

IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE

GREENTHREAD, LLC,

Plaintiff,

v.

ON SEMICONDUCTOR CORPORATION  
and SEMICONDUCTOR COMPONENTS  
INDUSTRIES, LLC d/b/a ON  
SEMICONDUCTOR LLC,

Defendants.

C.A. No. 23-cv-443-RGA-LDH

**JURY TRIAL DEMANDED**

GREENTHREAD, LLC,

Plaintiff,

v.

MONOLITHIC POWER SYSTEMS, INC.,

Defendant.

C.A. No. 23-cv-579-RGA-LDH

**JURY TRIAL DEMANDED**

**JOINT CLAIM CONSTRUCTION BRIEF**

**[DEFENDANTS' ANSWERING POSITIONS]**

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## I. INTRODUCTION

### A. Plaintiff's Introduction

Greenthread's Complaint against MPS asserts six patents that improve the performance of semiconductor devices.<sup>1</sup> All six patents claim priority to an application filed by Dr. Mohan Rao on September 3, 2004. Dr. Rao is one of the pioneers in the semiconductor industry. He is an award-winning inventor, and his inventions are featured in the Smithsonian museum. When he filed his application in 2004, he used terms that those skilled in the art would readily understand. He did not coin any new terms, nor disclaim the full scope of the plain meaning. Therefore, it is not surprising that plain meaning is the proper construction for all twelve disputed claim terms.

Ten of the twelve terms were previously at issue in *Greenthread v. Intel* (WDTX), *Greenthread v. Intel* (Oregon), and *Greenthread v. Cirrus Logic* (WDTX). In each instance, the court sided with Greenthread. In *Cirrus*, the WDTX issued a highly-persuasive eighty-four page order that carefully analyzes and rejects Defendants' arguments.

For terms 1-2 ("surface layer"), 6 ("graded"), and 9 and 11 ("aid carrier movement"), the WDTX has already determined these terms are not indefinite. Given the WDTX's findings of fact and legal conclusions, MPS cannot possibly meet its burden of clear and convincing evidence to convince this Court to reach a contrary result.

For term 3 ("substrate"), the WDTX agreed with Greenthread that it should be given its plain meaning. Rather than accept the WDTX's sound reasoning, Defendants contend "no construction is necessary."

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<sup>1</sup> Greenthread's Complaint against onsemi asserts two of the six patents (842 and 222), and Greenthread has filed a motion for leave to amend its Complaint to assert two more of the six patents (481 and 014).

For term 4 (“active region”), MPS’ construction has already been rejected. To the extent it requires construction, it should be given the same meaning the WDTX gave it.

For terms 5 (“single drift layer”) and 8 (“unidirectional”), MPS makes the same prosecution disclaimer argument that has already been rejected. MPS contends the drift layer can only have one electric field when the prosecution history says the *exact* opposite.

For term 10 (“active region...”), onsemi violates the doctrine of claim differentiation by limiting the independent claims to a particular type of transistor recited in a dependent claim.

Finally, for term 12 (“no active region”), onsemi argues it is indefinite, even though Dr. Rao clearly described it in Fig. 5B and the corresponding parts of his specification.

### **1. Plaintiff’s Technical Background**

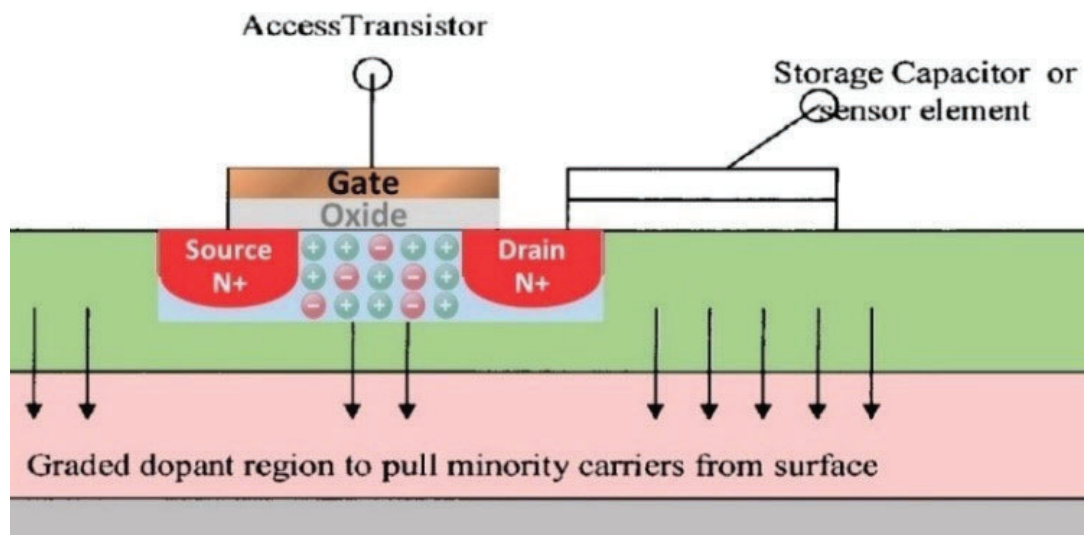
Silicon is an example of a semiconductor. In its pure form it is typically an insulator but it can become an electrical conductor when impurities called “dopants” are added. These dopants are usually phosphorous or boron atoms that have one more or one less valence electron than a silicon atom. If the dopant has one less valence electron, then it creates what is called a “hole,” which is a positive unit of charge. The extra electrons or holes disturb the local charge equilibrium in the silicon and can become mobile in response to electric fields. Thus, the electrons and holes are called “charge carriers.” JA4910-4928(¶¶1-26).

These dopants can also change the net electrical charge distribution in the surrounding silicon, which can influence the motion of other charge carriers passing by. When the dopant concentration is graded in a particular direction, other charge carriers will move in the gradient direction (or opposite direction) depending on the charge carrier’s polarity. This phenomenon is called “carrier drift.” JA4928(¶27).

At the time of Dr. Rao’s invention, most semiconductor devices relied on uniform concentrations of dopants. JA0002(195 Abstract); JA0013(1:36-40, 50-51). Dr. Rao recognized,

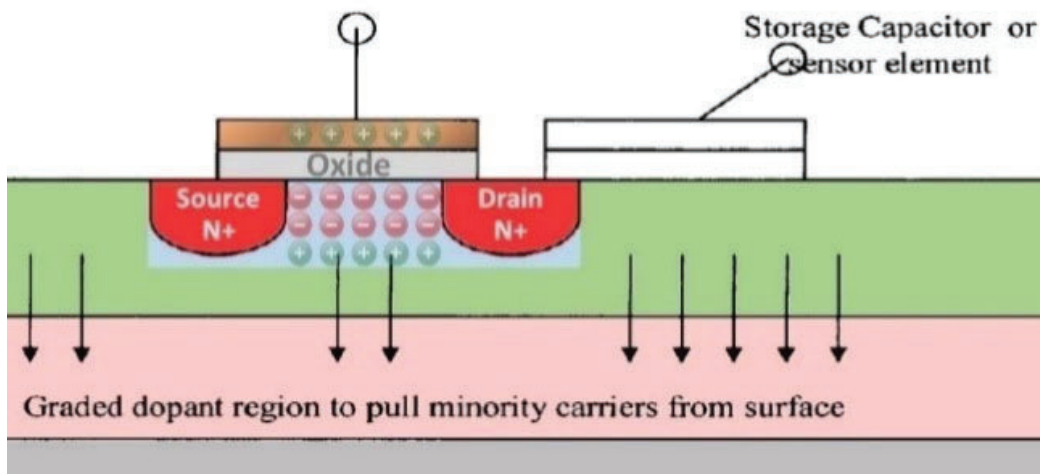
however, that graded concentrations of dopants can be used to improve the performance of transistors and other semiconductor devices. JA0002(Abstract); JA0014(3:3-13, 33-35). His invention is clearly disclosed in Figs. 5B-C, and the corresponding parts of his specification. JA4928(¶28).

A surface-channel MOSFET is a common type of transistor capable of controlling current flow at or along the surface of the semiconductor substrate. JA3592. Fig. 5B shows an n-channel metal oxide semiconductor (NMOS) transistor that is formed in a p-type surface layer. The transistor comprises (1) a gate; (2) a thin oxide separating the gate from the surface layer; and (3) two doped regions called the source and drain. JA0014(3:10-11, 3:42-43). The N<sup>+</sup> regions are heavily doped with an n-type dopant that creates a surplus of negative carriers (*i.e.*, electrons). The specification explains the NMOS transistor can be a surface-channel MOSFET.



JA4919-20(¶¶29-32); JA0014(3:41-43). Meanwhile, the p-type silicon between the source and drain has an abundance of positively charged holes (green circles). When the holes separate the source's electrons from the drain's electrons, current cannot flow through the transistor, and the transistor is in an "off" state. JA4920-4921(¶¶32-33).

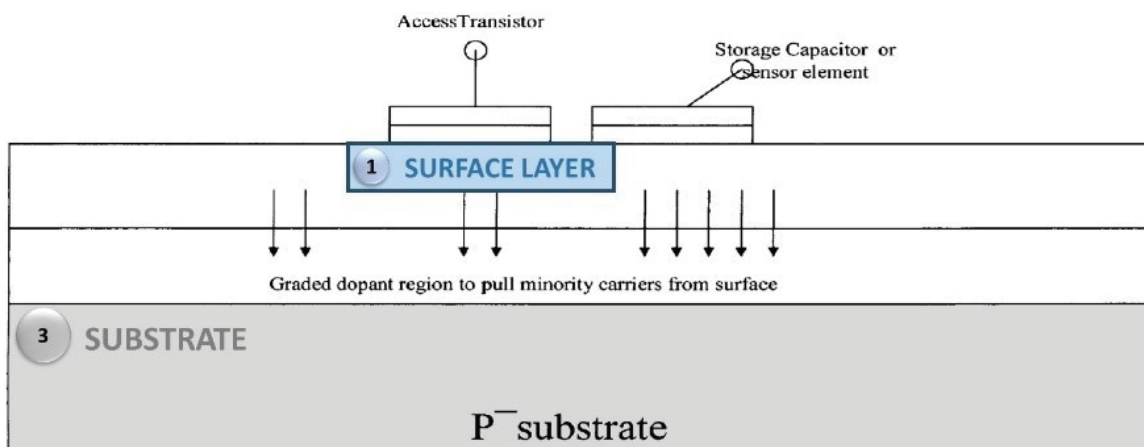
When a positive voltage is applied to the gate, an electric field forms in the oxide. *Id.* This electric field repels the holes downwards, while the electrons are attracted to move into the blue surface layer. When enough electrons have accumulated in the surface layer below the oxide, they form a conductive channel between the source and the drain, and current can begin to flow through the transistor.



JA4921(¶33). In order to turn the transistor “off,” the positive voltage is removed from the gate and the channel disappears as the holes return to the surface layer. *Id.* Dr. Rao recognized that by using graded concentrations of dopants, it is possible to “pull” carriers from the silicon’s surface. JA0011(Fig. 5B). In this example, pulling the holes from the surface layer when a positive voltage is applied to the gate, allows the transistor to turn “on” more quickly. This improves the speed and performance of the transistor. JA4922(¶35); JA0014(3:8-13).

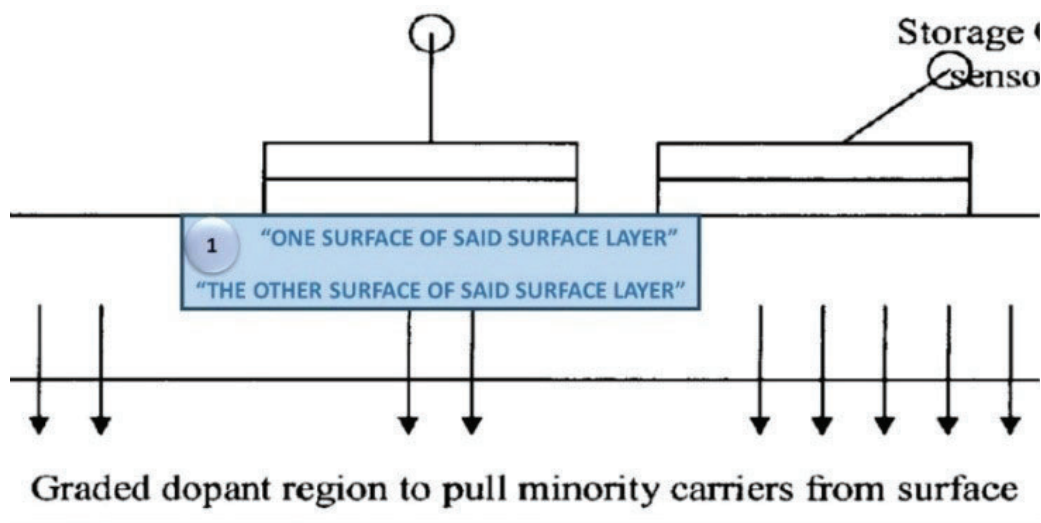
Turning to representative claim 195:1, it lines up exactly with Fig. 5B and the corresponding parts of the specification. JA4922-JA4923(¶¶37-38). Fig. 5B illustrates a CMOS device with metal and oxide layers on a silicon substrate. JA0013-14(2:27-31; 3:41-43). The specification specifically mentions that the device may be a surface channel MOSFET. *Id.*(3:41-43; 1:43-45).

The CMOS device comprises a surface layer (blue) and a substrate (gray). *Id.*(3:30-45). The substrate is lightly doped with holes (P-), and the surface layer is a layer at the surface of the silicon. The invention is concerned with moving minority carriers away from this surface layer.



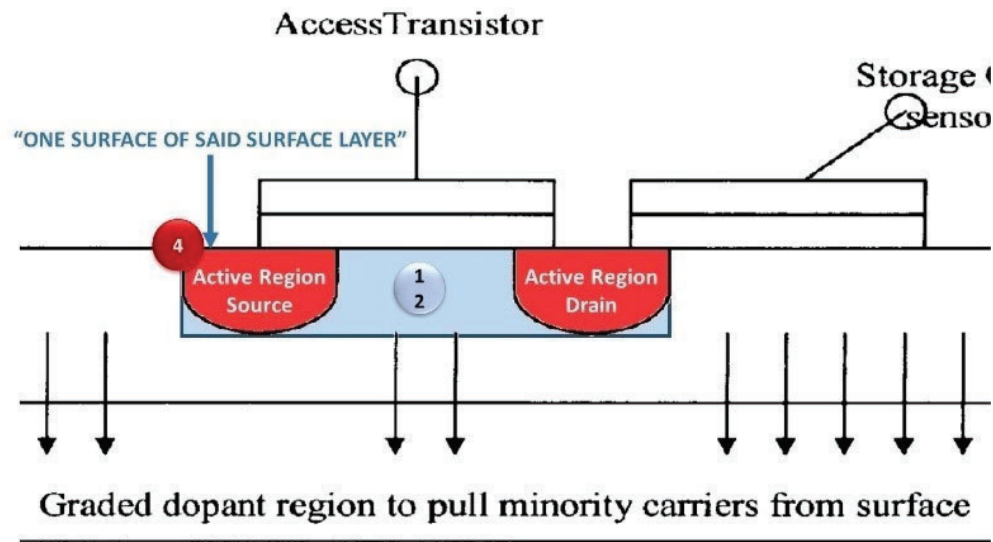
JA4923(¶39).

The surface layer has at least two surfaces, which 195:1 refers to as the “one surface of said surface layer” and “the other surface of said surface layer.”



