

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

CIRRUS LOGIC, INC.;
OMNIVISION TECHNOLOGIES, INC.; AND
TEXAS INSTRUMENTS INCORPORATED,
Petitioner,
v.

GREENTHREAD LLC,
Patent Owner.

Case No. IPR2024-00019*
Patent No. 11,316,014

**PETITIONER'S AUTHORIZED RESPONSE TO
DIRECTOR REVIEW REQUEST**

* Texas Instruments Inc. which filed a petition in IPR2024-00774, has been joined as a party to this proceeding.

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On May 22, 2025, Patent Owner Greenthread (“PO”) sought Director Review of two FWDs (IPR2024-00001, Paper 83 and IPR2024-00016, Paper 79) and raised only one issue—“privity” with Intel. PO did not raise any other challenge in those requests. Now that the Board has again thoroughly considered and rejected PO’s privity argument, PO takes the proverbial “throw in the kitchen sink” approach. Each of the five challenges can be summarily rejected because the Board correctly: (1) determined that prior art discloses a “graded dopant concentration” in an active region that aids movement of charge carriers, as claimed; (2) concluded that the claim construction orders from the district courts do not address the dispute between the parties regarding the scope of the “to aid carrier movement” limitation; (3) ordered discovery that was consistent with the Director’s Order (even though PO said it did not want the discovery); (4) gave appropriate weight to PO’s licenses when evaluating secondary considerations; and (5) gave appropriate weight to the testimony of Dr. Banerjee, Petitioner’s expert.

In addition, PO takes issue with the Board’s decisions in other IPRs, not this IPR, asserting “Director Review should be granted because the Board abused its discretion in *related* IPRs (‘the onsemi IPRs’).” PO Req., 1 (emphases added unless stated otherwise). PO even alleges that the Board “reuse[d] its FWDs from the onsemi IPRs” even though there is no other FWD on the ’014 patent at issue in this IPR. *Id.*, 1. Even if the Board had abused its discretion in other IPRs, that

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would not justify Director review here.

I. Background

A. The Initial Final Written Decisions and the Remand Proceedings

In fall 2023, Petitioner filed seven petitions challenging claims from six patents owned by PO. IPR2024-00001 & IPR2024-00016–00021. On April 22, 2025, the Board entered two FWDs holding that all challenged claims were unpatentable in two of the IPRs. IPR2024-00001, Papers 78, 80; IPR2024-00016, Papers 74, 76. On April 24, 2025, the then-Acting Director granted Director review in three of the onsemi IPRs, holding that “the case is remanded to the Board with instructions to allow discovery” into alleged privity between onsemi and Intel. IPR2023-01242, -01243, -01244, Paper 91, 3 (Director Apr. 24, 2025).

On May 2, 2025, the Board held a hearing regarding the remaining five petitions filed by Petitioner challenging PO’s patents (i.e., IPR2024-00017, IPR2024-00018, IPR2024-00019, IPR2024-00020, and IPR2024-00021) “to discuss . . . what scope of discovery would be appropriate.” Ex. 1073, 5:9–13. Subsequently, the Board instructed the parties to file a “joint paper, which includes a proposed discovery order approved by both parties or explains any areas of disagreement surrounding the scope of discovery.” IPR2024-00017, Ex. 3010.¹ On

¹ The Board’s instructions and the parties’ responses were the same in the other

(continued...)

May 12, 2025, PO along with Petitioner informed the Board that “*no additional discovery is needed*” in each proceeding. IPR2024-00017, Ex. 3011.

Nevertheless, the Board issued an order on June 27, 2025 stating that “[t]he Board *sua sponte* determines that post-hearing discovery on the privity issue may be helpful to the panel in reaching a fair and efficient resolution of the instant cases.” Paper 82, 4. The Board then instructed the Petitioner to provide discovery consistent with that ordered in the onsemi IPRs. *Id.*, 6.

On May 22, 2025, PO filed requests for Director Review in IPR2024-00001 and IPR2024-00016 raising two questions regarding privity: whether the Panel erred by (1) not requiring Petitioner to submit evidence of lack of privity; and (2) denying discovery on privity. IPR2024-00001, Paper 83, 1; IPR2024-00016, Paper 79, 1. On July 23, 2025, the Director ordered that “the cases are remanded to the Board with instructions to allow discovery, narrowly tailored to the privity issue, as the Board already has authorized in the first set of IPRs and the other related cases.” IPR2024-00001, Paper 89, 2–3. The Director instructed the Board to determine “whether Patent Owner has produced some evidence to support its argument that *Intel should be named as a privity* so as to have put the issue into dispute.” *Id.*, 3. The Board accordingly ordered the identical discovery regarding

IPRs. *See* IPR2024-00018, -00019, -00020, and -00021, Exs. 3010 & 3011.

