

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICRON TECHNOLOGY, INC.,

Petitioner,

v.

YANGTZE MEMORY TECHNOLOGIES COMPANY, LTD.,

Patent Owner.

Case IPR2024-00788

Patent 10,658,378

PATENT OWNER'S SUR-REPLY

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LIST OF EXHIBITS

Exhibit	Description
Ex. 2001	Micron 4-2 Claim Construction Disclosure
Ex. 2002	YMTC 4-2 Claim Construction Disclosure
Ex. 2003	Micron’s Preliminary Claim Constructions
Ex. 2004	YMTC’s Proposed Claim Constructions
Ex. 2005	February 10, 2025, Declaration of Dr. Yang (“Yang”)
Ex. 2006	Decision Granting Institution of <i>Inter Partes Review</i> of U.S. Patent No. 10,937,806 (IPR2024-00791, Paper 11)
Ex. 2007	Deposition Transcript of Dr. Lee

LIST OF ABBREVIATIONS

Abbreviation	Term
'378 or '378 patent	U.S. Pat. No. 10,658,378
'378FH	File History of U.S. Pat. No. 10,658,378
Board or PTAB	Patent Trial and Appeal Board
Challenged Claims	'378 patent, claims 15-17, 19-20
DI	Decision Granting Institution for <i>Inter Partes</i> Review of U.S. Patent No. 10,658,378 (IPR2024-00788, Paper 13)
Makala	U.S. Patent No. 10,262,945
Mushiga	U.S. Patent No. 10,354,980
Office or USPTO	U.S. Patent and Trademark Office
Parallel district court litigation	<i>Yangtze Memory Technologies Company, Ltd. v. Micron Technology, Inc.</i> , NDCA-3-23-cv-05792 (N.D. Cal.)
Patent Owner or PO	Yangtze Memory Technologies Company, Ltd.
Petition or Pet.	Petition for <i>Inter Partes</i> Review of U.S. Patent No. 10,658,378 (IPR2024-00788, Paper 1)
Petitioner	Micron Technology, Inc.
POR	Patent Owner Response for <i>Inter Partes</i> Review of U.S. Patent No. 10,658,378 (IPR2024-00788, Paper 17)
POSITA	Person of ordinary skill in the art
Reply	Petitioner's Reply for <i>Inter Partes</i> Review of U.S. Patent No. 10,658,378 (IPR2024-00788, Paper 20)
Toyama	U.S. Patent Publication No. 2017/0179026

I. INTRODUCTION

As explained in Patent Owner’s Response (POR), the Petition fails to establish that the Challenged Claims are disclosed or rendered obvious. Petitioner’s Reply does not cure the defects of the trial grounds; instead, it fails to address the proper constructions of multiple claim terms, ignores PO’s arguments, presents irrelevant evidence, and—contrary to 37 C.F.R. §42.23(b) and *Henny Penny Corp. v. Frymaster LLC*—introduces new theories that expand the case beyond the grounds set forth in the Petition. 938 F.3d 1324, 1330–31 (Fed. Cir. 2019). The validity of all Challenged Claims should be upheld.

Ground 1A relies on Toyama’s First Exemplary Structure, which fails to teach: (1) “a substrate with an isolation structure,” because the feature mapped to the “isolation structure” is extending all the way through and beyond the surfaces of the substrate, and is therefore not “part of” the substrate; and (2) “a dielectric structure on the isolation structure,” because Petitioner arbitrarily and improperly divides Toyama’s single dielectric structure into two regions and maps different regions to two separately claimed structures. The Reply relies on faulty claim construction arguments that contradict the ’378 and binding Federal Circuit law.

Ground 1B relies on Toyama’s Second Modification, which fails to teach (1) “a substrate with an isolation structure” for the same reasons as above; and (2) “[TACs] extending vertically through the dielectric and the isolation structures”

because Toyama’s alleged TACs do not extend through the **same** dielectric structure. Petitioner’s arguments again ignore binding Federal Circuit precedent.

Ground 2 relies on Mushiga, which fails to teach: (1) “a substrate with an isolation structure” for similar reasons as Toyama; (2) “a dielectric structure on the isolation structure and extending vertically through the...stack,” because the only alleged “dielectric structure” that extends through the stack is not also “on the isolation structure”; and (3) “[TACs] extending vertically through the dielectric and the isolation structures” for the same reason as Toyama. Petitioner’s Reply relies on faulty claim constructions, repeatedly ignores PO’s arguments, and inconsistently and improperly applies its purported definition of what constitutes a single structure.

Ground 3 again uses Mushiga and fails for the same reasons as Ground 2.

Finally, all grounds fail to disclose or render obvious the TAC region of claim 17 because the alleged region is not within or defined by the alleged dielectric structure as required under the proper construction.

II. CLAIM CONSTRUCTION

A. “a substrate with an isolation structure” (Claim 15)

The term “a substrate with an isolation structure” should be construed—consistent with the claim language and every ’378 embodiment—as requiring that ***the isolation structure is “part of” the substrate***. The plain meaning of “with” is “having” or “inclusive of.” Ex. 1038, 7. Consistent with these meanings, claim 15,

Yang, ¶¶59-60. This is shown, for example, in Figure 2:

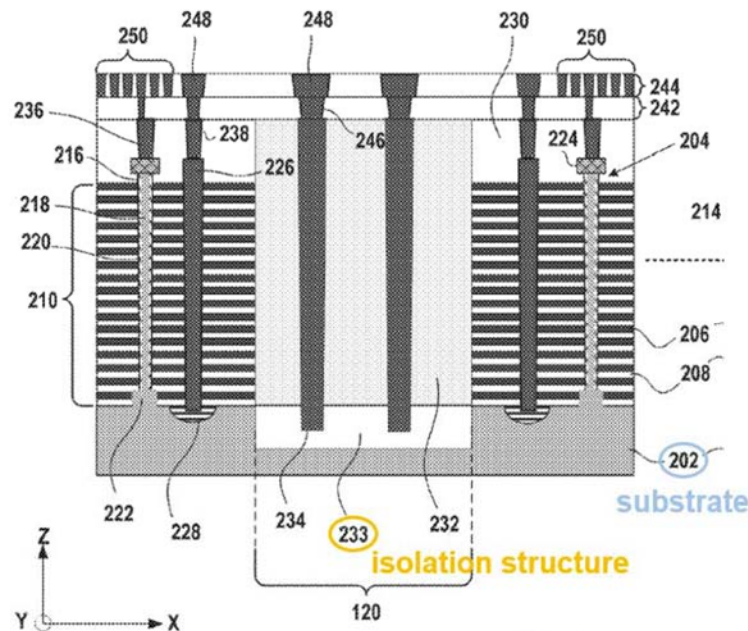


FIG. 2

substrate), then it is not part of the substrate.

with Petitioner's own extrinsic evidence, (2) misinterpret the specification, (3)

misinterpret PO's construction, and (4) improperly focus on function in lieu of the structural claim term.

