

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MONOLITHIC POWER SYSTEMS, INC.,
Petitioner,

v.

GREENTHREAD, LLC,
Patent Owner.

IPR2024-00470
Patent 11,121,222 B2

Before DONNA M. PRAISS, JON B. TORNQUIST, and
MONICA S. ULLAGADDI, *Administrative Patent Judges*.

ULLAGADDI, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. *Background and Summary*

Monolithic Power Systems, Inc. (“Petitioner”) filed a Petition for *inter partes* review (Paper 1, “Pet.”) challenging claim 44 of U.S. Patent No. 11,121,222 B2 (Ex. 1001, “the ’222 patent”). Greenthread, LLC (“Patent Owner”) filed a Preliminary Response. Paper 9 (“Prelim. Resp.”). With our authorization, Petitioner filed a Preliminary Reply (Paper 15, “Prelim. Reply”), and Patent Owner filed a Preliminary Sur-reply (Paper 16, “Prelim. Sur-reply”).

We have authority to determine whether to institute an *inter partes* review. 35 U.S.C. § 314 (2018); 37 C.F.R. § 42.4(a) (2023). The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides that an *inter partes* review may not be instituted “unless the Director determines . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” For the reasons set forth below, we determine the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail with respect to the sole challenged claim. Accordingly, we institute *inter partes* review on that claim on all grounds set forth in the Petition.

B. *Real Parties-in-Interest*

Petitioner identifies itself as the real party-in-interest. Pet. 1.

Patent Owner identifies itself as a real party-in-interest. Paper 4, 1.

C. *Related Matters*

The parties identify several proceedings involving the ’222 patent as related matters, including *Greenthread, LLC v. Cirrus Logic, Inc.*, 1:23-cv-

00369 (W.D. Tex.); *Greenthread, LLC v. OmniVision Technologies, Inc.*, No. 2:23-cv-00212 (E.D. Tex.); *Greenthread, LLC v. OSRAM GmbH*, No. 2:23-cv-00179 (E.D. Tex.); *Greenthread, LLC v. Texas Instruments Inc.*, No. 2:23-cv-00157 (E.D. Tex.); *Greenthread, LLC v. Monolithic Power Systems, Inc.*, No. 1:23-cv-00579 (D. Del.). Pet. 1–2; Paper 4, 1–2. Patent Owner also identifies *Greenthread, LLC v. ON Semiconductor Corporation*, No. 1:23-cv-00443, (D. Del.). Paper 4, 2.

The parties also identify four *inter partes* review proceedings involving the '222 patent, namely, IPR2022-01242, IPR2024-01244, IPR2024-00020, and IPR2024-00021. Pet. 2–3; Paper 4, 2–3.

D. The '222 Patent

The '222 patent is titled “Semiconductor Devices with Graded Dopant Regions.” Ex. 1001, code (54). The '222 patent “relates to all semiconductor devices and systems.” *Id.* at 1:23–24. According to the '222 patent, in bipolar junction transistors, “[e]fforts have been made in graded base transistors to create an aiding drift field to enhance the diffusing minority carrier’s speed from emitter to collector” versus the standard “uniformly doped base.” *Id.* at 1:34–48. This improvement has not been implemented in “most semiconductor devices, including various power MOSFETs [and] IGBT’s,” which “still use a uniformly doped ‘drift epitaxial’ region in the base.” *Id.* at 1:48–53.

The invention of the '222 patent implements graded dopant concentration in these devices, which causes “[t]wo important performance enhancements.” *Id.* at 3:4–31. These include sweeping electrons “from source to drain rapidly” and simultaneously causing holes to “be recombined

closer to the n⁺ buffer layer,” which “can improve t_{on} and t_{off} in the same device.” *Id.* at 3:31–35.

E. Illustrative Claim

The sole challenged claim is claim 44, which is reproduced below.

44. A CMOS Semiconductor device comprising:

[44.1] a surface layer;

[44.2] a substrate;

[44.3] an active region including a source and a drain, disposed on one surface of the surface layer;

[44.4] a single drift layer disposed between the other surface of the surface layer and the substrate, the drift layer having a graded concentration of dopants extending between the surface layer and the substrate,

[44.5] the drift layer further having a first static unidirectional electric drift field to aid the movement of carriers from the surface layer to an area of the substrate where there are no active regions; and

[44.6] at least one well region disposed in the single drift layer, the well region having a graded concentration of dopants and a second static unidirectional electric drift field to aid the movement of carriers from the surface layer to the area of the substrate where there are no active regions.

Ex. 1001, 8:21–39 (bracketed designations added by Petitioner (*see* Pet. 16–40)).

F. Asserted Unpatentability Challenges

Petitioner presents the following challenges set forth in the chart below. Pet. 5. Petitioner supports its challenges with the Declaration of Dr. Stephen Campbell. Ex. 1003.

Claim Challenged	35 U.S.C. §¹	Reference(s)/Basis
44	103	Onoda ²
44	103	Onoda, Nishizawa ³
44	103	Kawagoe ⁴

II. ANALYSIS

A. Legal Standards

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016). The burden of persuasion never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284 (2011), amended 35 U.S.C. § 102 and § 103, effective March 16, 2013. Because applications from which the ’222 patent claims priority were filed before this date, the pre-AIA version of § 102 and § 103 applies.

² Japanese Unexamined Patent Application Publication No. H8-279598, published Oct. 22, 1996 (Ex. 1043). A certified translation, to which we cite, is provided. Ex. 1042 (“Onoda”).

³ U.S. Patent No. 5,384,476, filed June 9, 1987 and issued January 24, 1995, to Nishizawa et al. (Ex. 1046, “Nishizawa”).

⁴ U.S. Patent No. 6,043,114, filed September 22, 1997 and issued March 28, 2000, to Kawagoe et al. (Ex. 1007, “Kawagoe”).

A claim is unpatentable under 35 U.S.C. § 103 if “the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103. The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) when present, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

To show obviousness, it is not enough to merely show that the prior art includes separate references covering each separate limitation in a challenged claim. *Unigene Labs., Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011). “Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” *Id.* (citing *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007)). “This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.” *KSR*, 550 U.S. at 418–19. On the other hand, an obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *Id.* at 418; accord *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). Nevertheless, “[a] factfinder should be aware,

of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning.” *KSR*, 550 U.S. at 421.

B. Level of Ordinary Skill in the Art

Petitioner asserts that a person of ordinary skill in the art (“POSITA”) “would have had a Bachelor’s degree in electrical engineering, material science, applied physics, or a related field, and four years of experience in semiconductor design and manufacturing or equivalent work experience.” Pet. 5 (citing Ex. 1003 ¶ 17). According to Petitioner, “[a]dditional education might compensate for less experience, and vice-versa.” *Id.* On the present record, Patent Owner does not contest Petitioner’s definition of a person of ordinary skill in the art. *See generally* Prelim. Resp.

In light of the record before us, and for purposes of this Decision, we adopt Petitioner’s proposal regarding the level of ordinary skill in the art. Based on our review of the ’222 patent and the prior art of record, we determine that the definition offered by Petitioner comports with the qualifications a person would have needed to understand the ’222 patent and the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (explaining that specific findings regarding ordinary skill level are not required “where the prior art itself reflects an appropriate level and a need for testimony is not shown”) (quoting *Litton Indus. Prods., Inc. v. Solid State Sys. Corp.*, 755 F.2d 158, 163 (Fed. Cir. 1985)).

C. Claim Construction

In *inter partes* review proceedings based on petitions filed on or after November 13, 2018, such as this one, we construe claims using the same claim construction standard that would be used in a civil action under 35

U.S.C. § 282(b), as articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. *See* 37 C.F.R. § 42.100(b).

Petitioner states that they do not believe any terms need to be construed and that they take no position regarding claim construction at this time. Pet. 5–8. Petitioner indicates that the district court in a related litigation provided “preliminary constructions” for certain claim limitations. Pet. 8 (citing Ex. 1037). Patent Owner does not dispute Petitioner’s assertions. *See generally* Prelim. Resp.

We determine that we do not need to expressly construe any terms to resolve the parties’ disputes on the current record.⁵ *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (“[W]e need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

D. Timeliness of Petition Under 35 U.S.C. § 315(b)

Patent Owner argues that the Petition should be dismissed because it is untimely. Prelim. Resp. 14. Specifically, Patent Owner argues that Petitioner is in privity with [REDACTED]

⁵ If either party intends to argue claim construction at trial, including what is the plain and ordinary meaning of a term, they should do so in a clearly designated section of their briefing so as to expressly identify such arguments. *See, e.g.*, 37 C.F.R. § 42.104(b)(3) (content of petition); *see also* Patent Trial and Appeal Board Consolidated Trial Practice Guide, 84 Fed. Reg. 64,280, at 46, 48–45 (Nov. 2019) (available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>). Claim construction arguments should not be relegated to patentability arguments on the facts.

⁶ Because Patent Owner does not identify a particular [REDACTED] entity in the Preliminary Response, we understand the reference to [REDACTED] to refer to

██████████—Patent Owner refers to ██████████ collectively as “Licensees”—who Patent Owner asserts are time-barred under 35 U.S.C. § 315(b) and licensed under Greenthread patents, including the ’222 patent. *Id.* at 15–16, 21–22.

Patent Owner advances several theories supporting its privity arguments, including that Petitioner serves as an “agent” of Licensees by exercising their “have made” rights under the license, that Petitioner is a beneficiary of the Licensee’s agreements related to accused products, that Petitioner and Licensees “are ‘preceding and succeeding owners of’ the licensed and/or infringing products,” that Petitioner’s licensed sales encumber otherwise infringing articles, and “Petitioners apparently indemnify the time-barred parties” for custom-made products. Prelim. Resp. 25–30.

1. Legal Standard

Although Petitioner is a party to a lawsuit involving the ’222 patent (*supra* § I.C), Patent Owner does not assert the Petition is time-barred based on this lawsuit—presumably because the Petition was filed within a year of service of the complaint involving the ’222 patent against Petitioner. *Compare* Pet. 1 (indicating related litigation commenced May 26, 2023) *with*, Paper 3, 1 (according a filing date of February 3, 2024 to the present Petition). Instead, Patent Owner asserts the Petition is time-barred because Petitioner is allegedly in privity with ██████████.

“A person who was not a party to a suit generally has not had a ‘full and fair opportunity to litigate’ the claims and issues settled in that suit.”

██████████ which is named in Exhibits 2008, 2023, 2024, 2025. Prelim. Resp. 14–15.

Taylor v. Sturgell, 553 U.S. 880, 892 (2008). An exception to this deeply-rooted rule exists for parties that are in privity with a defendant in an earlier litigation. *See WesternGeco*, 889 F.3d at 1319 (noting that “the standards for the privity inquiry must be grounded in due process”).

The Supreme Court in *Taylor* identified considerations where nonparty preclusion would be justified, including:

- (1) an agreement to be bound; (2) pre-existing substantive legal relationships between the person to be bound and a party to the judgment (e.g., “preceding and succeeding owners of property”); (3) adequate representation by someone with the same interests who was a party (e.g., “class actions” and “suits brought by trustees, guardians, and other fiduciaries”); (4) assumption of control over the litigation in which the judgment was rendered; (5) where the nonparty to an earlier litigation acts as a proxy for the named party to relitigate the same issues; and (6) a special statutory scheme expressly foreclosing successive litigation by nonlitigants.

Id. (citing *Taylor*, 553 U.S. at 894–95).