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“Intel Accused Products” in the other two IPRs. IPR2024-00001, Paper 91, 2–3.

B. Post-Remand Proceedings and the Final Written Decisions

Petitioner and real party in interest GlobalFoundries provided declarations, Ex. 2080, Ex. 2081, Ex. 2082, and each declarant submitted to a cross-examination, Ex. 2083, Ex. 2084, Ex. 2085. Subsequently, the Board issued a second set of FWDs in IPR2024-00001, Paper 113, and IPR2024-00016, Paper 109. The Board also issued FWDs in IPR2024-00017, Paper 114; IPR2024-00018, Paper 113; IPR2024-00019, Paper 109; IPR2024-00020, Paper 105; and IPR2024-00021, Paper 107. The Board uniformly concluded that all challenged claims were unpatentable, and that Petitioner was not in privity with any time-barred party.

II. Argument

A. The Board Correctly Evaluated Both the Location of the Graded Dopant Concentration and Its Effect on the Carriers

The record in this IPR is replete with the Board’s thorough analysis of the scope of the “graded dopant concentration” limitation and how the prior art discloses that limitation. The Board addressed the issue in the Institution Decision, during oral argument, and in the FWD. Papers 29, 73 and 109.

1. The Board Correctly Concluded That a “Graded Dopant Concentration” Is Sufficient to “Aid Carrier Movement”

The Board evaluated the specification of the patent, the file history of the parent U.S. Patent No. 8,421,195 (“the ’195 patent”) regarding the “graded dopant concentration,” the built-in electric field created by that graded dopant

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concentration, and the influence of that electric field on the minority carriers, Paper 109, 59–63, and rejected PO’s argument that claims require actual movement of carriers. *Id.*, 72. The Board concluded that the statements made by PO during the prosecution of the ’195 patent were clear and unambiguous, and that the public was entitled to rely upon those statements. *Id.*, 61. PO made clear during prosecution that the “aid carrier movement” limitation did not require an analysis of any parameters, and the ’014 patent does not mention any forces that need to be accounted for. *Id.* The Board concluded that a unidirectional drift (electric) field necessarily affects all the present minority carriers in the same direction and this inherent built-in unidirectional electric field ensures that all minority carriers are being moved in one direction. *Id.*

Given apparatus claims were at issue, the Board required the Petitioner to show that the prior art discloses an apparatus reasonably *capable* of operating so as to meet the claim limitation. *Id.*, 72. The Board expressly rejected PO’s contention that actual movement is needed stating that the “Petitioner need not demonstrate actual movement of carriers in Kawagoe, only that the device is capable of moving such carriers when they are present in the active region.” *Id.*, 72.

2. The Board Concluded That Prior Art Discloses a “Graded Dopant Concentration” That “Aids Carrier Movement”

Having ascertained the proper scope of the claims, the Board stated that “evidence of a sloping dopant concentration gradient that creates a unidirectional

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drift field in the appropriate location and pointing in the appropriate direction is sufficient to demonstrate the ‘aid carrier movement’ limitations of the claims.”

Paper 109, 61.

Kawagoe discloses a graded dopant concentration that decreases from the surface into the substrate. Kawagoe clearly shows that both “p-well δp and n-well δn have their impurity concentration gradually lowered in the depthwise direction from the principal surface (having impurity concentration N_w) of the epitaxial layer 2E.” Paper 1, 29–30 (citing Ex. 1007, 5:41–45, 15:62–16:40, Figs. 17 and 23). The Board concluded that Kawagoe discloses the disputed graded dopant concentration to aid carrier movement limitations of claims 1 and 21. Paper 109, 75.

The Board also rejected PO’s incorrect argument that the “graded dopant concentration” in Kawagoe is limited to preventing electrons from entering the p-well. Paper 109, 71–72. The Board correctly concluded that the graded dopant concentration in Kawagoe not only prevents the electrons found below the well from moving upwards, but also aids the downward movement of the electrons in the well. *Id.*, 72. The Board also observed that PO’s arguments in the IPR proceedings are inconsistent with its positions taken in the district court litigation. *Id.*, 62 (noting that PO stated in district court that when a drift field is present, it aids movement of carriers). Citing PO’s Markman briefs, Ex. 1020, 26, the Board noted PO’s position that mere presence of an electric field aids movement of the

carriers and that carriers move in response to the direction of the electric field.