First, Petitioner's assertion that "part of" is a "depart[ure] from the ordinary meaning of 'with'" (Reply, 3) is belied by its own extrinsic evidence, which lists definitions of "with" as "having" and "inclusive of" (Ex. 1038, 7). Thus, Petitioner's assertions that PO's construction is a "depart[ure]," "redefin[ition]," "disavowal," or "narrowing" of the plain meaning (Reply, 3-5) are baseless. Tellingly, the Reply never quotes a definition of "with" or explains its interpretation of the purported plain meaning. Petitioner's apparent interpretation would merely require that both elements are present in the device, or something similarly broad and unsupported.

Second, Petitioner misinterprets the specification; the excerpted quotes (Reply, 3-6) are fully consistent with and support PO's construction. As discussed, **every embodiment** depicts the isolation structure as within and not extending beyond the upper portion of the substrate. '378, Figs. 2, 4-13. Petitioner quotes 10:36-40 ("STI structure 233 is formed on a top portion of substrate 202"), but this refers to forming a recess in the substrate that is then "filled with a dielectric material" to form an STI that does not extend beyond the top surface of the substrate (*id.*), making the STI part of the substrate. POR, 22. Similarly, 21:7-12 ("forming an isolation structure on a substrate") is consistent with PO's construction, as depicted in Figs. 4-13.

To the extent Petitioner is suggesting these usages of “on” are inconsistent with “part of,” that is incorrect because the terms are not mutually exclusive. An isolation structure that is “part of” the substrate can also be “on” it if above a portion of the substrate in the z-direction, but merely being “on” the substrate is insufficient to show that that the isolation structure is “part of” the substrate (e.g., if the isolation structure extends beyond the top surface of the substrate then it is not part of the substrate). Indeed, claim 15 separately recites “with” and “disposed on” to describe two separate spatial relationships to the substrate, confirming that the terms are not interchangeable.¹

The specification’s reference to an isolation region “of” the substrate (Reply 4) is also consistent with PO’s construction, as depicted in Figs. 4-13. To the extent the Board in IPR2024-00909 made a preliminary determination that this wording allows the isolation region to extend all the way through the substrate (Reply, 4 (citing Ex. 1039, 15-16)), PO respectfully disagrees—such configuration involves completely removing the substrate in the region of the cut, such that the isolation region is at most abutting, rather than a part of, the substrate. In addition, such a

¹ Thus, to the extent the Board’s preliminary finding that any additional structures disposed on the substrate “could be considered part of...the substrate” (DI, 12-13) was suggesting that “on” is **sufficient** to show “part of,” PO respectfully disagrees.

configuration (as in the Petition art) causes the isolation to extend beyond the confines of the substrate. The '378 never describes or shows the isolation structure as merely next to or abutting the substrate (POR, 38-39), or extending beyond the surface of the substrate, and does not contemplate such configurations.

Petitioner concedes—as it must—that the specification also describes that the substrate “‘**includes**’ an isolation structure” (Reply, 4-5),² which supports PO’s construction. Petitioner argues that the specification’s descriptions vary too much to reach the level of “intent to redefine” or “disavowal” (*id.*). However, as discussed, PO’s construction is consistent with the plain meaning of “with” as read in light of the specification—indeed, as depicted in **every** embodiment—and thus is not redefinition or disavowal.

Third, Petitioner’s assertion that the isolation structure cannot be part of the substrate because the former is typically a dielectric and the latter might be a semiconductor (Reply, 4) misinterprets PO’s construction, which does not require the structures to be the same material and instead limits the spatial relationship between the two structures.

Finally, Petitioner argues that the isolation structure’s function does not “require” it to be part of the substrate (Reply, 5), but PO’s construction is limited by

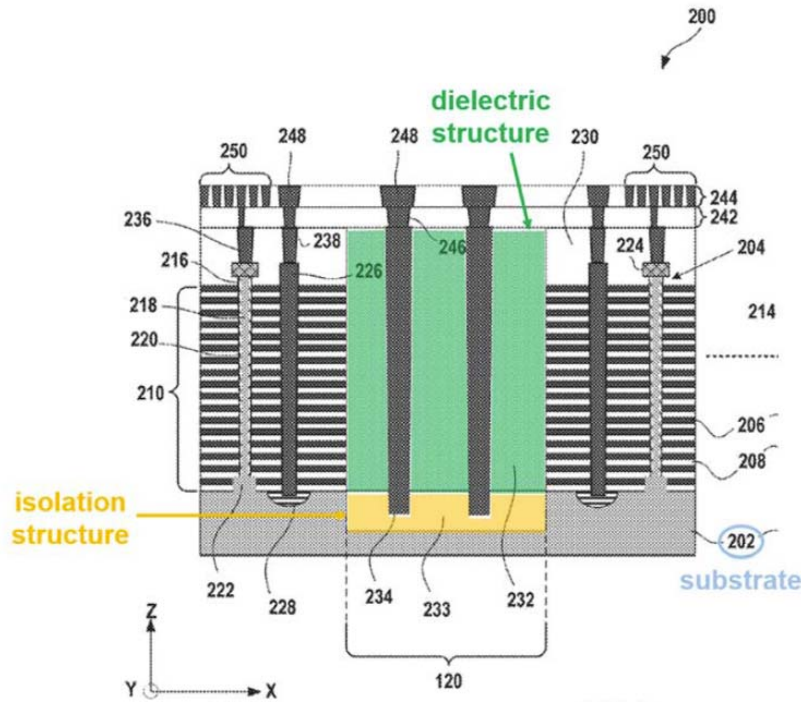
² All emphasis added unless otherwise indicated.

the claim language (“a substrate with an isolation structure”) consistent with the disclosed embodiments, does not necessarily encompass every possible structure that performs an isolation function, regardless of spatial limitations. Indeed, it would be improper to reduce the component to only its function and ignore the claimed spatial relationship.

B. “a dielectric structure on the isolation structure” (Claim 15)

Both parties *agree* that the term “on” should be construed to mean “above” in the z-direction (the vertical direction) when the substrate is positioned in the lowest plane of the semiconductor device in the z-direction. POR, 13-19; Reply, 5-6 (“Petitioner does not dispute this construction of ‘on’”). Thus, the term does not permit reorienting the direction of “on” to encompass any relative position or direction.

Petitioner instead asserts that the two separately recited structures—the “dielectric structure” and “isolation structure”—may be formed at the same time from a unitary material (Reply, 6), but this argument ignores that the structures are separate and distinct in the ’378 claims, figures, and specification (POR, 46-51). *Gaus v. Conair Corp.*, 363 F.3d 1284, 1288 (Fed. Cir. 2004) (where “claim lists” elements “separately,” it provides “clear implication” they are “separate” and “distinct” elements). For example, the ’378 illustrates two separate structures:



'378, Fig. 2; *see also* '378, Figs. 4-13. The dielectric structure is “formed so that it is aligned to or covers at least a portion of,” is “in contact with,” and “can cover only portion of” the isolation structure. '378, 10:30-43. These descriptions are inconsistent with Petitioner’s interpretation—for example, a single unitary structure does not have a dielectric structure in contact with an isolation structure, and a single structure cannot cover itself—nor can it be “on” itself.

