

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND SAMSUNG ELECTRONICS
AMERICA, INC.,
Petitioners,

v.

AQ CORPORATION,
Patent Owner.

Case No. IPR2026-00234

U.S. PATENT NO. 11,728,564

**PETITIONERS' REPLY TO PATENT OWNER'S PRELIMINARY
RESPONSE BRIEF**

TABLE OF CONTENTS

	<u>Page</u>
I. Introduction.....	1
II. Patent Owner’s Exhibit 2001 Confirms Kang’s Parallel-connected Antenna Disclosures	1
III. Kang Discloses Electrically Connecting Inner and Outer Wireless Charging Coils in Parallel.....	3
IV. Conclusion	5

TABLE OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 11,728,564 (“’564 Patent”)
1002	Declaration of David K. Choi, Ph.D
1003	<i>Curriculum Vitae</i> of David K. Choi, Ph.D
1004	File History of U.S. 11,728,564 (App. No. 17/955,126)
1005	PCT Publication 2017/175886 (“SeongPCT”)
1006	Certified English Translation of PCT Publication 2017/175886 (“Seong”)
1007	U.S. Pat. App. Pub. No. 2019/0109373 (“Ahn”)
1008	U.S. Patent No. 10,269,005 (“005Lee”)
1009	Korean Patent Publication 10-2017-0093670 (“ChoKPP”)
1010	Certified English Translation of Korean Patent Publication 10-2017-0093670 (“Cho”)
1011	U.S. Pat. App. Pub. No. 2017/0228721 (“721Lee”)
1012	U.S. Pat. App. Pub. 2018/0198209 (“Kang”)
1013	Comparison of the specifications of U.S. Patent No. 11,728,564 (“’564 Patent”) and U.S. Pat. App. Pub. 2018/0198209 (“Kang”)
1014	U.S. Pat. App. Pub. No. 2010/0090824 (“Rowell”)
1015	Exhibit B to Patent Owner’s Disclosure of Asserted Claims and Infringement Contentions in <i>AQ Corporation v. Samsung Electronics Co., Ltd. et al.</i> , Case No. 2:25-cv-01012-JRG (EDTX)
1016	William H. Hayt, Jr. and Jack E. Kemmerly, <i>Engineering Circuit Analysis</i> (1993)

1017	Mohamed M. El Rayes, et al., “A Review on Wireless Power Transfer,” IJETT Vol. 40. No. 5 (2016)
1018	Sung-Gu Kang, et al., “Near-Field Communication in Biomedical Applications,” Sensors (2021)
1019	Zebra, RFID Inlay Placement/Power Guidelines (2014)
1020	Constantine A. Balanis, “The Evolution of Antenna Technology,” IEEE Antenna & Propagation Magazine (2024)
1021	G. Stojanovic and Lj. Zivanov, “Comparison of Optimal Design of Different Spiral Inductors,” MIEL Vol. 2 (2004)
1022	Chandrasekharan Nataraj, et al., “General Analysis of Resonance Coupled Wireless Power Transfer (WPT) Using Inductive Coils,” Technical Gazette 25, 3 (2018).
1023	Zachariah Peterson, “How to Design a Printed Circuit Board in 10 Easy Steps,” (2025), https://resources.altium.com/p/10-easy-steps-comprehensively-designing-circuit-board-altium-designer
1024	“The Discovery of Radio Waves – 1888,” Spark Museum, http://www.sparkmuseum.com/BOOK_HERTZ.HTM
1025	“How Do Checkpoint Labels and Hard Tags work?,” Loss Prevention Systems, https://www.losspreventionsystems.com/checkpoint-labels-hard-tags-work/
1026	“Qi: Mobile Charging Empowered,” Wireless Power Consortium, https://www.wirelesspowerconsortium.com/standards/qi-wireless-charging/
1027	“Wireless Charging,” NFC Forum, https://nfc-forum.org/build/specifications/wireless-charging/
1028	“Qi Wireless Charging,” Lenhardt, https://ib-lenhardt.com/kb/qi-wireless-charging
1029	U.S. Patent No. 649,621

1030	U.S. Patent No. 1,119,732
1031	U.S. Patent No. 4,937,585
1032	Chinese Patent No. CN209266128
1033	Korean Patent No. KR20180113064
1034	PCT WO 2019/070090
1035	Korean Patent No. KR101832344
1036	U.S. Patent No. 4,313,152
1037	U.S. Patent No. 1,563,731
1038	Performance Specification: MIL-PRF-55110F (1993)

I. INTRODUCTION

Petitioners Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioners”) respectfully submit this reply to Patent Owner AQ Corporation’s (“PO”) Patent Owner Preliminary Response (“POPR,” Paper No. 11), to address the issues identified in Petitioners’ request for leave.

