IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
AUSTIN DIVISION

GREENTHREAD, LLC,	§	
Plaintiff,	§	
	§	
-v-	§	**1:23-cv-00369-DC-DTG**
	§	
CIRRUS LOGIC, INC.,	§	
Defendant.	§	

CLAIM CONSTRUCTION ORDER AND MEMORANDUM IN SUPPORT THEREOF

Before the Court are the Parties' claim construction briefs: Defendant Cirrus Logic's Opening Claim Construction Brief (ECF No. 35), Plaintiff's Greenthread, LLC's Responsive Claim Construction Brief (ECF No. 37), Defendant's Reply Claim Construction Brief (ECF No. 38), Plaintiff's Sur-Reply Claim Construction Brief (ECF No. 39), and the parties' Joint Claim Construction Statement (ECF No. 40).

The Court provided preliminary constructions for the disputed terms one day before the hearing. The Court held the *Markman* hearing on January 26, 2024. ECF No. 43. During that hearing, the Court informed the Parties of the final constructions for the disputed terms. *Id.* This Order does not alter any of those constructions.

I. DESCRIPTION OF THE ASSERTED PATENTS

Plaintiff asserts U.S. Patent Nos. 8,421,195, 9,190,502, 10,510,842, 10,734,481, 11,121,222, and 11,316,014, all of which are entitled "Semiconductor devices with graded dopant regions."

The claimed inventions describe an improvement to transistor technology through the use of "graded dopants." '195 Patent at Abstract (ECF No. 35-1 & 37-2). Dopants are chemical

impurities that are added to a semiconductor material to alter the electrical characteristics of that semiconductor material.

The asserted patents describe that, prior to the claimed inventions, dopant concentrations were "uniform." *Id.* The patents describe using a graded doping concentration in specific locations within the semiconductor device, *e.g.*, below the transistor, to create an electric field. *Id.* at 2:42–45. The electrical field moves majority or minority carriers from one point to another. For example, Figure 5(b) in the asserted patents depicts using a graded dopant region to create an electric field (arrows) that pulls minority carriers from the surface in to the p-substrate.

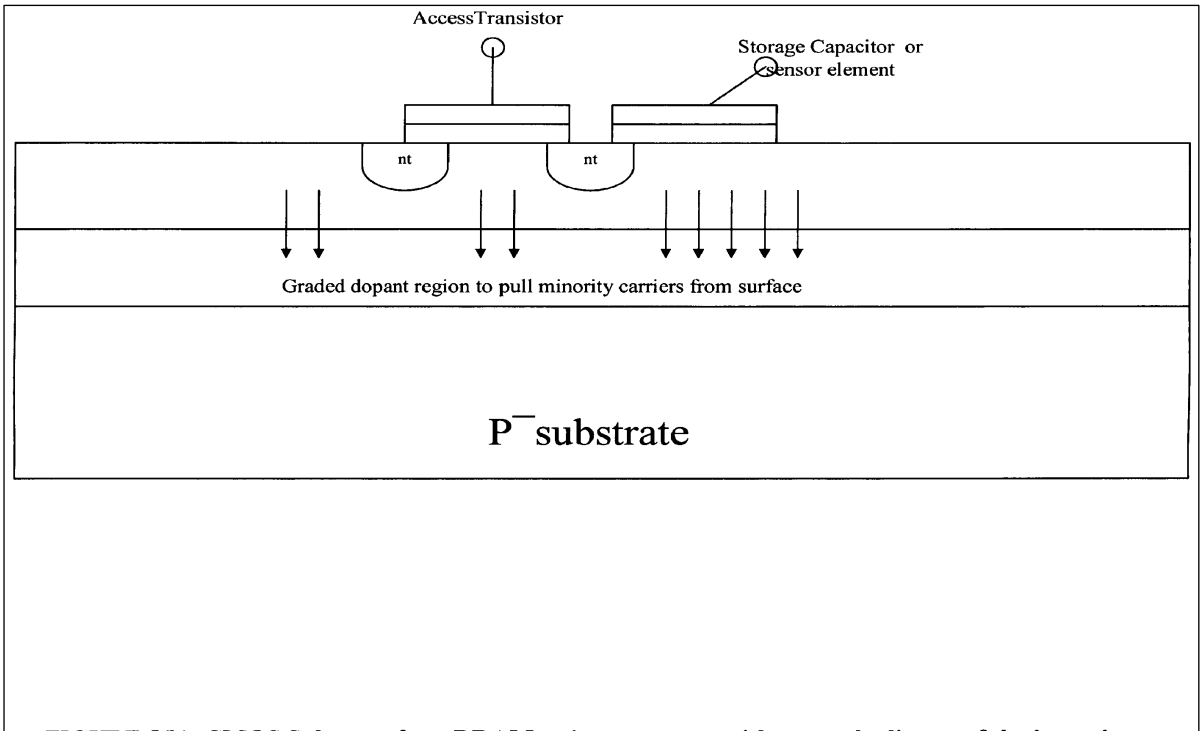


FIGURE 5(b) CMOS Substrate for a DRAM or image sensor, with one embodiment of the invention

By moving minority carriers into the substrate, the specification describes that the benefits of the embodiment in Figure 5(b) are improved DRAM refresh times and/or improved CMOS digital images. *Id.* at 3:21–27.

II. LEGAL STANDARD

A. General principles

The general rule is that claim terms are generally given their plain-and-ordinary meaning. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (*en banc*); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014), *vacated on other grounds*, 575 U.S. 959, 959 (2015) ("There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.") (internal quotation omitted). The plain-and-ordinary meaning of a term is the "meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention." *Phillips*, 415 F.3d at 1313.

The "only two exceptions to [the] general rule" that claim terms are construed according to their plain-and-ordinary meaning are when the patentee (1) acts as his/her own lexicographer or (2) disavows the full scope of the claim term either in the specification or during prosecution. *Thorner v. Sony Computer Ent. Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012). The Federal Circuit has counseled that "[t]he standards for finding lexicography and disavowal are exacting." *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1371 (Fed. Cir. 2014). To act as his/her own lexicographer, the patentee must "clearly set forth a definition of the disputed claim term" and "'clearly express an intent' to [define] the term." *Thorner*, 669 F.3d at 1365.

"Like the specification, the prosecution history provides evidence of how the PTO and the inventor understood the patent." *Phillips*, 415 F.3d at 1317. "[D]istinguishing the claimed invention over the prior art, an applicant is indicating what a claim does not cover." *Spectrum Int'l, Inc. v. Sterilite Corp.*, 164 F.3d 1372, 1379 (Fed. Cir. 1998). The doctrine of prosecution disclaimer precludes a patentee from recapturing a specific meaning that was previously disclaimed during prosecution. *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323 (Fed. Cir. 2003). "[F]or prosecution disclaimer to attach, our precedent requires that the alleged disavowing actions or statements made during prosecution be both clear and unmistakable." *Id.*

at 1325–26. Accordingly, when "an applicant's statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable." *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013).

A construction of "plain and ordinary meaning" may be inadequate when a term has more than one "ordinary" meaning or when reliance on a term's "ordinary" meaning does not resolve the parties' dispute. *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co*., 521 F.3d 1351, 1361 (Fed. Cir. 2008). In that case, the Court must describe what the plain-and-ordinary meaning is. *Id.*

"Although the specification may aid the court in interpreting the meaning of disputed claim language . . ., particular embodiments and examples appearing in the specification will not generally be read into the claims." *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988). "[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited." *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

Although extrinsic evidence can be useful, it is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 862 (Fed. Cir. 2004)). Technical dictionaries may be helpful, but they may also provide definitions that are too broad or not indicative of how the term is used in the patent. *Id.* at 1318. Expert testimony may also be helpful, but an expert's conclusory or unsupported assertions as to the meaning of a term are not. *Id.*

B. Indefiniteness

"[I]ndefiniteness is a question of law and in effect part of claim construction." *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012). Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112, ¶ 2. A claim, when viewed in light of the intrinsic evidence, must "inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 910 (2014). If it does not, the claim fails § 112, ¶ 2 and is therefore invalid as indefinite. *Id.* at 901. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application was filed. *Id.* at 911.

III. LEGAL ANALYSIS

This Court previously construed Terms 1–3, 5–7, and 10 in Greenthread's favor in the prior *Greenthread v. Intel* litigation. Response (ECF No. 37), Ex. 7 at GT-WDTX-CL_0065442–44. The case against Intel was severed and transferred to the District of Oregon. *Greenthread, LLC v. Intel Corp.*, No. 3-22-cv-02001, ECF No. 2 (D. Or. Dec. 21, 2022). Magistrate Judge Russo in the District of Oregon issued a recommendation that this Court's constructions should govern the Oregon case. Response (ECF No. 37), Ex. 8 at 8.

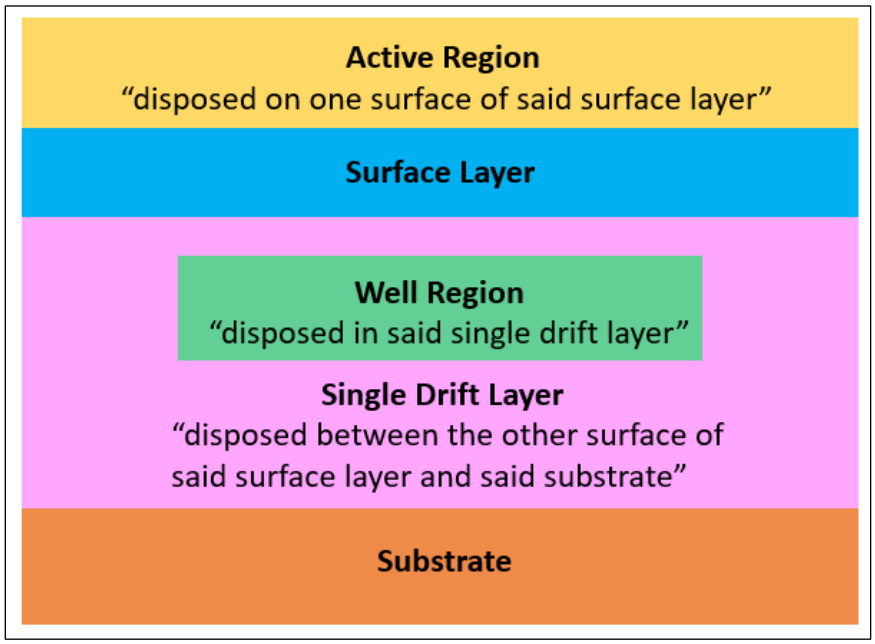
A. Term #1: "surface layer"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#1: "surface layer" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S.	Not indefinite. Plain and ordinary meaning, where the plain and ordinary meaning is "a layer at the surface"	Indefinite

Patent No. 11,121,222, Claim 44 Proposed by Cirrus		

<u>The Parties' Positions:</u>

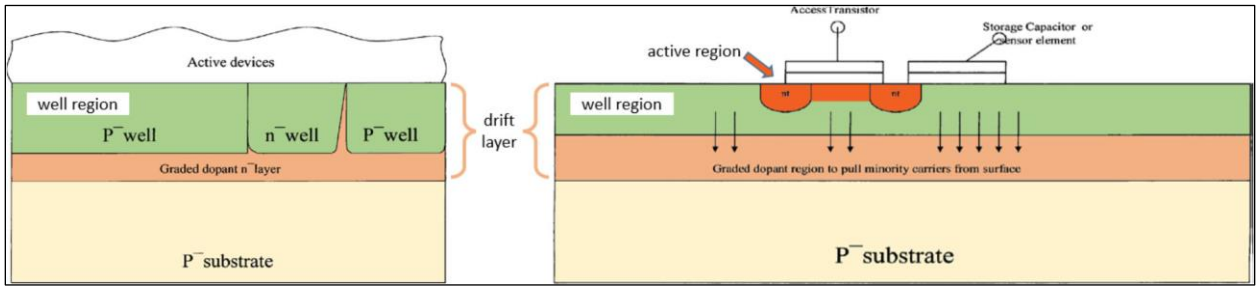
Cirrus contends that the claim language, *e.g.*, "an active region … ***disposed on*** one surface of said surface layer," requires that the active region be physically above the surface layer, as depicted below in the graphic Cirrus created. Opening (ECF No. 35) at 6–7 (citing '195 Patent, Claim 1; Opening (ECF No. 35), Ex. V (Subramanian dec.) at ¶¶ 26–29, 37–38) (emphasis in Cirrus's brief).



Cirrus contends that the term is indefinite because the term lacks a commonly accepted definition and that the specification fails to describe this layer. *Id.* at 8 Cirrus contends that Greenthread, by

contrast, seeks to rewrite the claims so that the active region is "disposed in" the surface layer. *Id.* at 7.

Cirrus contends that the specification does not disclose a "surface layer." *Id.* at 8. Rather, Cirrus contends that the specification depicts that the "active region directly abuts the single drift layer (which, as per the claim, includes the well region disposed within it) without any intervening layer." *Id.* at 8–9 (citing '195 Patent at Figs. 5(a), 5(b) (annotations in Cirrus's brief); Opening (ECF No. 35), Ex. V (Subramanian dec.) at ¶¶ 48–49).



Cirrus contends that "although the specification refers to a 'surface' in several instances and discloses layers such an 'underlying layer,' a person of skill would not understand any of these references to disclose a 'surface layer' exhibiting the spatial relationships of the claims." *Id.* at 9 (citing Opening (ECF No. 35), Ex. V (Subramanian dec.) at ¶ 50).

Cirrus contends that the file history also does not clarify the meaning of this term. *Id.* Cirrus contends that Applicant amended the claims to change "surface region" to "surface layer," which indicates that the two are not synonymous. *Id.* (citing Opening, Ex. G at 164–65). Cirrus contends that "[w]hile the Examiner identified a 'silane epitaxial film 23' disclosed in the prior art Kamins reference as a 'surface layer,' this mapping is wholly inconsistent with Greenthread's alleged 'blue-box' surface layer" in the multi-colored picture above. *Id.* (citing U.S. Patent No. 4,160,985 at Fig. 2, 2:51–53; Opening, Ex. V (Subramanian dec.) at ¶ 53).

Cirrus contends that the term does not have a commonly accepted meaning to a person of skill. *Id.* (citing Opening, Ex. V (Subramanian dec.) at ¶¶ 55–56). Cirrus contends that this term has "varied meanings" in the prior art depending on the context. *Id.* (citing Opening, Ex. V (Subramanian dec.) at ¶ 55). Rather, Cirrus contends that:

> A POSITA could use "surface layer"—depending on context—to describe a gate oxide layer, a field oxide layer, source and drains, mask layers, or any number of other layers that could be placed at a surface of the semiconductor device—none of which meet the spatial requirements of the claims because they are either above or within the active region.

Id. at 10 (citing Opening, Ex. V (Subramanian dec.) at ¶¶ 57–70).

Cirrus contends that Greenthread's arguments for this term fail. *Id.* at 12. Cirrus first contends that Greenthread's argument that the "surface layer" is simply a layer at the surface of the semiconductor device is contrary to the claim language which requires that the active region—which is part of the semiconductor device—be "disposed on" the "surface layer." *Id.* Cirrus contends that this contradiction further renders the claim to be indefinite. *Id.* (citing *TVnGO Ltd. (BVI) v. LG Elecs. Inc.*, 861 F. App'x 453, 457-460 (Fed. Cir. 2021), Opening, Ex. V (Subramanian dec.) at ¶ 75). Cirrus next contends that the claims described that the "surface layer" has two surfaces, so Greenthread's assertion that "surface layer" and "surface" are synonymous means that the "surface layer" would nonsensically have two "surface layers." *Id.* (citing Opening, Ex. V (Subramanian dec.) at ¶ 76).

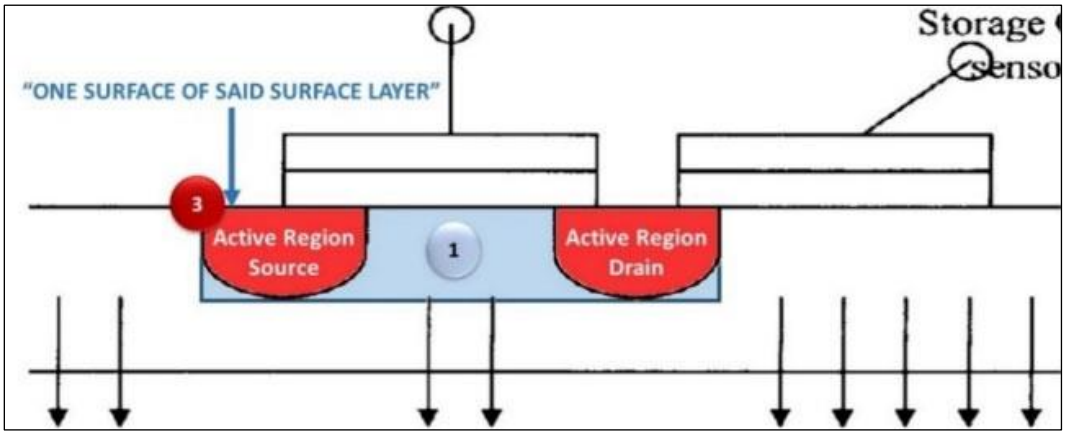
Cirrus contends that Greenthread's ceiling fan analogy in the prior *Intel* case (that the active region is located on the "ceiling" of the "surface layer," like a ceiling fan in a room) is inapplicable to semiconductor devices. *Id.* More specifically, Cirrus contends that semiconductor devices are solid and thus do not have "ceilings." Cirrus further contends that the claims specify

that there are only two surfaces, whereas Greenthread's analogy requires four surfaces (two exterior surfaces, top and bottom, and two interior surfaces, top and bottom). *Id.*

Cirrus finally contends that the "disposed on" cannot mean "disposed in" because the claim language uses both, which indicates that the two have a different meaning. *Id.* at 14 (citing *Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 448 F.3d 1324, 1333 n.3 (Fed. Cir. 2006); Opening, Ex. V (Subramanian dec.) at ¶ 79).