Paper 109, 66–67.

The Board also rejected PO's false contention that carriers will not be present in the active region in Kawagoe. Paper 109, 72–73. PO's own evidence, namely, Nishizawa, does not support its position. The Board observed that Nishizawa discloses that electrons are produced by an α -ray in the active region of the transistors shown in Kawagoe and illustrates how a graded dopant concentration like the one in Kawagoe behaves. *Id.* In addition, the Board further noted that PO itself admitted transistors in Kawagoe have carriers in the active region when its expert, Dr. Glew, conceded that electrons would be present throughout Kawagoe's devices. Paper 109, 73. Moreover, Dr. Glew's stated "any electric field will act on all charged particles within its vicinity," Ex. 1063, 242:2-15, 244:18-245:9, as the Board itself pointed out. Paper 109, 73.

Finally, relying upon *ParkerVision*, the Board noted that the "Petition need not demonstrate actual movement of carriers when they are present in active regions, only that the device is capable of moving such carriers when they are present in the active regions." Paper 109, 72. The Board concluded that Kawagoe's graded dopant concentration is capable of creating an electric drift field and that PO admitted there are electrons in the active region. *Id.*, 72–73.

PO selectively quotes from Wieczorek to imply that the doping profile at the

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surface is uniformly distributed. Even the Board acknowledged that PO's argument is untimely because the PO "did not address Dr. Banerjee's testimony or conclusions with respect to Figures 2a and 2b in its Response" but "waited until its Su-reply." Paper, 109, 87. Dr. Banerjee had stated in his first declaration that Wieczorek's disclosure was made relative to the "initial retrograde profile" and was consistent with his understanding that Wieczorek discloses a graded dopant concentration that is downward sloping from the top surface of the substrate. *Id.*, 87. Dr. Banerjee had explained, the retrograde profile of dopants disclosed in Wieczorek is subject to a heat treatment and, as a result, the dopant concentration peaks at the surface of the semiconductor device and decreases with the depth. Ex. 1003, ¶¶ 34, 148; *see also* Paper 109, 86–88 (citing Ex. 1006, ¶9); Paper 76, 28–29; Ex. 1001, 58–59. Thus, the Board correctly concluded that Wieczorek discloses a decreasing dopant concentration that helps move carriers away from the top surface and towards the bottom surface. Paper 109, 88–89.

B. The Board Correctly Analyzed the Prior *Markman* Orders

The Board also correctly rejected PO's mischaracterization of two district court claim construction orders. Neither order construed the term "to aid carrier movement" as requiring actual movement, or any specific magnitude for the graded dopant construction. Instead, as the Board correctly noted, PO's claim construction arguments are based on (1) a decision in the Western District of Texas

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that “graded” was not indefinite (Paper 109, 65–66), and (2) a decision in the Eastern District of Texas concerning whether the “graded concentration of dopants” must increase or decrease uniformly (*id.*, 67). In fact, the Board noted that the Court’s conclusion regarding the scope of the claims was consistent with Petitioner’s arguments in this proceeding and PO’s argument during prosecution, but contrary to PO’s present argument. Paper 109, 65–67.

The specific construction that PO seeks is also without merit. PO has at different times described its interpretation of “to aid carrier movement” differently based on the forum. In this proceeding PO argues that the claims require actual movement of carriers, *see* Paper 45, 6–12 & Paper 63, 3–5, whereas PO argued in the district court that presence of a unidirectional electric field is sufficient. Paper 109, 80; Paper 109, 62. The Board correctly recognized numerous problems with PO’s position. First, the prosecution history did not support PO’s argument. Paper 109, 61. Second, requiring actual movement would improperly transform a system claim into a hybrid method claim. *Id.*, 72–73 (citing *ParkerVision, Inc. v. Qualcomm Inc.*, 903 F.3d 1354, 1361 (Fed. Cir. 2018)). Third, requiring actual movement would contradict PO’s prior characterization of the claims in the district court litigation. *Id.*, 61–62 (citing Ex. 1020, 26). Fourth, PO’s reliance on Mr. Warrick’s testimony is misplaced. PO does not assert that Mr. Warrick is a person of ordinary skill or that he had considered PO’s statements regarding the “to aid

carrier movement” limitation during the prosecution of the ’195 patent. *Id.*, 64. Thus, Mr. Warrick, a Rule 30(b)(6) witness of Cirrus Logic, cannot opine on the scope of the claims, and his testimony cannot overcome PO’s clear and unambiguous statements during the prosecution of the ’195 patent. *Id.*, 65. The Board correctly rejected PO’s construction that requires actual movement by the carriers.

