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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC
Petitioner

v.

GREENTHREAD LLC
Patent Owner

Case IPR2023-01242
U.S. Patent No. 11,121,222

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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I. INTRODUCTION

The Patent Owner's Response (POR) rests on strained interpretations of the prior art and challenged claims that are contradicted by the intrinsic record and by Patent Owner's (PO's) own expert. As such, PO's technical arguments should be rejected. PO's secondary considerations arguments also fail because PO cannot show that there is a nexus between its cited license agreements and the actual claimed inventions at issue in this case. And PO's privity arguments—already rejected by the Board and in Director Review—remain flawed and should again be rejected.

II. THE CITED REFERENCES DISCLOSE “AID[ING] CARRIER MOVEMENT”

Petitioner's arguments relating to “aid carrier movement” do not rely on an assertion that “graded” means “aided.” *Contra* POR, 13.¹ Instead, the Petition and

¹ PO made similar mischaracterizations in parallel IPRs filed by Petitioner against related patents, and the Board correctly recognized in those proceedings that “Petitioner is not arguing or assuming that ‘graded dopant concentrations’ equals ‘aid carrier movement,’ nor is Petitioner attempting to read out the ‘aid the movement of minority carriers’ element.” IPR2024-00265, Paper 21 at 17 (PTAB Aug. 5, 2024); IPR2024-00266, Paper 21 at 14 (PTAB Aug. 5, 2024).

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Dr. Blalock correctly analyzed Kawagoe and Wieczorek, and explained how the specific devices in those references generate electric fields that “aid carrier movement” in the claimed directions. Petition (Paper 2), 18-28, 55-62. These electric fields, in turn, apply a force on carriers going from one surface of a device to another. *Id.* Because the direction of these electric fields aligns with the direction of carrier movement recited in the claims, the teachings of Kawagoe and Wieczorek meet the “aid carrier movement” limitations. *Id.*

PO’s own expert, Dr. Glew, agrees with the underlying physics. Dr. Glew testified that “a field will provide a force in a direction aiding [] movement in the direction of the force. **That’s just basic physics.**” EX1052, 108:15-109:14 (emphasis added). This “basic physics” means that the electric fields generated in each of Kawagoe and Wieczorek “aid carrier movement” in the claimed direction, and PO has no basis to argue otherwise.

A. PO mischaracterizes prior statements about the meaning of “aid carrier movement”

Under the strawman guise of arguing about whether “graded” means “aided,” PO repeatedly mischaracterizes prior relevant statements about what “aid[ing] carrier movement” requires. To be clear, Petitioner is not arguing that “graded” means “aided,” but Petitioner nonetheless disagrees with PO’s characterization of the “aid carrier movement” limitation. In particular, PO wrongly suggests that the

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“aid carrier movement” limitation requires calculating the slope of a dopant concentration, which is not disclosed in the patent, not discussed in the prosecution history, and would be inconsistent with PO’s statements in district court litigation.

1. Petitioner properly relied on PO’s litigation statements and relevant prosecution history

First, PO wrongly suggests its prior statements that electric fields from graded dopant concentrations always move carriers related instead to what is necessary to “meet the claim limitation.” POR, 13-14 (emphasis original). Even if PO’s characterization were correct, this argument does not help PO because the cited prior art references still disclose dopant concentrations that push carriers in a particular direction, and thus “meet the claim limitation.” Indeed, PO’s own expert confirmed that graded dopant concentrations always create electric fields that always interact with carriers—which is exactly what Petitioner argues. EX1052, 83:13-84:23. It is also notable that the full quote from EX1020 reiterates that “[w]hether the carrier movement has a particular speed or acceleration is beyond the scope of the claim,” which confirms that the magnitude of force from the electric field is irrelevant. POR, 14 (quoting EX1020 at 29).

Second, PO attempts to distinguish its litigation statement (EX1020, 2) that “[w]hen the dopant concentration is graded in a particular direction, other charge carriers will move in the gradient direction” on the basis that this involves carrier

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drift. POR, 14.² Without expert support, PO then suggests that carrier drift may not always occur. *Id.* But PO did not say in litigation that “charge carriers *sometimes* move”—PO said “charge carriers *will* move.” EX1020, 2 (emphasis added); *see also* POR, 3. And PO’s expert also did not suggest that carrier drift only occurred sometimes; he was clear in his deposition that as a matter of “basic physics” electric fields will always exert a force on a carrier. EX1052, 83:13-84:23, 108:15-109:14.

Third, PO wrongly tries to ignore the applicant’s representation that a downward-sloping graded dopant concentration was known to create an “inherent ‘built-in’ unidirectional electric field” that sweeps carriers down into the substrate.³ POR, 15; EX1016, 289-290. Instead of directly rebutting this admission, PO redirects to another quote to argue that the magnitude of a gradient’s slope is

² Despite arguing against this litigation statement in the body of its POR, PO repeats this statement verbatim in the Background section of its POR. *Compare* POR, 14 *with* POR, 3.

³ PO raised similar arguments about the relevant prosecution history in parallel IPRs filed by Petitioner against related patents, and the Board correctly rejected PO’s arguments. IPR2023-00264, Paper 21 at 31 (PTAB Aug. 5, 2024) (“[T]he statements made by Patent Owner during prosecution of the ’195 parent patent contradict its arguments in the present proceeding.”).

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important because “the movement of carriers ‘[d]epend[s] on the particular slope of the graded concentration of dopant[s].’” POR, 15 (emphasis added by PO, quoting EX1016, 289). But the full quote is “[d]epending 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).*” EX1016, 289. Read in context, the use of “particular slope” relates to whether the slope is positive or negative and thereby creates an electric field that sweeps all carriers “up” or “down.” This statement does not imply that any specific magnitude or absolute value of slope is required.

In addition, this section of the file history concerned a § 112 rejection on whether there was support in the specification for claiming a “unidirectional drift field drawing *all* minority carriers from said surface to said substrate.” EX1016, 250 (emphasis added), 269-270, 289-290. The challenged claims do not require that “all” minority carriers are moved, so any “additional parameter” that may provide for the motion of “all” minority carriers is not relevant. As PO’s expert acknowledged, the challenged claims do not require any set number of carriers to move—much less “all minority carriers.” *See* EX1052, 82:19-83:7.

