PUBLIC VERSION

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MONOLITHIC POWER SYSTEMS, INC.,
Petitioner,

v.

GREENTHREAD, LLC,
Patent Owner.

IPR2024-00551
U.S. Patent No. 10,734,481

PATENT OWNER'S SUR-REPLY

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Ex. 2002	*Greenthread, LLC v. Intel Corp.*, No. 6:22-cv-00105-ADA, Dkt. 7 (summons returned executed) (W.D. Tex. Feb. 7, 2022)	X
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I. INTRODUCTION

In related IPRs, the Director made it clear that privity is an important gate-keeping issue. Under *Worlds*, this IPR should never have been instituted, and it was legal error to do so. The only way to fix this legal error is to terminate this IPR in the Final Written Decision.

In its PO Preliminary Response, Patent Owner produced "more than enough evidence to sufficiently put this issue into dispute." Faced with this evidence, Petitioner was required to produce an affidavit, declaration, or other "actual evidence" to prove that its petition was not time-barred. The Federal Circuit made it clear in *Worlds* that a Petitioner cannot rely on "attorney argument" to meet its burden on the privity issue.

Petitioner was fully aware of *Worlds*. Yet Petitioner produced ***zero*** evidence and relied entirely on "attorney argument." The Institution Decision committed the exact same legal error that the Director corrected in her Director Review decision. And any supposed "absence of evidence" in this case is a problem that Petitioner created, and, in any event, is plainly incorrect, as PO *did* produce at least "some evidence" to raise the timeliness issue. Petitioner should not be rewarded for its failure to comply with *Worlds*. PO has been greatly prejudiced by the legal error in the Institution Decision, and to re-open discovery and effectively give Petitioner a do-over would only compound this harm further.

In addition to the privity issue, Petitioner had the burden to prove that the cited references have a "graded dopant concentration [GDC] to aid carrier movement [ACM] ***from*** the first surface to the second surface of the substrate." EX1001 ('481 patent), 4:62-65. In order for the GDC to do this, the GDC must (1) create an electric field that is in the ***correct*** location; (2) the electric field must point in the ***correct*** direction; and (3) the electric field must have sufficient magnitude to overcome other forces in the "active region." POR (Paper 34), 10-16, 20, 25, 27, 28-29 (citing EX2057, ¶¶ 54-58, 60). But Petitioner presented ***zero*** evidence on these points.

Instead, Petitioner argues that under *ParkerVision*, it must only show that the cited references are merely "capable" of performing the claimed limitations. But this is ***not*** the test. The Federal Circuit made it clear in *INVT* that not all apparatus claims are the same, and for apparatus claims with "structural limitations," like a GDC, Petitioner must show that the claimed structures *actually perform* the claimed limitations.

Petitioner cannot meet its burden whether the Board uses *INVT* or *ParkerVision*. Kawagoe and Onoda ***never*** mention moving carriers from the "active region." In Kawagoe, the alleged GDC is merely used to keep SEU electrons ***out*** of the well region. In Onoda, the dopant concentration is flat in the "active region" (*i.e.*, there is no GDC, much less one that would move carriers from the "active

region"). Therefore, there is no evidence that either reference is *even* "capable" of moving carriers ***from*** the "active region."

II. ARGUMENT

A. Petitioner has come forth with zero evidence that its Petition is timely, despite being afforded numerous opportunities to do so.

Petitioner argues that PO "has not come forward with *any* evidence showing privity." Reply (Paper 38), 25 (emphasis original). This is *not* true and this is *not* the proper test under *Worlds*. The Federal Circuit made it clear that it is a very low bar to sufficiently dispute privity. *Worlds Inc. v. Bungie, Inc.*, 903 F.3d 1237, 1244 (Fed. Cir. 2018) (holding that "a patent owner must produce *some* evidence that tends to show that a particular third party should be named a real party in interest.") (emphasis original). PO has more than met this burden, providing substantial evidence indicating that both Intel and [redacted] are real-parties-in-interest (RPI) in this case. *See* PO Mot. for Additional Discovery (Paper 7), 3-6; POPR (Paper 12), 20-24. Without question, PO has "presented more than enough evidence to sufficiently put this issue into dispute." *Worlds*, 903 F.3d at 1244 n.8. In *Worlds*, the patent owner produced *only* three forms of evidence:

(1) a development agreement showing that Bungie developed a video game called "Destiny";
(2) a letter that Worlds might add "Destiny" to the Activision litigation; and
(3) the fact that the five patents asserted in the Activision litigation were the same five patents in the IPRs.

903 F.3d at 1244. Similarly, PO has produced "some evidence" in this proceeding to "sufficiently put [the timeliness] issue into dispute." *Id.* at n.8 While PO does not have access to the development agreements between Petitioner and Intel and/or [redacted], Petitioner could have easily produced such agreements to disprove the status of Intel and [redacted] as RPIs; yet they failed to avail themselves despite multiple opportunities to do so. Critically, as emphasized in *Worlds*, PO never bore the burden to prove privity, and to fault PO for producing "some evidence," the requisite standard identified in *Worlds*, was clear legal error.

