**

28. Plaintiff realleges and incorporates by reference the foregoing paragraphs as if fully set forth herein.

29. Plaintiff owns by assignment all rights, title, and interest, including the right to recover damages for past, present, and future infringement, in U.S. Patent No. 10,243,400, titled "Wireless power transmitter." The '400 Patent was duly and

legally issued by the United States Patent and Trademark Office on March 26, 2019.

A true and correct copy of the '400 Patent is attached as Exhibit G.

30. On information and belief, Volkswagen makes, uses, offers for sale, sells, and/or imports certain automobiles with a wireless charger, including without limitation the Volkswagen Antenna Booster (5NA980611) included in the Volkswagen Golf R, Volkswagen Golf GTI, Volkswagen ID.4, Volkswagen Atlas, Volkswagen Atlas Cross Sport, Volkswagen Tiguan, Volkswagen Jetta, Volkswagen Arteon, and Volkswagen Taos (“Accused Products”), that directly infringe, literally and/or under the doctrine of equivalents, one or more claims of the '400 Patent. Identification of the accused products will be provided in Plaintiff's infringement contentions pursuant to the Court's scheduling order.

31. The Accused Products satisfy all claim limitations of one or more claims of the '400 Patent. A claim chart comparing exemplary independent claim 1 of the '400 Patent to representative Accused Products is attached as Exhibit H.

32. By making, using, offering for sale, selling and/or importing into the United States the Accused Products, Volkswagen has injured Plaintiff and is liable for infringement of the '400 Patent pursuant to 35 U.S.C. § 271(a).

33. As a result of Volkswagen's infringement of the '400 Patent, Plaintiff is entitled to monetary damages (past, present, and future) in an amount adequate to compensate for Volkswagen's infringement, but in no event less than a reasonable

royalty for the use made of the invention by Volkswagen, together with interest and costs as fixed by the Court.

**PRAYER FOR RELIEF**

WHEREFORE, Plaintiff respectfully requests that this Court enter:

a. A judgment in favor of Plaintiff that Volkswagen has infringed, either literally and/or under the doctrine of equivalents, the '685, '392, '537, and '400 Patents;

b. A judgment and order requiring Volkswagen to pay Plaintiff its damages (past, present, and future), costs, expenses, and pre-judgment and post-judgment interest for Volkswagen's infringement of the '685, '392, '537, and '400 Patents;

c. A judgment and order requiring Volkswagen to pay Plaintiff compulsory ongoing licensing fees, as determined by the Court in equity.

d. A judgment and order requiring Volkswagen to provide an accounting and to pay supplemental damages to Plaintiff, including without limitation, pre-judgment and post-judgment interest and compensation for infringing products released after the filing of this case that are not colorably different from the accused products;

e. A judgment and order finding that this is an exceptional case within the meaning of 35 U.S.C. § 285 and awarding to Plaintiff its reasonable attorneys' fees

against Volkswagen; and

f. Any and all other relief as the Court may deem appropriate and just under the circumstances.

**DEMAND FOR JURY TRIAL**

Plaintiff, under Rule 38 of the Federal Rules of Civil Procedure, requests a trial by jury of any issues so triable by right.

Dated: June 27, 2022

Respectfully submitted,

/s/ Brett Cooper

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P63245



*Attorneys for Plaintiff Scramoge  
Technology Limited*

## CERTIFICATE OF SERVICE

I hereby certify that on June 27, 2022, I electronically filed using the CM/ECF system, which will send notification of such filing to all parties of record via the ECF system.

/s/ Brett Cooper

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Technology Limited*


# **EXHIBIT F**


**U.S. Patent No. 7,825,537 (“’537 Patent”)**

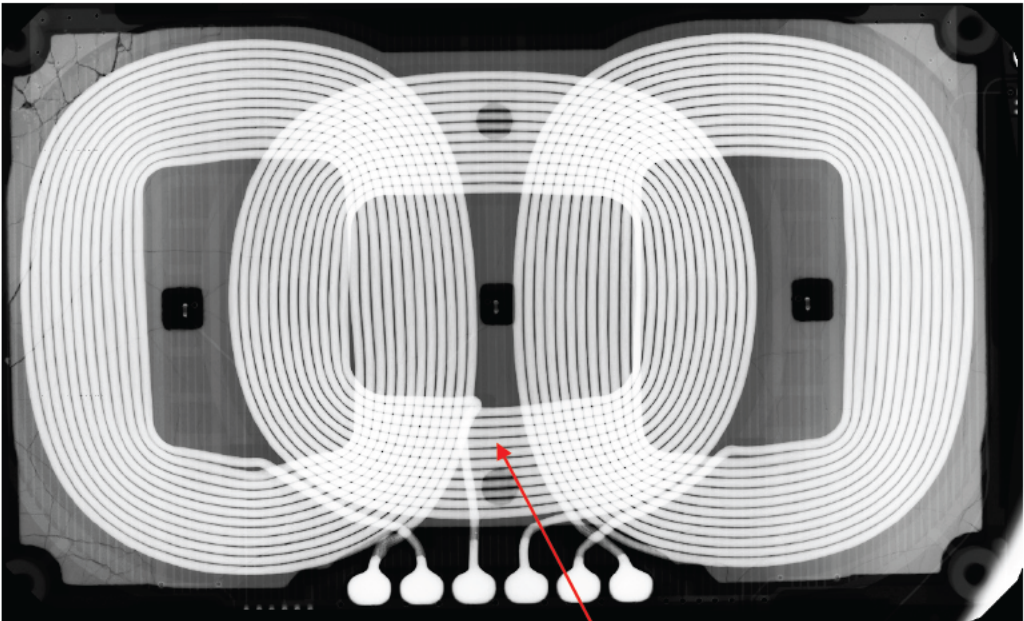
**Accused Products**


Volkswagen products, including without limitation the Volkswagen Antenna Booster (5NA980611) included in the Volkswagen Golf R, Volkswagen Golf GTI, Volkswagen ID.4, Volkswagen Atlas, Volkswagen Atlas Cross Sport, Volkswagen Tiguan, Volkswagen Jetta, Volkswagen Arteon, and Volkswagen Taos (“Accused Products”), infringe at least Claim 1 of the ’537 Patent.