2. PO’s “other evidence” does not show that “aid carrier movement” requires a specific dopant gradient slope

None of the “other evidence” PO refers to supports interpreting the “aid carrier movement” limitation as requiring a specific slope magnitude. For example, the

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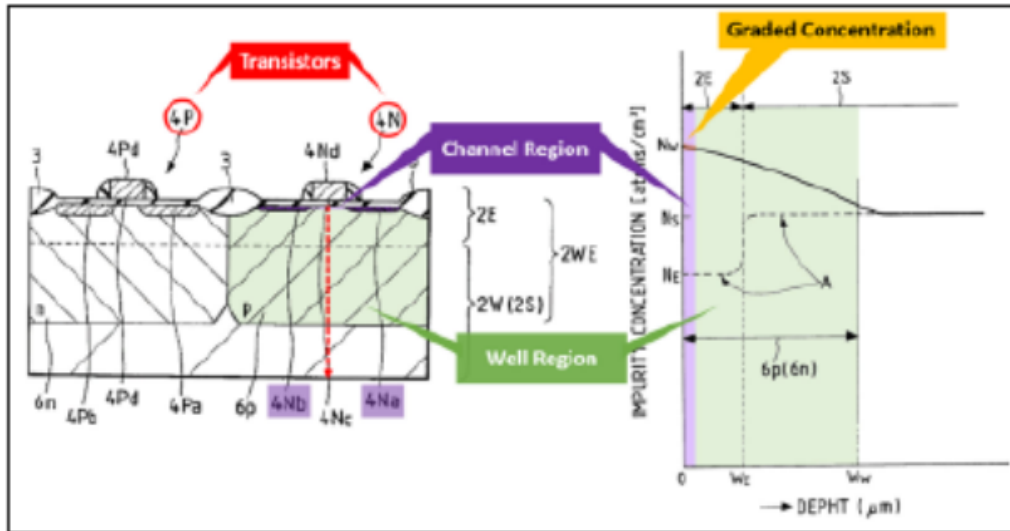
specification's statement that "[t]he *relative* slope of the donor concentration throughout the base creates a suitable aiding drift electric field" does not suggest any specific magnitude is required. EX1001, 2:60-64 (emphasis added). Instead, "relative" refers to the directionality of the slope (i.e., increasing or decreasing in concentration), which is consistent with the general presentation of gradient fields in Figures 5B and 5C. Indeed, less than two weeks ago, PO filed an office action response with an expert declaration for a related application (U.S. 17/728,588), which stated "'relative slope' [] means nothing more than the fact that one-side is relatively lower than the other side." EX1054, 12; EX1055, 5.

The examiner also never said that "'without knowing other parameters of the device' one cannot say whether the field would aid carrier movement." POR, 16 (citing EX1016, 270). What the examiner actually said was that "a unidirectional drift field may attempt to apply a force on all minority carriers in a specific direction, it does not appear to ensure (without knowing other parameters of the device) that it will draw 'all' minority carriers from said surface layer to said surface." EX1016, 270 (parenthetical in original). Again, this prosecution history addressed proposed claim language that required "drawing all minority carriers from said substrate to said surface layer." EX1016, 270 (emphasis original). The Examiner's focus on "all" confirms that while additional parameters may be required for moving "all" carriers, a graded dopant concentration resulting in a unidirectional drift field (like

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in Kawagoe and Wieczorek) is sufficient to move “some” carriers, which is enough to satisfy the challenged claims. *Id.*

Third, PO’s argument that Kawagoe only teaches “using a graded slope to *impede* carrier movement” is incomprehensible. POR, 16 (emphasis in original). As PO’s expert Dr. Glew admitted, whether an electric field from a graded dopant concentration aids movement or impedes movement ***depends on the direction of the movement***. EX1052, 83:13-89:13, 92:2-97:8, 102:2-109:14, 109:25-116:3, 121:19-123:15. It, thus, makes no sense to say an electric field would impede all movement (nor aid all movement): any given electric field will aid electron movement in one direction and impede electron movement in the opposite direction. *Id.* So, when Kawagoe says that “electrons produced by the α -ray are attracted to the substrate body 2S by that concentration gradient and prevented from entering the p-well,” this means an electric field aids carrier movement “to the substrate body 2S” and impedes carrier movement in the opposite direction “entering the p-well.” *Id.*; EX1007, 16:2-11, Figs. 17, 23; Petition, 27-28.



EX1007, Figs 17, 23 (annotated)

And there is no truth to PO's assertion that "Dr. Blalock actually agrees that Petitioner's 'aided' implies 'graded' theory is an artificial assumption[.]" POR, 16-18. Dr. Blalock explained throughout his declaration and deposition why the cited art's graded dopant concentrations generate electric fields that aid carrier movement. This was not an assumption. When Dr. Blalock appropriately considered and responded to PO's questions about *hypothetical* opposing forces, he was clear that such forces are not shown in the prior art. EX2058, 132:6-136:21.

B. Dr. Blalock correctly focused on the direction of gradient slopes

Far from "doom[ing]" the Petition's analysis (POR, 21-22), the Petition and Dr. Blalock correctly focused on the direction of the slope because (as the Petition and Dr. Blalock explained) a physical relationship exists between a "graded dopant concentration" and "aid[ing] carrier movement." Petition, 18-28, 55-62. "[I]f you

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have a downward-sloping graded dopant concentration, we know from the basic physics that that will lead to an electric field and that will create a force, which tends to move the carriers.” EX2058, 166:1-6. There is no dispute among the experts on these “basic physics,” as Dr. Glew similarly explained that “the graded dopant concentration creates a potential [or, electric field] that can act on charge carriers.” EX1052, 87:2-94:1. This electric field “aids movement in the direction of the field” and “in [] the 180 degree opposite direction [] it will repel and it pushes [a charge] away.” *Id.*, 102:2-109:14.