The POPR cites evidence that Intel, [redacted] are time-barred parties, and this IPR was filed more than one year after each was served in that litigation. *See* POPR, 20-21, 28. For example, Intel and [redacted] were served on February 1, 2022. *Id.*, 20 (citing EX2001-2002). [redacted] became a real-party-in-interest to [redacted] as of the First Amended Complaint (filed April 29, 2022). *Id.*, 21 (citing EX2003, 2005-2010). Then, [redacted] became a party to the suit as of the Second Amended Complaint (filed in January 2023[1]). *Id.* (citing EX2009). Petitioner did not dispute that both

[1] PO filed the Second Amended Complaint (EX2009) on January 23, 2023. [redacted] waived service of process under FRCP 4(d)(4) two days later on January 25, 2023. *See Greenthread, LLC v. Intel Corp., et al.*, No. 6:22-cv-00105-ADA, Dkt. 131 ([redacted] waiver of service) (W.D. Tex. Jan. 25, 2023).

Intel and [redacted] are time-barred parties in its Preliminary Reply (Paper 17), Opposition to PO's Motion for Additional Discovery (Paper 9), or its Petitioner's Reply (Paper 38).

The POPR also cites evidence that Petitioner developed chips and technology for Intel's processors, POPR, 24 (citing EX2017-2019), and these processors were accused in the Second Amended Complaint. *See* EX2009, ¶¶ 65-73 (describing the Intel Accused CPUs and Flash Memory Products). Petitioner did not dispute this fact when PO initially notified Petitioner of the evidence, *see* EX2014, or in its pre-institution papers.

The POPR also cites evidence that Petitioner developed chips for [redacted], POPR, 24 (citing EX2020-2021), and these [redacted] were accused in the Second Amended Complaint. *See* EX2009, ¶83 (describing [redacted] accused [redacted]); *id.*, 20 (showing image of [redacted] accused [redacted]). Again, Petitioner did not dispute this fact when PO initially notified Petitioner of the evidence, *see* EX2014, or in its pre-institution papers. Tellingly, the Board's Institution Decision (Paper 26) makes no mention of the Intel- and [redacted] specific evidence discussed above.

The ID committed the exact same error that the Director corrected in her Director Review decision, citing PO's "absence of evidence" despite precluding PO from getting the evidence into the record. ID, 19 (stating that "none of [PO's]

evidence" tended to show that a time-barred party was a real-party-in-interest (RPI) of Petitioner); *see Semiconductor Components Indus., et al. v. Greenthread, LLC*, IPR2024-01242, Paper 94 at 3 (Dir. Stewart Apr. 24, 2025) (holding that "the Board denied [PO's] motions and then cited the absence of evidence as a basis not to find a privity relationship.").

Finally, the same six patents that were asserted against Intel, [redacted] are the same six patents that are in Petitioner's seven IPRs. *See* EX2009, ¶2.

At this point, PO has already produced more than the requisite evidence identified as sufficient in *Worlds* (*i.e.*, "some evidence"), and Petitioner did not dispute any of this evidence despite having multiple opportunities to do so in its briefing. Additionally, PO produced license agreements showing that Intel and [redacted] received licenses to PO's patents, and therefore, Petitioner received certain "have made" rights as well. POPR, 22-23 (citing EX2011).

Prior to filing its POPR in the first set of Monolithic IPRs (IPR2024-00468, -00469, and -00470), PO sent the following email to Petitioner:

> Petitioner…has the burden of identifying all real parties in interest (RPIs) in the petitions and demonstrating that the petitions are not time barred.…
>
> If petitioner does not withdraw its petitions, then petitioner should produce:
>
> (1) All agreements with Intel, [redacted] relating to transistor products sold to or made for them or the prior litigations.
>
> (2) All communications with these Intel, [redacted] relating to such products or the prior litigations.

EX2013 (Feb. 5, 2024 email from N. Ozarkar to M. Bombach and Petitioner's counsel of record). Therefore, Petitioner was fully aware of *Worlds* and the requirement to produce "actual evidence"—well before Petitioner filed the present Petition on March 18, 2024. Nonetheless, Petitioner refused to produce any of the relevant agreements or, for that matter, any evidence at all supporting its attorney argument that neither Intel nor [redacted] are RPIs. *See* EX2014.

Further, in its POPR, PO alleged that any of the following would create privity between Petitioner and Intel or [redacted]: (1) customer-supplier relationship between Petitioner and time-barred parties; (2) indemnity relationships or obligations to the time-barred parties; (3) when two parties are "preceding and succeeding owners of property," or (4) when one party acts as an "agent" for the other. POPR, 26-27. Here, a finding of privity is appropriate when "[t]he evidence of record shows that the relationship" between Petitioner and time-barred parties "went beyond typical transactions between supplier and buyer" and created a "substantive legal

relationship between them that is defined by legal obligations and a sufficient degree of commonality of interest." *PayPal, Inc. et al. v. PersonalWeb Techs., LLC*, IPR2019-01111, Paper 27 at 20, 2019 WL 6443937, at *9 (PTAB Nov. 22, 2019).

