

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VICOR CORPORATION,
Petitioner,

v.

DELTA ELECTRONICS, INC.,
Patent Owner.

IPR2024-00705
Patent 9,819,263 B2

Before THU A. DANG, NATHAN A. ENGELS, and
SHEILA F. McSHANE, *Administrative Patent Judges*.

DANG, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background

Vicor Corporation (“Petitioner”) filed a Petition requesting an *inter partes* review of claims 1–6 (“the challenged claims”) of U.S. Patent No. 9,819,263 B2 (Ex. 1001, “the ’263 patent”). Paper 2 (“Pet.”). Delta Electronics, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 6 (“Prelim. Resp.”). With our authorization, Petitioner filed a Preliminary Reply to Patent Owner’s Preliminary Response (Paper 9, “Prelim. Reply”) and Patent Owner filed a Preliminary Sur-reply in Response to Petitioner’s Preliminary Reply (Paper 10, “Prelim. Sur-reply”).

Under 37 C.F.R. § 42.4(a), the Board has authority to determine whether to institute an *inter partes* review. Applying the standard set forth in 35 U.S.C. § 314(a), which requires demonstration of a reasonable likelihood that Petitioner would prevail with respect to at least one challenged claim, we grant Petitioner’s request and institute an *inter partes* review of all challenged claims.

B. Related Proceedings

The parties identify the following court proceeding that involves the ’263 patent: *Delta Electronics, Inc. v. Vicor Corporation*, Civil Action No. 6-23-cv-00726 (W.D. Tex.). Pet. 98; Paper 4, 2.

Petitioner further identifies IPR2024-00706 (challenging claims of U.S. patent No. 10,877,534 B2 (“the ’534 patent”), which is asserted in *Delta Electronics, Inc. v. Vicor Corporation*, Civil Action No. 1:23-cv-01246-JLH (D. Del.)), IPR2024-00715 (also challenging claims of the ’534 patent), and IPR2024-00704 (challenging claims of U.S. Patent No.

8,711,580 B2, which is asserted in the same Delaware civil action as the '534 patent). Pet. 98–99.

C. The '263 Patent

The '263 patent, titled “Power Converter and Method for Manufacturing the Same,” discloses a power converter that includes a carrier, first and second electronic components, and a connection part. Ex. 1001, codes (54), (57). In at least some embodiments, the carrier is disposed at 1/3 to 2/3 of a height of the power converter. *Id.* at code (57). The first electronic component is disposed on the bottom surface of the carrier, while the second electronic component is disposed on the top surface of the carrier. *Id.* The connection part comprises a first terminal coupled to either the top or bottom surface of the carrier and a second terminal attached to the first electronic component's surface apart from the carrier. *Id.*

Figure 1 of the '263 patent, reproduced below, illustrates a schematic diagram of a power converter. *Id.* at 2:41–43, 4:1–3.

100

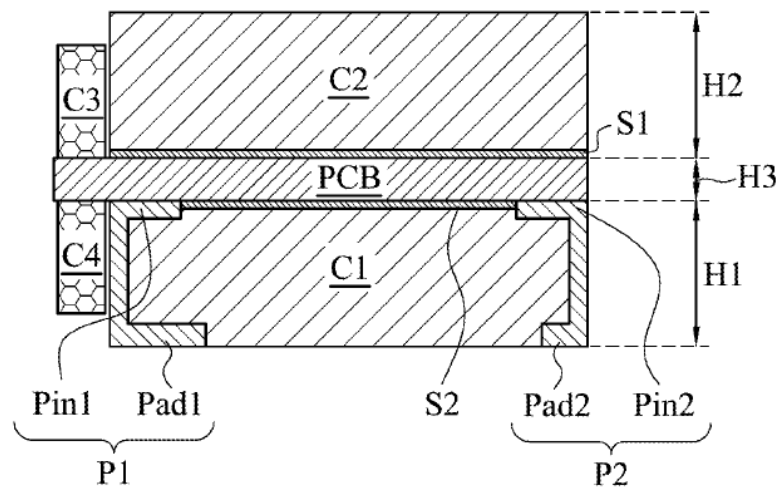


Fig. 1

Figure 1 illustrates a schematic diagram of a power converter. *Id.* at 2:41–43, 4:1–3.

Power converter 100 illustrated in Figure 1 includes carrier (“printed circuit board”) PCB, first electronic component C1, second electronic component C2, first connection part P1, and second connection part P2. *Id.* at 4:1–6. Carrier PCB includes top surface S1 and bottom surface S2, first connection part P1 includes first terminal Pin1 and second terminal Pad1, and second connection part P2 includes first terminal Pin2 and second terminal Pad2. *Id.* at 4:18–22.

Figure 1 further shows that carrier PCB can be disposed at 1/3 to 2/3 of the height of the power converter. *Id.* at 4:45–47. In one example, first height H1 is defined as “the vertical height between a highest one of the first electronic components (e.g. the electronic component C1)” and bottom surface S2 of carrier PCB. *Id.* at 5:5–9. Second height H2 may be defined as “the vertical height between a highest one of the second electronic

components (e.g. the electronic component C2)” and top surface S1 of carrier PCB. *Id.* at 5:11–14. The height of the power converter is calculated by adding first height H1, second height H2, and thickness H3 of carrier PCB. *Id.* at 5:14–17.

First connection part P1 may be fabricated by mechanical support of first electronic component C1. *Id.* at 4:47–49. The ’263 patent describes a method for manufacturing a power converter that includes curving the connection part by mechanical support of the first electronic component to fix the connection part at the first electronic component. *Id.* at 2:11–18. In one example, connection parts P1 and P2 are fabricated by mechanical support of first electronic component C1, and thus, according to the ’263 patent, “the gap between the connection parts P1 and P2 and the first electronic component C1 is close to zero.” *Id.* at 5:23–27.

D. The Challenged Claims

Of the challenged claims (claims 1–6), claim 1 is the only independent claim. Claim 1 is illustrative and is reproduced below:

1. A power converter, comprising:
 - a carrier, comprising:
 - an upper surface; and
 - a lower surface;
 - a first electronic component disposed at the lower surface of the carrier;
 - a second electronic component disposed at the upper surface of the carrier; and
 - a first connection part, comprising:
 - a first terminal electrically coupled to the upper surface or the lower surface of the carrier; and

a second terminal attached to a surface of the first electronic component apart from the carrier, wherein the second terminal of the first connection part is a bonding pad;

wherein the carrier is disposed at $\frac{1}{3}$ to $\frac{2}{3}$ of a height of the power converter, and wherein the first connection part is fabricated by mechanical support of the first electronic component.

Ex. 1001, 15:23–41.

Asserted Grounds of Unpatentability

Petitioner challenges the patentability of claims 1–6 of the '263 patent on the following grounds (Pet. 1–2):

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1–6	102	Vinciarelli-664 ²
1–6	103	Vinciarelli-664, Vinciarelli-269, ³ Vinciarelli-844, ⁴ Vinciarelli-747 ⁵
1–6	103	Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, Vinciarelli-747, Zeng-014 ⁶
1–6	103	Vinciarelli-218, ⁷ Zeng-014
1–6	103	Zeng-014, Vinciarelli-218

Petitioner relies on the declaration of R. Jacob Baker, Ph.D., P.E.
(Ex. 1003) in support of its unpatentability contentions.

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–288 (2011), amended various provisions of 35 U.S.C. Because the ’263 patent claims the benefit of the filing date from an application filed after March 16, 2013, we apply the AIA version of the statutory basis for unpatentability. *See* Ex. 1001, code (30).

² U.S. Patent No. 10,264,664 B1, issued April 16, 2019, filed June 4, 2015 (Ex. 1005, “Vinciarelli-664”).

³ U.S. Patent No. 8,427,269 B1, issued April 23, 2013, filed June 29, 2009 (Ex. 1006, “Vinciarelli-269”).

⁴ U.S. Patent No. 7,361,844 B2, issued April 22, 2008, filed November 25, 2002 (Ex. 1007, “Viciarelli-844”).

⁵ U.S. Patent No. 8,966,747 B2, issued March 3, 2015, filed May 11, 2011 (Ex. 1010, “Viciarelli-747”).

⁶ U.S. Patent Appl. Publication No. 2009/0175014 A1, published July 9, 2009, filed January 2, 2009 (Ex. 1008, “Zeng-014”).

⁷ U.S. Patent Appl. Publication No. 2014/0355218 A1, published December 4, 2014, PCT filed May 11, 2012 (Ex. 1009, “Vinciarelli-218”).

II. ANALYSIS

A. Claim Construction

We construe each claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art (POSITA) at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (en banc).

Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co. Matal*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner contends that the limitation “is fabricated by mechanical support of the first electronic component” is a “product-by-process” limitation because “it specifies the method of fabrication and therefore is not entitled to patentable weight when evaluating patentability.” Pet. 3. Patent Owner argues that “a description of [a] process alone does not necessarily imply a product-by-process interpretation” and “the limitation’s interpretation depends upon whether or not the limitation describes any structure.” Prelim. Resp. 7–8. In its Preliminary Reply, Petitioner contends that the limitation at issue “recites no structure beyond the ‘connection part’ and the process imparts no structure in addition to that already recited in the claim.” Prelim. Reply 1. Patent Owner responds in its Preliminary Sur-

reply that the limitation “describes a particular structural relationship (‘mechanical support’) between the connection part and ‘the first electronic component’” recited elsewhere in the claim. Prelim. Sur-reply 1–2.

In light of the parties’ arguments and evidence, we address claim terms “is fabricated by mechanical support of the first electronic component,” but only to the extent necessary to resolve the disputed issues before us.

“fabricated by mechanical support of the first electronic component” (claim 1)

Petitioner contends that, in claim 1, “[t]he ‘connection part’ must be ‘fabricated by mechanical support’ of an electrical component.” Pet. 3. According to Petitioner, the limitation is thus “construed as a product-by-process limitation,” wherein the limitation “may be ignored in a patentability analysis.” *Id.* at 5.

However, as Patent Owner points out, the district court has determined that “[c]laim language in a product claim may only be found as a process limitation if it does not describe structure.” Prelim. Resp. 7; *see Purdue Pharma L.P. v. Epic Pharma, LLC*, 811 F.3d 1345, 1353 (Fed. Cir. 2016). As Patent Owner further points out, the district court has determined that “[i]f the claim language ‘can connote with equal force a structural characteristic of the product or a process of manufacture[, it is] commonly and by default interpreted in their structural sense.’” Prelim. Resp. 7–8 (citing *In re Nordt Dev. Co., LLC*, 881 F.3d 1371, 1375–1376 (Fed. Cir. 2018) (emphasis omitted)).

Here, we find persuasive Patent Owner’s contention, which is supported by the testimony of Dr. Phinney that “the ‘mechanical support for

the first electronic component’ for the first connection part is a structural feature or relationship.” Prelim. Resp. 8 (citing Ex. 2001 ¶¶ 52–54). Here, claim 1 requires a structure in which the first connection part comprises a first terminal at one end coupled to a surface of a carrier such as a circuit board, and a second terminal at the other end attached to a surface of the first component, such that the first connection part has mechanical support of the first electronic component. *See* Ex. 1001, 15:31–37. We are persuaded by Patent Owner’s contention that “this claim language connotes sufficient structural characteristics that preclude a product-by-process.” Prelim. Resp. 9.