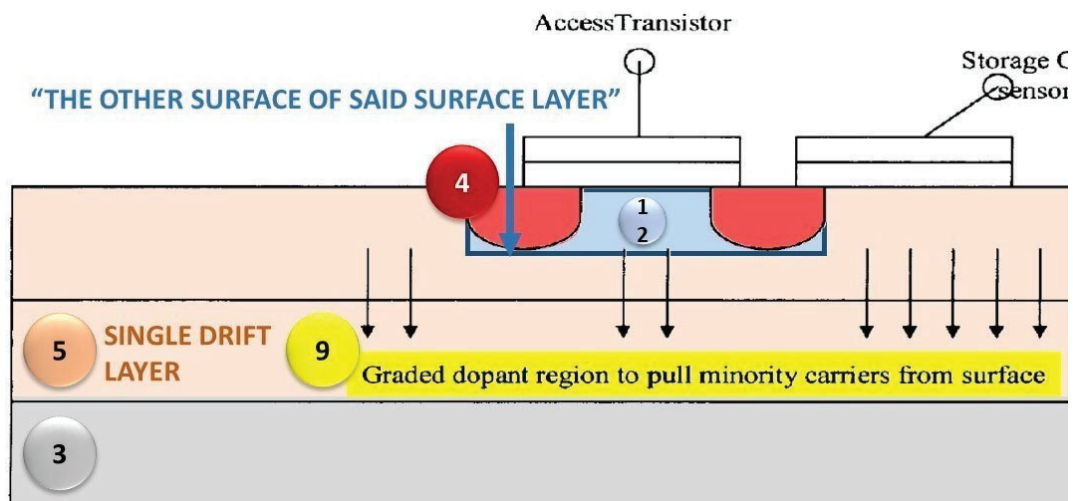
JA4924(¶40); JA0014(4:16-19). Next, the claim specifies an active region with a source and drain.

*Id.* Fig. 5B shows how the active region is “disposed on one surface of said surface layer.”



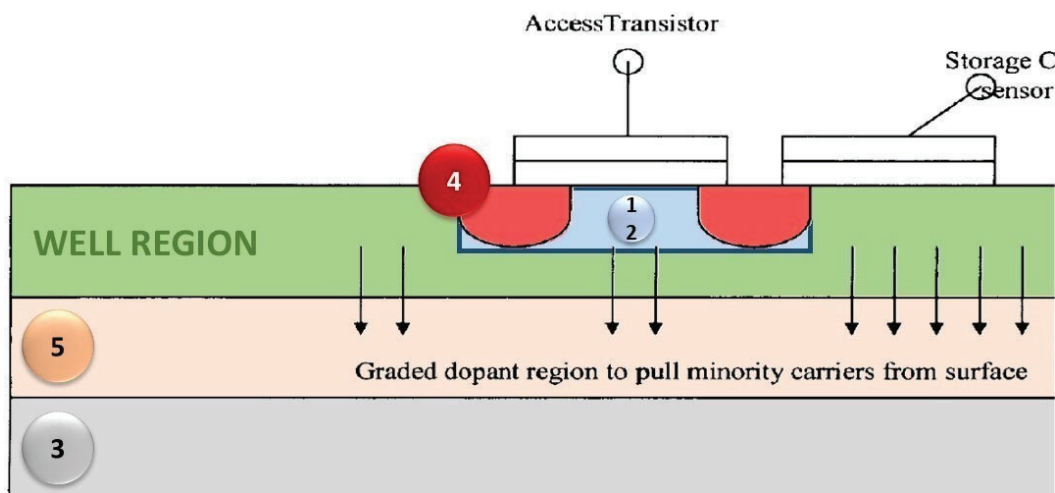
JA4924-4925(¶41). The “active region” is a doped region where a transistor can be formed.

*Id.*(¶42); JA0013-14(1:61-63; 2:18-23; 3:1-3, 30-33). Next, there is a single drift layer disposed between “the other surface of said surface layer” and the substrate. This layer has a graded concentration of dopants.



JA4925(¶43). The graded dopants create an electric field that aids the movement of minority carriers (*i.e.*, holes) from the surface layer to the substrate. JA4925(¶44); JA0014(3:17-20, 30-

37). Finally, there is a well region within the drift layer that creates another electric field that also aids the movement of minority carriers.



JA4926(¶45); JA0013-14(2:27-28; 3:37-40).

## B. Defendants' Introduction

Greenthread's patents all share the same extremely short specification, which has less than two columns of "detailed description." ('195 Patent, JA0013 at 2:35-4:8.) This specification describes the alleged invention as "creating a drift field to sweep [] unwanted minority carriers into the substrate as quickly as possible, from ... the surface." (*Id.* at 3:30-33.) According to the patents, sweeping minority carriers via a graded dopant concentration was already known, but the prior art purportedly did not include sweeping from the surface to the substrate. (*Id.* at 1:34-40.) (Notably, as the patent applicant later admitted during prosecution, this supposedly novel feature was also already known in the art.) (JA5078, ¶34.)

Regardless, Greenthread's proposed constructions seek to significantly broaden the Asserted Patents' claim terms in a manner disconnected from the original narrow invention. For example, Greenthread would change "layer," which describes a readily identifiable physical structure (*e.g.*, a layer of frosting) into a "portion or region," which could be anything.

Compounding this ambiguity, Greenthread would change “substrate” into “underlying layer,” which effectively means the “substrate” could be any portion in the device below the surface. At nearly every turn, Greenthread would misuse claim construction as a vehicle for broadening amendments.

Lacking intrinsic and extrinsic support, Greenthread’s primary argument is that different courts, in cases with different defendants, agreed to some of Greenthread’s proposed constructions. This argument should be ignored. The disputed terms and proposed constructions here are different from those handled in the prior cases, where the courts entered bare “plain and ordinary meaning” construction, without further explanation. Most importantly, these decisions do not dictate what this court should or should not do—Defendants were not a party to these other decisions, Defendants’ arguments differ from those prior cases, and this Court should make an independent assessment of whether the claims are indefinite. *Linear Tech. Corp. v. Monolithic Power Sys., Inc.*, 2007 WL 6126455, at \*2 (D. Del. Nov. 20, 2007) (noting that the court “is not bound to follow” a prior claim construction order); *Texas Instruments, Inc. v. Linear Techs. Corp.*, 182 F. Supp. 2d 580, 589–90 (E.D. Tex. 2002) (explaining “the application of stare decisis in the form of an adoption of claims construed without Defendants’ participation could cause an injustice of precisely the sort that due process seeks to avoid”).

## II. DISPUTED CONSTRUCTIONS

### A. Claim Terms Found in Representative Claim 195:1

| Terms                                                                               | U.S. Patent No. 8,421,195, Claim 1 (195:1)                          |
|-------------------------------------------------------------------------------------|---------------------------------------------------------------------|
|  | A CMOS Semiconductor device comprising:<br>a <u>surface layer</u> ; |
|  | a <u>substrate</u> ;                                                |

|   |                                                                                                                                                                                                                                                                     |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | an <b><u>active region</u></b> including a source and a drain, disposed on one surface of said surface layer;                                                                                                                                                       |
| 5 | a <b><u>single drift layer</u></b> disposed between the other surface of said surface layer and said substrate,                                                                                                                                                     |
| 6 | said drift layer having a <b><u>graded concentration of dopants extending between</u></b>                                                                                                                                                                           |
| 7 | <b><u>said surface layer and said substrate,</u></b>                                                                                                                                                                                                                |
| 8 | said drift layer further having a first static <b><u>unidirectional electric drift field</u></b>                                                                                                                                                                    |
| 9 | <b><u>to aid the movement of minority carriers</u></b> from said surface layer to said substrate; and                                                                                                                                                               |
|   | at least one well region disposed in said single drift layer, said well region having a graded concentration of dopants and a second static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate. |

1. “surface layer” (195:1; 502:7; 222:44)

| Greenthread                                                                                                     | MPS                                                                                                                                                         |
|-----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Not indefinite.<br>Plain and ordinary meaning, where the plain and ordinary meaning is “a layer at the surface” | Indefinite.<br>If this term is not found to be indefinite, it should be construed as “whole contiguous portion of a semiconductor material at the surface.” |

a) Plaintiff’s Opening Position

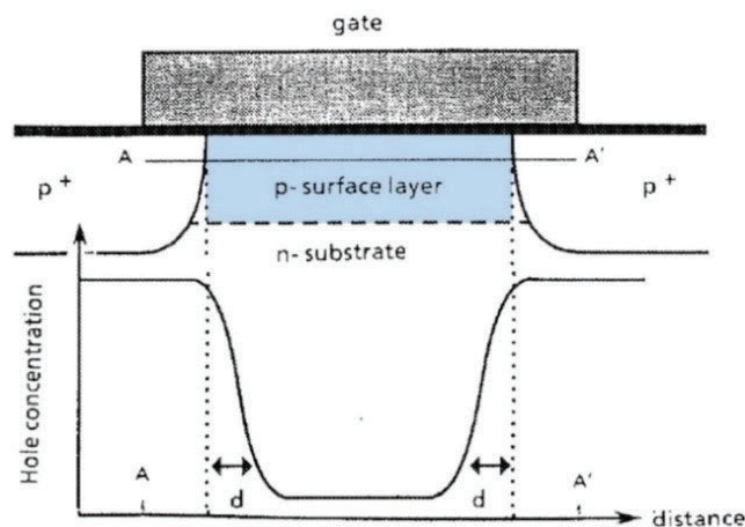
Intel and Cirrus previously argued this term is “indefinite,” and *all three times*, the court sided with Greenthread. JA3468; JA3476; JA3487-88. Like the previous defendants, MPS cannot possibly meet its heavy burden of proving indefiniteness. In *Cirrus*, the WDTX issued a detailed order that this term should be given its plain meaning: “a layer at the surface.” JA3487-500. Given the WDTX’s sound reasoning, this Court should adopt the same construction in order to avoid inconsistent rulings or findings of fact. *Finisar Corp. v. DirecTV Grp., Inc.*, 523 F.3d 1323, 1329 (Fed. Cir. 2008); *Finjan, Inc. v. Symantec Corp.*, No. 14-CV-02998-HSG, 2017 WL 550453, at \*3 (N.D. Cal. Feb. 10, 2017).

The specification confirms the “surface layer” is a “layer at the surface.” JA4931-4932(¶63); JA0010-14(1:43-45; 3:30-33; 3:38-43; 3:43-45; 3:53-55; Fig. 5A-B). In each instance, the specification is referring to the surface of the semiconductor device where the active region is located. JA4931-32(¶63).

The prosecution history further confirms this. During prosecution, Applicant elected claims directed to Figs. 5B-C. JA0146. These claims recited “active surface regions.” JA0106. Applicant subsequently added new claims that replaced “active surface regions” with “surface layer,” and specified that the “active region” is “disposed on one surface of said surface layer.” JA0262. In the next office action, the Examiner asserted that Kamins, Fig. 2, (23) is a “surface

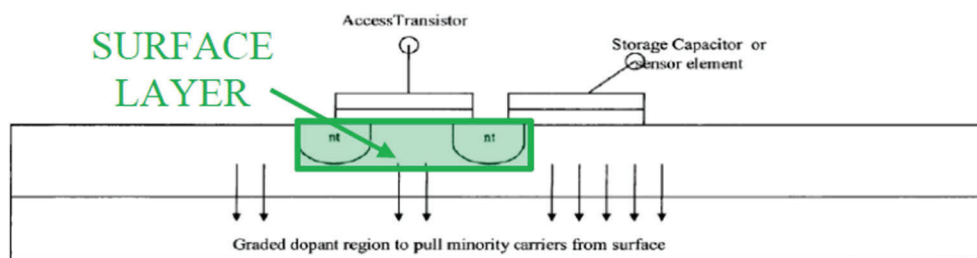
layer.” JA0280; JA3937. Notably, the Examiner identified the layer at the surface of the silicon as the “surface layer.” This confirms that the Examiner understood the “surface layer” to be a layer at the surface of the silicon.

It should go without saying that the plain meaning of “surface layer” is: “a layer at the surface.” This is because it is customary to refer to layers by their relative position. JA4932-4933(¶65). The well-known Wolf textbooks confirm this.



JA4932-4933(¶65); JA4376; JA4432, JA4435.

When Samsung and other defendants filed IPRs against Dr. Rao’s patents, they easily identified the “surface layer” as the exact same region that Greenthread does.



JA3642. These IPRs are compelling evidence that Greenthread’s construction is correct.

The WDTX agreed with Greenthread that this term is not indefinite for at least the following reasons:

- (1) a POSITA would understand “active region...disposed on [on surface of said surface layer]” to mean the “active region” is within the “surface layer.” JA3496.
- (2) the argument that the active layer must be on top of the surface layer improperly excludes preferred embodiments. JA3499.
- (3) previous defendants did not assert that this claim term is indefinite, which tends to indicate that a POSITA would understand the scope of this term with reasonable certainty. *Id.*
- (4) WDTX and Oregon previously determined this term is not indefinite, and Cirrus did not provide any clear and convincing evidence that would lead the court to reach a contrary conclusion. *Id.*

This Court should reach the same conclusion for the same reasons.

**b) MPS’s Answering Position**

MPS respectfully submits this term is indefinite for the same reasons as discussed for the term “layer,” below. Greenthread requested this term be construed separately from layer, and MPS is merely responding to Greenthread’s request.

If the Court does not find “layer” indefinite, this term should be given the construction “whole contiguous portion of a semiconductor material at the surface,” which is simply MPS’s proposed construction for “layer” with “at the surface” appended. Greenthread is effectively requesting the same thing by proposing “a layer at the surface.” (JA5082-85, ¶¶40-53.) Thus, the parties’ disagreements are entirely with the “layer” portion of this term, discussed below.

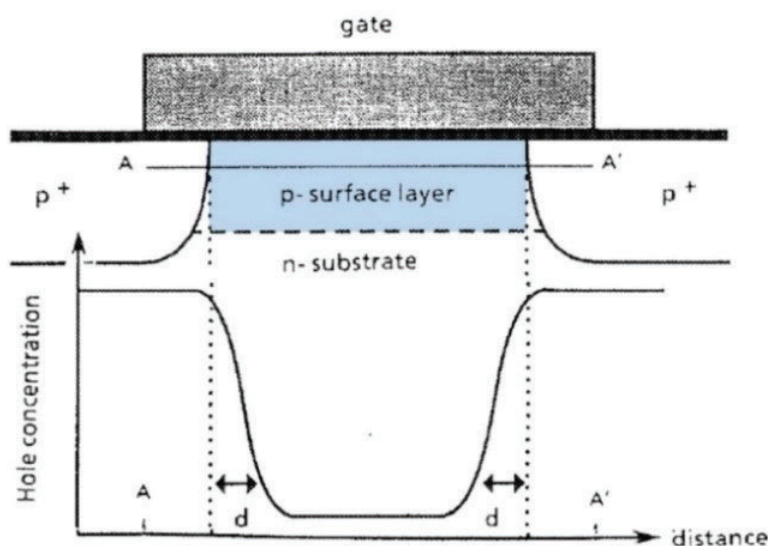
**2. “layer” (195:1; 502:7; 222:44)**

| <b>Greenthread</b> | <b>MPS</b>  |
|--------------------|-------------|
| Not indefinite.    | Indefinite. |

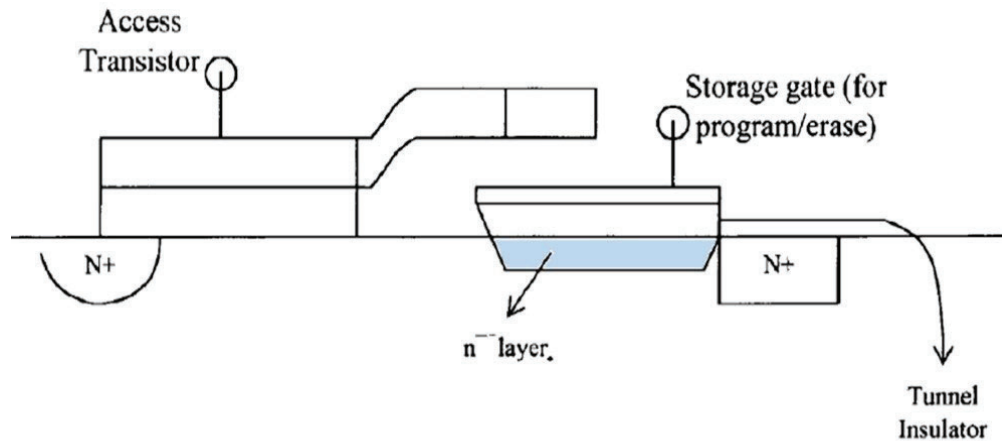
|                                                                                                                                                                                                                                     |                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| No further construction necessary. To the extent this term requires further construction, it should be given its plain and ordinary meaning, where the plain and ordinary meaning is “portion or region of a semiconductor device.” | If this term is not found to be indefinite, it should be construed as “whole contiguous portion of a semiconductor material.” |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|

### a) Plaintiff’s Opening Position

For this term, MPS argues that it is unclear what it is meant by “layer.” But when deciding “surface layer,” the WDTX already considered any arguments that MPS will likely make here. It is telling that no defendant has ever argued that “layer” by itself is indefinite. This is because “layer” is readily understood by POSITAs to mean “a portion or region of a semiconductor device.” JA4933-34(¶66). As seen in Wolf, the “surface layer” is a portion or region of the semiconductor device.