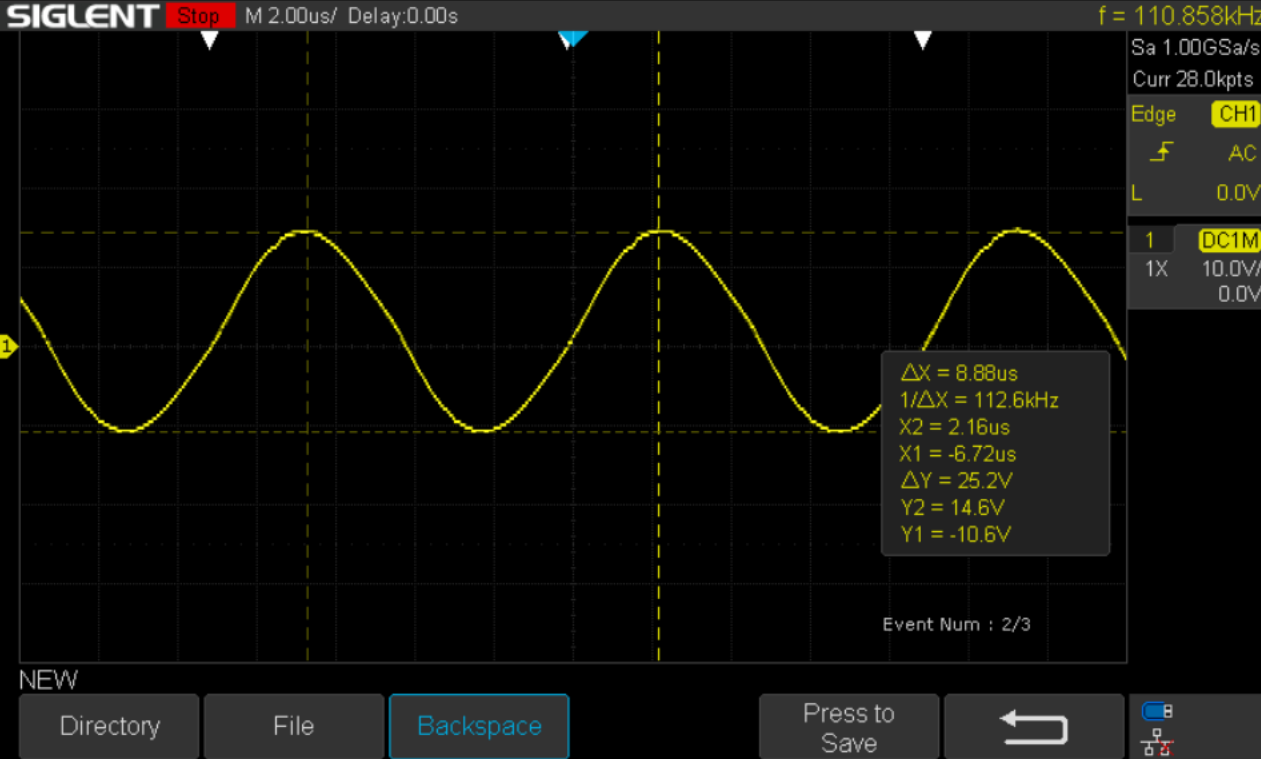
**Claim 1**

Claim 1	Accused Products
<p>[1pre] A method for inductively transferring power from a base unit providing input power, to a target unit providing output power, where the base unit and the target unit are electrically isolated, comprising:</p>	<p>To the extent the preamble is limiting, each Accused Product includes a method for inductively transferring power from a base unit providing input power, to a target unit providing output power, where the base unit and the target unit are electrically isolated.</p> <p><i>See, e.g.:</i></p>  <p>Photograph of the Volkswagen Antenna Booster showing the base unit for inductively transferring power to an electrically isolated target unit.</p>
<p>[1a] positioning a second inductive element of said target unit within a</p>	<p>Each Accused Product comprises positioning a second inductive element of said target unit within a predetermined distance of a first inductive element of said base unit.</p>


Claim 1	Accused Products
<p>predetermined distance of a first inductive element of said base unit;</p>	<p>For example, the exemplary Volkswagen Antenna Booster includes a coil, which comprises the first inductive element of the base unit. A covering positions the second inductive element of the target unit within a predetermined distance of the first inductive element of the base unit.</p> <p><i>See, e.g.:</i></p>  <p>Photograph of the covering for positioning a second inductive element of the target unit within a predetermined distance of a first inductive element of the base unit for the exemplary Volkswagen Antenna Booster.</p>

Claim 1	Accused Products
	 <p data-bbox="1318 943 1619 971">First inductive element</p> <p data-bbox="636 997 1866 1068">X-ray of the coils comprising the first inductive element inside the base unit from the exemplary Volkswagen Antenna Booster.</p>

Claim 1	Accused Products
	 <p data-bbox="1388 391 1535 418">Target unit</p> <p data-bbox="1436 613 1562 641">Base unit</p> <p data-bbox="634 756 1869 857">Photograph of the exemplary Volkswagen Antenna Booster showing how the covering positions the second inductive element of the target unit within a predetermined distance of the first inductive element of the base unit.</p>
<p data-bbox="205 868 604 1146">[1b] applying a time varying electric current to said first inductive element to produce a time varying magnetic field, said time varying magnetic field induces an electric current in said second inductive element;</p>	<p data-bbox="634 868 1854 969">Each Accused Product comprises applying a time varying electric current to said first inductive element to produce a time varying magnetic field, said time varying magnetic field induces an electric current in said second inductive element.</p> <p data-bbox="634 998 751 1026"><i>See, e.g.:</i></p>

Claim 1	Accused Products
	 <p>Oscilloscope measurement of the time varying electric current in the first inductive element from the exemplary Volkswagen Antenna Booster. The current produces a time varying magnetic field, which induces an electric current in the second inductive element of the target unit.</p>
<p>[1c] monitoring at least one parameter indicative of an efficiency of power transfer from said base unit to said target unit;</p>	<p>Each Accused Product comprises monitoring at least one parameter indicative of an efficiency of power transfer from said base unit to said target unit.</p> <p>For example, the exemplary Volkswagen Antenna Booster includes a NXP WCT1001 Wireless Power Transmitter IC, which monitors at least a voltage and current associated with the first inductive element in the base unit.</p> <p><i>See, e.g.:</i></p>



Claim 1	Accused Products
	 <p data-bbox="638 1117 1864 1182">Photograph of the NXP WCT1001 Wireless Power Transmitter IC on the PCB of the exemplary Volkswagen Antenna Booster.</p>

Claim 1

Accused Products

#### 4.1 Functional Block Diagram

This functional block diagram just shows the common pin assignment information by all members of the family. For the detailed pin multiplexing information, refer to Section 4.4 “Pin Function Description”.