That is not to say the “aid carrier movement” element is superfluous. Requiring the graded concentration to “aid carrier movement” *in a specific direction* tells a POSITA how the graded concentration must change going deeper into the device. EX1052, 32:15-33:25, 56:20-62:15, 69:3-71:9, 75:15-23, 83:17-89:13, 92:2-94:1, 102:2-109:14, 109:25-116:3, 120:11-123:15, 149:6-14. If the dopant concentration increases over depth, the resulting electric field would move carriers in one direction; if the dopant concentration decreases over depth, the resulting electric field would move carriers in the opposite direction. *Id.* So, “graded” does not mean “aided,” but “graded” does mean “electric field,” and an “electric field” means “aided” in one direction. This is why Dr. Blalock correctly focused on direction of the dopant concentration slope in Kawagoe (and Wieczorek). *See e.g.*, EX2058, 73:20-76:5, 167:9-169:7, 189:18-193:14, 196:8-198:8.

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C. Kawagoe meets the “aid carrier movement” limitations

1. All electric fields both aid and impede electron movement

PO incorrectly fixates on the statement in Kawagoe that electrons are “prevented from entering the p-well 6p” by the concentration gradient, even going so far as to wrongly question Petitioner’s candor to the Board. *See* POR, 22-23 (falsely accusing Petitioner of “strategically us[ing] square brackets to conceal” aspects of Kawagoe). Petitioner is not hiding anything, and this statement is perfectly consistent with Dr. Blalock’s (and Petitioner’s) position that the graded concentration in Kawagoe aids carrier movement. *Contra* POR, 22-23; *see also* EX1003, ¶ 94 and n.6.

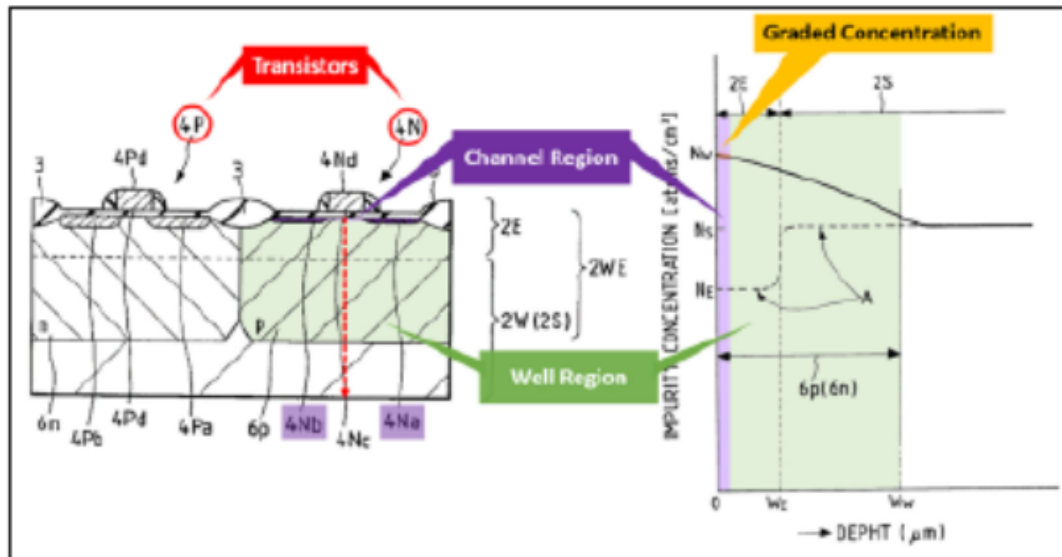
PO’s interpretation is misguided because—as PO’s own expert testified—an electric field “aids movement in the direction of the field” and “in [] the 180 degree opposite direction [] it will repel, and it pushes [a charge] away.” EX1052, 102:2-109:14. In other words, an electric field from a graded dopant concentration “aids carrier movement” in one direction and inhibits carrier movement in the opposite direction. *Id.* Which is exactly what Kawagoe says: because of the concentration gradient electrons are ***both*** “attracted to the substrate body 2S” (i.e., movement aided) ***and*** “prevented from entering the p-well” (i.e., movement inhibited). EX1007, 16:2-11.

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Kawagoe also does not disclose (and PO does not cite) any external force or resistance that would interfere with the “attract[ing]” and “prevent[ing]” operations of the electric field. EX1052, 102:2-116:3, 120:11-123:15. To the contrary, Kawagoe teaches that the graded dopant concentration is sufficiently strong to “attract[] [electrons] to the substrate body 2S” and to “prevent[] [electrons] from entering the p-well” (EX1007, 16:2-11). *Contra* POR, 17-18. As the Board correctly recognized when instituting an IPR on a related patent, “the fact that carriers are prevented from entering the active regions in Kawagoe, such as p-well 6p, appears to be strong evidence that the downward facing electric field is not negated or reversed by other fields or forces.” IPR2024-00263, Paper 21 at 19 (PTAB Aug. 5, 2024). So, while Petitioner continues to dispute whether “aid[ing] carrier movement” requires showing that a graded dopant concentration is stronger than other potential forces, Kawagoe would meet this requirement regardless.

Without expert support, PO also wrongly states in footnote 10 that Kawagoe’s concentration gradient would prevent carriers *above* well region 6p from entering the well. POR, 24. This is wrong and contrary to the testimony of PO’s own expert. As shown in Figures 17 and 23 below (and confirmed by Dr. Glew), the graded concentration in Kawagoe consistently decreases from the surface to the substrate, which means the resulting electric field points in the same downward direction above and below well 6p. EX1007, Figs. 17, 23; EX1052, 110:18-116:3. As PO’s expert

testified, this means electrons are pushed downward, throughout Kawagoe's device. *Id.*, EX1052, 110:18-116:3. So, electrons above well 6p (e.g., in the channel region, purple below) will be moved downward into the substrate body—not prevented from entering the well.