In its Preliminary Reply, Petitioner responds that, although it “clearly defines the relevant ‘connection part’ structure in the prior art when discussing [other] limitations [] which actually recite the claimed structure,” the limitation at issue “recites no structure beyond the ‘connection part,’” wherein “the process imparts no structure in addition to that already recited in the claim.” Prelim. Reply 1. However, we find availing Patent Owner’s contention that “[a]ddressing some claimed aspects of the ‘connection part’ for some limitations does not automatically address other claimed aspects of the ‘connection part’” in the limitation at issue. Prelim. Sur-reply 2. That is, as Patent Owner points out, there is “structural relationship between connection part and electronic component.” *Id.*

On the record before us, we are unpersuaded by Petitioner’s contention that the limitation at issue “may be ignored in a patent analysis” because it may be “construed as a product-by-process limitation.” Pet. 5. As the district court determined, a product claim may only be found as a process limitation “if it does not describe structure” (*Purdue Pharma*, 811

F.3d at 1353), and we find availing Patent Owner’s contention that “fabricated by mechanical support of the first electronic component” as recited in claim 1 describes a structure. Prelim. Resp. 7–8; Prelim. Sur-reply 1–2.

On this preliminary record, we determine that the term “fabricated by mechanical support of the first electronic component” as recited in claim 1 is not a product by process limitation. We determine no further explicit construction is necessary to resolve the controversy. *See Vivid Techs.*, 200 F.3d at 803. The parties are invited to address this claim construction issue further during trial, if so desired.

B. Principles of Law

To establish anticipation, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008). There is no requirement that the prior art must use the same words to describe a claim element in order to teach or disclose that claim element. Identity of terminology is not required for a claim element to be anticipated by the prior art without resorting to obviousness. *See In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009); *In re Bond*, 910 F.2d 831, 832 (Fed. Cir. 1990).

It is proper to take into account not only the literal and specific teachings of the reference, but also the inferences which one skilled in the art would reasonably be expected to draw therefrom. *In re Preda*, 401 F.2d 825, 826 (CCPA 1968). For anticipation, the dispositive question is whether one skilled in the art would reasonably understand or infer from a prior art reference that every claim element is disclosed in that reference. *Eli Lilly &*

Co. v. L. A. Biomed. Research Inst. at Harbor-UCLA Med. Ctr., 849 F.3d 1073, 1074–1075 (Fed. Cir. 2017).

A patent claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co. of Kan. City*, 383 U.S. 1, 17–18 (1966).

C. Claims 1–6 Anticipated by Vinciarelli-664 (Ground 1A), Obvious over Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, Vinciarelli-747, and/or Zeng-014 (Grounds 1B, 1C)

Petitioner contends that claims 1–6 of the ’263 patent are anticipated by Vinciarelli-664. Pet. 11–48. Petitioner also contends that claims 1–6 are obvious over the combination of Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, and Vinciarelli-747 (ground 1B) or the combination of Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, Vinciarelli-747, and Zeng-014 (ground 1C). *Id.* at 48–63. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 15–50.

We summarize the asserted Vinciarelli-664 and Vinciarelli-844 prior art below before turning to the parties’ contentions.

1. Vinciarelli-664

Vinciarelli-664 is titled “Method of Electrically Interconnecting Circuit Assemblies,” and relates to “forming edge connections and other conductive features on and through encapsulated electronic assemblies.” Ex. 1005, codes (54), (57), 1:7–11. Vinciarelli-664 describes “encapsulating panels containing pluralities of electronic modules delineated by cut lines and having conductive interconnects buried within the panel along the cut lines” to form “[e]lectronic modules having complex contact structures.” *Id.* at code (57).

Figure 1 of Vinciarelli-664, reproduced below, illustrates isometric views of a leadless panel-molded power converter module having castellated electrical-connections and integral heat-spreading EMI-shields. *Id.* at 5:11–13.

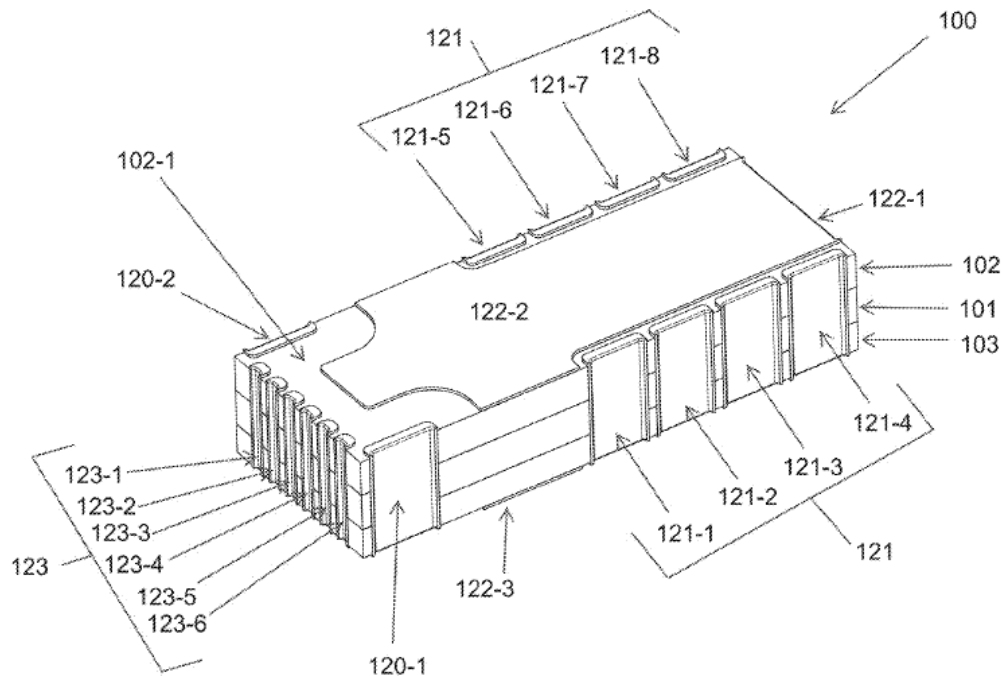


FIG. 1

Figure 1 illustrates a leadless panel-molded power converter module. *Id.* at 51–13.

As shown in Figure 1, leadless electronic module 100 has a plurality of electronic contacts (120-1, 120-2, 121, 122-1, and 123), as well as printed circuit board 101 disposed between cured layers of encapsulant 102 and 103. *Id.* at 5:54–56, 6:15–18. The electronic contacts extend vertically from the top surface of cured encapsulant 102 to the bottom surface of cured encapsulant 103. *Id.* at 6:18–21. As shown in Figure 1, the electrical connections extend from the bar codes up and down the sidewalls and onto selected portions of the top and bottom surfaces. *Id.* at 6:56–60.

Figure 2 of Vinciarelli-664, reproduced below, illustrates an exploded isometric view of the leadless panel-molded power converter module. *Id.* at 5:14–16.

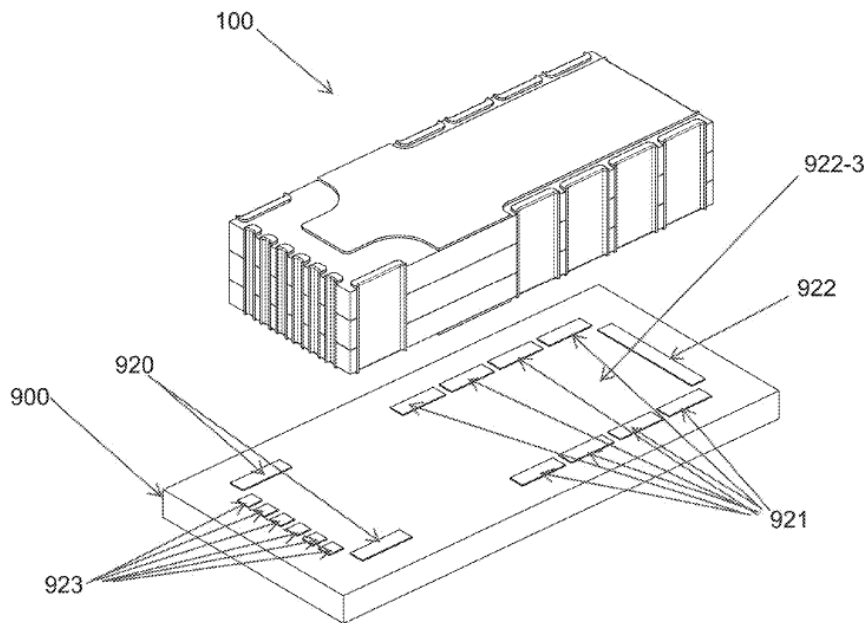


FIG. 2

Figure 2 illustrates an exploded view of a leadless panel-molded power converter module. *Id.* at 5:14–16.

Figure 2 shows module 100 in relation to customer printed circuit board 900. *Id.* at 6:62–62. The printed circuit board has conductive pads 920, 921, 922, and 923 arranged to mate with corresponding contacts 120, 121, 122, and 123 on module 100. Module 100 may be surface mount soldered to printed circuit board 900. *Id.* at 7:4–6.

2. Vinciarelli-844

Vinciarelli-844 is titled “Power Converter Package and Thermal Management,” and relates to “packaging of and thermal management in power converters.” Ex. 1007, codes (54), (57), 1:6–8. Vinciarelli-844 discloses a power conversion apparatus that includes a circuit board with power conversion circuitry and a package having an upper portion and a lower portion.” *Id.* at code (57).

Figure 10 of Vinciarelli-844, reproduced below, illustrates a partial cross-sectional view of a power converter apparatus showing heat flow between components in a power converter and a circuit board. *Id.* at 9:59–61.