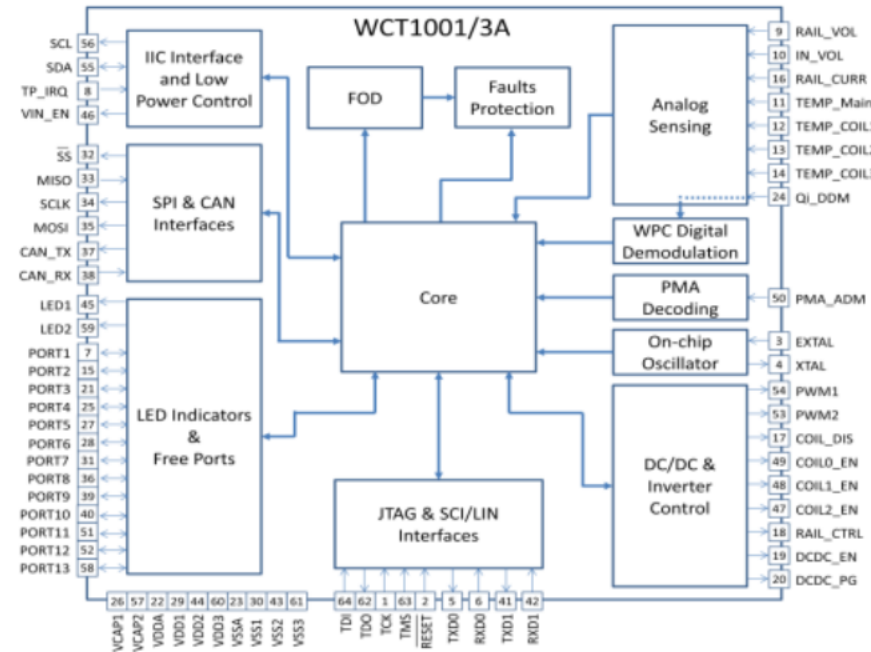


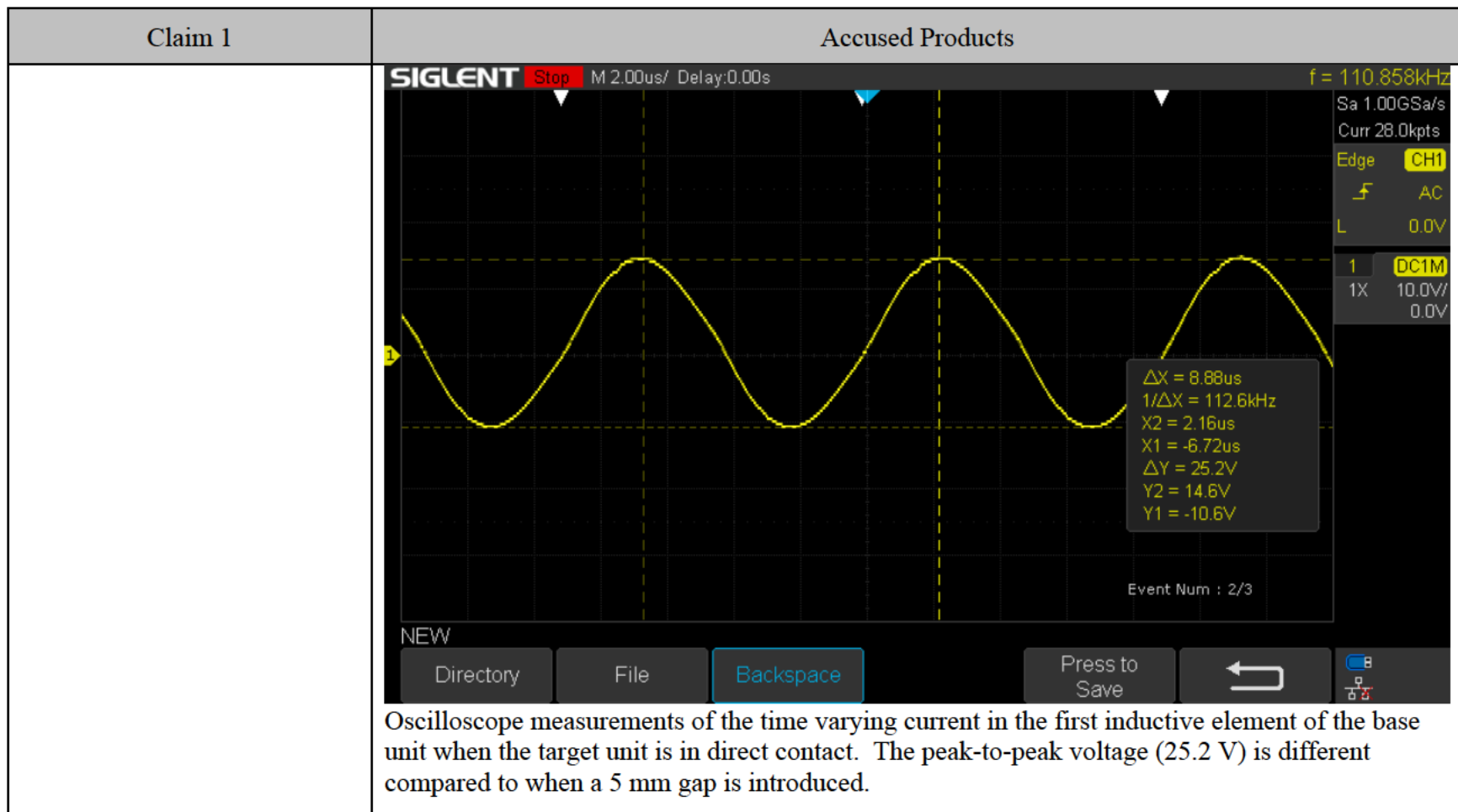
Figure 3. WCT1001/3AVLH Function Block Diagram