EX1007, Figs 17, 23 (annotated)

2. Carriers are present throughout Kawagoe's semiconductor device

PO's assertion that "the carriers that [Kawagoe's] graded dopant concentration affects are in the wrong place" is baseless and contradicted by the deposition testimony of PO's expert. POR, 24. When asked at his deposition if "[e]lectrons from a variety of sources would be found throughout the Kawagoe device," PO's expert agreed "[t]here are other electrons generated from other things, yes[.]" EX1052, 116:4-123:15; *id.*, 120:16 ("there are electrons"). In other words, the carriers are in the right place. And when asked if "throughout the depth in

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Kawagoe from 0 past Ww [(in Figure 17)] there is an electric field pushing electrons downward,” PO’s expert again agreed: “Yes, there’s that field shown in Figure 17.” *Id.* 112:8-113:16. This means Kawagoe has electrons in the right place (the active region, purple, in Figures 17 and 23 above) and there is an electric field pushing downward on those electrons.

Because there are electrons in the active region of Kawagoe—regardless of any alpha ray strikes—PO’s discussion of alpha rays is largely irrelevant. POR, 24-29. Petitioner referenced Kawagoe’s discussion of alpha rays because it illustrates features of the electric field generated by the graded dopant concentration in Kawagoe, but that electric field exists regardless of whether an alpha ray strike ever occurs. Nonetheless, PO’s arguments about alpha ray strikes are flawed.

PO cites a separate prior art reference (Nishizawa) to argue that alpha ray strikes in Kawagoe would only result in producing electrons in the substrate below the well, but Nishizawa itself disproves this point. POR, 27-28 (citing EX2060). Instead, Nishizawa says after an alpha ray strike “several ten thousand electrons will flow into the n+ type region 13,” which is part of the active region. EX2060, 19:41-42, Figs. 34-36; EX1052, 123:17-128:11. Because the challenged claims do not require a specific number or portion of electrons, it does not matter whether more electrons are also created in the substrate—an alpha ray strike still creates thousands

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of electrons in the relevant region.⁴ EX1052, 82:6-83:7, 116:4-123:15. Additionally, Nishizawa discloses various examples—which PO ignores—where an alpha ray strike actually generates the majority of electron-hole pairs at a depth closer to a device’s “top-most surface,” contradicting PO’s assertion that the probability of generating electron-hole pairs in this area would be “extremely low.” EX2060, 19:54-20:11, Fig. 36; POR, 27-28.

PO’s arguments about the date of Wang are also irrelevant because the points Petitioner supported with citations to Wang are admittedly known before the priority date. POR, 25-26. PO’s cited Nishizawa reference (issued in 1995) confirms that alpha-ray strikes generate electrons in the active region, and PO’s expert confirmed that alpha ray strikes from cosmic rays were well known before the priority date. EX1052, 82:6-83:7, 116:4-123:15; EX2057 at 30 n. 4.

⁴ The Board rejected similar arguments from PO in a parallel IPR, noting that the “claims [] do not require that the number of carriers produced would disrupt the performance of the system” and “[t]hus, whether an α -particle strike is *likely* (or how often they would statistically occur) in the active regions, or whether such a strike would produce a *disruptive number* of carriers, appears to be irrelevant.” IPR2024-00263, Paper 21 at 20 (PTAB Aug. 5, 2024) (emphasis in original).

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PO's arguments about whether Wang "give[s] a POSITA a reason to use Kawagoe in the active region" are also pointless because Petitioner is *not* proposing any modification of Kawagoe in view of Wang. *Contra* POR, 26. Kawagoe's Figure 17 already teaches a graded dopant concentration in the active region. More generally, because Petitioner is not arguing that Kawagoe must be modified to "aid carrier movement," it does not matter if a POSITA was aware of alpha ray strikes, concerned about them, or "adopted Kawagoe's solution." POR, 28. All that matters is how Kawagoe's disclosed electric field would interact with electrons/carriers, from any source. And as explained in the Petition and confirmed by both experts (*supra*), Kawagoe would generate an electric field in the active region that aids electrons moving down towards the substrate.

III. PO'S SOLE CHALLENGE TO THE WIECZOREK-WOLF GROUND FAILS

PO's only argument against the Wieczorek-Wolf ground is a mischaracterization. POR, 29. The Petition does not "rel[y] entirely on Greenthread's supposed admissions" to show that the Wieczorek-Wolf combination satisfies the "aid carrier movement" limitation. POR, 29. Wieczorek describes a downward-sloping graded dopant concentration, and there is no dispute that the graded dopant concentration will create an electric field that points in the direction required by the claims. EX1052, 32:15-33:25, 56:20-62:15, 69:3-71:9, 75:15-23, 83:17-89:13, 92:2-94:1, 102:2-109:14, 109:25-116:3, 120:11-123:15, 147:4-151:15.

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While PO insists that *hypothetical* forces opposing this field may exist, no such forces are identified by PO or PO's expert. *Id.*, 147:4-151:15. The challenged claims also do not require the graded dopant concentration be strong enough to move all carriers, or to accelerate any carrier to a specific speed, or to overcome a hypothetical resistance. The only requirement is "aid[ing] carrier movement" in the recited direction, and there is no reason to doubt that the gradient dopant concentration in Wiezorek would result in an electric field that "aids carrier movement" as claimed. Petition, 55-62.

