

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Inergy Technology, Inc.,

Petitioner

v.

Force Mos Technology Co., Ltd.,

Patent Owner

Case No. IPR2024-00093

Patent No. 7,629,634

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	CONSTRUCTION OF THE CLAIMS	1
A.	“lateral contact layer” (Claim 1)	1
1.	Express construction is not required	2
2.	Dopant concentration is not required.....	4
3.	Dopant implantation is not required	6
B.	“the sidewalls of said trenches in said base layer” (Claim 1)	8
III.	CLAIMS 1-9 ARE UNPATENTABLE	9
A.	Ground 1: Hirler Anticipates Claims 1, 2 and 6.....	9
1.	Claim 1	9
2.	Claims 2 and 6.....	15
B.	Ground 2: Hirler in view of Kobayashi and the Knowledge of a POSITA Render Obvious Claims 3-5 and 7-9.....	15
C.	Ground 3: Shiraishi Anticipates Claims 1 and 2.....	16
1.	Claim 1	16
2.	Claim 2	22
D.	Ground 4: Shiraishi in view of Kobayashi and the Knowledge of a POSITA Render Obvious Claims 3-9.....	22
E.	Ground 5: Kobayashi in view of Shiraishi and the Knowledge of a POSITA Render Obvious Claims 1-9	23

I. INTRODUCTION

Petitioner presented five grounds of unpatentability based on three prior art references and the knowledge of a POSITA. Patent Owner's challenges to these grounds fail because Patent Owner misreads the prior art disclosures and overlooks strong motivation to combine the relevant prior art teachings. Under any of the proposed claim constructions, including the Board's preliminary determination to interpret the claims according to their plain and ordinary meaning, Petitioner has demonstrated by a preponderance of the evidence that claims 1-9 of U.S. Patent No. 7,629,634 are unpatentable.

II. CONSTRUCTION OF THE CLAIMS

A. "lateral contact layer" (Claim 1)

In its Institution Decision, the Board correctly rejected Patent Owner's proposed construction for the phrase "lateral contact layer" for reading limitations into the claim from the specification. Paper 13 at 8-13. Patent Owner's Response, however, ignores the Board's guidance and attempts once again to improperly import the dopant implantation and concentration features into the claim. For the reasons discussed below, the Board should affirm its preliminary findings.

1. Express construction is not required

Patent Owner argues that “lateral contact layer” requires an express construction because the phrase is otherwise ambiguous as it appears in the claim. Paper 25 at 10-15. Patent Owner is wrong for three reasons.

First, Petitioner’s application of “lateral contact layer” is neither vague nor inconsistent. Paper 25 at 10. Petitioner’s application of the term merely reflects the fact that the phrase is broad on its face and covers both Hirler’s “body amplification zone” and of Shiraishi’s “layer 14.” As Patent Owner acknowledges, the prior art structures and the claimed “lateral contact layer” share benefits, which only reinforces that the “lateral contact layer” was found in the prior art. *Id.* In addition, there is no merit to Patent Owner’s suggestion that “lateral contact layer” is vague simply because the prior art does not use the same phrase. *Id.* Patent Owner does not point to any requirement that the prior art use the same words as the claim language to anticipate—because no such requirements exists.

Second, Patent Owner incorrectly argues that “lateral contact layer” is a “coined term” the meaning of which can only be determined from the specification. Paper 25 at 10-11. Patent Owner is wrong that “lateral contact layer” is a coined term that lacks any plain or established meaning simply because it was not used in the field before. *Id.* In *Malvern Panalytical*, for example, the Federal Circuit rejected the district court’s view that “‘pipette guiding mechanism’ is a coined term

(and thus cannot be construed broader than the disclosure in the specification) because the phrase itself lacked “a commonly understood meaning in the art.” *See Malvern Panalytical Inc. v. TA Instruments-Waters LLC*, 85 F.4th 1365, 1374 (Fed. Cir. 2023). Instead, the Federal Circuit construed the phrase according to its plain and ordinary meaning by looking to the plain meaning of the words “pipette,” “guiding,” and “mechanism” individually. *Malvern*, 85 F.4th at 1372. Thus, whether the phrase “lateral contact layer” was known in the art or readily understandable to a POSITA is immaterial to Patent Owner’s construction.