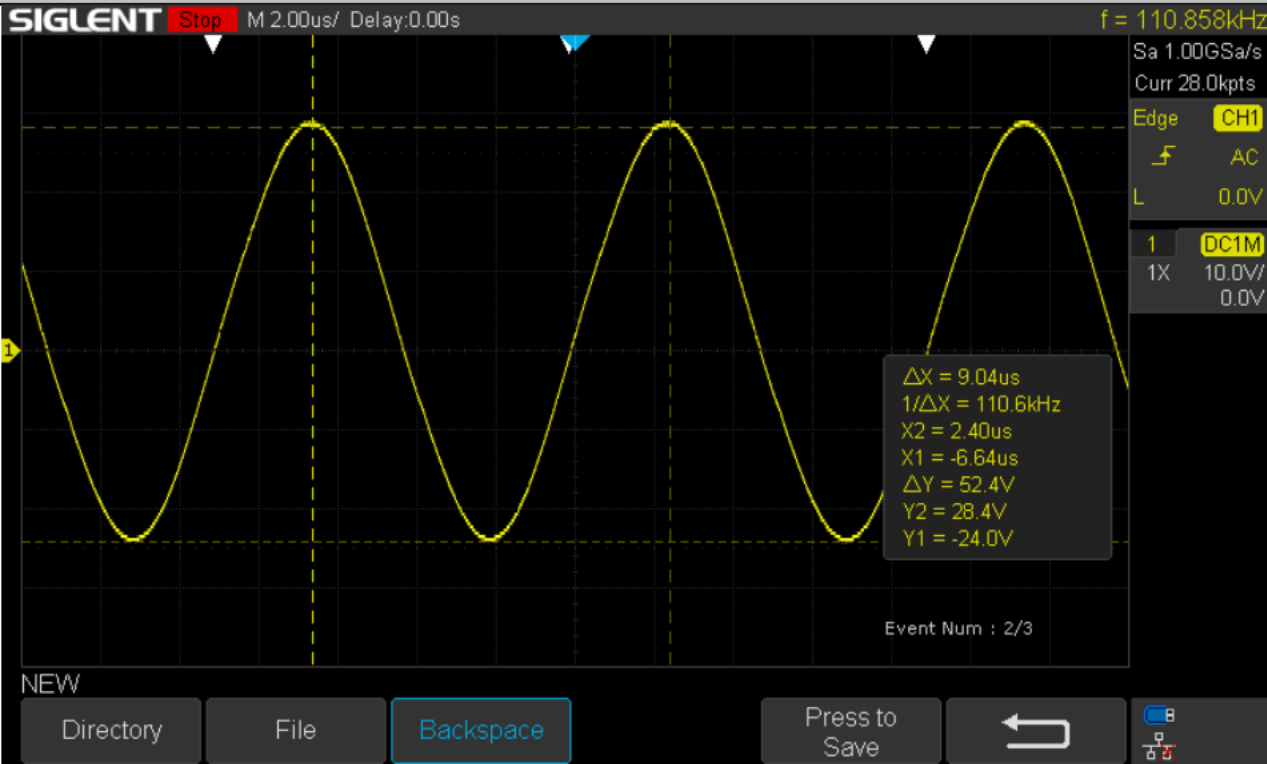
Functional block diagram from the NXP WCT1001 Wireless Power Transmitter IC datasheet showing that it includes an “analog sensing” unit that monitors a voltage and current associated with the first inductive element in the base unit. Source: <https://www.nxp.com/docs/en/datasheet/WCT100XADS.pdf>

Claim 1	Accused Products
	<div style="display: flex; justify-content: space-between;"> <div data-bbox="648 318 968 380"> <p><b>NXP Semiconductors</b> Data Sheet</p> </div> <div data-bbox="1257 324 1625 380"> <p>Document Number: WCT100XADS Rev. 1.2, 01/2021</p> </div> </div> <div data-bbox="648 448 1071 513"> <p><b>Automotive Wireless Transmitter Controller</b></p> </div> <div data-bbox="648 529 743 553"> <p><b>Features</b></p> </div> <ul style="list-style-type: none"> <li>• Conforms to the latest version WPC “Qi” specification</li> <li>• Supports wide DC input voltage range of 6 V (limited duration at Start/Stop operation) to 16 V for automotive battery input</li> <li>• Supports Foreign Object Detection (FOD)</li> <li>• Low-power system standby available using Freescale Touch technology</li> <li>• Provides free positioning solutions by using WPC A or B type multi-coil technology</li> <li>• Uses rail voltage control or phase shift control with fixed operating frequency to control power transfer to help alleviate automotive system interference</li> <li>• Supports the key FOB avoidance function</li> <li>• Supports the operation frequency dithering technology to eliminate the AM band interference</li> <li>• Improved EMC performance for automotive certification</li> <li>• Supports CAN/LIN/IIC/SCI/SPI interfaces</li> <li>• LED for system status indication</li> <li>• <span style="border: 1px solid red; padding: 2px;">Over-voltage/current/temperature protection</span></li> <li>• Software based solution to provide maximum design freedom and product differentiation</li> <li>• Qualified to AEC100 Test Group A&amp;B</li> <li>• Dual-mode capable</li> </ul> <div data-bbox="648 1133 779 1157"> <p><b>Applications</b></p> </div> <ul style="list-style-type: none"> <li>• Automotive Wireless Power Transmitter <ul style="list-style-type: none"> <li>○ WPC compliant</li> </ul> </li> </ul> <div data-bbox="632 1247 1894 1390"> <p>Excerpt from the NXP WCT1001 Wireless Power Transmitter IC datasheet showing that it has the capability for over-current and over-voltage protection, which suggests it monitors the voltage and current associated with the first inductive element in the base unit. Source: <a href="https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf">https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf</a></p> </div>

Claim 1	Accused Products
<p>[1d] automatically adjusting at least one characteristic of said time varying electric current responsive to said parameter to maximize an efficiency of power transfer from said base unit to said target unit.</p>	<p>Each Accused Product comprises automatically adjusting at least one characteristic of said time varying electric current responsive to said parameter to maximize an efficiency of power transfer from said base unit to said target unit.</p> <p>For example, the exemplary Volkswagen Antenna Booster includes a NXP WCT1001 Wireless Power Transmitter IC, which adjusts the voltage of the time varying electric current to improve power transfer efficiency.</p> <p>For example, using an oscilloscope, the voltage of the time varying electric current in the first inductive element of the base unit from the exemplary Volkswagen Antenna Booster was measured. As a small 5 mm gap was introduced between the target unit and base unit, the voltage was observed to change, which suggests that it was automatically adjusted to maximize power transfer efficiency.</p>