As this list of considerations indicates, “the mere existence of some relationship between a petitioner and another entity is not sufficient” to place that petitioner in privity with that entity. *Google LLC v. DDC Technology, LLC*, IPR2023-00707, Paper 27 at 37 (PTAB Oct. 25, 2023). Instead, “that relationship must be related to [an earlier] lawsuit and be sufficiently close that it can be fairly said the petitioner had a full and fair opportunity to litigate the validity of the patent in that lawsuit,” or the evidence must demonstrate that the “petitioner is simply serving as a proxy to allow another party to litigate the patent validity question that the other party raised in an earlier-filed litigation.” *Id.*; *WesternGeco*, 889 F.3d at 1319; *see also Ventex Co. v. Columbia Sportswear North America, Inc.*, IPR2017-00651,

Paper 148 at 10, 12 (PTAB Jan. 24, 2019) (precedential) (finding privity where the two parties “had a specially structured, preexisting, and well-established business relationship with one another, including indemnification and exclusivity arrangements”).

“[T]he mere existence of some relationship between a petitioner and another entity is not sufficient” to place that petitioner in privity with that entity. *Google LLC v. DDC Technology, LLC*, IPR2023-00707, Paper 27 at 37 (PTAB Oct. 25, 2023). Instead, “that relationship must be related to [an earlier] lawsuit and be sufficiently close that it can be fairly said the petitioner had a full and fair opportunity to litigate the validity of the patent in that lawsuit,” or the evidence must demonstrate “that petitioner is simply serving as a proxy to allow another party to litigate the patent validity question that the other party raised in an earlier filed litigation.” *Id.*; *WesternGeco*, 889 F.3d at 1319; *see also Ventex Co. v. Columbia Sportswear North America, Inc.*, IPR2017-00651, Paper 148, at 10, 12 (PTAB Jan. 24, 2019) (precedential) (finding privity where the two parties “had a specially structured, preexisting, and well-established business relationship with one another, including indemnification and exclusivity arrangements”).

A petitioner’s “initial identification of the real parties in interest [and privies] should be accepted unless and until disputed by a patent owner.” *Worlds Inc. v. Bungie, Inc.*, 903 F.3d 1237, 1244 (Fed. Cir. 2018). In order to raise such a dispute, “a patent owner must produce *some* evidence that tends to show that a particular [time-barred] third party should be named a [privity].” *Id.* The amount of evidence a patent owner must produce does not rise to the level of that required to overcome a burden of production. *Id.*

at 1244 n.8. One potential formulation of the amount of evidence required is “evidence that ‘reasonably brings into question the accuracy of a petitioner’s’” assertion that it is not time-barred. *Id.* (quoting *Atlanta Gas Light v. Bennett Regulator Guards, Inc.*, IPR2013-00453, Paper 88 (PTAB Jan. 6, 2015) (addressing the amount of evidence required from a patent owner to question a petitioner’s identification of the real parties-in-interest)). Although the “burden remains with the petitioner to establish” the timeliness of its petition, it need not respond until the patent owner reasonably brings into question the accuracy of its assertion that it is not time-barred. *Id.* at 1242.

2. Licensees as Alleged Privies

In the subsections below, we address Patent Owner’s arguments that Licensees are privies of Petitioner under § 315(b).

Agency

Patent Owner argues that Petitioner acts as the Licensees’ “agent” by making accused products on their behalf under the “have made” clause of the license. Prelim. Resp. 38–30. We disagree.

Patent Owner’s agency argument is not based on the applicable legal standard. For purposes of privity under § 315(b), the relevant question is whether Petitioner is acting as an agent for [REDACTED] in filing a petition for *inter partes* review. *See Taylor*, 553 U.S. at 895 (“preclusion is appropriate when a nonparty later brings suit as an agent for a party who is bound by a judgment”). As the Federal Circuit explains, the rationale behind § 315(b)’s time bar is “to prevent successive challenges to a patent by those who previously have had the opportunity to make such challenges in prior litigation.” *WesternGeco*, 889 F.3d at 1319.

Patent Owner argues that to be in privity with the Licensees, what matters is whether prior action concerned a matter within the agency. Prelim. Resp. 28 (citing *Herrion v. Children's Hosp. Nat. Med. Ctr.*, 786 F. Supp. 2d 359 (D.D.C.), *aff'd*, 448 F. App'x 71 (D.C. Cir. 2011)); *see id.* at 29 (citing *John Street Leasehold, LLC v. Cap. Mgmt. Res., L.P.*, 283 F.3d 73 (2d Cir. 2002); *Fiumara v. Fireman's Fund Ins. Companies*, 746 F.2d 87 (1st Cir. 1984)). This conclusion, however, would significantly expand the analysis set forth in *Taylor*, which noted that preclusion is only appropriate if the putative agent's conduct "is subject to the control of the party who is bound by the prior adjudication." *Taylor*, 553 U.S. at 906 (explaining that "courts should be cautious about finding preclusion" on the basis of agency). Moreover, the privity inquiry must take into account the rationale behind the preclusion provision in § 315(b), which "is to prevent successive challenges to a patent by those who previously have had the opportunity to make such challenges in prior litigation." *WesternGeco*, 889 F.3d at 1319. Patent Owner's broad interpretation would be inconsistent with this purpose.

Even if Patent Owner's argument that a general agency relationship is sufficient to demonstrate privity for purposes of nonparty preclusion were on solid legal footing, it lacks factual support in the record. An "essential element[] of agency" is "the principal's 'right to direct or control the agent's actions.'" *In re Google LLC*, 949 F.3d 1338, 1345 (Fed. Cir. 2020) (quoting *Meyer v. Holley*, 537 U.S. 280, 286 (2003)). Patent Owner does not argue in the Preliminary Response that [REDACTED] has or had such a right with respect to Petitioner, or vice versa, much less direct us to any evidence that would tend to prove the existence of such a right. *See generally* Prelim. Resp.

Preceding and Succeeding Owners of Property

Patent Owner argues that Petitioner and [REDACTED] are “preceding and succeeding owners” of “licensed and/or infringing products that Petitioner makes and supplies to Licensees.” Prelim. Resp. 25–26 (citing *Taylor*, 553 U.S. at 894). It is true that entities who are “preceding and succeeding owners of property” can be in privity with one another. *Taylor*, 553 U.S. at 894. This rule, however, is based on property law and “is extended or denied in an effort to protect conflicting property interests rather than an effort to implement concepts of participation or representation.” 18A C. Wright, A. Miller, & E. Cooper, *Federal Practice and Procedure* § 4448 (3d. ed. 2023); *see also id.* at § 4462 (“Successive Property Relationships”) (“There is no independent reason to treat the defeated litigant as the representative of his transferee. Preclusion is limited to the property involved in the judgment.”). As noted above, our relevant analysis is based on the relationships between the parties with respect to the prior proceedings or the Petition (e.g., participation or representation), not on property interests. *See WesternGeco*, 889 F.3d at 1319 (noting that the privity requirement is used “to prevent successive challenges to a patent by those who previously have had the opportunity to make such challenges in prior litigation”).

Moreover, the rule related to preceding and succeeding owners of property does not extend to the point where all manufacturers of allegedly infringing goods are in privity with the customers who buy those goods. *See, e.g., id.* at 1319–22 (the parties “had a contractual and fairly standard customer-manufacturer relationship regarding the accused product,” which “does not necessarily suggest that the relationship is sufficiently close that

both” parties should be considered to be in privity); *Wi-Fi One, LLC v. Broadcom Corp.*, 887 F.3d 1329, 1340–41 (Fed. Cir. 2018) (same); *Samsung Electronics Co. v. Netlist Inc.*, IPR2022-00615, Paper 64 at 22–26 (PTAB June 30, 2023) (same).

Patent Owner’s evidence that Petitioner’s products are components of Licensees’ products does not come close to suggesting that “it can be fairly said that the petitioner had a full and fair opportunity to litigate the validity of the patent” in the prior lawsuit, or that or that petitioner is serving as a proxy to allow any Licensee to again challenge the patent. *WesternGeco*, 889 F.3d at 1319. Thus, Patent Owner does not present evidence that lends support to a finding that Petitioner’s and Licensees’ status as preceding and succeeding owners of allegedly infringing products renders them privies for purposes of § 315(b).

Beneficiaries of License Agreement

Patent Owner argues that Petitioner and Licensees are privies because Petitioner is a “beneficiary” of Patent Owner’s licenses to [REDACTED], which Patent Owner asserts are “directly related to” the accused products. Prelim. Resp. 27 (citing *Ventex*, IPR2017-00651, Paper 148). We disagree. Unlike the agreements in *Ventex*, Paper 148 at 12, Patent Owner’s licenses to Licensees are not evidence of a privity relationship between Petitioner and Licensees because Petitioner is not a party to the license agreements. Although Patent Owner argues that “Petitioner operates under and is a beneficiary of Licensees’ agreement with Greenthread” and “[t]hat agreement is ‘directly related to’ the accused products, because it licenses some of them,” the record does not contain sufficient evidence of this. Patent Owner does not explain how obtaining a benefit—apart from being an

identified third-party beneficiary—from a license agreement makes Petitioner a privy.

Patent Exhaustion

Patent Owner argues that the doctrine of patent exhaustion gives rise to privity because “after Petitioner sells products under the license, any downstream user of the article sold would have an exhaustion defense against [Patent Owner].” Prelim. Resp. 28. According to Patent Owner, “Petitioner is effectively providing rights to third-parties under the license and, therefore, is in privity with Licensees.” *Id.* We disagree. It is true that downstream purchasers and users of Licensees’ products that incorporate products made by Petitioner may have a license (or exhaustion) defense against any claim of infringement by Patent Owner. The relevant question, however, is ultimately whether the relationship between Petitioner and the Licensees is sufficiently close to justify denying Petitioner its day in court. *See Taylor*, 553 U.S. at 892. Patent Owner does not sufficiently explain why a license defense supports such a privity relationship between Petitioner and Licensees.

Conclusion as to Timeliness of the Petition

As noted above, privity concerns “whether the petitioner and the prior litigant’s relationship—as it relates to the [earlier] lawsuit—is sufficiently close that it can be fairly said that the petitioner had a full and fair opportunity to litigate the validity of the patent in that lawsuit,” or “whether the petitioner is simply serving as a proxy to allow another party to litigate the patent validity question that the other party raised in an earlier filed litigation.” *WesternGeco*, 889 F.3d at 1319. A petitioner’s “initial identification of the real parties in interest [and privies] should be accepted

unless and until disputed by a patent owner.” *Worlds*, 903 F.3d at 1244. In order to raise such a dispute, “a patent owner must produce *some* evidence that tends to show that a particular [time-barred] third party should be named a [privy].” *Id.* Here, Patent Owner argues that it has produced such evidence in several respects, but, on the present record, none of the evidence in question tends to show that any time-barred Licensee is a privy of Petitioner for purposes of § 315(b). As such, the evidence of record does not tend to suggest that Petitioner is time-barred under 35 U.S.C. § 315(b), or call into question Petitioner’s assertion that the Petition is timely-filed.