Patent Owner also argues that an express construction is necessary because several potential ambiguities allegedly would arise if a POSITA looking at the words of “lateral contact layer” individually ***did not consider or ignored*** the specification. Paper 25 at 12-14. Again, this is wholly irrelevant. As the Federal Circuit has explained, it is appropriate to construe a term by looking to the meaning of the individual words in the context of the patent, not merely what is known in the art. *See Malvern*, 85 F.4th at 1374-75; *see also Littelfuse, Inc. v. Mersen USA EP Corp.*, 29 F.4th 1376, 1381 (Fed. Cir. 2022) (“[T]he district court was correct in seeking to give meaning to the term ‘fastening stem’ by looking to the meaning of the words ‘fastening’ and ‘stem’ as used in the patent.”). Here, Patent Owner does not argue that “lateral contact layer” lacks meaning when read as the words of the claim as used in the patent. To the contrary, as the Board correctly noted in its Institution

Decision, “[w]e find especially significant, on the point of ambiguity, that Patent Owner admits that the plain and ordinary meaning of ‘layer’ on its own is quite broad, meaning ‘a region having unique electrical properties (e.g., n layer).’” Against that backdrop, we are hard pressed to discern any ambiguity in the meaning of the term ‘lateral contact layer,’ which plainly indicates a lateral contact region having unique electrical properties.” Paper 13 at 10 (citations omitted).

Third, Patent Owner incorrectly argues that an express construction is needed to distinguish the “lateral contact layer” from other regions and layers because “claim 1 provides no guidance what those differences are.” Paper 25 at 14-15. As the Board correctly noted in its Institution Decision, “[t]he definitional and notice function of a patent claim is so central to patent law that, when a claim’s meaning is contested and the claim drafter can amend the claim to state expressly what the drafter contends it says implicitly, the burden is properly on the drafter to amend rather than to shift the burden onto anyone else — a patent examiner, a competitor, the public generally, or the courts — to guess about the claim’s meaning.” Paper 13 at n.7 (citing *In re Morris*, 127 F.3d 1048, 1054, 1057 (Fed. Cir. 1997); *White v. Dunbar*, 119 U.S. 47, 51–52 (1886)).

2. Dopant concentration is not required

Patent Owner argues that “the specification repeatedly and consistently refers to the layer contact layer as having P* doping, indicating that is required by the

invention as a whole.” Paper 25 at 16. The Board correctly rejected this argument, determining that the phrase “lateral contact layer” does not require “a dopant concentration between P and P+ (“P* doping”) for an N-channel MOSFET or between N and N+ (“N* doping”) in a P-channel MOSFET.” Paper 13 at 9-12. Moreover, Patent Owner concedes that the P* doping configurations “are focused on *the example of an ‘N-channel MOSFET structure.’*” Indeed, Patent Owner readily acknowledges that “the specification expressly provides that . . . ‘this invention is *also applicable to a P-channel MOSFET structure.*’ Thus, in a P-channel MOSFET, the lateral contact layer would have N* doping.” Paper 25 at 17 (internal citations omitted). Simply put, the examples of P* and N* doping from the specification remain insufficient to provide definitional language or serve as a disclaimer of claim scope. Indeed, as the Board correctly noted, “[c]laims 2 and 6 show that the patentee knew how to use words in a claim to impose a dopant concentration limitation on the lateral contact layer, but included no such language in claim 1.” Paper 13 at 11. Accordingly, the term “lateral contact layer” in claim 1 should not be read to convey a restriction on dopant concentration.

In its Institution Decision, the Board also found Patent Owner’s construction of “lateral contact layer” violates the principle of claim differentiation by rendering dependent claims 2 and 6 redundant. Paper 13 at 11-12. Patent Owner’s Response fails to show that the Board erred in its finding. Paper 25 at 17-19. Patent Owner

cannot show that the presumption of claim differentiation is overcome with a narrow construction dictated by the written description, particularly where the specification does not dictate a restriction on dopant concentration for “lateral contact layer.”

Further, Patent Owner’s argument that the restriction on dopant concentration in its construction does not render claims 2 and 6 redundant misses the point that the doping concentration limitation of claims 2 and 6, *i.e.*, “the lateral contact layer has less doping concentration than the base contact layer at bottom,” is implicit in the P* or N* dopant concentration feature in Patent Owner’s construction. Indeed, the fatal flaw in Patent Owner’s argument is underscored its own request that the Board infer from the doping concentration limitation of claims 2 and 6 that the “lateral contact layer” of claim 1 also requires the dopant concentration feature. Paper 25 at 16 (“The fact that the lateral contact layer is defined by the P* doping concentration of the specification is also strongly inferred from claims 2 and 6 which recite ‘the lateral contact layer has less doping concentration than the base contact layer at bottom.’”).