Claim 1	Accused Products
	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><b>NXP Semiconductors</b> Data Sheet</p> <p><b>Automotive Wireless Transmitter Controller</b></p> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>• Conforms to the latest version WPC “Qi” specification</li> <li>• Supports wide DC input voltage range of 6 V (limited duration at Start/Stop operation) to 16 V for automotive battery input</li> <li>• Supports Foreign Object Detection (FOD)</li> <li>• Low-power system standby available using Freescale Touch technology</li> <li>• Provides free positioning solutions by using WPC A or B type multi-coil technology</li> <li>• <span style="border: 1px solid red; padding: 2px;">Uses rail voltage control or phase shift control with fixed operating frequency to control power transfer to help alleviate automotive system interference</span></li> <li>• Supports the key FOB avoidance function</li> <li>• Supports the operation frequency dithering technology to eliminate the AM band interference</li> <li>• Improved EMC performance for automotive certification</li> <li>• Supports CAN/LIN/IIC/SCI/SPI interfaces</li> <li>• LED for system status indication</li> <li>• Over-voltage/current/temperature protection</li> <li>• Software based solution to provide maximum design freedom and product differentiation</li> <li>• Qualified to AEC100 Test Group A&amp;B</li> <li>• Dual-mode capable</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Automotive Wireless Power Transmitter               <ul style="list-style-type: none"> <li>○ WPC compliant</li> </ul> </li> </ul> <p><i>See, e.g.:</i> Excerpt from the NXP WCT1001 Wireless Power Transmitter IC datasheet showing that it controls the rail voltage to alleviate system interference and improve power transfer efficiency. Source: <a href="https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf">https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf</a></p> </div> <div style="width: 45%; text-align: right;"> <p>Document Number: WCT100XADS Rev. 1.2, 01/2021</p> <p><b>Overview Description</b></p> <p>The WCT100xA is a wireless power transmitter controller that integrates all required functions for WPC “Qi” compliant wireless power transmitter design. The WCT100xA transmitter IC manages the power transfer by receiving commands from the receiver. Receivers are detected by using either standard protocol methods or Freescale touch sensor technology. Once the mobile device is detected, the WCT100xA controls the power transfer by adjusting rail voltage or phase shift of power stage according to message packets sent by mobile device.</p> <p>To maximize the design freedom and product differentiation, the WCT100xA supports any 5W coil topology capable of supporting WPC Qi-based implementation. In addition, the system supports both WPC and PMA protocols.</p> <p>The WCT100xA also includes CAN/LIN/IIC/SCI/SPI interfaces, over-voltage/current/temperature protection and FOD method to protect from overheating by misplaced metallic foreign objects. It also handles any system fault and operation status, and provides comprehensive indicator outputs for robust system design.</p> </div> </div>




Claim 1	Accused Products
	 <p>Oscilloscope measurements of the time varying current in the first inductive element of the base unit when a 5 mm gap is introduced separating the target unit. The peak-to-peak voltage (52.4 V) changes compared to when no gap is present, which suggests an automatic adjustment to improve power transfer efficiency.</p>


**Claim 12**

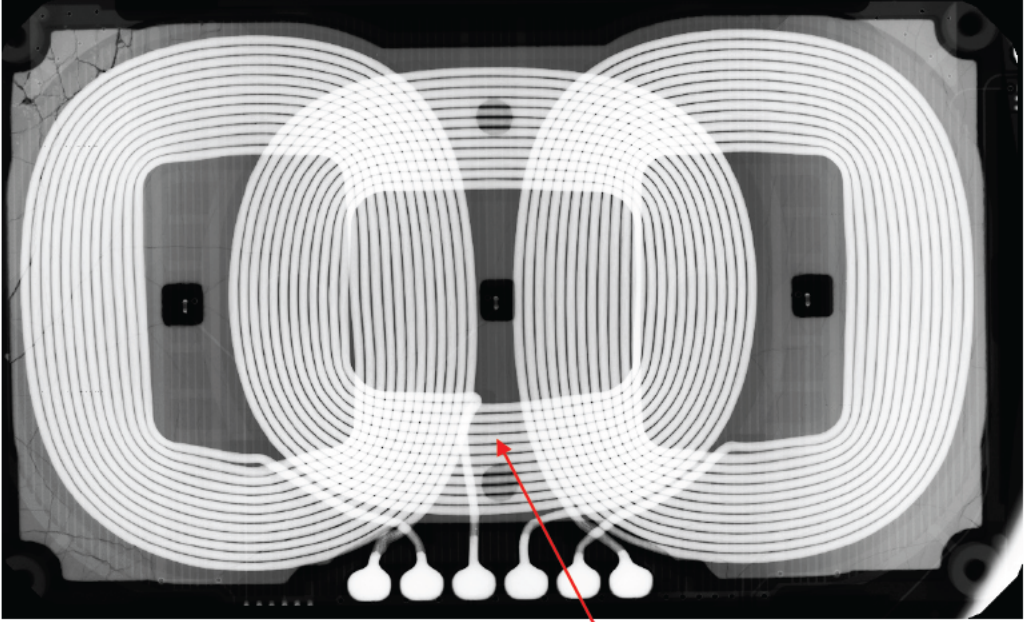
Claim 12	Accused Products
[12pre] An inductive power transfer system, comprising:	To the extent the preamble is limiting, each Accused Product includes an inductive power transfer system.


Claim 12	Accused Products
	<p><i>See, e.g.:</i></p>  <p>Photograph of the Volkswagen Antenna Booster comprising an inductive power transfer system while transferring power from a base unit to a target unit.</p>
<p>[12a] a base unit comprising a first inductive element configured for providing input power to a second inductive element of a target unit providing output power, said base unit electrically isolated from said target unit;</p>	<p>Each Accused Product includes a base unit comprising a first inductive element configured for providing input power to a second inductive element of a target unit providing output power, said base unit electrically isolated from said target unit.</p> <p>For example, the base unit of the exemplary Volkswagen Antenna Booster includes a coil, which comprises the first inductive element and provides output power to the second inductive element of the target unit.</p> <p><i>See, e.g.:</i></p>




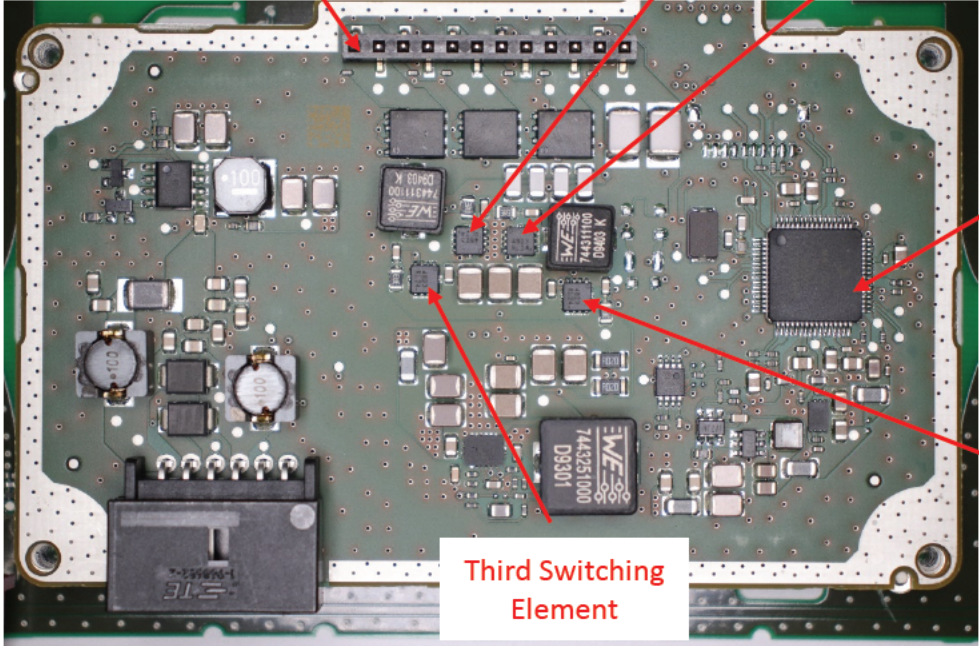
Claim 12	Accused Products
	 <p data-bbox="1388 391 1535 418">Target unit</p> <p data-bbox="1436 613 1562 641">Base unit</p> <p data-bbox="636 760 1881 824">Photograph of the base unit from the exemplary Volkswagen Antenna Booster and an electrically isolated target unit.</p>