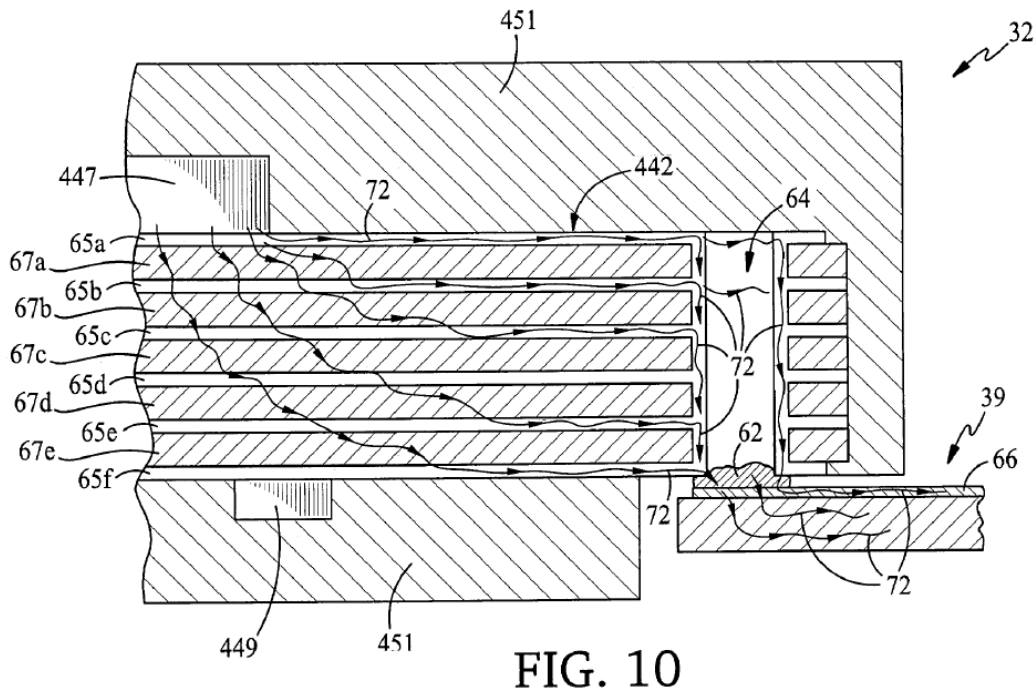


Figure 10 illustrates heat flow between components in a power converter and circuit board. *Id.* at 9:59–61.

Figure 10 shows a cross sectional view of power converter 32 mounted to circuit board 39. *Id.* at 14:42–44. Power converter 32 includes multilayer printed circuit board (PCB) 442 and circuit components 447 and 449 mounted on the top and bottom surfaces of multilayer PCB 442, respectively. *Id.* at 14:44–47. Multilayer PCB 442 may include several alternating layers of conductive traces 65a through 65f, which form connections between circuit components 447 and 449 and between interface contacts 33. *Id.* at 14:49–60.

3. Analysis

a. Ground 1A: Claims 1–6 as Anticipated by Vinciarelli-664

Petitioner contends that Vinciarelli-664 anticipates the challenged claims. Pet. 11. In particular, Petitioner contends that Vinciarelli-664

discloses a module that “has a plurality of electrical contacts that may be situated on all four sides of the module and extending to the top and bottom of the module as well.” *Id.* at 12 (citing Ex. 1005, 5:11–7:26, Figs. 1–2). To support its contentions, Petitioner provides annotated Figure 1 of Vinciarelli-664, as seen below.

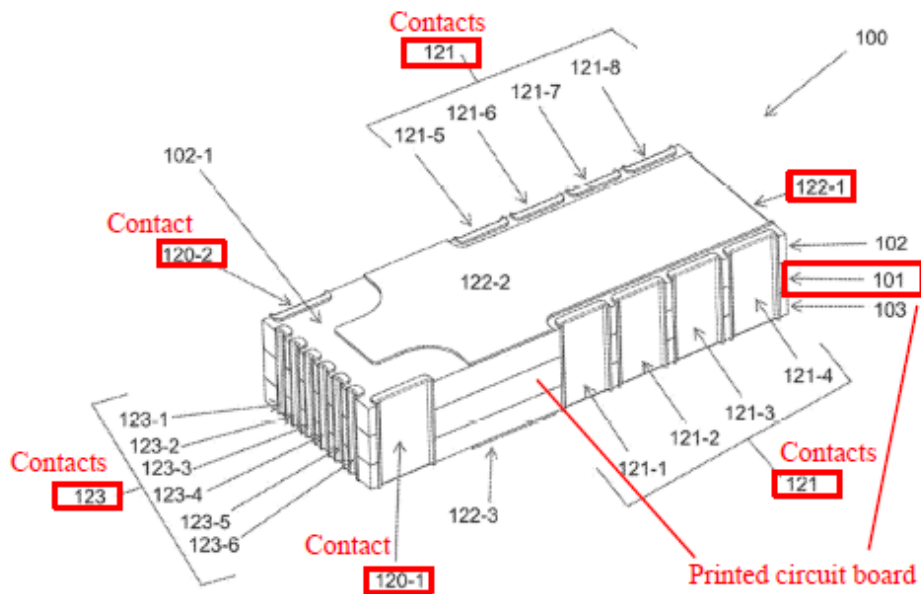


FIG. 1

Annotated Figure 1 of Vinciarelli-664 in the Petition shows module 100 comprising, as highlighted in red, “printed circuit board” 101 in the center, “disposed between cured layers of encapsulant 102 and 103,” and “contacts” 120-1, 121-1, 121-2, 121-3, 121-4, 123 that “may extend from a top surface of the top encapsulant to a bottom surface of the bottom encapsulant.” Pet. 13–14 (citing Ex. 1005, 6:15–27, 11:29–33).

Independent claim 1 of the ’263 patent recites, *inter alia*, a “first connection part,” comprising a “first terminal electrically coupled to the upper surface or the lower surface of the carrier,” and a “second terminal attached to a surface of the first electronic component apart from the

carrier,” wherein the first connection part is “fabricated by mechanical support of the first electronic component.” Ex. 1001, 15:31–37. According to Petitioner, Vinciarelli-664 discloses a “first connection part” because “it discloses a conductive surface on the power converter (‘contacts 120-1, 120-2, 121, and 122-1’).” Pet. 21 (citing Ex. 1005, 5:55–6:27).

Although Petitioner contends that Vinciarelli-664 discloses that “the connection part . . . (‘contacts 120-1, 120-2, 121, and 122’) has terminals electrically coupled to the upper or the lower surface of the carrier (printed circuit board)” (Pet. 22–23 (citing Ex. 1003 ¶¶ 88–96)), Petitioner does not point to any portion of Vinciarelli-664 for disclosure of such terminals. Instead, Petitioner contends that “a skilled artisan would have understood that the conductive features are coupled to electrical contacts on the surfaces of the printed circuit board to provide power and signal paths to the electronic components mounted on the circuit board.” *Id.* at 25.

Similarly, although Petitioner contends that Vinciarelli-664 discloses that “the connection part . . . (‘contacts 120-1, 120-2, 121, and 122’) has a second terminal (the bottom end of each contact) attached to a surface of the first electronic component” (Pet. 28), Petitioner does not point to any portion of Vinciarelli-664 for such second terminal. In fact, Petitioner does not point to any portion of Vinciarelli-664 for a teaching of a *surface* of a first electronic component. *See id.* at 16–21. Rather, Petitioner merely contends that a skilled artisan would have understood that “components are on both the upper and lower surface of the carrier” in Vinciarelli-664 because, for example, “the upper and lower layers (102 and 103) are roughly equal in size thus suggesting to one of ordinary skill that components are mounted on both sides” (*id.* (citing Ex. 1003 ¶ 78)), or that Vinciarilli-664 incorporates

Vinciarelli-844, Vinciarelli-269 and Vinciarelli-747 which disclose power converters with components mounted to surfaces of a printed circuit board. *Id.* at 18–21.

Here, claim 1 requires the “first connection part” to comprise a terminal electrically coupled a surface of the carrier on one end and a terminal at another end apart therefrom attached to a surface of the first electronic component. Ex. 1001, 15:31–37. Because Petitioner relies on Vinciarelli-664’s contacts 120-1, 120-2, 121, and 122 as the “first connection part” but does not identify any terminal on the contacts, let alone one coupled to a surface of a carrier *and* another on the same contact but apart from the carrier that is attached to a surface of an electronic component, at this stage of the proceeding, we are unpersuaded by Petitioner’s contention that Vinciarelli-664 anticipates claim 1 and claims 2–6 depending therefrom.

- b. Ground 1B: Claims 1–6 as Obvious over Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, and Vinciarelli-747

Petitioner contends that “[t]he same combination of elements used for Ground 1A further renders the Challenged Claims unpatentable.” Pet. 48. In particular, Petitioner contends that it would have been obvious to a skilled artisan “to look to Vinciarelli-269, Vinciarelli-844, and Vinciarelli-747 to provide details concerning power converters that may be absent from Vinciarelli-664.” *Id.* (citing Ex. 1003 ¶¶ 123–132). According to Petitioner, a skilled artisan reviewing Vinciarelli-664’s discussion of encapsulated power converters “would have sought further information concerning the details of the internal structure of the power converter.” *Id.* at 49 (citing Ex. 1005, 2:16–20, 6:21–22, 6:58, 7:15, 8:20–21, 10:13–26).

However, although Petitioner contends that “[t]he same combination of elements used for Ground 1A,” and thus, Petitioner is again relying on Vinciarelli-664’s contacts 120-1, 120-2, 121, and 122 as the “first connection part,” Petitioner again does not identify any terminal on such “first connection part,” let alone one coupled to a surface of a carrier and another on the same contact but apart from the carrier that is attached to a surface of an electronic component. Thus, at this stage of the proceeding, we are unpersuaded by Petitioner’s contention that claims 1–6 would have been obvious over Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, and Vinciarelli-747.

- c. Ground 1C: Claims 1–6 as Obvious over Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, Vinciarelli-747, and Zeng-014

Petitioner contends that “[t]his ground extends [to] the analyses of Grounds 1A and 1B, but applies the prior art process recited in the product-by-process limitation,” i.e., the limitation “wherein the first connection part is fabricated by mechanical support of the first electronic component.” Pet. 53. Petitioner then refers to Ground 1A and contends that “[t]he analysis in that Ground applies with equal force here, with the understanding that the ‘connection part’ is provided by the process in Zeng-014.” *Id.* at 61. Thus, Petitioner appears to be again relying on Vinciarelli-664’s contacts 120-1, 120-2, 121, and 122 as the “first connection part,” but again, Petitioner does not identify any terminal on such “first connection part,” let alone one coupled to a surface of a carrier and another on the same contact but apart from the carrier that is attached to a surface of an electronic component, as required by claim 1.

Thus, at this stage of the proceeding, we are unpersuaded by Petitioner's contention that claims 1–6 would have been obvious over Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, Vinciarelli-747, and Zeng-014.

D. Claims 1–6 Obvious over Vinciarelli-218 in View of Zeng-014 (Ground 2)

Petitioner contends that claims 1–6 of the '263 patent are obvious over the combination of Vinciarelli-218 in view of Zeng-014. Pet. 63–86. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 50–65.

We summarize the asserted Vinciarelli-218 prior art below.

1. Vinciarelli-218

Vinciarelli-218 is titled “Panel-Molded Electronic Assemblies” and “relates to the field of encapsulating electronic assemblies.” Ex. 1009, codes (54), (57), ¶ 2. Vinciarelli-218 describes a method of encapsulating a panel of electronic components, such as a power converter, that reduces wasted printed circuit board areas. *Id.* at code (57). The panel of electronics may be cut into one or more individual pieces after encapsulation. *Id.* During the singulation process, interconnection features provided along boundaries of individual circuits may be exposed providing electrical connections to the components. *Id.*

Figure 10B of Vinciarelli-218, reproduced below, illustrates a module after singulation. *Id.* ¶ 45.