3. Dopant implantation is not required

Patent Owner ignores the Board’s guidance and repeats its failed argument that “the specification makes clear that the lateral contact layer is implanted into the sidewall of then-existing the source contact trenches.” Paper 25 at 19-20. In its Institution Decision, the Board correctly noted that “[c]onstruing ‘lateral contact

layer’ to import from the specification the dopant implantation limitation advanced by Patent Owner would blur the distinction between claim and disclosure, and violate the well-settled principle that ‘the name of the game is the claim.’” Paper 13 at 13 (citing at *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998)). Nothing in Patent Owner’s Response shows that the specification clearly defined the term “lateral contact layer” to convey a dopant implantation feature or compels violating “the well-established principle that reading a claim in light of the specification does not mean reading limitations into the claim from the specification.” Paper 13 at 9 (citations omitted). On the contrary, Petitioner’s expert Dr. Neikirk acknowledged at his deposition that a P or N layer may be formed by different doping processes, such as “doping dot by diffusion, doping by ion implantation, doping during material growth are just specific.” Ex. 1018 (Neikirk Tr.) at 32:12-33:6. And in particular, Dr. Neikirk admitted that ion implantation “is an example of a process for creating this lateral contact layer in terms of adding dopants,” and that the term “lateral contact layer” is “not limited to a specific process.” *Id.* at 34:13-35:19.

Patent Owner also incorrectly contends that use of “region” and “layer” in the claim supports the dopant implantation limitation of Patent Owner’s construction. Paper 25 at 20-21. According to Patent Owner, use of “region” and “layer” would prompt a POSITA to “look to meanings of ‘layer’ that distinguish the ‘lateral contact layer’ from a ‘region’” because use of different words signals different meanings.

Id. at 20. Patent Owner then surmises that a convenient definition for “layer,” *i.e.*, a “thin sheet of a substance,” which would inform the meaning of “covered” in such a way so as to require “implanting dopant into the sidewalls of an existent source contact trench.” *Id.* at 20-21. Patent owner undermines its own purported distinction between “layer” and “region” by construing “lateral contact **layer**” to mean “a **region** of dopant which is implanted into sidewalls of the source contact trenches.” *Id.* at 21. Nothing in the Response refutes the Board’s finding that none of the words in claim 1 “even remotely touch upon a requirement related to dopant implantation.” Paper 13 at 12.

B. “the sidewalls of said trenches in said base layer” (Claim 1)

Petitioner submits that to the extent required, its proposed construction for “the sidewalls of said trenches in said base layer” remains correct for the same reasons set forth in the Petition. Petitioner, however, disagrees with Patent Owner that an express construction is necessary at this stage. Paper 25 at 21.

Patent Owner argues that an express construction is necessary because “the structure that Petitioner identifies in Shiraishi as the “lateral contact layer” does not cover the *entire* sidewalls of the source contact trenches in the base layer.” *Id.* However, in its Preliminary Response, Patent Owner argued against an express construction because it did not dispute that the structure identified by Petitioner as

the “lateral contact layer” in Shiraishi covers the entire sidewalls of the source contact trenches in the base layer:

In particular, although Patent Owner disputes whether the structures identified by Petitioner as the alleged “lateral contact layer” satisfy that limitation as properly construed, in this preliminary response, Patent Owner does not presently dispute the extent of those structures’ coverage of sidewalls in the base layer.

Paper 7 at 8. Patent Owner’s about-face on this issue belies its request for an express construction. The Board need not construe “the sidewalls of said trenches in said base layer” because any dispute is not one of claim scope, but instead about how the term is applied to the prior art.

III. CLAIMS 1-9 ARE UNPATENTABLE

A. Ground 1: Hirler Anticipates Claims 1, 2 and 6

1. Claim 1

The only elements of claim 1 that Patent Owner contends are missing from Hirler are elements 1[a] and 1[g]. Paper 24 at 22-32. Patent Owner’s arguments, however, rest on an improperly narrow read of Hirler’s teachings.

a) Hirler discloses an “epitaxial layer corresponding to said drain region” (element 1[a])

Patent Owner argues that Hirler’s “n- drift zone 11” does not correspond to the claimed “epitaxial layer corresponding with a drain region” because Hirler does not use “epitaxial,” “epitaxis,” or similar words and does not contain any description

of how the “n- drift zone 11” was created. Paper 24 at 23. The arguments fails on both grounds.

First, there is no requirement that the prior art use the same words as the claim language to anticipate. The fact that Hirler does not use the word “epitaxial” does not mean that the “n- drift zone 11” is not an epitaxial layer.