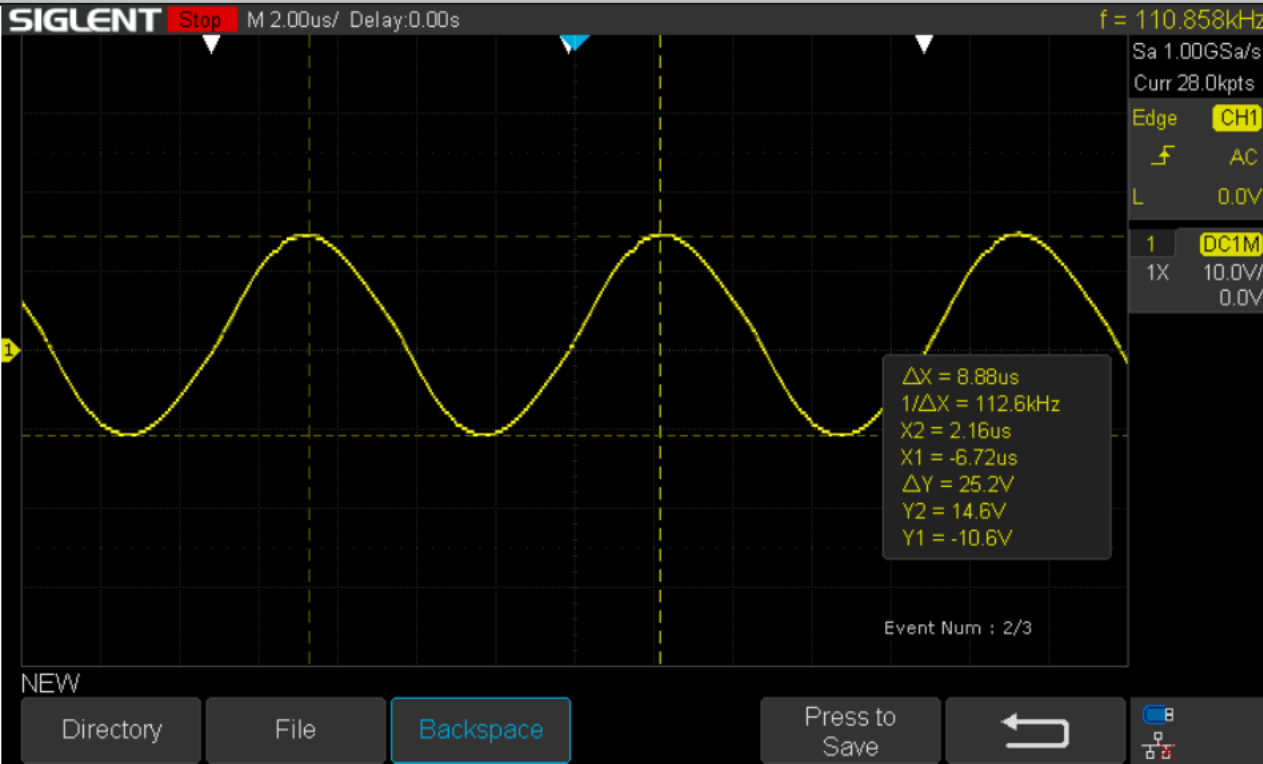
Claim 12	Accused Products
	 <p data-bbox="632 1110 1646 1143">Photograph of the base unit from the exemplary Volkswagen Antenna Booster.</p>

Claim 12	Accused Products
	 <p data-bbox="1318 943 1619 971" style="color: red;">First inductive element</p> <p data-bbox="636 997 1871 1068">X-ray of the coils comprising the first inductive element inside the base unit from the exemplary Volkswagen Antenna Booster.</p>
<p data-bbox="205 1097 611 1382">[12b] a positioning structure provided on at least one of said base unit and said target unit for removably positioning said second inductive element at a predetermined orientation and distance relative to said first inductive element;</p>	<p data-bbox="636 1097 1885 1198">Each Accused Product comprises a positioning structure provided on at least one of said base unit and said target unit for removably positioning said second inductive element at a predetermined orientation and distance relative to said first inductive element.</p> <p data-bbox="636 1227 1877 1328">For example, the exemplary Volkswagen Antenna Booster includes a covering that positions the second inductive element of the target unit at a predetermined distance and orientation relative to the first inductive element of the base unit.</p> <p data-bbox="636 1357 751 1390"><i>See, e.g.:</i></p>

Claim 12	Accused Products
	 <p data-bbox="634 1117 1864 1224">Photograph of the covering for positioning a second inductive element of the target unit at a predetermined distance and orientation relative to a first inductive element of the base unit from the exemplary Volkswagen Antenna Booster.</p>

