

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INFINEON TECHNOLOGIES AG,
Petitioner,

v.

FEINICS AMATECH TEORANTA¹,
Patent Owner.

IPR2022-00235
Patent 9,195,932 B2

Before STACEY G. WHITE, BRIAN D. RANGE and
JULIET MITCHELL DIRBA, *Administrative Patent Judges*.

WHITE, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

¹ Patent Owner is AmaTech Group Limited.

I. INTRODUCTION

Infineon Technologies Ag (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–10 of U.S. Patent No. 9,195,932 B2 (Ex. 1001, “the ’932 patent”). Paper 2 (“Pet.”). We instituted *inter partes* review of the challenged claims on all asserted grounds. Paper 13 (“Dec.”). After institution, AmaTech Group Limited (“Patent Owner”) filed a Patent Owner Response (Paper 22, “PO Resp.”), Petitioner filed a Reply (Paper 25, “Reply”), and Patent Owner filed a Sur-Reply (Paper 31, “Sur-Reply”). Patent Owner also filed a statutory disclaimer disclaiming claims 8–10. Ex. 2004. As a result, only claims 1–7 remain from among the originally-challenged claims. Petitioner also filed a Motion to Strike (Paper 32, “Mot.”) and Patent Owner filed an Opposition to the Motion to Strike (Paper 34, “Opp. Mot.”). An oral hearing was held on April 5, 2023, and a transcript of the hearing² is included in the record (Paper 40, “Tr.”). In addition, Patent Owner filed objections to a number of Petitioner’s demonstrative slides. Paper 39.

We have jurisdiction under 35 U.S.C. § 6. This Decision is issued pursuant to 35 U.S.C. § 318(a). For the reasons that follow, we determine Petitioner has shown, by a preponderance of the evidence, that claims 1–7 of the ’932 patent are unpatentable. In addition, we dismiss the Motion to Strike as moot. We also dismiss as moot Patent Owner’s Objections to Petitioner’s Demonstrative Slides.

² The oral hearing for related case IPR2022-00417 also was held that day and a single consolidated transcript was prepared and made of record in both cases.

A. Related Matters

The parties indicate that the '932 patent is the subject of the following district court proceedings: *Smart Packaging Solutions SA v. CPI Card Group Inc.*, No. 1:21-cv-00556 (D. Del. 2021) and *Smart Packaging Solutions SA v. Perfect Plastic Printing Corp.*, No. 1:21-cv-00557 (D. Del. 2021). Pet. xv; Paper 5, 2. Patent Owner further indicates that patents related to the '932 patent are at issue in pending IPR petitions in IPR2022-00417, *Infineon Technologies AG v. Feinics AmaTech Teoranta* (filed Jan. 10, 2022) (U.S. Pat. No. 9,033,250 B2) and IPR2022-00650, *Infineon Technologies AG v. AmaTech Group Ltd.* (filed Feb. 28, 2022) (U.S. Pat. No. 9,633,304 B2). Paper 5, 2–3. We also note, an additional pending IPR petition in IPR2022-00951, *Infineon Technologies AG v. AmaTech Group Ltd.* (Apr. 29, 2022) (U.S. Pat. No. 9,165,240 B2).

B. Statutory Disclaimer

Patent Owner filed a statutory disclaimer of claims 8–10 of the '932 patent pursuant to 37 C.F.R. § 1.321. PO Resp. 3; Ex. 2004. A statutory disclaimer is “considered as part of the original patent” as of the date on which it is “recorded” in the Office. 35 U.S.C. § 253(a). For a disclaimer to be “recorded” in the Office, the document filed by the patent owner must:

- (1) Be signed by the patentee, or an attorney or agent of record;
- (2) Identify the patent and complete claim or claims, or term being disclaimed. A disclaimer which is not a disclaimer of a complete claim or claims, or term will be refused recordation;
- (3) State the present extent of patentee's ownership interest in the patent; and
- (4) Be accompanied by the fee set forth in [37 C.F.R.] § 1.20(d).

37 C.F.R. § 1.321(a); *see also Vectra Fitness, Inc. v. TNWK Corp.*, 162 F.3d 1379, 1382 (Fed. Cir. 1998) (holding that a § 253 disclaimer is immediately “recorded” on the date that the Office receives a disclaimer meeting the requirements of 37 C.F.R. § 1.321(a), and that no further action is required in the Office).

Based on our review of Exhibit 2004 and the Office’s public records, we conclude that claims 8–10 have been disclaimed under 35 U.S.C. § 253(a) in compliance with 37 C.F.R. § 1.321(a), and thus, we will consider only the challenges to claim 1–7.

Petitioner contends that it has “invested substantial resources in challenging all claims. Given that AmaTech has continuation-in-part applications pending, adverse judgement should be entered to trigger estoppel precluding the pursuit of claims patentably indistinct from those AmaTech refused to defend here.” Reply 28 (citing 37 C.F.R. § 42.73(d)(3)(i)).

As to the on-going prosecution of related claims before this Office, we remind Patent Owner of its duty of candor. Rule 1.56 places upon

[e]ach individual associated with the filing and prosecution of a patent application . . . a duty to disclose to the Office all information known to that individual to be material to patentability as defined in this section. The duty to disclose information exists with respect to each pending claim until the claim is cancelled or withdrawn from consideration, or the application becomes abandoned.

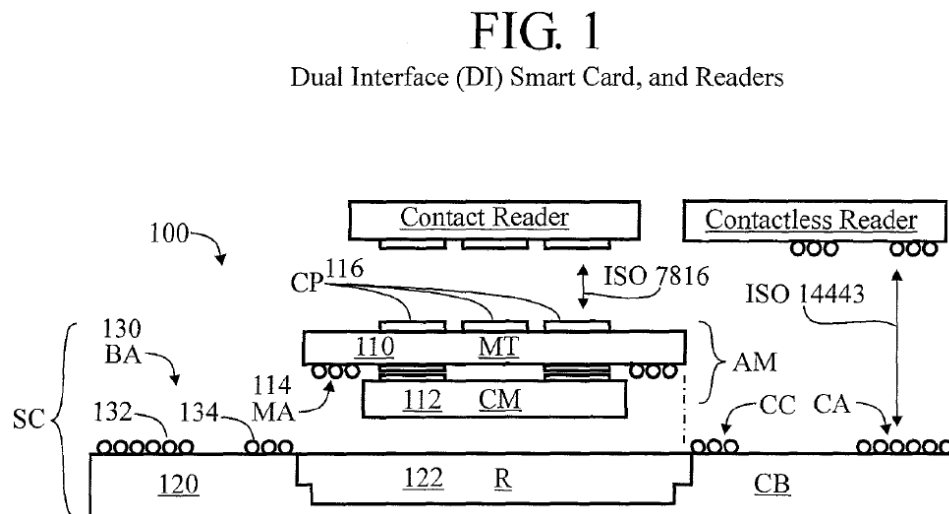
37 C.F.R. § 1.56.

Under the circumstances of this case, we do not agree that adverse judgment with respect to the disclaimed claims is appropriate. Our Rules, provide that a party may request judgment *against itself*. 37 C.F.R.

§ 42.73(b). Here, Patent Owner is not requesting adverse judgment against itself. While it is true that 37 C.F.R. § 42.73(b) provides that “[a]ctions construed to be a request for adverse judgment include . . . (2) [c]ancellation or disclaimer of a claim such that the party has *no remaining claim* in the trial” (emphasis added), we decline to construe Patent Owner’s statutory disclaimer as a request for adverse judgment in this proceeding because Patent Owner does not disclaim all challenged claims and the majority of the challenged claims remain in this trial.

C. The '932 Patent

The '932 patent is titled “Booster Antenna Configurations and Methods.” Ex. 1001, code (54). Generally, the '932 patent describes a booster antenna for a smart card. *Id.* at code (57). Figures 1 and 1A of the '932 patent are reproduced below.



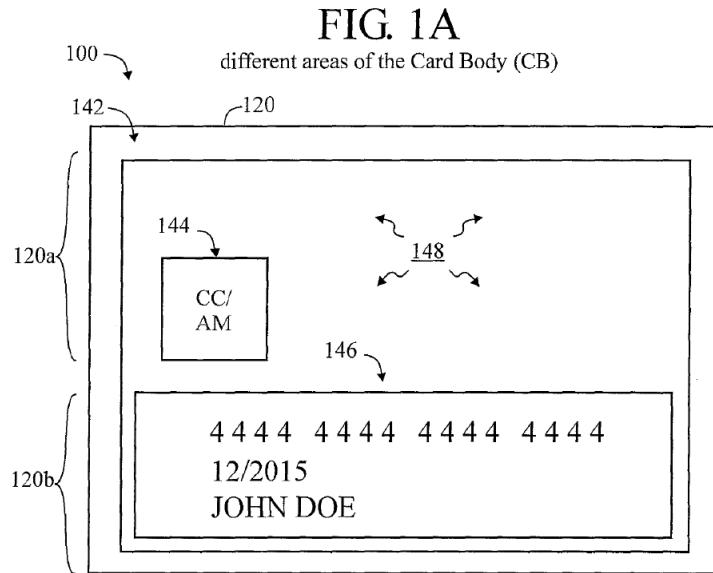


Figure 1 is a cross-section of a dual-interface smart card and reader and Figure 1A is the top view of a smart card's card body (CB). *Id.* at 7:27–29. A smart card may comprise card body (CB) (120) that has coupling area (144) in the location of antenna module (AM), and booster antenna (BA) (130). *Id.* at 1:57–59, 10:34–36. Antenna module (AM) may comprise an RFID (radio frequency identification) chip or chip module. *Id.* at 1:57–59. Booster antenna (BA) (130) may comprise various antenna components, such as card body antenna (CA) (132) for coupling with an external contactless reader, and coupling coil (CC) (134) for coupling with module antenna (MA) (114) of antenna module (AM). *Id.* at 1:57–59. Figure 11A is reproduced below.