Second, Patent Owner is wrong that Hirler does not contain any description of how the “n- drift zone 11” was created. Claim 1 of Hirler plainly describes that the “n- drift zone 11” is “successively provided” along with several other zones on a semiconductor substrate:

1. A MOS power transistor arrangement having a vertical transistor structure in which a ***drift zone (11)*** of a first conductivity type, a ***body zone (12)*** of a second conductivity type opposite 5 to the first conductivity type, and a ***source zone (13)*** of the first conductivity type are ***successively provided on a semiconductor substrate (10)*** of the first conductivity type, and in which a trench gate (14, 15) extends through the source zone (13) and the body zone (12) into the drift zone (11), wherein the body zone (12) has a contact zone 10 (17) at the base of a contact trench with a high doping concentration compared with the doping concentration of the body zone (12), characterized by a body amplification zone (19) which is introduced by implantation and subsequent annealing, and contains at least parts of the body contact zone (12).

Ex. 1006, Claim 1. Fabrication of the “n- drift zone 11” in this manner falls squarely within Patent Owner’s definition of “epitaxy” as “an ‘ordered deposition’; a process by which thin layer of single crystal material is deposited on single-crystal

substrate.” Ex. 2012 ¶109 (citations omitted). This alone demonstrates that Hirler’s n-drift zone is epitaxial.

Patent Owner contends that there are other, non-epitaxial, ways the n-drift zone 11 could be created, including by “counter-doping” and “back-side doping.” Paper 25 at 25. However, counter-doping and back-side doping are irrelevant here. According to Patent Owner’s expert, counter-doping and back-side doping are both processes that introduce dopants *into a substrate*. Ex. 2012 at ¶¶113-114. In contrast, the “epitaxial layer,” the “base layer,” and the “source layer” of Hirler’s claim 1 “are *disposed on top of each other in a specific order*.” Ex. 2012 at ¶90. As such, counter-doping and back-side doping cannot account for Hirler’s disclosure of the drift zone (11) being provided *on the substrate* (10). The only way to provide Hirler’s drift zone *on the substrate* is via epitaxial growth.

b) Hirler discloses “the sidewalls of said trenches in said base layer are covered by the lateral contact layer” (element 1[g])

Patent Owner incorrectly argues that Petitioner has not provided “any meaningful explanation as to why Petitioner contends Hirler satisfies the ‘lateral contact layer’ limitation.” Paper 25 at 27. This argument strains credulity. Indeed, Patent Owner has not rebutted any of Petitioner’s factual allegations regarding Hirler’s “body amplification zone.” Compare Paper 1 at 9-11, 21-22, 26 with Paper 25 at 26-32. Patent Owner’s quarrel is not with the sufficiency of Petitioner’s

arguments or the evidence, but rather with the breadth of its claim and its efforts to import limitations from the specification. The Board should not permit Patent Owner to reconstrue the claim language simply because Patent Owner is now dissatisfied with the claim scope.

Relying on its unduly narrow claim construction, Patent Owner argues that “Hirler’s ‘body amplification zone (19)’ cannot satisfy the ‘lateral contact layer’ for three reasons.” Paper 25 at 27. Each of these arguments is without merit.

First, Patent Owner contends that Hirler fails to disclose a “lateral contact layer” under its proposed construction because “Hirler’s body amplification zone is implanted into the semiconductor material *before* the source contact trench’s sidewalls exist.” Paper 25 at 28. In any case, Patent Owner’s theory fails because it improperly imports a method step (*i.e.*, dopant implantation) into the “lateral contact layer” of apparatus claim 1. *See Cont’l Circuits LLC v. Intel Corp.*, 915 F.3d 788, 799 (Fed. Cir. 2019) (citing *Vanguard Prods. Corp. v. Parker Hannifin Corp.*, 234 F.3d 1370, 1372–73 (Fed. Cir. 2000) (“Generally, ‘[a] novel product that meets the criteria of patentability is not limited to the process by which it was made.’”)).

Patent Owner also contends that “Hirler fails to disclose limitation 1[g] even if the Board rejects Patent Owner’s proposed construction of ‘lateral contract layer’ and instead adopts a plain and ordinary meaning construction.” Paper 25 at 28. But Patent Owner contends that the plain and ordinary meaning of “lateral contact