IV. KAWAGOE SATISFIES THE "FIRST ACTIVE REGION...WITH A SECOND DOPING TYPE OPPOSITE IN CONDUCTIVITY TO THE FIRST DOPING TYPE" LIMITATIONS

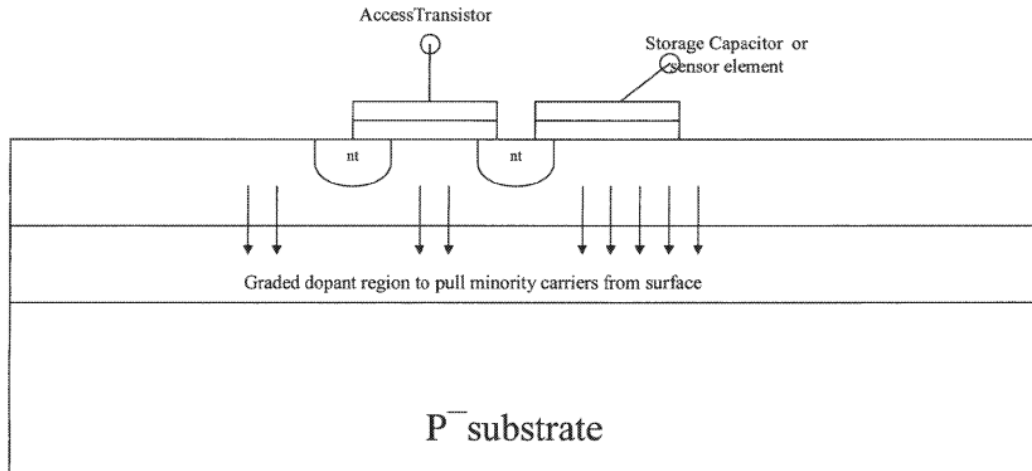
PO wrongly argues that the first active region Petitioner identified in Kawagoe (an NMOS) is not opposite to the conductivity of the substrate in Kawagoe (p-type) because "the channel of the transistor 4N is doped p-type." POR, 32-33 (emphasis original). PO's argument is based on an unsupported narrow interpretation of this claim language, which should be rejected. And regardless, even under PO's incorrect interpretation, Kawagoe still teaches the limitation.

PO does not (and cannot) cite to any support for its interpretation of the "first active region" as only having the "doping type" of the transistor channel. POR, 32-33. Instead, Figures 5B and 5C—which PO and Dr. Glew say "clearly disclose[]" the "claimed invention" (POR, 3-4; EX2057, ¶34)—show NMOS devices having n-

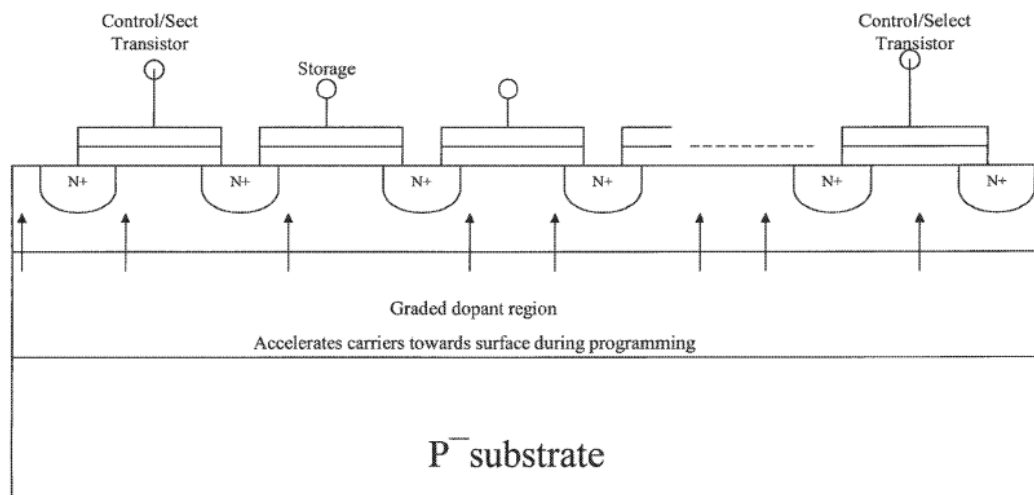
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type source and drain regions (labeled “nt” or “N+”), and a p-type substrate.

EX1001, Figs. 5B, 5C; EX1052, 23:21-24:25.