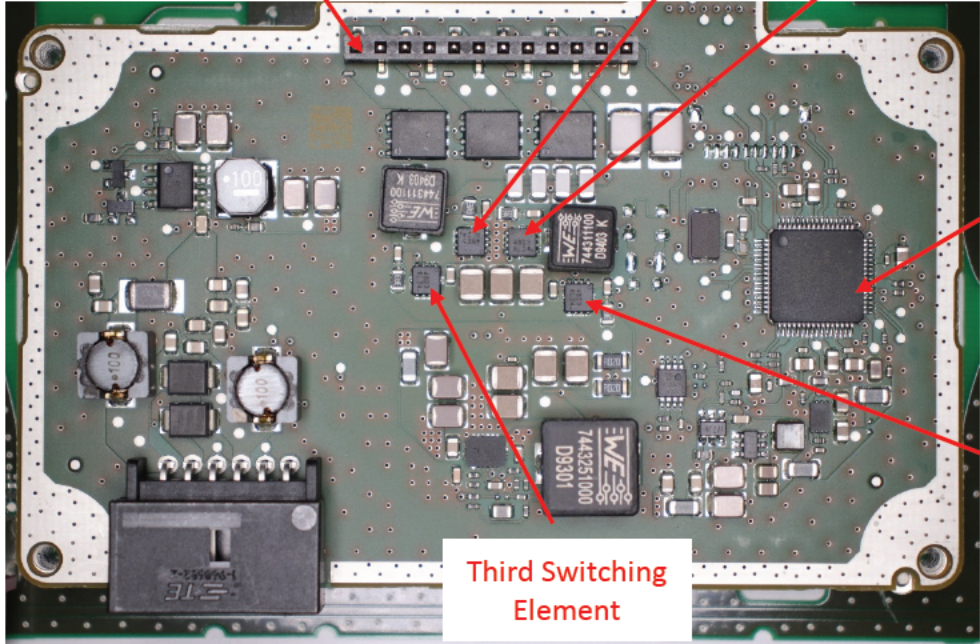
Claim 12	Accused Products
	 <p data-bbox="1396 389 1543 418">Target unit</p> <p data-bbox="1444 609 1564 638">Base unit</p> <p data-bbox="640 755 1890 857">Photograph of the exemplary Volkswagen Antenna Booster showing how the covering positions the second inductive element of the target unit at a predetermined distance and orientation relative to the first inductive element of the base unit.</p>
<p data-bbox="205 868 604 1218">[12c] a switch element configured for selectively applying a time varying electric current to said first inductive element to produce a time varying magnetic field, said time varying magnetic field inducing an electric current in said second inductive element; and</p>	<p data-bbox="640 868 1858 971">Each Accused Product comprises a switch element configured for selectively applying a time varying electric current to said first inductive element to produce a time varying magnetic field, said time varying magnetic field inducing an electric current in said second inductive element.</p> <p data-bbox="640 998 756 1027"><i>See, e.g.:</i></p>


Claim 12	Accused Products
	<p data-bbox="667 297 894 362">To First Inductive Element</p> <p data-bbox="1220 297 1444 362">Fourth Switching Element</p> <p data-bbox="1583 305 1814 370">Second Switching Element</p>  <p data-bbox="1675 597 1871 626">Control circuit</p> <p data-bbox="1675 824 1871 889">First Switching Element</p> <p data-bbox="1125 954 1329 1019">Third Switching Element</p> <p data-bbox="632 1092 1801 1195">Photograph of the PCB of the base unit from the exemplary Volkswagen Antenna Booster showing the four switching elements that apply the time varying electric current to the first inductive element.</p>

Claim 12	Accused Products
	 <p>Oscilloscope measurement of the time varying electric current in the first inductive element of the base unit from the exemplary Volkswagen Antenna Booster.</p>
<p>[12d] a control circuit configured for monitoring at least one parameter indicative of an efficiency of power transfer from said base unit to said target unit, and automatically adjusting at least one characteristic of said time</p>	<p>Each Accused Product comprises a control circuit configured for monitoring at least one parameter indicative of an efficiency of power transfer from said base unit to said target unit, and automatically adjusting at least one characteristic of said time varying electric current responsive to said parameter to maximize an efficiency of power transfer from said base unit to said target unit.</p>

Claim 12	Accused Products
<p>varying electric current responsive to said parameter to maximize an efficiency of power transfer from said base unit to said target unit.</p>	<p>For example, the exemplary Volkswagen Antenna Booster includes a NXP WCT1001 Wireless Power Transmitter IC, which comprises the control circuit and monitors the current and voltage associated with the first inductive element.</p> <p>For example, the exemplary Volkswagen Antenna Booster includes a NXP WCT1001 Wireless Power Transmitter IC, which adjusts the voltage of the time varying electric current to improve power transfer efficiency.</p> <p>For example, using an oscilloscope, the voltage of the time varying electric current in the first inductive element of the base unit from the exemplary Volkswagen Antenna Booster was measured. As a small 5 mm gap was introduced between the target unit and base unit, the voltage was observed to change, which suggests that it was automatically adjusted to maximize power transfer efficiency.</p> <p><i>See, e.g.:</i></p>



Claim 12	Accused Products
	<div style="text-align: center;"> <p data-bbox="680 305 909 375">To First Inductive Element</p> <p data-bbox="1234 305 1457 375">Fourth Switching Element</p> <p data-bbox="1591 315 1829 384">Second Switching Element</p>  <p data-bbox="1688 607 1881 638">Control circuit</p> <p data-bbox="1688 834 1881 904">First Switching Element</p> <p data-bbox="1138 971 1346 1040">Third Switching Element</p> </div> <p data-bbox="634 1068 1869 1138">Photograph of the PCB in the base unit of exemplary Volkswagen Antenna Booster showing the NXP WCT1001 Wireless Power Transmitter IC forming the control circuit.</p>

Claim 12	Accused Products
	 <p data-bbox="638 1117 1871 1187">Photograph of the NXP WCT1001 Wireless Power Transmitter IC forming the control circuit on the PCB of the exemplary Volkswagen Antenna Booster.</p>

Claim 12

Accused Products

### 4.1 Functional Block Diagram

This functional block diagram just shows the common pin assignment information by all members of the family. For the detailed pin multiplexing information, refer to Section 4.4 “Pin Function Description”.

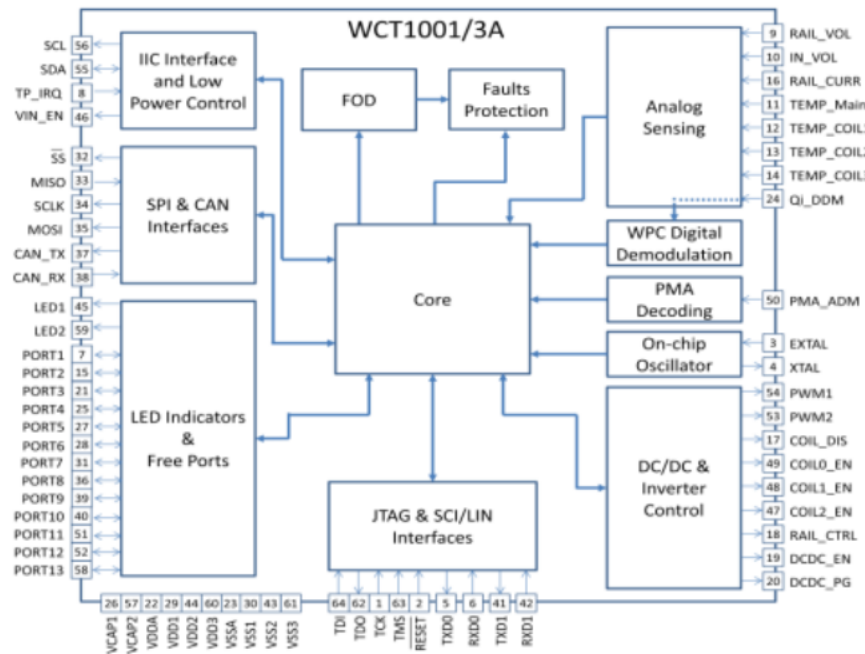


Figure 3. WCT1001/3AVLH Function Block Diagram

Functional block diagram from the NXP WCT1001 Wireless Power Transmitter IC datasheet showing that it includes an “analog sensing” unit that monitors a voltage and current associated with the first inductive element in the base unit. Source: <https://www.nxp.com/docs/en/datasheet/WCT100XADS.pdf>