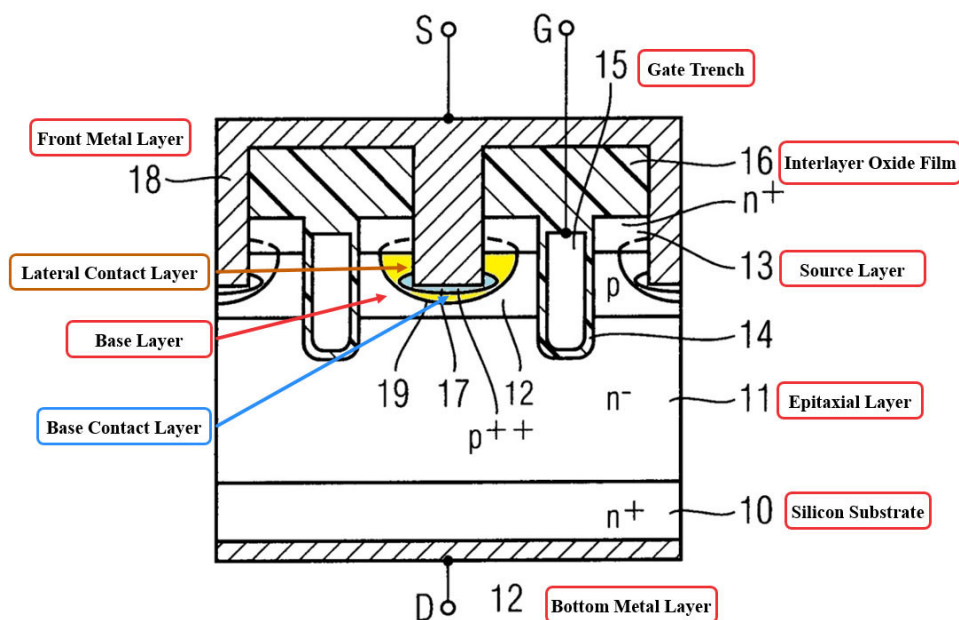
layer,” “the side walls [of the source contact trenches] need to already exist at the time of the creation of the lateral contact layer.” Paper 25 at 28-29. Thus, even under the purported plain and ordinary meaning, Patent Owner still tries to import a method step into apparatus claim 1.

Second, Patent Owner argues that Hirler fails to disclose a “lateral contact layer” under its proposed construction because Hirler’s body amplification zone has P+ doping rather than P* doping. Paper 25 at 30-31. Patent Owner’s assertions do not tell the full story. Hirler discloses that the (P+) doping concentration of the body amplification zone (19) is *larger* than the (P) doping concentration of the body zone (12) but *smaller* than the (P++) doping concentration of the body contact zone (17), which mirrors the ’409 Patent’s description of “P*.” Paper 1 at 10-11; Ex. 1003 at ¶41.

Hirler’s disclosure of the body amplification zone (19) having a P+ doping concentration between P and P++ directly corresponds to the “lateral contact layer” having a P* dopant concentration between P and P+. As Dr. Liu testified, P* is not a term of art, but rather simply denotes a relative doping concentration between the doping concentration of a base contact layer and the doping concentration of a base layer. Ex. 2014, 16:8-16. Hirler discloses precisely that same intermediate doping concentration. Once again, as noted above with respect to claim construction for

“lateral contact layer,” there is no requirement that the prior art use the same words as the claim language to anticipate.

Third, Patent Owner argues that Hirler fails, under its proposed construction, to disclose that the lateral contact layer cover the “entire” sidewalls of the source contact trench in the base layer. Paper 25 at 31. Patent Owner is wrong. As Hirler showed in Fig. 2F, the body amplification zone (19) corresponding to the “lateral contact layer” covers the entire sidewalls of the source contact trench in the p-body zone areas (12) corresponding to the “base layer.” Ex. 1003 at ¶63.



Hirler (Ex. 1006), Figure 2F (annotated)

Patent Owner mischaracterizes Hirler by suggesting that Hirler teaches that its body amplification zones will not cover the entire sidewalls of the source contact trenches. Paper 25 at 31-32. For example, Patent Owner argues that Hirler’s

disclosures “indicate that Hirler’s body amplification zone is not practically adjacent to the surface (i.e. immediately below the source layer).” Paper 25 at 31-32. Patent Owner’s self-serving interpretation lacks support and contradicts Figure 2F.

2. Claims 2 and 6

Patent Owner only disputes that Hirler anticipates claims 2 and 6 for the same reasons as claim 1. Paper 25 at 32-33. The Board should find that claims 2 and 6 are unpatentable as anticipated by Hirler for the same reasons discussed above with respect to claim 1 in Ground 1. *Supra* Section III.A.2.

B. Ground 2: Hirler in view of Kobayashi and the Knowledge of a POSITA Render Obvious Claims 3-5 and 7-9

Patent Owner challenges the combination of Hirler in view of Kobayashi and the knowledge of a POSITA on the basis that Hirler allegedly fails to disclose each limitation of claim 1. Paper 25 at 36-37. This argument fails for the same reasons discussed above with respect to claim 1 in Ground 1.