In its Preliminary Reply, Petitioner admitted that it is a "component supplier" to both Intel and [redacted]. Prelim. Reply, 5. Petitioner has never denied that there are supply agreements between Intel and [redacted], and that Petitioner provided components for products that were accused in the Intel-[redacted] litigation. *See id*., 5-7. Even more alarming, Petitioner has never denied that Petitioner had an obligation to indemnify Intel and [redacted] for those components. *Id*. And Petitioner's Reply is silent as to whether Intel and [redacted] have sought indemnification from Petitioner. *See* Reply, 25-28.

Petitioner was fully aware of *Worlds*. Yet Petitioner produced no "actual evidence" on the privity issue. Petitioner was required to produce an affidavit, declaration, or other "actual evidence" to prove that its Petition was not time-barred. *Worlds*, 903 F.3d at 1246. Instead Petitioner relied entirely on "attorney argument" in its Preliminary Reply, Opposition to PO's Motion for Additional Discovery, and post-institution Reply. These calculated actions are fatal to Petitioner's IPR.

When, as here, Petitioner has not produced the relevant agreement(s), this lack of evidence affirmatively "cuts against the party bearing the burden of proof on these issues." *Ventex Co., Ltd. v. Columbia Sportswear N. Am., Inc.*, IPR2017-00789,

Paper 148 at 14, 2019 WL 858745, at *6 (PTAB Jan. 24, 2019) (precedential). Under these circumstances, the Panel should have inferred that these agreements, and Petitioner's failure to produce any actual evidence whatsoever, are unfavorable to Petitioner. Instead the Panel rewarded Petitioner for its lack of production. Even worse, the Panel improperly credited Petitioner's "attorney argument" while rejecting documentary evidence provided by PO. This was clear legal error.

In its Reply, Petitioner argues that PO's infringement allegations in the Intel-[redacted] litigation were not directed to any of Petitioner's products. Reply, 25. But PO has already produced evidence that it accused Intel's processors and [redacted] products. Petitioner does not dispute that it provided components for those products.

Petitioner also argues that it had no opportunity to participate in the Intel-[redacted] litigation or the resulting settlement. *Id*. But the Board has previously rejected the argument that a petitioner was not in privity when it "was not placed on notice of the infringement" and could not "control the [prior] District Court litigation." *Bungie Inc. v. Worlds Inc.*, IPR2015-01264, Paper 64 at 38, 44 (PTAB Jan. 14, 2020).

Petitioner also argues that the relatively low-cost of its chips cuts against privity. Prelim. Reply, 5. But Petitioner still does not dispute that it makes custom products for Intel and [redacted], and that it maintains teams of engineers that work

directly with Intel and [redacted] on these products. *See* POPR, 36 (citing EX2022). Nor does Petitioner cite any evidence—either factual or legal—suggesting that the cost of a product has any bearing on the issues in dispute.

Finally, Petitioner baldly argues that it is not an "agent" of Intel or [redacted] or a beneficiary of the settlement agreement because it was not a party to the license agreement. *See* Prelim. Reply, 7. But this is ***not*** the test. When, as here, the license agreement may create a patent exhaustion defense, there is privity between Petitioner and the time barred parties. *Ventex*, 2019 WL 858745, at *5 (citing *Apps. in Internet Time, LLC v. RPX Corp.*, 897 F.3d 1336, 1363 Fed. Cir. 2018)).

In conclusion, PO has "presented more than enough evidence"—"actual evidence"—"to sufficiently put" the RPI and timeliness "issue[s] into dispute." *Worlds*, 903 F.3d at 1244 n.8, 1246. This stands in sharp contrast to Petitioner's complete absence of evidence on an issue that it had the burden to prove. Petitioner has had ample opportunity to do so: first, when PO requested that Petitioner come forth with the evidence on its own (EX2013, 2014) *before this Petition was even filed*, then, when Petitioner opposed PO's discovery motion, filed its authorized Preliminary Reply, and, finally, when Petitioner filed its Reply post-institution. At no point has Petitioner sought to carry its burden under § 315(b) and *Worlds*; Petitioner cannot prevail on these facts and the Petition should be dismissed as untimely.

B. Under *INVT*, Petitioner must show that the cited references actually move carriers from the "surface layer."

The Federal Circuit has *never* said that the test for obviousness—for *all* apparatus claims—is whether the prior art is "capable" of performing the claimed limitation. In fact, the Federal Circuit has made it clear that there are "configuration-type *apparatus* claims" and "capability-type *apparatus* claims." *INVT SPE LLC v. Int'l Trade Comm'n*, 46 F.4th 1361, 1372-72 (Fed. Cir. 2022). The type of claim does *not* turn on whether the claim is an apparatus or a method claim. *Id.* at 1372. Rather, it "depend[s] on the claim language," since "differences exist between apparatus claims." *Id.* at 1371.