After disclaiming all claims other than claims 8 and 16 (Ex. 2011), the POPR argues that several of Petitioners’ references, including the Kang application publication (Ex. 1012), allegedly do not disclose parallel-connected coils. The POPR is wrong and mischaracterizes those references’ disclosures. Notably, in a 2021 email that PO itself submitted in these proceedings after the Petition was filed, named inventor Kyungjun Choi described the patent resulting from Kang as including a “[t]echnical section related to parallel structure antenna.” Ex. 2001 at 149, 214. Mr. Choi’s statement belies the POPR’s argument that “Kang does not disclose or suggest electrically connecting an inner coil and an outer coil in parallel” or “in any way.” POPR at 19, 23. As explained below, and as confirmed by PO’s own named inventor, Kang expressly discloses parallel electrical connections between coils of the same antenna—including in inner/outer coil configurations.

II. PATENT OWNER’S EXHIBIT 2001 CONFIRMS KANG’S PARALLEL-CONNECTED ANTENNA DISCLOSURES

The POPR mischaracterizes Kang’s disclosure regarding parallel connections. The POPR argues that Kang is “silent with regard to any inner coil and outer coil

being electrically connected in parallel” and incorrectly argues that “*Kang* does not teach ... inner and outer coils of an antenna pattern connected in any way.” POPR at 17, 19; *see also id.* at 22 (arguing that *Kang* does not teach “electrically connecting in parallel an inner and outer coil of a single antenna pattern”), 23 (arguing that “*Kang* does not disclose an inner coil and an outer coil that make up the same antenna pattern formed on the same surface of a substrate, let alone that the inner and outer coil are electrically connected in parallel”). The POPR further incorrectly argues that *Kang* only “describes different functional antenna patterns that, while located on a same surface and including one coil surrounding the other coils, are not electrically connected in parallel, or at all.” *Id.* at 19.

Notably, however, PO’s named inventor, Kyungjun Choi, made statements that directly contradict the POPR’s characterizations of *Kang*. Exhibit 2001, submitted by PO, is a 2021 email in which named inventor Choi described U.S. Pat. No. 10,547,112 (the patent resulting from *Kang*) as including a “[t]echnical section related to parallel structure antenna.” Ex. 2001 at 149. Mr. Choi attached the *Kang* patent and highlighted a section that states, “two or more coils of different layers are connected by parallel connection to provide two more coil antennas that are parallel connected.” *Id.* at 214.

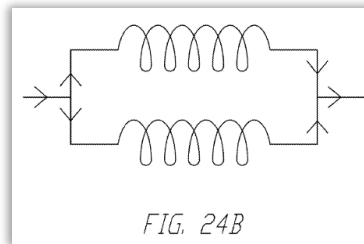
PO attempts to distinguish this evidence by arguing in its opposition to Petitioners’ request for leave that Ex. 2001 characterizes *Kang* as having “a parallel

structure across multiple layers,” and that Kang does not disclose parallel-connected coils “where the inner and outer coil are on the same surface.” Ex. 3001 at 3. But this narrow reading of Mr. Choi’s email ignores both its plain language and its broader context. Mr. Choi correctly described the Kang patent as disclosing “parallel structure antenna.” Ex. 2001 at 149. In fact, as discussed further below, Kang teaches parallel coil connections in multiple configurations, including same-side, single-antenna parallel connections disclosed in Kang paragraphs 214, 216, and 217, upon which the Petition relies.