Patent Owner further argues a lack of motivation “because Hirler does not solely disclose tungsten plugs for its source contact trenches.” Paper 25 at 33. This argument rests on a fundamentally flawed premise that Petitioner is required to provide a reason for selecting one of Hirler’s embodiments over another as a primary reference for an obviousness combination. No such requirement exists. Instead, “a reference must be considered for everything it teaches, not simply the described invention or a preferred embodiment.” *Netflix, Inc. v. DivX, LLC*, No. 2022-1083,

2023 WL 2298768, at *4 (Fed. Cir. Mar. 1, 2023) (quoting *In re Applied Materials, Inc.*, 692 F.3d 1289, 1298 (Fed. Cir. 2012)). Patent Owner’s other arguments regarding Hirler and Kobayashi likewise rest on misinterpretations of the references, including as to the barrier metal plug of claim 3, and fail to counter the strong motivation to combine these references that Petitioner demonstrated in the Petition. Paper 1 at 32-37.

C. Ground 3: Shiraishi Anticipates Claims 1 and 2

1. Claim 1

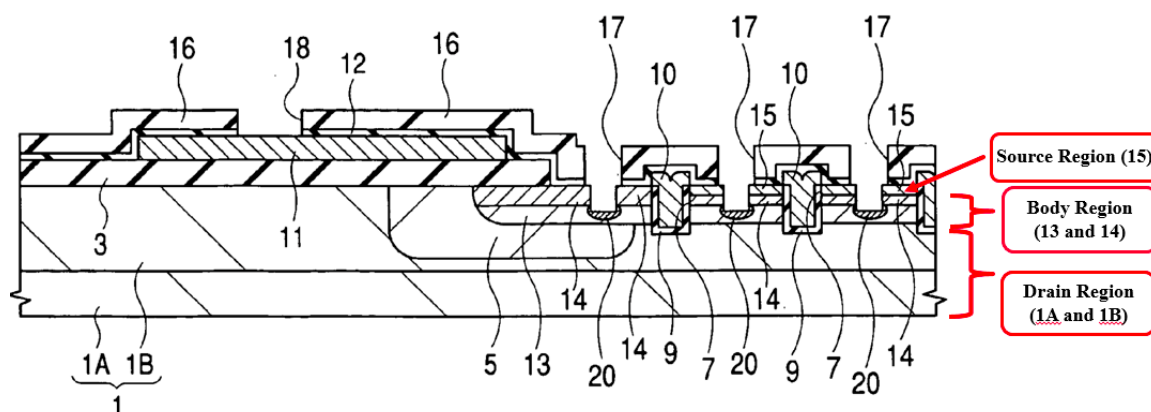
The only elements of claim 1 that Patent Owner contends are missing from Shiraishi are element 1[a] requiring “a source layer corresponding to said source region disposed on the top of said base layer” and element 1[g] requiring “the sidewalls of said trenches in said base layer are covered by the lateral contact layer.” Paper 24 at 38-49. Patent Owner’s arguments, however, rest on an improperly narrow read of Shiraishi’s teachings.

a) Shiraishi discloses “a source layer corresponding to said source region disposed on the top of said base layer”

Patent Owner argues that “according to Petitioner’s mapping of limitations, Shiraishi does not disclose a source layer corresponding to said source region disposed on the top of said base layer, because Shiraishi’s source layer 15 is instead

disposed on the top of layer 14.” Paper 25 at 39. That is not how Petitioner has applied claim 1 to Shiraishi.

As explained in the Petition with reference to Fig. 8 (reproduced below), Shiraishi discloses two p-type semiconductor regions 13 and 14, which together form a body region. Paper 1 at 37-38.



Shiraishi (Ex. 1009), Figure 8 (annotated)

More specifically, Shiraishi describes that “the p-type semiconductor region 13 may serve as a channel layer for the respective power MISFETs” and “the localized formation of the p- type semiconductor region 14 may be implemented in the p-type semiconductor region 13.” Paper 1 at 38; Ex. 1009 at [0072] and [0092]. Consistent with Shiraishi’s description of region 14 as *part of* region 13, Petitioner identified region 13 (which includes region 14) as a body or base layer that corresponds to the body region. Shiraishi further discloses region 15, which forms a source layer corresponding to a source region, disposed on the top of region 14, which is part of the region 13 that forms the base layer corresponding to the body

region. Accordingly, Shiraishi teaches a source layer (15) that corresponds to a source region and is disposed on the top of a base layer (13) and (14) that corresponds to a body region.

b) Shiraishi discloses “the sidewalls of said trenches in said base layer are covered by the lateral contact layer”

Patent Owner argues that Shiraishi’s p-type semiconductor region 14 “cannot satisfy the ‘lateral contact layer’ limitation as properly construed for at least three reasons.” Paper 25 at 40-41. Each of these arguments fails.