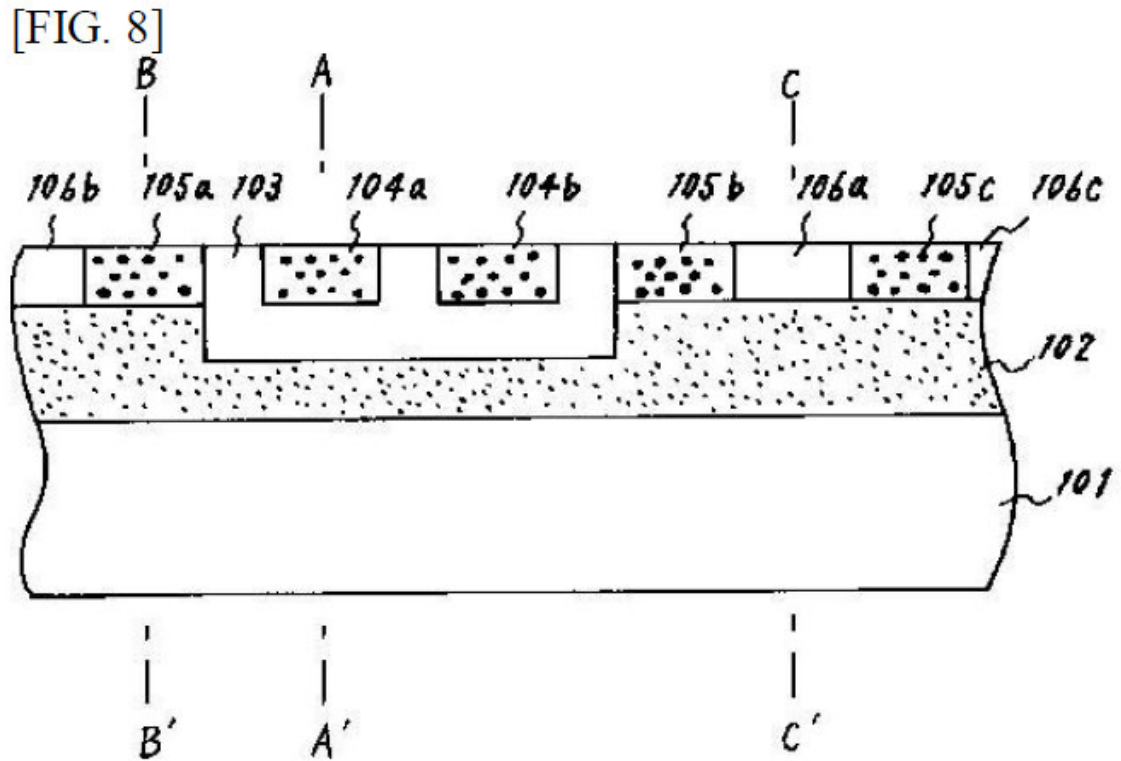
E. Ground I—Asserted Obviousness over Onoda

Petitioner contends claim 44 would have been obvious in view of Onoda. Pet. 19–42.

1. Onoda

Onoda is titled “Semiconductor Integrated Circuit Device, Nonvolatile Semiconductor Storage Device, and Manufacturing Method” and describes “a nonvolatile semiconductor storage device with improved latch-up resistance and punch-through breakdown voltage and improved junction breakdown voltage between the well regions and the semiconductor substrate.” Ex. 1042, codes (54), (57). Onoda “relates to a semiconductor integrated circuit device, to a nonvolatile semiconductor storage device, and to methods of manufacturing thereof, and, in particular, relates to a nonvolatile semiconductor storage device wherein a triple-well structure is formed in an epitaxial substrate.” *Id.* ¶ 1. Figure 8 of Onoda, reproduced below, “is a cross-sectional drawing illustrating, in step order [in conjunction with Figures 4–7], manufacturing of a semiconductor substrate

100 to which the first embodiment according to the present invention is applied.” *Id.* at 28.



Onoda's Figure 8, in conjunction with Figures 4–7, depicts a method for manufacturing a flash memory structured as shown. Ex. 1042 ¶ 46.

Figure 8 depicts a first semiconductor layer 101, which comprises a heavily-doped P-type silicon substrate (silicon wafer) with a dopant concentration of $1 \times 10^{19}/\text{cm}^3$ (*id.*) and a lightly-doped P-type second semiconductor layer 102 wherein the epitaxial layer 102a, as a whole, is between 1×10^{16} and $1 \times 10^{18}/\text{cm}^3$ (*id.* ¶ 47). Figure 8 also depicts an N-type first well region 103 with a depth of about $3 \mu\text{m}$ and a dopant concentration of between 1×10^{15} and $1 \times 10^{18}/\text{cm}^3$. *Id.* ¶ 48. Also shown in Figure 8 are boron implantation layers 104A, 104B, 105A, 105B, and 105C, and phosphorus implantation layers 106A through 106C. *Id.* ¶ 49.

2. *Petitioner's Initial Contentions for Claim 44*

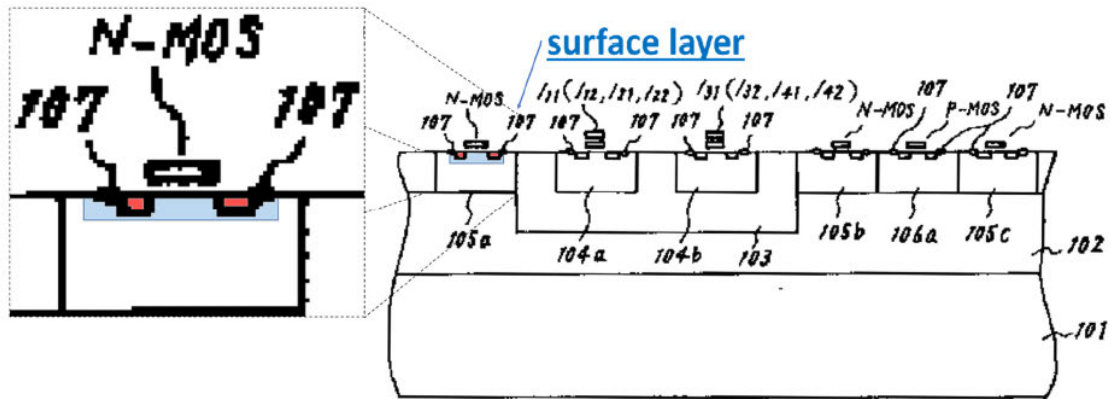
[preamble] “[a] CMOS Semiconductor device comprising”

Petitioner contends that “[t]o the extent the preamble is limiting, Onoda discloses a CMOS semiconductor device.” Pet. 21.⁷ Petitioner contends “Onoda discloses both N-channel MOS (NMOS) transistors and P-channel MOS (PMOS) transistors in the circuitry of its flash memory devices.” *Id.* (citing Ex. 1042 ¶¶ 44, 45, 52, Fig. 2, Claim 2). According to Petitioner, “[a] POSITA would have understood this to disclose CMOS because: (a) CMOS is a complementary pair of NMOS and PMOS transistors and (b) CMOS was at the time (and still is) the dominant fabrication technology used in memory devices.” *Id.* (citing Ex. 1003 ¶¶ 55–57) (second alteration added).

[44.1] “a surface layer”

Referring to its annotated version of Onoda's Figure 3, Petitioner contends that “Onoda teaches a surface layer (annotated blue, below)” that “is shown below in a region of the NMOS transistor . . . within the doped p-well region 105a, where the well has source/drain regions.” Pet. 22 (citing Ex. 1042 ¶ 43 (“105a, 105b, and 105c are P-type [] well regions”); *see also id.* ¶ 44, Claim 2 (“floating gate electrode formed over the second well region, positioned between the source region and the drain region”)).

⁷ We need not determine at this preliminary stage whether the preamble is limiting.

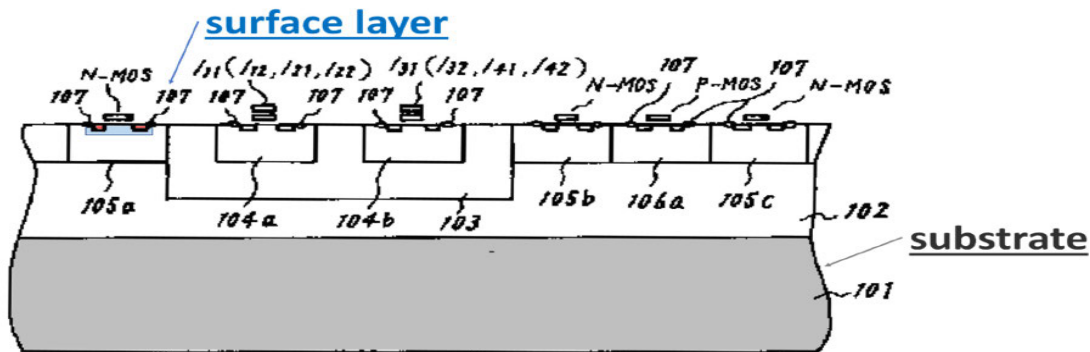


Petitioner's annotated version of Onoda's Figure 3.
Pet. 23.

Petitioner contends that “Onoda’s surface layer is at the surface of semiconductor substrate 100, and the source and drain regions (red) of Onoda’s transistors are in that layer.” *Id.* at 23 (Ex. 1003 ¶¶ 58–59).

[44.2] “a substrate”

Petitioner contends that “Onoda discloses ‘a semiconductor substrate 100’ on which the flash memory is formed.” Pet. 25 (citing Ex. 1042 ¶ 41). Pointing to its annotated version of Onoda’s Figure 3 reproduced below, “[w]ithin the semiconductor substrate is element 101 (annotated grey, below), which ‘is a first semiconductor layer made from a heavily-doped . . . P-type silicon substrate.’” *Id.*

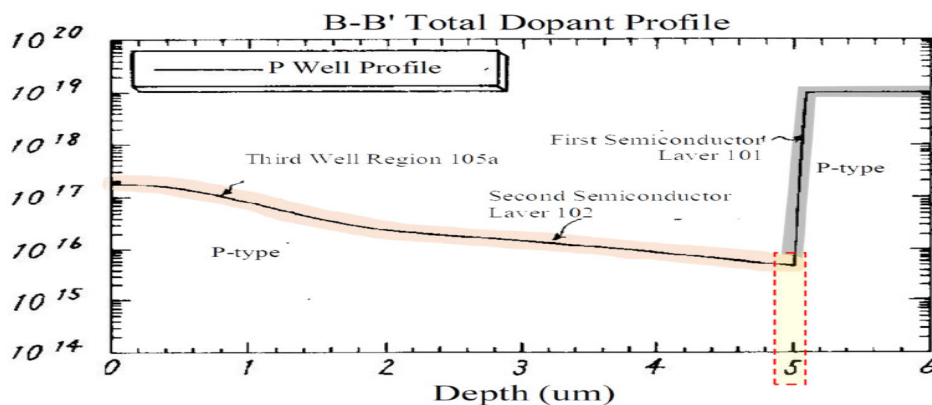


Petitioner's annotated version of Onoda's Figure 3.
Pet. 25.

[44.4] “a single drift layer disposed between the other surface of the surface layer and the substrate, the drift layer having a graded concentration of dopants extending between the surface layer and the substrate”

Petitioner contends that “[i]n Onoda’s FIG. 3, the second semiconductor layer 102 is an example of the claimed single drift layer.” Pet. 30. According to Petitioner, “[t]his single drift layer is ‘disposed between the “other surface of the surface layer” (the bottom surface) and the substrate.’” *Id.* Petitioner contends that “[t]he single drift layer is demonstrated in the intermediate processing step of FIG. 5, below, prior to well formation.” *Id.* at 31 (Ex. 1042 ¶¶ 41–51; Figs. 10–12). Petitioner further contends that “FIG. 8 depicts the semiconductor device of Onoda, and FIG. 11 demonstrates that device’s dopant profile of the portion marked as B-B’ (cross-section annotated yellow).” *Id.* (citing Ex. 1042 ¶ 52).

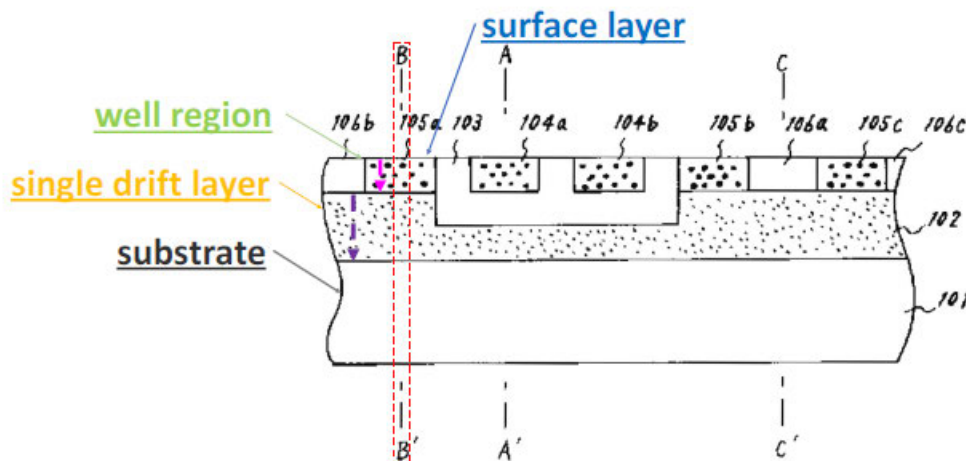
Pointing to Petitioner’s annotated version of Onoda’s Figure 11 reproduced below, Petitioner contends that “Onoda’s semiconductor device has a dopant profile whose impurities decrease from the surface, *i.e.*, depth 0, to the substrate, *i.e.*, depth of 5 μm .” *Id.* at 33 (citing Ex. 1042 ¶¶ 46–50, 52; Ex. 1003 ¶¶ 61–71).