FIG. 11A
BA with CC and EA

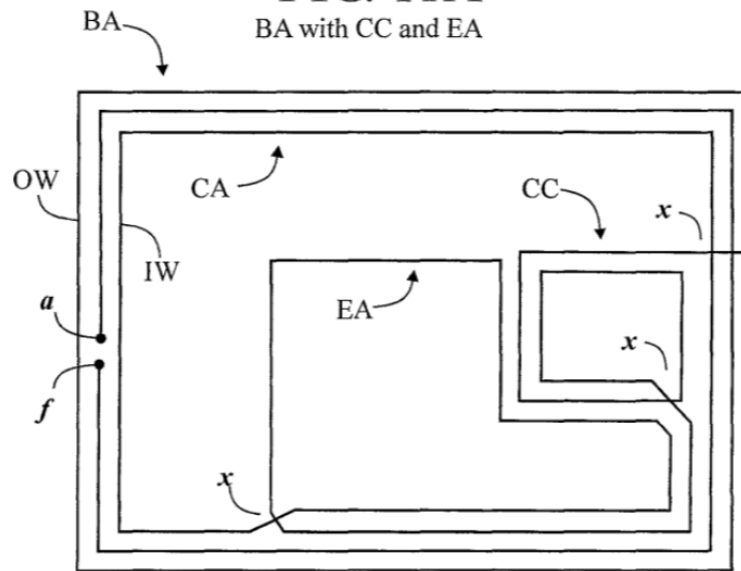


Figure 11A depicts a booster antenna (BA) and its components with the booster antenna having a starting point “a” and a finishing point “f.” *Id.* at 8:24–26, 34:18–36. Card antenna (CA) may extend around the card body (CB) and comprises two distinct windings, such as inner winding (IW) and outer winding (OW) (“x” marks the crossover of a turn or loop of a wire). *Id.* at 1:63–66, 2:41–44, 11:19–21, 33:53–57. Coupler coil (CC) may have clockwise (CW) or counter-clockwise (CCW) sense (or orientation or laying direction) which is the same as or opposite to the sense (CW or CCW) of the outer and inner windings. *Id.* at 4:26–30, 12:47–48, 33:50–53. Sense may be determined by following the pattern from “a” to “f” or “f” to “a.” *Id.* at 12:50–53. Antenna extension (EA) may comprise several turns of wire, and may be connected with none, one, or both of card antenna (CA) and coupler coil (CC). *Id.* at 10:63–67.

D. Illustrative Claims

Claim 1–7 are the remaining challenged, and claims 1 and 5 are independent. Claim 1 is illustrative.

1. A booster antenna (BA) comprising a card antenna (CA) component extending around a periphery of a card body (CB), a coupler coil (CC) component disposed at a coupling area of the card body (CB) corresponding to an antenna module (AM), and an extension antenna (EA) component, characterized by:

the extension antenna (EA) component has a sense opposite to that from the card antenna (CA) component.

Ex. 1001, 48:2–9.

E. Asserted Grounds of Unpatentability

Petitioner, supported by the declaration of Dr. Daniel van der Weide (Ex. 1003), asserts the following grounds³ of unpatentability (Pet. 1)⁴:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–7	102/103	Takeda-322 ⁵
1–6	102	Murayama ⁶
7	102/103	Murayama

³ There were additional grounds asserted, but those grounds are now moot in light of the statutory disclaimer.

⁴ The relevant sections of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, took effect on March 16, 2013. The application that issued as the ’932 patent was filed after this date, but claims the priority to applications filed before March 16, 2013. *See* Ex. 1001, codes (22), (60), (63). For the purposes of this Decision, we need not determine whether pre or post-AIA statutes apply, as explained below. Moreover, our analysis would be the same under either version of these statutes. *See* Pet. 60–61 (arguing that Murayama is prior art whether or not pre-AIA law applies).

⁵ JP 4016322 B2 (certified translation and original) (Ex. 1005, “Takeda-322”).

⁶ WO 2011/122162 A1 (certified translation and original) (Ex. 1007, “Murayama”).

II. ANALYSIS

A. Level of Ordinary Skill in the Art

In order to determine whether an invention would have been obvious at the time the application was filed, we consider the level of ordinary skill in the pertinent art at critical time. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). “The [person of ordinary skill in the art] is patent law’s hypothetical, legal construct ‘akin to the ‘reasonable person’ used as a reference in negligence determinations.’” *McCoy v. Heal Sys., LLC*, 850 F. App’x 785, 787–88 (Fed. Cir. 2021) (citing *In re Rouffet*, 149 F.3d 1350, 1357 (Fed. Cir. 1998)). Understanding what this hypothetical person would have known is important because it allows us to “maintain[] objectivity in the obviousness inquiry.” *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991). In assessing the level of ordinary skill in the art, various factors may be considered, including the “type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (quotation omitted). Generally, it is easier to establish obviousness under a higher level of ordinary skill in the art. *Innovention Toys, LLC v. MGA Entm’t, Inc.*, 637 F.3d 1314, 1323 (Fed. Cir. 2011) (“A less sophisticated level of skill generally favors a determination of nonobviousness . . . while a higher level of skill favors the reverse.”).

Petitioner asserts that a person having ordinary skill in the art “would have a Bachelor’s degree in electrical engineering or a similar field, and 1–2 years of experience researching and developing antennas used in RFID applications. Additional educational background could substitute for

professional experience and vice versa.” Pet. 8 (citing Ex. 1003 ¶¶ 22–26). Patent Owner argues that Petitioner’s definition of the level of ordinary skill in the art is too broad because the field of RFID is “incredibly wide,” with important differentiation criteria including the operating frequency of the reader, the physical coupling method, and the range of the system. PO Resp. 23 (citing Ex. 2003 ¶¶ 20–28; Ex. 2005, 11, 22).

According to Patent Owner, the smart cards of the ’932 patent operate on relatively low frequencies, require antennas that perform inductive coupling, and are technologically distinct from antennas for microwave RFID devices. *Id.* (citing Ex. 2003 ¶¶ 24). Thus, Patent Owner asserts that a person having ordinary skill in the art “would have had a Bachelor’s degree in electrical engineering or a similar field, and 1–2 years of experience researching and developing antennas for RFID devices that are used for inductive coupling; additional educational background could substitute for professional experience and *vice versa*.” *Id.* at 25 (citing Ex. 2003 ¶ 26) (emphasis original).

The parties are in general agreement as to the level of education (undergraduate degree in electrical engineering or equivalent) and the number of years of experience working with RFID devices (1–2 years), but differ as to the exact nature of that experience (developing antennae used in RFID devices versus developing antennae used in RFID devices for inductive coupling). Petitioner points out that “the claims are not limited to a [Booster Antenna (BA)] operating at any particular frequency range.” Reply 25. In addition, Patent Owner submitted into the record a text titled RFID Handbook, which details different frequencies and types of coupling that may be at use by various RFID systems. *See* Ex. 2005, 22–23.

Although this text differentiates between “inductively or capacitively coupled system[s] and microwave system[s] or backscatter system[s]” (*id.* at 23 (emphasis omitted)), its description of each of these types of RFID devices indicates that an ordinary artisan would have had experience with RFID devices generally. Thus, we are not persuaded that the level of ordinary skill should be narrowly confined to developing antenna for RFID devices that are used for inductive coupling. For the purposes of this Decision, we adopt Petitioner’s definition of the level of ordinary skill in the art as “a Bachelor’s degree in electrical engineering or a similar field, and 1–2 years of experience researching and developing antennas used in RFID applications.” Pet. 8⁷.

B. Dr. van der Weide’s Testimony

Patent Owner argues that we should not give substantial weight to the testimony of Petitioner’s declarant, Dr. van der Weide, because he “he lacks relevant experience, his testimony runs counter to fundamental principles of the RFID technology disclosed in the ’932 patent, and his testimony evidences a lack of candor.” PO Resp. 46. According to Patent Owner, Dr. van der Weide “has experience with RFID that operates at microwave frequencies,” but “identifies no experience with inductive RFID systems at lower frequencies (*e.g.*, frequencies such as 13.56MHz and 8.2MHz).” *Id.* This argument is based on Patent Owner’s articulation of the level of ordinary skill in the art, which we have not adopted. Moreover, Petitioner presents evidence that Dr. Van der Weide’s experience exceeds even Patent

⁷ We further note that our final determination, on the merits, would be the same even under Patent Owner’s definition of the level of ordinary skill in the art.

Owner’s articulation of the level of ordinary skill in the art. Reply 25–27. Dr. van der Weide’s education and experience are sufficient to allow us to grant his testimony our full consideration. *See* Ex. 1003 ¶¶ 2–7; Ex. 1004 (van der Weide *curriculum vitae*).

Patent Owner also argues that Dr. van der Weide’s testimony “runs counter to fundamental principles of inductive coupling RFID technology.” PO Resp. 47–48 (formatting omitted). In order to illustrate this alleged lack of experience and understanding of the inductive coupling RFID technology, Patent Owner directs us to an exchange from Dr. van der Weide’s deposition in which he failed to immediately know (and testify) that Takeda-322’s L_2 inductance is much larger than L_1 . *Id.* at 47. Patent Owner further argues that this alleged failure “is directly relevant to his mistaken opinion that Takeda-322 discloses an ‘extension antenna component.’” *Id.* at 48. Patent Owner further criticizes Dr. van der Weide’s deposition testimony in various regards including an alleged lack of candor. *Id.* at 49–52; Sur-Reply 24–26. Petitioner argues that Dr. van der Weide’s deposition testimony represents careful answers to irrelevant hypotheticals. Reply 27.

Patent Owner does not seek to exclude Dr. van der Weide’s testimony. When considering credibility and weight of evidence below, we consider Dr. van der Weide’s testimony as a whole as well as all other evidence of record.

C. Claim Construction

In an *inter partes* review proceeding, a patent claim shall be construed using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b). 37 C.F.R. § 42.100(b) (as amended Oct. 11, 2018). Our rule adopts the same claim construction

standard used by Article III federal courts, which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. In applying this standard, claim terms are generally given their ordinary and customary meaning, as would be understood by a person of ordinary skill in the art, at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner asserts that “[n]o claim term requires an exact outer boundary construction, because the prior art relied upon herein meets the claim terms under any reasonable interpretation.” Pet. 9. Patent Owner proposes constructions for the claim terms “booster antenna,” “card antenna component,” “coupler coil component,” and “extension antenna component.” PO Resp. 25–45. According to Patent Owner, Petitioner also has proposed its own constructions for these terms, despite stating that no claim term requires construction. *Id.* at 25–26. We address “booster antenna” and “extension antenna” below.⁸ It is unnecessary to construe “card antenna component” or “coupler coil component” in this Decision

⁸ Patent Owner also argues that Petitioner belatedly construes “card body” in Petitioner’s Reply. Sur-Reply 16–18. We do not construe “card body” because this construction is not necessary to resolve this matter. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

because none of the parties' disputes turn on the meaning of either term. *See, e.g., Nidec Motor Corp.*, 868 F.3d at 1017.

1. Booster Antenna

Patent Owner defines a “booster antenna” as “an antenna tuned to a single resonance frequency that enables a chip to communicate with an external reader.” PO Resp. 26. According to Patent Owner, Petitioner implicitly defines a “booster antenna” as “a conductive element that enables an IC chip to communicate with an external reader.” *Id.* at 28 (citing Pet. 16). Patent Owner directs us to multiple citations in the '932 patent specification that indicate a resonance frequency for the antenna. PO Resp. 27; *see e.g.*, Ex. 1001, 17:32–34 (“[booster antenna’s] resonance frequency”), 18:36–44 (“desired resonance of 13.56 MHz”). According to Patent Owner “the '932 patent teaches a new type of booster antenna” and the description in the specification is not “permissive” in regards to frequency. Sur-Reply 19–20. Patent Owner further argues that “[n]owhere does the '932 patent disclose a card antenna tuned to multiple resonance frequencies.” PO Resp. 27 (citing Ex. 2003 ¶ 71). Patent Owner then contends that “Petitioner argues that an amalgam of components from Murayama’s separate antennas, each tuned to a different frequency, constitutes a booster antenna” and thus, Petitioner’s implied construction is incorrect. *Id.* at 26. Dr. Eisenstadt supports Patent Owner’s position by opining that Petitioner’s construction is correct, but incomplete “in that it leaves open the unavailable possibility of the booster antenna being tuned to more than a single resonance frequency.” Ex. 2003 ¶ 69.