Petitioner’s analogy to a paper plane (Reply, 6-7) merely reinforces that the claims do not encompass a unitary dielectric—unlike the paper plane, the unitary dielectric does not have any boundaries or separately identifiable structures in Petitioner’s prior art (*see* §III.A.2). In addition, the analogy is inapposite because it does not pertain to the claimed memory device, which is composed of many separate

layers or structures. By Petitioner’s logic, the entire “memory device” could be a single unitary material—something PO certainly does not purport to have invented. Moreover, unlike in the *Retractable Techs.* case (Pet. 47), there is no teaching in the ’378 that the two components may be formed as a single integral structure. *Cf.* 653 F.3d 1296, 1303. Indeed, Petitioner has abandoned its reliance on *Retractable Techs.*, does not even attempt to respond to PO’s arguments regarding the case (POR, 50), and cites no other legal authority for its improper interpretation.

The ’378 disclosure that “[t]he boundaries of these functional building blocks have been **arbitrarily defined**” (’378, 22:65-23:5; Reply, 7) does not mean that boundaries may or may not exist—there still must be a defined boundary. Indeed, the next sentence clarifies that “**alternate boundaries can be defined**” (*id.*), which confirms that there is a boundary. Nothing in the ’378 suggests a single unitary structure without a boundary.

Lastly, Petitioner cites the Board’s institution decision in IPR2024-00909 (Reply, 7-8 (citing Ex. 1039, 16-18)), but the Board’s preliminary analysis fails to address several key problems with Petitioner’s construction. **First**, the Board cited *Retractable Techs.*, which as discussed is inapposite. **Second**, even when the same material is used, the ’378 describes two separate structures such that one is “aligned to” and “in contact with” another (’378, 10:35-36), and are formed at different steps (’378, Figs. 4-7, 15:12-50), which is inconsistent with a single unitary structure.

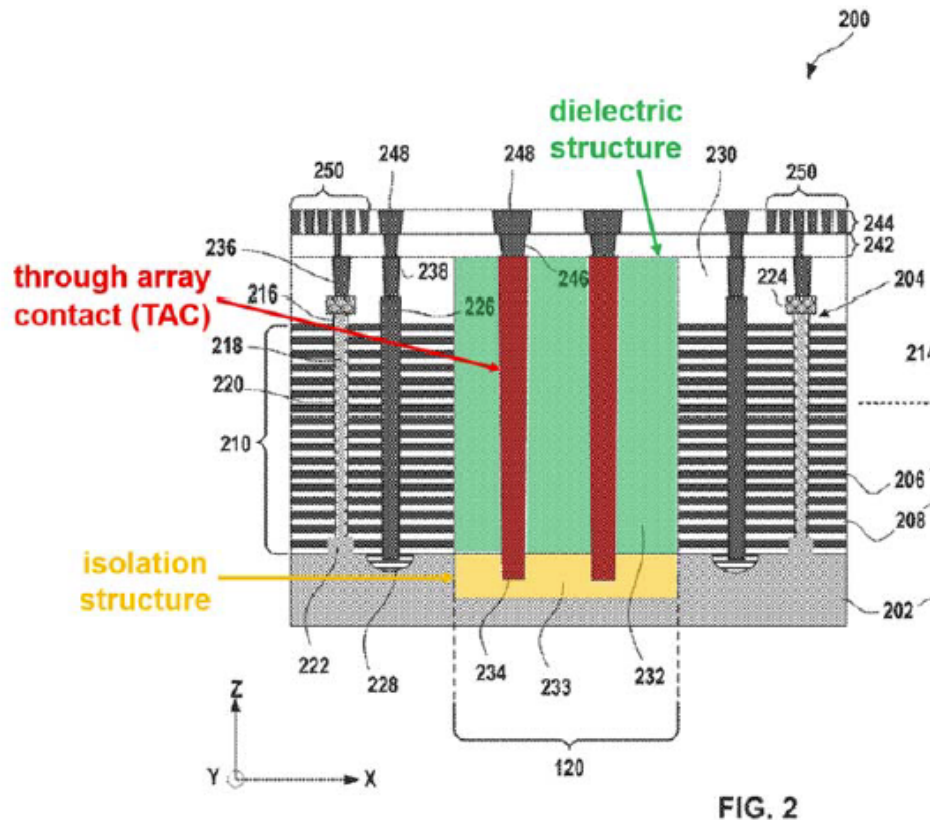
Third, contrary to the Board’s assertion, the ’378 does not teach forming the structures “in the same deposition step.” Ex. 1039, 18. Rather, “the *etch process* used to form opening 600 may also remove (recess) portion of the top surface of STI structure 233” (’378, 15:18-19) and “opening 600 can be *filled with a dielectric layer 702*” (’378, 15:42-43). Thus, after the isolation structure has already been created and then etched, a separate process deposits the dielectric structure. **Fourth**, the argument that a single unitary structure performs a common isolation function (Ex. 1039, 19) ignores that the claims are directed to two structures with a claimed spatial relationship, and do not necessarily encompass every possible structure that performs an isolation function.

C. “through array contacts (TACs) extending vertically through the dielectric and the isolation structures” (Claim 15)

The phrase “the dielectric and the isolation structures” should be construed—consistent with its antecedent terms and the specification—as “the dielectric structure and the isolation structure.” Thus, in accordance with binding Federal Circuit precedent, the claimed TACs must extend through the *same* dielectric structure.

First, Petitioner concedes that the antecedent claim terms are “a dielectric structure” and “an isolation structure” (Reply, 8). The use of the plural “structures” in the later limitation is merely because there are two types of structures—a dielectric structure and an isolation structure.

Second, the disclosed embodiments with multiple TACs in the '378 depict the TACs extending through the **same** dielectric, e.g. as shown in Figure 2:



The embodiment with a single TAC in a dielectric structure ('378, 21:17-25; Reply, 8-9) is irrelevant, since it does not include the claimed plurality of TACs. POR, 25-26.

Third, Petitioner's understanding of Federal Circuit precedent is flawed. While the indefinite article "a" does not preclude more than one, there must still be at least one instance of the element that meets all the requirements of the claim. See *Finjan LLC v. SonicWall, Inc.*, 84 F.4th 963, 974-975 (Fed. Cir. 2023) ("Even if an infringing system can use 'one or more computers,' the plain language of the claims

requires at least one of those computers to perform all the functions listed in the claims....”); *Salazar v. AT&T Mobility LLC*, 64 F.4th 1311, 1317 (Fed. Cir. 2023) (similar but regarding “microprocessors”). Thus, here one dielectric structure must meet all the requirements applicable to it, i.e. having TACs (plural) extending through it. The Board correctly concluded as much in its Institution Decision regarding a related patent that shares the same specification: “[w]hile the open-ended language may permit the claimed memory device to have more than one dielectric structure, this does not change the claim language that requires multiple TACs to extend vertically through a single dielectric structure.” Ex. 2006, 17-18; *see also* POR, 58-59.