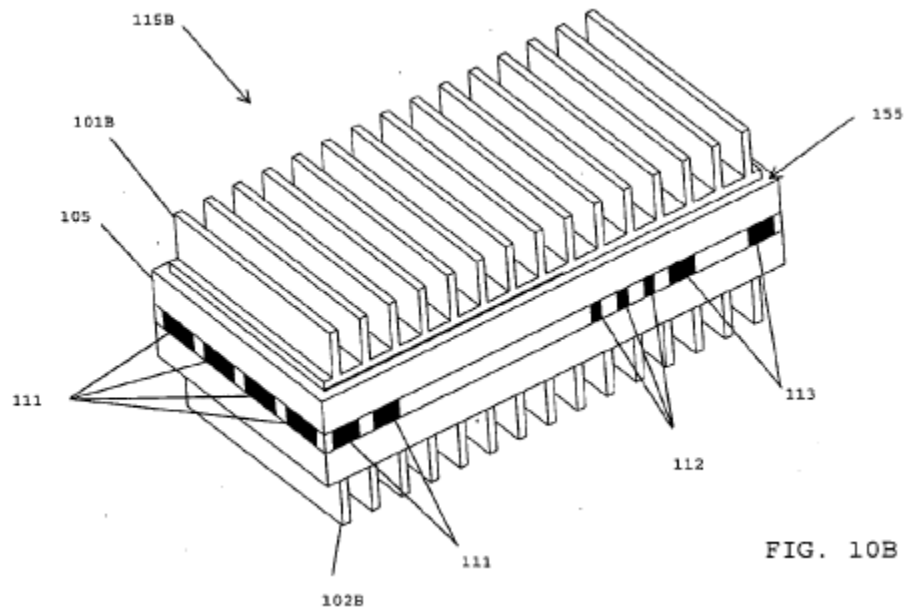


Figure 10B illustrates a module after singulation. *Id.* ¶ 45.

As shown in Figure 10B, module 115B is shown after singulation, wherein exposed interconnects 111, 112, 113 are shown embedded in the edge of the printed circuit board. *Id.* ¶ 107.

Figure 27 of Vinciarelli-218, reproduced below, illustrates top and bottom plan views of a section of a printed circuit board. *Id.* ¶ 63.

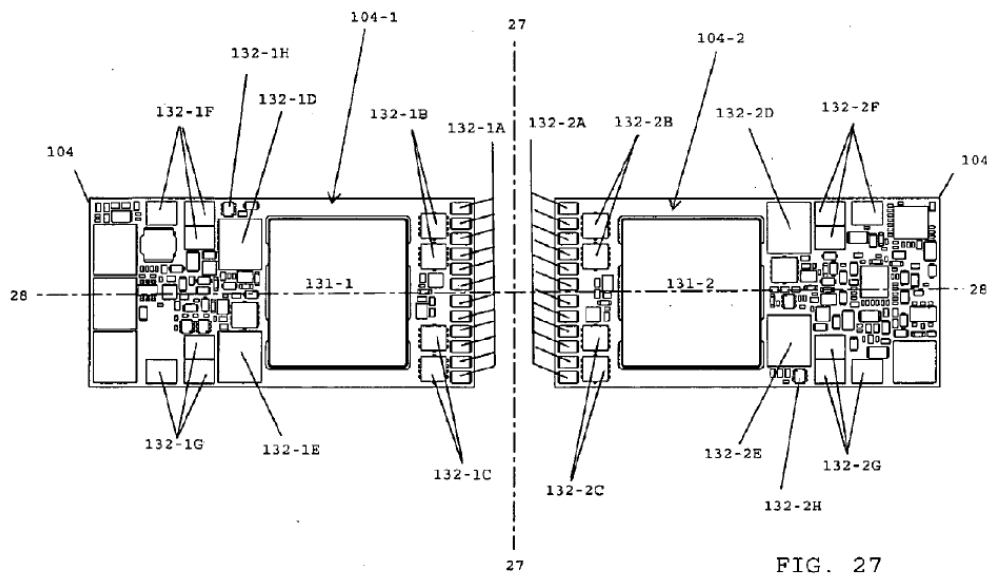
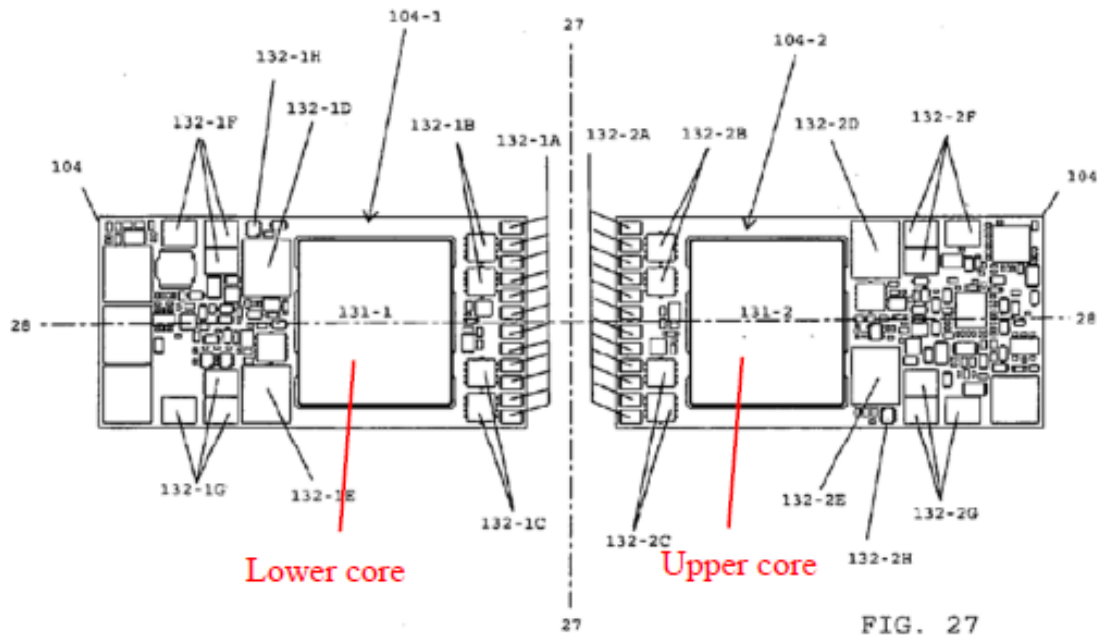


Figure 27 illustrates top and bottom faces of a populated printed circuit board from a power converter module. *Id.* ¶¶ 63, 141.

Vinciarelli-218 explains that components may be symmetrically arranged on printed circuit board PCB 104. *Id.* ¶ 141. As shown in Figure 27, populated PCB 104 is shown rotated along vertical axis 27. *Id.* The larger components may be distributed equally between both faces of PCB 104. *Id.* ¶ 143.

2. Analysis

Petitioner contends that Vinciarelli-218 discloses “a first electrical component (one or more of the components at the lower surface of the carrier) disposed at the lower surface of the carrier,” and “a second electrical component (one or more of the components on the upper surface of the carrier) disposed at the upper surface of the carrier.” Pet. 68 (citing Ex. 1009 ¶ 143, Fig. 27). To support its contentions, Petitioner provides annotated Figure 27 of Vinciarelli-218, as seen below.



Annotated Figure 27 of Vinciarelli-218 in the Petition shows top and bottom faces 104-1, 104-2 of PCB 104 from an individual power converter module, with lower magnetic core 131-1 and upper magnetic core 131-2, highlighted in red, provided on the respective faces. Pet. 68 (citing Ex. 1009 ¶¶ 100, 143, 179; Ex. 1003 ¶¶ 157–158).

According to Petitioner, Vinciarelli-218 further discloses a “first connection part” because it discloses “contacts to connect the power converter module to other devices.” Pet. 69. But Petitioner acknowledges that Vinciarelli-218 does not disclose forming the connection part by curving a piece of metal against an electronic component, and states that “[i]t would have been obvious in view of Zeng-014 to use such a connection part with the modules of Vinciarelli-218.” *Id.* (citing Ex.1003 ¶¶ 159–169).

In particular, Petitioner contends that Vinciarelli-218 discloses “exposed interconnects 111, 112, and 113” that are “embedded in the edge of the PCB 104 along one of the edges of the module 115.” Pet. 69 (citing

Ex. 1009 ¶ 108, Figs. 10A–10B). Although Petitioner acknowledges that Vinciarelli-218 discloses that the exposed interconnects “may be in the form of ‘conductive lands,’” “buried conductive vias located along the cut line,” or ‘conductive through-holes’” (*id.* at 75 (citing Ex. 1009 ¶¶ 109–110)), Petitioner contends that “components on the PCB surfaces may be surface mounted” (*id.* (citing Ex. 1009 ¶ 176)), wherein “it would have been obvious to a skilled artisan to use surface mount technology,” and thus, “[i]n . . . combination with Zeng-014, the contact point between the exposed interconnects and the Zeng-014 ‘connection part’ forms the first terminal.” *Id.* at 75–76 (citing Ex. 1003 ¶ 171).

Petitioner then contends that “Vinciarelli-218 in combination with Zeng-014 discloses a second terminal attached to a surface of the first electronic component (Zeng-014’s ‘conductive layer 61’ with ‘pin 40’).” Pet. 76 (citing Ex. 1008 ¶ 58).

The Federal Circuit has repeatedly warned that there has to be evidence of “glue” to make this specific combination, and not just the use of the claim as the roadmap for making the combination of prior art. *See, e.g., InTouch Technologies, Inc. v. VGO Communications, Inc.*, 751 F.3d 1327, 1348–49 (Fed. Cir. 2014) (“Dr. Yanco’s testimony was nothing more than impermissible hindsight; she opined that all of the elements of the claims disparately existed in the prior art, but failed to provide the glue to combine these references.”). Here, Petitioner’s alleged motivations to modify the modules Vinciarelli-218 to use the “connection part by curving a piece of metal against an electronic component” of Zeng-014 (Pet. 69) reflect impermissible hindsight bias.

Petitioner presents several alleged reasons to modify Vinciarelli-218 with Zeng-014 for the teaching of a connection part comprising the claimed first terminal and second terminal. Pet. 71–74. Petitioner first argues that Vinciarelli-218 discloses that there are “many variations for the power converter module.” *Id.* at 72 (citing Ex. 1009, Figs. 15–26, 33–36). However, Petitioner provides no rationale as to why a skilled artisan would have selected the method of forming the connection part by curving a piece of metal against an electronic component, as taught in Zeng-014, for the modification and to modify Vinciarelli-218 in the manner that Petitioner proposes as well. Instead, it appears that the objective was to apply Zeng-014’s connection part forming process, to its converter module forming process, to meet the claim limitations.

Petitioner also argues that the use of Zeng-014’s connection part is to stack components and save board space. Pet. 72. However, Patent Owner’s expert, Dr. Phinney, provides testimony that stacked modules “increases size, not decreases it.” Ex. 2001 ¶¶ 174–175. Accordingly, the parties’ evidence presents a classic battle of the experts, which we determine would be best addressed during a trial. The parties are invited to address this issue during trial, wherein, during the course of the trial, Petitioner will have the opportunity to cross-examine Dr. Phinney, and the parties will have the opportunity to provide and cross-examine further expert witnesses.