We are not persuaded that Patent Owner’s proposed construction is correct. We note that none of the claims recite specific frequencies or

frequency ranges, and no claims prohibit the booster antenna from resonating at different frequencies. Further, the examples in the specification describe the frequency with permissive and approximate language. *See e.g.*, Ex. 1001, 31:63–64 (“*may* have a self-resonance frequency of *approximately* 75 MHz”) (emphasis added); 31:66–32:1 (capacitors “*may* reduce the resonance frequency to a more desirable range of *approximately* 13~17 MHz”) (emphasis added); 39:41–42 (“the booster antenna [] *may* have a resonance frequency at or below 13.56 MHz”) (emphasis added). The specification also notes that “[w]hile the invention(s) has/have been described with respect to a limited number of embodiments, these should not be construed as limitations on the scope of the invention(s), but rather as examples of some of the embodiments.” *Id.* at 47:45–48; *see also id.* at 5:31–6:46 (noting eight times that the described embodiments are examples); 8:51–52 (embodiments “should be construed as illustrative rather than limiting”), 7:11 (“non-limiting example”). Patent Owner contends that “[e]ven if permissive language, so-called permissive language, is used in the specification, it’s still informing a person of ordinary skill in the art as to the scope of the claim terms.”⁹ Tr. 55:6–9. The Federal Circuit, however, has noted that “[e]mbodiments in the specification—even if there is only one embodiment—cannot limit the scope of the claims absent the patentee’s ‘words or expressions of manifest exclusion or restriction.’” *Apple Inc. v.*

⁹ Patent Owner relies on “the context of the ’932 patent” to support its construction and does not, for example, argue that an ordinary artisan would have understood the term “booster antenna” to be limited in this way outside of the context of the ’932 patent. Sur-Reply 19–20 (emphasis omitted); *cf.* Reply 13 (Petitioner explaining that booster antennas “designed to resonate at multiple frequencies were well-known”) (citing Ex. 1055 ¶¶ 56–60).

Wi-LAN Inc., 25 F.4th 960, 967 (Fed. Cir. 2022) (citing *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1372 (Fed. Cir. 2014)). We see no such manifest exclusion or restriction in the '932 patent specification.

Thus, we decline Patent Owner's request to limit the claims to the described single-frequency embodiments. *See Phillips*, 415 F.3d at 1323. We need not provide further express construction of this claim language to resolve the issues before us.

2. *Extension Antenna Component*

Patent Owner argues that "extension antenna component" should be construed as "a component connected to at least one of the card antenna component or the coupler coil, which enhances coupling between the module antenna and the booster antenna." PO Resp. 30. According to Patent Owner, Petitioner construes the term to mean "an additional coil, disposed in available card space, that contributes to the booster antenna's inductance." *Id.*; *see* Pet. 4. Petitioner does not propose an "outer bounds" construction for "extension antenna component" but argues that the extension antenna should contribute to the inductance of the booster antenna. *See, e.g.*, Pet. 4, 24, 73–74.¹⁰

We begin our assessment of the parties' arguments by examining the language of claims 1, 2, and 5. Claim 1 recites, in relevant part, "extension

¹⁰ Patent Owner argues that Petitioner fails to properly offer a construction for extension antenna. *See, e.g.*, Sur-Reply 1–2. While we agree that Petitioner has been less than clear as to precisely how Petitioner believes "extension antenna" should be construed, Petitioner took the position that "ordinary and customary" meaning applies. Pet. 9; *see also id.* (asserting that no outer bound is required "because the prior art relied upon in the grounds meets the claim terms under any reasonable interpretation."). Petitioner's position is sufficient to comply with 37 C.F.R. § 42.104(b)(3).

antenna (EA) component has a sense opposite to that from the card antenna (CA) component.” Ex. 1001, 26:49. Claim 2 depends from claim 1 and further recites, in relevant part, “wherein the coupler coil (CC) component has a sense which is the same as the sense of the extension antenna (EA) component.” Claim 5 recites, in relevant part, recites a booster antenna comprising several components including an extension antenna component and recites that “at least one of the components has a sense which is opposite one or more of the other components.” *Id.* at 28:14–42. Thus, the claim language does not provide insight into what the extension antenna component is connected to and how or whether the extension antenna component contributes to or enhances coupling or contributes to inductance. Therefore, the claim language is not particularly illuminating as to this dispute.

Next, we analyze the intrinsic record to see how that illuminates the disputed claim language. The Federal Circuit has “explained that the specification is the ‘single best guide to the meaning of a disputed term,’ and ‘is, thus, the primary basis for construing the claims.’” *Grace Instrument Indus., LLC v. Chandler Instruments Co., LLC*, 57 F.4th 1001, 1008 (Fed. Cir. 2023) (quoting *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996), *Phillips*, 415 F.3d at 1315) (internal citations omitted).

Patent Owner directs us to a number of passages in the specification that it asserts supports its position that the extension antenna component must be connected to the coupler coil and/or the card antenna. PO Resp. 14–17. For example, the Patent Owner directs us to this passage from column 16, which states that “[t]he extension antenna (or extension coil) EA has

two ends----one end is connected to the coupler coil CC, the other end is connected to the card antenna CA.” Ex. 1001, 16:57–59. That specific passage is describing Figure 4A of the ’932 patent. *Id.* at 16:24–27. In that embodiment, “The extension antenna EA has one end extending from an end of the coupler coil CC, and another end extending from an end of the card antenna CA, and exhibits a cross-over.” *Id.* at 16:35–37.

Petitioner direct us to a different passage that indicates that the extension antenna component “may also ‘*not [be] connected with either*’ [the card antenna or the coupler coil].” Pet. 73 (quoting Ex. 1001, 10:62–67). That passage states that “[t]he antenna extension EA may comprise several turns (or traces) of wire (or other conductive material), and may be either (i) connected with one or both of the card antenna CA and coupler coil CC or (ii) not connected with either of the card antenna CA and coupler coil CC.” Ex. 1001, 10:63–67.

We are persuaded that the specification supports Petitioner’s view. Patent Owner asserts that the passage cited by Petitioner “directly conflicts with oceans of disclosure showing the extension must be connected.” PO Resp. 34. Patent Owner further notes that the Federal Circuit has held that “a single sentence in the specification cannot overcome the overwhelming evidence in other parts of the specification and the provisional application ... demonstrating that the intended definition of [a] term.” *Id.* at 35 (quoting *Trustees of Columbia Univ. in City of New York v. Symantec Corp.*, 811 F.3d 1359, 1366 (Fed. Cir. 2016)). This, however, is not a case where there is “overwhelming evidence” of Patent Owner’s asserted construction. As Petitioner points out, the ’932 patent uses permissive language throughout the specification when discussing the connection between the extension

antenna component and the card antenna and/or coupler coil. Reply 21. For example, Patent Owner cites dozens of passages that it purports to support its position, however, the majority of those passages use permissive language to describe the connection between the extension antenna component and the coupler coil and card antenna, and the remainder simply describe a particular embodiment. *See* PO Resp. 14–17; *see e.g.*, Ex. 1001, 4:62-65 (“an extension antenna ... ***which may be connected*** to and extend from at least one of the card antenna (CA) and the coupler coil (CC)”), 5:56-59 (“(EA) has two ends. One end ***may be connected*** to an end of the coupler coil (CC). One [] end ***may be connected*** to the card antenna (CA) ...”), 33:46–47 (“The components CA, CC, EA of the booster antenna BA ***may be interconnected***, as shown.”).

Patent Owner’s Sur-Reply provides further citations to portions of the specification in which it describes as “mandatory.” Sur-Reply 11 (citing Ex. 1001, 16:35-37 (“EA has”), 16:57–59, 17:9–13, 17:60–62, 18:15–17, 18:25–26, 19:24–25, 19:38–40, 20:1–2, 20:25–26). We note, however, that each of these cited passages are describing embodiments shown in Figures 4A-4H. Ex. 1001, 7:44–49 (“illustrating embodiments of a booster antenna (BA) with card antenna CA, a coupler antenna (CC) and an extension antenna (EA)”). Thus, these passages are not sufficient to limit the scope of the extension antenna component. *See e.g., id.* at 19:38-40 (“***In this example***, the extension antenna EA have...”)(emphasis added).

Patent Owner further directs us to the findings of fact from a district court case regarding joint inventorship where the district court noted that the patent at issue there used the word “may” “repeatedly throughout the specification to refer to matters that are not optional.” Sur-Reply 5 (quoting

Ethicon, Inc. v. United States Surgical Corp., 937 F. Supp. 1015, 1030 (D. Conn. 1996)) The Federal Circuit, however, has approved of Board cases in which we have held that the use of permissive language is indicative of optional language. *See e.g., In re Johnston*, 435 F.3d 1381, 1384 (Fed. Cir. 2006) (“additional content did not narrow the scope of the claim because these limitations are stated in the permissive form ‘may’”). In addition, this district court decision is not precedent to the Board. Moreover, that decision is distinguishable for two reasons. First, the *Ethicon* court assessed a means plus function claim, claim 33, and determined that the specification described certain networks that were structure corresponding to the recited function pursuant to 35 U.S.C. § 112 ¶ 6. *Ethicon*, 937 F. Supp. at 1030. The use of the word “may” in the specification did not prevent the specification’s structure from limiting claim scope in this § 112 ¶ 6 context especially because the specification used “may” to also set forth required elements. *Id.* Here, in contrast, claims 1, 2, and 5 do not invoke § 112 ¶ 6; there is, thus, no invocation of means plus function language that would provide a statutory reason to limit claim scope to the specification’s structure.

Patent Owner also attempts a strained reading of the passage cited by Petitioner. According to Patent Owner, “[t]he second option does not mean ‘connected with neither the card antenna nor coupler coil.’ Instead, it means ‘unconnected with either the card antenna and the coupler coil.’” PO Resp. 36. This is not persuasive. The first option in that sentence states “(i) connected with one or both of the card antenna CA and coupler coil CC.” Ex. 1001, 10:63–66. This plainly describes Patent Owner’s preferred construction, one in which the extension antenna component is connected to

the card antenna alone, the coupler coil alone, or both the card antenna and the coupler coil. The second option, however, supports Petitioner's argument that the extension antenna component may be connected to neither the card antenna nor the coupler coil. It states "(ii) not connected with either of the card antenna CA and coupler coil CC." *Id.* at 10:66–67. Patent Owner's reading of this passage would render the second option superfluous. The first option already allows for connection with "one *or* both" of the card antenna or coupler coil. Thus, there would be no need for option two if it only meant that the extension antenna component could be unconnected with one of the card antenna or coupler coil. Patent Owner persists arguing that grammatically the word "not" modifies "connected" and not the word "either" and as such, regardless of the duplicative nature of that reading the option means not connected to either the coupler coil or the card antenna. Sur-Reply 12. This, however, ignore the word "and" which indicates to us that the extension antenna component is not connected to both the card antenna **and** the coupler coil.