The Federal circuit has recognized that for "mechanical apparatus claims" (as opposed to computer or software claims), the claims are "configuration-type claims." *Id.* at 1371-72 (citing *Ball Aerosol* and *Cross Medical*). Here, the claims are clearly "mechanical apparatus claims." The claims require a "graded dopant concentration to aid carrier movement ***from*** the first surface to the second surface of the substrate." EX1001, 4:62-65. The claims recite a specific structure (*i.e.*, a GDC) that "aid[s] carrier movement" from a first location (*i.e.*, "first surface" where the "active region" is located) to a second location (*i.e.*, "second surface of the substrate"). *Id.* As the specification explains, the GDC creates "a suitable aiding drift electric field," *id.*, 3:6-7; EX1055, 161:24-162:15, in order to "sweep these unwanted minority carriers into the substrate…as quickly as possible, from the

active circuitry at the surface," EX1001, 3:64-4:1. The claims *never* say the GDC is "capable" of moving minority carriers. Rather, the claims and specification make it clear that the minority carriers move "as quickly as possible." When, as here, an apparatus claim requires a specific structure to perform a specific limitation, the Petitioner must prove that the cited references ***actually perform*** that limitation. *See INVT*, 46 F.4th at 1371.

Instead, Petitioner relies on misleading quotes from *INVT*'s predecessor, *ParkerVision*, to dismiss PO's arguments as "unsupported." Reply, 4. But Petitioner cannot simply ignore a critical limitation of the claims. The claims do not require a GDC that is merely "capable" of moving minority carriers from the "surface layer." Instead, they require a GDC that *actually moves* carriers from the "surface layer."

As PO has explained in the parallel Cirrus Logic and OnSemi IPRs, *ParkerVision* does not apply to the Challenged Claims. The claims-at-issue in *ParkerVision* "recite[d] ***no structural limitations*** that would preclude a prior art reference that discloses a different structure from performing the claimed function." *ParkerVision, Inc. v. Qualcomm Inc.*, 903 F.3d 1354, 1362 (Fed. Cir. 2018).[2] PO's claims are clear that "aid[ing] carrier movement" can only be achieved by a GDC. There is no "different structure" that can "perform the claimed function." The

[2] All emphases added unless otherwise noted.

Challenged Claims are entirely distinguishable from the claims-at-issue in *ParkerVision*, *Ericsson*, and *Finjan*. In those cases, the claims recited software "modules," or other generic components, that did not require "actual performance of [the] operative steps." *INVT*, 46 F.4th at 1372-73.

Throughout its Reply, Petitioner erroneously suggests that the "claims are directed to a device capable of aiding carrier movement (as opposed to requiring movement)." Reply, 3. But the type of claim does *not* turn on whether it is an *apparatus* or *method* claim. Rather, it depends on the nature of the claim and the actual claim language. Petitioner *never* provided *any* justification (nor can it) for why a mechanical, non-computer, non-software claim that recites a specific structure ("GDC") for moving carriers, should be read to mean the GDC does *not* actually have to move them.

C. Petitioner relies upon an incorrect claim construction of "aid carrier movement."

In its Reply, Petitioner adopts a new and incorrect claim construction by alleging that PO "improperly injects limitations requiring carrier movement" into the claims. Reply, 3. But Petitioner's construction—that actual movement is not required—does render the claimed limitation "superfluous." *Id.*, 4. This is like arguing that a person can "aid movement" by pushing on a parked car. EX1055, 67:25-68:19. Even Petitioner's own expert understood "aiding carrier movement" to refer to "sweeping carriers from the active circuitry at the surface into the

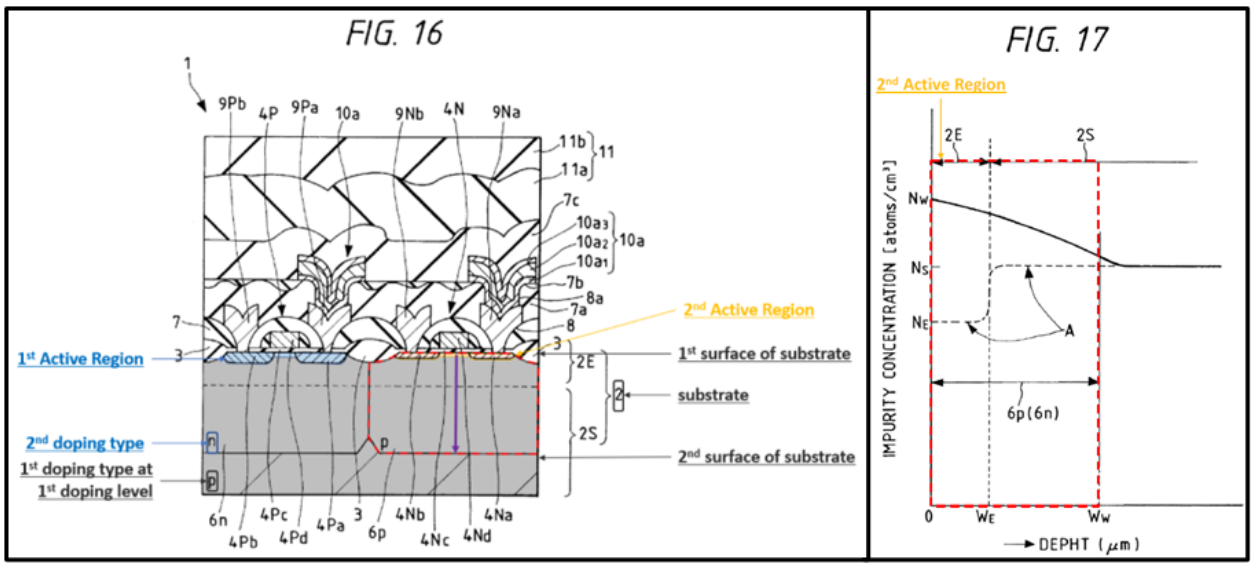
substrate." EX1003, ¶¶ 26, 46 (cleaned up). "Sweeping" the carriers means "moving" the carriers, and to argue otherwise is contrary to the surrounding claim language and the patent's specification.