Further, Petitioner asserts that Vinciarelli-218 states that it may be desirable to have a module that is flush mounted, wherein Zeng-014’s connection part would provide a flush mount without the need for a surface mount adaptor. Pet. 72. Vinciarelli-218, however, already teaches that its modules may be flush mounted and its invention decreases the mounting

area. Ex. 1009, code (57), ¶ 125. Petitioner provides no reason as to why a person of skill would specifically have been led to incorporate Zeng-014's connection part.

Additionally, Petitioner argues that because Zeng-014 discloses “the inductor in the figures ‘is only for purpose[s] of illustration, and in practice, the technology disclosed in [Zeng-014] may be applied to other electronic component[s],” a person of skill “would have recognized Zeng-014's applicability to the power converter modules of Vinciarelli-218, which are electronic components having a cuboid general form factor similar to the box-like inductor component of Zeng-014.” Pet. 72–73 (citing Ex. 1008 ¶ 57). However, Zeng-014's general statement is insufficient to support a rationale to make the specific modification proposed by Petitioner to Vinciarelli-218.

Petitioner then asserts that “Vinciarelli-218 and Zeng-014 both concern improvements to small power converters to provide increased ‘power density’ and decreas[e] the circuit board ‘area’ used by the power converters.” Pet. 73–74 (citing Ex. 1009 ¶ 3; Ex. 1008 ¶¶ 3, 8, 10, 65). Again, at a basic level, Petitioner proposes a specific substitution to Vinciarelli-218. Accordingly, Petitioner's proposed modification appears to be motivated by hindsight.

Thus, on this preliminary record, we are not persuaded that Petitioner has provided sufficient support for its rationale to combine Vinciarelli-218 with Zeng-014.

Accordingly, on this record, Petitioner has not demonstrated a reasonable likelihood of prevailing on its assertion that claims 1–6 are obvious over the combination of Vinciarelli-218 and Zeng-014.

E. Claims 1–6 Obvious over Zeng-014 in View of Vinciarelli-218 (Ground 3)

Petitioner contends that claims 1–6 of the '263 patent are obvious over the combination of Zeng-014 in view of Vinciarelli-218. *Id.* at 86–95. Patent Owner disputes Petitioner's contentions. Prelim. Resp. 65–78.

We summarize the Zeng-014 prior art below.

1. Zeng-014

Zeng-014 is titled “Assembled Circuit and Electronic Component,” and relates “to an electronic component and an assembled circuit.” Ex. 1008, codes (54), (57), ¶ 3. Zeng-014 describes an assembled circuit that comprises an inductive component, a connecting conductor, and a first electronic component. *Id.* at code (57). Zeng-014's connecting conductor is adapted to wrap a first surface of the inductive component. *Id.*

Figure 4B of Zeng-014, reproduced below, illustrates a bottom view of an electronic component wrapped with a conductive layer. *Id.* ¶ 22.

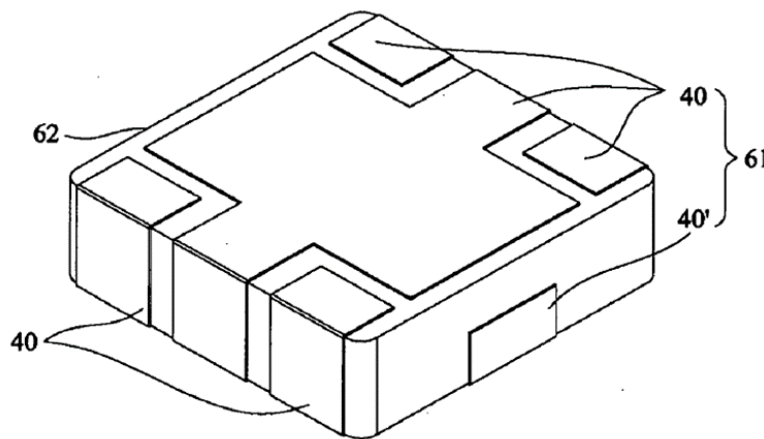


FIG. 4B

Figure 4B illustrates a bottom view of an electronic component wrapped with a conductive layer. *Id.* ¶ 22.

As shown in Figure 4B, inductive component 62 is wrapped with conductive layer 61. *Id.* ¶¶ 57–58. Conductive layer 61 comprises connecting conductor 40 and pin conductor 40'. *Id.* ¶ 58.

Figure 5C of Zeng-014, reproduced below, illustrates a step in a process of wrapping the first electronic component with a first conductive layer. *Id.* ¶ 25.

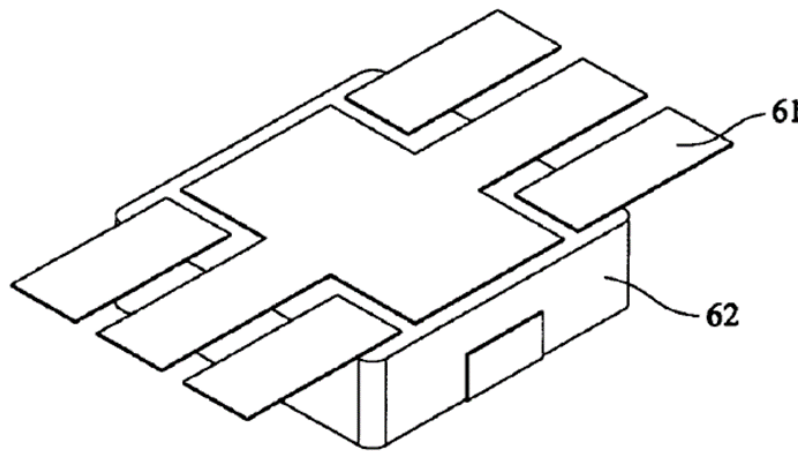


FIG. 5C

Figure 5C illustrates a step in method to form the first conductive layer on a body surface of the inductive component. *Id.* ¶¶ 25, 62.

Figure 5C illustrates first conductive layer 61 on a body surface of inductive component 62. *Id.* ¶ 62. As described in Zeng-014, first conductive layer 61 is bent in such a way that it wraps the first surface of inductive component 62. *Id.*

Figures 6A and 6B of Zeng-014, reproduced below, illustrate views of a DC to DC converter, while Figure 6C, also reproduced below, illustrates an assembled circuit incorporating a DC to DC converter. *Id.* ¶¶ 26–28.

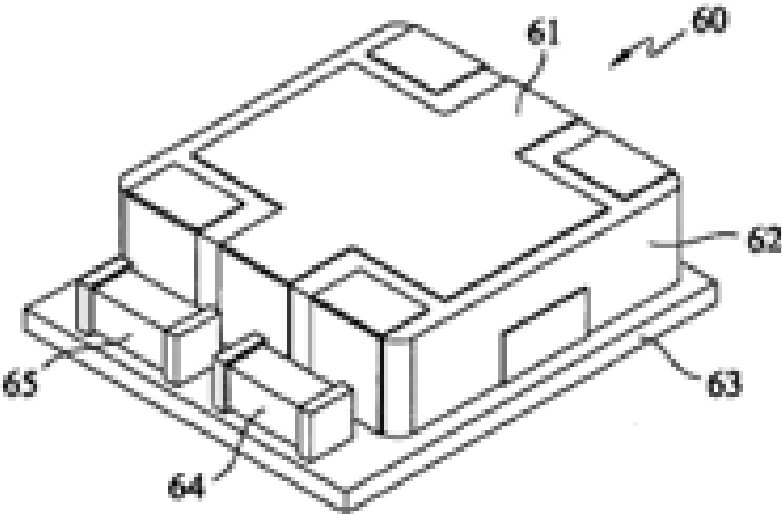


FIG. 6A

Figure 6A illustrates a top view of a DC to DC converter. *Id.* ¶ 26.

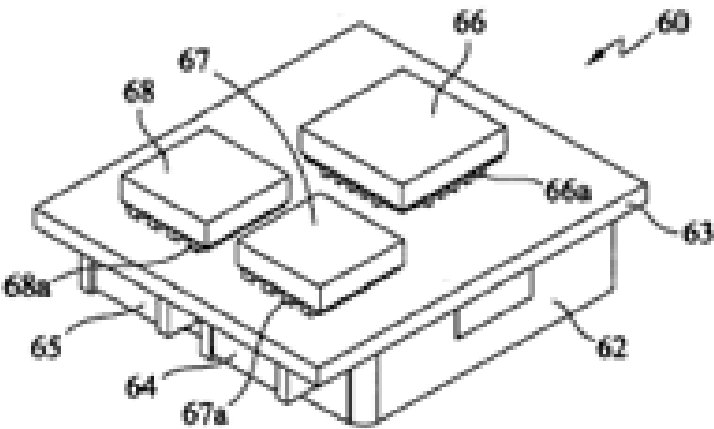


FIG. 6B

Figure 6B illustrates a bottom view of a DC to DC converter. *Id.* ¶ 27.

Figures 6A and 6B illustrate DC to DC converter 60 comprising inductive component 62, first conductive layer 61, electronic components 64–68, and circuit board 63. *Id.* ¶¶ 66, 68. Inductive component 62 wrapped with first conductive layer 61 and second electronic components, 64, 65, are mounted on one side of circuit board 63. *Id.* ¶ 68. First electronic component 66 and third electronic components, 67, 68, are mounted on the other side of circuit board 63. *Id.*

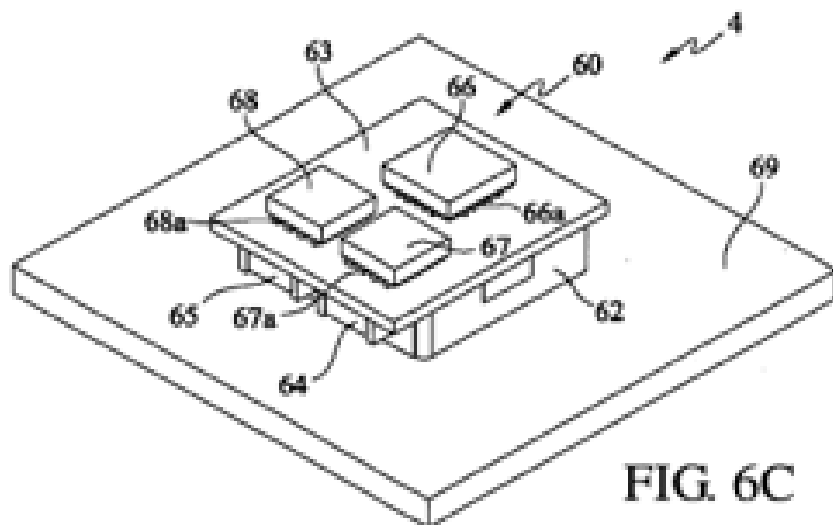


Figure 6C illustrates a top view of an assembled circuit comprising a DC to DC converter. *Id.* ¶ 28.

Figure 6C illustrates a perspective view of assembled circuit 4 formed by mounting DC to DC converter 60 onto first circuit board 69. *Id.* ¶¶ 65–66, 68. As described in Zeng-014, first circuit board 69 is electrically connected with DC to DC converter 60 through a connecting conductor wrapping the first surface of inductive component 62. *Id.* ¶ 67.