Now, we move on to the parties' dispute regarding whether the extension antenna component "enhances coupling between the module antenna and the booster antenna" (Patent Owner's construction) or "contributes to the booster antenna's inductance" (Petitioner's construction). Dr. William Eisenstadt opines that "[a person of ordinary skill in the art] would understand that the extension antenna enhances overall coupling between the module antenna and the booster antenna." Ex. 2003 ¶ 65 (citing Ex. 1001, 18:58–61). The passage Dr. Eisenstadt is relying on states that "extension antennas EA . . . *may enhance the overall coupling* between the booster antenna BA and the module antenna MA, and/or the booster antenna

BA and the antenna of an external reader.” Ex. 1001, 18:58–61 (emphasis added). Dr. Eisenstadt further testifies that the coupling is enhanced by “increasing the inductive coupling between the module antenna and the coupler coil (which is part of the booster antenna).” Ex. 2003 ¶ 66 (citing Ex. 1001, 17:42–46, 18:44–47). The passages that Dr. Eisenstadt relies upon for this point state, “[a]dditionally, the extension antenna EA **may increase the inductive coupling** between the module antenna MA of the antenna module AM and the coupler coil CC of the booster antenna BA, and this may be more important than increasing the inductivity of the booster antenna BA.” Ex. 1001, 17:42–46 (emphasis added); *see also id.*, 18:44–47 (“[t]he extension antenna EA **may increase the coupling factor** between the coupler coil CC and the module antenna MA of the antenna module AM.”) (emphasis added). Here again, the specification uses permissive language to describe the extension antenna component as a component that **may** increase coupling.

In contrast, the specification omits “may” when describing the extension antenna’s function of contributing to the inductance of the booster antenna. *See, e.g.*, Ex. 1001, code (57) (“an extension antenna (EA) contributing to the inductance of the booster antenna (BA)”), 5:52–53 (“The extension antenna (EA) contributes to the inductance of the booster antenna (BA).”), 27:41–44 (“In the present invention, the antenna extension EA . . . contributes to the inductance of the booster antenna BA”). Patent Owner is correct in stating that the specification notes that enhancing coupling “may be more important than increasing the inductivity of the booster antenna BA.” *See* Ex. 1001, 17:42–46. This language, however, is permissive and it conveys that the recited extension antenna component may enhance coupling

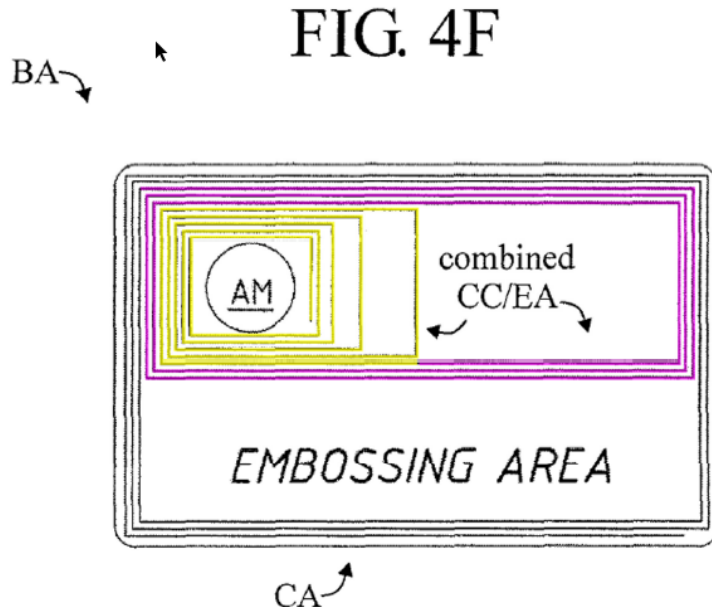
and, in the event that the coupling enhancement occurs, that may be more important than the contribution to inductance. We take from this passage that enhancing coupling is a powerful, but optional, feature as compared to the contribution to inductance which is required for the extension antenna component.

Patent Owner argues that the specification contemplates coils that provide merely “negligible” contributions of inductance to the booster antenna and finds those structures to be lacking. PO Resp. 33. The ’932 patent describes a “dummy turn” with “the winding direction of the two conductor tracts being opposite with respect to one another so that the dummy turn does not supply any or a negligible contribution to the inductance of the booster antenna structure.” Ex. 1001, 26:14–19. This dummy turn, however, contrasts with the description of the extension antenna which is expressly noted to contribute to inductance of the booster antenna. *See e.g., id.* at 5:52–53. Thus, the specification supports that the extension antenna’s contribution to the booster antenna is non-negligible.

Patent Owner appears to argue that, because the extension antenna and coupler coil are separate recitations, they must also have entirely non-identical functions. PO Resp. 33, 39–45. We disagree. Each of the challenged claims is directed to an apparatus. Thus, different claim terms have different meanings and refer to distinct structure of the claimed apparatus. There is no requirement, however, that different claim recitations in an apparatus claim necessarily perform entirely separate functions. Also, there is no requirement that different claim terms require that each separate structure within the apparatus necessarily has physical differences. *See Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 n.3

(Fed. Cir. 2006) (“[T]he use of two terms... connote[s] different meanings, not that they necessarily refer to two different structures.”); Pet. Reply 5.

Petitioner argues that “the ’932 Specification says the *same coil* may serve as both an extension antenna *and* a coupler coil.” Pet. 25 (citing Ex. 1001, 19:49–63; Ex. 1003 ¶ 104) (emphasis omitted). Patent Owner asserts that Petitioner’s reading of the specification is “clearly wrong.” PO Resp. 40 (citing Ex. 2003 ¶ 88); *see also* Sur-Reply 15–16. Patent Owner reproduces and colorizes Figure 4F of the ’932 patent, and we provide that reproduction below.



PO Resp. 23–24. Annotated Figure 4F, reproduced above, is a “diagram illustrating [an] embodiment[] of a booster antenna (BA) with card antenna CA, a coupler antenna (CC), and an extension antenna (EA).” Ex. 1001, 7:47–49. Patent Owner annotates the figure by coloring smaller size rectangular windings near the antenna module with yellow and colorizing larger rectangular windings farther from the antenna module with purple.

Figure 4F illustrates that, in this embodiment, the extension antenna and coupler coil are combined to form one large coil. We agree with Petitioner that deciding where to switch from yellow (coupler coil) to purple (extension antenna) in the figure is arbitrary. Pet. Reply 5–7; Ex. 1057 ¶ 19. Patent Owner’s witness agrees that the line could subjectively be moved to some amount. Ex. 1050, 143:10–20, 146:19–147:2 (Patent Owner’s witness, Dr. William Eisenstadt, indicating that the line could subjectively move). Moreover, Patent Owner’s witness indicates that at least a portion of the coupler coil could perform functions of either component. Ex. 1050, 144:18–146:16; *see also* Ex. 1055 ¶ 24 (Dr. van der Weide providing consistent testimony). Figure 4F, and the Specification’s discussion of that Figure, as a whole suggests that the line between extension antenna and coupler coil may be blurred such that portions of a combined coil may perform functions of both the extension antenna and coupler coil. Ex. 1001, 19:52–56 (“In this [Figure 4F] example, the coupler coil CC and extension antenna EA are essentially combined with one another.”); *see also* Pet. Reply 6 (explaining that portions of the Figure 4F extension antenna are closer to the antenna module than portions of the coupler coil meaning that parts of the extension antenna will couple more strongly with the antenna module than parts of the coupler coil) (citing Ex. 1055 ¶ 24; Ex. 1050, 142:1–5, 146:10–13).

Finally, we consider extrinsic evidence. Neither party, however, uses extrinsic evidence to argue what known or ordinary meaning “extension antenna” might have to a person having ordinary skill in the art, in this context. Just to the contrary, both parties appear to agree that “extension

antenna” was not a known term. *See, e.g.*, Sur-Reply 6–7 (Patent Owner acknowledges that extension antenna “was not a known term”).

Based on extrinsic evidence apart from the ’932 patent, however, Patent Owner presents evidence¹¹ that its witness, Dr. Eisenstadt, has testified that the extension antenna component enhances overall coupling between the module antenna and the booster antenna. Sur-Reply 12–13 (citing Ex. 2028). But this evidence, at most, only addresses functions that an extension antenna component, in view of Patent Owner’s patent disclosures, could perform. The evidence does not establish known or ordinary meaning of the words “extension antenna” to a person having ordinary skill in the art.

In view of all of the evidence presented above, we construe the “extension antenna” to mean “an additional coil, disposed in available card space, that non-negligibly contributes to the booster antenna’s inductance.”

D. Overview of the Asserted Prior Art

1. Takeda-322 (Exhibit 1005)

Takeda-322 describes “a contactless IC card.” Ex. 1005 ¶ 1. As described in Takeda-322 an IC card “can, by being provided with a booster coil that operates as an external antenna shared by a plurality of IC chips, provide an increased information transmission distance and have its included functions easily expanded.” *Id.* ¶ 5. Takeda-322’s “booster coil is formed, as a two-dimensional spiral of a plurality of turns.” *Id.* ¶ 6. The booster coil operates as an external antenna that boosts signals by providing increased

¹¹ This evidence is the subject of Petitioner’s Motion to Strike. Paper 32. As we explain *supra*, Petitioner’s motion is moot because even if this evidence is considered, it does not affect the outcome of our decision.

transmission distance to facilitate communication with an external reader/writer. *Id.* ¶¶ 5, 12. Takeda-322's Figure 3 is reproduced below.