First, Patent Owner argues that assuming Shiraishi’s region or layer 14 is part of the “base layer,” Shiraishi does not disclose that region 14 is a “lateral contact layer” covering the “entire” sidewalls of the source contact trench in the base layer, as required by Petitioner construction. Patent Owner is wrong.

In particular, Patent Owner contends that Shiraishi’s figures show “there are portions of the sidewalls in the base layer . . . not covered by the alleged lateral contact layer.” Paper 25 at 42-44. However, the annotated version Shiraishi’s Fig. 8 provided by Patent Owner (reproduced on the left below) is misleading because it obscures coverage of the sidewalls by the base contact layer at the bottom of the trench and improperly suggests that the base layer (green) covers the sidewall below the lateral contact layer (purple):

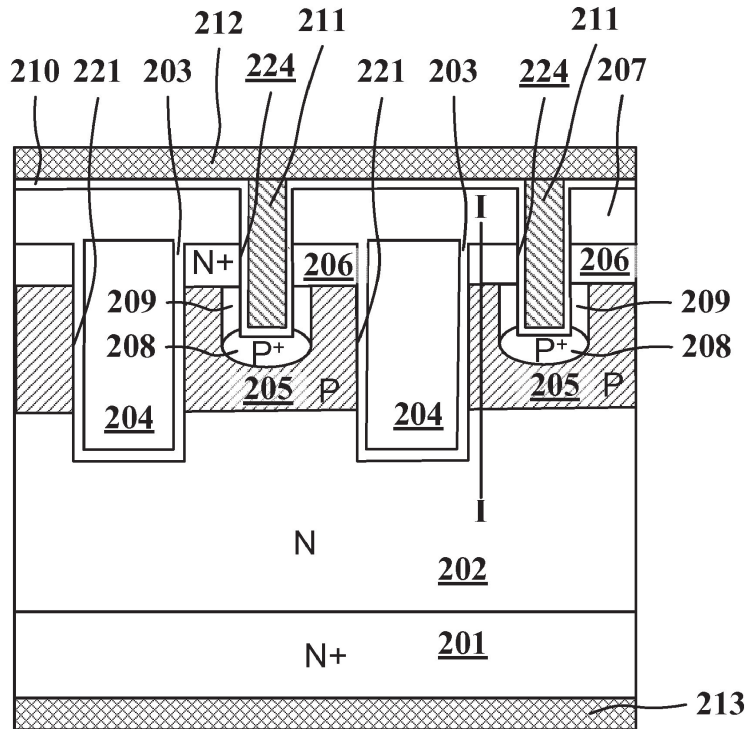


**Patent Owner's magnified and
cropped version of Fig. 8
(Paper 25 at 43)**



**Petitioner's magnified and
cropped version of Fig. 8
(Ex. 1009)**

A properly annotated version of Shiraishi's Fig. 8 (reproduced on the right above) clearly shows region 14 corresponding to the "lateral contact layer" covering the entire sidewalls of the source contact trench in the base layer between the source layer 15 and the base contact layer 20. Indeed, this part of the Shiraishi figure is very similar to the '634 Patent and its depiction of the lateral contact layer 209 covering the entire sidewalls of the trench 224 in the base layer 205 between the source layer 206 and the base contact layer 208:



'634 Patent (Ex. 1001), Figure 2G

Second, Patent Owner contends that Shiraishi fails to disclose a “lateral contact layer” under Patent Owner’s proposed construction requiring “a region of dopant which is implanted into sidewalls of the source contact trenches” because “Shiraishi’s layer 14 is implanted across the entire active region of the semiconductor surface *prior to* the sidewalls of a source contact trench existing.”¹ Paper 25 at 45. As with Hirler, Patent Owner’s theory fails because it improperly imports a method limitation, *i.e.*, implantation of the “lateral contact layer” must

¹ As explained with respect claim 1, Ground 1, this theory rests on a novel interpretation of “lateral contact layer” that is narrower than the construction initially proposed by Patent Owner.

occur only after the source contact trenches are etched, into apparatus claim 1. *See Cont'l Circuits*, 915 F.3d at 799 (citing *Vanguard*, 234 F.3d at 1372–73 (“Generally, ‘[a] novel product that meets the criteria of patentability is not limited to the process by which it was made.’”)).

Third, Patent Owner argues that Shiraishi fails to disclose a “lateral contact layer” under Patent Owner’s construction, which requires “a dopant concentration between P and P+ (“P* doping”) for an N-channel MOSFET or between N and N+ (“N* doping”) in a P-channel MOSFET” because Shiraishi does not disclose P* doping for region or layer 14. Paper 25 at 48-49. Patent Owner once again misses the mark.