1. Analysis

We begin by addressing in detail Petitioner’s contentions and Patent Owner’s arguments with respect to the limitations of independent claim 1.

a. Preamble –a “power converter”

Petitioner contends that Zeng-014 discloses “DC to DC converter 60.” Pet. 86–87 (citing Ex. 1008 ¶¶ 63–67, 73, Figs. 6A–B). At this stage of the proceeding, Patent Owner does not present arguments in the Preliminary Response addressing the specific merits of Petitioner’s contentions with respect to the preamble of claim 1. *See* Prelim. Resp. 65–78.

On this preliminary record, we are persuaded that Petitioner has made a sufficient showing that the combination of Zeng-014 and Vinciarelli-218 teaches a “power converter,” as recited in claim 1.⁸

b. a “carrier,” comprising an “upper surface” and a “lower surface”

Petitioner contends that Zeng-014 discloses “a carrier (‘circuit board 63’), which has an upper surface and a lower surface.” Pet. 87 (citing Ex. 1008 ¶¶ 67–68). To support its contentions, Petitioner provides annotated Figure 6B of Zeng-014, as seen below.

⁸ Because we find availing Petitioner’s contention that the combination of Zeng-014 and Vinciarelli-218 teaches a “power converter” recited in the preamble, for purposes of institution, we do not determine whether the preamble is limiting. *See Vivid Techs.*, 200 F.3d at 803.

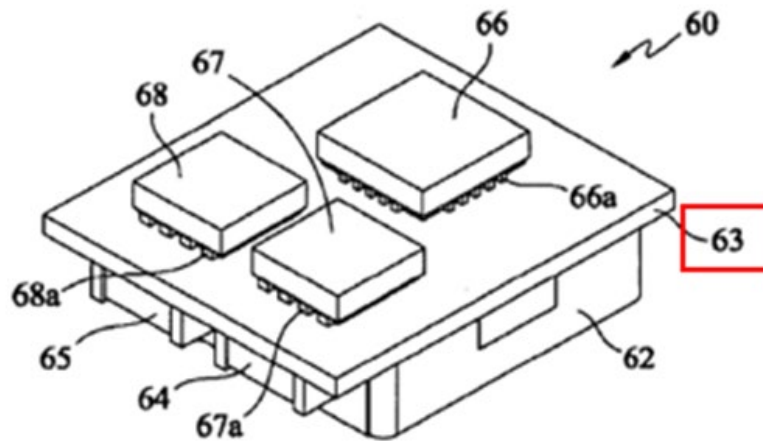


FIG. 6B

Annotated Figure 6B of Zeng-014 in the Petition shows DC to DC converter 60 comprising inductive component 62, and electronic components 64–68 mounted on circuit board 63 highlighted in red. Pet. 87. In particular, Zeng-014 discloses circuit board 63 as a “printed circuit board (PCB) having two opposite side,” wherein “[o]n one side of [] circuit board 63 are mounted [] inductive component 62 [] and [] electronic components 64, 65,” and “on the other side are mounted [] electronic component 66 and [] electronic components 67, 68.” See Ex. 1008 ¶ 68, Figs. 6A–B.

At this stage of the proceeding, Patent Owner does not present arguments in the Preliminary Response addressing the specific merits of Petitioner's contentions with respect to this limitation. *See* Prelim. Resp. 65–78.

On this preliminary record, we are persuaded that Petitioner has made a sufficient showing that the combination of Zeng-014 and Vinciarelli-218 teaches a “carrier,” comprising “an upper surface,” and a “lower surface,” as recited in claim 1.

- c. *a “first electronic component disposed at the lower surface of the carrier,” a “second electronic component disposed at the upper surface of the carrier”*

Petitioner contends that Zeng-014 discloses “a first electronic component (‘inductor 62’ shown in FIG. 6A) on the lower surface” of circuit board 63, “a second electronic component (e.g., ‘electronic component 66’ in FIG. 6B)” on the upper surface of circuit board 63, and “a first connection part (‘conductive layer 61’ on inductor 62).” Pet. 88 (citing Ex. 1008 ¶¶ 64–68, Figs. 6A–B; Ex. 1003 ¶¶ 193–194).

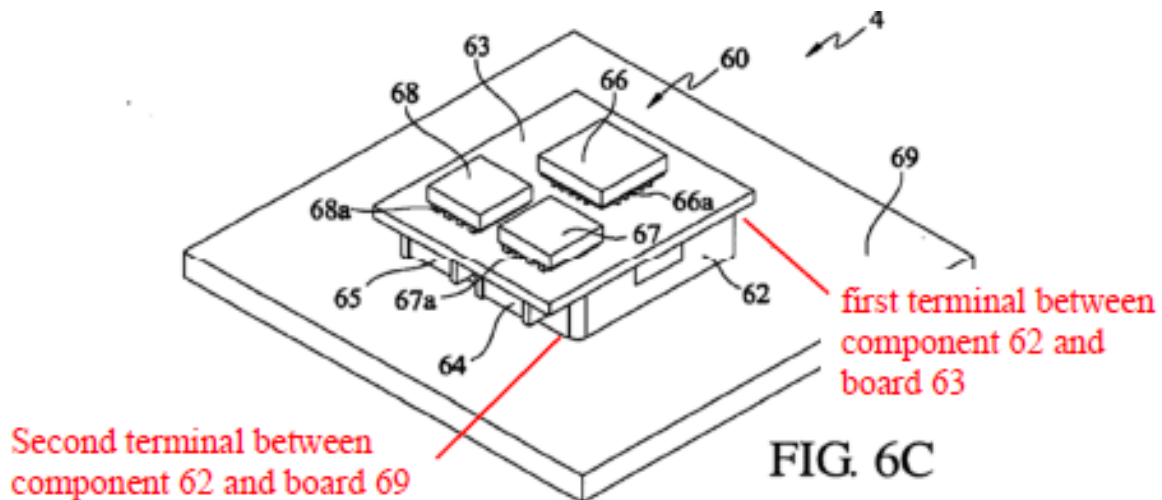
At this stage of the proceeding, Patent Owner does not present arguments in the Preliminary Response addressing the specific merits of Petitioner’s contentions with respect to this limitation. *See* Prelim. Resp. 65–78.

On this preliminary record, we are persuaded that Petitioner has made a sufficient showing that the combination of Zeng-014 and Vinciarelli-218 teaches “a first electronic component disposed at the lower surface of the carrier” and “a second electronic component disposed at the upper surface of the carrier,” as recited in claim 1.

- d. *a “first connection part” comprising a “first terminal electrically coupled to the upper surface or the lower surface of the carrier” and a “second terminal attached to a surface of the first electronic component apart from the carrier,” wherein the second terminal is a “bonding pad”*

Petitioner contends that Zeng-014 discloses “a first connection part (‘conductive layer 61’ on inductor 62).” Pet. 88 (citing Ex. 1008 ¶¶ 64–66; Ex. 1003 ¶ 194). Petitioner further contends that Zeng-014 discloses “a first terminal (portion of ‘conductive layer 61’ facing ‘circuit board 63’) coupled

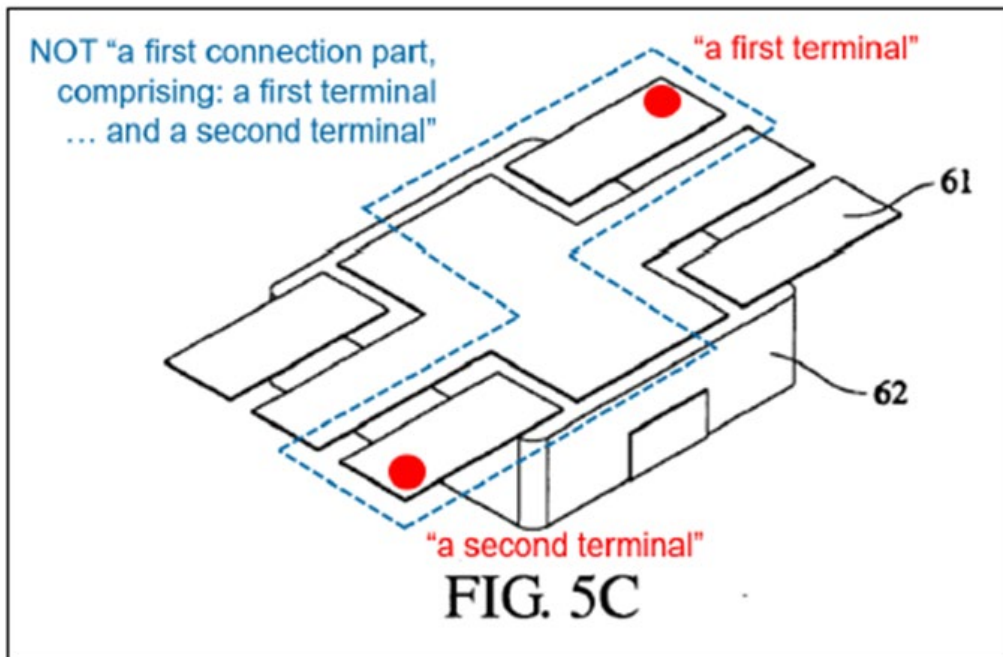
to the lower surface of the carrier (‘circuit board 63’).” *Id.* at 89 (citing Ex. 1008 ¶¶ 58, 65–69, 85–86, Figs. 6A, 6B, 8A, 8B, 9A, 9B, 10; Ex. 1003 ¶ 195). Petitioner contends that Zeng-014 also discloses “a second terminal (opposite side of ‘conductive layer 61’ from the first terminal) attached to the surface of [] inductor 62,” wherein “the second terminal is a bonding pad to which other components may be connected.” *Id.* at 89–90 (citing Ex. 1008 ¶¶ 67, 85–88, Figs. 6C, 8A, 8B, 9A, 9B, 10; Ex. 1003 ¶ 196). To support its contentions, Petitioner provides annotated Figure 6C of Zeng-014, as seen below.



Annotated Figure 6C of Zeng-014 in the Petition shows DC to DC converter 60 mounted on first circuit board 69, with the portion of the conductive layer between electronic component 62 and circuit board 63 highlighted in red as “first terminal” and the portion of the conductive layer between electronic component 62 and circuit board 69 highlighted in red as “second terminal.” Pet. 90.

Patent Owner contends that Zeng-014’s conductive layer 61 “is not a continuous layer wrapped on the entirety of the component’s surface,” but rather “is formed of multiple conductor islands that are separated from one

another.” Prelim. Resp. 74 (citing Ex. 2001 ¶ 204). Patent Owner contends that, as understood by a POSITA, the ’263 patent’s “first connection part” is “one individual feature or object, with the ‘first terminal’ and ‘second terminal’ being connected portions or ends of that contiguous body,” wherein, because Zeng’s conductive layer “is actually a group of individual conductors,” the Petition “must find the ‘first terminal’ and the ‘second terminal’ in the same individual conductor” within Zeng’s conductive layer. *Id.* at 75–76 (citing Ex. 1001, Fig. 24; Ex. 1008, Fig. 5C; Ex. 2001 ¶ 205). According to Patent Owner, Zeng-014’s “first terminal” and “second terminal” are “on different conductors” and thus “would fail to form one single ‘first connection part.’” *Id.* at 76 (citing Ex. 2001 ¶ 205). To support its contentions, Patent Owner provides annotated Figure 5C of Zeng-014, as seen below.