To improve performance of the claimed transistor, the minority carriers must not only *move*, but they must *move in the correct direction*, ***from*** the "first surface" to deeper in the substrate. The Federal Circuit has made it clear that claims should be construed to properly reflect the "purpose of the invention." *Sequoia Tech., LLC v. Dell, Inc.*, 66 F.4th 1317, 1326 (Fed. Cir. 2023) ("The specification further supports this construction. We have explained that a patent's express purpose of the invention 'informs the proper construction of claim terms.'"). Here, Petitioner relies upon an incorrect claim construction that "would eviscerate the stated purpose of the claimed invention." *KEYnetik, Inc. v. Samsung Elecs. Co., Ltd.*, 837 Fed. Appx. 786, 792 (Fed. Cir. 2020).

[redacted]

D. Petitioner presented *zero* evidence that Kawagoe is *even* capable of moving a carrier from the "surface layer."

In its Petition, Petitioner cites to Kawagoe's Figures 16 and 17 for the "graded dopant concentration to aid carrier movement from the first surface" limitation.



Pet. (Paper 1), 25-29. But Kawagoe *never* mentions moving carriers, much less moving carriers from the "active region." The best Petitioner could do was cite to the following disclosure: "electrons produced by the α-ray are attracted to the substrate body 2S by that concentration gradient and prevented from entering the p-well 6." *Id.*, 28. But whatever Kawagoe is doing, it is in the *wrong* location. As PO explained in its POR, Kawagoe is *not* moving carriers from the "first surface," where the "active region" is located. POR, 1, 20-26. Instead, it is preventing electrons produced by the α-ray (*i.e.*, the SEU electrons) from entering the p-well. *Id.*, 21-23 (citing EX1007, 16:7-11) ; EX2057, ¶¶ 62, 66 ("Kawagoe does not address carriers in the 'active region,'…because Kawagoe's carriers are nowhere near what

the Petition identifies as the 'surface' or first/second 'active regions.'"), EX2058. 43:8-20 (Dr. Campbell explaining that Kawagoe's "focus" is "reducing the carrier flow … Upwards from the substrate"). When Kawagoe keeps the SEU electrons that are already in the substrate, in the substrate, this is clearly not the same as moving carriers *from* the "first surface." EX2057, ¶ 66; EX1055, 112:17-20 ("electrons below the P-well are acted upon by a field so that they stay in the substrate."). It is telling that Kawagoe used the word "attracted" instead of the word "move." When Kawagoe says the SEU electrons are *attracted* to the substrate, it simply means the SEU electrons *stay* in the substrate.

In its Reply, Petitioner argues that Dr. Glew admitted that Kawagoe pushes electrons downward from the surface. Reply, 17. This is *not* true. When Dr. Glew was asked whether Figure 17 would sweep electrons from the active region, he answered: "electrons would be pushed ***potentially*** in the opposite direction to the right or downward." EX1055, 122:14-123:3. But in the very next line, Dr. Glew explained that "[t]his is an effect in isolation. Whether there was actually any motion or net effect would depend upon other forces acting upon the electron also." *Id.*, 123:3-7; 65:13-19 ("the field would have to be of sufficient magnitude to overcome countervailing or counter balancing fields from other structures and materials in the semiconductor device."). A few minutes earlier, Dr. Glew explained how "Kawagoe says that it keeps electrons from entering through the P-well. So it never mentions

that it's dealing with alpha particle generated electrons above the P-well." *Id.*, 117:7-12; *see also id.*, 120:20-121:5 (explaining that Kawagoe's only "effect" is "preclud[ing] electrons from entering the P-well"), 122:1-13 (same). Thus, the only plausible reading of Kawagoe is that whatever Figure 17 is doing, Figure 17 is keeping the electrons "in the large substrate body below the wells" where they were produced. EX2057, ¶¶ 66, 68; EX1055, 120:10-19 ("The patent is specific and clear that below the P-well there's sufficient forces to keep the electron from entering the P-well. It doesn't make that same claim or assertion in the P-well or active area.").

