NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

PRESIDIO COMPONENTS, INC.,
Appellant

v.

AVX CORPORATION,
Appellee

2019-2181

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2018-00167.

PRESIDIO COMPONENTS, INC.,
Appellant

v.

AVX CORPORATION,
Appellee

2019-2182

Appeal from the United States Patent and Trademark Office, Patent Trial and Appeal Board in No. IPR2018-00292.

Decided: September 23, 2020

GREGORY F. AHRENS, Wood, Herron & Evans, LLP, Cincinnati, OH, for appellant. Also represented by BRETT A. SCHATZ.

MICHAEL ROBERT HOUSTON, Foley & Lardner LLP, Chicago, IL, argued for appellee. Also represented by RUBEN JOSE RODRIGUES, Boston, MA. Also represented by NICHOLAS LAGERWALL, Madison, WI, in 2019-2182.

Before O'MALLEY, BRYSON, and REYNA, *Circuit Judges*.

REYNA, *Circuit Judge*.

In these two consolidated cases, Presidio Components, Inc., appeals the final written decisions of the U.S. Patent Trial and Appeal Board invalidating the challenged claims of two patents directed to broadband capacitor technology. Because the Board's findings were supported by substantial evidence, we affirm in both cases.

BACKGROUND

A. Patents at Issue

A capacitor is a device that stores energy in an electric field when connected to an electrical circuit. Capacitors are typically formed by parallel plates of conductive material, such as metal, that are separated by non-conductive or "dielectric" material, such as ceramic, so that an electric field can form between the plates. U.S. Patent No. 7,075,776 (the '776 patent) and U.S. Patent No. 7,307,829 (the '829

patent) are directed to capacitor structures that have a monolithic body containing multiple individual capacitors with different frequencies and capacitance values. This allows the device to perform effectively across a broader range of frequencies.

The '776 patent, titled "Integrated Broadband Ceramic Capacitor Array," is directed to a capacitor structure that contains two capacitors—a lower frequency, higher value first capacitor and a higher frequency, lower value second capacitor—contained in a substantially monolithic dielectric body. The two capacitors are connected in parallel by conductors that lie along two external surfaces of the dielectric body. This is shown in Figure 9A, in which the first capacitor (60) and second capacitor (62) are connected in parallel by conductors (12) and (13).

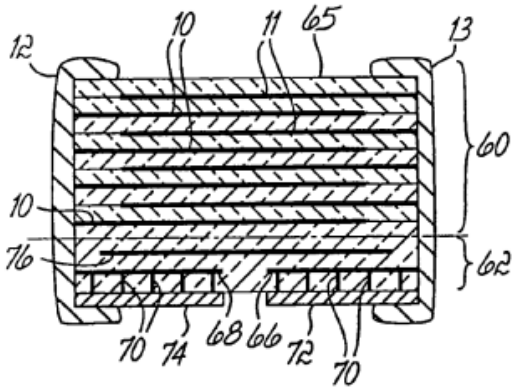


FIG. 9A

'776 patent at Fig. 9A.

When in use, the capacitor may be oriented so that one of the external surfaces with an external conductor (12 or 13) is mounted against the flat surface of the circuit board and the internal conductive plates are perpendicular to the board. '776 patent at 10:55–60. This is shown in Figures 16 and 17 of the '776 patent, in which the capacitor

structure is oriented so that external conductor (13) is attached to the circuit board.

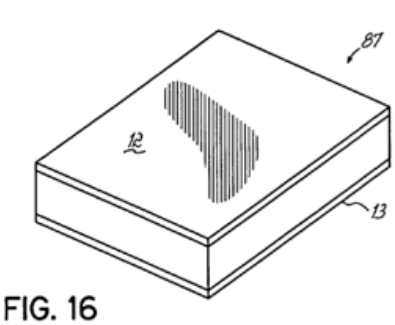


FIG. 16

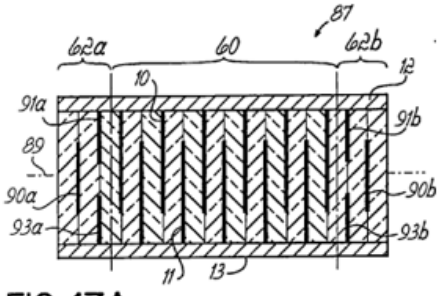


FIG. 17A

Id. at Figs. 16, 17A, 10:55–60.