Annotated Figure 5C of Zeng-014 in the Preliminary Response shows conductive layer 61 comprising a plurality of conductors adhered to a first

surface of inductive component 62, wherein the upper right conductor is marked with a red dot as “a first terminal,” and the bottom left conductor is marked with a red dot as “a second terminal.” Prelim. Resp. 76. According to Patent Owner, Zeng-014’s “‘first terminal’ being found on one individual conductor and the ‘second terminal’ being found on another individual conductor does not meet the claimed arrangement or combination of elements.” *Id.* (citing Ex. 2001 ¶ 205).

Based on the present record, we find preliminarily that Zeng-014 in combination with Vinciarelli-218 teaches a “first connection part” recited in claim 1. In particular, Petitioner makes a sufficient showing that Zeng-014 discloses “a first terminal” of a “first connection part” facing circuit board 63 that is coupled to the lower surface of circuit board 63, and “a second terminal” on the opposite side of conductive layer 61 from the first terminal, that is attached to the surface of inductor 62. Pet. 89; *see also* Ex. 1008, Fig. 6A. We find availing Petitioner’s contention that Zeng-014’s wrapping method “depict[s] the same curving of connectors against an electronic component that is disclosed and claimed in the ’263 patent.” Pet. 58.

Petitioner’s annotated Figure 6A of Zeng-014 is reproduced below.

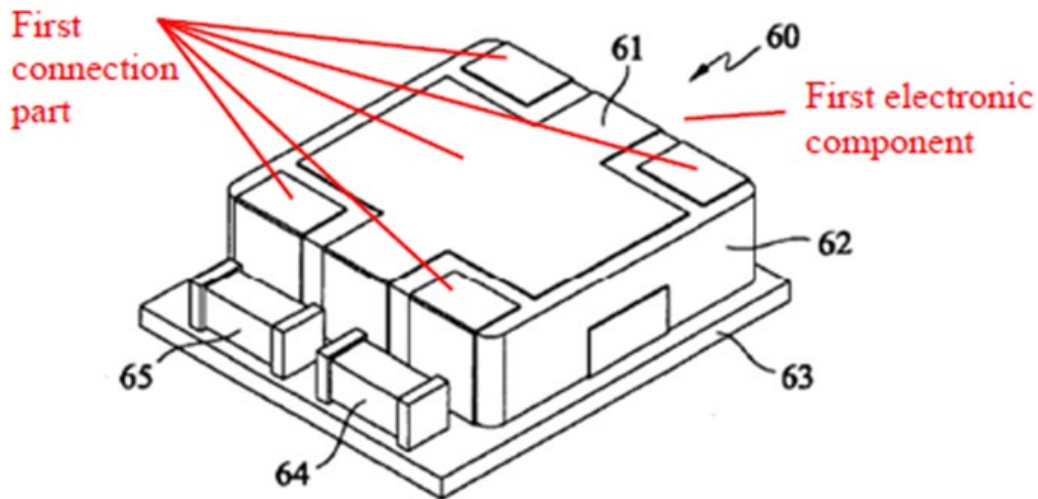
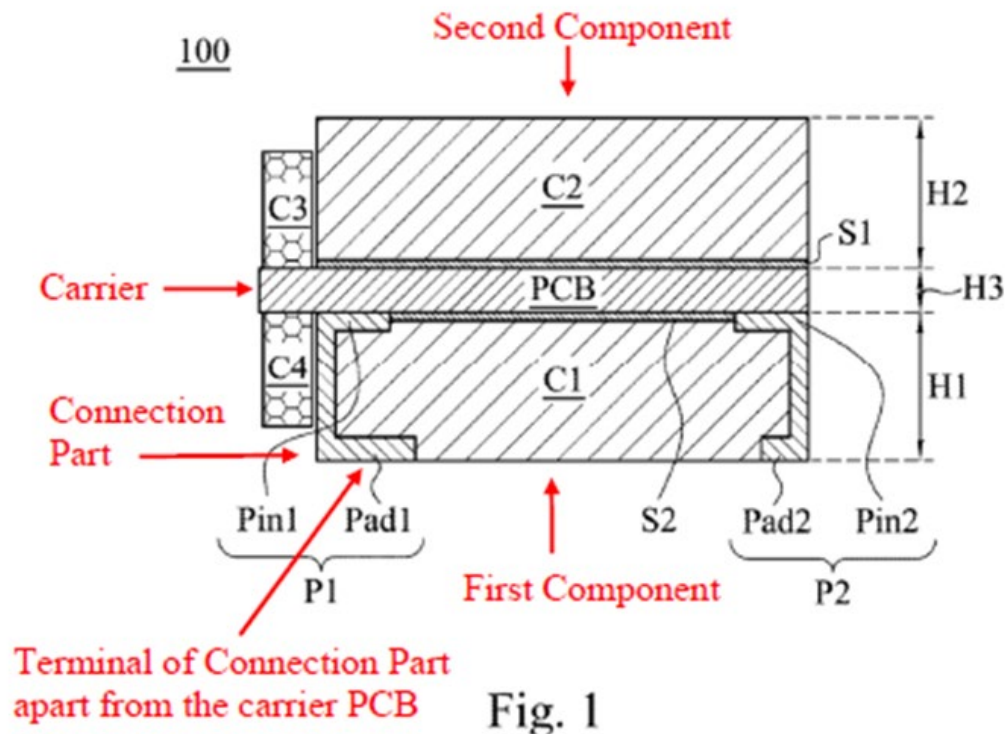


FIG. 6A

Annotated Figure 6A of Zeng-014 in the Petition shows DC to DC converter 60 comprising inductive component 62 highlighted in red as “First electronic component,” and conductive layer 61 highlighted in red as “First connection part.” Pet. 89. According to Zeng-014, on one side of circuit board 63, “inductive component 62 wrapped with . . . first conductive layer 61” is mounted. *See* Ex. 1008 ¶ 68, Fig. 6A.

We find availing Petitioner’s contention that, like the ’263 patent, Zeng-014 discloses a portion of conductive layer 61 that is coupled to a surface of circuit board 63, and another portion that is attached to a surface of inductor 62 on the opposite side of conductive layer 61 apart from circuit board 63. Pet. 89; *see also* Ex. 1008, Fig. 6A.

For comparison to Zeng-014’s Figure 6A, Petitioner’s annotated Figure 1 of the ’263 patent is reproduced below.



Annotated Figure 1 of the '263 patent in the Petition shows power converter 100 comprising printed circuit board PCB highlighted in red as “Carrier,” and electronic component C1 highlighted in red as “First Component” with right bracket P1 and left bracket P2, each having a portion Pin1, Pin2 attached to the surface of printed circuit board PCB and an opposite portion Pad1, Pad2 coupled to electronic component C1. Pet. 9.

Although we agree with Patent Owner that the claimed “first terminal” and “second terminal” must be “in the same individual conductor” within Zeng-014’s conductive layer (Prelim. Resp. 75–76), we find unavailing Patent Owner’s contention that Zeng-014’s “first terminal” is found on one individual conductor while Zeng-014’s “second terminal” is found on another individual conductor. *Id.* at 76. As shown in Figure 6A of Zeng-014, each individual conductor of conductive layer 61 comprises one portion that is coupled to a surface of circuit board 63 and another portion

(of the same individual conductor) that is attached to the surface of inductor 62 on the opposite side away from circuit board 63. *See* Ex. 1008, Fig. 6A. That is, similar to power converter 100 of the '263 patent, conductive layer 61 comprises a plurality of conductors, each with one portion coupled to the surface of a circuit board and the opposite portion attached to the surface of an electronic component. *Compare* Ex. 1008, Figs. 6A–B *with* Ex. 1001, Fig. 1.

On this preliminary record, we are persuaded that Petitioner has made a sufficient showing that the combination of Zeng-014 and Vinciarelli-218 teaches a “first connection part” comprising a “first terminal electrically coupled to the upper surface or the lower surface of the carrier,” and a “second terminal attached to a surface of the first electronic component apart from the carrier,” as recited in claim 1.

e. wherein “the carrier is disposed at 1/3 to 2/3 of a height of the power converter”

Petitioner contends that Zeng-014 in combination with Vinciarelli-218 a carrier “disposed at 1/3 to 2/3 of a height of the power converter.” Pet. 90. In particular, Petitioner contends that, as shown in Figure 34 of Vinciarelli-218, “the printed circuit board is mounted in the middle of the power converter.” *Id.* at 78 (citing Ex. 1009, Fig. 34; Ex. 1003 ¶ 176). According to Petitioner, a skilled artisan would have been motivated based on the teachings of Vinciarelli-218 to package DC to DC converter 60 of Zeng-014 within an encapsulated module as proposed by Vinciarelli-218. *Id.* at 91. Thus, Petitioner contends that, in the combination, “the DC to DC converter would have a carrier (printed circuit board) placed at 1/2 the height of the power converter and thus disposed at 1/3 to 2/3 of the height of the power

converter.” *Id.* at 92 (citing Ex. 1009 ¶¶ 142–143, 147–151; Ex. 1003 ¶ 203).

Patent Owner contends that Vinciarelli-218 as a whole fails to teach this contested limitation “for its complete silence on carrier thickness.” Prelim. Resp. 67. According to Patent Owner, “[a] PCB with undefined thickness is not disposed within the 1/3 to 2/3 height range.” *Id.* Patent Owner further contends that adding encapsulant on and around Zeng’s converter would not bring or move the carrier in Zeng-014 into the claimed 1/3 to 2/3 height range. *Id.* (citing Ex. 1003 ¶¶ 182–183).

Patent Owner then contends that a POSITA would not have been motivated to combine Zeng-014 and Vinciarelli-218, wherein such purported combination “is clearly hindsight.” Prelim. Resp. 69. According to Patent Owner, a POSITA would understand that, in making Zeng-014’s assembly cuboid-shaped using encapsulant as proposed by Petitioner, “every other assembly component with a shorter height than the exposed core is fully buried underneath the encapsulant.” *Id.* at 71 (citing Ex. 2001 ¶¶ 193–195).

Based on the present record, we find preliminarily that Zeng-014 in combination with Vinciarelli-218 teaches that “the carrier is disposed at 1/3 to 2/3 of a height of the power converter,” as recited in claim 1. In particular, Petitioner makes sufficient showing that, in the combination of Zeng-014 and Vinciarelli-218, “the DC to DC converter would have a carrier (printed circuit board) place[d] at 1/2 the height of the power converter and thus disposed at 1/3 to 2/3 of the height of the power converter.” Prelim. Resp. 92 (citing Ex. 1009 ¶¶ 142–143, 147–151; Ex. 1003 ¶ 203).