JA4933-4934(¶66). The “layer” does not need to cross an entire band or “row” of the semiconductor device. *Id.* This is because there are typically isolation regions between adjacent active regions. *Id.* For example, in Fig. 3B, the “n<sup>-</sup> layer” is adjacent to an N<sup>+</sup> region.



JA0006. Thus, Dr. Rao used “layer” consistent with its ordinary meaning to simply mean a “portion or region of a semiconductor device.” JA4933-4934(¶66).

To the extent MPS argues “layer” is indefinite because Dr. Rao did not specify its metes and bounds, the WDTX already rejected this argument. Courts have routinely recognized that claims are not indefinite merely because the specification does not specify the thickness of a particular layer or region. For example, in *Collins*, the defendants argued the claims were indefinite because the patent did not specify the “form or shape of the material.” No. 2:09-cv-219-TJW, 2011 U.S. Dist. LEXIS 108973, at \*27 (EDTX Sept. 23, 2011). The court disagreed, recognizing that the particular form or shape will depend on a number of factors, and the claims do not require “a specific thickness of the film” as long as it creates the claimed visual appearance. *Id.* at \*28. The same is true here. The claims do not require the “layer” to be a “particular form or shape,” as long as the other claim limitations are met.

Similarly, in *Cies*, the defendants argued “transparent protective coating” “would be indefinite without a limitation that the thickness be 5 millimeters or more.” 2009 U.S. Dist. LEXIS 110055, at \*8-9 (EDTX Nov. 25, 2009). The court disagreed, recognizing the functionality of the claim element does not depend on a “specific thickness,” but whether it achieves the claimed

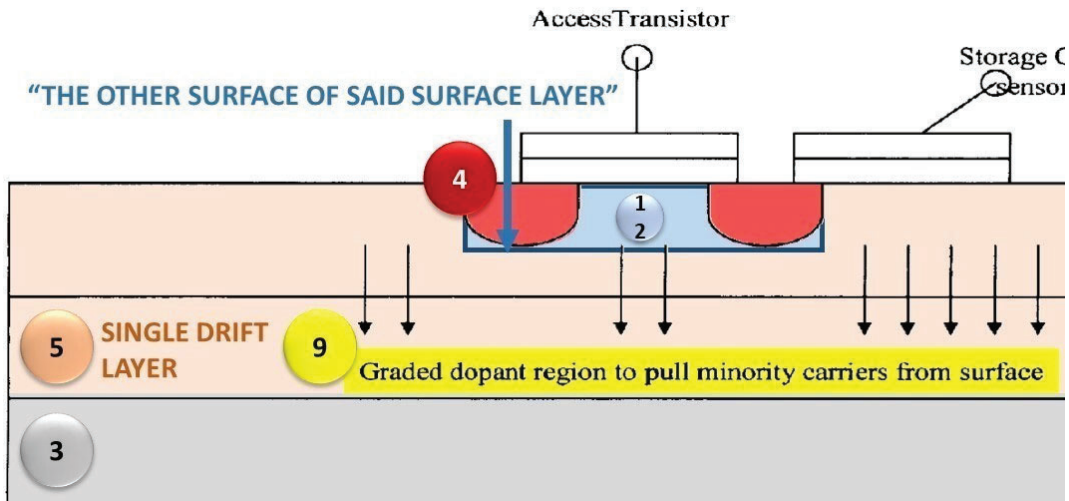
function. *Id.* at \*15. The same is true here. Dr. Rao’s invention does not depend on a “specific thickness” of the “layer” as long as the other limitations are met.

Turning to MPS’ alternate construction, “whole contiguous portion” does not appear anywhere in the intrinsic record, and it would read extraneous limitations into the claims. Furthermore, it would introduce ambiguity where there is none. MPS’s construction begs the questions: what is meant by whole? contiguous? Meanwhile, “layer” is a simple term that is understood by POSITAs and lay persons. In situations like this one, it is better to leave the claim untouched.

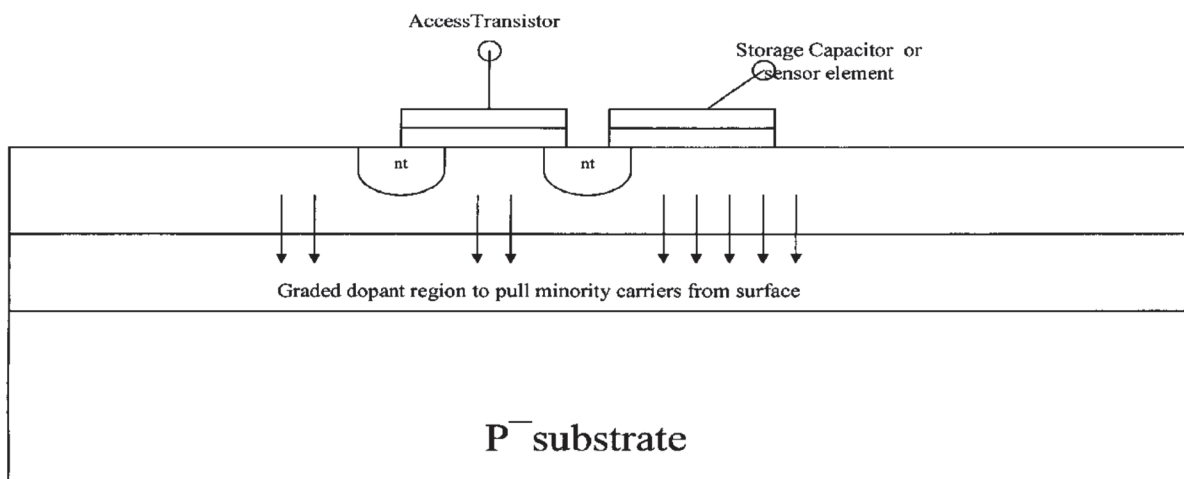
#### **b) MPS’s Answering Position**

The term “layer” is indefinite because Greenthread would apparently have it mean whatever Greenthread wants it to mean. Each time Greenthread labels a “layer” in a cross-section of a semiconductor device, the vertical and horizontal bounds change to meet whatever purpose Greenthread has at the time. (JA5082-83, ¶41.) Indeed, Greenthread has been unable to identify what differentiates the various features claimed by the patent—the surface layer, the drift layer, the well regions, and the substrate—other than by drawing arbitrary boxes. There simply is no rhyme or reason as to what Greenthread considers a “layer” (JA5083, ¶¶42-43.), and “a claim is indefinite if its language might mean several different things and no informed and confident choice is available among the contending definitions.” *Media Rts. Techs., Inc. v. Cap. One Fin. Corp.*, 800 F.3d 1366, 1371 (Fed. Cir. 2015) (internal quotations marks omitted).

The arbitrary manner in which Greenthread has identified supposed “layers” is shown in the annotated version of Figure 5(b) from the Asserted Patents that Greenthread put in its opening brief, copied below:



See also '195 Patent, JA0011 at Figure 5(b). Here, Greenthread has identified the supposed "surface layer" in the patent figure as an arbitrarily drawn blue box around certain features that ends both vertically and horizontally short of a larger box in the patent figure, which spans the entire device horizontally, and has more vertical depth. (JA5083, ¶43.) However, the single drift layer is then identified as the larger box in the patent figure, spanning the entire device horizontally. (*Id.* ¶44.) Critically, as shown by the unannotated Figure 5(b) below, the arbitrary blue box drawn by Greenthread does not appear—as the figure instead has a layer that spans the width of the figure—and is also not discussed anywhere in the patent:



If the meaning of “layer” depends solely on Greenthread’s whims, the term is indefinite.

Though precise dimensions are not required, there must be some logical constraints on what constitutes a “layer.” However, “layer” in the asserted patents (and in Greenthread’s arguments) has no discernable structure, location, composition, or boundaries. (JA5083, ¶45.) This is a problem because without knowing what counts as a “layer,” a POSITA cannot be reasonably certain about where one layer ends and another begins. Under Greenthread’s formulation, there is no interface between various layers (which depend solely on the arbitrary drawing of a box) and thus no way to distinguish where other claimed features should appear—including the allegedly novel claimed graded concentrations of dopants. (JA5084, ¶¶ 46-47.) The inability to differentiate a “layer” from other recited elements is fatal. *See Infinity Computer Prod., Inc. v. Oki Data Americas, Inc.*, 987 F.3d 1053, 1062 (Fed. Cir. 2021) (“[T]he indefiniteness here does not reside in the term ‘passive link’ or ‘computer’ on its own but rather in the relationship between the two in the context of these claims.”). Because a POSITA is left to speculate whether particular claimed features are within a single drift layer, well region, surface layer, or substrate, the claims fail “to afford clear notice of what is claimed, thereby ‘appris[ing] the public of what is still open to them.’” *Nautilus v. Biosig Instruments, Inc.*, 572 U.S. 898, 909 (2014).

Alternatively, if “layer” is not indefinite, it should be construed as to its plain and ordinary meaning, which is “whole contiguous portion of a semiconductor material.” (JA5084 ¶¶47-48.) The construction offered by Greenthread (“portion or region”) provides no meaningful limitations on the term. This is overbroad on its face, as not every region or portion aligns with the plain and ordinary meaning of a layer; a slice of cake is a portion of the cake, but it is not a “layer.” Indeed, the claim language itself distinguishes “region” from “layer”; yet Greenthread’s construction subsumes “region” within its scope. Greenthread’s failure to identify how layers are distinguished

from each other also infects other terms, like single drift layer and substrate. MPS’s construction avoids this pitfall by making it clear that a layer must be a whole contiguous portion of semiconductor material, meaning that it is defined by having homogenous material, and comports with the description and figures in the Asserted Patents. This sensible construction will avoid the arbitrary box drawing that Greenthread has repeatedly done.

This is how the Asserted Patents use the term layer. For example, the patent talks about “interfaces” between “similar or dissimilar layers.” ’195 Patent, JA0013 at 1:53-58. Greenthread’s arbitrarily drawn layers do not have any interfaces between layers, because they begin and end wherever Greenthread wants, rather than based on any discernable properties. (JA5084-85, ¶¶49-53.) All of the figures in the Asserted Patents also support MPS’s construction: none of them show a “layer” smaller than a whole contiguous portion of material.

**3. “substrate” (195:1; 502:7; 842:1-2, 4, 9-10, 12, 17; 481:1-3, 8, 15, 20, 22-23, 32; 222:1-3, 8, 15, 21, 23-24, 33, 39-42, 44; 014:1-3, 8, 15, 21, 23-24)**

| <b>Greenthread</b>                                                                                           | <b>Defendants</b>                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Not indefinite.<br>Plain and ordinary meaning, where the plain and ordinary meaning is “an underlying layer” | Defendants contend no construction is necessary.<br>To the extent this term requires construction, it should be given its plain and ordinary meaning, where the plain and ordinary meaning is “wafer on which integrated circuits are built.” |

**a) Plaintiff’s Opening Position**

Intel argued this term means the “initial material within which or on which the semiconductor device is fabricated.” Cirrus argued it is indefinite. In both cases, the WDTX sided with Greenthread. JA3468; JA3508. Now, Defendants seek an even narrower definition than the one that was rejected.

The WDTX determined “substrate” should be given its plain meaning. JA3500-508. The WDTX recognized that “substrate” has a broad meaning in the art, and Dr. Rao used it to refer to

both the bottom-most layer, and the layer below and/or including the active devices. JA3505-507. In both scenarios, the “substrate” is an “underlying layer.” JA4934-4935(¶67). Given the WDTX’s sound reasoning, this Court should adopt a similar construction in order to avoid inconsistent rulings or findings of fact.

The definition of “substrate” is “underlying layer.” JA3716; JA3726. This is how Dr. Rao consistently used the term. JA0004-14(1:50, 62; 2:18-28; 3:31-35; Figs. 2, 3A-D, 4, 5A-C).

Turning to Defendants’ fall-back construction, Intel previously argued “substrate” means “the initial material within which or on which the semiconductor device is fabricated.” While MPS changed “initial material” to “wafer,” it is essentially making the same argument. By removing “within which,” MPS has made it even narrower. MPS’ construction is clearly at odds with the WDTX’s determination that the substrate can be the layer where the active devices are located. JA3505-508; JA4935, ¶68. When, as here, Defendants’ construction is at odds with the specification, it is not the correct one.

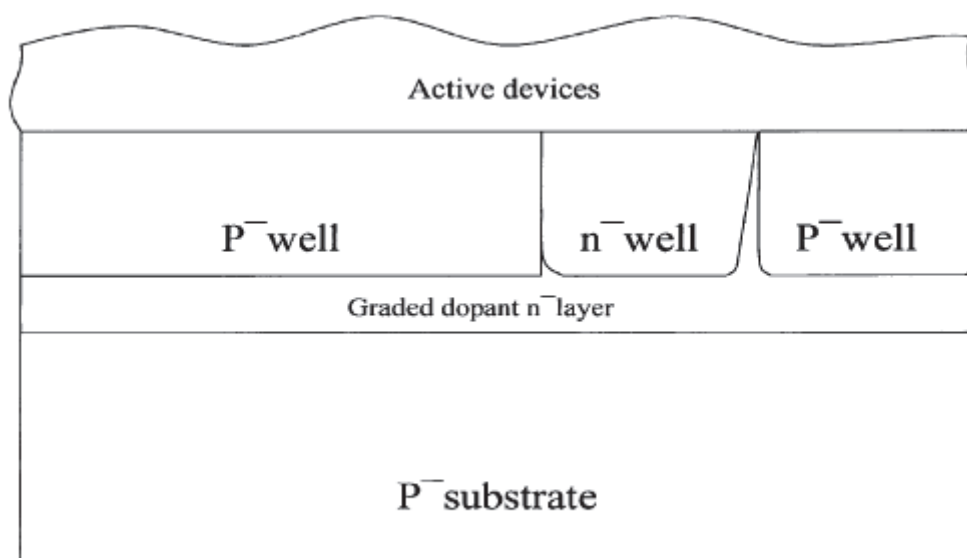
#### **b) Defendants’ Answering Position**

Defendants’ position has consistently been that the term “substrate” needs no construction. But Greenthread insisted it be construed and now seeks to improperly broaden the term beyond its plain and ordinary meaning. While a substrate does “underlie” other layer(s), that does not mean all underlying layers are substrates. (JA5085, ¶¶54-55.) Any construction of “substrate” should instead align with what a substrate actually is: the “wafer on which integrated circuits are built.”