[FIG. 3]

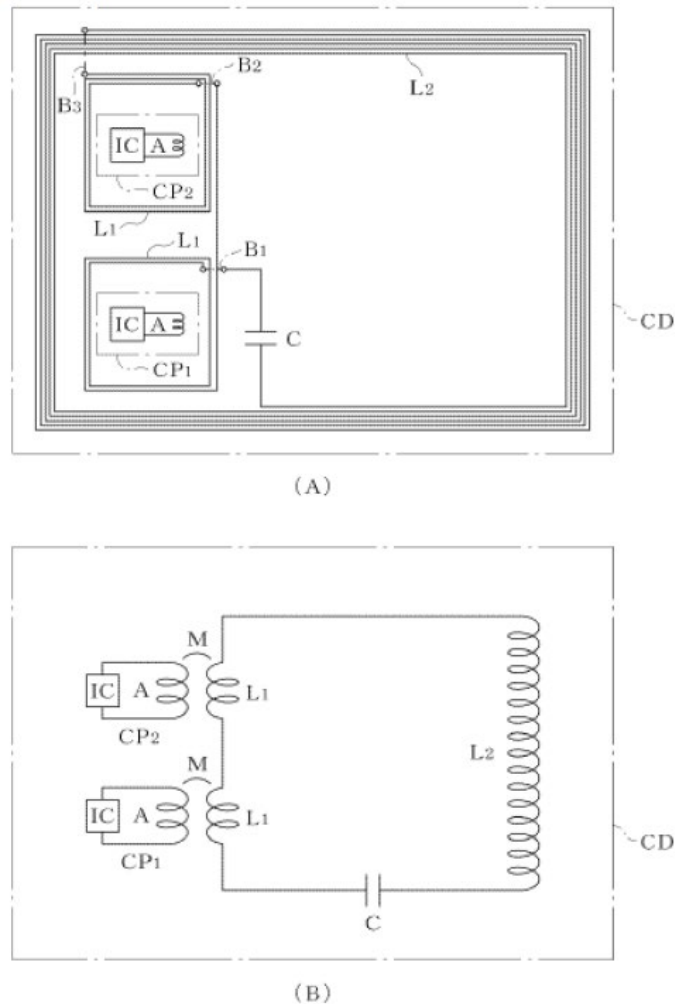


Figure 3 depicts (A) a schematic plan view of the card substrate CD and (B) a circuit diagram of card substrate CD. *Id.* ¶ 29. Takeda-322's "card substrate CD is formed in a thin card shape by an insulating material such as a paper material or a synthetic-resin material." *Id.* ¶ 22. Booster coil L2 extends around the card substrate and is used to "perform data communication with the external reader/writer." *Id.* at Fig 3(A), ¶¶ 12, 29–30. IC chips CP1, CP2 each can use booster coil L2 as a shared external antenna and individually perform data communication with the external

reader/writer to realize different functions of different applications. *Id.* ¶ 27. Takeda-322 describes a multi-wire implementation with exciting coils L1, L1 for the IC chips CP1, CP2 inductively coupling the IC chips to booster coil L2. *Id.* ¶¶ 6, 14, 29. The reference also describes a single wire implementation in which the coils “may be formed on the card substrate CD using one wire member having an insulating coating.” *Id.* ¶ 33. Exciting coils L1 “act as a secondary coil for the antenna of the IC chip and exhibit a signal-amplifying action according to a ratio of the number of turns had by each.” *Id.* ¶ 14. CP1 is disposed inside of exciting coil L1 such that the antenna of the IC chip is inductively coupled to the exciting coil with sufficient closeness. *Id.* ¶¶ 14, 25, 29. “M,” shown on Figure 3(B), indicates the inductive coupling between antenna A of CP1 and exciting coil L1 and the inductive coupling between antenna A of CP2 and booster coil L2 due to the enclosed portion G. *Id.* ¶ 25.

2. *Murayama (Ex. 1007)*

Murayama is titled “Composite Antenna and Composite Wireless Communications Device.” Ex. 1007, code (54). Murayama’s compound antenna is composed of a first antenna that functions in a first frequency band (e.g., 8.2 MHz) and a second antenna that functions in a second frequency band (e.g., 13.56 MHz). When the second antenna is operating, the first antenna “functions as a radiating element (boost antenna) of the second antenna in the second frequency band, thereby improving gain.” *Id.* ¶ 8. Figure 1 of Murayama is reproduced below.

[FIG. 1]

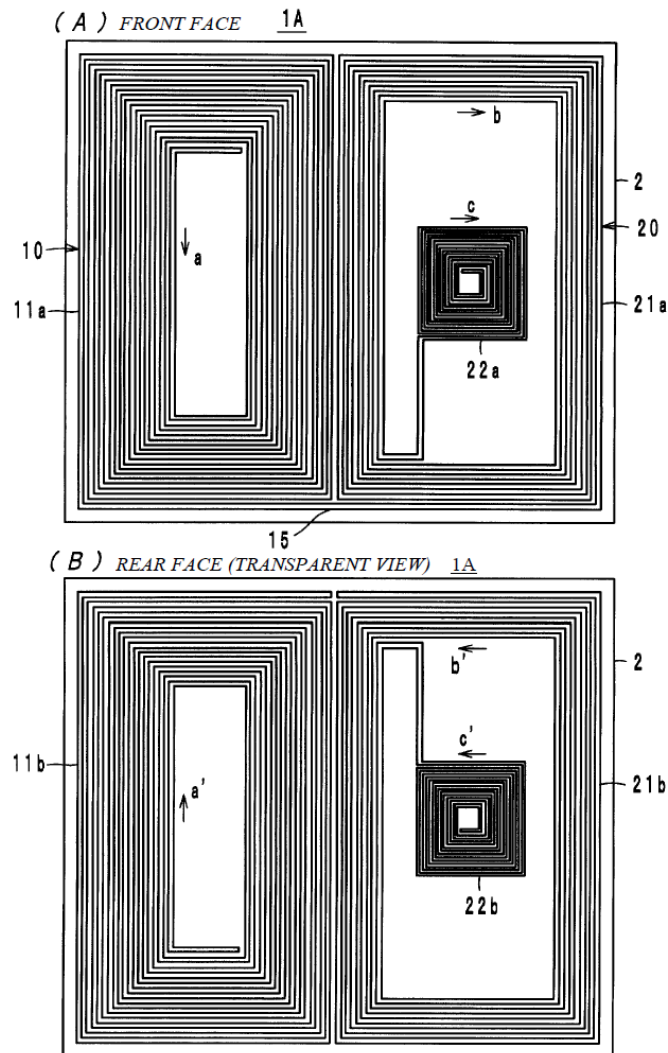


Figure 1 of Murayama, above, depicts a compound antenna “with (A) being a front face view, and (B) being a transparent view.” *Id.* ¶ 11. Compound antenna 1A is composed of insulating substrate 2, first antenna 10, and second antenna 20. *Id.* ¶ 13. First antenna 10 is composed of first and second coiled electrodes 11a, 11b formed opposing each other on a first main face (front) and a second main face (rear) of insulating substrate 2. *Id.* ¶ 14. Second antenna 20 is composed of first and second coiled electrodes 21a, 21b formed opposing each other on the front and rear faces of the

insulating substrate 2 and first and second coupling parts 22a, 22b that are looped in spiral patterns in the center. *Id.* ¶ 15.

E. Unpatentability over Takeda-322

Petitioner asserts that claims 1–7 are unpatentable under 35 U.S.C. §§ 102, 103(a) as anticipated by or obvious over Takeda-322, citing the Declaration of Dr. Daniel van der Weide for support. Pet. 9–47 (citing Ex. 1003).

1. Independent Claims 1 and 5

Upon consideration of Petitioner’s contentions and supporting evidence viewed in light of Patent Owner’s evidence and arguments, we are persuaded that Petitioner has demonstrated by a preponderance of the evidence that claims 1 and 5 are unpatentable over Takeda-322. *See* Pet. 9–36, 41. Independent claims 1 and 5 recite substantially similar language and Petitioner relies on substantially the same arguments and evidence for these claims. *See id.* at 41 (arguing that claim 5 is unpatentable “for the same reasons as claim 1”); *see also* Ex. 1003 ¶¶ 147 (Dr. van der Weide’s testimony that claim 5 is unpatentable “for the same reasons as I discussed for claim 1”). Thus, we will address these claims together.

a) Summarizing Petitioner’s Contentions

Petitioner asserts that Takeda-322 discloses or at least renders obvious every limitation of claims 1 and 5. Pet. 15. The difference between Petitioner’s anticipation and obviousness grounds is in regards to the booster antenna. Petitioner notes that the ’932 patent’s “BA can be formed from a single wire laid in a pattern to form several coils the specification characterizes as the CA, CC, and EA components.” *Id.* at 4 (citing Ex. 1001, 8:24–26, 34:18–36, Fig. 11A); *see also* Ex. 1003 ¶ 33 (testimony from

Dr. van der Weide that the BA “can be formed from a *single* wire”).

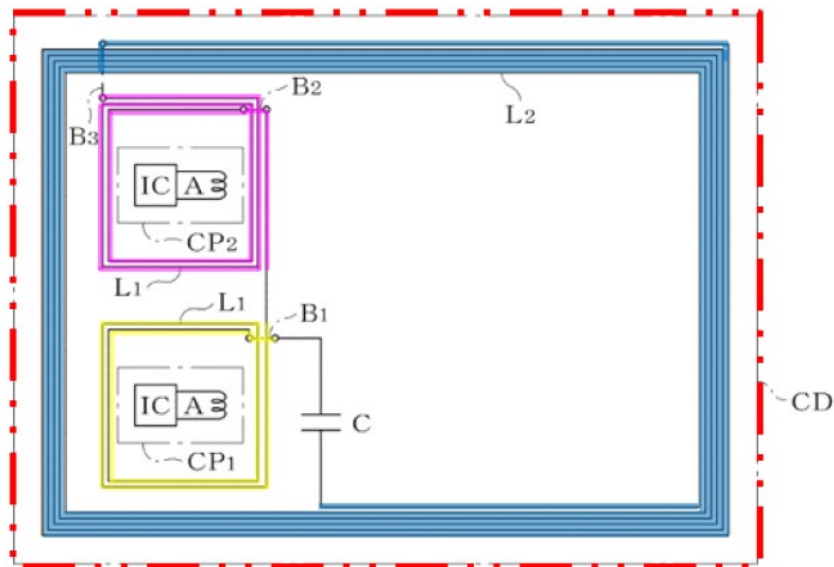
Petitioner argues that Takeda-322 discloses both a multi-wire embodiment that anticipates the challenged claims and a single wire embodiment that anticipates or at least renders obvious the challenged claims. *Id.* at 15.

According to Petitioner, the multi-wire implementation is one in which booster coil L2 and two exciting coils L1 are connected in series using jumper wires B1, B2 as shown in Figure 3. *Id.* at 10 (citing Ex. 1005 ¶¶ 29–30). Petitioner further argues that the single wire implementation is described as an alternative to using separate jumper-interconnected wires in which the coils “may be formed on the card substrate CD using ***one wire member*** having an insulating coating.” *Id.* at 12 (citing Ex. 1005 ¶ 33). “Thus, Takeda-322 expressly discloses that its FIG. 3 embodiment can be implemented via a single length of insulated wire laid to form and interconnect booster coil L₂ and ‘exciting coils’ L₁.” *Id.* (citing Ex. 1003 ¶ 62).