These features of the invention are recited in claim 1 of the '776 patent, its only independent claim, which is reproduced below:

> 1. A capacitor comprising:
>
> a substantially monolithic dielectric body having a first and second external surface, the first external surface adapted to be positioned substantially parallel to a major surface of a circuit board; and
>
> a lower frequency, higher value, first capacitor formed by a first plurality of conductive plates disposed within the dielectric body, the first plurality of conductive plates forming a plurality of capacitors connected in parallel with each other; and
>
> a higher frequency, lower value, second capacitor formed by a second plurality of conductive plates disposed within the dielectric body, the second plurality of conductive plates forming the second capacitor,

> wherein said first and second capacitors are connected in parallel by conductors lying along said first and second external surfaces.

Id. at 13:35–51.

The '829 patent is a continuation in part of the '776 patent and shares the same title. Two independent claims of the '829 patent are at issue in this appeal, claims 9 and 32.

Claim 9, reproduced below, is directed to a capacitor structure in which two "higher frequency, lower value" capacitors are located near opposite "end[s]" of a monolithic dielectric body, and a third "lower frequency, higher frequency" capacitor is "intermediate" between the two ends.

> 9. A capacitor comprising:
>
> a substantially monolithic dielectric body *comprising one end, an opposite end*, and first and second external surfaces;
>
> first and second contacts on the first and second external surfaces, respectively;
>
> a *higher frequency, lower value, first capacitor* formed by first conductive plates in the dielectric body *near the one end*, the first capacitor being electrically connected between the first and second contacts;
>
> a *higher frequency, lower value, second capacitor* formed by second conductive plates in the dielectric body *near the opposite end*, the second capacitor being electrically connected between the first and second contacts in a parallel circuit with the first capacitor;
>
> a *lower frequency, higher value third capacitor* formed by third conductive plates in the dielectric body *intermediate the one end and the opposite end* and between the first capacitor and the second

> capacitor, the third capacitor being electrically connected between the first and second contacts in a parallel circuit with the first capacitor and the second capacitor.

'829 patent at 16:62–17:16 (emphasis added).

Claim 32, reproduced below, is directed to a capacitor structure comprising three internal conductive plates in a dielectric body, where the "first and second" plates and the "second and third" plates are "substantially parallel and opposed in at least one region of said body, to form a capacitor therebetween."

> 32. A monolithic capacitor comprising:
>
> a three-dimensional dielectric body, having first and second external conductive contacts;
>
> a first conductive plate internal to said dielectric body, extending within said body and conductively connected to said first external conductive contact;
>
> a second conductive plate internal to said dielectric body, extending within said body and conductively connected to said second external conductive contact, wherein said *first and second conductive plates are substantially parallel and opposed in at least one region of said body, to form a capacitor therebetween*;
>
> a third conductive plate internal to said dielectric body, extending within said body and not conductively connected to any external conductive contacts, wherein said *second and third conductive plates are substantially parallel and opposed in at least one region of said body, to form a capacitor therebetween*;
>
> a first external conductive plate positioned on an external surface of the dielectric body and

> conductively connected to the first external conductive contact; and
>
> a second external conductive plate positioned on an external surface of the dielectric body and conductively connected to the second external conductive contact, the second external conductive plate being substantially coplanar with the first external conductive plate.

Id. at 20:23–50 (emphasis added).

Claim 34, which depends from claim 32, contains the further limitation that "the third conductive plate is substantially coextensive with the first and second conductive plates." *Id.* at 20:60–62.

B. Relevant Prior Art

Japanese Patent Application Publication No. H5-21429, published March 19, 1993, with named inventor Yoichi Kuroda ("Kuroda"), is directed to multilayer capacitors with high capacitance capacitor portions and low capacitance capacitor portions formed in a single sintered body. J.A. 350 (Kuroda at Abstract).[1] Kuroda teaches that this configuration allows the device to function effectively across a broader range of frequencies. J.A. 353 (Kuroda at ¶¶ 4–5). Figures 1, 5, and 6 of Kuroda depict various embodiments of its multilayer capacitors, with high

[1] Unless otherwise specified, citations herein to pages of the joint appendix refer to the appendix filed in Case No. 19-2181.

capacitance capacitor portions denoted with C_1 and low capacitance capacitor portions denoted with C_2.