Equating “substrate” with “an underlying layer” would conflict with the claim language. As shown in representative claim one of the ’195 patent, there exists at minimum a “single drift layer” disposed between the “surface layer” and the “substrate.” *See* ’195 Patent, JA0014 at 4:18-24 (requiring “single drift layer disposed between the other surface of said surface layer and said substrate”). (JA5085, ¶56.) Under Greenthread’s construction, that “single drift layer” would also

then be the “substrate” because it is also “an underlying layer” below the surface layer. It would be improper to define “substrate” in a way that necessarily encompasses other claimed elements, and Greenthread cannot “introduce ambiguity in a way that disregards language usage in the patent itself.” *Immunex Corp. v. Sanofi-Aventis U.S. LLC*, 977 F.3d 1212, 1221 (Fed. Cir. 2020).

The intrinsic evidence further demonstrates this defect in Greenthread’s construction. The *sole reference* in the specification and prosecution history to “an underlying layer” is to a graded dopant layer that sits *on top* of the substrate, not than the substrate itself: “FIGS. 5(a),5(b),5(c) illustrate the cross sections of a MOS silicon substrate with two wells, and, *an underlying layer* using embodiments of the invention to improve performance in each application VLSI logic, DRAM/image IC, nonvolatile memory IC.” See ’195 Patent, JA0013 at 2:27-31 (emphasis added). Taking Figure 5(a) as an example, it shows the “Graded dopant n\_layer” underlying the two wells, with the substrate beneath that layer:



’195 Patent, JA0010 at Figure 5(a). While both the “Graded dopant n\_layer” and the “P<sup>-</sup> substrate” underlie other layers, only one of them is a substrate. Figures 5(b) and 5(c) also show

multiple “underlying layers” but only one substrate. And Dr. Glew’s declaration does not cure the defect in Greenthread’s proposed construction, as it only notes a substrate is an example of an underlying layer (which is true), but never addresses the many underlying layers which are *not* substrates. (JA5085-86, ¶¶57-58.)

Notably, none of the claim construction orders Greenthread cites adopted this “underlying layer” construction—they only found “substrate” not indefinite, and that it should be given its plain and ordinary meaning. *See* JA3468 (Preliminarily adopting “plain and ordinary meaning” but not “underlying layer”); JA3559 (same). Indeed, in the non-final Cirrus Logic order, the sole issue was whether the term is indefinite, which Defendants are not arguing here. “Underlying” is not mentioned in the court’s analysis. *Id.* at JA3505-08.

Defendants maintain no construction is necessary, but if the Court is inclined to give one, it should be “wafer on which integrated circuits are built.” (JA5085-86 ¶¶ 4, 59.) A substrate is not just any underlying layer—it is the foundational silicon wafer on which active devices are built. (*Id.*) This aligns with the patent specification, which describes the substrate as “on which active devices are subsequently fabricated.” ’195 Patent, JA0013 at 1:62-63. (JA5086, ¶60.)

Defendants’ construction is also supported by extrinsic evidence cited by Greenthread. For example, in paragraph 67 of his declaration, Dr. Glew misleadingly says the American Heritage Dictionary (which is not a semiconductor-specific dictionary) defines substrate as “an underlying layer” (Ex. 46, JA4124-25), but this truncates the full definition: “An underlying layer, a substratum.” And the applicable definition of “substratum” is “The material on which another material is coated or fabricated.” JA3716. In other words, a substrate is not solely defined by underlying another layer, it is also necessary to include the fact it is the foundation for the fabrication of other material. (JA5086, ¶61.)

4. “active region” (195:1; 502:7; 842:1, 9; 481:1, 20; 222:1, 21, 39, 41-42, 44; 014:1, 21)

| Greenthread                                                                                                                                                                                                                                                                 | MPS                                                                                                                     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| No construction necessary.<br>To the extent this term requires construction, it should be given its plain and ordinary meaning, where the plain and ordinary meaning is “a doped silicon region at the surface of a semiconductor device where a transistor can be formed.” | “portions of the semiconductor that provide a conduction path between electrodes (e.g., source to drain via a channel)” |

**a) Plaintiff’s Opening Position**

Intel initially argued “active region” means “region that forms the current path of a device.” Then it proposed: “the source, drain and channel region of a device.” The WDTX rejected both constructions. JA3469. Cirrus re-argued Intel’s original construction. Again, the WDTX sided with Greenthread. JA3509-13.

The WDTX determined that the claims allow for an “active region” to not have a transistor. JA3512. More specifically, 481:1 requires a first and second active region, where a transistor is formed “in at least one of” them. JA3512-13. This means the other active region may not have a transistor, and thus, it would not “provide a conduction path between electrodes.” *Id.* When, as here, the proposed construction is at odds with the surrounding language, it cannot be the correct one.

An “active region” is a doped silicon region where a transistor can be formed. JA4935-4937(¶¶69-73). This is how the term is consistently used throughout the intrinsic record. *Id.*, ¶69. Because it is a commonly-known term of art, there is no need to construe it. *Acumed LLC v. Stryker Corp.*, 483 F.3d 800, 805 (Fed. Cir. 2007). To the extent it is construed, Greenthread’s construction is the only one that is consistent with the surrounding claim language and the rest of the intrinsic record.

**b) MPS's Answering Position**

Greenthread again relies on other courts finding the “plain and ordinary meaning” should apply, but none of the prior decisions explained what that is.

MPS’ construction, “portions of the semiconductor of the semiconductor that provide a conduction path between electrodes (*e.g.*, source to drain via a channel),” is the plain and ordinary meaning. (JA5086, ¶62.)

Greenthread’s expert Dr. Glew even admits that the active region “is used to refer to the source and drain of a MOSFET, and the silicon between the source and drain.” Ex. 46 at JA4126, JA4116. Prior expert testimony similarly supports MPS’s proposal. *See* JA3646 at ¶¶ 60 (“Based on my experience, an active region is generally understood in the art as referring to at least the channel region underneath the gate, and between the source and drain regions.”), 61 (“In my experience, region(s) that make a semiconductor device active may refer to semiconductor region(s) that facilitate the movement of carriers (*e.g.*, conducting current).”). As do textbook descriptions. *E.g.*, Wolf at JA4105 (“The top of the body consists of *active* or *transistor* regions as well as *passive* or (*field*) regions”).

MPS’s construction also aligns with the term’s use in the intrinsic record. *See* ’195 Patent, JA0013 at 2:2-4 (“Most of these techniques either divert the minority carriers away from [*sic*] the active regions of critical charge storage nodes at the surface.”). Additionally, in response to a prior art rejection at the applicant “amended the claims to define the ‘active regions’ as regions within which circuitry can be formed.” JA0612 (Ex.8). Because circuitry can only be formed where there is a path for electricity to flow, the “active region” must therefore be a portion of the semiconductor that provides a conduction path for this flow between electrodes. (JA5087, ¶ 63.)

Greenthread incorrectly contends the plain and ordinary meaning is “a doped silicon region at the surface of a semiconductor device where a transistor can be formed.” But “a doped silicon

region” is much broader than the “active region” because the entire integrated circuit is doped and thus, as shown in Figure 5(b) of the patents, Greenthread’s construction would result in the entire top layer containing the wells to be the “active region.” (JA5088, ¶¶67-68.)

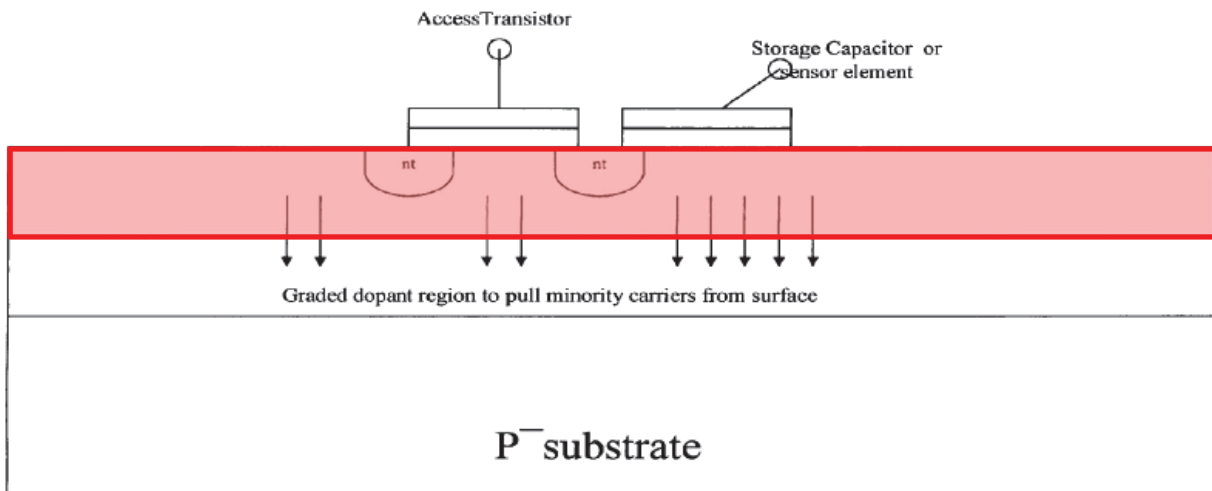
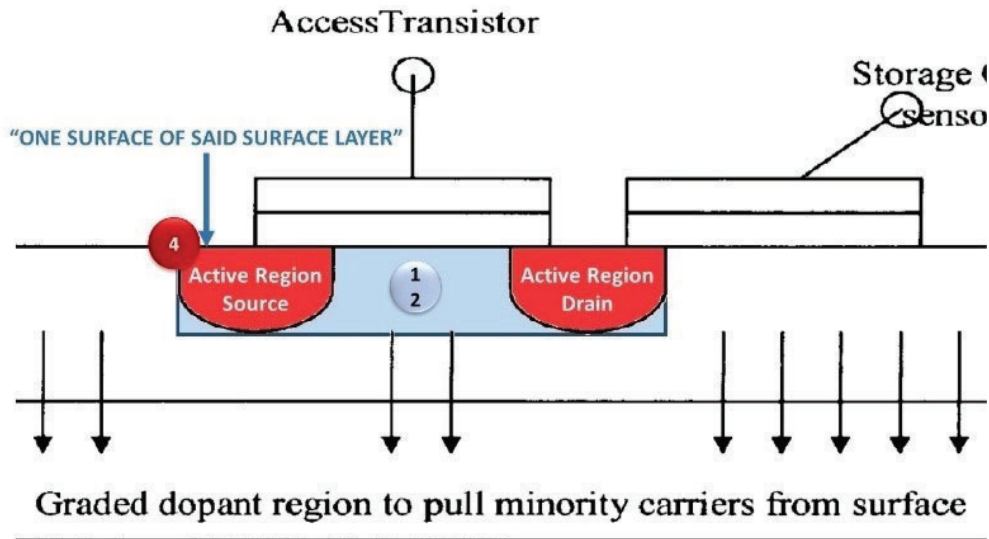


Figure 5(b)

Greenthread’s addition of “at the surface of a semiconductor device” is also confusing, as it has not explained why active regions should be limited to the surface of a device and its illustrations consistently show an active region extending some depth *below* the surface of a device, like Greenthread’s annotation of the patent Figure 5(b), reproduced below.



In addition, “semiconductor device” is unclear because it can refer to the transistor that includes the gate, source, drain, or any component that uses semiconductor material in general. Accordingly, MPS’s construction is a more helpful and accurate description of the plain and ordinary meaning of “active region.” (JA5088-89, ¶69.)

##### 5. “single drift layer” (195:1; 502:7; 222:44)

| Greenthread                                                                                                                                                                                                                                           | MPS                                                              |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| No construction necessary.<br>To the extent this term requires construction, it should be given its plain and ordinary meaning, where the plain and ordinary meaning is a “single ( <i>i.e.</i> one) layer with at least one electric drift field”).” | “single unidirectional layer with a graded dopant concentration” |

##### a) Plaintiff’s Opening Position

Intel and Cirrus argued the “single drift layer” must have only one electric field that is unidirectional over the entire drift layer. More specifically, they argued: (1) the electric field cannot be for just part of the drift layer, and (2) there cannot be multiple fields. The WDTX rejected both arguments. JA3469; JA3523-3532.

For this term and term #8, MPS appears to be making the same arguments the WDTX

rejected. With the slight of pen, MPS has rewritten “single drift layer” to mean something completely different: “single unidirectional layer.” A “single” drift layer does **not** mean there is only one field in that layer. Presumably MPS will argue the drift layer cannot have multiple fields due to the prosecution history. But the prosecution history says the **exact** opposite, and this argument has already been rejected by the WDTX.

During prosecution, Dr. Rao initially amended the claims to add “unidirectional.” JA0348. But “unidirectional” does **not** mean there cannot be multiple fields. If it did, there would have been no reason for Dr. Rao to make the following amendment: “a single static unidirectional electric drift field.” JA0384. This amendment proves MPS is wrong. If “unidirectional” necessarily meant **only** one field, there would have been **no** reason to specify a “single” field. But then it gets worse for MPS. The claims were subsequently amended to remove the word “single” and **broaden** their scope.

said drift layer further having a first to create and maintain a single static unidirectional electric drift field...; and  
at least one well region disposed in said single drift layer, said well region having...a second static unidirectional electric field...

JA0414. This amendment not only got rid of the single field requirement, but it confirms the drift layer has at least two electric fields (one in the drift layer, and one in the well region disposed in the drift layer).

The prosecution history is fatal to MPS’ construction, and the WDTX has already determined this term should be given the full scope of its plain meaning for at least the following reasons:

- (1) there is a “heavy presumption” that terms should be give their plain meaning. JA3496.
- (2) Cirrus did not expressly allege lexicography or disclaimer, which are the only two

exceptions to the general rule. *Id.*

- (3) the plain meaning of “unidirectional” only means a single direction; it does not mean the field has to point in a single direction over a particular area or region. JA3529-30.
- (4) Applicant did not make a prosecution disclaimer for Kamins because the claimed electric field draws minority carriers away from the surface (not towards it as done in Kamins). JA3530-32.
- (5) “Unidirectional” does not mean there is only one electric field for at least two reasons: (1) the plain meaning of “unidirectional” refers to how many directions, not how many fields; and (2) during prosecution, Applicant added “single” before “unidirectional electric field” (if “unidirectional” meant “single,” then the amendment to add “single” would be meaningless). JA3532;
- (6) 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. JD3532.
- (7) WDTX and Oregon previously rejected Cirrus’ arguments and determined that it should be given its plain meaning. *Id.*

This Court should reach the same conclusion for the same reasons.

Because the surrounding claim language clarifies the “single drift layer” has a “graded concentration of dopants” and a “unidirectional electric drift field,” there is no reason to construe this term to say what the surrounding claim language already says. To the extent the Court requires construction, this term should be construed to mean: “single (*i.e.* one) layer with at least one electric drift field.”

#### **b) MPS’ Answering Position**

Greenthread’s construction says nothing, provides no clarity, and instead improperly

attempts to broaden this claim to cover multiple electric drift fields existing within the recited single drift layer, which is contrary to the intrinsic record.

The intrinsic evidence discusses the single drift layer as a single unidirectional layer with a graded dopant concentration. The applicant successfully used that feature to distinguish the prior art, arguing that the prior art contained a “subsurface field [ ] formed using a heavily doped ‘buried layer’ and a lightly doped epitaxial film over a lightly doped substrate” which the applicant described as “layers of different dopant concentrations,” in contrast to the applicant’s “single layer with a gradient established in donor concentration.” JA0312. The Examiner responded that the claims did not recite that the drift layer is required to be a “single layer” (JA0324), to which applicant amended the claims to add “a single drift layer” and made the drift field “unidirectional” (JA0332). A POSITA would also understand that a single drift layer requires one layer with the graded dopant concentration. As the name confirms, the layer is singular. (JA5089, ¶¶71-72.)