In its response, Greenthread asserts that this Court and the District of Oregon already determined that this term is not indefinite. Response (ECF No. 37) at 9. Greenthread contends that "surface layer" is a lay term that simply means a layer at the surface. *Id.*

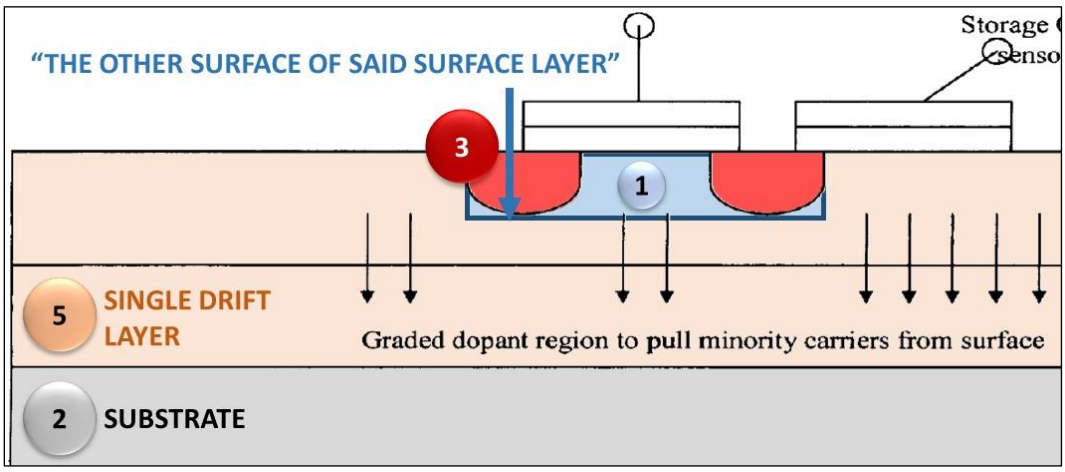
Greenthread contends that Cirrus "insists" that the surface layer is not at the surface, as it is under the active layer. *Id.* Greenthread contends that Cirrus's interpretation would both contradict the plain meaning of this term and exclude the embodiment depicted in Figure 5B. *Id.* More specifically, Greenthread contends that, by contrast, that the "surface layer" has two surfaces and the active layer is on the underside of top surface of the "surface layer" *Id.* (citing '195 Patent at Fig. 5B (annotations in Greenthread's brief)).



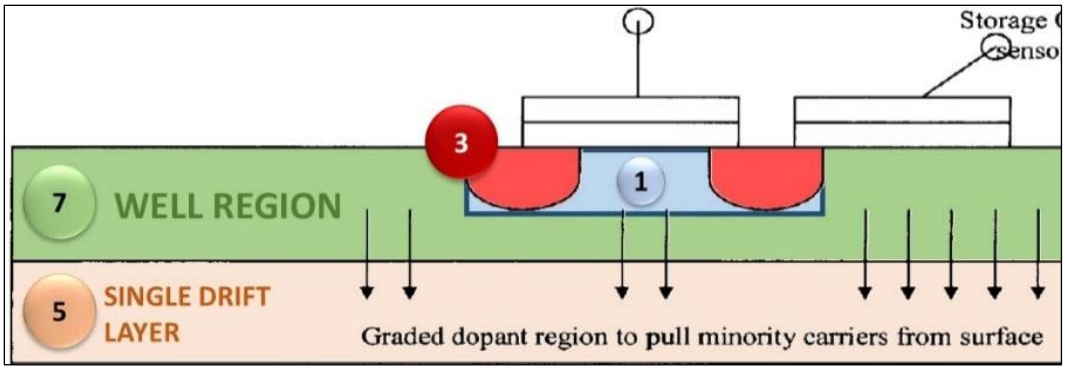
Greenthread contends that the claim language ("an active region … disposed on one surface of said surface layer") does not require that the active region is a separate layer above the "surface

layer." *Id.* at 10. Rather, Greenthread analogizes the surface layer to a room that has two surfaces, the ceiling and the floor. *Id.* Greenthread contends that a ceiling fan "disposed on" the ceiling does not mean the ceiling fan on the roof pointing upwards like a helicopter's rotor, but rather it is connected to the ceiling inside the room. *Id.*

With respect to Cirrus's "disposed [on / between / in]" argument, Greenthread contends that when read correctly, "it lines up exactly with the preferred embodiment in Figure 5B," and that the Federal Circuit has held that claims should include the preferred embodiment. *Id.* at 10–11 (citing *SynQor, Inc. v. Artesyn Techs., Inc.*, 709 F.3d 1365, 1378-79 (Fed. Cir. 2013)). More specifically, Greenthread contends that "the single drift layer is 'disposed between' the *other* surface of the surface layer and the substrate." *Id.* (citing Response, Ex. 1 (Glew dec.) at ¶ 61, '195 Patent at Fig. 5B (annotations in Greenthread's brief)) (emphasis in Greenthread's brief).



Greenthread similarly contends that "the well region is 'disposed in' the single drift layer." *Id.* at 11 (citing'195 Patent at Fig. 5B (annotations in Greenthread's brief); Response, Ex. 1 (Glew dec.) at ¶ 62).



With respect to Cirrus's argument that "surface layer" does not appear in the specification, Greenthread contends that that is legally irrelevant as the law only requires that a person of skill would have understood what the term means after reading the intrinsic record. *Id.* In particular, Greenthread contends that a person of skill would understand that the specification discloses that the "surface layer" is the surface of the silicon where the source and drain are located. *Id.* at 11–12 (citing Response, Ex. 1 (Glew dec.) at ¶¶ 62–63, '195 Patent at 1:43–45, 3:30–33, 3:38–43, 3:43–45, 3:53–55).

Greenthread contends that the prosecution history further confirms that the "surface layer" is the top layer of the silicon. *Id.* at 12. More specifically, Greenthread contends that during prosecution of the '195 Patent, Applicant elected claims directed to the embodiment depicted in Figures 5(b) and 5(c). *Id.* at 12–13. Greenthread contends that Examiner identified the top layer as the surface layer, and not the oxide layer on top of the silicon, thus confirming that Examiner understood that the layer at the surface of the silicon is the "surface layer." *Id.* at 13.

Greenthread contends that "surface layer" has a plain meaning as used in the claims. *Id.* More specifically, Greenthread contends that it is customary to refer to layers by their relative position. *Id.* Greenthread further contends that Cirrus does not argue that "surface" is unclear. Based on that, Greenthread contends that a "surface layer" is a layer at the surface. *Id.*

Greenthread contends that the Wolf textbooks Cirrus cites confirm that understanding. *Id.* (citing Opening (ECF No.37), Ex. N3 at 109, Ex. N4 at 30, 33). Greenthread contends that "that the textbooks may use the term differently in other contexts does not alter the fact that in the context of MOSFETs, 'surface layer' means a 'layer at the surface.'" *Id.* at 13–14. Greenthread contends that "[w]hen, as here, a term may have multiple plain meanings, the one that is most consistent with the asserted patent's context should be used." *Id.* at 14 (citing *Renishaw PLC v. Marposs S.p.A.*, 158 F.3d 1243, 1250 (Fed. Cir. 1998)).

In its reply, with respect to claim language's requirement that the "active region … disposed on one surface of said surface layer," Cirrus contends that Greenthread's ceiling fan analogy is inapt because substrates are not hollow like a room is. Reply (ECF No. 38) at 4. Cirrus further contends that the "active region" is not "***disposed in***" the surface layer as Greenthread suggests as the claims used "disposed in" in other places. *Id.* at 5 (emphasis in Cirrus's brief).

Cirrus contends that Greenthread fails to demonstrate that "surface layer" had a consistent meaning in the art or that a person of skill would understand the scope of the term based on the intrinsic evidence. *Id.* With respect to Greenthread's argument that Cirrus's proposed construction excludes an embodiment, Cirrus contends that there is no such embodiment as the patentee did not disclose "surface layer" in the specification. *Id.* Cirrus contends that Greenthread's responsive brief inconsistently depicts that the surface layer may extend to or extend past the bottom of the source and drain. *Id.* at 6.

With respect to Greenthread's argument that surface refers to the relative position, Cirrus contends that this description is still ambiguous because it is unclear which of the many surfaces described in the claim that Greenthread is referring to. *Id.*

In its sur-reply, Greenthread contends that Cirrus does not make any arguments that Intel did not. Sur-Reply at 2. Greenthread contends that "surface layer" ordinarily means "a layer at the surface" and that the claims, specification, and prosecution history confirm that understanding. *Id.* Greenthread contends that under its interpretation, the claims "line up perfectly with the embodiment in Figure 5B," while Cirrus's proposed construction excludes that embodiment. *Id.* (citing *SynQor*, 709 F.3d at 1378–79).

With respect to Cirrus's argument that the "active region" is on top of the "surface layer," Greenthread contends that there is no plausible reason for that and it does not square with the preferred embodiment in Figure 5(b). *Id.* at 2–3.

With respect to its ceiling fan analogy, Greenthread contends that Cirrus's criticisms are red herrings as it is only an analogy. *Id.* Greenthread contends that:

> The test for indefiniteness is not whether a semiconductor layer can have a "ceiling," but rather whether a POSITA, in light of the intrinsic record, would have understood "surface layer." The claims, specification, and prosecution history all confirm that Dr. Rao used "surface layer" consistent with its ordinary meaning to mean "a layer at the surface."

With respect to Cirrus's argument that the term is indefinite because the inventor did not specify the exact dimensions of the "surface layer," Greenthread contends that the exact dimensions depend on the specific application or implementation, but the inventor cannot be expected to specify the exact dimensions for all situations. *Id.* Greenthread contends that "Dr. Rao's invention does not depend on a specific shape or size, as long as the other claim limitations are met (*e.g.*, the graded dopants aid the movement of minority carriers from the surface layer to the substrate)." *Id.*

<u>The Court's Analysis:</u>

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that the term is not indefinite for the reasons that follow. First, Cirrus misinterprets the claim language "active region … disposed **on**" to require that the active region is above the surface layer and not within the surface layer. *See, e.g.*, '195 Patent, Claim 1, Limitation [c] (emphasis added). More specifically, Cirrus's interpretation incorrectly assumes that the active region cannot be within the surface layer and, as such, must be on top of it. But a person of skill would understand that the active region includes a source and drain, and that the source and drain are simply heavily doped regions of a semiconductor, *e.g.*, the surface layer. *Id.* Therefore, based on the fact that the plain meaning of "surface layer" is a layer at the surface and that the claims do not recite a layer on top of the surface layer, the Court concludes that a person of skill would understand that the "active region" is within the recited surface layer, and not within an unnamed layer that Cirrus's interpretation assumes.

The Court also concludes that a person of skill would understand that "on" does not mean that the active region is on top of the surface layer, but rather specifies that the active layer is just under the top surface of the surface layer. More specifically, given that dopant atoms can be implanted into the surface layer, a person of skill would understand that the active region is within the surface layer. As such, the word "on" then describes where within the surface layer the active region is.

The claims make clear that the active region is on the top surface of the surface layer. For example, Claim 1 of the '195 Patent requires that the drift layer is on the "other surface of said surface layer." *Id.*, Claim 1, Limitation [d]. Claim 1 of the '195 Patent also requires the drift layer is between the surface layer and the substrate. *Id.* Therefore, based on the claim language, a person of skill would understand that the active region is within the surface layer, but disposed

on the opposite surface as the surface that the drift layer is adjacent to, *i.e.*, disposed on the top surface of the surface layer.

The specification confirms this understanding. For example, Figure 5(b) of the ’195 Patent depicts an access transistor, with its associated source and drain in the top-most layer, *i.e.*, the surface layer. Figure 5(b) also depicts a layer below the surface layer that is described as a “graded dopant region to pull minority carriers from the surface.” This description matches the description of the drift layer in the claims. *See, e.g.*, ’195 Patent, Claim 1, Limitation [d] (“said drift layer having a graded concentration of dopants extending between said surface layer and said substrate”). Figure 5(b) finally depicts that the drift layer is between the surface layer and the substrate. This description again matches the description of the location of the drift layer in the claims. *Id.* (“a single drift layer disposed between the other surface of said surface layer and said substrate”). Therefore, the specification depicts an embodiment where the surface layer is the top-most layer, immediately above the drift layer, and where the active region is touching the top surface of the surface layer.

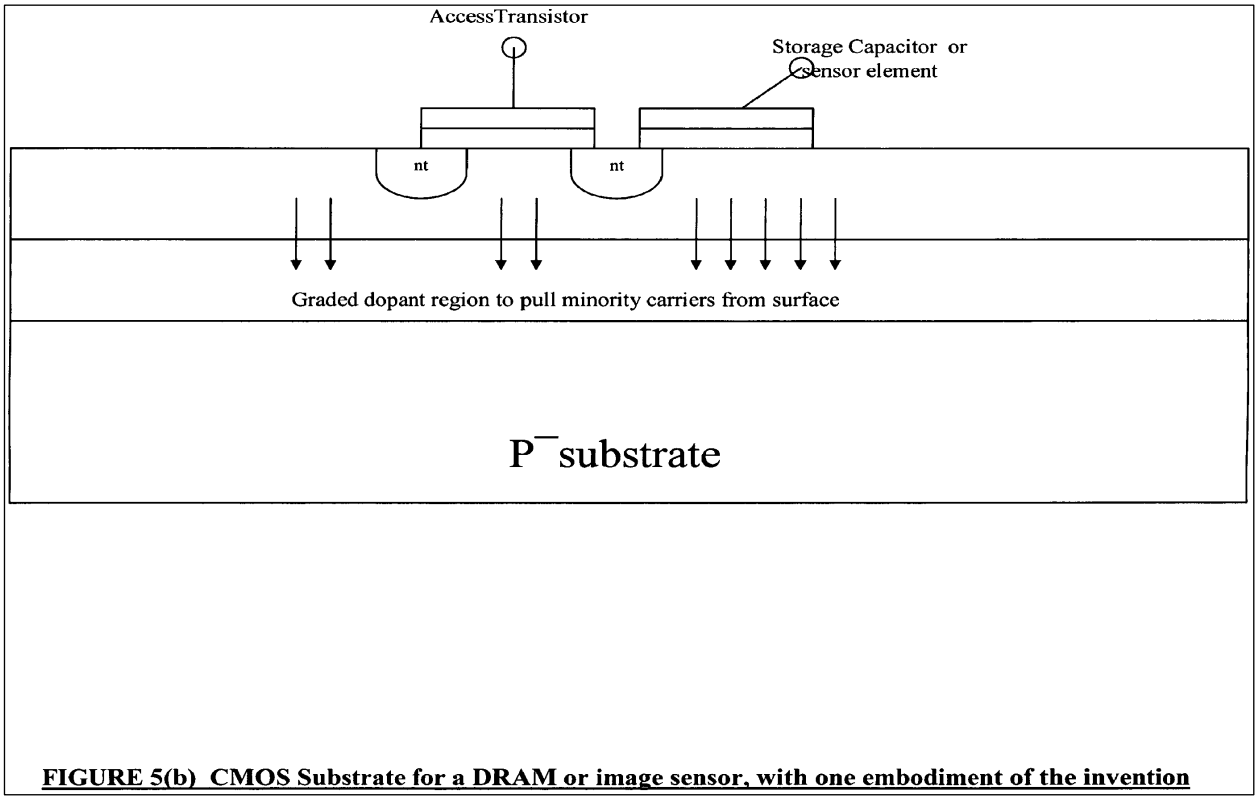


FIGURE 5(b) CMOS Substrate for a DRAM or image sensor, with one embodiment of the invention

With respect to Greenthread's ceiling fan analogy, the Court agrees with Greenthread that the location of the ceiling fan in Greenthread's analogy parallels the location of the active region in the surface layer. With respect to Cirrus's argument that Greenthread's analogy is inapposite because the surface layer is not "hollow" like a room is, the Court disagrees because dopants are implanted into the surface layer to form the source and drain of the active regions, so it is irrelevant that the surface layer is not hollow. As such, while the surface layer is not hollow, the dopant atoms are still able to be deposited within the surface layer and be adjacent to the top surface of the surface layer in a similar manner to how a ceiling fan is attached to the ceiling of a room.

Therefore, for the reasons described above, the Court concludes that the term is not indefinite because a person of skill would understand the meaning of this term with reasonable certainty. *Nautilus*, 572 U.S. at 910.

Second, Cirrus's argument that the active layer must be on top of the surface layer improperly excludes embodiments disclosed in the patent, *e.g.*, Figure 5(b). *Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276 (Fed. Cir. 2008) ("We normally do not interpret claim terms in a way that excludes embodiments disclosed in the specification … where claims can reasonably be interpreted to include a specific embodiment, it is incorrect to construe the claims to exclude that embodiment, absent probative evidence to the contrary.").

Third, the Court notes that Intel did not assert that this claim term is indefinite, which tends to indicate that a person of skill would understand the scope of the claim term with reasonable certainty.

Fourth, this Court and the District of Oregon previously determined that this term is not indefinite. The Court concludes that Cirrus has not provided any clear and convincing evidence that would lead this Court to come to a contrary conclusion.

For these reasons, the Court concludes that Defendant has not provided clear and convincing evidence that this term is indefinite.

Because the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning and because Defendants does not allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning, the Court concludes that the term should be construed as having its plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347; *Thorner*, 669 F.3d at 1365.

Furthermore, the Court concludes that it may be helpful for a jury to add "a layer at the surface" to explain what the plain-and-ordinary meaning is. *Sulzer Textil A.G. v. Picanol N.V.*, 358 F.3d 1356, 1366 (Fed. Cir. 2004) ("The district court simply must give the jury guidance that

can be understood and given effect by the jury once it resolves the issues of fact which are in dispute.”).

Therefore, for the reasons described above, the Court finds that the term is not indefinite and should be construed according to its plain-and-ordinary meaning, wherein the plain-and-ordinary meaning is a layer at the surface.