PO fully presented its arguments about the prior *Markman* orders in its POR, Paper 44, 9, which the Board expressly considered in its FWD. Paper 109, 65–67. The Board’s rejection of PO’s mischaracterization of the *Markman* orders from the district courts demonstrates that PO’s arguments lack merit, not that the Board is incapable of fairly evaluating contradictory arguments. PO’s allegations about the Board’s inability to fairly consider arguments are baseless.

C. The Board’s Grant of Discovery Mirrors the Director’s Order

PO’s complaints about the scope of discovery lack merit. Even though PO asserted that it did not need discovery, the Board ordered discovery that was entirely consistent with the previous grant of Director Review. Paper 109, 35–37. Indeed, in granting the Director Review for IPR2024-00001 and IPR2024-00016, the Director implicitly approved the Board’s similar Orders on discovery in related IPRs. IPR2024-00016, Paper 89, 3 (“[T]he cases are remanded to the Board with instructions to allow discovery, narrowly tailored to the privity issue, as the Board

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already has authorized in the first set of IPRs and the other related cases.”). The scope of the discovery the Board ordered was appropriate for several reasons.

First, contrary to PO’s assertion that the Board “enabled Petitioners to entirely avoid the real issue” of whether “IAPs [Intel Accused Products] include *components* made and sold by Petitioners,” the Board ordered the Petitioner to provide discovery on “whether Petitioner was supplier of any product, or *component of a product*, accused of infringement in the Intel litigation.” IPR2024-00016, Paper 87, 6. Petitioner duly provided relevant declaration testimony by declarants who stated under penalty of perjury that no Petitioner has supplied any components of the IAPs. Ex. 2080 (Ng Decl.), ¶8; Ex. 2083 (Ng Tr.), 15:16–18, 48:11–17; Ex. 2081 (Leach Decl.), ¶6; Ex. 2084 (Leach Tr.), 43:22–45:8, 70:5–18 Ex. 2082 (Cleary Decl.), ¶¶7, 12; Ex. 2085 (Cleary Tr.), 34:5–35:12. PO had a full and fair opportunity to depose each of Petitioner’s declarants but failed to uncover any evidence supporting its assertion, and the Board did not “discern that Petitioner’s investigations were in any way insufficient.” Paper 109, 35. PO’s failure is not an accident. As the Board noted, despite conducting detailed teardown analyses of the IAPs, PO never identified any components in any of the IAPs supplied by any third parties, much less the Petitioner. Paper 109, 31. In fact, PO’s teardowns of the IAPs corroborate Petitioner’s testimony. *See, id.*, 31–32.

Second, contrary to PO’s assertion that the Director required the Board to

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evaluate potential privity with [REDACTED] and [REDACTED] the Director only ordered the Board to evaluate “whether Patent Owner has produced some evidence to support its argument that *Intel* should be named as a privity so as to have put the issue into dispute.” Paper 89, 3. Indeed, PO had not even asked the Director for discovery on [REDACTED] and [REDACTED] IPR2024-00001, Paper 83, 2 n.2 (“For purposes of this Request, PO has focused on just the privity with *Intel*.”). Thus, PO’s assertion that the Board should have allowed discovery regarding [REDACTED] and [REDACTED] is incorrect. Moreover, as the Board explained, discovery regarding [REDACTED] and [REDACTED] would have been futile. Paper 109, 33. [REDACTED] was served with an infringement complaint less than a year before the Petition was filed, so [REDACTED] alleged RPI or privity status is moot, and [REDACTED] is not even alleged to be an RPI or privity of Petitioner. *Id.*, 33.