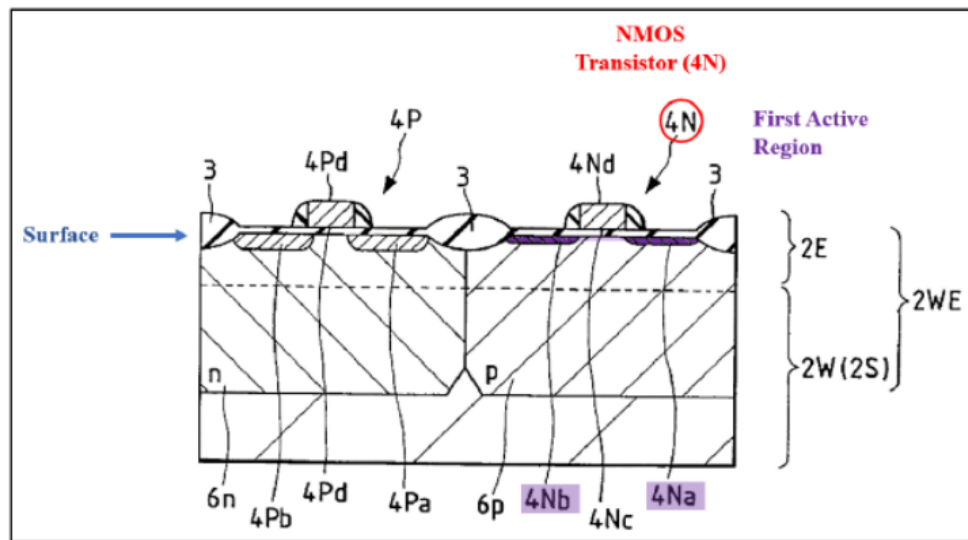
EX1001, Fig. 5B



EX1001, Fig. 5C

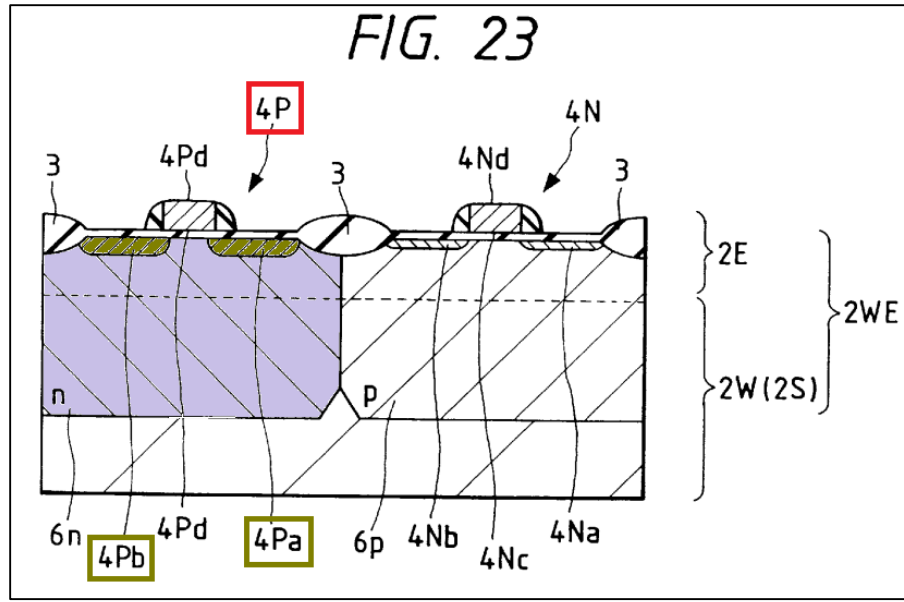
This indicates that the source and drain regions of the active region (n-type in Figures 5B and 5C) should be compared to the conductivity of the substrate (p-type in Figures 5B and 5C). Following the format of Figures 5B and 5C—and the general

convention for identifying NMOS/PMOS transistors—Petitioner submits that the “doping type” of the “first active region” is the doping type of the associated source and drain regions. EX1001, Figs. 5B, 5C; EX1008B, 32-33 (native pages 298-299). And there is no dispute that the first active region Petitioner identified in Figure 23 of Kawagoe has n-type doped source and drain regions, which would be opposite to a p-type substrate. Petition, 13-16, 50-53; EX1052, 136:15-137:14.



EX1007, Fig. 23 (annotated)

However, the Board need not resolve this dispute because even under the PO’s incorrect interpretation, Kawagoe still teaches this limitation. Specifically, Kawagoe describes a CMOS device that has both the NMOS device *and* an adjacent PMOS transistor 4P having source and drain regions 4Pa, 4Pb formed with an n-type channel in n-type well 6n. EX1007, 9:40-54, 17:50-54, 18:15-23, 21:55-61, Fig. 23.



EX1007, Fig. 23 (annotated)

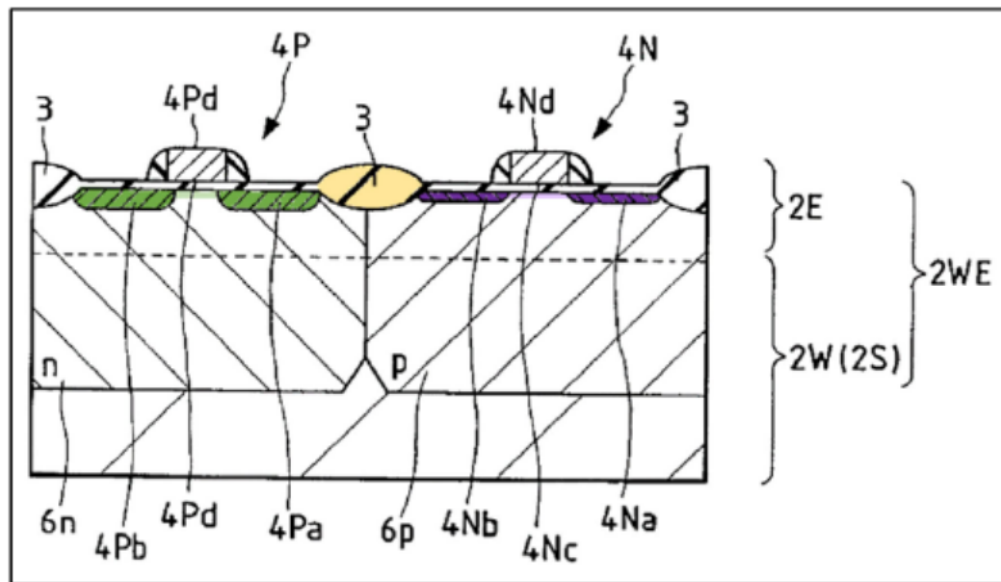
This configuration in Kawagoe is indistinguishable from implied PMOS devices in the asserted patents, which Dr. Glew testified would meet this claim limitation: a p-type transistor having an n-type channel is opposite to a p-type substrate. EX1052, 22:7-28:24, 71:12-75:23, 132:24-137:14. Thus, even using PO’s incorrect focus on the channel region doping type, Kawagoe still discloses a “first active region” that is opposite in conductivity to the p-type substrate in Kawagoe.

V. KAWAGOE ALONE OR IN VIEW OF GUPTA SATISFIES CLAIMS 6 AND 27

PO’s argument that the insulating film 3 in Kawagoe—shown in Figure 23 as separating the NMOS and PMOS transistors—does not constitute an “isolation region” is baseless. POR, 35-36.

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As an initial matter, PO's argument rests on an unsupported assumption that claims 6 and 27 require the isolation region to separate the first and second active regions at all points along their respective depth. POR, 35-36. But the claims do not specify where and to what extent the isolation region must separate the first and second active regions. As shown in Figure 23, insulating film 3 separates at least the surface portions of the first and second active regions. EX1007, 8:40-52, 15:37-40, 17:62-18:8; EX1008A, 818-20, FIG. 16-11(f); EX1003, ¶116; Petition, 31-32.