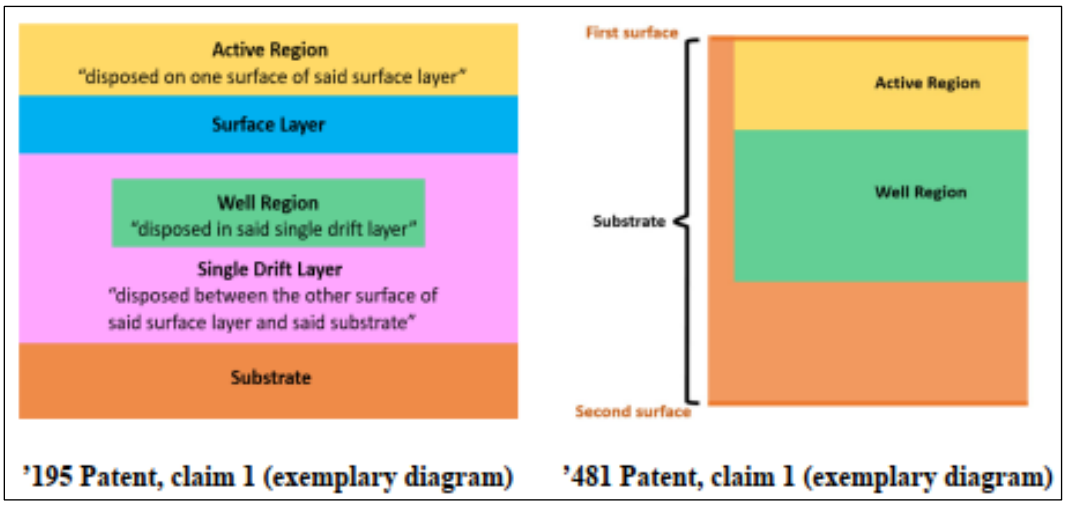
B. Term #2: “substrate”

Term	Greenthread’s Proposed Construction	Cirrus’s Proposed Construction
#2: “substrate” U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1–2, 4, 9–10, 12, 17; U.S. Patent No. 10,734,481, Claims 1–3, 8, 15, 20, 22–23, 32; U.S. Patent No. 11,121,222, Claims 1–3, 8, 15, 21, 23-24, 33, 39–42, 44; U.S. Patent No. 11,316,014, Claims 1–3, 8, 15, 21, 23–24	Not indefinite. Plain and ordinary meaning, where the plain and ordinary meaning is an “underlying layer”	Indefinite

Proposed by Cirrus		

<u>The Parties' Positions:</u>

Cirrus contends that Greenthread admits that the claim term has a different meaning depending on the context. Opening (ECF No. 35) at 15. Using two figures it created, Cirrus contends that, for example, in the Claim 1 of the '195 Patent describes that the substrate is the bottom-most layer while Claim 1 of the '481 Patent describes that the substrate "extends ***beyond*** the bottommost layer, and includes at least some of the other regions of the claimed semiconductor device." *Id.* at 14–15 (citing Opening, Ex. V (Subramanian dec.) at ¶¶ 85–86) (emphasis in Cirrus's brief).



Cirrus contends that the specification also depicts this inconsistency. *Id.* at 15. More specifically, Cirrus contends that Figure 5C depicts that the substrate is the bottom-most layer while Figure 3D depicts that the substrate extends to the top of surface. *Id.* at 15–16 (depicting '195 Patent at Figs. 5C, 3D (annotations in Cirrus's brief)).

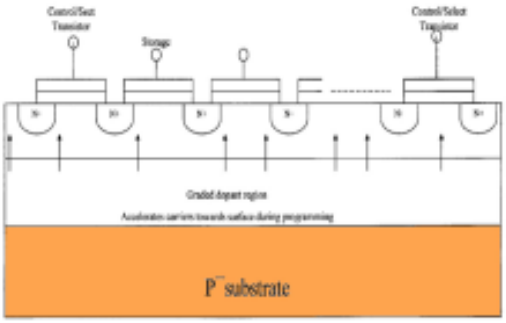


Fig. 5C (substrated annotated)

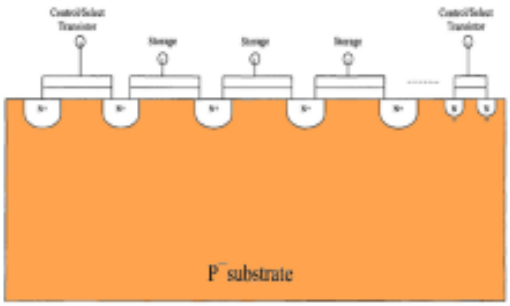
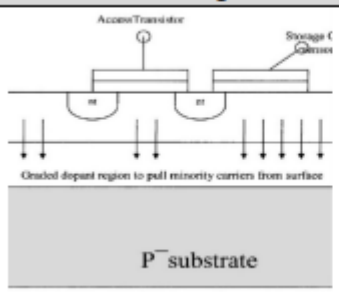
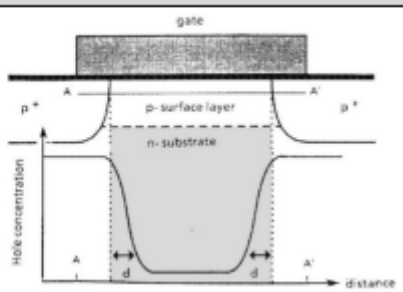


Fig. 3D (substrate annotated)

Cirrus contends that Greenthread admitted in the *Intel* case that "***Dr. Rao sometimes used it to refer to the bottom layer***, and ***other times he used it to refer to the wells*** that are underneath the surface layer and active region." *Id.* at 16 (quoting Ex. RR at 6) (emphasis in Cirrus's brief). Cirrus contends that these inconsistent meanings are contrary to Federal Circuit case law. *Id.* at 16–17 (citing cases).

In its response, Greenthread asserts that this Court and the District of Oregon already determined that this term should be construed according to plain-and-ordinary meaning. Response (ECF No. 37) at 14. Greenthread contends that, in contrast to Cirrus's proposed construction, no defendant in previous litigations asserted that the claim is indefinite. *Id.*

Greenthread contends that "substrate" is a term readily understood by a person of skill. *Id.* (citing Response, Ex. 1 (Glew dec.) at ¶¶ 66–68, Ex. 10, Ex. 11). Greenthread contends that Figure 5B of the '195 Patent depicts that the "p-substrate" is an underlying layer and that the Wolf textbooks also depict the same. *Id.* at 14–15 (citing Opening, Ex. N3 at 109).

195 Patent, Fig. 5B	Wolf
	

Greenthread contends that the intrinsic evidence describes "substrate" as an "underlying layer." *Id.* (citing '195 Patent at 1:50, 1:62, 2:18–23, 2:27–28, 3:31–32, 3:35, Figs. 2, 3(a)–(d), 4, 5(a)-(c)).

With respect to Cirrus's argument that the claim term is indefinite because it has a different meaning depending on the context, Greenthread contends that this is illogical as semiconductor patents refers to layers by their relative location to other layers. *Id.* Greenthread contends that in all cases, the substrate is an underlying layer. *Id.*

Greenthread contends that it never argued that the claims use "substrate" inconsistently. *Id.* Rather, Greenthread contends that "substrate" is a relative term and that the inventor correctly used it to refer to both the bottom layer and the wells underneath the surface layer and active region as both as underlying layers. *Id.* at 15–16. Greenthread contends that the "mere fact that the same term can be used to refer to different physical locations does not make it indefinite, but rather indicates breadth. *Id.* at 16 (citing *BASF Corp. v. Johnson Matthey Inc.*, 875 F.3d 1360, 1367 (Fed. Cir. 2017)).

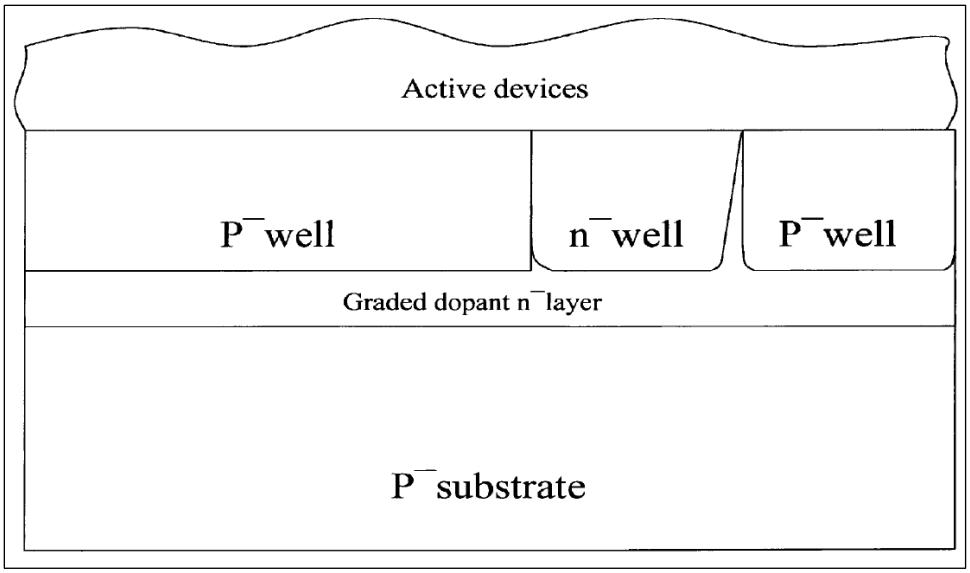
In its reply, Cirrus contends that its argument is not that "substrate" is unclear, but rather that the claims use it inconsistently. Reply (ECF No. 38) at 6. With respect to Greenthread's argument that "substrate" refers to underlying layers, Cirrus contends that Greenthread only cites non-technical dictionaries in support of that argument. *Id.* Cirrus further contends that this description is unhelpful because semiconductor devices comprise many layers such that any layer is underlying another. *Id.* at 6–7.

With respect to Greenthread's argument that Figures 5(a), 5(b), and 5(c) supports its proposed construction, Cirrus contends that the captions for Figures 5(a), 5(b), and 5(c) describe that the entirety of each figure is the substrate. *Id.* at 7. Based on that. Cirrus contends that "the

specification (but not the labels on Figures 5A-C) is consistent with *some of the* claims (*e.g.*, ’481 patent, claim 1) but not others, whereas the labels of the figures (but not the specification) is only consistent with certain other claims (*e.g.*, ’195 patent, claim 1) but not others.” *Id.* (emphasis in Cirrus’s brief).

In its sur-reply, Greenthread contends that that law does not require that patent specify the exact dimensions of the “substrate.” Sur-Reply (ECF No. 39) at 4. Greenthread contends that, as was the case for “surface layer,” the exact dimensions depend on the specific implementation or application, and that the “invention does not depend on a specific shape or size, as long as the other claim limitations are met (*e.g.*, aid the movement of minority carriers from the surface layer to the substrate).” *Id.* at 4–5.

Greenthread contends that “Cirrus misses that in Fig. 5, Dr. Rao correctly uses ‘substrate’ to refer to both the (1) bottom-most layer (*i.e.*, P- substrate); and (2) layers below active devices (*i.e.*, CMOS substrate).” *Id.* at 5. Greenthread contends that this is “entirely proper” because the “‘P-substrate’ is an underlying layer for the graded dopant and other layers, and the CMOS substrate (*i.e.*, wells and lower layers) is an underlying layer for the ‘active devices.’” *Id.* (citing ’195 Patent at Fig. 5A).



Greenthread contends that "[e]very time 'substrate' is used in the asserted claims, it is consistently used to mean 'an underlying layer.'" *Id.*

<u>The Court's Analysis:</u>

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that the term is not indefinite for the reasons that follow. First, the specification uses "substrate" to refer to both the (1) bottom-most layer and (2) the layer below and/or including the active devices. With respect to the former, Figure 2 of the '195 Patent depicts that the substrate is the bottom-most layer of several layers.

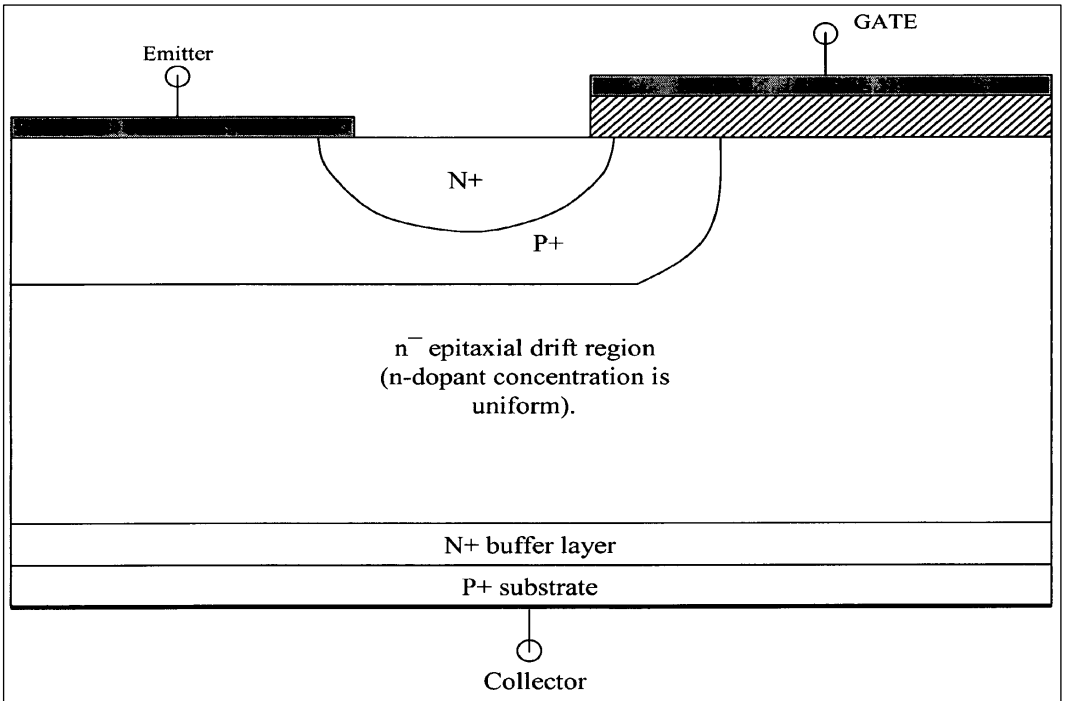


FIGURE 2 Prior art

Figure 4 depicts a similar structure, but for an IGBT, while Figures 5(a), 5(b), and 5(c) depict similar structures for a CMOS transistor.

With respect to the latter, Figure 3(a) of the '195 Patent depicts that the substrate may be the layer below the active devices while Figures 3(b), 3(c), and 3(d) depict that the substrate the active devices may be at the top of the substrate.

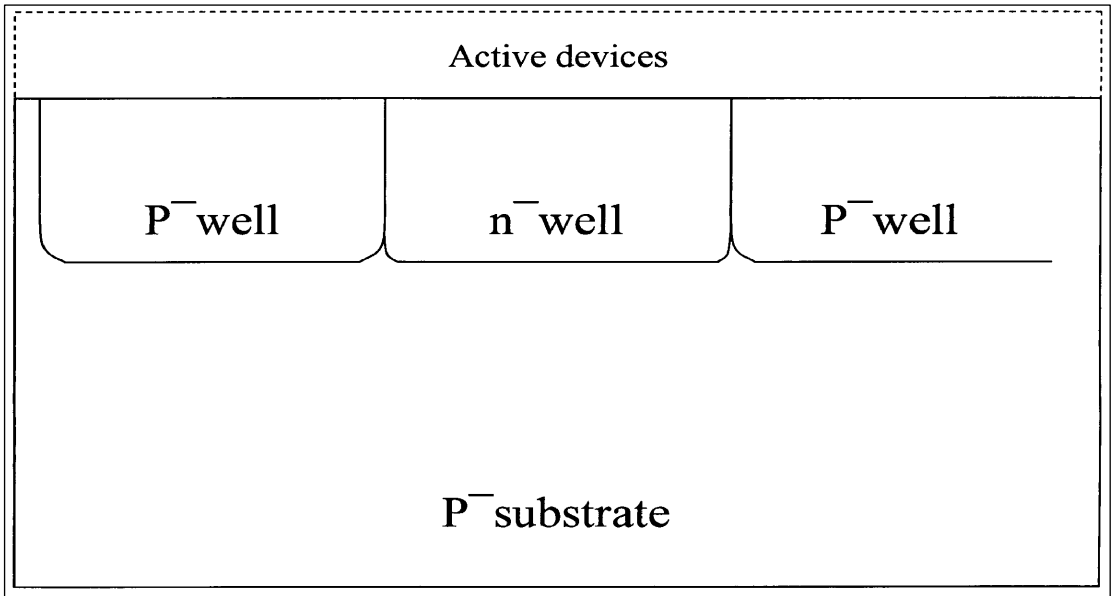


FIGURE 3(a) Prior art (Twin well CMOS) for a CMOS integrated circuit

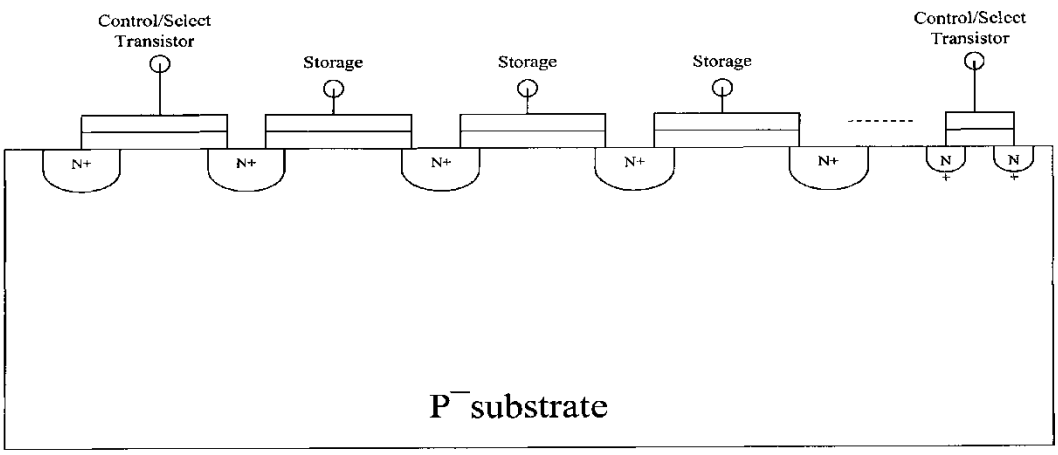


FIGURE 3(d) Prior art for a NAND flash memory cell

Note: Control/ Sect transistors have a single insulator - traditional MOS transistor.
Storage nodes have a stacked gate structure, typically with a floating gate and control gate comprising the stack.

Therefore, based on these disclosures, the Court concludes that, rather than being indefinite, "substrate" has a broad meaning in the art. *BASF*, 875 F.3d at 1367 ("Breadth is not

indefiniteness."). It is important to note that Figures 2 and 3(a)–(d) are depictions of the prior art, which indicates that "substrate" had that same broad meaning in the prior art and that it is not indefinite. *Energizer Holdings, Inc. v. Int'l Trade Comm'n*, 435 F.3d 1366, 1370 (Fed. Cir. 2006) ("Claim definiteness is analyzed 'not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art.'").