Petitioner’s annotated version of Onoda’s
Figure 11. Pet. 33.

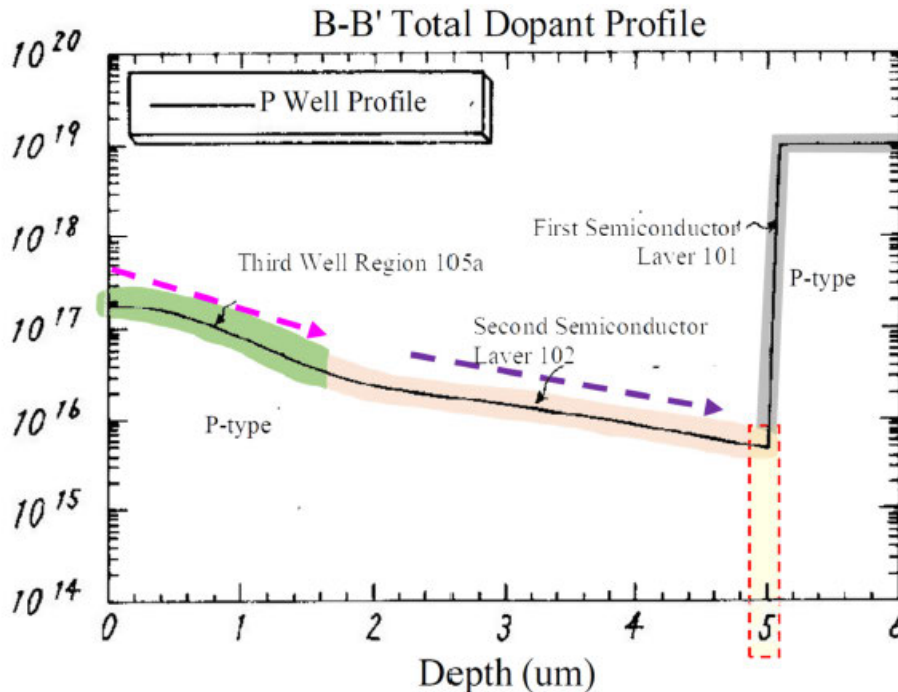
[44.5] “the drift layer further having a first static unidirectional electric drift field to aid the movement of carriers from the surface layer to an area of the substrate where there are no active regions” and

Petitioner contends that “[a]s discussed above with regard to Element [44.4], Onoda discloses a single drift layer (tan) having a downward-sloping dopant concentration extending between the surface layer (blue) and the substrate (gray, starting at the 5 μm depth level).” Pet. 34. Pointing to its annotated versions of Onoda’s Figure 8 reproduced below and Figure 11 reproduced further below, Petitioner contends that Onoda “depicts the first static unidirectional electric drift field (purple arrow)[□] that aids in the movement of minority carriers from the surface to the substrate, at a depth corresponding to Onoda’s second semiconductor layer 102 (tan)” and that “there is no active region in the substrate area.” *Id.* (citing Ex. 1003 ¶ 141); *see id.* at 34, n.7 (“The arrow indicates the movement of minority carriers from the surface layer to the substrate. A POSITA would understand that the field would be in the opposite direction.”) (citing Ex. 1003 ¶¶ 72–74).



Petitioner’s annotated version of Onoda’s Figure 8.
Pet. 39.

One of Petitioner's annotated versions of Onoda's Figure 11, reproduced below, illustrates the generally downward-sloping dopant concentration profile relative to the depth in Onoda's second semiconductor layer .



Petitioner's annotated version of Onoda's Figure 11. Pet. 39.

Citing statements made by Patent Owner during prosecution of the parent '195 patent, Petitioner contends

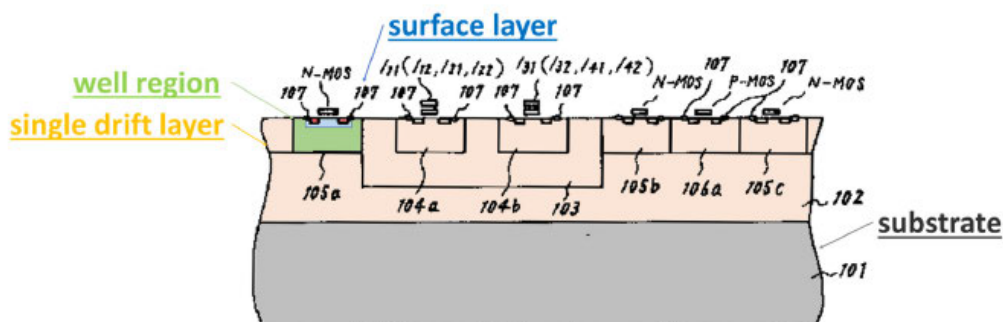
Patent Owner conceded during prosecution, [that] a POSITA would have further understood that a downward-sloping graded-dopant concentration creates an inherent built-in unidirectional electric drift field to aid the movement of minority carriers. . . . Patent Owner in prosecution described a downward graded dopant profile as providing an "inherent 'built-in' unidirectional electric field" that moves carriers into the substrate. Moreover, a POSITA would have understood this to be an inherent property of a downward sloping doping gradient. Furthermore, the static unidirectional electric drift field would have been understood to be static. As discussed in [44.4], the dopant profile is created through ion implantation and thermal diffusion techniques and is

thusly set once the device has been fabricated. In other words, this would have understood to be static to a POSITA. Patent Owner also described “static” similarly during prosecution, stating that a semiconductor device with a fabricated dopant profile provides a static unidirectional electric field. Consequently, [a] POSITA would have understood Onoda’s downward sloping gradient to provide a first static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate.

Pet. 35–36 (citing Ex. 1003 ¶¶ 66–74; Ex. 1002, 318, 333; Ex. 1042 ¶¶ 47–50; Pet. 9–13, 74); *see id.* at 37–38.

[44.6] “at least one well region disposed in the single drift layer, the well region having a graded concentration of dopants and a second static unidirectional electric drift field to aid the movement of carriers from the surface layer to the area of the substrate where there are no active regions.”

Pointing to its annotated version of Onoda’s Figure 3, Petitioner contends that “disposed within that single drift layer is a well region (green) which is within the claimed single drift layer.” Pet. 37 (citing Ex. 1042 ¶¶ 42 (“105a, 105b, and 105c are P-type third well regions formed in the surface of the second semiconductor layer 102”), 44 (“the plurality of N-channel MOS transistors is formed in the third well regions 105a, 105b, 105c”)).



Petitioner’s annotated version of Onoda’s Figure 3.
Pet. 37.

According to Petitioner, “there is no active region in the substrate area.”

Id. (citing Ex. 1003 ¶ 142). Petitioner further contends that

Onoda discloses the steps to form the P-wells and the N-wells (including the exemplary claimed “well region”) in the lightly-doped semiconductor layer 102. After forming the epitaxial second semiconductor layer 102, an N-type dopant (*e.g.*, phosphorus P) is implanted and heat treatment is carried out to form an N-type first well region 103 with a depth of about 3 μm . Thereafter, a P-type dopant (*e.g.*, boron B) is implanted to form P-type implantation layers 104a, 104b and 105a through 105c, and an N-type dopant is implanted to form N-type implantation layers 106a through 106c. Finally, after carrying out heat treatment, P-type second well regions 104a and 104b, P-type third well regions 105a through 105c, and N-type fourth well regions 106a through 106c are formed in the second semiconductor layer 102, as illustrated in Figure 8 below. The well formation is depicted in FIG. 8, where P-well regions 105a, 105b, 105c, 104a and 104b and N-well regions 103, 106a, 106b and 106c are formed in semiconductor layer 102.

Id. at 38 (citing Ex. 1042 ¶¶ 42, 48–50); *see id.* at 39–42.

Petitioner contends that

the well region 105a, like the “single drift layer” 102, has a dopant profile that has a downward sloping gradient. The well region 105a has the claimed second static unidirectional electric drift field (*e.g.*, pink arrow) 8 to aid the movement of minority carriers from said surface layer to said substrate for the same reasons as described in Element [44.5]. And, as detailed in [Petition] section VII.B at pages 11-14, Patent Owner in prosecution described a downward graded dopant profile as providing an “inherent ‘built-in’ unidirectional electric field” that moves carriers into the substrate . . . A POSITA would have understood Onoda’s dopant profile over the well region 105a to teach a second static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate.

Pet. 40 (citing Ex. 1007 ¶ 52; Ex. 1003 ¶¶ 75–83). As shown in the annotated version of Onoda’s Figure 8 reproduced above, Petitioner maps the claimed substrate to Onoda’s first semiconductor layer 101. *Id.* at 39.

3. *Patent Owner’s Arguments and Petitioner’s Responsive Contentions*

Patent Owner argues that none of Petitioner’s challenges sufficiently teach or suggest “a first static unidirectional electric drift field to aid the movement of carriers from the surface layer to an area of the substrate where there are no active regions” and “a second static unidirectional electric drift field to aid the movement of carriers from the surface layer to the area of the substrate where there are no active regions,” as recited in claim 44. *See* Prelim. Resp. 1.

First, with respect to the statement made during prosecution of the parent ’195 patent cited by Petitioner—that “a downward-sloping graded dopant concentration was known in the prior art to create an ‘inherent “built-in” unidirectional electric field’ that sweeps carriers down”—Patent Owner asserts that Petitioner’s quotation of this statement is incomplete. *See id.* at 2–3 (citing Ex. 1002, 286, 289). Patent Owner takes the position that it also argued “that the movement of carriers ‘[d]epend[s] on the particular slope of the graded concentration of dopant[s]’” and this statement was made in response “to an Office Action regarding a claim that required a ‘single static unidirectional electric drift field to aid the movement of carriers.’” *Id.* at 3 (citing Ex. 1002, 289).

Second, pointing to the Examiner’s findings during prosecution of the ’195 parent patent, Patent Owner contends that “the Office agreed that ‘without knowing other parameters of the device’ one cannot say whether the gradient would aid the movement of carriers.” Prelim. Resp. 7 (citing Ex.

1002, 270).⁸ According to Patent Owner, “[s]ince neither the Petition nor Dr. Campbell analyze ‘other parameters’ they cannot show whether Onoda’s concentration gradient would ‘aid the movement’ of carriers ‘from the surface layer.’” *Id.* Patent Owner further contends that Dr. Campbell “does not offer an opinion regarding the strength of the force created by the dopant grading” in any of the prior art, and because he “offers no opinion about the strength of the force created by the dopant gradients,” he “necessarily cannot compare it to other forces acting on carriers.” *Id.* at 12. Finally, Patent Owner faults Dr. Campbell for failing to “describe what forces these curves [in Onoda] exert on carriers” or “how those forces compare with other forces acting on carriers.” *Id.* at 13.

During prosecution of the ’195 parent patent, the Examiner rejected claims under the pre-AIA version of 35 U.S.C. § 112, first paragraph and found that “movement of minority carriers is affected by multiple forces and fields” and that “it does not appear that simply the presence of ‘a unidirectional drift field’ in itself can achieve ‘drawing *all* minority carriers from said surface layer to said substrate.’” Ex. 1002, 289 (emphasis added). Patent Owner responded with following argument:

[A] unidirectional drift (electric) field necessarily affects all the present minority carriers in the same way - moving all minority carriers in the same direction because of the unidirectional drift due to the existence of the electric field. *See* “Physics and Technology of Semiconductor Devices,” A.S. Grove, pp. 224–

⁸ Patent Owner contends that “during prosecution, the examiner said that in ‘a complex electronic device, movement of minority carriers is affected by multiple forces and fields’ and that a ‘drift field may attempt to apply a force on all minority carriers in a specific direction’ but that ‘without knowing other parameters of the device’ one cannot say whether the field would aid carrier movement.” Prelim. Resp. 6 (citing Ex. 1016, 270).