The Petition *never* identifies an electric field, much less the location, direction, and magnitude of the electric field. Instead, Petitioner relies entirely on the prosecution history. Pet., 12-14. In its Reply, Petitioner gravely misrepresents the prosecution history. To be exact, Petitioner states:

> Applicant unequivocally committed itself to the position that a downward dopant gradient, by itself, "aid[s] the movement of minority carriers."
>
> PO argued that a downward dopant gradient—in itself—aids carrier movement and that a POSITA would understand as much.

Reply, 6-7. But this is *not* what Applicant said. Applicant actually said:

> Yet, this argument 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 dopants.

EX1002, 289-290. Applicant *never* said a "downward-sloping dopant concentration" would sweep carriers down into the substrate. Rather, Applicant said the "direction" of the electric field, and the resulting direction of the carrier movement, depends on the *slope* of the "graded concentration." *Id.* Whether the "resulting direction" is "up" or "down" (or whether the carrier moves at all) depends on a number of factors including:

(1) Whether the dopants are n-type or p-type;

(2) Whether the dopants are increasing or decreasing;

(3) Whether the carrier is a hole or an electron;

(4) Whether the electric field generates a force that is sufficient to overcome the resistance of the semiconductor;

(5) Whether the resulting force is in the same direction or the opposite direction of another force; and

(6) Whether the force is greater than or less than the other forces.

See EX2057, ¶¶ 35-37, 54-55, 57-58, 60, 63-65.

Petitioner *never* addressed any of these factors in its Petition or elsewhere. Even Petitioner's expert admitted that other factors—which he did not analyze—affect carrier movement. EX2058, 34:1-36:19 (explaining that a "properly constructed" electric field has to "have a sufficient electric field intensity"), 39:8-12; EX2085, 43:21-46:14, 50:19-51:7, 139:20-140:11, 144:16-148:19. Even further, Petitioner admitted that Kawagoe is "silent" regarding the presence of other forces acting within the semiconductor device. Reply, 12. This is critical, since, as

Petitioner's expert explained, "[t]here may be other forces acting upon the carriers, and you have to add all of the forces" to determine movement. EX2085, 42:12-22. The net effect of the forces is what determines the movement of the minority carriers. *Id.*, 154:15-18, 46:18-47:1 ("a weak electric field that is pushing [minority carriers] down … may not have enough force"), 52:22-53:9 (the "electric field due to a doping gradient … is not as strong of a force as the electric field created by the gate."), 93:7-94:1 ("There are forces that overcome" the electric field). Dr. Campbell explained that it is "always true" that "under Newton's first law, [one] would have to look at the other forces in order to determine what actually happens" to a carrier. *Id.*, 95:11-17. PO's expert agrees. EX1055, 60:2-17 (explaining how a "POSITA would understand that one would need to account for whatever [other] forces existed"), 66:10-67:18, 91:12-14. As a result, Petitioner cannot prove that a force generated by Kawagoe's graded concentration is sufficient enough to possibly aid carrier movement. POR, 25 (citing EX2057, ¶¶54-56).

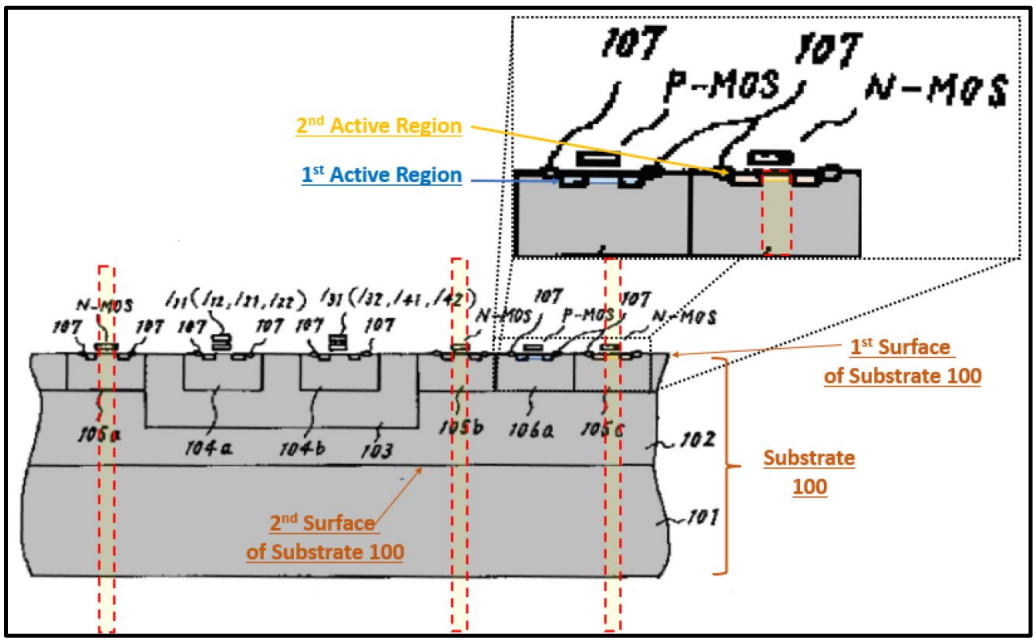
To summarize, Kawagoe never mentions moving carriers, much less moving carriers from the "active region." Dr. Glew never testified that Kawagoe would move carriers from the "active region." In fact, he confirmed that Kawagoe does *not* disclose moving carriers from the "active region." EX1055, 182:12-25. There is nothing in the prosecution history that would support this argument either. The prosecution history never said that a "downward sloping dopant concentration"