Second, the Court notes that Intel did not assert that this claim term is indefinite, which tends to indicate that a person of skill would understand the scope of the claim term with reasonable certainty.

Third, this Court and the District of Oregon previously determined that this term is not indefinite and should be construed according to its plain-and-ordinary meaning. The Court concludes that Cirrus has not provided any clear and convincing evidence that would lead this Court to come to a contrary conclusion.

For these reasons, the Court concludes that Defendant has not provided clear and convincing evidence that this term is indefinite.

Because the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning and because Defendants does not allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning, the Court concludes that the term should be construed as having its plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347; *Thorner*, 669 F.3d at 1365.

Therefore, for the reasons described above, the Court finds that the term is not indefinite and should be construed according to its plain-and-ordinary meaning.

C. Term #3: "active region"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#3: "active region" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claims 7, 8; U.S. Patent No. 10,510,842, Claims 1, 5–7, 9, 13–15, 17, 18; U.S. Patent No. 10,734,481, Claims 1, 4–6, 8, 9, 13, 20, 24–27; U.S. Patent No. 11,121,222, Claims 1, 4–6, 8, 9, 13, 20, 21, 25–28, 35, 39, 40, 41, 42, 44; U.S. Patent No. 11,316,014, Claims 1, 4–6, 8, 9, 13, 20, 21, 25–28 Proposed by Cirrus	Plain and ordinary meaning	"region that forms current path of a device"

<u>The Parties' Positions:</u>

The dispute between the parties is whether the active region must have transistors <u>already formed</u> therein (Cirrus's position) or whether transistors <u>can be formed</u> therein (Greenthread's position).

Cirrus contends that Greenthread's position conflates "active region" and "well region," which are separately recited in the intrinsic evidence. Opening (ECF No. 35) at 17. Cirrus contends that the claims require that the active region contain a source and drain, which are portions of a transistor. *Id.* at 17–18 (citing '195 Patent, Claim 1; '502 Patent, Claim 7; '222 Patent, Claim 44). Cirrus contends that other claims require that the active region contain a graded dopant concentration, which is a requirement in "many" of these claims. *Id.* at 18 (citing '842 Patent, Claim 1; '481 Patent, Claim 1; '222 Patent, Claim 1; '014 Patent, Claim 1).

Cirrus further contends that the specification also uses the term "active region," which "distinguishes it from an 'isolation' region." *Id.* (citing '195 Patent at Abstract, Opening, Ex. V

(Subramanian Dec.) at ¶ 93). Cirrus contends that Applicant also did the same during prosecution. *Id.*

Cirrus contends that "active region" had a "well-known and accepted" meaning in the art which is described in its proposed construction. *Id.* at 18–20. Cirrus contends that the extrinsic evidence describes that the "active region" is distinct from non-active regions, *e.g.*, wells. *Id.* at 20.

In its response, Greenthread asserts that this Court and the District of Oregon in the *Intel* case already rejected the same construction as Cirrus proposes and determined that this term should be construed according to its plain-and-ordinary meaning. Response (ECF No. 37) at 16.

Greenthread contends that a person of skill would understand from the claims and the intrinsic record that an "active region" is "a doped silicon region at the surface of a semiconductor device where a transistor can be formed." *Id.* (citing Response, Ex. 1 (Glew dec.) at ¶¶ 69–73). Greenthread contends that there is no need to construe the term and that doing so would unnecessarily introduce ambiguity. *Id.* (citing *Acumed LLC v. Stryker Corp*., 483 F.3d 800, 805 (Fed. Cir. 2007)).

Greenthread contends that the term should be construed to have the same meaning across patents, *e.g.*, '195 Patent, Claim 1 and '842 Patent, Claim 1. *Id.* at 16–17 (*NTP, Inc. v. Research in Motion, Ltd.*, 418 F.3d 1282, 1293 (Fed. Cir. 2005)). Greenthread contends that some claims, *e.g.*, '842 Patent, Claim 1, requires two active regions, but that a transistor needs only to be formed in at least one of them, which means that there may not be a transistor in the other active region. *Id.* at 17. Based on that, Greenthread contends that Cirrus's proposed construction is incorrect. *Id.*

Furthermore, Greenthread contends that because the inventor contemplated that transistors may be formed later, this indicates that transistors do not need to be formed in a region for that region to be an active region. *Id.* (citing '502 Patent at 1:61–63, 2:18–23, 3:1–3; Response, Ex. 1 (Glew dec.) at ¶ 71)). Based on that, Greenthread contends that Cirrus's proposed construction excludes this embodiment. *Id.*

With respect to the extrinsic evidence, Greenthread contends that "in the context of Dr. Rao's inventions, it is more accurate to refer to an active region as a doped silicon region at the surface of a semiconductor device (*e.g.*, the source and drain and silicon between them) where a transistor can be formed." *Id.* (citing Response, Ex. 1 (Glew dec.) ¶ 72).

With respect to Cirrus's argument that it conflates "active region" and "well region," Greenthread contends that "all of the claims where 'active region' appears, the claim specifies additional limitations. These additional limitations differentiate the 'active region' from the 'well region' or other regions of the semiconductor device." *Id.* (citing Response, Ex. 1 (Glew dec.) at ¶ 73).

In its reply, with respect to Greenthread's argument that the claims specify additional limitations, Cirrus contends that Greenthread does not "adequately" explain how those additional limitations differentiate the "active region" and "well region." Reply (ECF No. 38) at 8. Cirrus contends that, by contrast, Greenthread's explanation (that the "active region" is a region where a transistor can be formed") also describes a well region. *Id.* at 8–9.

With respect to Greenthread's argument that its proposed construction requires that the transistor always be on, which excludes a preferred embodiment, Cirrus contends that its proposed construction does not require that the transistor be on. *Id.* at 9.

In its sur-reply, Greenthread contends that Cirrus makes the same arguments that Intel did, and that this Court and the District of Oregon rejected those arguments. Sur-Reply (ECF No. 39) at 5–6.

Greenthread contends that claims and intrinsic record describe that an "active region" is "a doped silicon region at the surface of a semiconductor device where a transistor can be formed." *Id.* (citing Response, Ex. 1 (Glew dec.) at ¶¶ 69–73). Greenthread contends that there is no need to construe the term and that doing so would unnecessarily introduce ambiguity. *Id.* (citing *W. Union Co. v. MoneyGram Int'l, Inc.*, 2008 U.S. Dist. LEXIS 108129, at *15-16 (W.D. Tex. Nov. 6, 2008)).

Greenthread contends that Cirrus's proposed construction not only requires a transistor, but that that transistor is always turned on. *Id.* More specifically, Greenthread contends that because the current path is formed only when the transistor is on, Cirrus's proposed construction—which requires forming a current path—requires that the transistor must be on. *Id.*

<u>The Court's Analysis:</u>

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that this term should be construed according to its plain-and-ordinary meaning for the reasons that follow. First, the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347. Second, Defendant does not expressly allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning. *Thorner*, 669 F.3d at 1365.

Third, the claims allow for the possibility that active region may not have a transistor. More specifically, Claim 1 of the '481 Patent, requires a first and second active region. '481

Patent, Claim 1, Limitations [b]–[c], The claim further requires that a transistor is formed "in at least one of the first active region or second active region." *Id.*, Claim 1, Limitation [d]. Because a transistor may be formed in only one of the two active regions, the other active region will not have a transistor formed within it. Accordingly, Cirrus's proposed construction—which requires that a transistor be formed within the active region—contradicts and/or reads out some of the claim language. As such, Cirrus's proposed construction improperly "revise[s] or ignore[s] the explicit language of the claims." *Generation II Orthotics Inc. v. Med. Tech. Inc.*, 263 F.3d 1356, 1365 (Fed. Cir. 2001) (a court's claim construction must "not revise or ignore the explicit language of the claims."); *Motionless Keyboard Co. v. Microsoft Corp.*, No. CIV.04-180-AA, 2005 WL 1113818 (D. Or. May 6, 2005), *reversed on other grounds*, 486 F.3d 1376 (Fed. Cir. 2007) ("the construction must be consistent with the claim language and the description of the invention in the specification").

Fourth, the term "active region" appears to be a term of art, so construing it would be an "obligatory exercise in redundancy." *U.S. Surgical Corp. v. Ethicon, Inc.*, 103 F.3d 1554, 1568 (Fed. Cir. 1997) ("Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy.")

Fifth, this Court and the District of Oregon previously rejected Cirrus's proposed construction and determined that it should be construed according to its plain-and-ordinary meaning.

Therefore, for the reasons described above, the Court finds that the term should be construed according to its plain-and-ordinary meaning.

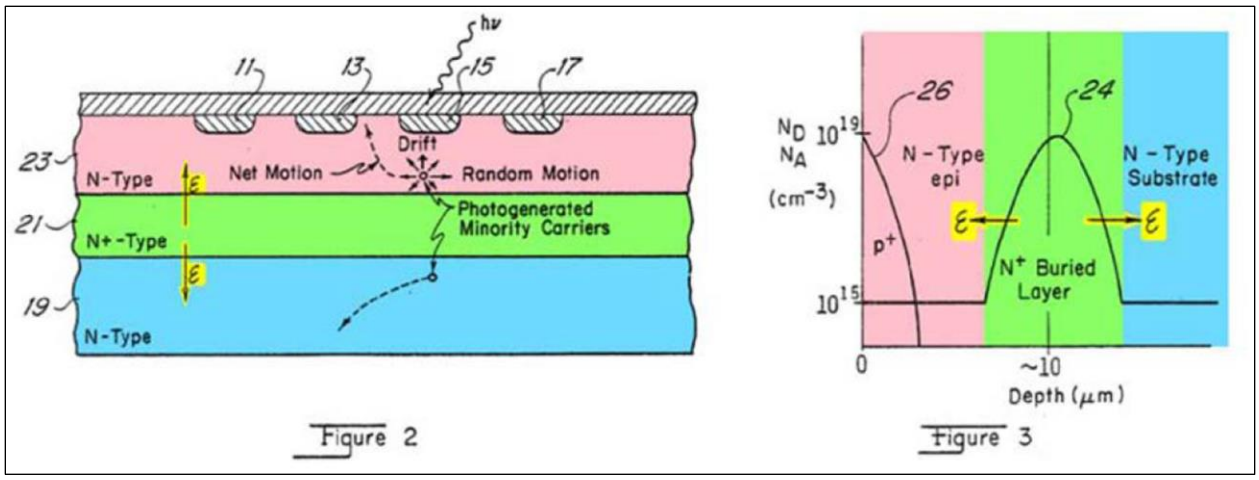
D. Term #4: "graded dopant concentration" / "graded dopant region" / "graded dopant acceptor concentration" / "graded donor dopant concentration" / "graded concentration of dopants" / "graded dopant" / "graded concentration"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#4: "graded dopant concentration" / "graded dopant region" / "graded dopant acceptor concentration" / "graded donor dopant concentration" / "graded concentration of dopants" / "graded dopant" / "graded concentration" U.S. Patent No. 8,421,195, Claims 1, 5, 6; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1, 6, 8–9, 14, 16; U.S. Patent No. 10,734,481, Claims 1, 5, 7, 9, 20, 25, 27, 31; U.S. Patent No. 11,121,222, Claims 1, 5, 7, 9, 21, 26, 28, 32, 39–42, 44 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning, where the plain and ordinary meaning is a graded (or varying) concentration of dopants.	Indefinite

<u>The Parties' Positions:</u>

Cirrus contends that the specification and claims do not provide any guidance for a person of skill as to the scope of this term. Opening (ECF No. 35) at 2. Cirrus contends that the former only describes this term by contrasting it with "uniform doped concentration." *Id.* (citing '195 Patent at 3:45–49). Cirrus contends that merely contrasting the two without clarifying the boundary between them renders "graded" to be indefinite. *Id.* (citing *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1364 (Fed. Cir. 2018)).

Cirrus contends that Greenthread, in the *Intel* case, characterized a curved concentration profile in the Kamins prior art as being "uniform." *Id.* at 3 (citing Opening, Ex. RR at 23, 24). More specifically, Cirrus contends that Greenthread concentration of n-type atoms in the green shaded area as being "uniform." *Id.* (citing Opening, Ex. RR at 23, 24 (annotations in Cirrus's brief)).



Cirrus contends that extrinsic evidence describes that the following doping profile, which was created by multiple ion implants, as "flat." *Id.* at 4 (citing Opening, Ex. T at 481, Fig. 24).

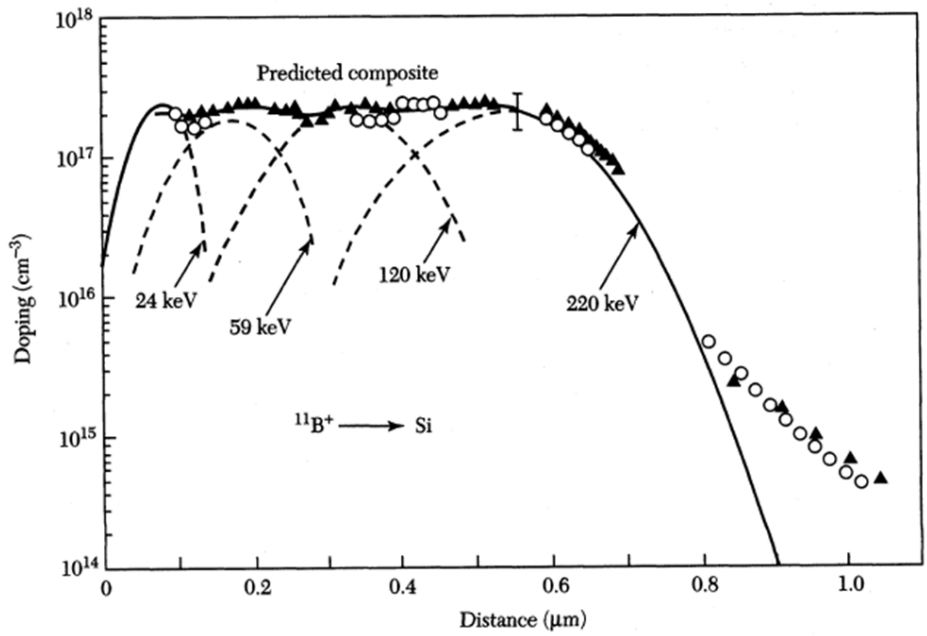


Fig. 24 Composite doping profile using multiple implants.[23]

Cirrus contends that diffusion due to high-temperature annealing will cause causing dopant concentration profiles to change. *Id.* at 4–5 (Opening, Ex. V (Subramanian dec.) at ¶ 127; Ex. N1 at 324–25). Cirrus contends that there will be "a natural curved dopant concentration" at the junction of two "different dopant concentrations." *Id.* at 5.

Based on the above, Cirrus contends that this term "cannot mean any and all curve or slope in dopant concentration profile measured as a function of position within a region." *Id.* But Cirrus contends that the specification does not describe the boundary between "uniform" and "graded." *Id.* Further complicating things, Cirrus contends that the inventor, in another patent, described that uniformity is a matter of degree. *Id.* (citing U.S. Patent No. 4,055,444 at 4:18–21, Fig. 2).

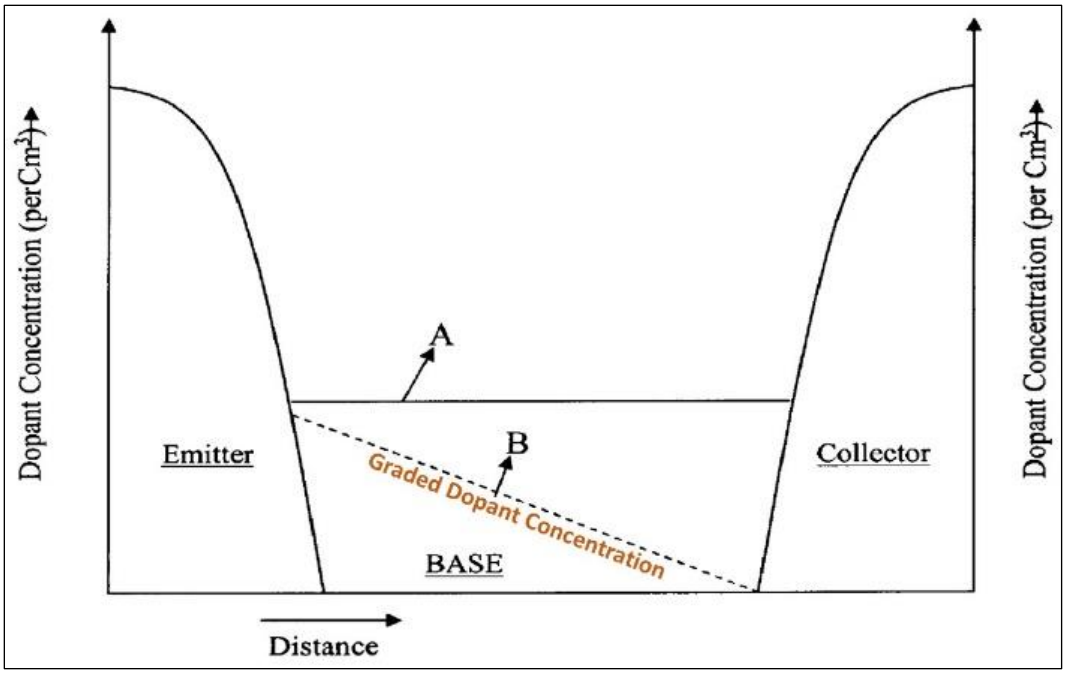
Cirrus contends that "[a]t best, the Asserted Patents suggest that whether a dopant concentration is 'graded' hinges on whether the design and processing of the semiconductor

device were intentionally chosen to create a 'graded' dopant concentration." *Id.* at 6 (citing '195 Patent at 1:34–36).

In its response, Greenthread contends that the Court and the District of Oregon in the *Intel* case construed a larger phrase containing this claim term to be plain-and-ordinary meaning. Response (ECF No. 37) at 18. Greenthread contends that not one of the Intel defendants argued that this term was indefinite. *Id.* Greenthread contends that in Cirrus's IPRs, both Cirrus and its experts understood the meaning of this term. *Id.*

Greenthread contends that the claim language confirms that a "graded concentration of dopant" is "graded (or varying) concentration of dopants. *Id.* at 19. More specifically, Greenthread contends that the asserted claims specify that the "graded dopants" generate a "first static unidirectional electric field" that "aids the movement of minority carriers." *Id.*

Greenthread contends that the specification further confirms that understanding. *Id.* More specifically, Greenthread contends that the patents disclose an example of what a graded dopant concentration looks like. *Id.* at 19–20 (citing '195 Patent at Fig. 1 (annotations added by Greenthread).