Petitioner’s assertion that “the claim at issue in *Finjan* could have been met by multiple computers working together” (Reply, 11) flatly contradicts the Federal Circuit’s holding. The Federal Circuit rejected *Finjan*’s argument that multiple computers working together could infringe—holding that the claim “requires that the **same computer** perform each of the claimed steps.” 84 F.4th at 973-75.

Petitioner’s cited cases (Reply, 9-10) are inapposite, as they were not addressing the *Finjan* issue applicable here. *KCJ* merely addressed whether “a...continuous...chamber” encompasses one or more chambers, and not whether the same chamber must satisfy each reference to the chamber throughout the claim. *KCJ Corp. v. Kinetic Concepts, Inc.*, 223 F.3d 1351, 1355-57 (Fed. Cir. 2000).

Similarly, *ABS* addressed whether the claimed flow channel’s focusing region must be “configured for only a single sample stream” (i.e., whether the term excludes a second stream) which is a separate issue from whether the same sample stream must meet all claimed requirements. *ABS Glob., Inc. v. Cytonome/St, LLC*, 84 F.4th 1034, 1040-43 (Fed. Cir. 2023); *Carrum Techs., LLC v. Ford Motor Co.*, No. CV 18-1647-RGA, 2023 WL 7407778, at *5 (D. Del. Nov. 9, 2023) (“Plaintiff’s reliance on *ABS Global* is misplaced because the Federal Circuit addressed a different issue there.”).

Petitioner’s reliance on *Baldwin* (Reply, 10) fares no better, and indeed the Federal Circuit expressly distinguished *Baldwin* as merely addressing the principle that the indefinite article a means one or more, and “***not...whether the use of a definite article to refer to the initial antecedent phrase requires the same component to perform the later limitation.***” *Finjan*, 84 F.4th at 974 (citing *Baldwin Graphic Sys., Inc. v. Siebert, Inc.*, 512 F.3d 1338, 1342 (Fed. Cir. 2008)).

D. “the dielectric structure comprises a through array contact region of the 3D memory device” (Claim 17)

Consistent with the plain language of the claims and the specification, the term “through array contact region” (“TAC region”) should be construed as “a region that is within or defined by the dielectric structure and which includes the through array contacts extending through the dielectric structure.” Thus, because the dielectric structure extends through the alternating conductor/dielectric layer stack

(independent claim 15), and the TAC region is within or defined by the dielectric structure, the TAC region does not include the stack.

Claim 17 recites that “the dielectric structure comprises a [TAC] region,” which indicates that the TAC region is nested within the dielectric structure, or at most is coextensive with the dielectric structure. POR, 27-28. Moreover, in *all* the disclosed embodiments that have a TAC region, the TAC region is within or defined by the dielectric structure (’378, 6:11-16, 10:21-24, 5:60-7:4, Figs. 1A-1C, 2; POR, 28-29), for example as shown in Figure 2.

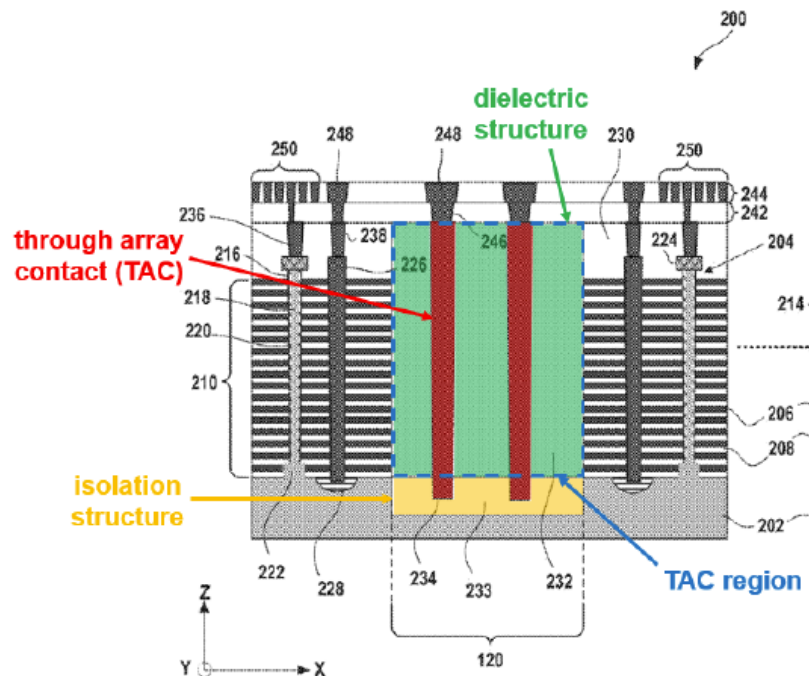


FIG. 2

Petitioner argues that the term should instead be construed as “a region that includes at least one [TAC]” (Reply, 12), but this construction does not put *any* limit on the boundaries of the TAC region—the *entire device* could be a TAC region

under Petitioner's construction. Petitioner's construction (unlike PO's) also renders the term superfluous, because independent claim 15 already separately recites TACs extending through a dielectric structure. POR, 27-28.

Petitioner asserts that its construction would give meaning to the term because it would "limit[] the location of the 'TAC region'...such that the 'dielectric structure' must comprise at least part of it" (Reply, 14-15), but again, claim 15 already separately requires TACs to extend through the dielectric structure. The two cases cited by Petitioner (Reply, 15) merely stand for the principle that the rule disfavoring redundant claim terms sometimes yields to other principles of claim construction, but Petitioner has cited no such superseding principle here. For example, unlike in *VLSI*, Petitioner is not relying on an express definition from the specification, 53 F.4th 646, 652-53 (Fed. Cir. 2022), and unlike in *SimpleAir*, Petitioner has not shown that PO's construction is inconsistent with "a key aspect of the invention," 820 F.3d 419, 430-31 (Fed. Cir. 2016). On the contrary, PO's construction is both consistent with the intrinsic record and gives meaning to the term. POR, 27-29.

Petitioner's argument that the '378 phrase "[component] region" describes an area that includes more than just that component (Reply, 12) misunderstands the dispute and is irrelevant. PO's construction does not preclude other components within the dielectric structure, so long as the TAC region is within or defined by the dielectric structure.

Petitioner next argues that Fig. 1A shows “TAC region 102” that includes “TAC region 120” and other components (Reply, 12-13), but the claims are not directed to TAC region 102.