FIG. 1

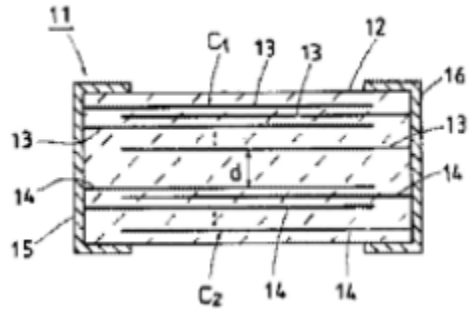


FIG. 5

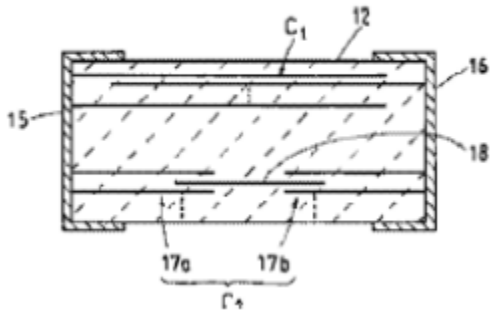
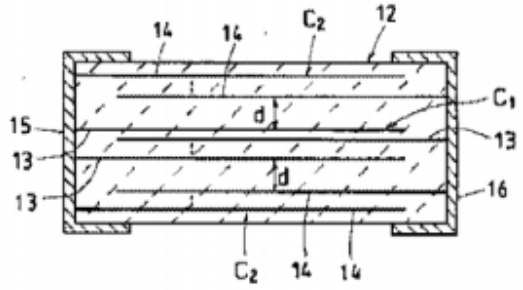


FIG. 6



J.A. 351–352 (Kuroda at Figs. 1, 5, 6).

U.S. Patent Application Publication No. 2002/0195700 A1 ("Li") is directed to an electronic assembly that includes one or more capacitors connected to a housing. *See* J.A. 363

(Li at Abstract). The housing can be an integrated circuit package that includes a printed circuit board. *Id.* Li teaches that a multilayer capacitor can be connected vertically to the housing, such that the surfaces on which its primary external electrodes are formed is oriented parallel to the surface of the circuit package. J.A. 377 (Li at ¶¶ 52–53). This arrangement is illustrated at Figure 7 of Li, where the multilayer capacitor (506) is vertically mounted to the circuit package (502).

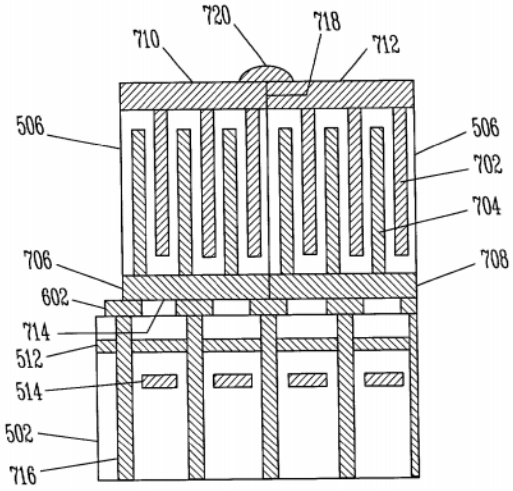


Fig. 7

J.A. 367 (Li at Fig. 7). Li discloses that vertical mounting has certain benefits such as enabling "more capacitors to be embedded within or surface mounted to the package" and "more off-chip capacitance to be supplied to die loads without increasing package sizes" and providing "lower vertical and/or lateral inductances" and shortened voltage droop response times. J.A. 375-376 (Li at ¶¶ 30, 34).

C. *Inter Partes* Reviews

AVX filed two petitions for *inter partes* review before the U.S. Patent Trial and Appeal Board ("the Board"), challenging claims 1–14 of the '776 patent and claims 9–11 and 32–34 of the '829 patent. The Board instituted review on

both petitions and issued final written decisions finding each of the challenged claims unpatentable over the prior art. In IPR No. 2018-00167, the Board found claims 1–6, 11, 13, and 14 of the '776 patent to be anticipated by Kuroda. *AVX Corp. v. Presidio Components, Inc.*, IPR2018-00167, 31, 41–42 (P.T.A.B. May 14, 2019). The Board also found all claims of the '776 patent to be obvious over a combination of references including Kuroda and Li. *Id.* at 57, 59, 60. In IPR No. 2018-00292, the Board analyzed the '829 patent and found claims 9–11 to be anticipated by Kuroda and claims 32–34 to be obvious over Kuroda in combination with other references. *AVX Corp. v. Presidio Components, Inc.*, IPR2018-00292, 44–45, 62, 71–72 (P.T.A.B. May 15, 2019).