The prosecution history further confirms that the gradient of the dopant concentration must go in one direction. As applicant explained, the prior art “show[s] two electrical fields with opposing directions, away from the area of maximum dopant concentration towards both the surface layer and the substrate, respectively.” JA0335 (referencing Kamins Figure 3). And the applicant’s amendment “clarif[ied] that Applicant’s claimed ‘drift layer’ is a single unidirectional layer with a graded dopant concentration.” JA0335. In related applications, applicant also explained “the ‘direction’ of the electrical field and the resulting direction of the carrier movement depends solely on the slope of the graded concentration of dopant.” JA0667-68; *see generally* JA0934. The graded dopant concentration causes the electric field to aid the minority carriers toward the substrate based on the slope of the gradient. (JA5089-90, ¶¶72-74.)

Because the minority carriers can only move in one direction in the single drift layer

following the direction of the grade of the dopant concentration, all the statements made by the applicant during prosecution support MPS's construction. To establish the later claimed unidirectional electric drift field, the gradient of the dopant concentration must go in one direction. Allowing multiple gradients, as is permitted by Greenthread's broadening instruction, would violate the physics of the semiconductor device. (JA5090, ¶ 75.). Nothing in the intrinsic or extrinsic record supports Greenthread's broadened construction.

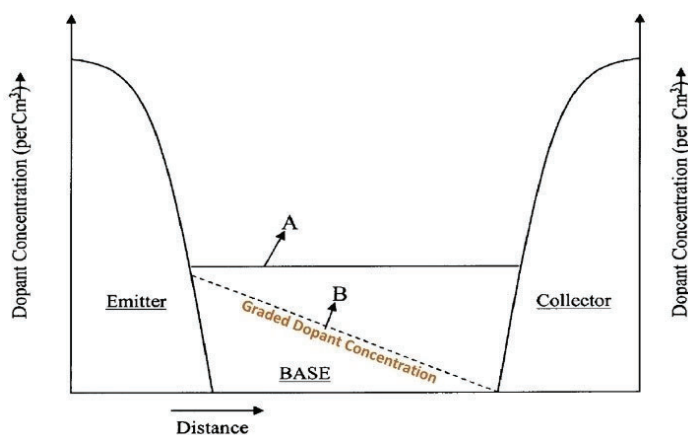
6. “graded concentration of dopants” and other “graded” terms (195:1, 5, 6; 502:7; 842:1, 6, 8, 9, 14, 16; 481:1, 5, 7, 9, 20, 25, 27, 31; 222:1, 5, 7, 9, 21, 26, 28, 32, 39–42, 44)

| Greenthread                                                                                                           | Defendants                                                                  |
|-----------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|
| Plain and ordinary meaning, where the plain and ordinary meaning is a “graded (or varying) concentration of dopants.” | “dopants that continuously decrease in concentration over increasing depth” |

**a) Plaintiff’s Opening Position**

Cirrus argued the “graded” terms are indefinite. The WDTX disagreed, and gave them their plain meaning. JA3514-23. Now, Defendants seek to require dopants that “continuously decrease in concentration over increasing depth.” This is not the plain meaning, and it is squarely at odds with the intrinsic record and the WDTX’s determination that the “drift layer” can have multiple fields.

A POSITA would understand that a “graded” concentration” is one that “varies.” In fact, these were Dr. Rao’s exact words. JA0013(2:36). This is how “graded” is used in Fig. 1 and throughout the rest of the intrinsic record.



JA4937-4938(¶75); JA0003. While Fig. 1 arguably shows a concentration that continuously decreases over increasing depth, Dr. Rao never said it had to continuously decrease, and he certainly did not disclaim the full scope of the plain meaning of “graded.”

The prosecution history is fatal to Defendants' construction. During prosecution, the Examiner pointed to Rhodes, [0046] and region 160 as disclosing a "graded" concentration." JA0153. As explained in [0048-49] (JA4472), region 160 has the following dopant concentration.

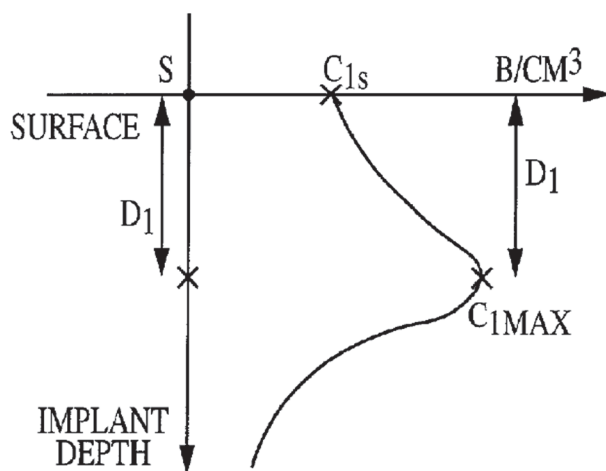
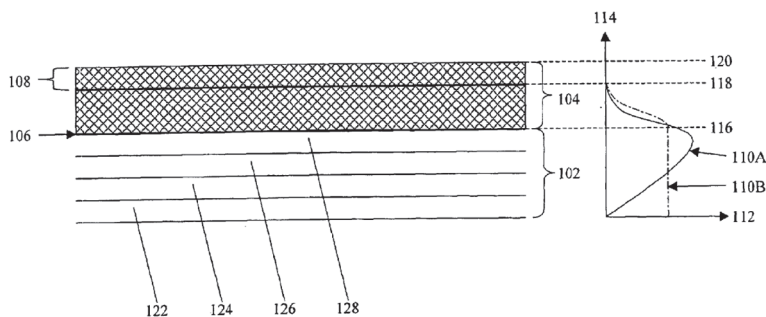


FIG. 13a

JA4472(Fig. 13a). Thus, the Examiner understood "graded" to include a non-linear concentration that both increases and decreases over increasing depth. Upon receiving this rejection, Dr. Rao never argued that this concentration is not "graded."

Later, the Examiner pointed to Currie as disclosing a "graded" concentration." JA0210. The concentration is shown in the following figure.



JA4498(Fig. 1). Again, the Examiner understood "graded" to include non-linear concentrations that both increase and decrease. Like before, Dr. Rao did not disagree.

To drive this point home, the Examiner cited to Kamins as disclosing a “graded” concentration.

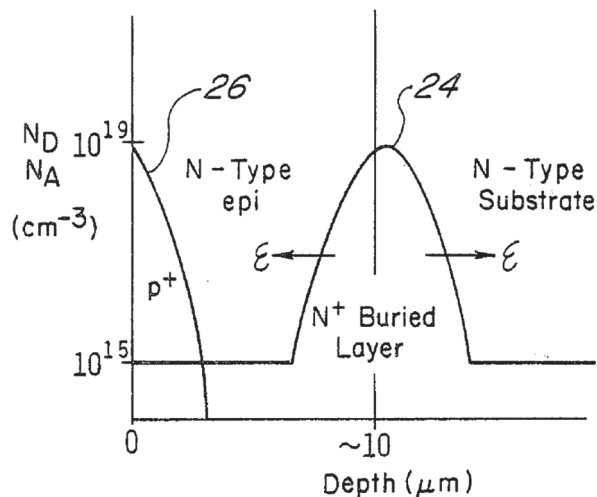


Figure 3

JA0280; JA3938(Fig. 3). Again, the Examiner understood “graded” to include non-linear concentrations that both increase and decrease, and Dr. Rao did not disagree. There is no way to reconcile Defendants’ construction with the prosecution history and the rest of the intrinsic record. When construing this term, the Court should give it the full scope of its plain meaning, and use the same wording that Dr. Rao did (*i.e.*, a varying concentration of dopants).

### b) Defendants’ Answering Position

The dispute centers around whether the dopant concentration can vary across a specific layer/region (Greenthread), or if it must “continuously decrease” (Defendants). Defendants’ interpretation is correct because it follows the intrinsic record and, moreover, the purported novelty of aiding carrier movement downward via the decreasing dopant concentration. Greenthread’s “varying” construction would result in varying carrier movement, which is inconsistent with the intrinsic record and alleged point of novelty. Under Greenthread’s “varying” construction, the

only type of dopant concentration *not* covered would be an unvarying, 100% homogeneous concentration from top to bottom, which is a physical impossibility. (JA5091, ¶¶77-78.)

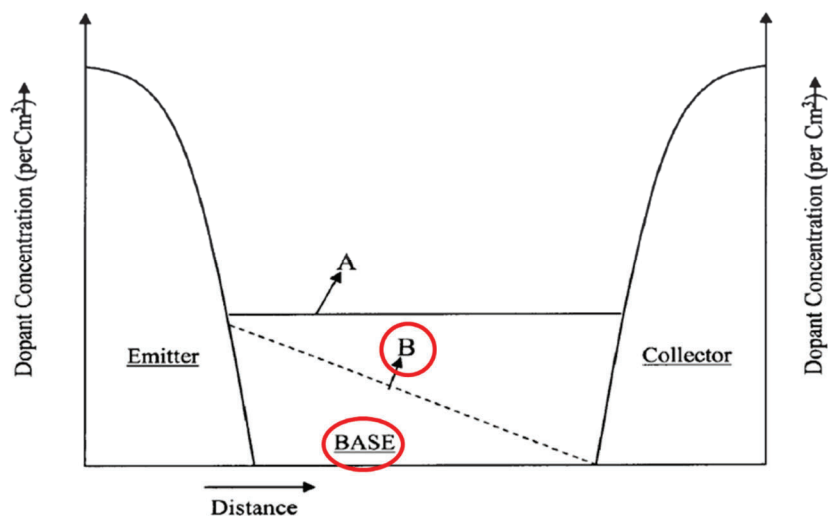
The claim language supports Defendants’ construction, because it accurately describes the physical structure of the graded dopant concentration in a manner consistent with aiding carrier movement downward. Specifically, exemplary claim 1 of the ’195 Patent recites: (a) a specific structure (“single drift layer,” ’195 Patent at 4:18); (b) the structure’s location (“disposed between the other surface of said surface layer and said substrate,” *id.* at 18-19); and (c) the structure’s property (“having a graded concentration of dopants extending between said surface layer and said substrate,” *id.* at 4:20-21). This dopant concentration provides a specific effect, *i.e.*, providing a “drift field to aid the movement of minority carriers from said surface layer to said substrate.”<sup>2</sup> (*Id.* at 4:21-24.) To have the “single drift layer” that aids minority carriers downward, the layer must have a dopant concentration that “continuously decrease[s],” and this is consistent with Defendants’ construction. (JA5091-92, ¶80.)

In an attempt to avoid this reality, Greenthread misleadingly points to illustrations of dopant concentrations from prior art devices as a whole, as opposed to the specifically claimed layer/region that has the “graded concentration.” Naturally, numerous layers, if taken as a whole, can have a “varying” doping concentration. That does not mean the claimed singular specific layer with the “graded concentration” at issue can vary. All five patents claim a specific region/layer that has a “graded concentration of dopants” (JA5092, ¶81.) but also recite other layers whose concentrations are not limited. (*Id.*) Greenthread’s analysis of devices as a whole is thus inconsistent with the claims.

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<sup>2</sup> This field—according to applicant in prosecution—is created by the “graded dopant concentration [that] itself creates a ‘built-in’ electric field that forces the movement of carriers into a particular direction.” (JA0387-JA0388, Apr. 17, 2012 Amendment at 6-7.)

The specification further supports Defendants’ construction. FIG. 1—which Greenthread admits supports Defendants’ construction—illustrates a continuously decreasing dopant concentration when it provides the meaning of “graded” (marked in red, below). (’195 Patent at 2:13-15 (“FIG. 1 illustrates the relative doping profiles of emitter, base, and collector, for the two most popular bipolar junction transistors: namely, *A-uniform base*, and *B-graded base*”) (emphasis added).)



The specification further states that the dopant concentration decreases by 10 to 100x from one end of the base to the other, *i.e.*, it decreases consistent with FIG. 1. (*Id.* at 2:38-40.) The specification continues that the “slope of the donor concentration throughout the base[] creates a suitable aiding drift electric field, to help the holes [] transverse from emitter to collector.” (*Id.* at 2:42-45.) The drift field—created by this decreasing concentration of dopants—is described by the specification as the “novel technique” that drives minority carriers downward. (*Id.* at 3:30-33 (“a novel technique has been described here by creating a drift field to sweep these unwanted minority carriers into the substrate as quickly as possible.”). Further, when describing examples of dopant gradients, the specification describes only those that provide a continuously sloped

dopant profile (as opposed to something whose slope varies from negative to positive or vice versa). (*Id.* at 2:40-45; (JA509-93, ¶82.) These consistent descriptions strongly support Defendants’ construction. *See Sequoia Tech., LLC v. Dell, Inc.*, 66 F.4th 1317, 1326 (Fed. Cir. 2023).

The prosecution history further provides support for Defendants’ construction because, as discussed above, applicant repeatedly and successfully argued that a layer with a continuously decreasing dopant concentration distinguished his invention from the prior art. The issued claims recite a “single drift layer” that provides an electric field that “aids the movement of minority carriers from said surface layer to said substrate.” (’195 Patent at 22-24.) This field—according to applicant in prosecution—is created by the “graded dopant concentration [that] itself creates a ‘built-in’ electric field that forces the movement of carriers into a particular direction.” (JA0387-JA0388 at 6-7; JA5093, ¶84.)

Applicant argued that the graded dopant concentration’s slope is what forces minority carriers downward or upward.<sup>3</sup> (JA0387 at 6 (“[d]epending on the particular slope of the graded concentration of dopant, all minority carriers are either swept ‘down’ (from the surface layer to the substrate) or ‘up’ (from the substrate to the surface layer).”) This feature, according to applicant, was not present in the prior art because it either forced carriers upward or forced carriers downward, *i.e.*, it varied their movement. (JA0388 (“Kamins discloses a photosensing device in which selective doping of a semiconductor substrate of the device produces electric fields in the substrate which accelerate photogenerated charge carriers toward or away from the surface of the device”).). The importance of the dopant concentration’s downward slope to novelty described in prosecution contradicts Greenthread’s argument that it can be varying.

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<sup>3</sup> The upward aspect is covered by claims not asserted in this case. (’195 Patent at 4:58-59.)

The prosecution history also refutes Greenthread's "varying" construction by excluding a multilayer structure. In response to the Examiner rejecting the claims over Kamins (JA320), applicant argued that Kamins failed to provide a "graded concentration of dopants" in a layer because it taught "layers of different dopant concentrations." (JA0298 ("Kamins use of the phrase 'dopant gradients' refers to layers of different dopant concentrations, and not a single layer with a gradient established in donor concentration as required by the claim.")). In other words, applicant argued that the claims are directed to a single layer having a "graded dopant concentration" and not one that varies across multiple layers.

For its part, Greenthread's construction renders the limitation superfluous, because the only way the limitation would *not* be met is if the dopant concentration is completely unvarying and constant from top to bottom. (JA5093-94, ¶¶85-86.) This is physically impossible (*id.* at ¶ 78), and thus would make the limitation meaningless.

Lacking any real intrinsic evidence for its construction, Greenthread misconstrues the exchanges regarding the Kamins, Rhodes, and Currie prior art. As an initial matter, Greenthread provides no legal support for its argument that an examiner's interpretation is relevant for claim construction. Nonetheless, Greenthread's statements are wrong as a factual matter.

First, as discussed above, Greenthread's assertion that there was no significant exchange relevant to the disputed "graded concentration" phrase in Kamins is plainly wrong.

Second, Greenthread is incorrect that the Rhodes exchange is supportive of its construction. Greenthread's cited-to rejection (JA0153) is excerpted below and, on its face, it is inconsistent with Greenthread's premise that the Examiner "understood 'graded' to include a non-linear concentration that both increases and decreases over increasing depth." This rejection is generic:

3. Claims 3 and 6 are rejected under 35 U.S.C. 102(b) as being anticipated by Rhodes (US 2003/0042511 ), hereinafter Rhodes. Regarding claim 3, Rhodes (refer

to Figures 5-14) teaches a semiconductor device with graded dopant concentration (page 4, para 0046, 1st sentence) in the well regions (160, 170, 180) to aid carrier movement away from the active surface regions, towards the substrate (page 6, para 0061; page 4, para 0045 & 0049).