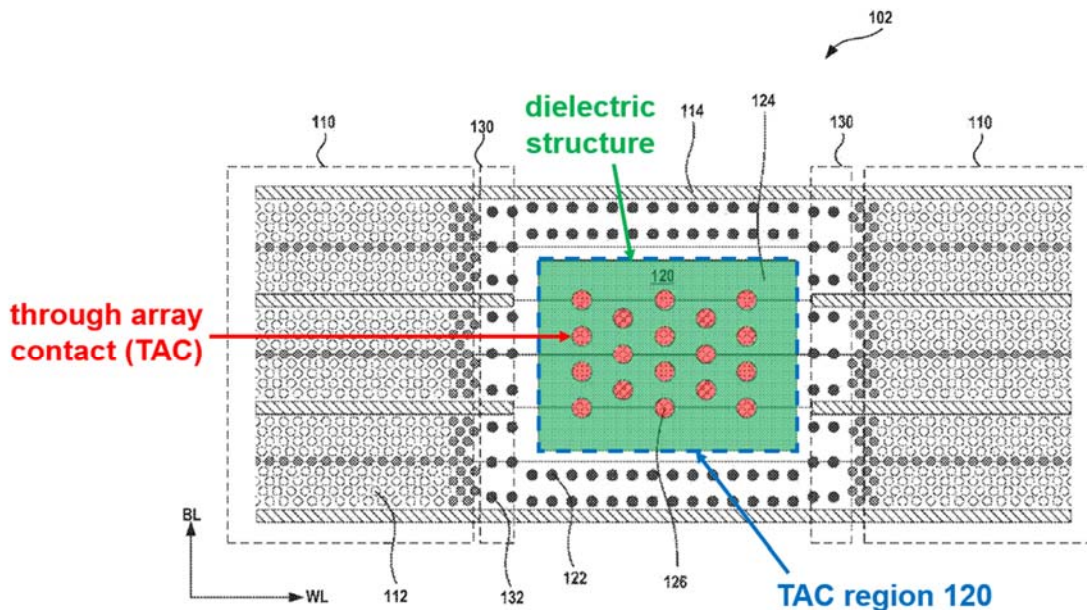


FIG. 1A

'378, Fig. 1A (annotated). The larger region 102 (and 104 and 106 in Figures 1B-1C, respectively) illustrate the placement of the claimed TAC region 120 in the context of other components. These placements are called “WL TAC region 102” (6:23-25), “BL TAC region 104” (6:41-43), and “staircase TAC region 106” (6:62-64) to illustrate the relative location.³ But the actual TAC region structure at each location is TAC region 120. Thus, as Dr. Yang explained, “a [POSITA] would

³ “WL” is “word line” and “BL” is “bit line.” '378, 5:60-63.

understand that a TAC region, which is...a claimed element..., is actually 120.” Ex. 1040, 71:4-72:1. Petitioner does not dispute that TAC region 120 is shown as defined by the dielectric structure and does not include the stack.

Petitioner argues that the specification uses permissive language such as “can” and “in some embodiments” (Reply, 13-14), but as discussed, Petitioner ignores the nested structure of the claim language, and ignores that ***all*** disclosed embodiments with a TAC region meet PO’s construction. POR, 28-29.

Finally, Petitioner’s assertion that “PO’s argument is contrary to the plain meaning of ‘comprises’” (Reply, 14) is incorrect. The term “comprising” in patent law “is synonymous with ‘including’ [or] ‘containing.’” *MPEP* 2111.03.I. PO’s construction is consistent with this meaning—the dielectric structure comprises (i.e., includes, contains) the TAC region, not the other way around. Thus, while the dielectric structure can include other structures due to the open-ended “comprises,” the TAC region is nested within the dielectric structure and therefore cannot extend beyond it. It is Petitioner, not PO, that ignores the meaning of “comprising.”

III. GROUND 1: TOYAMA DOES NOT DISCLOSE OR RENDER OBVIOUS CLAIMS 15-17 AND 19-20

A. Independent Claim 15

1. Toyama's First Exemplary Structure (1A) and Toyama's Second Modification (1B) Do Not Disclose or Render Obvious "a Substrate with an Isolation Structure"

Toyama fails because under the proper construction (§II.A), it is undisputed that the alleged isolation structure identified in the Petition is not "part of" the alleged substrate. POR, 38-45, 53-56; Reply, 15-18.

Petitioner instead presents an improper new mapping (Reply, 15-18), which in any event still fails to meet the claim. Petitioner argues that its new mapping is permitted because PO proposed a construction in the POR. Reply, 16. However, the cited *Apple* case permits new arguments only "where a patent owner in an IPR ***first proposes a claim construction in a patent owner response.***" *Apple Inc. v. Omni MedSci, Inc.*, No. 2023-1034, 2024 WL 3084509, at *5 (Fed. Cir. June 21, 2024) (quoting *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1384 (Fed. Cir. 2023)). That is not the situation here, because PO first raised the claim construction earlier, in the Preliminary Response. POPR, 39 ("the 'isolation structure' is ... not part of the substrate as required by the Challenged Claims."). This distinction is important, because the Federal Circuit's narrowly tailored holding addressed the unique concern regarding estoppel if a new construction is held back and raised for the first time ***after*** institution. See *Apple*, 2024 WL 3084509, at *6; *Axonics*, 75 F.4th at

1384. Moreover, Petitioner could have requested a Preliminary Reply here, but did not. Therefore, Petitioner’s new claim mapping is improper and should not be considered, as Petitioner was required to make its case in the Petition. 37 C.F.R. §42.23(b); *Henny Penny*, 938 F.3d at 1330-31.

Regardless, Petitioner’s new mapping fails because it simply purports to fold the alleged isolation structure into the substrate (Reply, 16-18 (arguing that the components are “collectively a substrate”)), which does not alter the fundamental deficiency with *Toyama*—the alleged isolation structure extends all the way through and beyond the surfaces of the substrate, instead of being part of the substrate.⁴ POR, 38-45, 53-56. As explained in §II.A, PO’s construction excludes a configuration like *Toyama*’s.

Petitioner’s new mapping is also nonsensical and fails to address related claim limitations. For example, in *Toyama*’s First Exemplary Structure, if 430 and 10 are “collectively a substrate” as alleged (Reply, 16), then Petitioner is now pointing to

⁴ Petitioner’s argument appears to be based on a misunderstanding of PO’s construction. The specific geometry of the alleged isolation structure relative to the substrate determines whether it is “part of” the substrate (*see* §II.A), and so merely labelling an alleged isolation structure as a “substrate” does nothing to address this issue.

the same structure (430) for ***three different claim elements***—the isolation structure, the substrate, and the dielectric structure. And in both embodiments, Petitioner has not even attempted to show how its new mappings satisfy the other claim elements that refer to the isolation structure and/or substrate. Thus, Petitioner has failed to meet its burden under its new mappings.

2. Toyama’s First Exemplary Structure (1A) Does Not Disclose or Render Obvious “a Dielectric Structure on the Isolation Structure”

Toyama’s First Exemplary Structure fails because Petitioner arbitrarily and improperly divides Toyama’s single dielectric structure into two regions and maps them to two separately claimed features. POR 45-51. As discussed in §II.A, the claims do not encompass a single unitary structure, like Toyama’s, for the claimed “dielectric structure” and “isolation structure.”