Petitioner argues that if we do not agree with its assertion that Takeda-322’s Figure 3 embodiment may be formed with a single wire then it would have been obvious to use a single wire. *Id.* at 12 (citing Ex. 1003 ¶ 63). Dr. van der Weide opines that “using a single insulated wire was a known, conventional technique to form multi-coil antennas on IC cards.” Ex. 1003 ¶ 64 (citing Ex. 1012). He further opines that “using a single insulated wire would have provided the desirable and predictable results of producing Takeda-322’s three coils using a single manufacturing step that avoids the expense and reliability drawbacks associated with needing to connect multiple separate wires using jumpers.” *Id.* ¶ 65 (citing Ex. 1012). Finally, Dr. van der Weide testifies that “using a single insulated wire is nothing but

applying a known technique (using a single insulated wire to form a multi-coil IC card antenna) to a known device (Takeda-322's IC card) ready for improvement to yield predictable results (producing Takeda-322's IC card using a single manufacturing step instead of many).” *Id.* ¶ 66. Petitioner also asserts that one of ordinary skill in the art would have had a reasonable expectation of success in implementing Takeda-322 with a single-wire because such systems were known at the time and techniques has been developed to implement such systems. Pet. 13 (citing Ex. 1003 ¶ 67).

As to the remaining limitations of claims 1 and 5, Petitioner's arguments may be summarized as follows: Petitioner directs us to Figure 3 of Takeda-322 and its supporting text. *Id.* at 15. Annotated Figure 3 is reproduced below. *See id.* at 23.



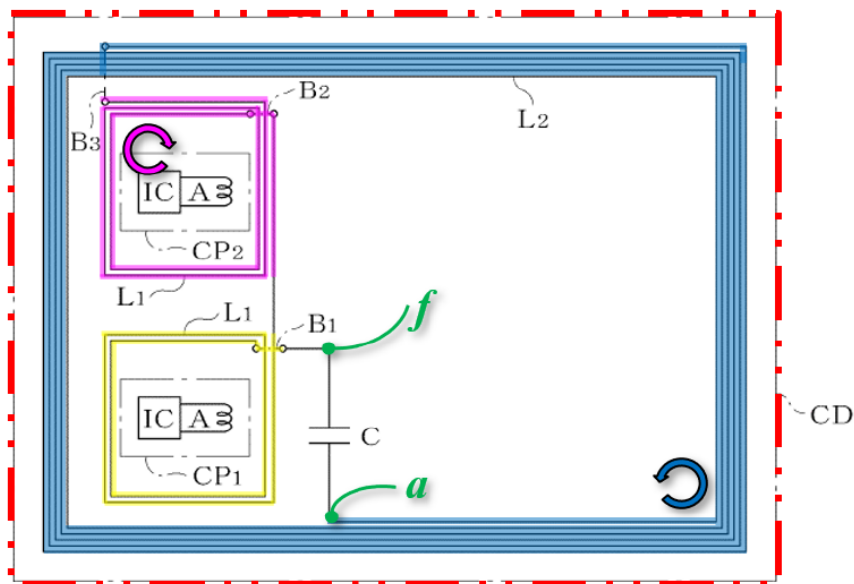
Petitioner annotated Figure 3 of Takeda-322, above, to illustrate its arguments regarding the challenged claims. *See id.* As shown in blue, Petitioner directs us to Takeda-322's booster coil L2 to disclose the recited card antenna CA. *Id.* at 16. According to Petitioner, L2 extends around the periphery of the card substrate CD (red), which discloses the recited card

body CB. *Id.* at 17. As to the recited coupler coil CC, Petitioner directs us to Takeda-322’s lower exciting coil L1 (yellow), which is coupled to chip CP1. *Id.* at 16, 20. Petitioner states that “IC chip CP₁ is disposed ‘inside’ the exciting coil so the chip’s antenna A ‘is inductively coupled to the *exciting coil*.’” *Id.* at 21 (quoting Ex. 1005 ¶ 14). Petitioner asserts that the booster coil L2 is coupled to the chip’s antenna via exciting coil L1 “and thereby ‘operate[s] as the external antenna of the IC chip.’” *Id.* (quoting Ex. 1005 ¶ 14).

As to the recited antenna module AM, Petitioner directs us to CP1 with its antenna A. *Id.* at 22 (citing Ex. 1001, 9:32–43, Ex. 1003 ¶ 91). As to the recited extension antenna EA, Petitioner directs us to the upper inner exciting coil (pink). *Id.* at 23 (citing Ex. 1003 ¶ 96). “The upper inner coil comprises turns of wire, contributes to the inductance of the multi-coil antenna, and is connected in series with the CA (booster coil L₂ highlighted blue) and CC (lower inner coil highlighted yellow) components and is a ‘continuation’ and/or ‘extension’ of those components.” *Id.* at 24 (citing Ex. 1001, 10:58–67, 27:35–44, 18:4–9, 18:25–28; Ex. 1005 ¶¶ 14–15, 29–30, Fig. 3(B); Ex. 1003 ¶ 99). Petitioner argues that each of Takeda-322’s coils “additively contributes to the inductance of the booster antenna, and that the upper inner coil acts as an EA component of the booster antenna and its CA component.” *Id.* at 25 (citing Ex. 1005 ¶¶ 15, 29–30; Ex. 1003 ¶¶ 101–102). According to Petitioner, “[i]t is immaterial that Takeda-322’s upper inner coil *also serves* the additional function of coupling IC chip CP₂ to booster coil L₂.” *Id.* (citing Ex. 1003 ¶ 103). Dr. van der Weide opines that there is no disclosure in the ’932 patent or its prosecution history that would exclude embodiments such as Takeda-322 in which the extension

antenna EA also may couple to an additional IC chip on the card. Ex. 1003 ¶ 103. He also points out that “[t]he ’932 specification states that the *same coil* may serve as both an extension antenna component *and* a coupler coil component.” *Id.* ¶ 104 (citing Ex. 1001, 19:49–63, Fig. 4F).

Finally, as to the recited “extension antenna (EA) component has a sense opposite to that from the card antenna (CA) component,” Petitioner asserts that “Takeda-322’s EA component (upper inner coil) has a sense opposite to that from the CA component (‘booster coil L_2 ’).” *Id.* at 30. Petitioner annotated Figure 3A of Takeda to illustrate its allegations as to this limitation.



As shown above in Petitioner’s annotated Takeda-322’s Figure 3(A), “tracing the wire from one end to the other . . . reveals that the extension antenna component (upper inner coil highlighted pink) has a sense opposite that of the card antenna component (booster coil L_2 highlighted blue).” Pet. 33 (citing Ex. 1003 ¶ 126). Petitioner contends that if one of ordinary skill in the art began at end “a” and traced over the wire to end “f,” “as illustrated by the blue and pink arrows—that the card antenna component (blue) has

counter-clockwise sense, whereas the extension antenna component (pink) has *clockwise* sense.” *Id.* at 33. Dr. van der Weide supports Petitioner and opines that in the ’932 patent a single wire’s laying direction determines the sense of that wire. Ex. 1003 ¶ 124. According to Dr. van der Weide, “the relative ‘sense’ of the coils annotated blue and pink in Takeda-322’s FIG. 3 is the *same* as between the inner and outer coils in ’932 patent FIG. 5B.” *Id.* ¶ 127. He further testifies that Takeda-322’s booster coil L2 and exciting coils L1 can have the same “winding direction” in the multi-wire implementation, but different winding directions in the single wire implementation. *Id.* ¶ 128. Dr. van der Weide further opines that even in the event that the booster coil L2 (blue) and the upper inner coil (pink) could be considered to having the same winding direction “*given the way those coils are connected in series*, they have different ‘laying directions’ and opposite ‘sense’ as those terms are used in the ’932 patent.” *Id.*

b) Analysis

We have reviewed Petitioner’s arguments and evidence and have found them to demonstrate the unpatentability of claims 1 and 5 by a preponderance of the evidence.

First, Petitioner argues that the challenged claims are anticipated by or would have been obvious over Takeda-322’s single wire implementation or anticipated by the multi-wire implementations of Takeda-322. We agree with Petitioner’s assertion that Takeda-322’s Figure 3 embodiment may be formed with either multiple wires or a single wire. As to the multiple wires, Takeda-322’s Figures 3(A)-(B) are argued to illustrate one embodiment of Takeda-322’s multi-coil antenna comprising one “booster coil” L2 and two “exciting coils” L1 all connected in series (using “jumper wires” B1-B3) on

“card substrate” CD. Pet. 10 (citing Ex. 1005 ¶ 29–30). As to the single wire, Takeda-322 states that “[i]n the description above” exciting coil L1 and booster coil L2 may be formed “using one wire member.” Ex. 1005 ¶ 33. The “description above” is of “[o]ther embodiments” depicted in Figures 3 and 4. *Id.* ¶¶ 29–32. Thus, we are persuaded by Petitioner’s argument that both multiple wire and single wire implementations are disclosed in Takeda-322.

Next, as to Petitioner’s mapping of the remaining claim elements of claims 1 and 5, we are persuaded that Petitioner’s evidence and arguments demonstrate that all of the limitations of claims 1 and 5 were disclosed by Takeda-322. Petitioner persuasively directs us to where it believes each element of the challenged claims is disclosed by Takeda-322. Petitioner’s allegations are well supported by the testimony of Dr. van der Weide. In addition, we are persuaded by Petitioner’s argument that the ’932 patent claims are not limited to embodiments in which the extension antenna EA only may perform a single function. *See also supra* § II.C.2 (addressing construction of “extension antenna component”). Petitioner persuasively directs us to a passage from the ’932 patent in which the EA and the CC are “essentially combined with one another.” Pet. 35 (quoting Ex. 1001, 19:49–63).

Therefore, we are persuaded that Petitioner has shown that claims 1 and 5 are anticipated by Takeda-322. In addition, we are persuaded that Petitioner has shown that claims 1 and 5 would have been obvious over the teachings of Takeda-322. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1373 (Fed. Cir. 2019) (“[A] disclosure that anticipates under § 102 also renders the claim invalid under § 103, for ‘anticipation is the epitome of

obviousness.” (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983))).

Patent Owner disputes Petitioner’s showing, but its arguments are insufficient to overcome Petitioner’s arguments and evidence. Patent Owner asserts that Petitioner’s challenge fails because Takeda-322 does not have an extension antenna component, but rather “at most, shows two alleged coupler coils (each titled L_1), each of which couples to a different antenna A connected to a different integrated circuit IC.” PO Resp. 53.

Much of Patent Owner’s argument is premised on its proposed claim construction of extension antenna component, which we did not adopt. *See* § II.C.2; *see also* PO Resp. 56–57 (arguing that the Petition has not shown that extension antenna and coupler coil mean the same thing). To be clear, we do not find the terms extension antenna and coupler coil to be identical, but rather we agree with Petitioner’s assertion that a structure could serve as a coupler coil for one antenna/IC chip and also as an extension antenna component for another antenna/IC chip. During Oral Argument, Counsel for Patent Owner confirmed that Patent Owner did not view the claims as requiring the wire to have a different structure for the coupler coil as compared to the extension antenna. Tr. 62:18–24. There seems to be no dispute, however, that the winding and placement of the wire is an important element of the various components of the booster antenna. *See* Tr. 61:25–62:11.