Greenthread contends that the specification discloses that graded dopants generate an electric field that aids in the movement of carriers. *Id.* at 20 (citing ’195 Patent at 1:55–57). Greenthread contends that the patent describes that the prior art in Figure 2 depicts uniform doping while the claimed invention in Figures 4, 5A, 5B, and 5C depict graded doping. *Id.*

Greenthread contends that, during prosecution, Examiner pointed to disclosures in several prior art references as disclosing graded dopants regions. *Id.* at 21. Greenthread contends that this indicates that Examiner understood the term. *Id.*

With respect to Cirrus’s argument about the Kamins prior art reference, Greenthread contends that it was misstatement to say that layer 21 is a uniform dopant layer. *Id.* Greenthread argues that it “does not contend here or anywhere else in the present litigation that layer 21 contains a uniform concentration of dopants.” *Id.*

In its reply, Cirrus contends that Greenthread sidesteps the issues whether the claim is indefinite because the intrinsic record does not provide guidance as to the scope of the claim, but rather construes the meaning of “graded” as “varying.” Reply (ECF No. 38) at 1–2.

Cirrus contends that it

> demonstrated based on technical authority, buttressed by admissions by Greenthread and inventor Rao himself, any conventional "uniformly doped" regions as referenced in the specification would exhibit *some (often a significant) degree of variation* in concentration level, due to the natural variation in how deep individual dopant ions travel during implantation and other natural variations caused by semiconductor processes[.]

Id. at 2 (emphasis in Cirrus's brief).

With respect to Greenthread's citation of Figure 1, Cirrus contends that this figure is not helpful as it is oversimplified, does not contain any numbers, and is not drawn to scale. *Id.* Cirrus contends that Greenthread made the same arguments in an IPR about petitioner's reliance on Figure 11 of the Payne prior art reference. Cirrus contends that "Greenthread cannot reject simplified figures in Payne to avoid prior art, but then take a diametrically opposite approach—presenting its own simplified figure as a 'specific example of a graded dopant concentration,' to avoid indefiniteness." *Id.* at 2–3 (internal citations omitted). Cirrus otherwise contends that none of the other passages Greenthread cites provides objective guidance to distinguishing "graded" from "uniform." *Id.* at 3.

With respect to Greenthread's argument that its characterization that it inadvertently characterized layer 21 in the Kamin reference as being uniform, Cirrus contends that "those statements were made (i) in a claim construction brief (ii) to this Court, (iii) regarding the same patented claims at issue here," and that Greenthread did not correct that misstatement in its Sur-Reply. *Id.* Cirrus contends that "it was *no* inadvertent error, as the Applicant also argued during prosecution that there was 'not a single layer with a gradient . . .' in Kamins' structure." *Id.* (citing Opening, Ex. G at 214) (emphasis in Cirrus's brief).

Cirrus contends that that "Greenthread conveniently ignores that Dr. Rao himself characterized a dopant profile as being "more *uniform*" post-annealing, even though the profile

still *varied* in concentration." *Id.* at 4 (citing '444 Patent at 4:18–21, Fig. 2) (emphasis in Cirrus's brief).

In its sur-reply, Greenthread contends that the intrinsic evidence provides sufficient guidance about the scope of the claim. Sur-Reply (ECF No. 39) at 6. More specifically, Greenthread contends that the claims specify that the graded dopants generate an electric field that aids in the movement of minority carriers. *Id.* at 7. Greenthread contends that Figure 1 in the '195 Patent depicts the difference between uniform and graded concentration, namely, that the concentration in the former is the same across a region while in the latter, the concentration has a slope. *Id.*

Greenthread also contends that Figure 1 does not need numerical units as the key point from that figure is that the slope of uniform concentration is flat while the slope of graded concentration is not flat. *Id.* Even then, Greenthread contends that the specification describes that concentration in a graded region may be 10^{14} to $10^{16}/cm^3$ where the concentration at one end may be 10 to 100 times more than the concentration at the other end. *Id*. at 8–9. Greenthread contends that these examples are more than enough to overcome an indefiniteness challenge. *Id.* at 9.

With respect to the "rough" drawing in an IPR, Greenthread contends that it "***never*** argued the drawing was insufficient to determine whether there was a 'graded' concentration. Rather, Greenthread pointed out it was insufficient to determine whether the change in concentrations was sufficient to effect carrier movement." *Id.* (emphasis in Greenthread's brief).

With respect to layer 21 in the Kamin reference, Greenthread contends that Cirrus does not argue that layer 21 is not graded. *Id.* Greenthread further contends that Dr. Rao distinguished Kamins on other grounds (that there was no "single drift layer" that aids movement of "minority carriers from said surface layer to the substrate."). *Id.*

Greenthread contends that Examiner also pointed to "graded" concentrations as those that varied or changed. *Id.* at 7.

The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that the term is not indefinite for the reasons that follow. First, the specification provides some guidance as to the meaning of this claim term. For example, Figure 1 depicts a graded doping concentration of the base in a bipolar junction transistor. This figure shows that, in contrast, to a "uniform" doping concentration, the graded doping concentration has a linearly decreasing doping concentration from the emitter-side to the collector-side of the base.[1] The specification also provides a numerical example of what constitutes a graded dopant concentration. *See, e.g.*, '195 Patent at 2:38–4 ("n graded base p-n-p transistors, the donor dopant concentration may be 10 to 100x at the emitter-base junction, relative to the base-collector junction (1X).").

Second, the claim language provides some guidance as to the scope of this term. More specifically, the claim language describes that the graded concentration of dopants creates an electric field. *See, e.g.*, '195 Patent, Claim 1, Limitation [d] ("said drift layer having a graded concentration of dopants … said drift layer further having a first static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate"). The Court concludes that a person of skill would understand that the graded concentration has to be sufficiently graded to result in a "static unidirectional electric drift field to aid the movement

[1] Figure 1 is directed towards one type of transistor, a bipolar junction transistor ("BJT"), but some of the claims are directed towards a different type of transistor, a Metal Oxide Semiconductor, Field Effect Transistor ("MOSFET"). '195 Patent, Claim 1; '502 Patent, Claim 1. While both parties cite to and discuss Figure 1 and while BJTs and MOSFETS are two different types of transistors that operated very differently, neither party asserted that citations to a different type of transistor was inapposite. *See, e.g.*, Response at 19–20, Reply at 2–3.

of minority carriers." This establishes a minimum graded concentration of dopants, *i.e.*, a graded concentration of dopants that is below this minimum will not aid in the movement of minority carriers and thus is not a graded concentration.

Third, the Examiner knew what "graded" meant, which indicates that it is not indefinite. *Guangdong Alison Hi-Tech Co. v. Int'l Trade Comm'n*, 936 F.3d 1353, 1361–62 (Fed. Cir. 2019) ("While not dispositive, the application of these terms by the parties' experts, along with the examiner and Board at the further supports our conclusion that the challenged claim term is not indefinite."); *see also Sonix Tech. Co. v. Publications Int'l, Ltd.*, 844 F.3d 1370, 1380 (Fed. Cir. 2017) ("Although ... application by the examiner and an expert do not, on their own, establish an objective standard, they nevertheless provide evidence that a skilled artisan did understand the scope of this invention with reasonable certainty.").

Fourth, in Cirrus's IPRs, both Cirrus and its experts understood the meaning of this term. *See, e.g.*, Opening, (ECF No. 35), Ex. 20 at 19–21, Ex. 21 at ¶¶ 89–93.

Fifth, the extrinsic evidence also shows that "graded" was a term of art. As a first example, the textbook that Cirrus cites describes that "[u]nder some implantation conditions either highly abrupt or graded junctions can be formed." Opening, Ex. N-1 at CIRRUS_0003398. As a second example, even Cirrus's own patent applications use the term "graded" to describe the channel region. Response, Ex. 22 (U.S. Patent Publication 2020/0006551) at [0004].

Sixth, the Court notes that Intel did not assert that this claim term is indefinite, which tends to indicate that a person of skill would understand the scope of the claim term with reasonable certainty.

Seventh, this Court and the District of Oregon previously determined that this term is not indefinite and should be construed according to its plain-and-ordinary meaning. The Court

concludes that Cirrus has not provided any clear and convincing evidence that would lead this Court to come to a contrary conclusion.

Finally, with respect to Cirrus' argument that Greenthread characterized the curved concentration profile in the Kamins prior art as "uniform," the Court disagrees that this evidence renders the claim term to be indefinite. More specifically, as described above, the intrinsic and extrinsic describe that "graded" is a term of art that describes a sloped doping concentration. But Greenthread's description of Kamins, in the context of the *Intel* litigation, is completely contrary to that. As such, the Court concludes that Greenthread's statement, standing alone, does not provide the required clear and convincing evidence, let alone provides clear and convincing evidence in light of the intrinsic and extrinsic evidence to the contrary. Rather, the Court agrees with Greenthread that this was likely an inadvertent typo.

For these reasons, the Court concludes that Defendant has not provided clear and convincing evidence that this term is indefinite.

Because the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning and because Defendants does not allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning, the Court concludes that the term should be construed as having its plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347; *Thorner*, 669 F.3d at 1365.

Therefore, for the reasons described above, the Court finds that the term is not indefinite and should be construed according to its plain-and-ordinary meaning.

E. Term #5: "said [drift layer further/well region…] having a [first/second] static unidirectional electric drift field" / "said [drift layer further/well region] having a graded concentration of dopants generating a [first/second] static unidirectional electric drift field"

Term	Greenthread's Proposed	Cirrus's Proposed

	Construction	Construction
#5: "said [drift layer further/well region…] having a [first/second] static unidirectional electric drift field" "said [drift layer further/well region] having a graded concentration of dopants generating a [first/second] static unidirectional electric drift field" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 11,121,222, Claim 44 Proposed by Cirrus	Plain and ordinary meaning	"said [drift layer further/well region...] having a [first/second] static electric drift field that is unidirectional over the extent of the [drift layer/well region]" "said [drift layer/well region] having a graded concentration of dopants generating a [first/second] static electric drift field that is unidirectional over the extent of the [drift layer/well region]"

<u>The Parties' Positions:</u>

The dispute between the parties is whether the claims "unidirectional electric drift field" may occur at any portion of the recited drift layer (Greenthread's position) or if it must be unidirectional across the length of the drift layer (Cirrus's position). Opening (ECF No. 35) at 20.

Cirrus contends that the claim language "implies a single unidirectional field over the extent of the layer or region." *Id.* at 21 (citing '195 Patent, Claim 1; '520 Patent, Claim 7). Cirrus contends that the specification discloses that "the relative slope of a dopant gradient creates a 'drift electric field' over the region of the gradient to move minority carriers over that region in the direction of the gradient." *Id.* (citing'195 Patent at 2:40–45, Fig. 1). Cirrus contends that the specification also discloses that the claimed invention uses a "'graded dopant concentration' in a

layer or region to create a 'drift field' to 'sweep . . . minority carriers' from 'active circuitry at the surface . . . deep into the substrate.'" *Id.* (citing'195 Patent at 3:30–35, Figs. 5(a), 5(b)).

Cirrus contends that Greenthread made a prosecution disclaimer that supports Cirrus's proposed construction. *Id.* More specifically, Cirrus contends that to overcome the Kamins reference, Applicant amended the pending claim to require a "unidirectional drift layer." *Id.* at 22 (citing Opening, Ex. G at 234). Cirrus contends that Applicant distinguished Kamins on the basis that the field of the claimed drift layer was "unidirectional" while the Kamins disclosed two electric fields with opposing directions, one that accelerated carriers to the surface and another that accelerated carriers to the substrate. *Id.* (citing Opening, Ex. I (Kamins) at 2:32–55, 2:64–3:18, Figs. 2–3; Ex. G at 237). Cirrus contends that Applicant "subsequently amended the claims to require that both the drift layer and a well region have a 'static unidirectional electric drift field,' while repeatedly arguing that Kamins 'does not teach that the electric drift field is a 'unidirectional electric drift field.'" *Id.* at 23 (citing Opening, Ex. G at 286, 290, 330, 333) (some internal quotation marks omitted).

Cirrus contends that Greenthread "apparently contends that these claim terms could be satisfied by a unidirectional field that exists in only a portion of a drift layer or well region," or by multiple electrical fields pointing in opposite directions. *Id.* Cirrus contends that such an interpretation would read "unidirectional" out of the claims. *Id.*

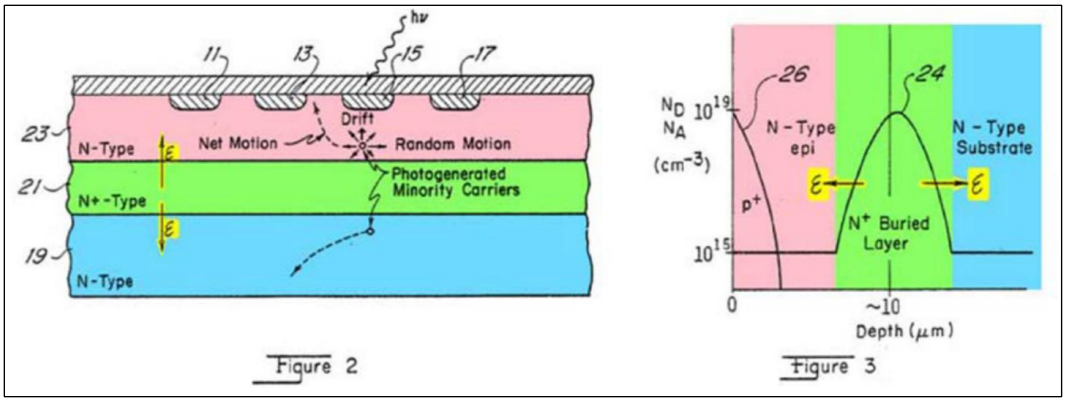
In its response, Greenthread asserts that this Court and the District of Oregon already determined that this term should be construed according to plain-and-ordinary meaning. Response (ECF No. 37) at 22.

Greenthread contends that the claim language only requires a "single drift layer," and not a "single unidirectional field," and there is nothing in the claim preventing additional electric

fields. *Id.* at 23 (citing Response, Ex. 1 (Glew dec.) at ¶ 82). Greenthread contends that Cirrus, through its use of "implies," agrees that the claims do not expressly require that the electric field is unidirectional over the entire drift layer. *Id.* As such, Greenthread contends that "[t]he fact that the field may stop before the end of the layer does not mean that the drift layer does not have a unidirectional field." *Id.*

Greenthread contends that, contrary to Cirrus's citations, nothing in the specification discloses that there is only one electric field per layer, nor that the field must continue across the entire layer or region. *Id.* Greenthread contends that the Court already considered this possibility in the prior *Intel* case and agreed with Greenthread. *Id.* With respect to Figures 5(b) and 5(c), Greenthread contends that these two figures depict "multiple electric fields that traverse only part of the well region and drift layer." *Id.* at 23–24. Greenthread contends that Cirrus's proposed construction would exclude both of these embodiments. *Id.* at 24.

Greenthread contends that there is no clear disavowal so there is no justification for Cirrus attempting the rewrite the claim term to include "over the extent of the drift layer." *Id.* at 22, 24. Greenthread contends that Applicant distinguished Kamins on the basis that there was no "single draft layer" that aids movement of the minority carriers ***from*** the surface layer to the substrate. *Id.* at 24 (citing Opening, Ex. G at 223, 238) (emphasis in Greenthread's brief). Greenthread contends that, by contrast, Kamins discloses a semiconductor device where minority carriers are accelerated toward the surface, *i.e.*, in the opposite direction of the claimed invention, and toward the substrate. *Id.* at 24–25 (citing Response, Ex. 1 (Glew dec.) at ¶ 85) (annotations in Greenthread's brief).



Greenthread contends that this difference distinguished Kamins and that "[t]here is no logical reason that Dr. Rao would have limited his claims to require the electric field to be unidirectional over the entire drift layer, or disclaimed multiple electric fields in any of the layers." *Id.* at 25 (citing *Baxalta Inc. v. Genentech, Inc.*, 972 F.3d 1341, 1348-49 (Fed. Cir. 2020)).

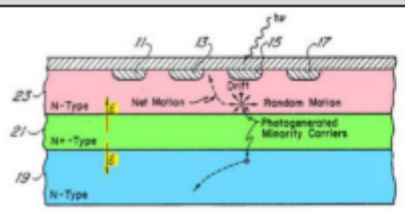
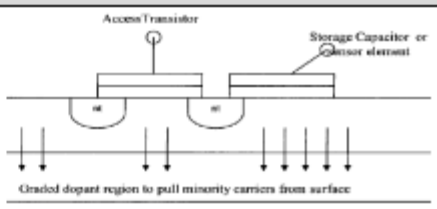
In its reply, Cirrus contends that Applicant disclaimed multiple fields pointing in opposite directions during prosecution. Reply (ECF No. 38) at 9. More specifically, with respect to Greenthread's assertion that Applicant distinguished the semiconductor device in Kamins because it did not aid the movement of minority carriers from the surface to the substrate, Cirrus contends that the rejected claim already included the limitation "a drift field drawing minority carriers from said surface layer to said substrate." *Id.* at 10. Cirrus contends that Applicant subsequently amended the pending claim to include "<u>unidirectional</u> drift field drawing <u>all</u> minority carriers from said surface layer to said substrate." *Id.* (emphasis in Cirrus's brief). Based on that, Cirrus contends that "Applicant was not able to distinguish the pending claims from Kamins based on the argument that the layer 21 does not aid the movement of minority carriers from the surface layer to the substrate" and that the addition of "unidirectional" was necessary to distinguish Kamins. *Id.* at 10, 11.

With respect to Greenthread's argument that "[t]he fact that the field may stop before the end of the layer does not mean that the drift layer does not have a unidirectional field," Cirrus

contends that under Greenthread's interpretation, "the word 'unidirectional' would be meaningless because even bidirectional or quad-directional electric fields may be arbitrarily subdivided to identify a portion that is pointing in one direction." *Id.* at 12.

