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6 **IN THE UNITED STATES DISTRICT COURT**  
7 **FOR THE DISTRICT OF ARIZONA**  
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9 Continental Circuits LLC,  
10 Plaintiff,  
11 v.  
12 Intel Corporation, et al.,  
13 Defendants.

No. CV16-2026 PHX DGC

**ORDER**

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15 Plaintiff Continental Circuits LLC asserts claims for patent infringement against  
16 Defendants Ividen U.S.A. Corp., Ividen Co. Ltd., and Intel Corp. The Court previously  
17 ruled on claim construction (Doc. 243), and its decision was reversed by the Federal  
18 Circuit. *See Cont'l Circuits LLC v. Intel Corp.*, 915 F.3d 788, 792 (Fed. Cir. 2019). The  
19 case has been remanded for further litigation.

20 The Court's previous ruling declined to address three means-plus-function claims.  
21 Doc. 243 at 18-20. The parties have now re-briefed the construction of these claims.  
22 Docs. 324, 325, 336, 337. This order will set forth the Court's ruling.

23 **A. Background.<sup>1</sup>**

24 When the claims of a patent include the "means for" doing something, they  
25 describe a function. But if a function is claimed, what structure of devices has actually  
26 been patented? Congress has answered this question in 35 U.S.C. § 112(f), which

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28 <sup>1</sup> The Court assumes the reader is familiar with the background facts and will  
recount only facts and events relevant to construction of the means-plus-function claims.

1 provides that “[a]n element in a claim for a combination may be expressed as a means or  
2 a step for performing a specified function without the recital of structure, material, or acts  
3 in support thereof, and such claim shall be construed to cover the corresponding  
4 structure, material, or acts described in the specification and equivalents thereof.”  
5 35 U.S.C. § 112(f).<sup>2</sup> This provision “allows a patentee to express a claim limitation by  
6 reciting a function to be performed rather than by reciting structure or materials for  
7 performing that function.” *Northrop Grumman Corp. v. Intel Corp.*, 325 F.3d 1346,  
8 1350, 66 U.S.P.Q.2d 1341 (Fed. Cir. 2003).

9 How then is a function claim construed so as to enable a fact finder to determine  
10 when the claim has been infringed? Under § 112(f), “[s]uch a limitation is construed to  
11 cover the corresponding structure, materials, or acts described in the specification and  
12 equivalents thereof.” *Id.* As the Federal Circuit has explained:

13 Functional terms written in “means” form are “construed to cover the  
14 corresponding structure, material, or acts described in the specification and  
15 equivalents thereof.” 35 U.S.C.A. § 112, ¶ 6. Infringement is found  
16 literally if the claimed function is performed by either the structure  
17 described in the patent or an equivalent of that structure. Thus construction  
of “means” claim terms requires review of not only the function, but also  
the structure by which it is performed.

18 *Vulcan Eng’g Co., Inc. v. Fata Aluminium, Inc.*, 278 F.3d 1366, 1373 (Fed. Cir. 2002).

19 The Court’s task is to identify the “function” associated with the plain language of  
20 the claim and then identify the corresponding “structure” in the specification that is  
21 associated with that function. *Medtronic, Inc. v. Advanced Cardiovascular Sys., Inc.*, 248  
22 F.3d 1303, 1311 (Fed. Cir. 2001) (“The first step in construing such a limitation is a  
23 determination of the function of the means-plus-function limitation. The next step is to  
24 determine the corresponding structure described in the specification and equivalents  
25 thereof.”).

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27 <sup>2</sup> Cases cited by the parties, the parties’ briefs, and some language quoted in this  
28 order refer to this statute as § 112, ¶ 6. In 2011, Congress reformatted the paragraphs of  
§ 112 as subsections. Leahy-Smith America Invents Act (‘AIA’), Pub. L. No. 112-29,  
125 Stat. 284 (2011). Thus, § 112, ¶ 6 is now codified as § 112(f).