Patent Owner concedes that Shiraishi describes the (P-) doping concentration of the contact layer 14 is larger than the (P-) doping concentration of the body layer 13, but smaller than the (P+) doping concentration of the base contact layer 20. Paper 25 at 48. As explained above with respect claim 1, Ground 1, Dr. Liu testified that P* is not a term of art, but rather simply denotes a relative doping concentration between the doping concentration of a base contact layer and the doping concentration of a base layer. Ex. 2014, 16:8-16. Shiraishi discloses just such a relative doping concentration and therefore anticipates.

2. Claim 2

Patent Owner only disputes that Shiraishi anticipates claim 2 for the same reasons as claim 1. Paper 25 at 49. The Board should find that claim 2 is unpatentable as anticipated by Hirler for the same reasons discussed above with respect to claim 1 in Ground 1. *Supra* Section III.A.1.

D. Ground 4: Shiraishi in view of Kobayashi and the Knowledge of a POSITA Render Obvious Claims 3-9

As an initial matter, Patent Owner argues that “the Petition again assumes, without explanation, that a POSITA would be motivated to select tungsten plugs in the combination (Pet., 47-48), even though Shiraishi teaches filling its source contact trenches with aluminum.” Paper 25 at 50. Petitioner did explain why the POSITA would be motivated to combine the tungsten metal contact plugs taught by Kobayashi with the disclosure of Shiraishi. Paper 1 at 47-48. Further, Patent Owner incorrectly suggests that Shiraishi teaches away because it discloses filling its source contact trenches with aluminum, not tungsten. Mere disclosure of more than one alternative does not constitute teaching away unless the alternatives are criticized, discredited, or otherwise discouraged. *See In re Fulton*, 391 F.3d 1195, 1201 (Fed. Cir. 2004).

Patent Owner also purports to identify significant differences between Shiraishi and Kobayashi. Paper 25 at 52. But, as with the combination of Hirler and Kobayashi, Patent Owner fails to explain how the purported differences relating to

dopants in the channel region teach away from modifying Kobayashi's teaching to add Shiraishi's barrier metal layer and metal contact plugs (claims 3-5) or to invert the P/N types of Shiraishi (claims 6-9). Patent Owner's arguments do not rebut the reasons it would have been obvious to combine Shiraishi and Kobayashi, as Petitioner explained in its Petition. Paper 1 at 46-51.

E. Ground 5: Kobayashi in view of Shiraishi and the Knowledge of a POSITA Render Obvious Claims 1-9

Patent Owner argues a lack of motivation to combine Kobayashi and Shiraishi based on three reasons. Paper 25 at 54-58. Each argument fails.

First, Patent Owner contends that Kobayashi would not benefit from a punch-through stopper layer because other forms of breakdown, *e.g.*, avalanche breakdown, could be a limiting factor. Paper 25 at 55. But this incorrectly assumes that different limiting factors are independent and exclusive of each other. To the contrary, as Dr. Liu explained in his declaration and his deposition, avalanche breakdown and punch-through, are interrelated. Ex. 1003, ¶¶ 34-35, 56; Ex. 2014 (Liu Tr.), 34:11-21. Reducing punch-through in Kobayashi remains a valid reason to combine it with Shiraishi. Paper 1 at 62-66.

Second, Patent Owner rehashes its arguments addressed in Ground 4 regarding allegedly significant differences between Shiraishi and Kobayashi. Paper 25 at 56. But again, Patent Owner fails to show that any such differences amount to a teaching away.

Third, Patent Owner repeats the same failed argument addressed above regarding whether Shiraishi layer 14 covers the entire sidewalls of trenches in the base layer.

Patent Owner's remaining arguments for claim 1, including limitations 1[a] and 1[g], are based on the same arguments and so fail for the reasons discussed in connection with anticipation based on Shiraishi (Ground 3).

Similarly, Patent Owner's remaining arguments for claim 3-5 and 7-9 are based on the same arguments and so fail for the reasons discussed in connection with the combination of Shiraishi and Kobayashi (Grounds 4 and 5).

Dated: November 11, 2024

Respectfully submitted,

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CERTIFICATION UNDER 37 C.F.R. § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner's Reply to Patent Owner's Response totals 5,174 words, which is less than the 5,600 allowed under 37 CFR § 42.24.

Dated: November 11, 2024

/Charles M. McMahon/

Charles M. McMahon

CERTIFICATE OF SERVICE

I hereby certify that on November 11, 2024, I caused a true and correct copy of Petitioner's Reply to Patent Owner's Response to be served on Patent Owner via email at the following addresses:

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Dated: November 11, 2024

/Charles M. McMahon/
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