Presidio appeals both decisions. We have jurisdiction under 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

We review the Board's factual determinations for substantial evidence and its legal determinations de novo. *Liqwd, Inc. v. L'Oreal USA, Inc.*, 941 F.3d 1133, 1136 (Fed. Cir. 2019). Anticipation is a question of fact that we review for substantial evidence. *In re Hodges*, 882 F.3d 1107, 1111 (Fed. Cir. 2018). Obviousness is a legal question based on underlying fact findings. *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1335 (Fed. Cir. 2020). We review the Board's ultimate claim construction de novo and any subsidiary factual findings involving extrinsic evidence for substantial evidence. *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1042 (Fed. Cir. 2019).

A. The '776 Patent Claims

As discussed, the Board found all claims of the '776 patent to be unpatentable as obvious and certain of the claims to also be anticipated. On appeal, Presidio focuses its challenge to the Board's determinations on one limitation of the challenged claims: that at least one of the two external

surfaces along which the conductors lie is "adapted to be positioned substantially parallel to a major surface of a circuit board." '776 patent at 14:37–39. Presidio argues that the Board erred in declining to decide whether the term "adapted to be" should be construed as "designed to be" or merely as "capable of being" after concluding that the claims are invalid under either construction. Presidio contends that our precedent requires the Board to construe "adapted to" as meaning "made to, designed to, or configured to," and that under that construction, the conductor-bearing surfaces of the devices disclosed in Kuroda are not "adapted" for bonding to the surface of the circuit board. We disagree.

At the outset, although we have held that "adapted to" should be construed to mean "made to," "designed to," or "configured to" when the specification discloses structural features that render the claimed apparatus suitable for a claimed function, *see In re Man Mach. Interface Techs. LLC*, 822 F.3d 1282, 1286 (Fed. Cir. 2016) (citing *In re Giannelli*, 739 F.3d 1375, 1379 (Fed. Cir. 2014)), here, Presidio failed to identify for the Board any structural features of the claimed device as described in the specification that make it especially suitable for vertical mounting. *See* J.A. 1709, ll. 3–12 (counsel pointing vaguely to a "combination of" unspecified elements and "the orientation relative to the capacitor plates" when asked what structural features of the dielectric body itself render it specifically adapted for bonding to the circuit board). Thus, unlike in our prior cases, the intrinsic evidence here does not establish that "adapted to" means "designed to" in the context of the '776 patent.

In addition, there was uncontested evidence in the record that the devices depicted in Kuroda possessed the structural features of the devices depicted in the '776 patent as embodying the claimed invention. *See* IPR2018-00167 at 22, 50. For example, when directly questioned on this point by the Board, Presidio was unable to identify any

structural differences between the device depicted in Figure 5 of Kuroda, when rotated 90 degrees for vertical mounting, and 17A of the '776 patent, which Presidio agreed embodies the claims. *See* Oral Hearing Tr. at 68, ll. 1–18, IPR2018-00167 (P.T.A.B. Feb. 12, 2019). Based on this concession, the Board reasonably concluded that the device in Kuroda, when vertically mounted as taught in Li, would satisfy the requirements of the '776 patent claims, regardless of how the "adapted to" limitation is construed.

Presidio further argues that a skilled artisan would not have been motivated, with a reasonable expectation of success, to apply the teachings of Li to the devices in Kuroda and mount them vertically. However, the Board's findings of motivation and expectation of success were supported by Li's express discussion of the benefits of vertical mounting and its teaching that multilayer capacitors can be used in a vertical orientation. IPR2018-00167 at 49–50 (citing J.A. 375–376 (Li at ¶¶ 30, 31, 34, 40)). In addition, AVX's expert testified that a skilled artisan would have readily recognized that the capacitor of Kuroda could have easily been rotated and vertically connected to a circuit board using any of the well-known techniques discussed in the prior art. *Id.* at 50 (citing J.A. 1562 (¶ 22)); *see also* J.A. 1587–1592 (¶¶ 60–68). Presidio contends that vertical mounting of the devices in Kuroda would require wire bonding, which had disadvantages that would have dissuaded a skilled artisan, but the Board was entitled to rely on the teachings of Li itself as well as the testimony of AVX's expert in concluding that a skilled artisan could have readily adjusted for the disadvantages of wire bonding and that there were other known techniques available for vertically mounting the devices in Kuroda. IPR2018-00167 at 51–52 (citing J.A. 375–377 (Li at ¶¶ 32, 39, 41, 53); J.A. 1574 (¶ 43)). The Board's finding of motivation and reasonable expectation of success were thus supported by substantial evidence.