Claim 12	Accused Products
	<div style="display: flex; justify-content: space-between;"> <div data-bbox="653 318 968 378"> <p><b>NXP Semiconductors</b> Data Sheet</p> </div> <div data-bbox="1262 323 1625 378"> <p>Document Number: WCT100XADS Rev. 1.2, 01/2021</p> </div> </div> <div data-bbox="653 448 1071 513"> <p><b>Automotive Wireless Transmitter Controller</b></p> </div> <div data-bbox="653 529 743 553"> <p><b>Features</b></p> </div> <ul style="list-style-type: none"> <li>• Conforms to the latest version WPC “Qi” specification</li> <li>• Supports wide DC input voltage range of 6 V (limited duration at Start/Stop operation) to 16 V for automotive battery input</li> <li>• Supports Foreign Object Detection (FOD)</li> <li>• Low-power system standby available using Freescale Touch technology</li> <li>• Provides free positioning solutions by using WPC A or B type multi-coil technology</li> <li>• Uses rail voltage control or phase shift control with fixed operating frequency to control power transfer to help alleviate automotive system interference</li> <li>• Supports the key FOB avoidance function</li> <li>• Supports the operation frequency dithering technology to eliminate the AM band interference</li> <li>• Improved EMC performance for automotive certification</li> <li>• Supports CAN/LIN/IIC/SCI/SPI interfaces</li> <li>• LED for system status indication</li> <li>• <span style="border: 1px solid red; padding: 2px;">Over-voltage/current/temperature protection</span></li> <li>• Software based solution to provide maximum design freedom and product differentiation</li> <li>• Qualified to AEC100 Test Group A&amp;B</li> <li>• Dual-mode capable</li> </ul> <div data-bbox="653 1133 779 1157"> <p><b>Applications</b></p> </div> <ul style="list-style-type: none"> <li>• Automotive Wireless Power Transmitter <ul style="list-style-type: none"> <li>○ WPC compliant</li> </ul> </li> </ul> <div data-bbox="636 1247 1894 1390"> <p>Excerpt from the NXP WCT1001 Wireless Power Transmitter IC datasheet showing that it has the capability for over-current and over-voltage protection, which suggests it monitors the voltage and current associated with the first inductive element in the base unit. Source: <a href="https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf">https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf</a></p> </div>

Claim 12	Accused Products
	<div style="display: flex; justify-content: space-between;"> <div data-bbox="653 318 968 378"> <p><b>NXP Semiconductors</b> Data Sheet</p> </div> <div data-bbox="1262 323 1625 378"> <p>Document Number: WCT100XADS Rev. 1.2, 01/2021</p> </div> </div> <div style="display: flex;"> <div data-bbox="653 448 1071 509" style="flex: 1;"> <p><b>Automotive Wireless Transmitter Controller</b></p> </div> <div data-bbox="1192 456 1413 482" style="flex: 1;"> <p><b>Overview Description</b></p> </div> </div> <div style="display: flex;"> <div data-bbox="653 529 1119 1120" style="flex: 2;"> <p><b>Features</b></p> <ul style="list-style-type: none"> <li>• Conforms to the latest version WPC “Qi” specification</li> <li>• Supports wide DC input voltage range of 6 V (limited duration at Start/Stop operation) to 16 V for automotive battery input</li> <li>• Supports Foreign Object Detection (FOD)</li> <li>• Low-power system standby available using Freescale Touch technology</li> <li>• Provides free positioning solutions by using WPC A or B type multi-coil technology</li> <li>• <span style="border: 1px solid red; padding: 2px;">Uses rail voltage control or phase shift control with fixed operating frequency to control power transfer to help alleviate automotive system interference</span></li> <li>• Supports the key FOB avoidance function</li> <li>• Supports the operation frequency dithering technology to eliminate the AM band interference</li> <li>• Improved EMC performance for automotive certification</li> <li>• Supports CAN/LIN/IIC/SCI/SPI interfaces</li> <li>• LED for system status indication</li> <li>• Over-voltage/current/temperature protection</li> <li>• Software based solution to provide maximum design freedom and product differentiation</li> <li>• Qualified to AEC100 Test Group A&amp;B</li> <li>• Dual-mode capable</li> </ul> <p><b>Applications</b></p> <ul style="list-style-type: none"> <li>• Automotive Wireless Power Transmitter               <ul style="list-style-type: none"> <li>○ WPC compliant</li> </ul> </li> </ul> </div> <div data-bbox="1192 493 1665 982" style="flex: 1; padding-left: 10px;"> <p>The WCT100xA is a wireless power transmitter controller that integrates all required functions for WPC “Qi” compliant wireless power transmitter design. The WCT100xA transmitter IC manages the power transfer by receiving commands from the receiver. Receivers are detected by using either standard protocol methods or Freescale touch sensor technology. Once the mobile device is detected, the WCT100xA controls the power transfer by adjusting rail voltage or phase shift of power stage according to message packets sent by mobile device.</p> <p>To maximize the design freedom and product differentiation, the WCT100xA supports any 5W coil topology capable of supporting WPC Qi-based implementation. In addition, the system supports both WPC and PMA protocols.</p> <p>The WCT100xA also includes CAN/LIN/IIC/SCI/SPI interfaces, over-voltage/current/temperature protection and FOD method to protect from overheating by misplaced metallic foreign objects. It also handles any system fault and operation status, and provides comprehensive indicator outputs for robust system design.</p> </div> </div> <p>Excerpt from the NXP WCT1001 Wireless Power Transmitter IC datasheet showing that it controls the rail voltage to alleviate system interference and improve power transfer efficiency. Source: <a href="https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf">https://www.nxp.com/docs/en/data-sheet/WCT100XADS.pdf</a></p>