In Reply, Petitioner has no argument under PO’s construction, and instead argues that it would have been obvious to form Toyama’s “dielectric fill material portion 430” in two steps. Reply, 19-20. But Petitioner has still failed to show a motivation to modify Toyama. For example, Petitioner cites electrical isolation (Reply, 20), but isolation is provided regardless of whether “dielectric fill material portion 430” is formed in two steps, and thus cannot motivate the modification. In addition, in response to PO’s identification of factors that would have dissuaded a POSITA, Petitioner merely asserts that “using isolation structures on a

substrate...was well-known,” which, even assuming were accurate, does not address the motivation issue. As explained by Dr. Yang, Petitioner does not address, e.g., “how the process of etching an opening for the dielectric structure would be controlled to stop at the location of the alleged isolation structure, which is an added complication that would have dissuaded a [POSITA] from making the proposed modification.” Ex. 2005, ¶111. Likewise, Petitioner’s “mere substitution” argument (Reply, 19) fails to address these issues. Dr. Yang’s testimony remains un rebutted.

3. Toyama’s Second Modification (1B) Does Not Disclose or Render Obvious “Through Array Contacts (TACs) Extending Vertically Through the Dielectric and the Isolation Structures”

It is undisputed that Toyama’s Second Modification fails to expressly teach TACs extending through the *same* dielectric structure (see §II.C). POR, 57-60; Reply, 21-22 (Petitioner arguing instead that the limitation is met “if...[15.H] permits the [TACs] to extend through multiple dielectric structures”). Petitioner’s analysis (Reply, 21-22) again misapplies *Finjan*. See §II.C.

Petitioner’s fallback obviousness argument that Toyama’s discrete liners collectively form a dielectric structure (Reply, 22-25) also misses the mark. This argument still relies on the multiple discrete elements (each TAC has its own separate, unconnected liner) and therefore is the same flawed mapping that is improper under *Finjan*. Petitioner is simply trying to reframe the issue as an end-

run around Federal Circuit precedent, which should be rejected. Moreover, the Board already rejected this theory when Petitioner could not “sufficiently explain how multiple constructed items can be considered...a single structure” under Petitioner’s own definition (“something...that is constructed”). Ex. 2006, 17-18. As the Board recognized, “[e]very component of Toyama’s memory device” could be combined under such a broad definition. Switching definitions—now quoting “something arranged in a definite pattern of organization” (Reply, 22)—does not fix the problem. Every component in a semiconductor device like Toyama’s could be considered patterned (e.g., because of the design and manufacturing process).

Finally, Petitioner’s reliance on analogies and testimony from Dr. Yang (Reply, 22-25) is misplaced. Dr. Yang was asked about the unrelated term “wall structure,” and regardless ultimately agreed only that the fence was a “wall” not a “wall structure.” Ex. 1040, 44:23-25, 47:3-17. Moreover, unlike Toyama’s separate liners, Petitioner’s obscure fence and stair designs are actually connected. *Id.*, 28:10-31:8, 47:23-25, 48:2-50:16, 52:7-53:8. And regardless, these purported usages of “structure” in building construction are not relevant to how a POSITA would have understood the term in the context of memory devices or the ’378. See Yang, ¶¶126-129.

B. Claim 17: Toyama’s First Exemplary Structure (1A) and Second Modification (1B) Do Not Disclose or Render Obvious “the Dielectric Structure Comprises a Through Array Contact Region of the 3D Memory Device”

Toyama’s First Exemplary Structure (1A) fails because it does not teach the claimed dielectric structure (*see* §III.A.2), and as a result, does not disclose or render obvious a TAC region that is within or defined by the dielectric structure.

Toyama’s Second Modification (1B) fails because the alleged TAC region is not within or defined by the alleged dielectric structure as required by the proper construction (*see* §II.D), and instead includes portions of the alternating conductor/dielectric stack. POR, 71-74. Petitioner’s assertion that Toyama’s alleged TAC region is within or defined by the dielectric structure (Reply, 26-29) is incorrect for two independent reasons.

First, Petitioner ignores that Toyama’s alleged TAC region extends far beyond “the dielectric structure” to encompass three separate insulating liners, and is therefore not defined by or within⁵ “the dielectric structure.” In other words, there

⁵ Contrary to Petitioner’s assertion (Reply, 29), PO has never argued that the TAC region must be “coextensive” with the dielectric structure—it can be within, and does not preclude other components (e.g., the TACs) within the dielectric structure. *See* POR 29.

is no single dielectric structure that “comprises” the TAC region as required by claim 17, rather Petitioner points to a region that comprises dielectric structures. Petitioner’s attempt to treat multiple insulating liners as a single “structure” fails. *See* §III.A.3.

Second, Petitioner ignores that Toyama’s alleged TAC region includes portions of the alternating stack, which claim 17 precludes. Specifically, because the dielectric structure must extend through the alternating stack (independent claim 15), and the TAC region must be within or defined by the dielectric structure (dependent claim 17), the TAC region cannot include the stack. *See* §II.D; POR, 27-29.

IV. GROUND 2: MUSHIGA DOES NOT DISCLOSE OR RENDER OBVIOUS CLAIMS 15-17 AND 19-20

A. Independent Claim 15

1. Mushiga Does Not Disclose or Render Obvious “a Substrate with an Isolation Structure”

Mushiga fails because under the proper construction (§II.A), it is undisputed that the alleged isolation structure is not “part of” the alleged substrate. POR, 64-68. Like with Toyama, Petitioner relies only on a new mapping (Reply, 30-31), which is improper. *See* §III.A.1.

Regardless, Petitioner’s new mapping fails because, like with Toyama, it simply purports to fold the alleged isolation structure into the substrate (Reply, 30-

31), which does not alter Mushiga’s deficiency—the alleged isolation structure extends all the way through and beyond the surface of the substrate, and at most merely abuts the substrate, instead of being part of the substrate.⁶ And, as with Toyama, Petitioner’s new mapping fails to address related claim limitations. Thus, Mushiga fails for the same reasons discussed for Toyama in §III.A.1.

2. Mushiga Does Not Disclose or Render Obvious “a Dielectric Structure on the Isolation Structure and Extending Vertically Through the Alternating Conductor/Dielectric Stack”

Mushiga fails because the only alleged “dielectric structure” that even arguably extends through the stack—insulating spacer 586—is not also “on” the isolation structure as required under the agreed construction (*see* §II.B). POR, 69-79. Specifically, as shown below, the insulating spacer 586 is not “above” the alleged isolation structure in the z-direction (the vertical direction).

⁶ In addition, the “backside insulating layer 306” portion of the alleged isolation structure is merely *below* the alleged substrate and thus not “part of” it (or even “on” it under the agreed meaning of that term). POR, 67; §II.A.