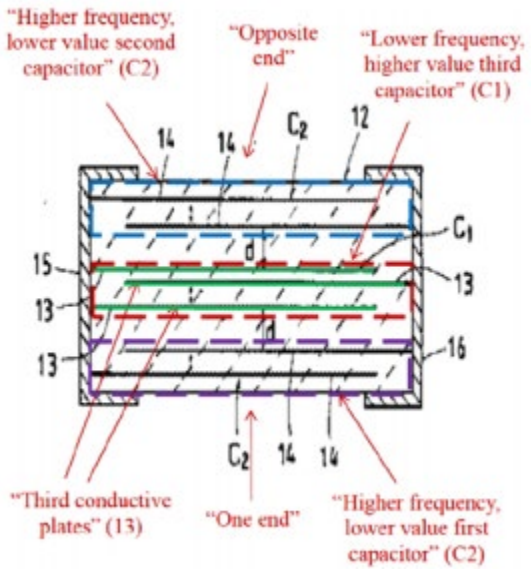
For these reasons, we affirm the Board's determinations that all claims of the '776 patent are unpatentable as obvious.

B. The '829 Patent Claims

The Board found claims 9–11 of the '829 patent anticipated by Kuroda and claims 32–34 obvious over Kuroda and another reference. We discuss in turn Presidio's challenges to these conclusions.

1. Claims 9–11

In finding that Figure 6 of Kuroda disclosed every element of claims 9–11 of the '829 patent, the Board relied on the following annotated figure provided by AVX in which the top and bottom surfaces of the device are identified as its two "ends."



IPR2018-00292 at 41. Presidio contends that the Board's finding relied on an overly broad construction of the word "end" in claim 9. Specifically, Presidio contends that "end" should be construed to mean "the extreme or last part *lengthwise* of the capacitor," rather than any "part of an area that lies at a boundary," as the Board construed the

term. Presidio reasons that under its construction, Figure 1 of Kuroda does not disclose a first and second capacitor located near the opposite "ends" of the device.

We find no error in the Board's construction. In concluding that the broadest reasonable interpretation of the claim term "end" was not limited to the lengthwise extremities of a capacitor, the Board pointed to the absence of any language in the specification suggesting such a limitation. The Board also relied on the patent's description of the top surface of the capacitor in Figure 14, reproduced below, as one of the "ends" of the device. IPR2018-00292 at 15–16 (citing '829 patent at 11:4–6 ("Figure 14 also illustrates another embodiment in that the *ends of the chip* are provided with an *insulating coating 128*.") (second emphasis added)).

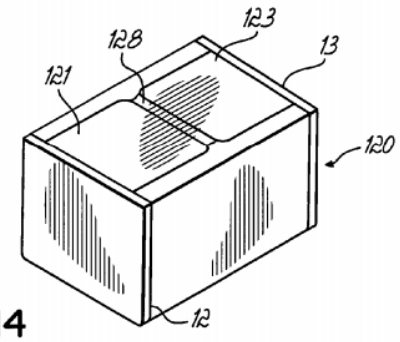


FIG. 14

'829 patent at Fig. 14.

While Presidio contends that the patent's reference to the "ends of the chip" in paragraph 14 was an error, and that the patent should have referenced the ends of the conductive pads (121 and 123), the Board specifically considered and declined to credit that argument when it was presented by Presidio's expert because it had no support in the specification. IPR2018-00292 at 16–17. Presidio provides no persuasive reason for why that credibility determination was outside the scope of the Board's reasonable

discretion.[2] *See Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (holding that the Board is "well within its discretion" to give more or less credibility to expert testimony unless "no reasonable trier of fact could have done so"). Moreover, even if the description of Figure 14 did contain an error, and the patent did not expressly refer to a top surface as an "end," Presidio points to nothing in the specification to suggest that the word "end" in the context of the patent is used only to refer to lengthwise extremities. Contrary to Presidio's assertion, the fact that claim 9 refers to one end and an opposite end in the capacitor structure does not suggest that the device can have only two ends. And while one definition of "end" in Meriam Webster's Dictionary includes a "lengthwise" limitation, the first definition provided by the same dictionary omits the "lengthwise" requirement and simply defines end as "the part of an area that lies at the boundary," which is consistent with the Board's construction. J.A. 886 (Case No. 19-2182).