EX1007, FIG. 23

PO's argument also rests on two misunderstandings of the geometry in Kawagoe. One, the active regions in Kawagoe do not always have a depth equal to $2E$ in Figure 23. As quoted by PO, Kawagoe states that semiconductor regions 4Na, 4Nb, 4Pa, and 4Pb (the active regions) are "made as deep as about $0.5\text{ }\mu\text{m}$ " (POR,

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35 (citing EX1007, 9:3-6)); however, Kawagoe also explains that “the thickness of the epitaxial layer 2E is preferred to range from 0.3 μm to 5 μm .” *Id.*, 8:36-40, 9:3-6, 9:47-53, 17:22-25. Thus, while Kawagoe contemplates examples where the active regions are “formed in the range of the thickness of the epitaxial layer 2E,” Kawagoe also teaches such active regions having a depth that is significantly less than that of epitaxial layer 2E—for example, active regions having a depth of 0.5 μm versus epitaxial layer 2E having a depth of 5 μm —which is consistent with Figure 23. *Id.*

The second mistake PO makes regarding the geometry in Kawagoe is that the formation of insulating film 3 necessarily goes into the surface of device. *Contra* POR 35-36. Specifically, Kawagoe teaches that insulating film 3 is formed via LOCOS which (according to PO’s own expert) “consumes a portion of the silicon and works its way downward.” EX1052, 139:2-142:2. Given these misunderstandings, Dr. Glew’s conclusory declaration, simply repeating the POR’s assertion that the active regions extend beyond insulating film—without supporting evidence or technical reasoning—should be given little weight. *Xerox Corp.*, IPR2022-00624, Paper 9, 15-17 (Precedential).

Lastly, even if PO were right about the claims requiring separation on the full depth of the active regions **and** if PO were right about the active regions protruding deeper into the device than insulating film 3, Kawagoe would **still** teach an “isolation region” that separates the first and second active regions. Specifically, Kawagoe

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teaches that “a channel stopper region is formed below the field insulating film 3, although not shown.” EX1007, 8:43-45. As PO’s expert explained, the purpose of a channel stopper region “is to stop errant carriers from migrating from one transistor to another” and “[i]t needs to be deep enough to do that.” EX1052, 142:4-143:11. So, to the extent PO is correct that insulating film 3 does not satisfy claims 6 and 27 alone (and Petitioner maintains that PO is wrong), Kawagoe’s channel stopper region would still provide an “isolation region” as claimed.

VI. PO’S LICENSE AGREEMENTS DO NOT SHOW NON-OBVIOUSNESS

PO’s purported secondary considerations of non-obviousness should be rejected because there is no evidence that the licenses in question relate to the challenged claims or the value of the underlying technology.⁵ On their face, none

⁵ Petitioner also intends to strike the declaration of Mr. John (EX2072), which PO relies on for its alleged secondary considerations. During the course of Petitioner’s deposition of Mr. John, it became clear that he had no personal knowledge of the substance of his declaration, and his testimony contradicted much of his declaration. *See, e.g.*, EX1053, 11:3-12:17, 18:14-19:17, 20:8-21:4, 21:18-22:17, 23:2-25:14, 25:5-26:25, 27:1-29:6, 29:20-32:20, 32:21-34:21, 36:15-19, 37:18-38:3, 43:20-45:7, 47:14-50:12.

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of the license agreements are specifically related to the technology of the challenged patents—the licenses cover a portfolio of patents from PO. EX2072, ¶¶1-2; EX1053, 25:9-26:25. PO’s declarant, Mr. John, further testified that he was not aware of any connection between the *claims* of U.S. Patents 11,121,222 or 10,510,842 and the license agreements. EX1053, 25:9-26:25. Nor was Mr. John aware of any licensee mentioning the challenged patents during negotiations of the licenses in question. *Id.*, 24:21-25:8.

Having no direct evidence of praise or commercial success, PO relies solely on the payment of licensing fees to support its secondary considerations, and this is insufficient as a matter of law. “[T]he fact that a patent has been licensed, taken alone, generally is insufficient for purposes of showing commercial success.” *Itron Networked Sols., Inc. v. Acoustic Tech., Inc.*, No. IPR2017-01031, 2018 WL 10440326, at *10 (P.T.A.B. Aug. 21, 2018) (citing *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1539 (Fed. Cir. 1983) and *Iron Grip Barbell Co. v. USA Sports Inc.*, 392 F.3d 1317, 1324 (Fed. Cir. 2004)). Instead, for a license agreement to support non-obviousness, Federal Circuit caselaw “specifically require affirmative evidence of nexus [...] because it is often cheaper to take licenses than to defend infringement suits.” *Iron Grip Barbell*, 392 F.3d at 1324 (internal quotation marks omitted). So, because PO lacks affirmative evidence that the license agreements were motivated

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by the technical merits of the challenged claims, PO's secondary considerations arguments must fail.

Not only does PO lack affirmative evidence of a nexus, the evidence shows that PO's licenses were likely motivated by litigation—most of the licenses are in fact settlements of active litigation. On this point, the *Fox Factory* decision PO cites to suggest litigation settlements may show secondary considerations was vacated by the Federal Circuit “[b]ecause the Board erroneously presumed nexus between the evidence of secondary considerations and the independent claims[.]” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1378 (Fed. Cir. 2019). Applying the correct standard for nexus on remand, the Board ultimately found all challenged claims unpatentable and concluded that “at best, Patent Owner shows a **weak nexus**” for the licenses that mentioned the patent at issue and “**no nexus** with respect to the remaining licenses” that did not. *Fox Factory, Inc. v. SRAM, LLC*, IPR2017-00472, Paper 74, 4, 14, 24-25 (P.T.A.B. Feb. 25, 2021). Accordingly, PO's reliance on the vacated *Fox Factory* decision is misplaced.

RPX's involvement in the [REDACTED] licenses—Greenthread's only licenses that were not direct settlements of litigation—also shows that these licenses were motivated by litigation cost concerns, and not the merits of the underlying invention. *See* EX2072, ¶5. RPX explicitly markets itself as a cost-saving service that “spread[s] the cost of reducing patent litigation across a large

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network of participating companies” and “remove[s] patents from circulation before they become costly issues.” EX1051, 1 (obtained from <https://www.rpxcorp.com/faqs/#we-are-a-unique-solution-to-all-forms-of-patent-risk>). RPX advertises that it “ensure[s] that each RPX client avoids more in legal costs and settlements each year than they pay RPX in subscription fees,” that it “review[s] the RPX acquisitions relevant to the client and determine[s] a specific ‘avoided cost,’” and that the “cumulative avoided cost is applied against the client’s annual fee to calculate the dollar savings we have delivered for the year.” *Id.*, 2 (obtained from <https://www.rpxcorp.com/faqs/#we-provide-compelling-cost-savings>). RPX’s entire value proposition is “cost savings to all of the members in our network, a key factor in our consistently strong annual renewal rate” and that it intends to “prevent potential litigation – and the associated legal defense costs, internal expenses, and settlements – that would otherwise have occurred.” *Id.*; *id.*, 3 (obtained from <https://www.rpxcorp.com/faqs/#we-prevent-patent-litigation>). Accordingly, RPX’s involvement is strong evidence that [REDACTED] [REDACTED] were motivated by potential litigation costs.