With respect to Greenthread's argument that the specification does not disclose there is only one field per layer, Cirrus contends that that argument is beside the point as the specification "does not show any layer with electric fields pointing in opposite direction." *Id.*

In its sur-reply, Greenthread contends that there is no justification requiring that the electric field is unidirectional "over the extent of the drift field." Sur-Reply (ECF No. 39) at 10. With respect to Cirrus's prosecution disclaimer argument, Greenthread contends that Cirrus cannot establish prosecution disclaimer because there is another explanation for the amendment. *Id.* More specifically, Greenthread contends that Applicant did not distinguish Kamins because layer 21 created two electric fields, but rather because Kamins pushed minority carriers towards the surface layer instead of pulling them away from the surface layer as depicted below. *Id.* at 10–11 (annotations in Greenthread's brief).

Kamins, Fig. 2 (annotated)	195 Patent, Fig. 5B (excerpt)
	

Greenthread contends that, during prosecution, Applicant amended the claim to recite

> said drift layer having a graded concentration of dopants extending between said surface layer and said substrate to create <u>and maintain</u> a <u>single static</u> unidirectional <u>electric</u> drift field <u>to aid the movement</u> of ~~drawing all~~ minority carriers from said surface layer to said substrate

Id. at 11–12 (quoting Opening, Ex. G at 287) (emphasis and alterations in Greenthread's brief). Greenthread contends that "Cirrus never mentions the word 'single' because it proves Cirrus is

wrong." *Id.* at 12. More specifically, Greenthread contends that if "unidirectional" meant only one field as Cirrus contends, that there would be no reason to amend the claim to add "single" to limit the "unidirectional electric field" to one field. *Id.* Greenthread contends that Applicant subsequently amended the claim to remove "single" and also broaden the scope by reciting that there is both a first and second electric field, *i.e.*, there is more than one electric field. *Id.* at 12 (quoting Opening, Ex. G at 316). Greenthread contends that the amendment also removed the requirement that the graded dopants create the unidirectional field. *Id.*

Greenthread contends that because "unidirectional" means one direction—and not one field"—Cirrus is incorrect that a unidirectional electric field must continue over the entire drift layer. *Id.* at 13.

Greenthread contends that Cirrus is incorrect that the specification does not show any layer with fields pointing in opposite directions. *Id.* In particular, Greenthread contends that Figures 5(b) and 5(c) shows electric fields in opposite directions. *Id.*

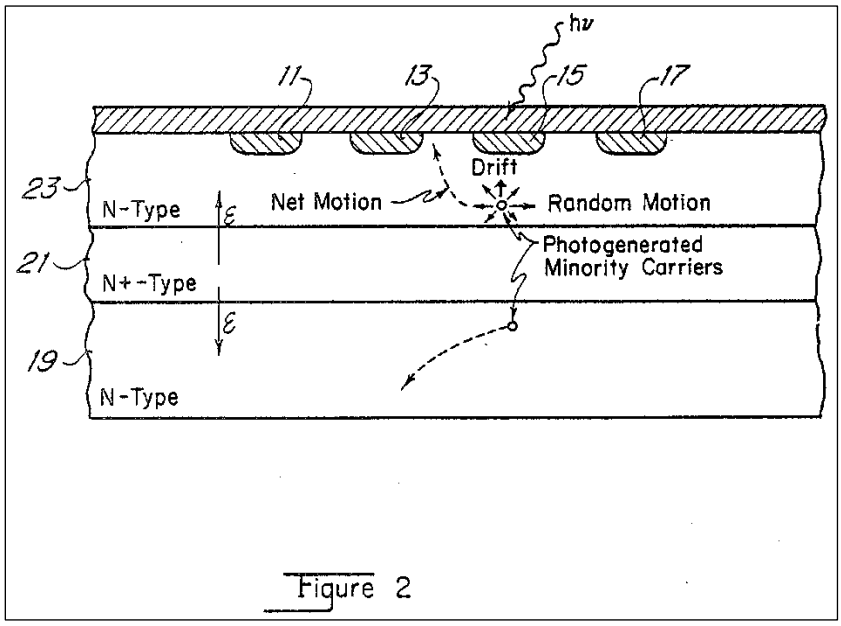
The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that this term should be construed according to its plain-and-ordinary meaning for the reasons that follow. First, the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347. Second, Defendant does not expressly allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning. *Thorner*, 669 F.3d at 1365.

Third, with respect to Cirrus's proposed construction, which requires that the "static unidirectional electric drift field" is "unidirectional over the extent of the [drift layer/well

region]," the Court concludes that Cirrus improperly narrows the meaning of the claim term. More specifically, the claim term recites that there is a "unidirectional electric drift field." But Cirrus narrows the meaning of "unidirectional" to require that the electric drift field not only be "unidirectional," but that it must be unidirectional over the entire drift layer or well region. But the plain meaning of "unidirectional" only requires that it only be in a single direction; it does not require that the claimed electric field point in a single direction over a particular area or region. Based on that, Cirrus's proposed construction improperly narrows the meaning of "unidirectional" by requiring it to be unidirectional over a particular area or region.

Fourth, with respect to the prosecution history, the Court agrees with Greenthread that Applicant did not make a prosecution disclaimer with respect to the Kamins patent. More specifically, Kamins describes that photogenerated minority carriers in layer 21 are accelerated towards the surface or towards substrate 19 by subsurface electric fields. Kamins Patent at 1:38–44.



[3]

By contrast, the claimed invention describes that the electric field draws minority carriers away from the surface, *i.e.*, not towards the surface as is done in the Kamins patent. '195 Patent, Claim 1, Limitation [d] ("…to aid the movement of minority carriers from said surface layer to said substrate"). The specification also describes that it is important to sweep minority carriers away from active regions, which are in the surface layer, and into the substrate. *See, e.g.*, '195 Patent at 3:14–33. Therefore, the fact that Kamins patent does the opposite of what the asserted patents do is a key difference between the Kamins patent and the asserted patents.

With respect to Applicant's prosecution statements and amendments, the Court concludes that they do not rise to the level of a disclaimer because there is no "clear and unambiguous disavowal of claim scope." *Saffran v. Johnson & Johnson*, 712 F.3d 549, 559 (Fed. Cir. 2013). For example, Applicant argued that the "claimed 'drift layer' is a single unidirectional layer with graded dopant concentration which draws all minority carriers away from the surface layer to the substrate—none of the carriers is drawn from the substrate to the surface layer." Opening (ECF No. 35), Ex. 6 at GT-WDTX-CL_0042866; *see also* Opening, Ex. 6 at GT-WDTX-CL_0042882. The bulk of this sentence is directed at highlighting the key difference between the asserted patents and the Kamins patent, namely, that the claimed invention in the asserted patents draws minority carriers away from the surface, *i.e.*, where the active regions are, while the Kamins does the opposite by moving some minority carriers towards the surface. Based on that, the Court concludes that it is more likely that Applicant was trying to distinguish the Kamins patent based on the direction that the minority carriers move, rather than disclaiming that the claimed electric field must be a single, unidirectional over the extent of the drift layer or well region. As such, Applicant's statements are not "'so clear as to show reasonable clarity and deliberateness,' and

'so unmistakable as to be unambiguous evidence of disclaimer.'" *Genuine Enabling Tech. LLC v. Nintendo Co.*, 29 F.4th 1365, 1374 (Fed. Cir. 2022).

For at least two reasons, the Court concludes that "unidirectional" cannot mean "single." The plain meaning of the word "unidirectional" does not refer to how many electric fields there are, but rather to the how many directions the electric fields may point to, *i.e.*, in only one direction. Furthermore, during prosecution, Applicant amended claim to add "single" before 'unidirectional electric field." Opening, Ex. G at GT-WDTX-CL_0042916. As such, if "unidirectional" meant "single," then the amended to add "single" would be meaningless.

All of the asserted claims are "comprising" claims, which allows for the possibility of additional—but unclaimed—electric fields. Furthermore, nothing in the claim language prevents additional electric fields. Based on this, Cirrus's proposed construction improperly limits the claim scope to only allow for a single electric field.

Finally, this Court and the District of Oregon previously rejected Cirrus's arguments and determined that it should be construed according to its plain-and-ordinary meaning.

For the reasons described above, the Court finds that the term should be construed according to its plain-and-ordinary meaning.

F. Term #6: "to aid the movement of minority carriers from…to…" / "to aid the movement of carriers from… to…" / "to aid carrier movement from… to …" / "to aid carrier movement from…towards…" / "to aid carrier thereof movement from…to…"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#6: "to aid the movement of minority carriers from…to…" "to aid the movement of carriers from… to…"	Plain and ordinary meaning	"to aid the movement of minority carriers starting from…and reaching…" "to aid the movement of carriers starting from…and reaching…"

"to aid carrier movement from… to …" "to aid carrier movement from…towards…" "to aid carrier thereof movement from…to…" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1, 9; U.S. Patent No. 10,734,481, Claims 1, 20; U.S. Patent No. 11,121,222, Claims 1, 21, 39, 41–42, 44; U.S. Patent No. 11,316,014, Claims 1, 21 Proposed by Cirrus		"to aid carrier movement starting from…and reaching…" "to aid carrier movement starting from…towards…" "to aid carrier thereof movement starting from…and reaching…"

<u>The Parties' Positions:</u>

The parties dispute whether this term requires that the minority carriers must traverse the entire path from the surface to the substrate (Cirrus's position), or whether they need only to traverse a portion of that path (Greenthread's position). Opening (ECF No. 35) at 25.

Cirrus contends that when the patentee wanted to only require a movement in a direction, the patentee used "towards." *Id.* (citing '014 Patent, Claim 1). Cirrus contends that "to" and "towards" are different words, which are presumed to have a different meaning. *Id.*

Cirrus contends that the specification recites accelerating electrons "from emitter to collector," which requires that electrons fully transit the path from the emitter and collector in order for current to flow between the two. *Id.* (citing '195 Patent at 2:51–56, 3:10–12).

Cirrus contends that, during prosecution, Applicant had a pending claim that required "drawing all minority carriers from [the] surface layer to [the] substrate." *Id.* Cirrus contends that while this language is not present in the issued claims, the words "to" and "from" should be construed to have the same meaning. *Id.* at 25–26.

In its response, Greenthread asserts that this Court and the District of Oregon already determined that this term is not indefinite and should be construed according to its plain-and-ordinary meaning. Response (ECF No. 37) at 25.

Greenthread contends that Cirrus has not identified any "prosecution disclaimer, specification disclaimer, or any other form of disclaimer" that justifies rewriting the claim term. *Id.* Greenthread further contends that the word "to" does not need construction. *Id.* (citing Response, Ex. 1 (Glew dec.) at ¶¶ 87–89). Greenthread contends that the patentee's use of "to" in some places and "towards" in other places is "not a legitimate basis for replacing the word 'to' with 'and reaching.' To do so, would insert extraneous limitations that limit the scope of Dr. Rao's invention." *Id.*

Greenthread contends that the passage from the specification that Cirrus cites has little relevance, if any, to the claim language about moving minority carriers from the surface to the substrate. *Id.* (citing Response, Ex. 1 (Glew dec.) at ¶ 89).

Finally, with respect to the prosecution history, Greenthread contends that Cirrus admits that the issued claims do not recite the same language as the pending claims, so that is not a basis for limiting the scope of the claim term. *Id.*

In its reply, Cirrus contends that Greenthread does not argue Cirrus's proposed construction is too narrow or too broad. Reply (ECF No. 38) at 13. Cirrus contends that Greenthread, in connection with another term, "echoed Cirrus's proposed construction" by

arguing that Kamins is distinguishable "it does not move minority carriers ***from*** the surface layer to the substrate" and "merely moves them deeper into the substrate." *Id.* (citing Response at 13). Cirrus further contends that the Court needs to construe this term to the jury does not improperly construe the meaning of this term. *Id.* (citing *O2 Micro*, 521 F.3d 131–62).

With respect to Greenthread's assertion that the passage Cirrus cites from the specification are irrelevant, Cirrus contends that (1) "these statements show that when a drift field aids the movement of minority carriers from one location to another location, it aids the movement during the entire path between the locations" and (2) Applicant cited this passage during prosecution. *Id.* at 13–14 (citing Opening, Ex. G at 254).

In its sur-reply, Greenthread contends that Cirrus is improperly adding limitations to the claim term without identifying any disclaimer that would justify that. Sur-Reply (ECF No. 39) at 13. Greenthread contends that Cirrus's *O2 Micro* justification is inadequate because Cirrus does not "explain how a jury might be confused, or how Greenthread might 'expand' the term." *Id.* at 13–14.

Contrary to Cirrus's assertion, Greenthread contends that it "never distinguished Kamins on the basis that it did not aid the movement of carriers 'starting from said surface layer' … Rather, Greenthread pointed out Kamins moves them from a sublayer to deeper in the substrate." *Id.* at 14. Greenthread contends that it does not agree with Cirrus's proposed construction. *Id.*

With respect to Cirrus's citation of the specification, Greenthread contends that "misreads the specification to mean that when a drift field aids the movement from one location to another location, it aids the movement ***during the entire path*** between the locations." *Id.* (emphasis in Greenthread's brief). Greenthread contends that the specification and prosecution history do not

use words such as "during the entire path, "starting from," "and reaching," or anything remotely close to that. *Id.*

<u>The Court's Analysis:</u>

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that this term should be construed according to its plain-and-ordinary meaning for the reasons that follow. First, the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347. Second, Defendant does not expressly allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning. *Thorner*, 669 F.3d at 1365.

Third, "to" and "from" are common English words that a lay jury will readily understand. As such, there is no need to construe them. *U.S. Surgical*, 103 F.3d at 1568 ("Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy.").

Fourth, the Court disagrees with Cirrus that Applicant made a disclaimer during prosecution that justifies limiting the claim term. For disclaimer to attach, the disclaimer must be a "clear and unambiguous disavowal of claim scope." *Saffran*, 712 F.3d at 559. The Court has reviewed the prosecution statements that Cirrus cites and concludes that they fall far short of the "exacting" standard required for a prosecution disclaimer. *Hill-Rom Servs.*, 755 F.3d at 1371.

Therefore, for the reasons described above, the Court finds that the term should be construed according to its plain-and-ordinary meaning.

G. Term #7: "well region"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#7: "well region" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1, 9; U.S. Patent No. 10,734,481, Claims 1, 20; U.S. Patent No. 11,121,222, Claims 1, 21, 39, 41–42, 44; U.S. Patent No. 11,316,014, Claims 1, 21 Proposed by Cirrus	Plain and ordinary meaning. Note not for jury: portions of a well are not well regions	"A well, whether formed by single or multiple implants. Portions of a well are not well regions."

<u>The Parties' Positions:</u>

The dispute between the parties is whether it is necessary to clarify that a well can be formed by single or multiple implants. Opening (ECF No. 35) at 26.

Cirrus contends that during an IPR proceeding, Greenthread argued that "[n]owhere in the claims or the specification does the '195 patent suggest that the claimed 'well region' is a portion of a well. . . . [S]uch a construction [would] be inconsistent with . . . the manner in which a POSITA would understand the term 'well region[.]'" *Id.* at 27 (citing Opening, Ex. P at 47). Cirrus contends that "Greenthread's IPR expert similarly opined that a POSITA would not understand 'well region' to be 'broad enough to include only a portion of a well.'" *Id.* at 28 (citing Opening, Ex. Q at ¶ 41). Cirrus contends that "Greenthread emphasized that the fact that a well is formed by ***multiple implants*** does not transform that well into multiple 'well regions[.]'" *Id.* at 28 (quoting Opening, Ex. P at 80) (emphasis in Cirrus's brief). Cirrus contends that Greenthread's IPR expert admitted the same. *Id.* (Opening, Ex. Q at ¶ 50).

Based on the above statements, Cirrus contends that Greenthread cannot dispute that Cirrus's proposed construction captures the plain-and-ordinary meaning. *Id.* Cirrus further contends that the above statements are a clear disclaimer. *Id.* More specifically, Cirrus contends that by arguing that "Wieczorek [prior art reference] did not disclose both a 'single drift layer' and a 'well region' because 'Wieczorek's N-well structure is a single well formed by multiple implants," Greenthread disclaimed that "a portion of a well" could be a "well region." *Id.* (quoting Opening, Ex. P at 72, 80, 74).

In its response, Greenthread asserts that this Court and the District of Oregon already determined that this term should be construed according to plain-and-ordinary meaning. Response (ECF No. 37) at 26. Greenthread contends that "well region" is well-understood term that refers to "a doped region that surrounds the active region of a semiconductor device." *Id.* at 27 (citing Response, Ex. 1 (Glew dec.) at ¶ 90). Greenthread contends that this is how the claims, specification, and prosecution history describe this term. *Id.* Greenthread contends that this meaning can be easily explained to a jury. *Id.*

With respect to Cirrus's construction, Greenthread contends that including "whether formed by single or multiple implants" is unnecessary and also introduces ambiguity, as it is unclear what "single or multiple implants means." *Id.* With respect to "portions of a well are not well regions," Greenthread contends that that is best left as a note not for the jury. *Id.* at 27, 28.

In its reply, Cirrus contends that while Greenthread does not believe that it is necessary to include "whether formed by single or multiple implants" in the Court's construction, Greenthread "apparently believed that it was necessary and saw no ambiguity in explaining [that] to the PTAB[.]" Reply (ECF No. 38) at 14. Cirrus contends that the Court should construe this

term as this time as the failure to do so may "may allow the scope of the patent claims to be improperly expanded late[.]" *Id.*

With respect to "portions of a well are not well regions," Cirrus contends that the "jury needs to understand the scope of the claims to determine whether they are infringed and/or invalid." *Id.*

In its sur-reply, with respect to the note not for the jury, Greenthread contends that "Cirrus oddly takes issue with it being handled as a 'note not for the jury,'" as "Greenthread is merely following the Court's construction in the *Intel* case." Sur-Reply (ECF No. 39) at 14.

With respect to whether it is necessary to include "whether formed by single or multiple implants," Greenthread contends that it is not as Cirrus only posited "vague allegations" of what "may" happen in the future and that this additional language will only confuse the jury. *Id.*

The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that this term should be construed according to its plain-and-ordinary meaning for the reasons that follow. First, the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347. Second, Defendant does not expressly allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning. *Thorner*, 669 F.3d at 1365.