1           The parties briefed this issue before the Court’s earlier claim construction ruling,  
2 and agreed that three claims, two in the ’582 patent and one in the ’105 patent, are  
3 means-plus-function limitations. *See* Doc. 177 at 15-16.<sup>3</sup> The parties also agreed on the  
4 function for each term. *Id.*

5           The first limitation identified by the parties, found in Claim 109 of the ’582 Patent,  
6 is “means for joining the conductive layer to the dielectric material.” Doc. 177 at 15.  
7 The parties agreed in their previous briefing that this claim has the following function:  
8 “joining the conductive layer to the dielectric material.” *Id.*

9           The second limitation is found in Claim 114 of the ’582 Patent and reads: “means  
10 for mechanically gripping a conductive layer to the surface of the dielectric material so  
11 that the conductive layer is burrowed in and under the top surface of the dielectric  
12 material.” *Id.* The parties agreed on the following function for this claim: “mechanically  
13 gripping a conductive layer to the surface of the dielectric material so that the conductive  
14 layer is burrowed in and under the top surface of the dielectric material.” *Id.*

15           The third term comes from the ’105 Patent and reads: “means for interlocking a  
16 conductor part of the circuitry configured for filling cavities with an epoxy dielectric  
17 material disposed in combination with the circuitry and coupled with the conductor part.”  
18 *Id.* at 116.<sup>4</sup> The parties agree on this function: “interlocking a conductor part of the  
19 circuitry configured for filling cavities with an epoxy dielectric material disposed in  
20 combination with the circuitry and coupled with the conductor part.” *Id.*

21           In the previous claim construction briefing, Plaintiff proposed a different structure  
22 for each of these claims. This was based in part on Plaintiff’s belief that each of the  
23 claims disclosed a different function. While it is true that the language of the functions  
24 was different, the Court disagreed with Plaintiff’s premise:

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25           <sup>3</sup> Citations are to page numbers added at the top of each page by the Court’s  
26 electronic filing system.

27           <sup>4</sup> The parties’ previous filings identified this as Claim 103 of the ’105 patent  
28 (Doc. 166 at 16), but Claim 103 states: “A product produced by the process of 21.”  
Claim 21 includes that actual quoted language. *See* Doc. 325-3 at 11. The Court will  
therefore refer to Claim 21 in this order.

1 The Court also disagrees with Plaintiff's suggestion that the words  
2 "joining," "mechanically gripping," and "interlocking" have different  
3 meanings. These terms are not defined in the patents. Each is used to  
4 describe the means by which the layers adhere to each other. And, as  
5 Defendants note, these terms are used interchangeably in some parts of the  
6 specification.

7 Doc. 243 at 20. As a result, the parties' recent briefing does not address the precise  
8 functions disclosed in the three claims. Plaintiff notes that neither party appealed this  
9 decision to the Federal Circuit, and that it is now law of the case. Doc. 336 at 4 n.1.

10 After reading many more means-plus-function cases in the last few days than it  
11 had time to read when ruling on the broader claim construction issues addressed in the  
12 earlier briefing, the Court reaches a different conclusion. The Court now believes that  
13 each function may have a slightly different meaning. While all of the claims describe a  
14 function that causes the layers of the device to adhere to each other, the Court concludes  
15 that the plain language of the claims should be adopted. The Federal Circuit has  
16 instructed that "[t]he function of a means-plus-function limitation . . . must come from  
17 the claim language itself." *Creo Prod., Inc. v. Presstek, Inc.*, 305 F.3d 1337, 1344 (Fed.  
18 Cir. 2002); *see also Micro Chem., Inc. v. Great Plains Chem. Co.*, 194 F.3d 1250, 1258  
19 (Fed. Cir. 1999) ("The statute does not permit limitation of a means-plus-function claim  
20 by adopting a function different from that explicitly recited in the claim.").

21 The functions adopted by the Court, therefore, are as follows: "means for joining  
22 the conductive layer to the dielectric material" in Claim 109 of the '582 patent; "means  
23 for mechanically gripping a conductive layer to the surface of the dielectric material" in  
24 Claim 114 of the '582 patent; and "means for interlocking a conductor part of the  
25 circuitry configured for filling cavities with an epoxy dielectric material disposed in  
26 combination with the circuitry and coupled with the conductor part" in Claim 21 of the  
27 '105 patent. The Court apologizes to the parties for wobbling about on this issue, but  
28 concludes that these functions are truer to the actual claim language and the teachings of  
the Federal Circuit.