The Examiner's analysis was focused on the well regions, which did not extend into any region where the concentration decreases. JA4487 at [0049] ("At the bottom of the deep retrograde p-well 60, that is, at depth D1 (FIG. 13a).")

Moreover, Greenthread's argument that it did not address the doping limitation in light of Rhode's FIG. 13a and therefore "graded" must mean "varying" has no factual basis. Greenthread's brief selectively provides a singular figure (FIG. 13a) at the exclusion of others (FIG. 13b, below, JA4481) subject to the rejection. FIG. 13b shows a downward sloping profile, and applicant would not argue against the claimed doping profile when it was taught by the prior art.

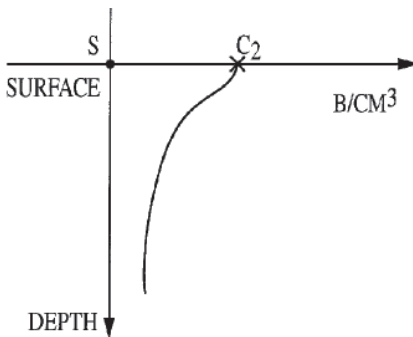


FIG. 13b

Greenthread's other arguments on examiner representations relating to Currie similarly fail. The rejections are as generic as above (*see, e.g.*, JA0210 (Currie rejection)), and Currie teaches a downward sloping gradient in some layers, *e.g.*, layers 122, 124, and 128 (annotated below). (*See also* JA4503-04 at 4:66-5:5 (describing 122, 14, and 126 as separate layers).) Again, it would be improper to give any weight to applicant's non-responsiveness under this factual record.



**a) Plaintiff's Opening Position**

With this term, MPS appears to be taking another run at arguments that Intel and Cirrus lost. As discussed above, the drift layer is not limited to dopants that continuously decrease from the surface layer to the substrate. Therefore, MPS' construction cannot be correct.

As explained above, a "graded" concentration is one that varies, and the prosecution history confirms the dopants can increase and decrease between the surface layer and the substrate. When this larger issue is resolved in Greenthread's favor, no further construction is necessary. The words "extending" and "between" are common words that do not need to be construed.

To the extent the Court require construction, MPS' construction is wrong. The plain meaning of "extending" includes "stretching." JA3618. Thus, the "graded" concentration can "extend (stretch) between" the surface layer and the surface, without extending all the way *from* the surface layer *to* the surface. To rewrite this term, to require "from" and "to" would read extraneous limitations into the claims when there is no justification for doing so. It would also be at odds with the WDTX's determination that the electric field can be for part, but not all of the drift layer. JA3529-30. Should the Court construe this term it should be given its plain meaning: "extending (*i.e.*, stretching) between the surface layer and the substrate." JA4940-4941(¶81).

**b) MPS' Answering Position**

The disputed phrase has two general components, "graded concentration" and "extending." The "graded concentration" dispute was discussed in the preceding section, and this section addresses the "extending" component. The claims make clear that the graded concentration should extend "from the surface layer to the substrate," consistent with MPS's construction. ('195 Patent at 4:20-21.) In other words, the plain meaning is that the graded concentration starts at the surface layer and extends to the substrate. (JA5094-95, ¶¶88-89.)

Defendants' construction is further supported via the specification's description of the '195

Patent's novelty. *Sequoia Tech.*, 66 F.4th at 1326. The purported novelty lies in sweeping minority carriers from the surface into the substrate via the graded concentration of dopants. ('195 Patent at 3:30-35 ("novel technique has been described here by creating a drift field to sweep these unwanted minority carriers into the substrate as quickly as possible, from the active circuitry at the surface.")). (JA5095, ¶¶90-91.)

Defendants' construction is also supported by the prosecution history, where the invention was repeatedly described as sweeping minority carriers from the surface to the substrate. The examiner applied a rejection, arguing that the Kamins prior art taught the claimed "graded concentration of dopants extending between said surface layer and said substrate." (JA320-321.) In response, applicant argued that Kamins was different because it had a dopant gradient that did not extend from the surface to the substrate, and this variation in the dopant curve changed whether carriers were attracted to the surface or to the substrate. (JA0335 (arguing that Kamins teaches that "carriers created below the maximum dopant concentration are accelerated into the substrate [ ... ], while carriers created above the maximum dopant concentration are accelerated toward the surface.")).) Applicant contrasted the claims as reciting a "graded dopant concentration which draws all minority carriers away from the surface layer to the substrate - none of the carriers [are] drawn from the substrate to the surface layer." (JA0335.) The examiner again rejected the claims based on Kamins. (JA0368-369.) In response, applicant again emphasized the disputed phrase, arguing that "[d]epending on the particular slope of the graded concentration of dopant[s], all minority carriers are either *swept 'down' (from the surface layer to the substrate)* or 'up' (from the substrate to the surface layer)." (JA3087 (emphasis added).) Applicant continued that the examiner improperly had "not consider[ed] that the graded dopant concentration itself creates a 'built-in' electrical field that forces the movement of carriers into a particular direction."

(JA0388.) The claims were subsequently allowed based on further amendment to other limitations.

(JA0443.) This history confirms that the doping gradient must sweep carriers from the surface to the substrate, which is accurately captured in both the claim language and MPS's construction.

(JA5095-96, ¶¶92-93.)

While Greenthread's proposal using "stretching" is facially acceptable, its apparent interpretation of "stretching" is incorrect. A plain understanding of "stretching" between two points, would similarly mean that whatever is being "stretch[ed]" is being "stretch[ed]" from point A and B. Greenthread, however, argues that "stretching" covers any instance where a "dopant gradient" exists at any location between A and B. This argument is inconsistent with the plain language and intrinsic record.

Finally, Greenthread's argument that Intel/Cirrus offered this construction is incorrect; this phrase has never been construed.

8. “aid the movement” terms (195:1; 502:7; 842:1, 9; 481:1, 20; 222:1, 21, 39, 41-42, 44; 014:1, 21)

| Greenthread     | MPS                                                                                                                                |
|-----------------|------------------------------------------------------------------------------------------------------------------------------------|
| Not indefinite. | Indefinite.<br>If this term is not found to be indefinite, it should be construed as “cause [minority] carriers to move downward.” |

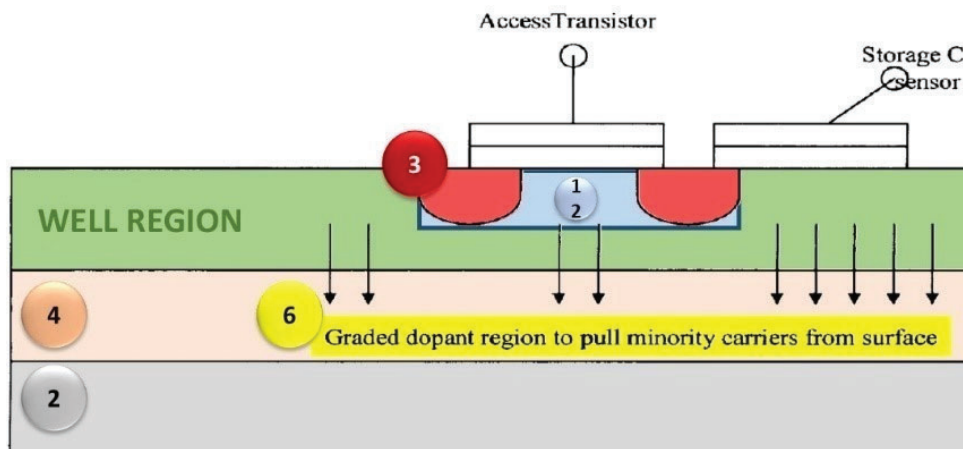
a) Plaintiff’s Opening Position

Intel argued these terms are indefinite. The WDTX and Oregon disagreed. JA3469; JA3476. Notably Intel and Cirrus did not argue they are indefinite, and they filed IPRs indicating that they knew what this term means. This is compelling evidence these terms are not indefinite. Cirrus argued instead that these terms require, for example, “starting from [the surface layer] and reaching to [the substrate].” JA3532-3536. The WDTX disagreed and gave them their plain meaning.

“Aid the movement” is a simple term that is readily understood by POSITAs and lay persons alike. JA4941(¶85). Any one that has put a little WD40 on a rusty hinge, or stretched before exercising, knows what it means to “aid the movement” of something. The claims specify exactly *who* and *what* is “aiding the movement,” and *where* and *when* the movement occurs. *Id.*, ¶88. Moreover, the specification provides specific examples of each of these, and the prosecution history confirms these examples. When as, here, the patent has claimed with particularity and provided specific example, the claim is not indefinite. *Enzo Biochem, Inc. v. Applera Corp.*, 599 F.3d 1325, 1336 (Fed. Cir. 2010).

The claims themselves explain that it is the drift layer, and more specifically the electric drift field, that aids the movement of minority carriers. JA4942(¶87). Electric drift fields are a

well-known phenomenon, and a POSITA would have readily understood that this field makes it easier for the carriers to move. JA4943(¶89). This is exactly what is shown in Fig. 5B.



JA4943(¶89). The specification confirms how the field aids the movement of the carriers. JA0013-14(2:40-47, 3:30-35). The prosecution history further confirms this. JA0154, JA0179-80, JA0210-11. Thus, a POSITA would readily understand this term. JA4943(¶90).

Turning to MPS' alternate construction, it reads extraneous limitations into the claim when there is no justification for doing so. Under MPS' construction, the relevant-part of the claim would read:

[electric field] to ~~aid the movement of minority carriers~~ cause minority carriers to move downward from said surface layer to said substrate

This construction wrongly implies the electric field actually causes minority carriers to move downward from the surface layer to the substrate, as opposed to simply *aiding the movement* of minority carriers from the surface layer to the substrate. This construction will only confuse the jury and lead to nonsensical results. Dr. Rao never intended to say the minority carriers actually move from the surface layer to the substrate, and this is not how carrier movement works. JA4943-4944(¶91). There is no justification for rewriting the claims in this manner. Instead, they should

be construed to be consistent with the claim language and the description of Dr. Rao's invention. When, as here, the claims are clear on their face, they are better left untouched.

**b) MPS' Answering Position**

"Aid" itself is an unclear term that relies on a person's subjectivity. There is not any objective bound to what aiding means and this subjectivity renders "aid movement" indefinite. *See, e.g., Intell. Ventures I LLC v. T-Mobile USA, Inc.*, 902 F.3d 1372, 1381 (Fed. Cir. 2018) (finding the term "QoS [(quality of service)] requirements" indefinite because it is entirely subjective); *PerfectVision Manufacturing, Inc. v. PPC Broadband, Inc.*, Case No. 4-12-cv-623-JLH at 41, 2014 WL 4285786 at \*22 (E.D.Ark., Aug. 29, 2014) (finding the term "to help" (a synonym to "aid") indefinite because it is subjective).

Greenthread's own briefing makes the subjectivity of "aid" and its indefiniteness clear: in response to MPS's alternative construction, Greenthread argues that minority carriers ***never have to move at all*** to have their movement aided. ("Dr. Rao never intended to say the minority carriers actually move from the surface layer to the substrate, and this is not how carrier movement works.") Greenthread's paradoxical positions that carriers do not move and "aid[ing] movement" can encompass no movement whatsoever make the term entirely subjective. (JA5096-97, ¶95.)

Greenthread's position also directly conflicts with the language of the claims, the specification, the prosecution, and the extrinsic evidence. According to the claims, an electric field "aid[s] the ***movement*** of minority carriers from said surface layer to said substrate." ('195 Patent at 4:27-29 (emphasis added).) The specification further states that the "novel technique has been described here by creating a drift field ***to sweep these unwanted minority carriers*** into the substrate as quickly as possible." (*id.* at 3:30-35 (emphasis added).) Furthermore, the applicant emphasized carrier movement as a point of novelty in prosecution. (JA3087 ("[d]epending on the particular slope of the graded concentration of dopant[s], all minority ***carriers are either swept***

**‘down’** (from the surface layer to the substrate) or ‘up’ (from the substrate to the surface layer)”) (emphasis added).) Finally, minority carriers are simply electrons (p-type) or “holes,” the absence of electrons (n-type), and their movement can easily be observed. (JA5095, ¶89.) Greenthread’s attempt to disavow all these statements is bizarre. In the context of the asserted patents, a POSITA has no way to be reasonably certain that “minority carrier movement” has been aided if minority carriers need not actually move. By eliminating any structural requirement from “aid carrier movement,” Greenthread demonstrates that the term is speculative and subjective and thus indefinite. (JA5096-97, ¶¶ 94-97.)

Greenthread’s folksy examples further demonstrate the subjectivity in what might “aid” movement, especially if no actual movement is required. A “little WD40 on a rusty hinge” might aids a hinge’s movement, but what if the door is nailed shut? If the hinge cannot move, it becomes a speculative and philosophical question whether WD40 still “aids” impossible movement. Similarly, it is speculative to say stretching “aids” exercise for a person who cannot exercise because of an unrelated restraint.

**B. Claim Terms Found in Representative Claims 842:1 & 9**

| Terms | U.S. Patent No. 10,510,842, Claim 1 (842:1)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10    | <p>A semiconductor device, comprising:</p> <ul style="list-style-type: none"> <li>a substrate of a first doping type at a first doping level having first and second surfaces;</li> <li>a first <b><u>active region</u></b> disposed adjacent the first surface of the substrate <b><u>with a second doping type opposite in conductivity to the first doping type</u></b> and within which transistors can be formed;</li> <li>a second active region separate from the first active region disposed adjacent to the first active region and within which transistors can be formed;</li> <li>transistors formed in at least one of the first active region or second active region;</li> <li>and</li> <li>at least a portion of at least one of the first and second active regions having at least one graded dopant concentration to aid carrier movement from the first surface to the second surface of the substrate.</li> </ul> |

| Terms | U.S. Patent No. 10,510,842, Claim 9 (842:9)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 11    | <p>A semiconductor device, comprising:</p> <ul style="list-style-type: none"> <li>a substrate of a first doping type at a first doping level having first and second surfaces;</li> <li>a first active region disposed adjacent the first surface of the substrate with a second doping type opposite in conductivity to the first doping type and within which transistors can be formed in the surface thereof;</li> <li>a second active region separate from the first active region disposed adjacent to the first active region and within which transistors can be formed in the surface thereof;</li> <li>transistors formed in at least one of the first active region or second active region;</li> <li>and</li> <li>at least a portion of at least one of the first and second active regions having at least one graded dopant concentration to <b><u>aid carrier movement from the surface to the substrate.</u></b></li> </ul> |

10. “a first active region...with a second doping type opposite in conductivity to the first doping type” (842:1, 9; 222:39, 41-42)

| Greenthread                                                                                                                                                                                                                                                                                             | onsemi                                                                                                                                                  |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| No construction necessary.<br>To the extent this term requires construction, it should be given its plain and ordinary meaning, where the plain and ordinary meaning is “a first active region that is doped with a second type of dopants that are opposite in conductivity to the first doping type.” | “a first active region...with a source region and a drain region that each have a second doping type opposite in conductivity to the first doping type” |

**a) Plaintiff’s Opening Position**

Onsemi’s construction is at odds with the surrounding claim language and the doctrine of claim differentiation. There is no justification for limiting the 842 and 222 claims to CMOS transistors with a source and a drain, when Dr. Rao deliberately chose broader claim language that reads on other types of transistors.

By comparison, claim 195:1 requires “an active region including a source and a drain.” A source and drain are found in a particular type of transistor called a “CMOS” transistor. JA4944(¶¶93-94). Not all active regions will have a source and a drain, and 195:1 drives this point home. If an active region necessarily required them, there would have been no reason to include the additional limitations “source” and “drain.”