225, John Wiley and Sons, Inc., New York, 1st Edition 1967 (“This same electric field will then be of such direction as to aid the motion of injected holes. Thus the injected minority carriers will now move not only by diffusion but also by drift due to the existence of this electric field.”). Depending on the particular slope of the graded concentration of dopant, all minority carriers are either swept “down” (from the surface layer to the substrate) or “up” (from the substrate to the surface layer). *See* Applicant’s Figs. 5(b) and 5(c).

Id. Patent Owner further argued that the Examiner’s finding

appears to not consider that the graded dopant concentration itself creates a “built-in” electrical field that forces the movement of carriers into a particular direction, whereby the “direction” of the electrical field and the resulting direction of the carrier movement depends *solely* on the slope of the graded concentration of dopant. With regard to the existence of a “built-in” electric field created by a graded dopant density, . . . *this inherent “built-in” unidirectional electric field is the additional parameter for ensuring that all minority carriers are being moved in one direction* and which parameter the Office Action deemed to be missing from the disclosure.

Id. at 289–90 (emphases added). Also, “without conceding its position on this issue,” Patent Owner amended claims to eliminate reference to “*all* carriers” and instead, refer to “carriers.”⁹ *Id.* at 290.

4. *Analysis of Claim 44*

After considering the parties’ arguments and information on the present record, we determine that Petitioner has shown sufficiently and

⁹ The examined claims of the ’195 patent generally recited “a unidirectional drift field drawing all minority carriers from said surface layer to said substrate.” Ex. 1002, 286. Patent Owner amended the claims of the ’195 patent to recite “maintain[ing] a single static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate.” *Id.*

supported by Dr. Campbell’s testimony, for purposes of institution, that the cited portions of Onoda teach or suggest the subject matter of the preamble and limitations 44.1 through 44.6 of independent claim 44.¹⁰ At this stage of the proceeding, we determine that the statements made by Patent Owner during prosecution of the ’195 parent patent contradict its arguments in the present proceeding with regard to limitations 44.5 and 44.6. *See generally* Prelim. Resp; *see* Prelim. Reply 4–5 (Petitioner correctly stating that Patent Owner asserted, during prosecution, that “the graded dopant concentration itself creates a ‘built-in’ electrical field that forces the movement of carriers into a particular direction,” and that this “inherent ‘built-in’ unidirectional electric field is the additional parameter for ensuring that all minority carriers are being moved in one direction” (quoting Ex. 1002, 289–290) (emphasis omitted)). And Petitioner presents evidence demonstrating that a graded dopant concentration results in an electric field, which exerts a force on charged particles that will move, or aid movement, of the carriers in a specific direction. Pet. 34–42. Contrary to Patent Owner’s assertions, Petitioner is not arguing or assuming that “*any* ‘graded dopant concentration’ would *necessarily* ‘aid carrier movement,’” nor is Petitioner attempting to read out the “aid the movement of minority carriers” element. Prelim. Resp. 1–2; Prelim. Reply 4–5.

As set forth above, Patent Owner argued that a graded dopant concentration creates an electric field that forces the movement of carriers in a particular direction, absent any discussion of the force exerted by the

¹⁰ At this stage of the proceeding, we do not determine whether the preamble of claim 44 is limiting because Petitioner shows the subject matter of the preamble to be disclosed in the reference.

specific dopant gradients, whether any other forces are present, or the comparative magnitude of all forces present, during prosecution. *See* Ex. 1002, 289–290. Furthermore, although Patent Owner now directs us to the Examiner’s findings during prosecution also set forth above (*see* Prelim. Resp. 4 (citing Ex. 1002, 270)), Patent Owner previously represented to the Patent Office that it disagreed with the Examiner’s position (Ex. 1002, 289).

Additionally, Patent Owner does not direct us to any discussion in the ’222 patent regarding a specific slope value that is necessary to “aid the movement of minority carriers,” either in isolation or in the presence of other forces that may act upon the carriers. Nor does Patent Owner direct us to any authority suggesting that we should demand more from the prior art disclosure in Onoda than is provided in the disclosure of the ’222 patent.

In view of this, we determine Petitioner’s assertion that Onoda discloses a first and second “static unidirectional electric drift field to aid the movement of carriers from the surface layer to an area of the substrate where there are no active regions” as recited in limitations 44.5 and 44.6 because Onoda has a graded dopant concentration is sufficient for purposes of institution. There is no evidence on this record that any other additional parameter is necessary, present, or acting upon the carriers in Onoda’s system. Prelim. Reply 5 (citing Ex. 1002, 290); Sur-reply 2 (discussing, without disputing, Petitioner’s statements regarding “other forces”). At this stage of the proceeding, we credit Dr. Campbell’s testimony that Onoda teaches the limitations 44.5 and 44.6. Ex. 1003 ¶¶ 72–83 (opining as to substantially similar limitations 1.5 and 1.6 of claim 1; *see also id.* ¶¶ 141–42 (opining as to limitations 44.5 and 44.6 of claim 44). Dr. Campbell’s

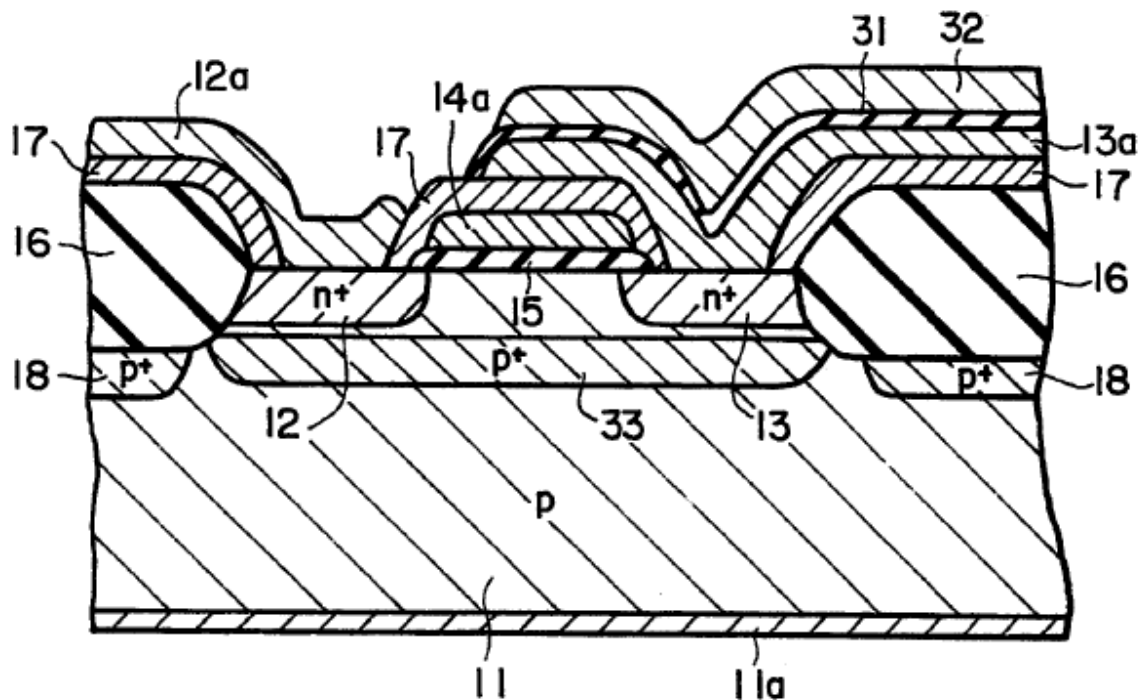
testimony is consistent with, and supported by, other evidence in the record, and disputed only by attorney argument.

F. Ground II—Asserted Obviousness over Onoda and Nishizawa

Petitioner contends claim 44 would have been obvious based on Onoda and Nishizawa. Pet. 42–49. Regarding motivation to combine Onoda with Nishizawa, Petitioner argues that a POSITA “would have been motivated to apply Nishizawa’s teachings of minority carrier diffusion based on a downward sloping dopant gradient to Onoda’s teachings of a downward sloping dopant gradient.” *Id.* at 44 (citing Ex. 1046, 18:46–67, Fig. 11; Ex. 1003 ¶¶ 91–92).

1. Nishizawa

Nishizawa “relates to a semiconductor device, and more particularly to a semiconductor device such as an insulation-gate transistor which allows a high packing density integration and effects a good holding of memory contents and which does not make soft errors induced by alpha-particle irradiation.” Ex. 1046, 1:21–29. Figure 16 of Nishizawa, reproduced below, is a diagrammatic sectional view showing the structures of a dynamic random access memory (“d-RAM”) cell. *Id.* at 8:25–26.



Nishizawa's Figure 16 depicts a p-type substrate 11 and a substrate electrode 11a. The cell includes n⁺ type regions 12, n⁺ type storage region 13, and p⁺ type buried region 33a. Ex. 1046, 17:40–47.

Numerals 12a and 13a represent a source electrode and a drain electrode, respectively, which are made of a metal such as aluminum. *Id.* at 2:7–10.

Numeral 15 represents a gate oxide film, 16 a field oxide film, and 17 a PSG film. *Id.* at 2:6–7. Numeral 18 represents a p⁺ type region which serves as a channel-stopper region for inhibiting the tendency of formation of a current channel between the field oxide film 16 and p type substrate 11. *Id.* at 2:10–13. Numeral 14a represents a gate electrode made of p⁺ type polysilicon, 13a an n⁺ type polysilicon, 31 a thin oxide film, and 32 a metal electrode such as aluminum. *Id.* at 10:17–20.

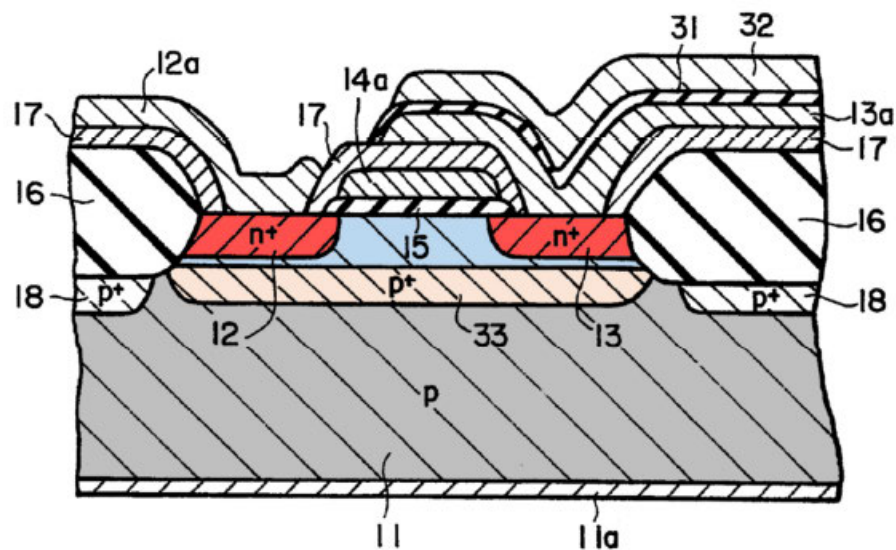
2. *Petitioner's Initial Contentions for Claim 44*

According to Petitioner, “Ground II takes Nishizawa’s teachings of CMOS and minority carrier diffusion, and combines it with teachings from Onoda.” Pet. 43.