1           **B.     The Parties’ Proposed Structure Constructions.**

2           The parties disagree on the structure that corresponds to the functions in each  
3 claim. Plaintiff asserts that the corresponding structure for all of the claims is simply  
4 “teeth.” Nothing more. Doc. 325 at 5.

5           Defendants proposed a much more detailed structure for each of the claims:

6           [A]t least about 20% of the “teeth” in a layer must meet the following three  
7 factors:

8                   • For shape, each tooth is: “substantially triangular in shape” “(e.g.,  
9 equilateral, isosceles, scalene, right, obtuse, or any combination thereof)”  
10 and “obtuse, canine, or fang-shaped [] to help the conductive coating and  
11 metal layer hook under the exterior surface of the applied dielectric  
material”;

12                   • For size, each tooth is: “sized at least 1 tenth of a mil deep” and up  
13 to “about 2 tenths of a mil [deep]”; and

14                   • For frequency of the teeth meeting these shape and size  
15 requirements, there are: “at least about 5,000 teeth per linear inch” and “at  
16 least about 25,000 teeth per square inch”.

17 Doc. 324 at 2 (citations omitted).

18           **C.     The Court’s Construction.**

19           The parties each rely on language from the ’582 patent to support their arguments,  
20 noting that the language of the patents at issue is largely the same. The Court agrees, and  
21 therefore will focus its analysis on language from the ’582 patent. *See Cont’l Circuits*,  
22 915 F.3d at 792 (patents at issue in this case “share substantially the same specification”).

23           The parties each rely on the same language from the ’582 patent. For example,  
24 but both sides cite column 3, lines 35-37, 42-46, and 52-67, as well as column 4 lines 1-2  
25 and 6-11. Curiously, neither side devotes time to discussing the language in the actual  
26 claims at issue – Claims 109 and 114 of the ’582 patent and Claim 21 of the ’105 patent.

27           The Court concludes that Plaintiff’s claimed structure – teeth – is too broad. In  
28 support of this proposed construction, Plaintiff argues that the Court must be “careful to

1 limit the corresponding structure to only that which is necessary to perform the recited  
2 function.” Doc. 325 at 6-7 (quoting *Nomos Corp. v. Brainlab USA, Inc.*, 357 F.3d 1364,  
3 1367 (Fed. Cir. 2004)). Plaintiff argues that “[t]his requirement is meant to preserve a  
4 broader construction, not a narrower one. Doc. 325 at 7. But in support of this  
5 proposition, Plaintiff cites *Platex Products, Inc. v. Procter & Gamble Co.*, 400 F.3d 901,  
6 909 (Fed. Cir. 2005), a case which does not hold that broader constructions are favored in  
7 a means-plus-function analysis. To the contrary, a means-plus-function construction  
8 under § 112(f) is generally narrower than other kinds of claim construction. *See, e.g.*,  
9 *Micro Chem.*, 194 F.3d at 1260 (“Claim treatment outside of the requirements of § 112,  
10 ¶ 6 generally gives the claims broader scope.”); *Johnston v. IVAC Corp.*, 885 F.2d 1574,  
11 1580 (Fed. Cir. 1989) (“[S]ection 112 ¶ 6 does not in any event expand the scope of the  
12 claim. An element of a claim described as a means for performing a function, if read  
13 literally, would encompass any means for performing the function. But section 112 ¶ 6  
14 operates to cut back on the types of means which could literally satisfy the claim  
15 language.”); *Uniloc USA, Inc. v. AVG Techs. USA, Inc.*, 2017 WL 1154927, \*4 (E.D.  
16 Tex. 2017) (“Generally, means-plus-function claims have a narrower scope than non-  
17 means-plus-function claims.”).