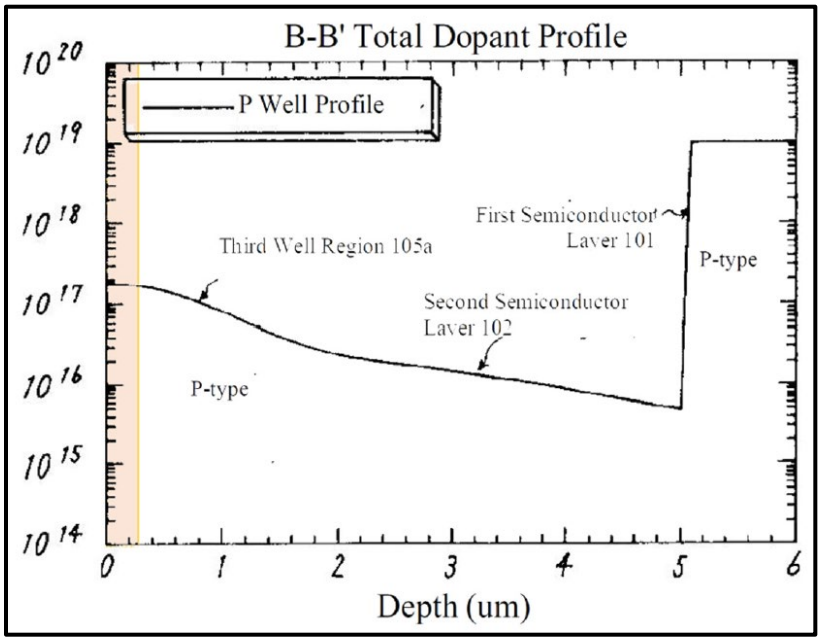
would "sweep carriers down into the substrate." To the contrary, it said the movement will depend on the *slope* of the "graded concentration." EX1002, 289-290; *see also* EX1055, 22:3-21.

Petitioner never identified an electric field, much less the location, direction, and magnitude of the electric field, or whether the electric field is sufficient to overcome other forces in the "surface layer." Not only is there *no* evidence that Kawagoe moves carriers from the "surface layer," there is also *no* evidence that Kawagoe is *even* capable of moving carriers from the "surface layer."

E. Petitioner presented *zero* evidence that Onoda is *even* capable of moving a carrier from the "surface layer."

In its Petition, Petitioner cites to Onoda's Figures 3 and 11 for the "graded dopant concentration to aid carrier movement from the first surface" limitation.





Pet., 53-61. But like Kawagoe, Onoda *never* mentions moving carriers, much less moving carriers from the "surface layer." Petitioner provides no citations to the specification for this point. *Id.*, 54-56. Instead, Petitioner relies entirely on the pictures above. *Id.*

Onoda has a ***uniform*** concentration at the "first surface" (where the "active regions" are located). For doping at the "first surface," the Petition points to Figure 11 and a conclusory sentence that Onoda's "dopant profile is downward graded going through the channel of the active region, the third well regions 105a/b/c, and the second semiconductor layer 102." *Id.*, 55-56. But Figure 11 does ***not*** disclose a graded concentration that would actually aid carrier movement where it is required—***from*** the "active region." In fact, just earlier, Petitioner ignores the dopant profile in the "active region," stating how Onoda's "dopant concentration decreases as a function of depth through the third well region 105a (p-type) and the second semiconductor layer 102 (p-type)." *Id.*, 54. Only later does Petitioner conclude that *annotated* Figure 11—without more—"depict[s] that the downward gradient exists in the active region's (tan) channel." *Id.*, 56. But that is not enough to show that Onoda's dopant is sufficiently graded in the "surface layer" to aid carrier movement. In fact, Onoda is silent with respect to the "active region" that Petitioner has overlayed on Figure 11. EX2058, 52:2-20 ("I can't say exactly where [Onoda's] active area would end."), 55:9-56:6 (Onoda "doesn't have any numbers

on it."). There is ***zero*** disclosure in Onoda discussing the depth of the "surface layer" or any characteristics of the dopant profile just below depth 0.

Even looking at Petitioner's annotated Figure 11 demonstrates that the alleged "graded concentration" is flat throughout the surface layer. To be sure, Onoda's dopant profile does decrease through the "third well region 105a," but it does not "fall off smoothly" immediately below the surface (depth 0). Rather, the dopant profile does not begin to angle downward until approximately 0.5 μm. EX1055, 91:22-92:4, 94:7-13 (Dr. Glew explaining how "in the region of zero to about half-a-micron in Figure 11, the concentration appears to be flat or constant, roughly, in terms of concentration.…Beyond half-a-micron, the concentration decreases."); EX2058, 52:2-20 (agreeing that "the source drain depth was about half a micron"). But again, Onoda is silent with respect to *where* the "first surface"/"active region" begins and ends. All Petitioner can point to is a general decreasing dopant profile across an entire span of 5 μm (which covers a well region 105a and an epitaxial layer 102). Onoda *may* disclose a dopant profile with a downward doping gradient from *somewhere below* the surface to the substrate, but it does not disclose, as Petitioner concludes, a "downward gradient existing in the active region." Pet., 51. Of course, since the dopant profile is flat in the surface layer, "there would be no force in the first half-micron exerted…by a field generated by this dopant profile." EX1055, 94:10-12; 178:1-18 ("Because the dopant profile is flat, it does not generate an

electric field near the surface. It is flat near the surface. Thus, it cannot move holes or electrons or any charged carrier.").