[preamble] “[a] CMOS Semiconductor device comprising”

Pointing to Petitioner’s annotated version of Nishizawa’s Figure 16 reproduced below, Petitioner contends that “Nishizawa teaches a CMOS device . . . that provides a buried region that has a graded dopant profile (annotated tan, below).” Pet. 42 (citing Ex. 1046, 7:61–63, 18:46–67, 20:25–27, Figs. 16, 32); *supra* n.7.

FIG. 16



Petitioner’s annotated version of Nishizawa’s
Figure 16. Pet. 43.

According to Petitioner, “[t]he graded dopant profile is provided to create an electric drift field that flows minority carriers (electrons) from the surface region (blue) having the source and drain (red) to the substrate (gray) in order to prevent device errors.” *Id.* (citing Ex. 1046, 18:10–18, 19:1–9,

16:19–24 (describing the migration of carriers flowing to the surface as causing errors)). Petitioner contends that

Ground II takes Nishizawa’s teachings of CMOS and minority carrier diffusion, and combines it with teachings from Onoda. As described in Ground I, the CMOS and minority carrier diffusion elements are disclosed or, at the very least, rendered obvious by Onoda. Even if Patent Owner were to somehow successfully argue that these limitations were not disclosed by Onoda, Nishizawa nonetheless contains explicit statements about these elements making it clear that they were well-known to a POSITA.

Id.; *see id.* at 44–45.

[44.1] “a surface layer”

[44.2] “a substrate”

[44.3] “an active region including a source and a drain, disposed on one surface of the surface layer”

[44.4] “a single drift layer disposed between the other surface of the surface layer and the substrate, the drift layer having a graded concentration of dopants extending between the surface layer and the substrate”

For limitations 44.1 through 44.4, Petitioner relies on its showing in Ground I and asserts that these limitations “are disclosed and/or rendered obvious by the Onoda-Nishizawa combination.” Pet. 46.

[44.5] “the drift layer further having a first static unidirectional electric drift field to aid the movement of carriers from the surface layer to an area of the substrate where there are no active regions” and

Petitioner contends that, “[a]s described in Ground I, Element [44.5], Onoda discloses a drift layer whose dopant concentration has a downward gradient which a POSITA would have recognized as providing a built-in, static, unidirectional electric drift field to aid the movement of minority

carriers from the surface layer to the substrate where there is no active region.” Pet. 46 (citing Ex. 1003 ¶ 145).

Petitioner further contends that “Nishizawa makes these elements explicit” —pointing to its annotated version of Nishizawa’s Figure 16 reproduced above, Petitioner asserts that it “depicts a source and drain (red, below) at the surface region (blue), where buried region 33 (tan) provides an ‘impurity concentration gradient . . . [that is] progressively decreasing toward the p type substrate’ (gray).” *Id.* (citing Ex. 1042, 19:4–5, 18:50–59 (“the impurity concentration of that portion of the p+ type buried region 33a located adjacent the channel region and the n+ type region 13 is set at about $1 \times 10^{17} \text{ cm}^{-3}$, with progressively lowered concentration as the portions of the buried region 33a go progressively toward the p type substrate 11, in such manner that the impurity concentration of lowermost portion of the buried region is less than at least one third of that of the highest impurity concentration”))).

Petitioner also contends that “[a]s recognized by Nishizawa, ‘a drift electric field’ is created when there is a ‘difference in the degree of impurity concentration,’ which is used to drift minority carriers to the substrate.” *Id.* at 46–47 (citing Ex. 1046, 18:9–18). “To drift electrons within the p+ buried layer to the substrate, ‘an impurity concentration gradient in the p+ type buried region 33a in the direction toward the p type substrate’ is formed.” *Id.* at 47 (citing Ex. 1046, 18:35–50, 18:51–67 (stating that the impurity concentration has a downward gradient to the substrate), 19:1–9; Ex. 1003 ¶¶ 96–97). Petitioner further contends that “[a]s described in Ground I, Element [44.5], Onoda discloses a drift layer with an impurity dopant profile with a downward gradient” and that “[t]he Onoda-Nishizawa

combination makes clear that this drift layer in Onoda provides a static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate.” *Id.* (citing Ex. 1003 ¶¶ 96–97).

[44.6] “at least one well region disposed in the single drift layer, the well region having a graded concentration of dopants and a second static unidirectional electric drift field to aid the movement of carriers from the surface layer to the area of the substrate where there are no active regions.”

Petitioner contends that “[a]s described immediately above, the Onoda-Nishizawa combination renders Element [44.5] obvious.” Pet. 48. Petitioner further contends “[a]s described in Ground I, Element [44.6], Onoda discloses a drift layer having a well-region with an impurity dopant profile with a downward gradient.” *Id.* According to Petitioner, “[t]he Onoda-Nishizawa combination makes clear that this well region in Onoda provides a second static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate for the same reasons described in Ground II, Element [44.5] and that the substrate does not have an active region.” *Id.* at 48–49 (citing Ex. 1003 ¶¶ 98, 146).

3. *Patent Owner’s Arguments and Petitioner’s Responsive Contentions*

Patent Owner presents the same arguments of general applicability related to Onoda, as discussed above at Section II.E.3. Prelim. Resp. 1–7, 7–8. With respect to Nishizawa in particular, Patent Owner argues that “Nishizawa’s dopant gradient is explicitly ‘to prevent [the] flow of electrons,’” not aid carrier movement. *Id.* at 7 (citing Ex. 1046, 28). Patent Owner also argues that “setting aside that deficiency, Petitioner does not explain how or why Nishizawa’s gradients would move carriers ‘from the

surface layer,” because “[f]ar from being concerned with carriers at the ‘surface layer,’ Nishizawa expressly states that such carriers can be ‘disregarded.’” *Id.* at 8 (citing Ex. 1046, 29). Patent Owner further argues that

[w]hen an α -ray strikes a semiconductor device it can create carriers in the substrate (annotated by Petitioner in gray below) which can travel upwards. However, Nishizawa says that “the probability of creation of electron-hole pairs [due to α -rays] is *extremely low near the surface*” of the device (blue). Any carriers there can be “disregarded.” Rather than trying to affect carriers in the “surface region” (blue), Nishizawa describes using graded dopants in the p⁺ layer (tan) “in order to prevent [the] flow of electrons,” up into the “surface region” (blue).[□] Simply put, Petitioner points to nothing in Nishizawa about moving carriers “from the surface layer” downward.

Id. (citing Pet. 46–47; Ex.1046, 28, 29); *see id.* at 8, n.4 (Patent Owner agreeing with Petitioner that “the [quoted] text in Nishizawa applies to Figure 35, which is . . . equivalent to Figure 16” and asserting that “[r]egions 33 and 33a in the figures correspond to each other”) (citing Pet. 46, n.9).

Petitioner replies that Nishizawa “identifies the problem that electrons migrate into the n⁺ type region 13 of FIG. 35, i.e., the active region at the surface, from the p⁺ type region” and solves the problem by applying “an impurity concentration in the p⁺ type region that decreases downward.”

Prelim. Reply 6–7 (citing Ex. 1046, 18:37–42, 18:42–50, 18:54–56).

According to Petitioner, “Nishizawa discloses that in certain conditions, the effect of electrons is small and will not affect memory and can thusly be disregarded.” *Id.* at 7 (citing Ex. 1046, 20:19–22 (“the amount of electrons created which adversely affect the memory action is no greater than only 10% of the stored electric charge, and thus it can be disregarded”), 19:67–

20:22 (describing graph that shows electron hole pairs)). Petitioner also asserts that the fact “[t]hat Nishizawa states that the probability that an electron causing memory errors is small does not mean that its downward gradient does not migrate electrons downwards” because “[t]hese are two different concepts.” *Id.*

4. *Analysis of Claim 44*

In view of our determination that Petitioner establishes a reasonable likelihood of prevailing on its challenges based on Onoda alone (Petitioner’s Ground I), we institute *inter partes* review.

Because Petitioner demonstrates a reasonable likelihood of success in proving that at least one claim of the challenged patent is unpatentable, we institute on all grounds and all claims raised in the Petition. *See* 37 C.F.R. § 42.108(a). Therefore, at this stage of the proceeding, it is not necessary for us to provide an assessment of every challenge raised by Petitioner, especially, as in this case, when Petitioner establishes a reasonable likelihood of prevailing on its challenge based on Onoda alone. Petitioner’s challenge based on Onoda in combination with Nishizawa, in our view, is best left for trial after full development of the record.

Because we determine that at least one ground is sufficient for institution, we institute on all grounds in the Petition. 37 C.F.R. § 42.108(a); *SAS*, 138 S. Ct. at 1353 (“The agency cannot curate the claims at issue but must decide them all.”); *PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018) (interpreting the statute as requiring “a simple yes-or-no institution choice respecting a petition, embracing all challenges included in the petition”).

G. Ground III–Asserted Obviousness over Kawagoe

Petitioner contends claim 44 would have been obvious over Kawagoe. Pet. 49–75.

1. Kawagoe

Kawagoe discloses a process for manufacturing a semiconductor integrated circuit device using an epitaxial wafer, i.e., a semiconductor wafer having a semiconductor single crystal epitaxial layer grown over a polished semiconductor substrate. Ex. 1007, 1:13–27, 2:31–35. According to Kawagoe, “[t]he epitaxial wafer is advantageous in that it is excellent in suppressing the soft errors and resisting to the latchup,” as well as “drastically reduc[ing] the defect density of the gate insulating film” of a semiconductor integrated device. *Id.* at 1:33–40.

Kawagoe discloses various “representative” processes, including processes in which the single crystal (epitaxial) layer contains an impurity of the same type and in the same concentration as the substrate body. Ex. 1007, 2:55–3:9. According to Kawagoe, the impurity concentration of the substrate body can be made higher than that of epitaxial layer “so that the resistance of the semiconductor substrate body can be relatively lowered to improve the resistance to the latchup.” *Id.* at 4:1–8. Kawagoe discloses a process for manufacturing a semiconductor integrated circuit device including a step of forming a semiconductor region (well) extending below the epitaxial layer and having an impurity concentration that decreases with increasing depth below the epitaxial layer. *Id.* at 3:10–25. According to Kawagoe, the well can be used for forming a complementary Metal-Oxide-Semiconductor.Field-Effect-Transistor (“MOS.FET”) circuit. *Id.* at 3:32–38.

Kawagoe describes seven embodiments, including Embodiment 1 (Ex. 1007, 6:41–12:40, Figs. 1–8) and Embodiment 4 (*id.* at 14:46–19:64, Figs. 16–25). According to Embodiment 1, a semiconductor integrated circuit device includes semiconductor substrate body 2S, epitaxial layer 2E, and gettering layer 2G. *Id.* at 6:51–56, Fig. 1. Substrate body 2S and epitaxial layer 2E are doped with p-type impurity in equal concentrations. *Id.* at 6:60–7:3, 10:51–55, 11:12–16. Embodiment 1 includes n-channel MOS.FET (“nMOS”) 4N and p-channel MOS.FET (“pMOS”) 4P, the latter being formed in n-well 6, which is doped with n-type impurity and extends below the epitaxial layer. *Id.* at 8:46–52, 9:32–40, 11:18–24, 11:43–50, Figs. 1, 5, 7.

According to Embodiment 4, substrate body 2S and epitaxial layer 2E are doped with p-type impurity, and the impurity concentration of substrate body 2S is higher than that of epitaxial layer 2E “to improve the resistance to the latchup.” Ex. 1007, 14:64–15:6, 15:13–17, 16:16–21, 19:59–63, Fig. 17. Embodiment 4 includes p-well 6_p formed with nMOS 4N and n-well 6_n formed with pMOS 4P. *Id.* at 15:26–40, 17:40–18:35, Figs. 16, 21–23. In Embodiment 4, the impurity concentration in p-well 6_p and n-well 6_n decreases with increasing depth below the epitaxial layer. *Id.* at 15:62–16:15, 17:55–61, Fig. 17. Kawagoe discloses that the concentration gradient reduces soft errors by attracting carriers (electrons) to the substrate and preventing them from entering the p-well. *Id.* at 16:2–11.