III. KANG DISCLOSES ELECTRICALLY CONNECTING INNER AND OUTER WIRELESS CHARGING COILS IN PARALLEL

Contrary to the POPR’s arguments (at 19-24), Kang teaches electrically connecting an inner and an outer coil performing the same function (including wireless charging) in parallel, Kang explains how to do this, and the Petition properly relies on those disclosures. To start, Kang expressly discloses electrically connecting coils in parallel: “[T]he first coil antenna includes two or more coils electrically connected to each other in series *or in parallel* in the flexible PCB.” Ex1012 ¶ 214 (cited in the Petition at 12, 23, 55). Kang further discloses that the parallel-connected coils can perform a single antenna function together: “[T]he two coils may be connected in *parallel* [and] the two coils connected to each other can be used as a single antenna,” such as “an MST antenna, an NFC antenna and other antenna that uses a coil antenna, such as wireless charging antenna.” Ex. 1012

¶ 217 (cited in the Petition at 12, 23, 55, 63), ¶ 238 (cited in the Petition at 11, 33, 37, 53, 65). Kang teaches how to electrically connect these coils in parallel by illustrating the configuration in Figure 24B:



Ex. 1012 ¶ 217, Fig. 24B (cited in the Petition at 12, 23, 55).

Further, Kang discloses that the electrically connected coils performing wireless charging can be on the same surface of the substrate: “the two or more coils of the first coil can be arranged side by side.” Ex. 1012 ¶ 214 (cited in the Petition at 12, 23, 55). And Kang teaches that these coils can be arranged in an inner and outer coil configuration on the same substrate: in some embodiments “the antenna module includes two coils in which one coil surrounds the other,” and in others “one of the three or more coils surrounds another coil that surrounds one or more coils.” *Id.* ¶ 216 (cited in the Petition at 11, 33, 37, 53, 65).

In short, contrary to the POPR’s mischaracterizations, Kang’s teachings—paragraph 214’s teaching that coils within the same coil antenna can be connected in parallel, paragraph 217’s teaching that parallel-connected coils can operate as a single antenna, and paragraph 216’s teaching that coils can surround other coils on the same surface—disclose inner and outer coils on the same side of the substrate

may be electrically connected in parallel to function as a single antenna.

PO's opposition to Petitioners' request for leave incorrectly argues that the Petition "did not rely on the portion of Kang that Exhibit 2001 is characterizing" and that Petitioners are now seeking to "re-define the bounds" of the Petition. Not so. The Petition cites to the section containing the highlighted portion, and its related figures, over 15 times, as well as Kang's other disclosures of its "parallel structure antenna" (Ex. 2001 at 149), which teach parallel-connections in antennas with an inner-outer coil configuration. *See* Ex1012 ¶¶ 261-263, Figs. 46, 48-49 (cited in the Petition at 11, 20-22, 31, 33-35, 37, 40-41, 53); *see also* Ex1012 ¶¶ 214, 217, 238, Fig. 24B (cited in the Petition at 11-12, 23, 33, 37, 53, 55, 65).

IV. CONCLUSION

For the foregoing reasons, the Petition properly relies on Kang's teachings concerning parallel-connected coils in each of its three grounds. The Board should consider these points, as well as the other references' teachings set forth in the Petition, in evaluating whether the Petition has demonstrated a reasonable likelihood that the challenged claims are unpatentable.

Date: June 9, 2026

Respectfully submitted,

/s/ Robert A. Appleby

Robert A. Appleby, P.C.
Reg. No. 40,897

Attorney for Petitioners

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e)(4), it is hereby certified that on June 9, 2026, an electronic copy of this Petitioners' Reply to Patent Owner's Preliminary Response Brief were served via email on Patent Owner's counsel of record in this proceeding:

Jason Engel

Reg. No. 51,654

Anna Rebekah Hill

Reg. No. 81,745

K&L Gates LLP

70 W. Madison Street, Suite 3100

Chicago, IL 60602

Jason.Engel.PTAB@klgates.com

rebekah.hill@klgates.com

Erik J. Halverson

Reg. No. 73,552

K&L Gates LLP

4 Embarcadero Center, Suite 1200

San Francisco, CA 94111

erik.halverson@klgates.com

Date: June 9, 2026

Respectfully submitted,

/s/ Robert A. Appleby

Robert A. Appleby, P.C.

Reg. No. 40,897

Attorney for Petitioners