[REDACTED] allegedly being “sophisticated semiconductor companies” is also irrelevant. POR, 37-38. Simply being a “sophisticated” company does not establish a nexus between a claimed invention and license agreements. *GCE Gas Control Equip. Inc. v. VBOX, Inc.*, IPR2023-00326, Paper

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27, 56-58 (P.T.A.B. June 24, 2024) (Final Written Decision) (a licensee being “a market leader . . . [with] a good reputation in the industry” is not sufficient to establish a nexus between the claimed invention and the license).

VII. THE PETITION IS TIMELY UNDER 35 U.S.C. §315(b)

PO parrots the same privity arguments that were already rejected by the Board and during Director review, but now alleges that Petitioner is in privity with [REDACTED] as well as [REDACTED] and Intel.⁶

PO’s arguments about the burden of proof are misplaced because PO has not come forward with *any* evidence showing that Intel or [REDACTED] and Petitioner are in privity. *See Worlds Inc. v. Bungie, Inc.*, 903 F.3d 1237, 1242–44 (Fed. Cir. 2018) (“[A] patent owner must produce some evidence that tends to show that a particular third party should be named a real party in interest.”). The RPX Agreements—

⁶ PO did not add [REDACTED] as a party to the Intel litigation until a second amended complaint dated January 23, 2023; thus, the Board need not address whether [REDACTED] is a privy. EX2019, EX2032, EX2018; *Shark Ninja Operating LLC v. iRobot Corp.*, IPR2020-00734, Paper 11 at 18 (PTAB Oct. 6, 2020); *Unified Patents, LLC v. MemoryWeb, LLC*, IPR2021-01413, Paper 76 at 4-5 (PTAB May 22, 2023) (Decision Granting Director Review). However, the same arguments for Intel and [REDACTED] would also apply to [REDACTED]

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entered into without Petitioner's knowledge—are irrelevant to the relationship between Petitioner and Intel or [REDACTED]. It is also well established that a standard manufacturer/customer relationship, even with indemnity provisions, does not establish privity. *See, e.g., WesternGeco*, 889 F.3d at 1319-1322; *Wi-Fi One, LLC v. Broadcom Corp.*, 887 F.3d 1329, 1340–41 (Fed. Cir. 2018); *Samsung Electronics Co. Ltd. v. Netlist Inc.*, IPR2022-00615, Paper 64 at 22-26 (PTAB, June 30, 2023).

PO's arguments about the same products being at issue in the prior cases and Petitioner's sales being both licensed and infringing is nonsensical. A licensed sale is not infringing. 35 U.S.C. § 271(a). Any license or exhaustion outcomes are the result of *PO's actions*, beginning when PO entered the RPX Agreements, followed by RPX later sublicensing Intel and [REDACTED] (if such a sublicense was in fact granted). PO itself created this situation, and PO cannot "ignore[] the practical consequences of its own actions." *Assa Abloy AB v. CPC Patent Tech. Pty., Ltd.*, IPR2022-01006, Paper 47 at 18, 42, 45-47 (PTAB Nov. 30, 2023). Nor does the bare supply of products create an agency relationship. *See In re Google LLC*, 949 F.3d 1338, 1345 (Fed. Cir. 2020) (quoting Restatement (Third) of Agency § 1.01). And, in a district court action involving the subject patent, PO has not pleaded any affirmative defense of *res judicata* or collateral estoppel in answer to Petitioner's invalidity counterclaims, further showing PO's privity argument is nothing but a red herring. *See IPR2023-01242*, Paper 31, 7-8. Moreover, if any party's due process

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rights are at risk, it is Petitioner's; PO attempts to bar Petitioner's right to challenge the subject patent based on an agreement *between PO and a third party* made without Petitioner's knowledge.

At bottom, Petitioner's standard manufacturer/customer relationship with Intel and [REDACTED] did not provide Petitioner a "full and fair" opportunity to challenge the validity of any patents in any previous matter. Petitioner was a stranger to the Intel and [REDACTED] litigations, and it would be unjust and contrary to precedent to bind Petitioner as a privy to those cases. *Taylor*, 553 U.S. at 893-95; *WesternGeco*, 889 F.3d at 1319-22.

Dated: August 12, 2024

Respectfully submitted,

/Roger Fulghum/

Roger Fulghum

Reg. No. 39,678

Attorney for Petitioner

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CERTIFICATE OF COMPLIANCE

I hereby certify that this Petitioner's Reply to Patent Owner's Response complies with the type-volume limitations of 37 C.F.R. § 42.24(c)(1) because it contains 5,589 words (as determined by the Microsoft Word word-processing system used to prepare the reply), excluding the parts of the reply exempted by 37 C.F.R. § 42.24(c).

August 12, 2024
Date

/Roger Fulghum/
Roger Fulghum
Reg. No. 39,678
Attorney for Petitioner

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. § 42.6(e), the undersigned certifies that on August 12, 2024, a complete and entire copy of the foregoing **PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE** and supporting exhibits were served on Patent Owner via electronic mail at the below addresses:

greenthread-onsemi-ms@mckoolsmith.com

awhitehurst@mckoolsmith.com

nmatich@mckoolsmith.com

ajairam@mckoolsmith.com

smccommas@mckoolsmith.com

nozarkar@mckoolsmith.com

August 12, 2024
Date

/Roger Fulghum/
Roger Fulghum
Reg. No. 39,678
Attorney for Petitioner