Turning now to representative claim 842:1, there is no mention of a CMOS transistor, much less a source or a drain. It simply says a transistor can be formed in the active region. This means the transistor can be any type of transistor, including one that does not have a source or a drain. If Dr. Rao had intended to limit 842:1 to a CMOS transistor, he could have done so. But he decided otherwise. Instead, he added a dependent claim 18 that specifies the transistors are “CMOS transistors requiring a source, a drain, a gate and a channel region.” Under the doctrine of claim differentiation, these limitations should not be read into the base claim.

Once this larger issue is resolved in Greenthread’s favor (*i.e.*, the claims-at-issue do not require a source and a drain), there is no need to construe this term. It is clear on its face what is meant by the active region have a second doping type opposite in conductivity to the first doping type. Should the Court require construction, this term should be given its plain meaning: “a first active region that is doped with a second type of dopants that are opposite in conductivity to the first doping type.”

**b) Onsemi’s Answering Position**

*1. onsemi seeks to clarify what is the “doping type” of the “first active region”*

Construction is necessary because Greenthread would eliminate the requirement that the substrate and first active region have opposite doping types. Claim 1 of the ’842 patent recites “a substrate of a first doping type at a first doping level” and “a first active region...with a second doping type *opposite* in conductivity to the first doping type and within which transistors can be formed.” JA0045 (’842 patent, claim 1) (emphasis added); *see also id.*, claim 9; JA0079-0080 (’222 patent, claims 39, 41, and 42). This means that if the doping type of the substrate is “p-type,” then the doping type of the first active region must be “n-type,” and, conversely, if the substrate is “n-type,” then the first active region must be “p-type.”

However, identifying the “doping type” of the “first active region” is not straightforward because transistors in a semiconductor device typically include regions with different doping types. The source and drain regions are separated by a channel region, which usually has a different doping type from the source and drain. *See* JA4101 (“A *channel region* in the semiconductor under the gate electrode separates the source and drain. The channel...is lightly doped with a dopant type opposite to that of the source and drain”) (emphasis in original); p. 3, *supra*. Thus, onsemi’s construction is appropriate to explain that a POSITA would understand the “doping type” of the “first active region” to be the doping type of the source region and the drain region, *not* the

channel region.

Focusing on the source and drain regions aligns with the industry-wide description of transistor types in semiconductor devices. The “N” in NMOS and the “P” in PMOS correspond to the doping types (n and p, respectively) of a transistor’s source and drain regions; these devices are also referred to as “n-channel” and “p-channel” devices, with “n-” and “p-” identifying the conducting carriers (and thus matching the doping type of the source/drain, but *not* the doping type of the channel). See JA3750 (referring to “n-channel MOSFETs” as “NMOS for short” and “p-channel transistors” as “PMOS”); JA5018-5019 (NMOS has “n-type source and drain regions”); JA4105-4107. This is shown in the two figures below from textbooks, each showing a NMOS/n-channel transistor with n-type source and drain regions, and a p-type channel region:

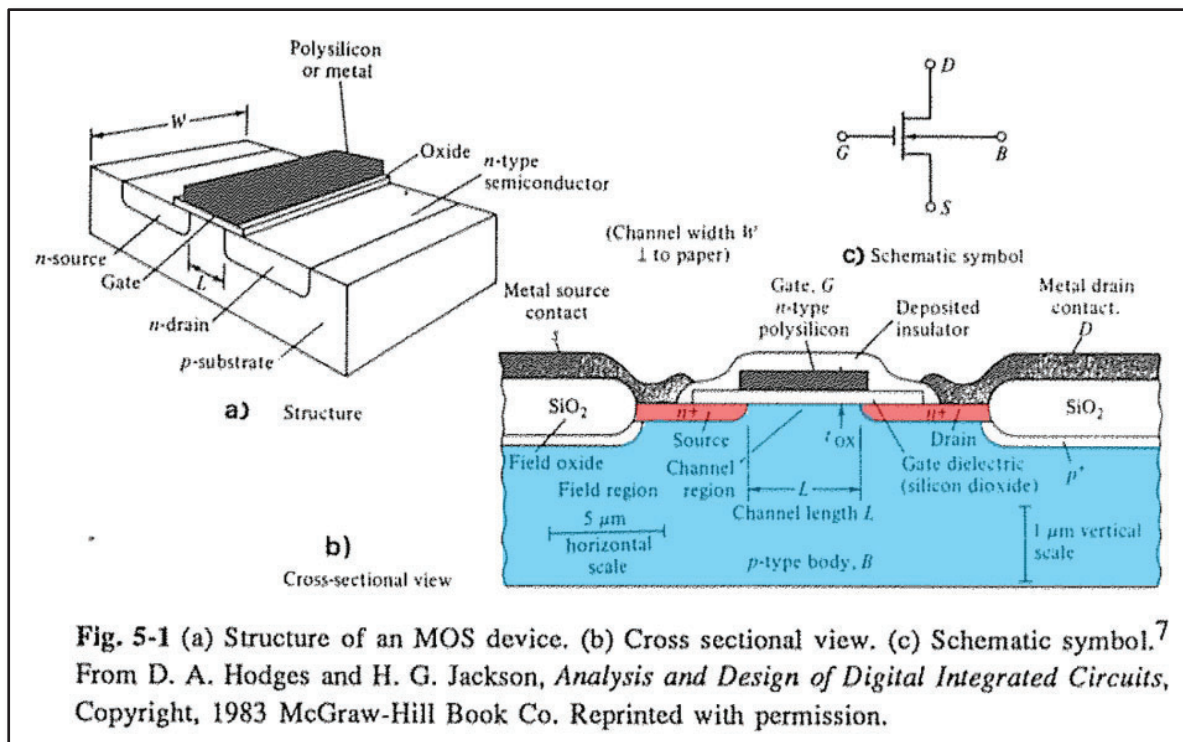
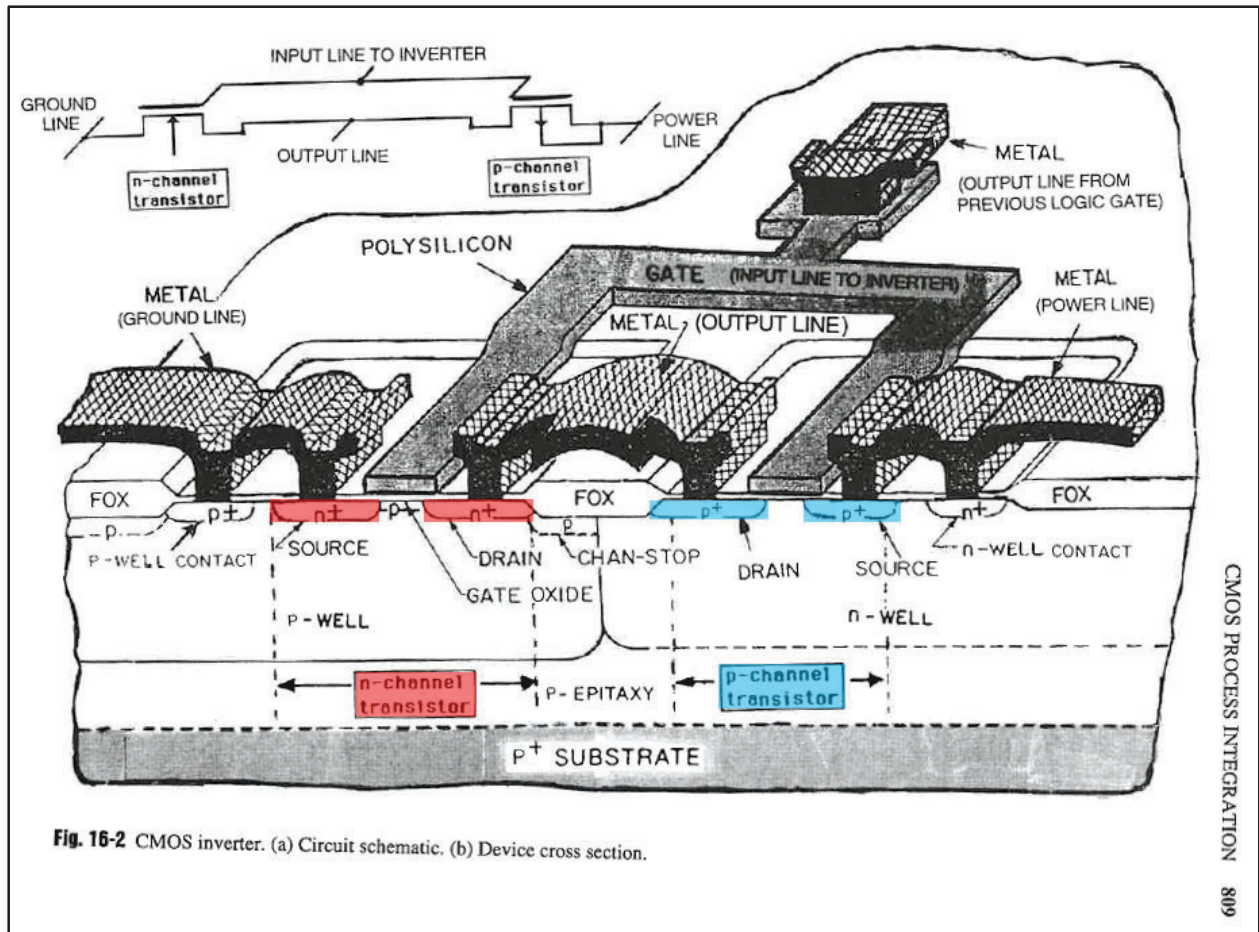


**Fig. 5-1** (a) Structure of an MOS device. (b) Cross sectional view. (c) Schematic symbol.<sup>7</sup>  
From D. A. Hodges and H. G. Jackson, *Analysis and Design of Digital Integrated Circuits*,  
Copyright, 1983 McGraw-Hill Book Co. Reprinted with permission.

JA4105, Figure 5-1(a)-(c) (annotated)



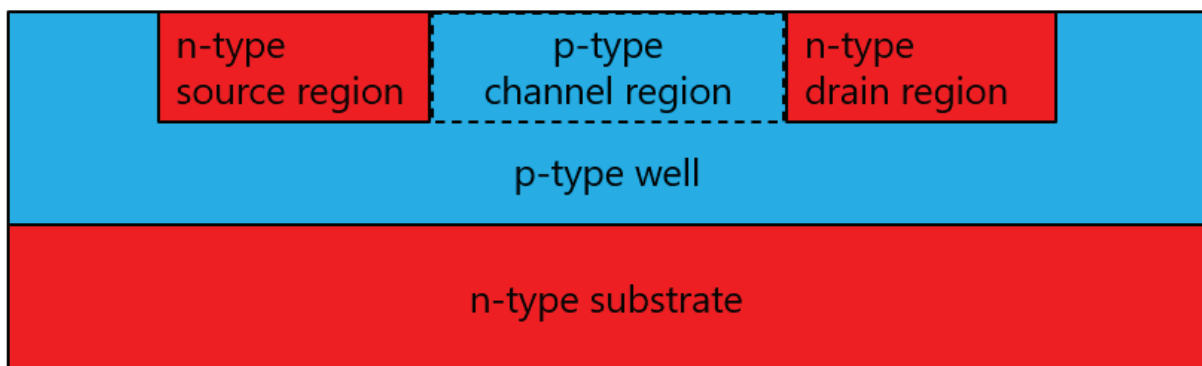
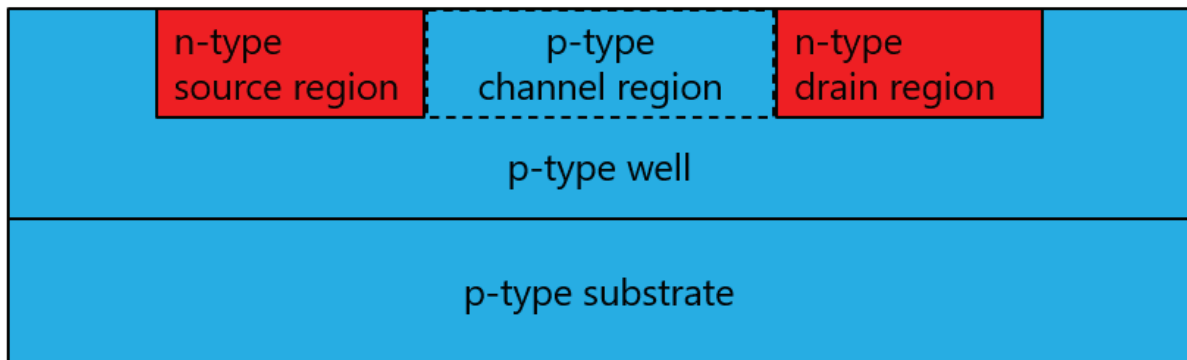
JA4049, Figure 16-2 (annotated).

2. Greenthread is trying to read “opposite” out of the claims

Under the guise of “no construction,” Greenthread is effectively seeking a construction where the doping type of *either* the source/drain *or* of the channel counts as the “doping type” of the “first active region.” Under this interpretation, virtually every “first active region” *would have both* p-type and n-type doping. Allowing the “doping type” of the “first active region” to be so flexible contradicts the plain claim language and is unsupported by the intrinsic record.

Greenthread’s interpretation would render the “opposite in conductivity to the first doping type” limitation meaningless. Because the source and drain of a transistor are typically opposite in doping type from the channel, the doping type of the substrate would no longer matter: no

matter the doping type of the substrate, part of the “first active region” would necessarily have a doping type opposite in conductivity. If the substrate and channel are both p-type, then the source/drain would be n-type; and if the substrate and source/drain regions are all n-type, then the channel region would be p-type.



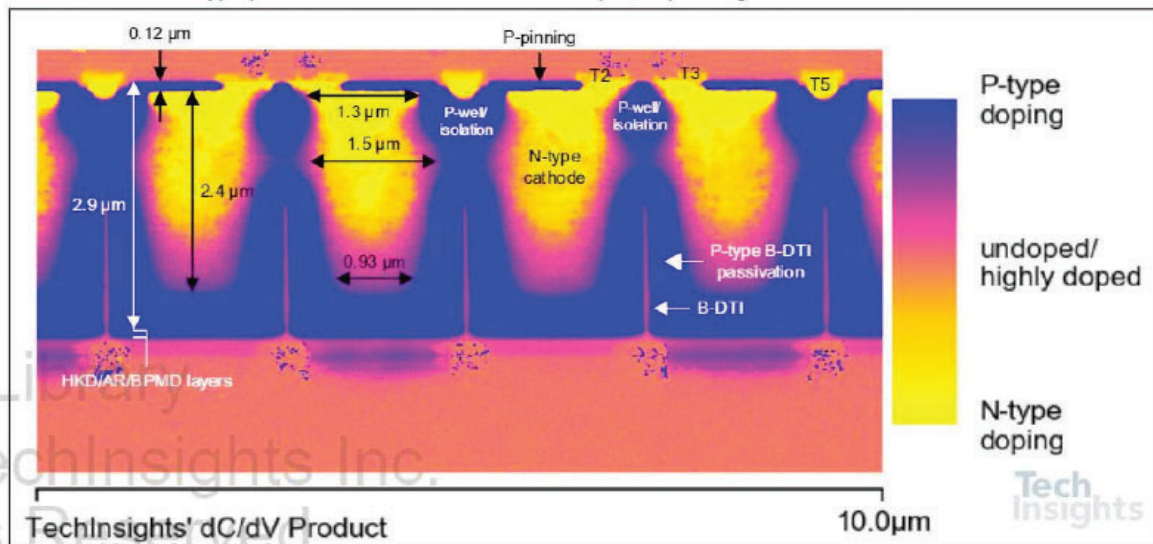
Put another way, if asked whether the “doping type” of a given active region is n-type or p-type, Greenthread’s answer would be “both.” That cannot be correct. To be “opposite” of the substrate’s doping type (n or p), the active region must be one or the other (p or n). Otherwise, “opposite” has no meaning— “opposite” could be replaced with “identical,” and the claim scope would be unchanged.