After having conducted a detailed analysis of the privity issue, the Board concluded that the PO “did not produce ‘some evidence’ tending to show that Petitioner was in privity with Intel, and the burden never shifted to Petitioner.” *Id.*, 25. Moreover, the Board noted that, even if PO did produce sufficient evidence to put the privity issue in dispute, the evidence adduced during trial clearly supports that Petitioner is not time barred under § 315(b). *Id.* PO does not offer any legitimate reason to disturb the FWD because, as the Board concluded, “the only record evidence on point supports Petitioner’s position that it did not control, or have any opportunity to control, the litigation.” *Id.*

D. The Board Gave Appropriate Weight to Greenthread’s Licenses

PO’s complaints about the Board’s decision not to attribute significant weight to the RPX licenses are baseless. The Board correctly found that PO’s licenses were not entitled to significant weight because the record demonstrates that the licenses were motivated in part by potential legal costs. *See* Paper 109, 40–44. The Board noted that because RPX is a litigation “risk mitigation service” the license reflected the value of avoiding the risk of litigation. *Id.*, 43.

Contrary to PO’s assertion that the Board ignored *Ancora Technologies, Inc. v Roku, Inc.*, 140 F.4th 1351 (Fed. Cir. 2025), the Board cited and relied upon *Ancora* to conclude that there was a nexus between the challenged claims and the objective indicia. *Id.*, 38–39. But the Board also concluded that the record did not provide sufficient evidence that the amount paid for the RPX license was exclusively due to the licensed technology, rather than some other reason. *Id.*, 41. The Board also relied on Federal Circuit authority holding that licenses are not relevant when the feature allegedly creating commercial success was not known in the prior art. *Id.*, 42 (citing *Tokai Corp. v Easton Enters., Inc.*, 632 F.3d 1358, 1369 (Fed. Cir. 2011); *Ormco Corp. v Align Technology, Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006)). Finally, the Board expressly stated that the “Petitioner’s showings of *prima facie* obviousness, particularly in view of the strength of the grounds . . . **outweigh** Patent Owner’s objective evidence of non-obviousness.” *Id.*, 42. Thus,

PO fails to offer any credible basis to justify vacating the FWD.

E. The Board Appropriately Considered Dr. Banerjee's Testimony

PO's objections regarding Dr. Banerjee's testimony are without merit.

First, when Dr. Banerjee submitted his initial declaration on October 10, 2023, Texas Instruments (TI) was neither a petitioner nor an RPI. Dr. Banerjee did not list the grant from TI in his CV filed in Oct. 2023 because the funding from TI did not start until April 2024. IPR2024-00017, Paper 75, 33. Thus, PO's arguments about research funding from TI are baseless.

Second, PO mischaracterizes excerpts from Dr. Banerjee's textbook to incorrectly imply that forces "may be insufficient" to effect electron movement. Consistent with his declaration, Dr. Banerjee states in his textbook that when a weak electric field is applied to an electron, the electron experiences a net force from the field but "[t]his force may be insufficient to alter *appreciably* the random path of an individual electron." Ex.1062A, 98–99. The book clarifies that the force may be insufficient to *appreciably* alter the path of an electron. Paper 73, 93–94. It does not state that the forces don't move the electrons, as PO incorrectly implies.

Third, PO complains about Dr. Banerjee's redirect testimony and Petitioner's instruction not to reveal any conversation during the break. Dr. Banerjee was able to clearly articulate that the three categories of forces mentioned during cross-examination either do not impact carrier movement or are not mentioned in the

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'014 patent. Paper 109, 71 n.29. PO's objections clearly lack merit because, PO did not move or strike Dr. Banerjee's redirect testimony. *Id.* Neither PO nor Dr. Glew provided any contrary testimony. *Id.*, 71. Petitioner is allowed to "confer with [a] witness before redirect examination begins." *Focal Therapeutics, Inc. v. Senorx*, IPR2014-00016, Paper 19 at 3 (PTAB July 1, 2014) (citation omitted).

Fourth, PO complaints about certain overlap between Dr. Banerjee's declaration and the declaration submitted by Intel's expert in IPR2023-00260 are irrelevant. Dr. Banerjee stated in his declaration that he had reviewed the declaration in the earlier IPR proceeding, and after conducting his own independent analysis, he excerpted portions of that declaration for efficiency. Ex. 1003, ¶3. The experts are allowed broad latitude in how they research, structure, and draft their declarations. Paper 109, 92. Importantly, PO does not point to any testimony regarding the key disputed issues in the case that Dr. Banerjee could not explain or provide a basis for. *Id.* The Board rejected PO's assertion that Petitioner is required to show that "Prior Art *actually moves carriers*" because the claims only require a graded dopant concentration of appropriate slope to aid movement of carriers, and the magnitude does not matter. *Id.*, 61–62, 72–73.

III. Conclusion

The Board's Final Written Decision on remand should not be disturbed.

Date: December 4, 2025

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §42.6(e), I hereby certify that the foregoing
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