18 Defendant’s proposed structure, on the other hand, is too narrow, including very  
19 specific requirements and overlooking broader statements in the specification. The  
20 Federal Circuit has instructed “that corresponding structure must include *all* structure that  
21 actually performs the recited function.” *Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*,  
22 296 F.3d 1106, 1119 (Fed. Cir. 2002) (emphasis added). And a court may not “limit the  
23 corresponding structure to the preferred embodiment and not include all structure in the  
24 specification corresponding to the claimed function.” *Callicrate v. Wadsworth Mfg., Inc.*,  
25 427 F.3d 1361, 1369 (Fed. Cir. 2005) (quotation marks and citation omitted). This is  
26 what Defendants do. They rely heavily on the following paragraphs from the ’582 patent,  
27 which make clear that a preferred embodiment is being described:

28

1 Further, it has been found *preferable* to have numerous teeth sized  
2 and shaped so that they are not too large or too small. If the teeth are too  
3 small, wide, straight, and shallow, then the surface resembles the roughened  
4 surface of prior art techniques, vaguely analogous to a surface of molar  
5 teeth, and the adherence is not much better than that achieved by known  
6 prior art roughening techniques.

7 However, if the teeth are too large, deep, and fanged or hook-shaped,  
8 the teeth undercut the surface to such an extent that the strength of the  
9 dielectric material surface is weakened. As a result, adherence is decreased  
10 over the *preferred embodiment*.

11 Not too great and not too slight, the right sized and shaped teeth, set  
12 in a fanged orientation and with sufficient frequency, have been found to be  
13 *the best structure*. If the correct balance of these critically important factors  
14 is created, the result is a greatly improved circuit board or other such  
15 electrical device.

16 '582 Patent, Column 2 lines 7-24 (emphasis added); *see also* 3:52-61 (“it is *preferable*  
17 that the teeth be within a certain size range”; “[t]he *optimal* size range for obtuse, canine,  
18 or hook-shaped teeth involves a balance”; “[*b*]etter is at least 1.25 tenths of a mil deep,  
19 and even better is at least 1.5 tenths of a mil deep”; “[h]owever, 1.75 tenths of a mil is  
20 *acceptable*”); 4:7-11 (“Having at least about 20% of the teeth in one or more of these  
21 ranges, and *preferably* at least 50%, is a *preferred* balance of mechanical grip without a  
22 weakening the integrity of the layering, particularly in combination.”) (emphasis added).

23 What, then, is the correct structure for the functions identified in the three claims  
24 at issue? The Court finds this to be a difficult question. Even after reading many cases  
25 from the Federal Circuit describing means-plus-function claims construction, and many  
26 readings of the patent, the answer is elusive. Language from the '582 patent contains  
27 numerous references to structure that can help improve adherence between the layers of  
28 the device being described. *See, e.g.*, Doc. 325-2 at 1:54-57 (“teeth that are preferably  
angled or hooked like fangs or canine teeth to enable one layer to mechanically grip a  
second layer”); 1:59-60 (“a surface of the teeth is an improvement in that there is an  
increase in surface area”); 2:1-3 (“the conductive coating and metal layer is actually

1 burrowed in and under the dielectric material”); 2:7-9 (“numerous teeth sized and shaped  
2 so that they are not too large or too small and vice versa”); 2:9-13 (“If the teeth are too  
3 small, wide, straight, and shallow, then the surface resembles the roughened surface of  
4 prior art techniques, vaguely analogous to a surface of molar teeth, and the adherence is  
5 not much better than that achieved by known prior art roughening techniques.”); 2:14-17  
6 (“if the teeth are too large, deep, and fanged or hook-shaped, the teeth undercut the  
7 surface to such an extent that the strength of the dielectric material surface is weakened”);  
8 2:19-21 (“the right sized and shaped teeth, set in a fanged orientation and with sufficient  
9 frequency, have been found to be the best structure”); 3:15-17 (“note particularly the size,  
10 shape, frequency, and depth of the teeth in FIG. 1 with the surface produced by  
11 roughening in FIG. 2”); 3:21-24 (“It could also be said that the layers join in a saw-  
12 toothed manner, i.e., teeth made of both materials in an interlocking bite.”); 3:28-32 (“A  
13 further way of articulating the ‘teeth’ concept is to view each tooth as being substantially  
14 triangular in shape, with the base of the triangle being defined by a plane of the applied  
15 dielectric material before it is etched, or more precisely by the exterior surface thereof.”);  
16 3:32-35 (“The invention can be carried by forming cavities in the applied dielectric  
17 material for receiving the teeth, and then forming the teeth from the conductive coating  
18 and metal layer formed thereon.”); 3:35-39 (“Generally, the teeth can be of any triangular  
19 shape (e.g., equilateral, isosceles, scalene, right, obtuse, or any combination thereof).  
20 Preferably, though, the teeth are obtuse so as to hook or angle under the exterior surface  
21 of the applied dielectric material.”); 3:40-43 (“The use of any shape of teeth increases the  
22 surface area where the conductive coating is on the applied dielectric material.”).