Third, with respect to Cirrus's proposed construction, the Court believes that including the phrase "whether formed by single or multiple implants" is confusing for a jury. For example, a jury may wonder whether a well may be formed by means other than single or multiple implants or why all this phrase is necessary as it seems to describe the entire universe of implant

options. *Sulzer*, 358 F.3d at 1366 ("The district court simply must give the jury guidance that can be understood and given effect by the jury once it resolves the issues of fact which are in dispute.").

Fourth, this Court and the District of Oregon previously rejected Cirrus's arguments and determined that it should be construed according to its plain-and-ordinary meaning.

Therefore, for the reasons described above, the Court finds that the term should be construed according to its plain-and-ordinary meaning. Because the phrase "portions of a well are not well regions" is present in both parties' proposed constructions, the Court adds that phrase to its construction.

H. Term #8: "said graded concentration" / "the graded dopant"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#8: "said graded concentration" / "the graded dopant" U.S. Patent No. 8,421,195, Claims 5, 6; U.S. Patent No. 10,734,481, Claims 7, 31; U.S. Patent No. 11,121,222, Claims 7, 32; U.S. Patent No. 11,316,014, Claim 7 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite

<u>The Parties' Positions:</u>

Cirrus contends that these terms are indefinite because it is unclear what the antecedent basis is in the independent claims. Opening (ECF No. 35) at 34–35. More specifically, Cirrus contends that each of the dependent claims recite "[said / the] graded [concentration / dopant],"

while the corresponding independent claims recite two different dopant regions, *e.g.*, in the drift layer and in the well region. *Id.* at 35.

In its response, Greenthread contends that Cirrus makes a "hyper-technical" argument that a claim term is indefinite because the antecedent basis appears twice in the independent claims. Response (ECF No. 37) at 27. Using the '195 Patent, Claims 1 and 5 as an example, Greenthread contends that because independent Claim 1 recites "a graded concentration of dopants" for both the drift layer and the well region and because the dependent Claim 5 requires that "said graded concentration follows a quasi-linear gradient," this indicates that the "quasi-linear gradient" requirement applies to both "graded concentration of dopants" in Claim 1. *Id.* at 28 (citing Response, Ex. 1 (Glew dec.) at ¶¶ 91–92). Based on that, Greenthread contends that this claim term is not indefinite. *Id.* (citing cases).

In its reply, Cirrus contends that the claim language does not support Greenthread's contention that the claim term in the dependent claim refers back to, and applies to, both antecedent bases recited in the independent claim, as the limitation in the independent claim is not a plural, *i.e.*, "[said / the] graded [concentration**s** / dopant**s**]," Reply (ECF No. 38) at 17 (emphasis added). Cirrus contends that the specification likewise does not support Greenthread's contention as it is silent on requiring both the drift layer and the well region to have the same type of gradient. *Id.*

Finally, Cirrus contends that the cases Greenthread cites are inapposite as neither shows a claim limitation applying to two different antecedent bases. *Id.*

In its sur-reply, Greenthread contends that Cirrus's argument "misses the mark" as "[e]ven if, there are different gradients, this does not prevent the dependent claims from applying to both regions." Sur-Reply (ECF No. 39) at 15 (citing Response, Ex. 1 (Glew dec.) at ¶¶ 91–92).

Greenthread disagrees with Cirrus that the cases it cited in its Response are inapposite, as both cases had limitations that referred back to multiple antecedent bases. *Id.*

The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, although it was a close call, the Court agrees with Cirrus that the term is indefinite. In particular, the Court agrees with Cirrus that the claim language and specification do not provide a person of skill with any guidance as to which of the previously recited antecedent bases the claim term refers back to. More specifically, with respect to the former, there does not appear to be any language that would indicate to a person of skill that the claim term refers to one antecedent basis over the other or that the claim term refers back to both antecedent bases, nor does Greenthread identify any such language. With respect to the latter, the specification does not contain any passage about requiring both the drift layer and the well region to have the same type of gradient, nor does Greenthread identify any such disclosure.

With respect to Greenthread's argument that the claim term refers back to both antecedent bases, while it may be possible that the claim term refers back to both antecedent bases, it is equally possible that the claim term could refer back to only one of two antecedent bases. As such, because claim term could refer back to one of three distinct possibilities (either of the antecedent bases singly or both antecedent bases together) and because there is no intrinsic evidence to support Greenthread's contention that it refers back to both antecedent bases, the Court does not find that Greenthread's argument is correct.

Finally, the Court agrees with Cirrus that the cases that Greenthread cites (*Summit 6 LLC v. HTC Corp.*, No. 7:14-CV-00014-O, 2015 WL 11117868 (N.D. Tex. Mar. 21, 2015); *Gen. Atomics v. Axis-Shield*, No. C 05-04074 SI, 2006 WL 2792428 (N.D. Cal. Sept. 27, 2006)) are

inapposite. As a preliminary matter, neither case is binding on this Court. In *Summit 6*, Plaintiff and its expert argued that "said identification" refers only to "identification of digital content" and not to "identification of user." *Summit 6*, No. 7:14-CV-00014-O, 2015 WL 11117868, at *17–19. The Court in that case found that the testimony of Plaintiff's expert was "credible." In this case, by contrast, the Court does not find that Greenthread's expert's opinions regarding this term were not persuasive, but rather appear to be only bare, unsupported opinions. Response, Ex. 1 at ¶ 91.

In *Gen Atomics*, the claim term at issue was "said analyte." *Gen. Atomics*, No. C 05-04074 SI, 2006 WL 2792428, at *6. Based on an analysis of the claim language, the court concluded that an analyte must have both properties of being a substrate and being non-labelled, and not that there are two different analytes that provide antecedent bases. *Id.* at *6–8. In this case, by contrast, as described above, the claim language does not indicate which of the two antecedent bases this claim term refers back to.

The Court concludes that Defendant has provided clear and convincing evidence that a person of skill would not understand with reasonable certainty which of the two prior antecedent bases—or both—the claim term refers back to, the claim term is indefinite.

I. Term #9: "respective active regions"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#9: "respective active regions" U.S. Patent No. 9,190,502, Claim 8 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite

<u>The Parties' Positions:</u>

Cirrus contends that dependent Claim 8 is indefinite because it refers to "respective active regions" while Claim 7 only refers to "an active region," so it is unclear which active regions Claim 8 is referring. Opening at 35.

In its response, Greenthread contends that Cirrus's argument is a "hyper-technical antecedent basis" argument. Response at 28. Greenthread contends that there may be multiple transistors, as depicted in Figure 5C of the '502 Patent, and where there is an active region for each transistor. *Id.* at 29. Based on that, Greenthread contends that dependent claim "clearly contemplates" that independent Claim 7 comprises multiple active regions and that electric fields are adapted to each of the active regions. *Id.*

In its reply, Cirrus contends that Greenthread does not dispute that independent Claim 7 recites "an active region" while Claim 8 recites plural "respective active regions." Reply at 17. Cirrus contends that independent Claim 7 does not mention any transistor and, even if there are multiple transistors and multiple active regions, a person of skill would not understand which of those active regions the "respective active regions" refer to. *Id.*

In its sur-reply, Greenthread contends that "an active region" may be plural as use of "an" in a "comprising" claim means one or more. Sur-Reply at 15 (citing *ABS Glob., Inc. v. Cytonome/St, LLC*, 84 F.4th 1034, 1040 (Fed. Cir. 2023)). Greenthread contends that Cirrus's assertion that a person of skill would not understand which of those active regions is the "respective active regions" refer to is conclusory and unsupported by an expert declaration or other evidence. *Id.* at 15–16.

<u>The Court's Analysis:</u>

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that this term should be construed according to its plain-and-ordinary

meaning for the reasons that follow. First, the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347. Second, Defendant does not expressly allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning. *Thorner*, 669 F.3d at 1365.

Third, it is black letter patent law that "an" means "one or more. *Convolve, Inc. v. Compaq Computer Corp.*, 812 F.3d 1313 (Fed. Cir. 2016). As such, "an active region" means "[one or more] active region[s]." The specification describes that a semiconductor device may have multiple transistors, each with its own active region. *See, e.g.*, '502 Patent at Fig. 5(c).

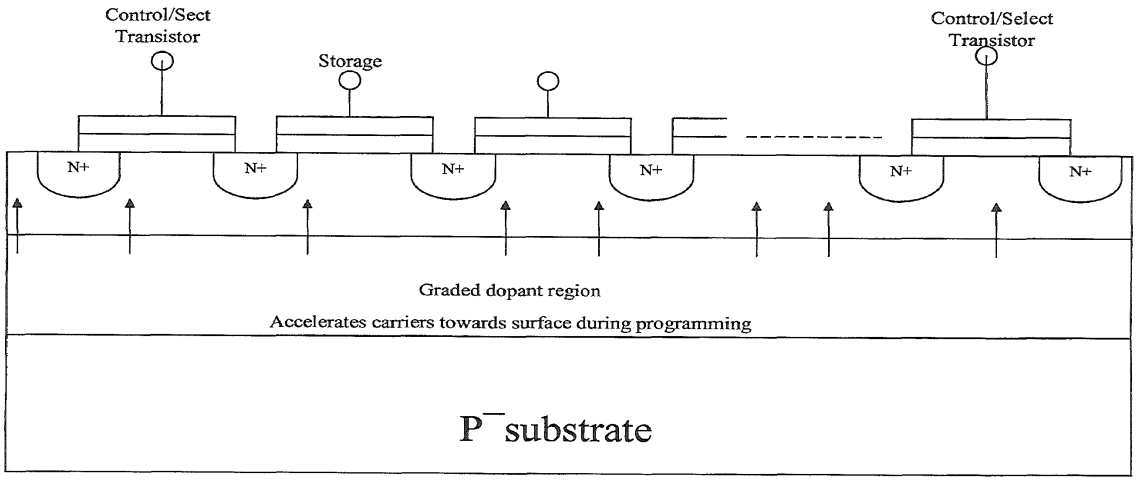


FIGURE 5(c) CMOS Substrate for a NAND flash device to improve programming times

Therefore, when the claimed semiconductor device has multiple transistors, there is "respective active regions" for each transistor and that the claimed electric fields "aid movements of carriers in respective active regions."

Therefore, for the reasons described above, the Court finds that the term should be construed according to its plain-and-ordinary meaning.

J. Term #10: "active region…within which transistors can be formed"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#10: "active region…within which transistors can be formed" U.S. Patent No. 10,510,842, Claims 1, 9; U.S. Patent No. 10,734,481, Claims 1, 20; U.S. Patent No. 11,121,222, Claims 1, 21, 39, 41–42; U.S. Patent No. 11,316,014, Claims 1, 21 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite

<u>The Parties' Positions:</u>

Cirrus contends that this term is indefinite given that an "active region" is an area where transistors are already formed, so when the claim term recites that the transistors may be formed in the active region, that would result in transistors being formed on top of transistors, which would destroy the existing device. Opening (ECF No. 35) at 29. Cirrus contends that there is no discussion in the patents of how "a region can be electrically 'active' but not yet occupied by an existing device so that a transistor 'can be formed' in it." *Id.* at 30.

Cirrus contends that the prosecution history further confuses the meaning of this term. *Id.* More specifically, Cirrus contends that "Greenthread first argued that an 'active region' is the current path of an existing transistor, but later argued that an 'active region' is the non-active region within which the transistor is formed." *Id.* at 32; *see also id.* at 30–32. Cirrus contends

that "[t]his confusing record concerning what is (and is not) an 'active region … within which transistors can be formed' means that the scope of this term cannot be determined with reasonable certainty." *Id.* at 33 (citing Opening, Ex. V at ¶ 110).

In its response, Greenthread asserts that this Court and the District of Oregon already determined that this term is not indefinite. Response at 29. Greenthread contends that Cirrus "essentially copied Intel's opening brief ***verbatim***, including Intel's misleading use of ellipsis and brackets to hide the real story." *Id.* (emphasis in Greenthread's brief).

Greenthread contends that "[i]n the specification and entire prosecution history, Dr. Rao consistently used 'active region' to refer to the doped regions at the surface of a semiconductor device (*e.g.*, the source and drain) where, for example, a MOSFET transistor is built or can be built." *Id.* at 30.

Greenthread contends that an active region does not require current flow, as a transistor that is off does not mean that the active region ceases to exist. *Id.*

Greenthread next contends that the specification confirms that an "active region" is a doped region at the surface of a semiconductor device where a transistor can be built. *Id.* at 30–31. With respect to Cirrus's argument "that the specification never describes a region that is both an 'active region,' and a 'region…within which transistors can be formed,' Greenthread contends that the '842 Patent "repeatedly describes active regions where transistors ***are*** built," which is proof that these "active regions" are "regions…within which transistors can be formed." *Id.* at 31 (emphasis in Greenthread's brief).

Greenthread contends that, in the earlier prosecution history, it did not assert that the "active region" is the current path of an existing transistor. *Id.* In particular, Greenthread contends that:

> ***First***, Cirrus cites to where Applicant mentions "active and well regions," and then states an "active element" (*i.e.*, a pair of transistors) "can be active when a voltage (or current) is applied." This statement confirms that an "active region" is an "active region" regardless of whether the "active element" is turned "on." ***Second***, Cirrus cites to a prior art reference's use of the term "electrically active." But "electrically active" (as opposed to "active") confirms that an "active region" does ***not*** have to have an electrical current. If an "active region" necessarily required an electrical current, then it would be redundant to say "electrically active." ***Finally***, as Cirrus correctly notes, Applicant has identified the "active region" as the doped region at the surface where the transistor is built.

Id. at 31–32 (internal citations omitted; emphasis in Greenthread's brief).

With respect to the later prosecution, Greenthread contends that "confirms that 'active region' is a doped region at the surface where a transistor can be built." *Id.* at 32. Greenthread contends that "[a]ny confusion was created by the Examiner, not Dr. Rao" and that Dr. Rao did not agree with Examiner's incorrect positions, but rather that "Dr. Rao was merely explaining that even under the Examiner's incorrect construction, his invention is still patentable over the prior art." *Id.* Based on this, Greenthread contends that "the prosecution history supports Greenthread, not Cirrus." *Id.* at 33 (citing Response, Ex. 1 (Glew dec.) at ¶¶ 104–105).

In its reply, Cirrus contends that "Greenthread points to specification disclosure of 'active regions where transistors ***are*** built' already, but this does not square with the claim language specifying 'active region . . . within which transistors *can be formed*.'" Reply at 15 (emphasis in Cirrus's brief). Cirrus further contends that "Greenthread seeks to rewrite '**active region** . . . within which transistors can be formed' to mean a '**doped region at the surface of a semiconductor device** . . . where a transistor can be formed,'" which improperly reads out "active region." *Id.* (citing *Synchronoss Techs., Inc. v. Dropbox, Inc.*, 987 F.3d 1358, 1367 (Fed. Cir. 2021)) (internal citations omitted). Cirrus contends that "Greenthread's argument, elsewhere in its brief, that transistors are not formed in an active region until turned '***on***,' is similarly

nonsensical. *Id.* (emphasis in Cirrus's brief). A transistor does not exist only when it is turned 'on,' and cease to exist when it is turned 'off.'" *Id.*

Cirrus contends that while Greenthread attempts to shift the blame to Examiner,

> Dr. Rao himself added to the confusion by explicitly arguing both that (1) 'there is only provided a 'single' ***active region 311*** within which two transistors are formed," and that (2) Hong's source/drain region "2 or 5" is not the claimed "second active region" because it "***cannot have a transistor formed*** therein."

Id. at 16 (emphasis in Cirrus's brief).

Cirrus contends that Greenthread cannot resolve the inconsistency between the claim language and the prosecution history, and the inconsistency in the claim language, so the claim is indefinite. *Id.*

In its sur-reply, Greenthread contends that Cirrus "misses the point" when it argues the specification describes where transistors are built. Sur-Reply at 16. Greenthread contends that "the active regions are the regions where these transistors could be formed. But there may be active regions, where transistors have not been built yet or might never be built." *Id.*

With respect to Cirrus's assertion that Greenthread reads "active region" out of the claim term, Greenthread contends that an "active region" being a "doped region at the surface of a semiconductor device where a transistor can be formed" is entirely consistent with an "active region…within which transistors can be formed," as "[t]hey both accurately reflect that an active region is a region where a transistor can be formed." *Id.*

With respect to Cirrus's argument that a transistor does not only exist when it is on, Greenthread contends that "Cirrus misses the point" and that "[t]here is more to forming a transistor than just doped regions (*e.g.*, there have to be terminals connected to the source, drain, and gate, and a voltage applied to the gate)." *Id.* (citing Response, Ex. 1 at ¶ 71).

With respect to the prosecution history, Greenthread contends that Cirrus makes "convoluted arguments," but that Dr. Rao "never said the active region is the current path to an existing transistor." *Id.*

The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that the term is not indefinite for the reasons that follow. First, Cirrus's argument is based on the premise that "active regions" already contain transistors, but Cirrus's argument is just a rehash of its arguments for Term #3, which, for the reasons described above, the Court found to be not indefinite.

Second, the Court disagrees with Cirrus that the prosecution history "confuses" the meaning of this term. In particular, Cirrus argues that during the prosecution of the earlier '195 and '502 Patents, "Greenthread repeatedly referred to the [1] claimed 'active region' as the current path of an existing transistor, such as the 'electrically active surface region of [a] device' in Rhodes [prior art] … and [2] distinguished this region from the surrounding 'wells' within which the transistors are formed[.]" Opening (ECF No. 35) at 30 (internal citations omitted, annotations added).

With respect to the former, "electrically active surface region of [a] device" is not the same term as "active region." Furthermore, Cirrus's citation to the prosecution history of the '195 Patent does not support its argument because the cited passages refer to "active elements" and not "active regions." Opening (ECF No. 35), Ex. G at 164–65. Similarly, Cirrus's citation to the prosecution history of an ancestor application to the '842 Patent (U.S. Publication No. 2013-0221488) does not support its argument because the phrase "active region (devices)," when

discussing prior art, is entirely consistent that the "active region" is where transistors may be formed.

With respect to the latter, the Court concludes distinguishing "active regions" from the p/n-wells does not create any confusion because "active regions" are simply areas within the wells where transistors may be formed, while wells are much larger structures (by volume) that provide electrical isolation for the active regions.

Based on this, the Court concludes that, at least for the purposes of indefiniteness, the Court concludes that there is not clear and convincing evidence that a person of skill would understand that Greenthread took different positions during the prosecution of the earlier '195 and '502 Patents and the prosecution of the later '842, '481, '222, and '014 Patents that would render the scope of this claim term to be indefinite.