Patent Owner also argues that Petitioner has not shown that the L_1 coil alleged to disclose the extension antenna component provides a non-negligible contribution to the booster antenna’s inductance. PO Resp. 57. We disagree. As noted in the Petition, Takeda-322’s upper L_1 coil

contributes to the inductance of the booster antenna. Pet. 24–25 (citing Ex. 1005 ¶¶ 14–15, 29–30, Fig. 3(B); Ex. 1003 ¶¶ 99, 101–102); *see also* Ex. 1005, Fig. 3; Ex. 1003 ¶ 101 (explaining that adding an inductor in series contributes to a circuit’s inductance). The Petition also notes that “Takeda-322’s inner coils each ‘act[s] as a secondary coil for the antenna of the IC chip [disposed within it] and exhibit[s] a signal-amplifying” function.” Pet. 14 (citing Ex. 1005 ¶ 14). In addition, Dr. van der Weide testifies in support of Petitioner position noting that “[n]either Patent Owner nor Dr. Eisenstadt has any explanation for how a coil with sufficient inductance to inductively couple a booster antenna to a chip’s module antenna could be considered to have ‘negligible’ inductance.” Ex. 1057 ¶ 53. Dr. van der Weide also testifies that an ordinary artisan would have understood that the L₁ coil non-negligibly contributes to the booster antenna’s inductance. *Id.* ¶¶ 44–45. We are persuaded that Petitioner’s evidence and argument are sufficient to show that L₁ provides a non-negligible contribution to the booster antenna’s inductance. Moreover, Patent Owner identifies no evidence to the contrary. Ultimately, after reviewing the evidence of record, we are persuaded that the top L₁ coil provides a non-negligible contribution to the booster antenna’s inductance.

Petitioner has shown by a preponderance of the evidence that Takeda-322 discloses all of the elements of claims 1 and 5. Thus, we are persuaded that Petitioner has established by a preponderance of the evidence that Takeda-322 anticipates and renders claims 1 and 5 obvious.

2. Dependent Claims 2–4, 6 and 7

Petitioner accounts for the limitations recited in claims 2–4, 6, and 7. Pet. 36–47. Petitioner provides detailed explanations as to how Takeda-322

discloses, teaches, or suggests the limitations of these claims, citing Dr. van der Weide's testimony for support. *Id.* (citing Ex. 1003).

We are persuaded that Petitioner has demonstrated that Takeda-322 discloses all of the limitations recited in claims 2–4, 6, and 7. Patent Owner provides no arguments regarding these claims outside of the arguments discussed in regards to the independent claims. *See generally* PO Resp. Having reviewed Petitioner's arguments and supporting evidence, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 2–4, 6, and 7 are unpatentable under §§ 102 and 103(a) over Takeda-322.

F. Unpatentability over Murayama

Petitioner asserts that claims 1–6 are unpatentable under 35 U.S.C. § 102 as anticipated by Murayama and claim 7 would have been unpatentable under 35 U.S.C. §102 or in the alternative § 103(a) over Murayama, citing the Declaration of Dr. Daniel van der Weide for support. Pet. 59–85 (citing Ex. 1003).

1. Prior Art Status of Murayama

Murayama was published October 6, 2011. Ex. 1007, code (43). The '932 patent claims priority to more than thirty U.S. Patent applications. Ex. 1001, codes (60), (63). The priority chain includes eight applications that predate the publication of Murayama with two of those applications predating the publication of Murayama by more than a year. *See id.* (listing provisional application No. 61/373,269, filed on Aug. 12, 2010 and provisional application No. 61/384,219, filed on Sep. 17, 2010). Petitioner argues that "Murayama's earlier publication date establishes Murayama as prior art absent a showing from Patent Owner that the Challenged Claims

are entitled to an earlier effective filing date.” Pet. 59 (citing *PowerOasis v. T-Mobile USA*, 522 F.3d 1299, 1305–06 (Fed. Cir. 2008)).

The Federal Circuit has held that in an *inter partes* review there are two distinct burdens of proof: the burden of persuasion and the burden of production. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)). Petitioner bears the ultimate burden of persuasion regarding unpatentability, which never shifts to Patent Owner. *Id.* at 1379. *Dynamic Drinkware*, however, also establishes that Petitioner has the initial burden of production to show a reference is prior art. *Id.* Once Petitioner’s burden of production is satisfied, the burden of production then shifts to Patent Owner to refute Petitioner’s argument by either showing the prior art does not actually render the claims unpatentable or does not qualify as prior art. *Id.* at 1380. The burden of production then shifts back to Petitioner to respond to Patent Owner’s argument. *Id.*

Petitioner contends that “Murayama published October 6, 2011, before the ’932 patent’s February 6, 2014, filing date,” which “establishes Murayama as prior art absent a showing from Patent Owner that the Challenged Claims are entitled to an earlier effective filing date.” Pet. 59.

We find that Petitioner has met its initial burden of production and as such, the burden shifted to Patent Owner to assert evidence regarding the prior art status of Murayama. Patent Owner, however, did not provide such argument or evidence. Thus, we are persuaded that Petitioner has established the prior art status of Murayama. *See Dynamic Drinkware*, 800 F.3d at 1379–80. The burden of persuasion still rests with Petitioner and

thus, we must analyze Murayama and the related arguments and evidence to determine whether Petitioner's challenge prevails.

2. Independent Claims 1 and 5

Upon consideration of Petitioner's contentions and supporting evidence viewed in light of Patent Owner's evidence and arguments, we are persuaded that Petitioner has demonstrated by a preponderance of the evidence that claims 1 and 5 are unpatentable over Murayama. *See* Pet. 61–80, 84–85. Independent claims 1 and 5 recite substantially similar language and Petitioner relies on substantially the same arguments and evidence for these claims. *See id.* at 84–85 (arguing that claim 5 is unpatentable “for the same reasons as claim 1”); *see also* Ex. 1003 ¶¶ 266 (Dr. van der Weide's testimony pointing back to his discussion of claim 1 for his analysis of claim 5). Thus, we will address these claims together.

a) Summarizing Petitioner's Contentions

Petitioner's arguments may be summarized as follows: Petitioner directs us to Murayama's compound antenna 1A to disclose the recited booster antenna. *Id.* at 65. First antenna 10 and second antenna 20 are purported to be the components of “compound antenna 1A.” *Id.* at 62 (citing Ex. 1007 ¶ 11). Figures 1(A)-1(B) respectively illustrate front face and rear face views. *Id.* (citing Ex. 1007 ¶ 13–14).

Petitioner directs us to Murayama's interconnected electrodes 21a and 11a, which extend around the periphery of the front face of substrate 2, as disclosing the recited card antenna component. *Id.* at 67. Insulating substrate 2 is argued to disclose the recited “card body.” *Id.* Petitioner contends that “Murayama's interconnected electrodes 21a, 11a (Murayama, [0016]) meet the specification's description of a card antenna component—

they may be a ‘single wire (or conductive trace) having two ends, arranged in a generally a [sic] rectangular spiral pattern, and disposed in the peripheral area ... of the card body.’” *Id.* at 68 (citing Ex. 1001, 11:14–17; Ex. 1003 ¶¶ 219–21). Petitioner further argues that “[n]othing in the ’932 patent’s claims or specification limits the ‘different’ rectangular portions of a card antenna component to being disposed one inside the other, rather than side-by-side as shown in Murayama FIG. 1(A).” *Id.* at 69 (citing Ex. 1003 ¶ 224).

Petitioner relies on Murayama’s coupling part 22b to disclose the claimed coupler coil (CC) component. *Id.* (citing Ex. 1003 ¶ 226). As to the antenna module, Petitioner directs us to Murayama’s wireless communication element 30, which comprises wireless IC chip 31 and power supply circuit board 35 with an inductor. *Id.* at 70 (citing Ex. 1007 ¶¶ 17, 31; Ex. 1003 ¶ 227).

Petitioner contends that Murayama’s electrode 11b discloses the recited extension antenna component. *Id.* at 73. Petitioner alleges that Murayama’s electrode 11b contributes to the inductance of booster antenna 1A. *Id.* at 74. In support of its position, Petitioner directs us to several passages from the Murayama specification. *Id.*; *see e.g.*, Ex. 1007 ¶ 22 (“[A]ntenna 10 forms a resonant circuit ***through the inductance of*** the first and second coiled electrodes 11a, 11b and the capacitance formed by the electrodes 11a, 11b being disposed opposing each other.”). Petitioner argues that the opposite sense limitation is disclosed because Electrodes 11a, 11b “are looped in coil patterns in opposite directions” indicated by arrows a, a’ “from the center on the front and rear faces of the substrate 2.” Pet. 75 (citing Ex. 1007 ¶ 14).

b) Analysis

We have reviewed Petitioner's arguments and evidence and have found them to demonstrate the unpatentability of claims 1 and 5 by a preponderance of the evidence.

As to Petitioner's mapping of the elements of claims 1 and 5, we are persuaded that Petitioner's evidence and arguments demonstrate that all of the limitations of claims 1 and 5 were disclosed by Murayama. Petitioner's allegations are well supported by the testimony of Dr. van der Weide. Therefore, we are persuaded that Petitioner has shown that claims 1 and 5 are anticipated by Murayama.

Patent Owner disputes Petitioner's showing, but its arguments are insufficient to overcome Petitioner's arguments and evidence.

First, Patent Owner contends that Petitioner's challenge fails because Murayama's alleged extension antenna component is unconnected to the remainder of the alleged booster antenna. PO Resp. 59. Patent Owner argues that "Electrode 11b, however, is disconnected from the alleged card antenna and coupler coil components" and as such, does not qualify as an extension antenna. *Id.* at 63. Patent Owner's argument is premised upon its proposed claim construction, which required the extension antenna component to be connected to at least one of the card antenna component or the coupler coil. As noted above, however, we did not adopt Patent Owner's proposed construction. *See* § II.C.2. As discussed above, we are persuaded that the extension antenna is not required to be connected to those other components. As such, Patent Owner's argument is unavailing.

Next, Patent Owner argues that Petitioner has not established that the alleged extension antenna component contributes to inductance of the

booster antenna. PO Resp. 63. Petitioner directs us to page 74 of the Petition which discusses “Murayama’s teaching that 11a/11b’s inclusion ‘increases the range over which the magnetic field is emitted,’ which a [person of ordinary skill in the art would have] understood only arises from a nonnegligible contribution to inductance.” Reply 24 (citing Ex. 1007 ¶ 26). We are persuaded that this teaching in Murayama discloses the non-negligible inductance required of the recited extension antenna.