Even if the concentration is graded within the "active region" (which it is not), Onoda never mentions using the grading to affect carrier movement. POR, 2, 26-28. Instead, Petitioner relies entirely on the prosecution history. Pet., 57. But once again, Petitioner gravely misrepresents the prosecution history. *Id.* Applicant said the "direction" of the electric field, and the resulting direction of carrier movement, depends on the *slope* of the "graded concentration." EX1002, 289-290. Whether the resulting direction is "up" or "down" (or whether the carrier moves at all) depends on a number of factors and forces, as Dr. Campbell admits. EX2058, 34:15-36:19, 39:8-12; EX2085, 43:21-46:14, 50:19-51:7, 139:20-140:11, 144:16-148:19; POR, 27. But Petitioner has never addressed any of these factors in its Petition or elsewhere, and thus cannot determine that Onoda's dopant profile and resulting field are "properly constructed." EX1003, ¶ 32.

Nishizawa cannot save Onoda, since it does not teach moving carriers down ***from*** the surface layer. POR, 28-30. Just like Kawagoe (discussed above), Nishizawa was concerned with preventing carriers from moving *up* from the substrate. EX2057, ¶¶ 44-45; EX2058, 31:13-16, 43:8-20; EX1055, 96:18-21, 98:2-7, 106:14-18. Nishizawa is ***silent*** about affecting carriers in the surface layer,

EX1046, 19:21-34, 20:19-22, and for the same reasons as Kawagoe, it does not teach the "aid carrier movement from the first surface" limitation.

To summarize, Onoda never mentions moving carriers, much less moving carriers from the "active region." Even if Petitioner can show that there is a graded concentration in the active region (which it cannot), there is no evidence that it would move carriers from the active region. EX1055, 92:5-16. Dr. Glew never testified that Onoda would move carriers from the "active region." In fact, he confirmed that Onoda does *not* disclose moving carriers from the "active region." *Id.*, 94:7-13; 178:1-18. There is nothing in the prosecution history that would support this argument either. The prosecution history never said that a "downward sloping dopant concentration" would "sweep carriers down into the substrate." To the contrary, it said the movement will depend on the *slope* of the "graded concentration." EX1002, 289-290; *see also* EX1055, 22:3-21.

Petitioner never identified an electric field, much less the location, direction, and magnitude of the electric field, or whether the electric field is sufficient to overcome other forces in the active region. Not only is there *no* evidence that Onoda moves carriers from the "surface layer," there is also *no* evidence that Onoda is *even* capable of moving carriers from the "surface layer."

F. PO's prior licenses are objective indicia of non-obviousness that support patentability.

Petitioner has manufactured various issues regarding PO's prior licenses with major semiconductor companies to avoid some of "the most probative and cogent evidence in the record." *See Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1538 (Fed. Cir. 1983). There is zero doubt that there is a "legally and factually sufficient connection between the [licenses] and the patented invention." *See Quanergy Sys., Inc. v. Velodyne Lidar USA, Inc.*, 24 F.4th 1406, 1417 (Fed. Cir. 2022). Each license agreement covers a ***single patent family*** with nearly identical specifications, and the claimed feature of using a graded dopant ***is*** recited in the licenses. EX2078, ¶¶ 2-3, p. 19, 45. It is also undisputed that RPX *approached Greenthread* on behalf of [redacted]—two companies under no threat of litigation. *Id.*, ¶ 4. Petitioner's reliance on RPX's marketing material is simply out of place, as it can point to zero evidence that [redacted] were motivated by "avoid[ing] litigation costs." Reply, 23-24.

III. CONCLUSION

For at least the foregoing reasons, the Petition should be dismissed as untimely and the Challenged Claims should be found patentable over the cited references.

[redacted]

Dated: May 9, 2025

Respectfully submitted,

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24(d), Petitioner hereby certifies that the word count for the foregoing **PATENT OWNER'S SUR-REPLY** is 5,577 words, which is within the 5,600 word limit set in 37 C.F.R. §42.24(c)(4). This word count does not include the table of contents, table of authorities, exhibit list, certificate of word count, and certificate of service. This word count was prepared using Microsoft Word.

Dated: May 9, 2025

By: */Alan Whitehurst/*
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[redacted]

CERTIFICATION OF SERVICE

The undersigned hereby certifies that a copy of this **PATENT OWNER'S SUR-REPLY** has been served on Petitioner via email on the following counsel of record for Petitioner:

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