This is also not an accident; Greenthread seeks to read “opposite in conductivity” out of

the claims because Greenthread is accusing products with n-type transistors and n-type substrates. Greenthread alleges that onsemi's accused products include "a silicon (Si) substrate having a first doping type (n-type)," and then Greenthread later identifies "P-wells...with a second doping type opposite in conductivity to the first doping type[.]" *Compare* D.I. 1-4 (Exhibit 4 to Complaint), p. 8 (Exhibit A-1 ('842 Patent), Claim 1, Element 1) *with* pp. 9-10 (Claim 1, Element 2). Greenthread relies on the p-well because the source and drain regions in the accused products (below) are n-type, *the same as* the n-type substrate. No POSITA would call these n-type transistors "opposite in conductivity" to the n-type substrate.

## Pixel Cross Section Analysis – X-Direction

- SCM cross section image through section line G (T2 and T3 XFER gates).
- The N-type photocathode is 2.4  $\mu\text{m}$  thick. As shown in the sMIM-C image on the next page, the top region of the photocathode has a higher doping concentration.
- The width of the N-type photocathode varies from 0.93-1.5  $\mu\text{m}$ , depending on the location.



T2 and T3 (XFER) Gates and Photocathode (Section Line G) – SCM

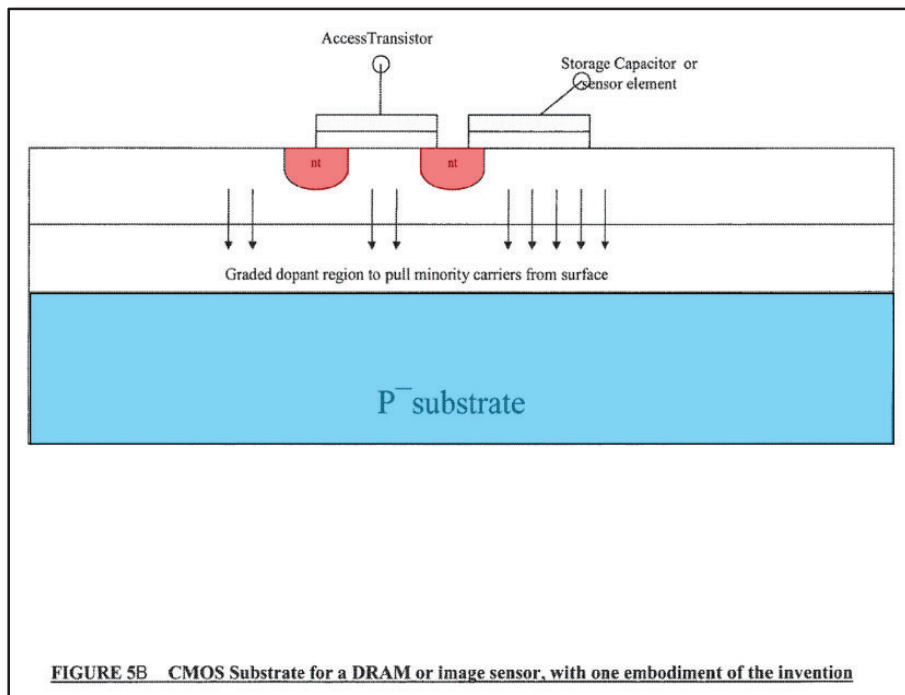
152 All content © 2020, TechInsights Inc. All rights reserved.

AR0820AT Report at 152.

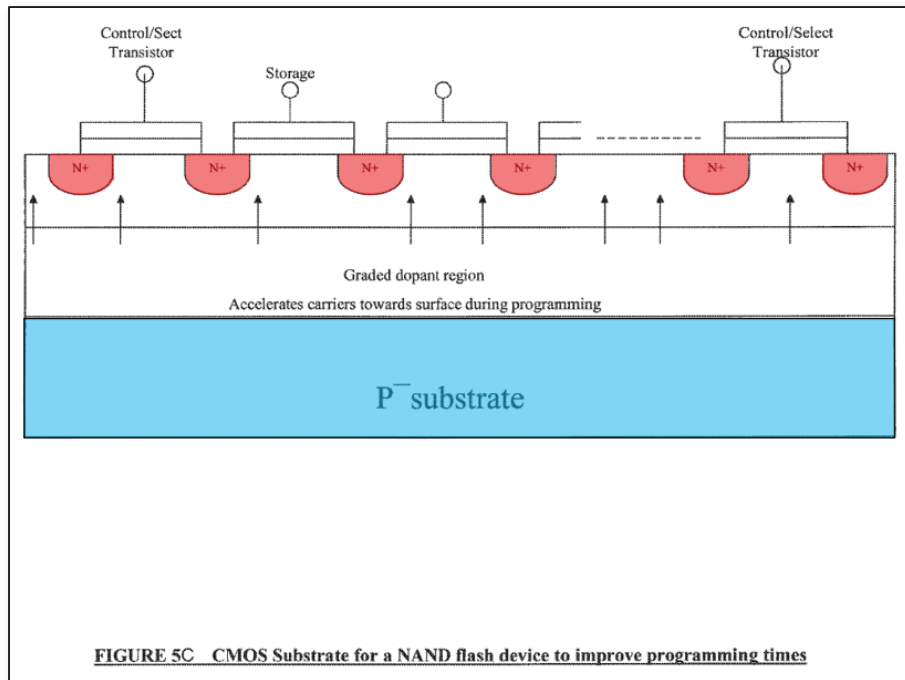
D.I. 1-4 (Exhibit 4 to Complaint), p. 10

3. onsemi's construction is supported by the intrinsic record

The intrinsic record also supports onsemi's construction. Figures 5B and 5C of the patents (below) show an n-type source region and an n-type drain region, and a  $p^-$  type substrate. Being n-type, these source and drain regions are “a second doping type opposite in conductivity to the first doping type” of the  $p^-$  type substrate. This is exactly what onsemi proposes. The “doping type” of the channel region is not even identified in these figures, which confirms the channel region doping type is irrelevant.



JA0042 ('842 patent, Figure 5B) (annotated)



JA0043 ('842 patent, Figure 5C) (annotated)

Dependent claim 6 of the '842 patent also follows the traditional usage of the terms “n-channel” and “p-channel,” which supports onsemi’s interpretation. JA0046. Claim 6 recites “wherein the first active region and second active region contain either p-channel or n-channel devices in n-wells or p-wells, respectively, and each well has a graded dopant.” *See also* claim 14 (which depends on claim 9). This matches the descriptions of n-channel (NMOS) and p-channel (PMOS) devices in the textbooks annotated above. *See* JA4049, Figure 16-2 and JA4105, Figure 5-1(a)-(c) (*supra*). By describing the “-channel” of the devices as opposite in conductivity to the well regions, claim 6 confirms that a POSITA would focus on the doping type of the source and drain regions, not the channel region. Similar descriptions of “p-channel” and “n-channel” devices appear throughout the prosecution of patents in this family. *See also* JA0225-0226 ('195 patent file history, Amendment dated 8/26/2009) (“It is well known in the art that p-ch xstors [*sic*] are in n-well and vice versal in CMOS circuits”); JA5041 (File history to U.S. Pat. App. 13/854,319

(related application of asserted patents), Amendment dated 4/29/2014) (“the n-well effectively isolates a p-channel transistor fabricated in the n- well from the n-channel transistors fabricated in the respective p- wells” and “both the n- well and p- wells each function to isolate the active region (devices)...”). These distinctions between the well (i.e., channel) doping types and the active region/channel doping types confirms onsemi’s proposed construction.

4. Greenthread’s focus on the “source” and “drain” terms is a red herring

Greenthread’s assertion that “[t]here is no justification for limiting the 842 and 222 claims to CMOS transistors with a source and a drain” misses the point entirely. *See* p. 47, *supra*. There is no meaningful dispute that the transistors at issue have a source and a drain. Greenthread confirms as much by identifying claim 1 of the ’195 patent as “representative” in its Technical Background section (*see* page 4, *supra*). As Greenthread notes, this claim relates to a “CMOS” transistor having a “source” and “drain” as it explicitly recites a “CMOS Semiconductor device” and an “active region including a source and a drain.” JA0014; *see* pp. 4-7, *supra*.

Because there is no dispute that the transistors at issue have a source and a drain, onsemi maintains that it is appropriate to use the simple terms “source” and “drain” as a shorthand to refer to “where the electrons are coming from” and “where the electrons are going.” This is how Greenthread itself ubiquitously describes the claimed invention. *See* pp. 2-4 (e.g., “When enough electrons have accumulated in the surface layer below the oxide, they form a conductive channel between the source and the drain, and current can begin to flow through the transistor”), 5-7, *supra*. But, to resolve this dispute, other descriptors for “where the electrons are coming from” and “where the electrons are going” could be added to onsemi’s proposed construction, e.g.: “a first active region...with a source (or emitter) region and a drain (or collector) region that each have a second doping type opposite in conductivity to the first doping type. The exact words used for

“where the electrons are coming from” and “where the electrons are going,” are not important. What is important is clarifying that the doping type of these regions—whether called a source/drain or an emitter/collector—defines the doping type of the active region.

**11. “aid carrier movement from the surface to the substrate” (842:9; 481:20)**

| <b>Greenthread</b> | <b>Defendants</b> |
|--------------------|-------------------|
| Not indefinite.    | Indefinite        |

**a) Plaintiff’s Opening Position**

This term overlaps with term #9. As discussed above, Intel argued this term is indefinite, but the WDTX and Oregon disagreed. JA3469; JA3476. Additionally, Cirrus argued “the surface” is indefinite. Again, the WDTX sided with Greenthread and determined “the surface” refers to the surface of the active region. JA3552-55. These two rulings put to rest any arguments Defendants can possibly make.

As the WDTX correctly noted, a POSITA would have understood that the graded concentration aids carrier movement from the surface *of the active region* to the substrate, and this is exactly what is shown in Fig. 5B. JA4945(¶95). Given the WDTX’s previous decisions, Defendants cannot possibly meet their burden of clear and convincing evidence to convince this Court to reach a contrary result.

**b) Defendants’ Answering Position**

Greenthread’s reliance on prior decisions is misplaced because Defendants are entitled to independently challenge these claims, as discussed above. Notwithstanding any prior decisions, this claim language is indefinite for two reasons. First, the claims recite “first and second surfaces” and it is not clear which surface “the surface” refers to. Second, because the claim already requires these surfaces to be part of “a substrate,” it is unclear what moving “from the surface to the substrate” requires. Carriers at the surface have already reached the substrate—no motion is required. These ambiguities make it impossible for a POSITA to understand the claims with reasonable certainty.

Moreover, Greenthread's citation to the WDTX court's decision highlights these ambiguities. While Greenthread says the claims refer to "the surface *of the active region*..." this is *not* what the Court in WDTX concluded. *See* p. 57, *supra* (emphasis in original). That court concluded "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.**" JA3557 (bolding added). The "surface of the active region" (Greenthread's interpretation) is not the same as the "surface of the substrate" (the WDTX court's interpretation). This disconnect confirms that a POSITA cannot understand the scope of these claims with reasonable certainty.

Greenthread's assertion that "the surface" refers to "the active region" does nothing to clarify the claim. The claims recite a "first active region" and a "second active region," and Greenthread does not explain which active region "the surface" purportedly refers to. This is no better than referring to a first and second surfaces. The specification and figures also shed no light on the meaning. Figures 5B and 5C do not clarify which "surface" is relevant to this element. Indeed, Greenthread has not identified any "surface of the active region" in Figure 5B or 5C that would be "the surface" at issue.

**C. Claim Term Found in Claim 222:39**

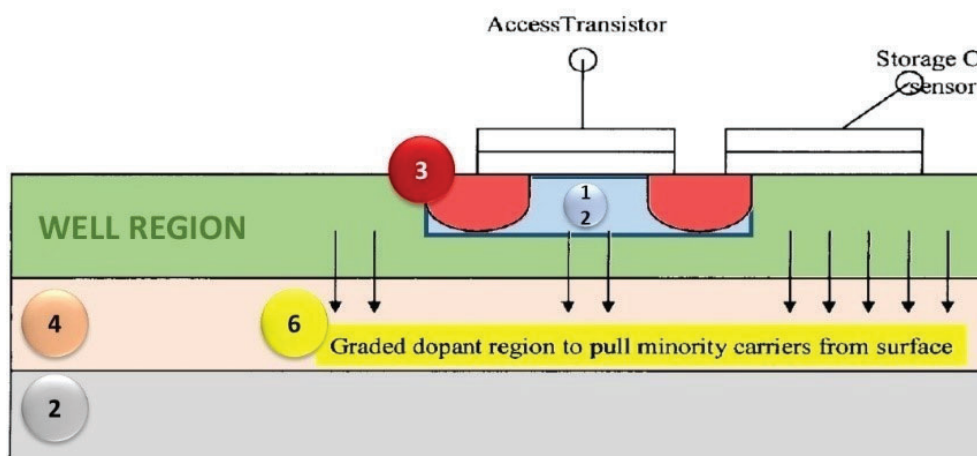
| Terms                                                                             | U.S. Patent No. 11,121,222, Claim 39 (222:39)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>A semiconductor device, comprising:</p> <ul style="list-style-type: none"> <li>a substrate of a first doping type at a first doping level;</li> <li>a first active region disposed adjacent to a surface of the substrate with a second doping type opposite in conductivity to the first doping type and within which transistors can be formed;</li> <li>a second active region separate from the first active region disposed adjacent to the first active region and within which transistors can be formed;</li> <li>transistors formed in at least one of the first active region or second active region; and</li> <li>at least a portion of at least one of the first and second active regions having at least one graded dopant concentration to aid carrier movement from the first or second active region to <b><u>at least one substrate area where there is no active region</u></b>.</li> </ul> |

12. “at least one substrate area where there is no active region” (222:39, 41-42)

| Greenthread     | onsemi     |
|-----------------|------------|
| Not indefinite. | Indefinite |

**a) Plaintiff’s Opening Position**

A POSITA would have understood the graded concentration is aiding carrier movement from the active region to a portion of the substrate where there is no active region. JA4945(¶96). This is exactly what is shown in Fig. 5B.



JA0011. The graded concentration is aiding carrier movement to an underlying layer where there is no active region. The claim language is clear on its face, and a POSITA would have readily understood what is meant. JA4945-46(¶97).

**b) Onsemi’s Answering Position**

A POSITA has no way of understanding when a carrier has moved to “at least one substrate area where there is no active region.” The specification and file history are unhelpful, and Greenthread’s own explanation misses the point. The key problem is that the claims do not recite going from the active region to the substrate—the claims require going to an “area” with no active region. Nothing in the patent explains when a carrier is out of the “area” of an active region.

Greenthread’s argument that “[t]he graded concentration is aiding carrier movement *to an underlying layer* where there is no active region” does nothing to resolve the uncertainty. *See* p. 60, *supra* (emphasis added). Greenthread has merely substituted its proposed definition of “substrate” into the claim language. This does not explain what “area” means—Greenthread simply eliminates “area” from the claims. By seeking to eliminate the idea of an “area,” Greenthread is implicitly acknowledging that there is no coherent way to define the bounds of an “area” in the ’222 patent.

Figure 5B also does not explain when a carrier has moved to any “area” where there is no active region. The layers that Greenthread highlights in Figure 5B do not appear to be to scale. At best, Figure 5B merely shows carrier movement to some intermediate layer (Greenthread’s “4”) between the substrate and the “well region” (identified by Greenthread in green). *Id.* It is unclear this relates to the claim language, and it provides no guidance about what “area” means.

### **III. CONCLUSION**

#### **A. Plaintiff's Conclusion**

For the reasons above, terms 1-2, 9, and 11-12 are not indefinite, and all of the terms should be given their plain meaning.

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