Petitioner relies primarily on Kawagoe Figures 16 and 17, which are reproduced below and illustrate Embodiment 4 and its properties.

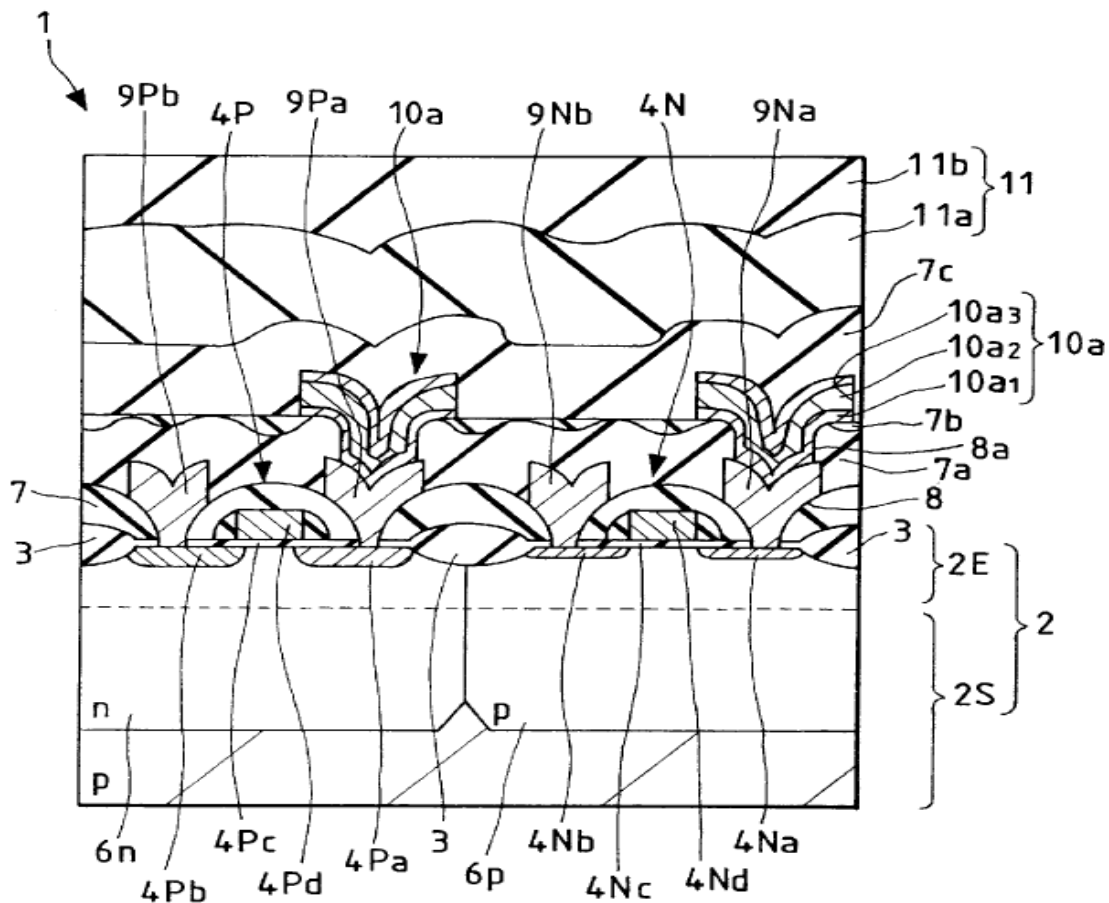


Figure 16 of Kawagoe is a section showing an essential portion of a semiconductor integrated circuit device 1. Ex. 1007, 5:38–40.

The device comprises a relatively lightly doped semiconductor substrate body 2S made of a p-type Si single crystal or the like. *Id.* at 14:61–64. An epitaxial layer 2E made of a p⁻-type Si single crystal or the like is formed over a principal surface of the semiconductor substrate body 2S. *Id.* at 15:1–3. The epitaxial layer 2E is doped with a p-type impurity such as boron in a concentration lower than the designed one of the semiconductor substrate body 2S. *Id.* at 15:3–6. The semiconductor substrate 2 is formed in its upper portion with a p-well (i.e., the first semiconductor region) 6p and an n-well (i.e., the first semiconductor region) 6n. *Id.* at 15:26–28. The p-well 6p is

doped with a p-type impurity such as boron and is formed with the nMOS 4N. *Id.* at 15:28–30. The n-well 6n is doped with an n-type impurity such as phosphor and is formed with the pMOS 4P. *Id.* at 15:30–32. On the insulating film 7, there is deposited an insulating film 7a of SiO₂, for example, on which is deposited a flattening insulating film 7b. *Id.* at 15:44–46. The insulating films 7, 7a and 7b are formed with connection holes 8a extending to reach the electrodes 9Nb and 9Pb, through which a second-layer wiring line 10a is electrically connected with the electrodes 9Na and 9Pa. *Id.* at 15:46–50.

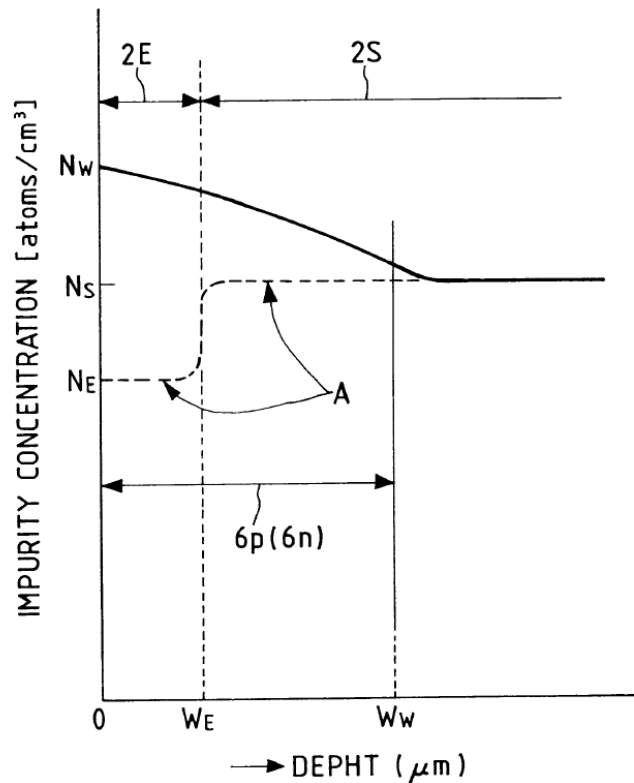


Figure 17 of Kawagoe is a plot of impurity concentration as a function of depth in a semiconductor integrated circuit device. Ex. 1007.

Figure 17 of Kawagoe shows “the p-well 6p and n-well 6n have their impurity concentrations gradually lowered in the depthwise direction from

the principal surface (having an impurity concentration N_w) of the epitaxial layer 2E.” *Id.* at 5:41–45, 15:62–16:40.

2. *Petitioner’s Initial Contentions for Claim 44*

[preamble] “[a] CMOS Semiconductor device comprising”

Petitioner contends that “Kawagoe discloses a CMOS semiconductor device.” Pet. 49 (citing Ex. 1007, 15:37–40 (describing the CMOS structure of the embodiment of Fig. 16 having an NMOS 4N and PMOS 4P), 8:46–54 (describing the CMOS); Ex. 1003 ¶ 101); *supra* n.7.

[44.1] “a surface layer”

Pointing to its annotated version of Kawagoe’s Figure 16, Petitioner contends that “Kawagoe teaches a surface layer as depicted below in blue in annotated FIG. 16” that “exists in the epitaxial layer (2E) and . . . has an active region with a source and drain formed within it (4Nb and 4Na).[□]” Pet. 50–51 (citing Ex. 1007, 8:66–9:6, 15:26–32; Ex. 1003 ¶ 102).

[44.2] “a substrate”

Pointing to its annotated version of Kawagoe’s Figure 16, Petitioner contends that “Kawagoe’s substrate is annotated in gray” and that “Kawagoe forms its p-well 6p and n-well 6n in part of the substrate body 2S from the original wafer.” Pet. 53 (citing Ex. 1007, 15:62–65, 17:50–61, Fig. 21). According to Petitioner, “[a] POSITA would understand that at least the portion of the substrate—separate from the well regions—would satisfy the claimed substrate.” *Id.* (citing Ex. 1003 ¶ 104).

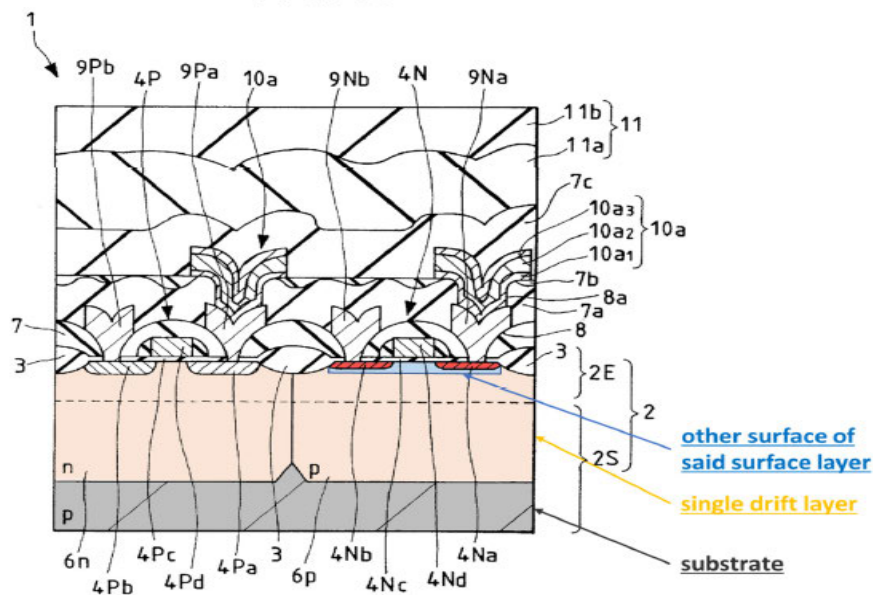
[44.3] “an active region including a source and a drain, disposed on one surface of the surface layer”

Pointing to its annotated version of Kawagoe’s Figure 16, “the surface layer contains source and drain 4Nb and 4Na which form an active region.” Pet. 54–55 (citing Ex. 1007, 8:66–9:6, 9:47–53; Ex. 1003 ¶ 106).

[44.4] “a single drift layer disposed between the other surface of the surface layer and the substrate, the drift layer having a graded concentration of dopants extending between the surface layer and the substrate”

Pointing to its annotated version of Kawagoe’s Figure 16 reproduced below, Petitioner contends that “Kawagoe teaches the claimed single drift layer (annotated tan, below) disposed between the other surface of said surface layer (blue) and said substrate (gray), where the drift layer has a graded concentration of dopants extending between the surface layer and substrate.” Pet. 58.

FIG. 16

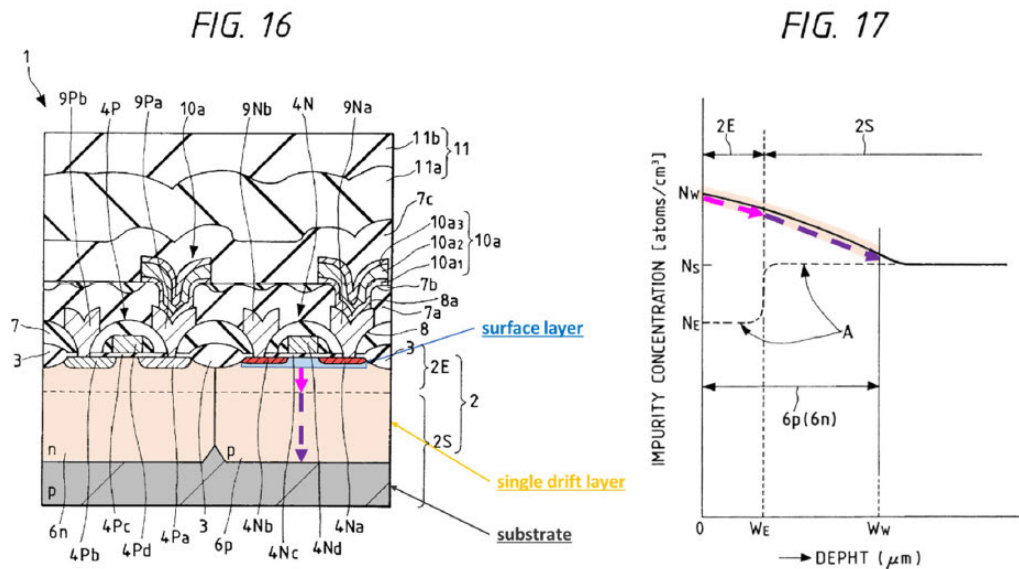


Petitioner's annotated version of Kawagoe's
Figure 16. Pet. 59.