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[2] Presidio's primary argument on this point is that the Board failed to consider language in the specification that describes an insulating coating (132) applied between the "ends" (125 and 126) of the conductive pads (121 and 123). However, that same paragraph makes clear that Figure 14 "illustrates *another alternative embodiment* in that the ends of the chip are provided with an insulated coating 128 to provide an electrical barrier from shorting with *other devices*" and that "the insulating coating 128 *is substantially similar to* the insulating coating 132." '829 patent at 11:4–11 (emphasis added). This suggests, contrary to Presidio's reading, that the insulating coating (128), which is applied to the ends of the chip for the purpose of prevent shorting with other devices, is distinct from (even if similar to) the insulating coating (132), which is applied between the conductive pads to prevent conduction between the pads.

The Board therefore properly rejected Presidio's construction of the term "end." Presidio does not dispute that Kuroda anticipates claims 9–11 under the Board's construction. Thus, we affirm the Board's invalidation of claims 9–11 of the '829 patent.

2. Claims 32–34

Presidio contends that the Board erred in construing the word "substantially" in the phrase "substantially parallel and opposed" as modifying "parallel" but not "opposed." On this basis, Presidio contends that the Board erred in finding that Figure 5 of Kuroda discloses a capacitor in which the "second and third conductive plates are substantially parallel and opposed in at least one region of said body, to form a capacitor therebetween."

We agree with the Board's construction. As explained in the final written decision, while the patent discusses plates that are "substantially parallel" or perpendicular to other surfaces, it never describes the plates as "substantially opposed." IPR2018-00292 at 21. Presidio asserts that the phrase "substantially parallel" is never used in the patent to describe the relationship of the plates to each other, but Presidio points to no affirmative intrinsic evidence to suggest the requirement that the capacitor plates in the claimed invention be substantially opposed to each other. Rather, Presidio relies solely on "grammatical evidence" from a grammar blog for the rule that "the scope of a modifier tends to extend to all the words that follow it." J.A. 948 (Case No. 19-2182). The Board was well within its discretion in declining to give weight to that evidence. *See Velander v. Garner*, 348 F.3d 1359, 1371 (Fed. Cir. 2003) ("It is within the discretion of the trier of fact to give each item of evidence such weight as it feels appropriate").

Presidio further contends that the objective of claim 32 is clearly to form a capacitor between the internal plates, which can only be accomplished if the plates are opposing. Presidio provides no explanation for why the plates need to

be "substantially" opposed across the length of the plates rather than merely opposed "in at least one region" of the dielectric body to form a capacitor. To the extent Presidio contends that the second and third conductive plates in Kuroda do not form a capacitor, the Board's finding on this point was adequately supported by Presidio's expert's testimony, based on testing he conducted, that a charge difference would develop between the plates so as to form a capacitor between them. IPR2018-00292 at 56–57 (citing J.A. (Case No. 19-2182) 1095–1096 (¶¶ 127–28)). Thus, in light of the evidence as a whole, we conclude that the Board's construction was the broadest reasonable interpretation. *See Alacritech, Inc. v. Intel Corp.*, 966 F.3d 1367, 1374 & n.7 (Fed. Cir. 2020) (concluding that the Board's construction was the broadest reasonable interpretation when there was nothing in the claim language requiring a narrower reading and the appellant could point to no other support for limiting the scope of the claim).

Presidio raises one separate argument as to claim 34 and its requirement that "the third conductive plate is substantially coextensive with the first and second conductive plates." Presidio contends that the Board improperly inferred that the third conductive plate in Kuroda Figure 5 is "substantially coextensive" with the other plates based on the "sufficient overlap" between them. According to Presidio, the presence of overlap does not necessarily establish that the plates have "largely . . . the same spatial scope or boundaries," as required by the Board's construction of "substantially coextensive." IPR2018-00292 at 27. We disagree. Regardless of whether an overlap between plates is always suggestive of their similarity in spatial scope and boundaries, Kuroda Figure 5 on its face and the testimony of AVX's expert constitute substantial evidence to support the Board's conclusion that the plates depicted in the figure have similar scope and boundaries.

For these reasons, we conclude that the Board's unpatentability determination as to claims 9–11 and 32–34 of

the '829 patent did not rely on improper claim construction and was otherwise supported by substantial evidence. Thus, we affirm the Board's decision.

CONCLUSION

We have considered Presidio's remaining arguments and find them to be unpersuasive. For the reasons discussed, we affirm the Board's invalidation of claims 1–14 of the '776 patent and claims 9–11 and 32–34 of the '829 patent.

AFFIRMED

COSTS

Costs to Appellee.