23 Many different arguments can be made as to which of these structure descriptions,  
24 or others in the patent not cited here, correspond to the specific functions at issue. The  
25 Court finds the most helpful language to be in the claims themselves.

26 **1. Claim 109.**

27 Claim 109 reads as follows:

28 An electrical device including:



1  
2 a dielectric material comprising a surface;

3 a conductive layer forming a portion of circuitry of an electrical  
4 device; and

5 means for joining the conductive layer to the dielectric material, the  
6 means including a structuring of teeth built up on the dielectric  
7 material and comprised of the conductive layer and angled  
8 sufficiently for mechanically gripping the dielectric material in  
9 three dimensions, wherein a plurality of the teeth are within the  
10 range of 1 tenth of a mil deep to 1.75 tenths of a mil deep, and

11 wherein at least one of the cavities includes an upgrade slope with  
12 respect to the surface of the dielectric material, and one of the  
13 teeth engages a portion of the dielectric material at the slope.

14 Doc. 325-2 at 14.

15 This claim language includes the function – “means for joining the conductive  
16 layer to the dielectric material” – and also a description of the corresponding structure:  
17 “teeth built up on the dielectric material and comprised of the conductive layer and  
18 angled sufficiently for mechanically gripping the dielectric material in three dimensions,  
19 wherein a plurality of the teeth are within the range of 1 tenth of a mil deep to 1.75 tenths  
20 of a mil deep.” *Id.* The language also includes this description of the structure: “wherein  
21 at least one of the cavities includes an upgrade slope with respect to the surface of the  
22 dielectric material, and one of the teeth engages a portion of the dielectric material at the  
23 slope.” *Id.*

24 Section 112(f) requires the Court to find “the *corresponding* structure, material, or  
25 acts described in the specification and equivalents thereof.” 35 U.S.C. § 112(f)  
26 (emphasis added). The Federal Circuit has instructed that the focus of the “corresponding  
27 structure” inquiry is not merely whether a structure is capable of performing the recited  
28 function, but rather whether the corresponding structure is “clearly linked or associated  
with the [recited] function.” *Medtronic*, 248 F.3d at 1311. Here, the only structure  
language that is clearly linked or associated with the recited function in Claim 109 is in

1 the language of Claim 109 itself. Other language regarding teeth and structure can be  
2 found throughout the patent, but the Court cannot find evidence that these other  
3 references are clearly linked or associated with the function in Claim 109.

4 The Federal Circuit has also instructed that § 112(f) does not “permit  
5 incorporation of structure from the written description beyond that necessary to perform  
6 the claimed function.” *Micro Chem.*, 194 F.3d at 1258. The Court cannot conclude that  
7 Defendant’s highly specific detail should be adopted as it appears to be a preferred  
8 embodiment and “structure from the written description beyond that necessary to perform  
9 the claimed function.” *Id.*

10 The Court accordingly construes the corresponding structure for the Claim 109  
11 function to be “teeth built up on the dielectric material and comprised of the conductive  
12 layer and angled sufficiently for mechanically gripping the dielectric material in three  
13 dimensions, wherein a plurality of the teeth are within the range of 1 tenth of a mil deep  
14 to 1.75 tenths of a mil deep, with at least one cavity that includes an upgrade slope with  
15 respect to the surface of the dielectric material, and one tooth that engages a portion of  
16 the dielectric material at the slope, and equivalents thereof.”