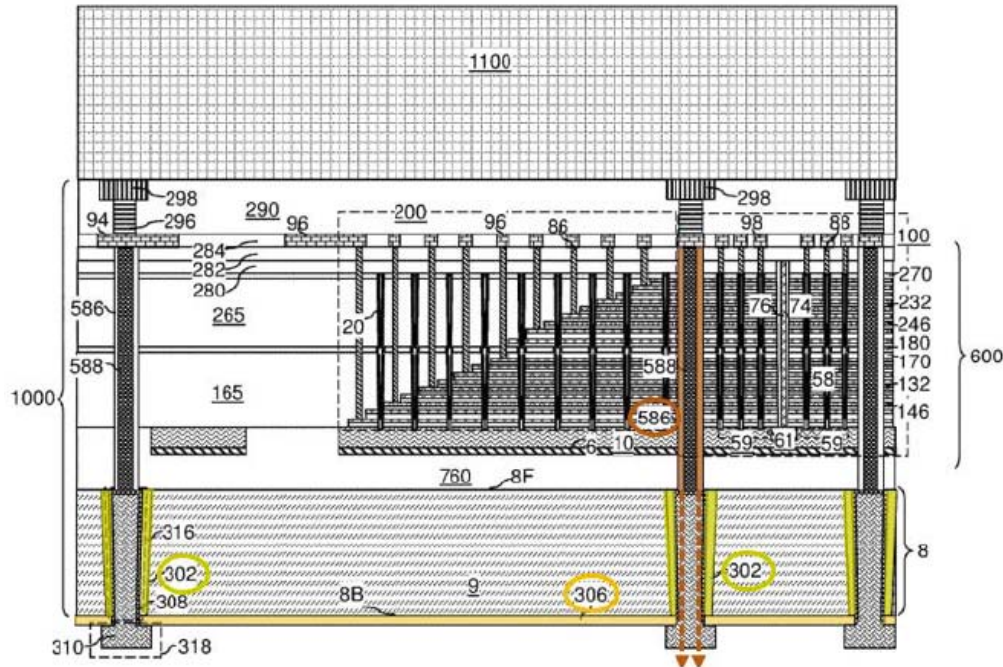
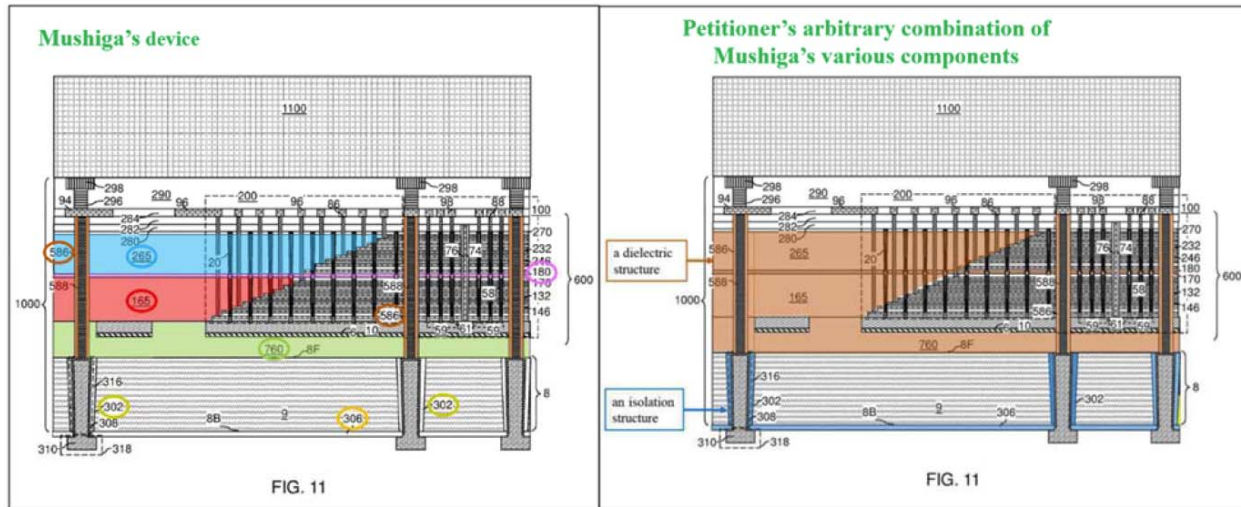


FIG. 11

Ex. 1006, Fig. 11 (annotated).

Petitioner again argues that multiple structures together can correspond to the claimed “dielectric structure” (Reply, 31-33), but fails to rebut several unresolvable problems with its grouping, which has no discernable logic. **First**, aside from 586, none of the cited structures extends vertically through the stack as required. **Second**, Petitioner arbitrarily combines distinct structures in Mushiga that are analogous to structures in the ’378 that have distinct locations and roles, and thus are not the specific “dielectric structure” described and claimed in the ’378. POR, 72-75.



Ex. 1006, Fig. 11 (left annotated by PO; right annotated by Petitioner with top heading added by PO). **Third**, Petitioner selectively omits other neighboring dielectrics (highlighted in red, below) that, if included, would result in the TACs not extending all the way through the dielectric as required by the claims (POR, 75-77), and Dr. Lee essentially concedes hindsight, admitting that he was guided by the claim language (Ex. 2007, 53:21-57:17).