Petitioner further contends that “Kawagoe’s single drift layer includes the upper portion of the substrate body 2S colored in tan and the epitaxial layer 2E colored in tan that constitute an epitaxially integrated single structure.” *Id.* (citing Ex. 1003 ¶¶ 110–11). Petitioner also contends that “Kawagoe’s

single drift layer (annotated in tan, above) is at the surface of the semiconductor device and is formed into the CMOS device so that minority carriers (*e.g.*, electrons in the p-well) are attracted to the substrate to reduce errors.” *Id.* (citing Ex. 1007, 16:7–11, 15:62–16:15; Ex. 1003 ¶ 111).

Petitioner further contends that “[t]he single drift layer comprises both p-wells and n-wells, where the ‘impurity concentrations [of those wells are] gradually lowered in the depthwise direction from the principal surface . . . of the epitaxial layer 2E.’” *Id.* (citing Ex. 1007, 15:66–16:2). According to Petitioner, “[t]he depthwise gradient extends from the surface of the semiconductor device into its substrate and is formed by diffusing impurities in the upper portion of the semiconductor substrate. *Id.* at 59–60 (citing Ex. 1007, 16:2–15, 15:26–36). Pointing to Petitioner’s annotated versions of Kawagoe’s Figures 16 and 17 reproduced below, Petitioner contends that “Kawagoe’s graded concentration of dopants is depicted in FIG. 17 where the gradient of dopants in the drift layer (tan) extends from the surface of 2E (epitaxial layer wafer) through the p and n wells (6p and 6n) (with depth depicted in yellow) and a portion of the substrate (substrate of wafer).¹¹” *Id.* at 60 (citing Ex. 1003 ¶ 111).



Petitioner's annotated versions of Kawagoe's
Figures 16 and 17. Pet. 67.

[44.5] “the drift layer further having a first static unidirectional electric drift field to aid the movement of carriers from the surface layer to an area of the substrate where there are no active regions” and

Petitioner contends that “Kawagoe teaches a single drift layer with a graded dopant profile” and that “[t]his graded dopant profile results in ‘electrons . . . [being] attracted to the substrate body 2S by that concentration gradient.’” Pet. 65–66 (citing Ex. 1007, 16:7–11). Petitioner further contends that “[a] POSITA would understand that electrons refer to minority carriers in the p-well, and that the electrons are attracted to the substrate due to a static unidirectional electric drift field.” *Id.* at 66 (citing Ex. 1003 ¶ 117). Petitioner also contends that “[a] POSITA would understand the field to be static because it is created by doping impurities that are fixed during device fabrication, as depicted in Kawagoe.” *Id.* (citing Ex. 1007, 15:26–36, Figs. 20–21; Ex. 1003 ¶ 117).

Citing Patent Owner's statements during prosecution of the '195 parent patent, Petitioner states that

[t]his was, moreover, recognized by Patent Owner as a property of a graded dopant profile in the specification of the '222 Patent and during prosecution. There are electric fields in separate regions due to the graded doping concentrations, *e.g.*, those depicted by pink and purple arrows in annotated FIG. 17 below, where the pink field satisfies the first static unidirectional electric drift field.[□] However, the substrate does not contain an active region as shown below.

Id. (citing Ex. 1003 ¶¶ 36, 118, 152); *see id.* at 66, n.14 ("The arrow orientation and direction are depicting the drift of minority carriers (electrons) in the p-well. A POSITA would understand that the electric field would exist in the opposite direction." (citing Ex. 1003 ¶ 117)).

Pointing to its annotated versions of Kawagoe's Figures 16 and 17 reproduced below, Petitioner contends that "[t]hese electric fields are not exhaustive, and a POSITA would understand that numerous fields exist in the diffusion layer to attract minority carriers to the substrate.[□]" *Id.* at 67 (citing Ex. 1003 ¶ 118); *see id.* at 67, n.15 ("Indeed, Patent Owner has argued that the limitation is not limited to a drift layer that has only one electric field, and covers the instance where there are multiple such fields." (citing Ex. 1030, 21 (stating that "[t]here is nothing in the claim preventing additional electric fields"))). According to Petitioner,

[a] POSITA would understand that Kawagoe's single drift layer has multiple static unidirectional electric drift fields that aid in the movement of minority carriers to the substrate, and that any one of them satisfies the claimed "first static unidirectional electric drift field," *e.g.*, the one depicted in pink over the epitaxial layer.

Id. (citing Ex. 1003 ¶ 118).

[44.6] “at least one well region disposed in the single drift layer, the well region having a graded concentration of dopants and a second static unidirectional electric drift field to aid the movement of carriers from the surface layer to the area of the substrate where there are no active regions.”

Citing Petitioner’s annotated versions of Kawagoe’s Figures 16 and 17, Petitioner contends that “Kawagoe’s single drift layer (the diffusion layer which comprises n and p wells) has at least one well region disposed within it (e.g., the p well).” Pet. 69. According to Petitioner, “[t]his p-well is part of the diffusion layer and, like the diffusion layer described in Element [44.4], it has a graded dopant concentration.” *Id.* (citing Ex. 1007, 15:62–16:15, 15:26–36, 17:11–21, 1:59–2:5, 2:20–23, 15:62–16:15; Ex. 1003 ¶ 120). Petitioner further contends that

as described in Element [44.5], this dopant concentration results in several static unidirectional electric drift fields, where the pink arrow indicates the first static unidirectional electric drift field. The second static unidirectional electric drift field is annotated in purple. As depicted below, the well region (green) is disposed within the single drift layer (tan with tanned dashes) and graphically overlaps. But the substrate does not contain an active region.

Id. at 69–70 (citing Ex. 1003 ¶¶ 120, 152).

3. Patent Owner’s Arguments and Petitioner’s Responsive Contentions

At this stage, Patent Owner disputes only Petitioner’s contention that Kawagoe discloses or suggests the “aid the movement of minority carriers” or “from the surface” claim limitations. Prelim. Resp. 9–13. As noted above, because we have determined we will institute *inter partes* review, we need not resolve this issue now. *Supra* § II.F.4. Nevertheless, we provide the following preliminary guidance to the parties.

In addition to the arguments discussed above with regard to Onoda (*supra* § II.E.3), Patent Owner argues that Kawagoe does not disclose aiding the movement of carriers, but rather, “[j]ust like Nishizawa, Kawagoe actually teaches the use of graded dopant regions to impede movement of carriers caused by α -rays.” Prelim. Resp. 9. According to Patent Owner, Kawagoe teaches the following:

Specifically, the electrons produced by the α -ray are attracted to the substrate body 2S by that concentration gradient and prevented from entering the p-well 6p so that the soft errors can be reduced in case the MIS memory of the DRAM or the like is formed in the p-well 6p.

Id. at 10 (quoting Ex. 1007, 16:7–11) (emphases omitted). Patent Owner also contends that, “like Nishizawa, the carriers that Kawagoe discusses are not in the ‘surface layer’” and instead, “[t]hey are far away from it.” Prelim. Resp. 10 (citing Ex. 1007, 28). Patent Owner contends that “[t]he carriers Kawagoe describes are below ‘the p-well 6p’—the region that Petitioner identifies as the single drift layer—because Kawagoe says that they are ‘prevented from entering’ 6p which is Petitioner’s drift layer.” *Id.* (citing Pet. 59 (Petitioner’s annotated version of Kawagoe’s Figure 16); Prelim. Resp. 10, n.5).

In response, Petitioner contends that

addressing the limitation “aid carrier movement [downward],” [Patent Owner] argues that Nishizawa and Kawagoe “teach using a graded concentration to impede carrier movement.” While [Patent Owner] would have the Board believe that carrier movement is impeded downward or simply halted altogether, the references state that carrier movement is only impeded upwards towards the circuit because the dopant concentration gradient migrates those carriers downwards. This makes logical sense; if

something is aided downwards, it is prevented from going upwards.

Prelim. Reply 5 (citing Prelim. Resp. 5, 8) (second and third alterations added). Petitioner supports its position by quoting the same portion in column 16, lines 7 through 11 of Kawagoe quoted by Patent Owner. *Id.* at 6; *see id.* at 6, n.1. According to Petitioner, Kawagoe discloses “that ‘impurity concentration of the p-well 6p is given such a gradient that it is gradually lowered in the depthwise direction from the surface of the epitaxial layer 2E, so that the influence to be caused by the carriers (or electrons) due to the a-ray is lowered.’” *Id.* (quoting Ex. 1007, 16:2–7). Citing Dr. Campbell’s testimony, Petitioner contends that “because electrons are moved down to the substrate body 2s[,] they are prevented from going upwards into the conductive active region, thus reducing errors resulting from conduction.” *Id.* (citing Ex. 1003 ¶¶ 33–34). Thus, Petitioner contends, Patent Owner’s “reliance on the word ‘prevents’ misrepresents Kawagoe.”

Patent Owner does not meaningfully dispute that Kawagoe has a graded dopant concentration. *See generally* Prelim. Resp.; Prelim. Sur-reply. Kawagoe more closely supports Petitioner’s position because it states that carriers are “attracted to the substrate body . . . by that concentration gradient.” Ex. 1007, 16:7–9. At this stage of proceeding, Patent Owner’s arguments are not supported by objective evidence. *See In re De Blauwe*, 736 F.2d 699, 705 (Fed. Cir. 1984) (lawyer arguments and conclusory statements which are unsupported by factual evidence are entitled to little probative value).

Based on this undisputed evidence, coupled with Patent Owner’s statement during prosecution that a “graded dopant concentration itself

creates a ‘built in’ electrical field that forces the movement of carriers in a particular direction,” and that “this inherent ‘built-in’ unidirectional electric field is the additional parameter for ensuring that all minority carriers are being moved in one direction” (Ex. 1002, 289–290), we determine that the weight of the evidence on the present record favors Petitioner. The parties, however, are invited to further develop the evidence and arguments relevant to this issue during the course of this proceeding.

III. CONCLUSION

After considering the evidence and arguments presented in the current record, we determine that Petitioner demonstrates a reasonable likelihood of success in proving that at least one of the challenged claims of the ’222 patent is unpatentable. We therefore institute trial on all challenged claims and grounds raised in the Petition. At this stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim or as to the construction of any claim term. Any final determination will be based on the record developed during trial. We place Patent Owner on express notice that any argument not asserted in a timely-filed Response to the Petition, or in another manner permitted during trial, shall be deemed waived, even if that argument was presented in the Preliminary Response.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review is instituted with respect to the challenged claims and each of the grounds asserted in the Petition;

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which shall commence on the entry date of this Decision;

FURTHER ORDERED that, in view of the pending motion to seal, this Decision is being filed “Board and Parties Only”; and

FURTHER ORDERED that after conferring with Petitioner, Patent Owner shall, within one week of this Decision, submit to the Board via email to Trials@uspto.gov, a version of this Decision to be filed on the public record, with any redactions proposed by either party.

IPR2024-00470
Patent 11,121,222 B2

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