Third, this Court and the District of Oregon previously determined that this term is not indefinite. The Court concludes that Cirrus has not provided any clear and convincing evidence that would lead this Court to come to a contrary conclusion.

For these reasons, the Court concludes that Defendant has not provided clear and convincing evidence that this term is indefinite.

Because the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning and because Defendants does not allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning, the Court concludes that the term should be construed as having its plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347; *Thorner*, 669 F.3d at 1365.

Therefore, for the reasons described above, the Court finds that the term is not indefinite and should be construed according to its plain-and-ordinary meaning.

K. Term #11: "the surface thereof" / "the surface"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#11: "the surface thereof" / "the surface" U.S. Patent No. 10,510,842, Claim 9; U.S. Patent No. 10,734,481, Claim 20; U.S. Patent No. 11,121,222, Claim 21; U.S. Patent No. 11,316,014, Claim 21 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite

<u>The Parties' Positions:</u>

Cirrus contends that the asserted claims recite having either "a surface' or "first and second surfaces." Opening at 34. Cirrus contends that asserted claims then require "active regions" within which transistors can be formed in the surface thereof." *Id.* Cirrus contends that this term is indefinite because it is unclear whether "the surface thereof" refers to one of the two surfaces of the substrate or a surface of the first active region. *Id.* Cirrus similarly contends that it is unclear whether "the surface" refers to one of the two surfaces of the substrate or to "the surface thereof. *Id.* Based on that, Cirrus contends that the claim term is indefinite. *Id.*

In its response, Greenthread contends that "it is readily apparent from the face of the claim that in claim 842:9, the transistor can be formed in the surface of the active region." Response at 33 (citing Response (ECF No. 37), Ex. 1 (Glew dec.) at ¶ 106; Ex. 17 at 1296). Greenthread contends that Figure 5C depicts this layout. *Id.*

Greenthread contends that Cirrus is again making an "hyper-technical" antecedent basis argument and that a person of skill would understand the meaning of the claim. *Id.* at 33–34. More specifically, Greenthread contends that "When, as here, a later term ('the surface thereof') is referring to an inherent part ('surface') of the antecedent basis ('first active region'), it is entirely proper to use 'the' as Dr. Rao did when he referred to 'the surface thereof.'" *Id.* (citing *Bose Corp. v. JBL, Inc.*, 274 F.3d 1354, 1359 (Fed. Cir. 2001)).

In its reply, Cirrus contends that the claim term is indefinite because a person of skill would not understand (1) which surface of the active region "the surface thereof" refers to and (2) "which surface of which active region 'the surface' refers to." Reply at 16–17.

In its sur-reply, Greenthread contends that this term relates to forming a transistor on the surface of the active region, which is what Figure 5C depicts. Sur-Reply at 17. Greenthread contends that Cirrus's assertion that "a person of skill would not understand which surface or active region it is referring to" is a "bald assertion [that] is insufficient to prove indefiniteness." *Id.*

<u>The Court's Analysis:</u>

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that the term is not indefinite for the reasons that follow. The Court concludes that while the claims are not a model of clarity and precision, a person of skill reading the claims in light of the specification would understand with reasonable certainty the scope of

the term. *Energizer*, 435 F.3d at 1370 ("Claim definiteness is analyzed 'not in a vacuum, but always in light of the teachings of the prior art and of the particular application disclosure as it would be interpreted by one possessing the ordinary level of skill in the pertinent art.'"). More specifically, Figure 5C depicts that the transistor can be formed on the surface of the active region.

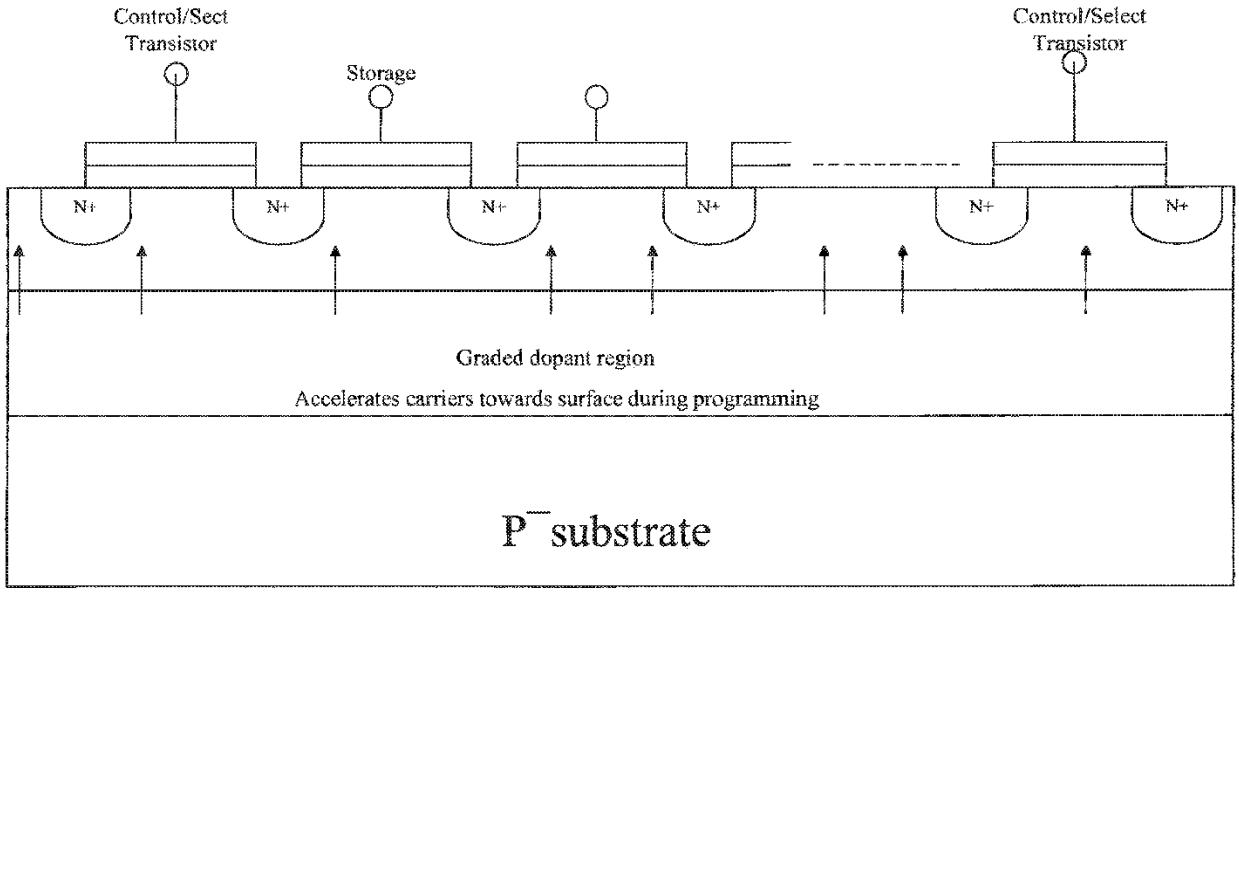


FIGURE 5C CMOS Substrate for a NAND flash device to improve programming times

Based on this disclosure, the Court concludes that a person of skill would understand the scope of the term with at least reasonable certainty. *Nautilus*, 572 U.S. at 910. At minimum, this evidence prevents Cirrus from meeting their burden of clear and convincing evidence.

For these reasons, the Court concludes that Defendant has not provided clear and convincing evidence that this term is indefinite.

Because the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning and because Defendants does not allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning, the Court concludes that the term should be construed as having its plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347; *Thorner*, 669 F.3d at 1365.

Therefore, for the reasons described above, the Court finds that the term is not indefinite and should be construed according to its plain-and-ordinary meaning.

L. Term #12: "aid carrier movement from the surface to the substrate"

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction
#12: "aid carrier movement from the surface to the substrate" U.S. Patent No. 10,510,842, Claim 9; U.S. Patent No. 10,734,481, Claim 20 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite

<u>The Parties' Positions:</u>

Cirrus contends that this claim term is indefinite for two reasons. Opening (ECF No. 35), at 33. Cirrus contends that this claim term is indefinite because it is unclear which surface (first surface or second surface of the substrate) this term refers to. *Id.* Cirrus next contends that because the first and second surface of the substrate is still part of the substrate, it is nonsensical

for the claim to require that the carrier movement is from the surface (*i.e.*, the substrate) to the substrate. *Id.*

In its response, Greenthread contends that Cirrus makes a "hyper-technical" argument that a claim term is indefinite. Response at 34. Greenthread contends that "the surface" in the claim term refers to the surface of the active region. *Id.* Greenthread contends that Figure 5C depicts this layout. *Id.*

With respect to Cirrus's first bases of indefiniteness, Greenthread contends that "[i]t is clear from the face of the claim that (1) the active region has a surface, and (2) the graded dopants are in the active region," and accordingly "graded dopants are aiding carrier movement from the surface *of the active region* to the substrate." *Id.* at 34–35 (citing Response, Ex. 1 (Glew dec.) at ¶ 107) (emphasis in Greenthread's brief). With respect to Cirrus's second bases of indefiniteness, Greenthread contends that Cirrus's argument that it is nonsensical for carriers to move from the substrate to the substrate itself." "is further proof that Greenthread's reading of the claim is correct." *Id.* at 35.

In its reply, Cirrus contends that the claim term is still indefinite because there are multiple active regions and the claims "do not specify any specific surface of either active region," so a person of skill "would not understand which surface of which active region 'the surface' refers to under Greenthread's manufactured interpretation of 'the surface.'" Reply at 16.

In its sur-reply, Greenthread contends that a person of skill would understand that "surface" refers to the surface of the "active region" and that this understanding lines up "perfectly" with the preferred embodiment. Sur-Reply at 17. Greenthread contends that a person of skill would not provide any support for its assertion that a person of skill would not understand "which surface or active region it is referring to." *Id.*

The Court's Analysis:

After reviewing the parties' arguments and considering the applicable law, the Court agrees with Greenthread that the term is not indefinite for the reasons that follow. As described above, Cirrus argues that this term is indefinite because: (1) it is unclear which surface (first surface or second surface of the substrate) this term refers to and (2) it is nonsensical for the claim to require that the carrier movement is from the surface (*i.e.*, the substrate) to the substrate. With respect to Cirrus's first argument, this is essentially the same argument Cirrus made for Term #11. And as described in connection to Term #11, the specification (*e.g.*, Figure 5C) provides guidance as to which surface of the substrate the claim is referring to.

Cirrus's second argument is similarly unpersuasive. In particular, the Court concludes that it is not nonsensical for the claim to require that the carrier movement is from the surface (*i.e.*, the substrate) to a point deeper in the substrate. Rather, the Court believes that a person of skill would understand with reasonable certainty that "aid carrier movement from the surface to the substrate" simply means to aid the movement of carriers from one part of the substrate, *i.e.*, the surface of the substrate, to deeper into the substrate. *Nautilus*, 572 U.S. at 910. The specification teaches this type of minority carrier movement. See, e.g., '842 Patent at 3:60–66 ("Hence, a novel technique is described herein which creates a drift field to sweep these unwanted minority carriers from the active circuitry at the surface into the substrate in a monolithic die as quickly as possible. In a preferred embodiment, the subterranean n−layer has a graded donor concentration to ***sweep the minority carriers deep into the substrate***.") (emphasis added); 2:24–27 ("Most of these techniques either divert the minority carriers away from the active regions of critical charge storage nodes at the surface, or, increase minority carrier density locally as the particular application requires."); Figure 5B.

For these reasons, the Court concludes that Defendant has not provided clear and convincing evidence that this term is indefinite.

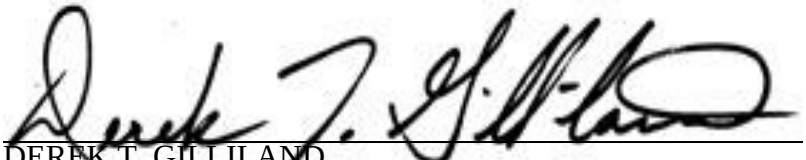
Because the "heavy presumption" is that terms should be construed according to their plain-and-ordinary meaning and because Defendants does not allege lexicography or disclaimer, which are the only two exceptions to the general rule that a term should be construed as having its plain-and-ordinary meaning, the Court concludes that the term should be construed as having its plain-and-ordinary meaning. *Azure Networks*, 771 F.3d at 1347; *Thorner*, 669 F.3d at 1365.

Therefore, for the reasons described above, the Court finds that the term is not indefinite and should be construed according to its plain-and-ordinary meaning.

IV. CONCLUSION

In conclusion, for the reasons described herein, the Court adopts the below constructions as its final constructions.

SIGNED this 13th day of March, 2024.



DEREK T. GILLILAND
UNITED STATES MAGISTRATE JUDGE

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#1: "surface layer" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 11,121,222, Claim 44 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning, where the plain and ordinary meaning is "a layer at the surface"	Indefinite	Not indefinite. Plain-and-ordinary meaning, wherein the plain-and-ordinary meaning is a layer at the surface
#2: "substrate" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1–2, 4, 9–10, 12, 17; U.S. Patent No. 10,734,481, Claims 1–3, 8, 15, 20, 22–23, 32; U.S. Patent No. 11,121,222, Claims 1–3, 8, 15, 21, 23–24, 33, 39–42, 44; U.S. Patent No. 11,316,014, Claims 1–3, 8, 15, 21, 23–24 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning, where the plain and ordinary meaning is an "underlying layer"	Indefinite	Not indefinite. Plain-and-ordinary meaning.

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#3: "active region" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claims 7, 8; U.S. Patent No. 10,510,842, Claims 1, 5–7, 9, 13–15, 17, 18; U.S. Patent No. 10,734,481, Claims 1, 4–6, 8, 9, 13, 20, 24–27; U.S. Patent No. 11,121,222, Claims 1, 4–6, 8, 9, 13, 20, 21, 25–28, 35, 39, 40, 41, 42, 44; U.S. Patent No. 11,316,014, Claims 1, 4–6, 8, 9, 13, 20, 21, 25–28 Proposed by Cirrus	Plain and ordinary meaning	"region that forms current path of a device"	Plain-and-ordinary meaning

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#4: "graded dopant concentration" / "graded dopant region" / "graded dopant acceptor concentration" / "graded donor dopant concentration" / "graded concentration of dopants" / "graded dopant" / "graded concentration" U.S. Patent No. 8,421,195, Claims 1, 5, 6; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1, 6, 8–9, 14, 16; U.S. Patent No. 10,734,481, Claims 1, 5, 7, 9, 20, 25, 27, 31; U.S. Patent No. 11,121,222, Claims 1, 5, 7, 9, 21, 26, 28, 32, 39–42, 44 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning, where the plain and ordinary meaning is a graded (or varying) concentration of dopants.	Indefinite	Not indefinite. Plain-and-ordinary meaning, which includes a graded concentration of dopants.

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#5: "said [drift layer further/well region…] having a [first/second] static unidirectional electric drift field" "said [drift layer further/well region] having a graded concentration of dopants generating a [first/second] static unidirectional electric drift field" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 11,121,222, Claim 44 Proposed by Cirrus	Plain and ordinary meaning	"said [drift layer further/well region...] having a [first/second] static electric drift field that is unidirectional over the extent of the [drift layer/well region]" "said [drift layer/well region] having a graded concentration of dopants generating a [first/second] static electric drift field that is unidirectional over the extent of the [drift layer/well region]"	Plain-and-ordinary meaning

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#6: "to aid the movement of minority carriers from…to…" "to aid the movement of carriers from… to…" "to aid carrier movement from… to …" "to aid carrier movement from…towards…" "to aid carrier thereof movement from…to…" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1, 9; U.S. Patent No. 10,734,481, Claims 1, 20; U.S. Patent No. 11,121,222, Claims 1, 21, 39, 41–42, 44; U.S. Patent No. 11,316,014, Claims 1, 21 Proposed by Cirrus	Plain and ordinary meaning	"to aid the movement of minority carriers starting from…and reaching…" "to aid the movement of carriers starting from…and reaching…" "to aid carrier movement starting from…and reaching…" "to aid carrier movement starting from…towards…" "to aid carrier thereof movement starting from…and reaching…"	Plain-and-ordinary meaning

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#7: "well region" U.S. Patent No. 8,421,195, Claim 1; U.S. Patent No. 9,190,502, Claim 7; U.S. Patent No. 10,510,842, Claims 1, 9; U.S. Patent No. 10,734,481, Claims 1, 20; U.S. Patent No. 11,121,222, Claims 1, 21, 39, 41–42, 44; U.S. Patent No. 11,316,014, Claims 1, 21 Proposed by Cirrus	Plain and ordinary meaning. Note not for jury: portions of a well are not well regions	"A well, whether formed by single or multiple implants. Portions of a well are not well regions."	Plain and ordinary meaning, for which portions of a well are not well regions
#8: "said graded concentration" / "the graded dopant" U.S. Patent No. 8,421,195, Claims 5, 6; U.S. Patent No. 10,734,481, Claims 7, 31; U.S. Patent No. 11,121,222, Claims 7, 32; U.S. Patent No. 11,316,014, Claim 7 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite	Indefinite.

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#9: "respective active regions" U.S. Patent No. 9,190,502, Claim 8 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite	Plain and ordinary meaning
#10: "active region…within which transistors can be formed" U.S. Patent No. 10,510,842, Claims 1, 9; U.S. Patent No. 10,734,481, Claims 1, 20; U.S. Patent No. 11,121,222, Claims 1, 21, 39, 41–42; U.S. Patent No. 11,316,014, Claims 1, 21 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite	Not indefinite. Plain-and-ordinary meaning.

Term	Greenthread's Proposed Construction	Cirrus's Proposed Construction	Court's Preliminary Construction
#11: "the surface thereof" / "the surface" U.S. Patent No. 10,510,842, Claim 9; U.S. Patent No. 10,734,481, Claim 20; U.S. Patent No. 11,121,222, Claim 21; U.S. Patent No. 11,316,014, Claim 21 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite	Not indefinite. Plain-and-ordinary meaning.
#12: "aid carrier movement from the surface to the substrate" U.S. Patent No. 10,510,842, Claim 9; U.S. Patent No. 10,734,481, Claim 20 Proposed by Cirrus	Not indefinite. Plain and ordinary meaning.	Indefinite	Not indefinite. Plain-and-ordinary meaning.