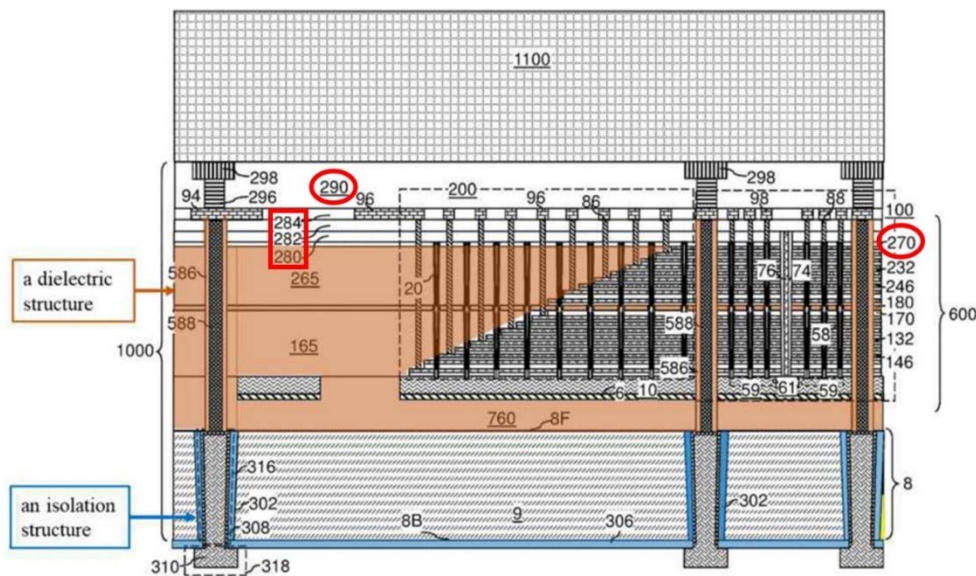


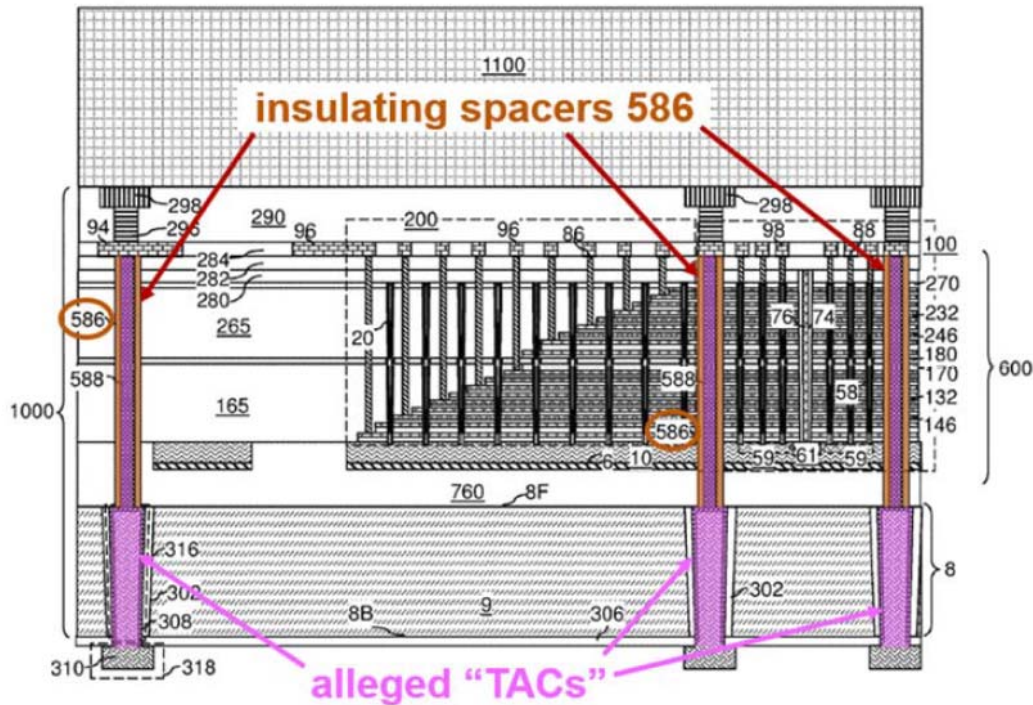
FIG. 11

Mushiga, Fig. 11 (annotated by Petitioner; red annotations added by PO). Indeed, the omitted layers also “possess a dielectric quality” (POR, 76)—Petitioner’s purported criteria for its grouping. Reply, 33, n.9. Petitioner cannot have it both ways—either all of these purported dielectrics are the same structure or they are not. ***Fourth***, Petitioner’s citation to the Institution Decision ignores the Board’s subsequent decision in IPR2024-00791, in which the Board rejected the idea that different components constitute a single structure merely because they are constructed. Ex. 2006, 17; POR, 77-78.

Instead of addressing these issues, Petitioner again relies on the same irrelevant testimony and analogies (Reply, 32) as for Toyama. *See* §III.A.3. Finally, the ’378’s discussion of the term “layer” (Reply, 32) addresses a different term, and, regardless, does not address the issues discussed above.

3. Mushiga Does Not Disclose or Render Obvious “TACs Extending Vertically Through the Dielectric and the Isolation Structures”

Mushiga fails because its alleged TACs do not extend through the same “dielectric structure” as required (*see* §II.C), and instead each extend through a separate, unconnected insulating spacer 586. POR, 79-80.



Ex. 1006, Fig. 11 (annotated). Petitioner raises the same flawed arguments regarding combining separate components (Reply, 31-33), which should be rejected for the reasons discussed in §§II.C (claim construction), III.A.3, and IV.A.2.

B. Claim 17: Mushiga Does Not Disclose or Render Obvious “the Dielectric Structure Comprises a Through Array Contact Region of the 3D Memory Device”

Mushiga fails because the alleged TAC region is not within or defined by the alleged dielectric structure as required (see §II.D). POR 80-82. Specifically, Petitioner’s alleged TAC region (Pet. 100) is an arbitrarily defined region that extends beyond the dielectric structure and other structures it contains. Petitioner now disavows this figure, calling its annotations “inadvertant[.]” (Reply, 33), but this

improper last-minute attempt to change its mapping should be rejected. Regardless, Petitioner has not provided an illustration of the purported new region, making it impossible to identify or judge its boundaries.

V. GROUND 3: MUSHIGA IN VIEW OF MAKALA DOES NOT DISCLOSE OR RENDER OBVIOUS CLAIMS 15-17 AND 19-20

Petitioner does not dispute that all the arguments PO raises for Ground 2 are also equally applicable to Ground 3.

VI. CONCLUSION

Petitioner has still failed to demonstrate by a preponderance of the evidence that any of the Challenged Claims of the '378 are anticipated or obvious. Accordingly, the Board should uphold the validity of all Challenged Claims.

Dated: June 25, 2025

Respectfully submitted,

ROPES & GRAY LLP

By: /James L. Davis, Jr./

James L. Davis, Jr.

Reg. No. 57,325

ROPES & GRAY LLP

525 University Avenue, 8th Floor

Palo Alto, CA 94301

Telephone: +1-650-617-4794

James.L.Davis@ropesgray.com

Andrew T. Radsch

(*pro hac vice* forthcoming)

ROPES & GRAY LLP

525 University Avenue, 8th Floor

Palo Alto, CA 94301
Telephone: +1-650-617-4011
Andrew.Radsch@ropesgray.com

Christopher M. Bonny
Reg. No. 63,307
ROPES & GRAY LLP
525 University Avenue, 8th Floor
Palo Alto, CA 94301
Telephone: +1-650-617-4011
Christopher.Bonny@ropesgray.com

Allen S. Cross
Reg. No. 74,729
ROPES & GRAY LLP
2099 Pennsylvania Avenue, NW
Washington, D.C. 20006-6807
Phone: 202-508-4708
Allen.Cross@ropesgray.com

*Attorneys for Patent Owner, Yangtze
Memory Technologies Co. Ltd.*

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The undersigned certifies that the foregoing PATENT OWNER'S SUR-
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Dated: June 25, 2025

Respectfully submitted,

By: /James L. Davis, Jr./
James L. Davis, Jr.
Reg. No. 57,325
ROPES & GRAY LLP

CERTIFICATE OF SERVICE

The undersigned certifies that the foregoing PATENT OWNER’S SUR-REPLY was served in its entirety by filing through the Patent Trial and Appeal Case Tracking System (P-TACTS), as well as providing a courtesy copy via e-mail to the following attorneys of record for Petitioner listed below:

Lead Counsel	Back-up Counsel
Jeremy Jason Lang Registration No. 73,604 (jjlang@orrick.com) Postal & Hand-Delivery Address: Orrick, Herrington & Sutcliffe LLP 51 West 52nd Street New York, NY 10019 T: 212-506-5000; F: 212-506-5151 P52PTABDocket@orrick.com PTABDocketJL2@orrick.com PTABDocketJ3B3@orrick.com T61PTABDocket@orrick.com PTABDocketP2S7@orrick.com micron-ymtc_ohs@orrick.com	K. Patrick Herman Registration No. 75,018 (pherman@orrick.com) Jared Bobrow <i>Pro Hac Vice</i> (jbobrow@orrick.com) Travis Jensen Registration No. 60,087 (tjensen@orrick.com) Parth Sagdeo Registration No. 71,275 (psagdeo@orrick.com)
<i>Counsel for Petitioner Micron Technology, Inc.</i>	

Dated: June 25, 2025

By: /Jonathan Bradford/
Name: Jonathan Bradford

ROPES & GRAY LLP