17 **2. Claim 114.**

18 The Court reaches a similar conclusion on Claim 114. It reads:

19 An electrical device including:

20 a dielectric material having a surface remaining from removal of a  
21 portion of the dielectric material; and

22 means for mechanically gripping a conductive layer to the surface of  
23 the dielectric material so that the conductive layer is burrowed in  
24 and under the top surface of the dielectric material, wherein the  
25 conductive layer forms a portion of circuitry of an electrical  
26 device, wherein the means for mechanically gripping is  
27 comprised of teeth, and a plurality of the teeth are within the  
28 range of 1 tenth of a mil deep to 1.75 tenths of a mil deep, and

1                   Wherein at least one of the cavities includes an upgrade slope with  
2                   respect to the surface of the dielectric material, and one of the  
3                   teeth engages a portion of the dielectric material at the slope.

4                   Doc. 325-2 at 14.

5                   This claim language includes the function – “means for mechanically gripping a  
6                   conductive layer to the surface of the dielectric material” – and also a description of the  
7                   corresponding structure: “so that the conductive layer is burrowed in and under the top  
8                   surface of the dielectric material, wherein the conductive layer forms a portion of  
9                   circuitry of an electrical device, wherein the means for mechanically gripping is  
10                  comprised of teeth, and a plurality of the teeth are within the range of 1 tenth of a mil  
11                  deep to 1.75 tenths of a mil deep,” and “at least one of the cavities includes an upgrade  
12                  slope with respect to the surface of the dielectric material, and one of the teeth engages a  
13                  portion of the dielectric material at the slope.” For reasons explained above, the Court  
14                  adopts this language – plus equivalents thereof – as the structure that corresponds to the  
15                  function in Claim 114.

16                   **3.        Claim 21.**

17                   Claim 21 of the '105 patent includes this language:

18                   A process of making an article of manufacture, the process  
19                   comprising: implementing a circuit design for an electrical device with  
20                   circuitry comprising means for interlocking a conductor part of the circuitry  
21                   configured for filling cavities with an epoxy dielectric material disposed in  
22                   combination with the circuitry and coupled with the conductor part in a  
23                   configuration where the dielectric material comprises a non-uniformly  
24                   roughened surface comprising cavities located in and underneath an initial  
25                   surface of the dielectric material delivered with solid content being non-  
26                   homogeneous and configured to bring about formation of the nonuniformly  
27                   roughened surface by etching of the epoxy, at least some the cavities  
28                   having a first cross-sectional distance proximate the initial surface and a  
                    substantially greater cross sectional distance distant from the initial surface.

26                   Doc. 325-3 at 11.

27                   This claim language includes the function – “means for interlocking a conductor  
28                   part of the circuitry configured for filling cavities with an epoxy dielectric material

1 disposed in combination with the circuitry” – and also a description of the corresponding  
2 structure: “coupled with the conductor part in a configuration where the dielectric  
3 material comprises a non-uniformly roughened surface comprising cavities located in and  
4 underneath an initial surface of the dielectric material delivered with solid content being  
5 non-homogeneous and configured to bring about formation of the nonuniformly  
6 roughened surface by etching of the epoxy, at least some the cavities having a first cross-  
7 sectional distance proximate the initial surface and a substantially greater cross sectional  
8 distance distant from the initial surface.”

9 Because the entire patent specification clearly anticipates that the interlocking  
10 described in this claim will be accomplished by teeth, the Court adopts this structure for  
11 Claim 21: “the conductor part of the circuitry and the dielectric part coupled by  
12 interlocking teeth, in a configuration where the dielectric material comprises a non-  
13 uniformly roughened surface comprising cavities located in and underneath an initial  
14 surface of the dielectric material, formed by etching of the epoxy, at least some the  
15 cavities having a first cross-sectional distance proximate the initial surface and a  
16 substantially greater cross sectional distance distant from the initial surface, and at least  
17 one of the cavities receiving teeth from the conductor part of the circuitry, and  
18 equivalents thereof.”

19 Dated this 16th day of December, 2019.

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David G. Campbell  
United States District Judge