Although Patent Owner contends that Vinciarelli-218 is completely silent on the carrier thickness (Prelim. Resp. 67), as Petitioner points out, Vinciarelli-218 discloses in Figure 34 that the PCB is provided in the middle of the power converter. Pet. 78. Drawings are “evaluat[ed] and appl[ied] . . . on the basis of what they reasonably disclose and suggest to one skilled in the art” (*In re Aslanian*, 590 F.2d 911, 914 (CCPA 1979) (quoting *In re Baum*, 374 F.2d 1004, 1009 (CCPA 1967)), and drawings may teach relative quantitative relationships between or among the depicted elements. *See Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1566 (Fed. Cir. 1991); *In re Mraz*, 455 F.2d 1069, 1072 (CCPA 1972). Here, Vinciarelli-218 shows through its drawings that the PCB is in the middle of the converter, i.e., as Petitioner contends. Pet. 92. We find availing Dr. Baker’s testimony supporting Petitioner’s contention that “[w]hen there are components on both sides of the board, the board would generally be in the middle.” Ex. 1003 ¶ 175.

Thus, although the references do not disclose the exact location of the PCB, as Patent Owner argues, there is nonetheless sufficient evidence that the components are placed symmetrically on the two surfaces of the PCB, placing the PCB in the middle of the converter’s height, i.e., between 1/3 and 2/3 of the height of the converter.

Although Patent Owner contends that the purported combination “is clearly hindsight” (Prelim. Resp. 69), Patent Owner’s argument does not undermine Petitioner’s showing that it would have been obvious to package Zeng-014’s power converter as a single cuboid module to “provide ease of manufacturing, produce a multiplicity of modules at a time, and that may be of a small size and surface mounted to a customer board.” Pet. 91 (citing Ex. 1009 ¶¶ 4, 86). Petitioner’s rationale, supported by Vinciarelli-218,

shows that Zeng's power converter would benefit in encapsulation into a single cuboid module. *Id.*

We also find unavailing Patent Owner's contention that, in making Zeng-014's assembly cuboid-shaped using encapsulant, a component with a shorter height than the exposed core would be fully buried underneath the encapsulant. Prelim. Resp. 71. As Petitioner points out, Vinciarelli-218 provides "numerous contact surfaces ('exposed interconnects') that enable connections of components with a shorter height. Pet. 91. We agree that a skilled artisan would have understood that conductors may be arranged on the printed circuit board "thus easily allowing the external conductive layer to be electrically coupled to components within the module through the printed circuit board." *Id.*

Further, as Petitioner points out, Vinciarelli-218 explains that, for encapsulation, "the power converter is designed such that the components are symmetrical on the top and bottom of the converter." Pet. 92. In particular, Vinciarelli-218 discloses that, laying out the component on the PCB using symmetry produces "key benefits including enhanced thermal performance, reducing top to bottom and side to side imbalances during encapsulation caused by asymmetrical distribution of components."

Ex. 1009 ¶ 15.

On this preliminary record, we are persuaded that Petitioner has made a sufficient showing that the combination of Zeng-014 and Vinciarelli-218 teaches placing the carrier in the middle, i.e., "at 1/3 to 2/3 of a height of the power converter," as recited in claim 1. Furthermore, on this preliminary record, we are persuaded that Petitioner has made a sufficient showing that a

POSITA would have had a reason to combine the teachings of Zeng-014 and Vinciarelli-218 in the manner proposed.

f. wherein “the first connection part is fabricated by mechanical support of the first electronic component”

Petitioner contends that Zeng-014 discloses a connection part that is “fabricated by mechanical support” of an electronic component because Zeng-014 discloses that “the connection part (‘conductive layer 61’) is fabricated by curving the metal layer against the component.” Pet. 93 (citing Ex. 1008 ¶¶ 62–63). Although Patent Owner argues that there is no evidence that the combination of Zeng-014 and Vinciarelli-218 results in the same structure of the ’263 patent “in which curved contacts are fixed at components” (Prelim. Resp. 14), in its Preliminary Reply, Petitioner points out that Zeng’s connection parts are fixed and supported. Prelim. Reply 1–2. In particular, Petitioner contends that Zeng-014’s contacts “are identical [to] those disclosed in Fig. 24 of the [’]263 patent.” *Id.* at 2.

Figure 24 of the ’263 patent describes a method for manufacturing a power converter, and is reproduced below.

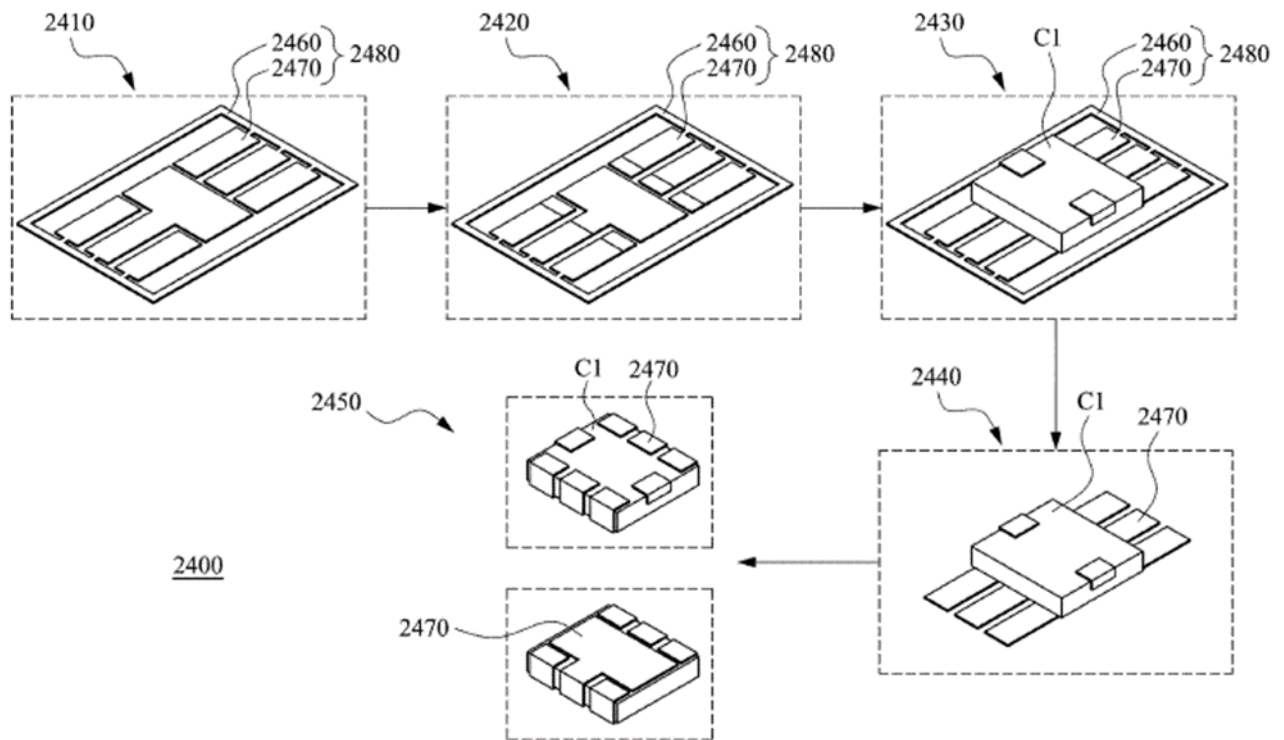


Fig. 24

Figure 24 of the '263 patent shows a method for manufacturing a power converter. Ex. 1001, 10:57–62.

As shown in Figure 24, first electronic component C1 is mounted on lead frame 2480 including retaining part 2460 and connection part 2470. Ex. 1001, 10:62–65. Next, retaining part 2460 is cut off, and only connection part 2470 is left. *Id.* at 10:65–11:1. Subsequently, connection part 2470 is curved by mechanical support of first electronic component C1, for connection part 2470 to be fixed at first electronic component. *Id.* at 11:1–5.

Based on the present record, we find persuasive Petitioner's contention that Zeng's connection parts are fixed and supported. Prelim. Rely 1–2. That is, we find unavailing Patent Owner's contention that there

is no evidence that Zeng-014 and Vinciarelli-218 results in a structure “in which curved contacts are fixed at components.” Prelim. Resp. 14. In particular, Zeng-014 discloses that the connecting conductor “has a number of different conductor regions, . . . wrapping and *attaching* on the first surface of a body of the inductive component.” Ex. 1008 ¶ 59 (emphasis added). That is, the various conductor regions are “attached,” i.e., fixed at the components, similar to the structure in, for example, Figure 24 of the ’263 patent.

Having reviewed all of Petitioner’s assertions regarding this limitation, as well as Patent Owner’s arguments to the contrary, we preliminarily determine on this record that Petitioner has made a sufficient showing that the combination of Zeng-014 and Vinciarelli-218 teaches that “the first connection part is fabricated by mechanical support of the first electronic component,” as recited in claim 1.

g. Dependent claims 2–6

Petitioner provides detailed explanations as to how the combination of Zeng-014 and Vinciarelli-218 teaches the limitations recited in dependent claims 2–6, citing Dr. Baker’s testimony for support. Pet. 93–95 (citing Ex. 1008 ¶¶ 6, 11; Ex. 1009 ¶¶ 3, 4, 20, 147, 148; Ex. 1003 ¶ 206, 207). At this stage in the proceeding, Patent Owner does not separately address the dependent claims. *See* Prelim. Resp. 65–78.

Having reviewed Petitioner’s arguments and supporting evidence in the present record, we preliminarily determine Petitioner has made a sufficient showing that the combination of Zeng-014 and Vinciarelli-218 teaches the subject matter of dependent claims 2–6.

h. Conclusion

For the foregoing reasons, we determine that the evidence and arguments presented show a reasonable likelihood that Petitioner would prevail in establishing that the subject matter of claims 1–6 would have been obvious in view of Zeng-014 and Vinciarelli-218.

III. CONCLUSION

Because we determine that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing at least one of the challenged claims is unpatentable, we institute *inter partes* review as to all challenged claims and grounds presented in the Petition. At this stage of the proceeding, we have not made a final determination as to the patentability of any of these challenged claims.

IV. ORDER

For the reasons given, it is

ORDERED that pursuant to 35 U.S.C. § 314, an *inter partes* review is instituted as to claims 1–6 of the '263 patent to determine whether:

1) claims 1–6 are unpatentable under 35 U.S.C. § 102 as anticipated by Vinciarelli-664;

2) claims 1–6 are unpatentable under 35 U.S.C. § 103 as obvious over Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, and Vinciarelli-747;

3) claims 1–6 are unpatentable under 35 U.S.C. § 103 as obvious over Vinciarelli-664, Vinciarelli-269, Vinciarelli-844, Vinciarelli-747, and Zeng-014;

4) claims 1–6 are unpatentable under 35 U.S.C. § 103 as obvious over Vinciarelli-218 and Zeng-014; and

5) claims 1–6 are unpatentable under 35 U.S.C. § 103 as obvious over Zeng-014 and Vinciarelli-218.

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which commences on the entry date of this Decision.

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