As to the booster antenna, Patent Owner notes that Murayama’s compound antenna 1A is composed of two antennas that operate on two frequency bands (8.2 MHz – antenna 10 and 13.56 MHz – antenna 20). *Id.* at 60 (citing Ex. 1007 ¶ 22). Patent Owner further contends that in addition to operating at different frequencies, antennas 10, 20, which make up compound antenna 1A, operate in different manners. *Id.* at 62. Petitioner responds by arguing that “when Murayama’s compound antenna resonates at 13.56 MHz to communicate with an RFID reader, all its antenna components work together, with electrodes 11a/11b acting “as a capacitive component” that boosts the communication range.” Reply 12 (citing Pet. 65–66 (citing Ex. 1007 ¶¶ 8, 24–26)).

Patent Owner’s arguments do not overcome Petitioner’s showing. Murayama discloses a composite antenna with first antenna (10) that resonates in the first frequency band, and second antenna (20) that resonates in a second frequency band higher than the first frequency band. Ex. 1007, code (57). As noted above, however, we did not adopt Patent Owner’s proposed construction which would have limited booster antenna to a single frequency. *See* § II.C.1. In any event, Murayama states that the antennas “can be used as a single antenna even in a first frequency band.” Ex. 1007,

code (57). These antennae are “electrically connected” and “the coupling of the wireless communication element 30 to the second antenna 20 results in the compound antenna 1A being configured as a wireless communication device (wireless IC tag) that communicates with a reader-writer of an RFID system.” *Id.* ¶¶ 16, 27.

Petitioner argues that “Murayama only ever describes one frequency at which the compound antenna enables a chip to communicate with an external reader.” Tr. 37:13–14. Dr. van der Weide supports Petitioner’s position by opining that the Petition identifies “Murayama’s compound antenna as a booster antenna that operates at 13.56 MHz to communicate with an RFID reader – because that is precisely what it is.” Ex. 1055 ¶ 66. Murayama explains that currently RFID communication and anti-theft tags operate on different frequencies because anti-theft tags use electromagnetic fields to communicate over comparatively long ranges while RFID uses magnetic fields to communicate over relatively short ranges. Ex. 1007 ¶ 3. Prior systems, therefore, had to use two separate communication devices for inventory management and loss prevention. *Id.* Murayama’s solution was to create a compound antenna that allowed the first antenna to provide anti-theft communication and a second antenna that provided RFID communication. *Id.* ¶¶ 6–8. When the second antenna (RFID) is in use, the first antenna “functions as a radiating element (boost antenna) of the second antenna in the second frequency band, thereby improving gain.” *Id.* ¶ 8. We are persuaded that this discloses the recited booster antenna.

Finally, Patent Owner argues that Murayama does not disclose a card antenna component because “a card antenna component must be wholly in an antenna tuned to a single frequency.” PO Resp. 66. This argument is

premised upon Patent Owner’s proposed construction of booster antenna¹², which required, in relevant part, “an antenna turned to a single resonance frequency.” *Id.* Patent Owner’s argument presumes a single frequency for the booster antenna would thereby require a single frequency for the card antenna. *See id.* We declined to adopt Patent Owner’s proposed construction of booster antenna, which would have required a single frequency. *See* § II.C.1. As such, this argument is unavailing.

Patent Owner further contends that “Murayama’s alleged card antenna component includes components that do not couple with an external card reader when the alleged card antenna component operates.” PO Resp. 59–60. In response, Petitioner argues that “[Patent Owner] does not identify which ‘components’ identified as Murayama’s CA allegedly ‘do not couple with an external card reader,’ and never explains what it means for a component—rather than the CA—to couple to the reader.” Reply 17–18. Further, Petitioner asserts that Murayama’s first antenna aids in the second antenna’s coupling to the RFID card reader because it “function[s] as a boost antenna” allowing the compound antenna “to couple to the reader at distances 1.5 times greater than without.” *Id.* (citing Ex. 1007 ¶¶ 25–26, Ex. 1057 ¶ 74). We agree with Petitioner, and we find Petitioner’s allegations

¹² Patent Owner’s proposed construction of card antenna component is “a component in a booster antenna for coupling with an external contactless reader.” PO Resp. 28–29, 66. We declined to provide an explicit construction of this term because there is no dispute between the parties that would be aided by our construction of this term. *See* Tr. 60:11–23; *see also* Reply 17 n.4 (arguing that Patent Owner’s proposed construction of card antenna is “irrelevant to [Patent Owner’s] argument that Murayama lacks a CA.”).

and evidence to show that Murayama discloses the recited card antenna component. *See also* Pet. 67–69.

Petitioner has shown by a preponderance of the evidence that Murayama discloses all of the elements of claims 1 and 5. Thus, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 1 and 5 are unpatentable under § 102 over Murayama.

3. Dependent Claims 2–4, and 6

Petitioner accounts for the limitations recited in claims 2–4, and 6. Pet. 81–85. Petitioner provides detailed explanations as to how Murayama discloses the limitations of these claims, citing Dr. van der Weide’s testimony for support. *Id.* (citing Ex. 1003).

We are persuaded that Petitioner has demonstrated that Murayama discloses all of the limitations recited in claims 2–4, and 6. Patent Owner provides no arguments regarding these claims outside of the arguments discussed in regards to the independent claims. *See generally* PO Resp. Having reviewed Petitioner’s arguments and supporting evidence, we are persuaded that Petitioner has established by a preponderance of the evidence that claims 2–4, and 6 are unpatentable under § 102 over Murayama.

4. Dependent Claim 7

Petitioner accounts for the limitations recited in claim 7. Pet. 88–90. Petitioner provides detailed explanations as to how Murayama discloses or at least suggests the limitations of these claims, citing Dr. van der Weide’s testimony for support. *Id.* (citing Ex. 1003).

Claim 7 recites, in relevant part, “at least one of the components is laid from an innermost turn to an outermost turn; and at least another of the components is laid from an outermost turn to an innermost turn.” Ex. 1001,

48:34–37. According to Petitioner, “Claim 7 is anticipated by Murayama if the Board agrees the ‘is laid’ limitations limit the components’ orientations rather than how they were manufactured. Claim 7 is rendered obvious by Murayama if the ‘is laid’ limitations limit the method of manufacture.” *Id.* at 88. Petitioner contends that the challenged patent “refers to a component’s ‘sense’ and laying direction interchangeably.” *Id.* at 90 (citing Ex. 1001, 33:46–53 (“the ‘sense’ or laying direction (either clockwise CW, or counter clockwise CCW) of the various components may be the same, or different”), 36:3-6 (“laying senses”); Ex. 1005 ¶ 283). Petitioner asserts that EA and CA components have opposite sense and thus, anticipate claim 7. *Id.* Patent Owner provides no argument or evidence to dispute these assertions. We find that Petitioner’s arguments and evidence establish that the components have opposite sense and that that is within the scope of the recited phrase “is laid.”

Petitioner also argues that a person of ordinary skill in the art would have found it obvious to lay Murayama’s BA by using a conventional laying tool and lay 22b’s free end (FE-1) clockwise while laying free end FE-4 clockwise. Pet. 90. (citing Ex. 1003 ¶¶ 284–86). Dr. van der Weide supports this assertion by opining that one of ordinary skill in the art would have known of this manufacturing technique and citing evidence to support his testimony. Ex. 1003 ¶¶ 284–86 (citing Ex. 1014 ¶ 319)). Petitioner asserts that one of ordinary skill in the art would have had a reasonable expectation of success in implementing this convention use of a wire-laying tool. Pet. 90. Patent Owner provides no argument or evidence to dispute these assertions. We find that Petitioner’s arguments and evidence establish the obviousness of this manufacturing technique.

We have reviewed the entirety of Petitioner’s arguments and evidence and we are persuaded that under either reading of the claim Petitioner has demonstrated that Murayama renders claim 7 unpatentable. Patent Owner provides no arguments regarding this claim outside of the arguments discussed in regards to the independent claims. PO Resp. 67. Having reviewed Petitioner’s arguments and supporting evidence, we are persuaded that Petitioner has established by a preponderance of the evidence that claim 7 is unpatentable under §§ 102 and 103 over Murayama.

III. MOTION TO STRIKE

Petitioner filed a Motion to Strike seeking “to strike Ex. 2028, and quotations therefrom, that Patent Owner . . . submitted with its Sur-Reply.” Mot. 1. According to Petitioner, Patent Owner improperly introduced Exhibit 2028 as new evidence in its Sur-Reply. Paper 32, 1 (citing 37 C.F.R. § 42.23(b)). Patent Owner argues that Petitioner stipulated that Patent Owner could use Exhibit 2028 as evidence and, therefore, cannot move to strike. Paper 34, 1–4. Petitioner argues that the stipulation did not relate to the Board’s rules regarding the timing of new evidence and argues that Patent Owner needed Board authorization to add evidence via Sur-Reply. Paper 32, 2–5.

As explained below, our decision here remains the same, on the merits, even if we consider Exhibit 2028 as evidence. *See* § II.C.2., *infra*. Resolution of Petitioner’s motion to strike, therefore, would have no impact on our decision. We, thus, dismiss Petitioner’s motion to strike as moot.

IV. PATENT OWNER’S OBJECTIONS TO PETITIONER’S DEMONSTRATIVE SLIDES

Patent Owner objects to a number of Petitioner’s demonstratives for oral argument because, for example, the demonstratives constitute evidence

that Petitioner did not reference or discuss in a prior paper. *See, e.g.*, Paper 39 *passim*.

We have considered the objections. Demonstratives for oral argument, however, are not evidence. Paper 33, 2 (Order Setting Oral Argument); *see also* Consolidated Trial Practice Guide 84, *available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated> (“Demonstrative exhibits used at the final hearing are aids to oral argument and not evidence.”). We do not rely on demonstratives as evidence in our decision making; instead, we rely solely on the arguments properly presented in the parties’ briefs and the evidence of record. Because demonstratives do not affect our decision making, Patent Owner’s objections to the demonstratives likewise do not affect our decision making. We dismiss Patent Owner’s objections as moot.

V. CONCLUSION¹³

Based on the evidence presented with the Petition, the evidence introduced during the trial, and the parties’ respective arguments, Petitioner has shown by a preponderance of the evidence that each of claims 1–7 of the ’932 patent are unpatentable.

¹³ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. *See* 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. *See* 37 C.F.R. § 42.8(a)(3), (b)(2).

In summary:

Claim(s)	35 U.S.C. §	Reference(s)/ Basis	Claims Shown Unpatentable	Claims Not Shown Unpatentable
1–7	102	Takeda-322	1–7	
1–7	103	Takeda-322	1–7	
1–6	102	Murayama	1–6	
7	102	Murayama	7	
7	103	Murayama	7	
Overall Outcome			1–7	

VI. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that Petitioner has established by a preponderance of the evidence that claims 1–7 of the '932 patent are unpatentable;

FURTHER ORDERED that Petitioner's Motion to Exclude is *dismissed as moot*;

FURTHER ORDERED that Patent Owner's Objections to Petitioner's Demonstratives are *dismissed as moot*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

IPR2022-00235
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