

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VICOR CORPORATION,

Petitioner,

v.

DELTA ELECTRONICS, INC.,

Patent Owner.

PTAB Case No. IPR2024-00705

U.S. Patent No. 9,819,263

**PATENT OWNER'S RESPONSE TO PETITION TO INSTITUTE INTER
PARTES REVIEW PURSUANT TO 37 C.F.R. § 42.120**

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EXHIBIT LIST

Exhibit No.	Description
2001	Declaration of Dr. Joshua Phinney
2002	J. Phinney, Multi-resonant Passive Components for Power Conversion (Doctoral Thesis, Massachusetts Institute of Technology, Oct. 2005) (“Phinney Thesis”)
2003	“IPC 7093 Design and Assembly Process Implementation for Bottom Termination Components,” (Standards Document, IPC, March 2011) (“IPC 7093 Standard”)
2004	“VTM™ Current Multiplier VTM2308S60Z1513T00” (Datasheet), Rev. 1.5, Vicor Corporation (2022) (“VTM Datasheet”)
	NEW EXHIBITS
2005	Declaration of Dr. Joshua Phinney
2006	Deposition of Dr. R. Jacob Baker taken on December 20, 2024 (Condensed)
2007	https://sst.semiconductor-digest.com/2000/10/lead-free-solders-vs-conductive-adhesives/

I. INTRODUCTION

Vicor Corp. (“Petitioner”) challenged claims 1-6 of U.S. Patent No. 9,819,263 (“the ’263 Patent”) on five grounds in its petition (“Petition”). Delta Electronics, Inc. (“Delta” or “Patent Owner”) hereby submits its Response.

Ground 1A fails to demonstrate that Vinciarelli-664 anticipates the claimed “connection part.” The “connection part” requires a “first terminal” 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.” Petitioner identifies no terminal on Vinciarelli-664 that constitutes the “first terminal,” and further fails to identify the limitations of the “second terminal,” *i.e.*, that it is a “bonding pad” “attached to a surface of the first electronic components.”

The below figures demonstrate the dissimilarity between ’263 Patent’s connection part (pictured first in yellow, with the PCB in aqua and electronic component in green) and Petitioner’s reliance on Vinciarelli-664 (immediately after, with the PCB in aqua and an insulator in orange).

Vinciarelli-664 stating that the PCB is within 1/3 to 2/3 of the height of the power device. This is insufficient as a legal matter and fails as a factual matter; measuring Vinciarelli-664's figures demonstrates that the PCB extends outside of the middle 1/3rd.

Ground 1B and 1C do not cure the above-described deficiencies to [1d], [1e], [1g], and [1f], and instead generically describe combinations. Grounds 1B and 1C fail for the same reasons.

Ground 1C fails for an additional reason; it replaces Vinciarelli-664's conductor with Zeng-014's conductor. A POSITA would not take Zeng-014's conductor to replace Vinciarelli-664's conductor because doing so would add significant manufacturing steps. Vinciarelli-664 describes producing thousands of devices in a panel—with conductors—whereas Zeng-014 describes bending conductors across devices one-by-one. A POSITA would not have replaced Vinciarelli-664's mass production techniques with Zeng-014's significantly slower techniques.

Ground 2 fails because Petitioner fails to present a motivation to combine to arrive at the “connection part.” Like Ground 1C, Petitioner proposes using Zeng-014's conductor (but this time with Vinciarelli-218). Petitioner wrongly argues that “Vinciarelli-218 does not have surface mount conductors” and that a POSITA would turn to Zeng-014, but Vinciarelli-218 provides specific surface mount

conductors for its surface mount devices that have unique features (PCB bar codes). Applying Zeng-014's wrapped conductors to Vinciarelli-218 would result in a device that would not reliably establish and maintain electrical contacts with those PCB bar codes and would result in conductor bowing and bending. A POSITA would not have made Petitioner's modifications and Ground 2 applies hindsight bias.

Ground 3 relies on the same combination (but applies different embodiments from Zeng-014 and Vinciarelli-218). Fatal to this combination, Petitioner relies on entirely different embodiments of Vinciarelli-218 to meet the "connection part" limitations of [1f] and [1g]. Petitioner combined Vinciarelli-218's device with features of Zeng-014's device to meet [1f], but then relied on an entirely different embodiment of Vinciarelli-218 (modified with a different embodiment of Zeng-014) to meet [1g]. As a result, [1f] and [1g] describe entirely different physical devices. Petitioner never resolves this discrepancy, and Ground 3 fails as a threshold matter.

Ground 3 further fails to provide a motivation to combine. For limitation [1g], Petitioner relies on the same combination as in Ground 2, but fails to articulate any motivation. If one were to be inferred, it fails for the same reasons as outlined in Ground 2.

Ground 3 is further deficient because it fails to teach [1f], which requires

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

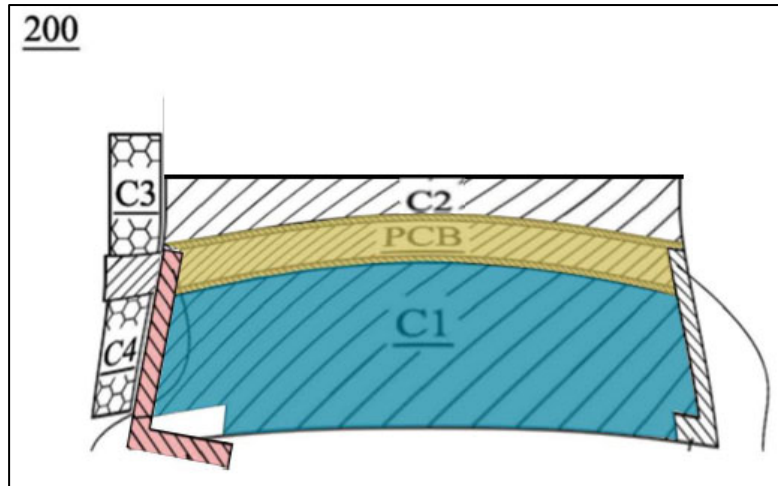
Petitioner’s analysis does not consider that Zeng-014’s device has a significantly larger component (an inductor) on the lower surface of the carrier which precludes [1f] from being met. The Petition provides no motivation to place an inductor on top which is significantly larger than any other component (and thereby mirror it as the bottom component) to arrive at [1f]. There is no reason to do and Petitioner improperly uses the patented claims as a guide.

Further detail is below.

II. THE ’263 PATENT

The ’263 Patent is directed to improvements in the design and manufacture of power converters. (*See generally* ’263 Patent.)

The ’263 Patent describes metrics that drive power converter design: efficiency and power density. (’263 Patent at 1:17-25.) Generally, carriers in existing converters were susceptible to warping as they inevitably heated up during operation. (EX2005 at ¶¶38-39.) Warping can be caused by releasing of uneven stresses and can lead to electrical connection failures and less durability. (*Id.*; *see also* ’263 Patent at 5:31-32 (considering mechanical strengths and mounting requirements), 5:47-53 (considering additional stress solutions if stress distribution was non-uniform).) These issues are demonstrated below, in an annotated and modified version of FIG. 2 of the ’263 Patent. (EX2005 at ¶39.)

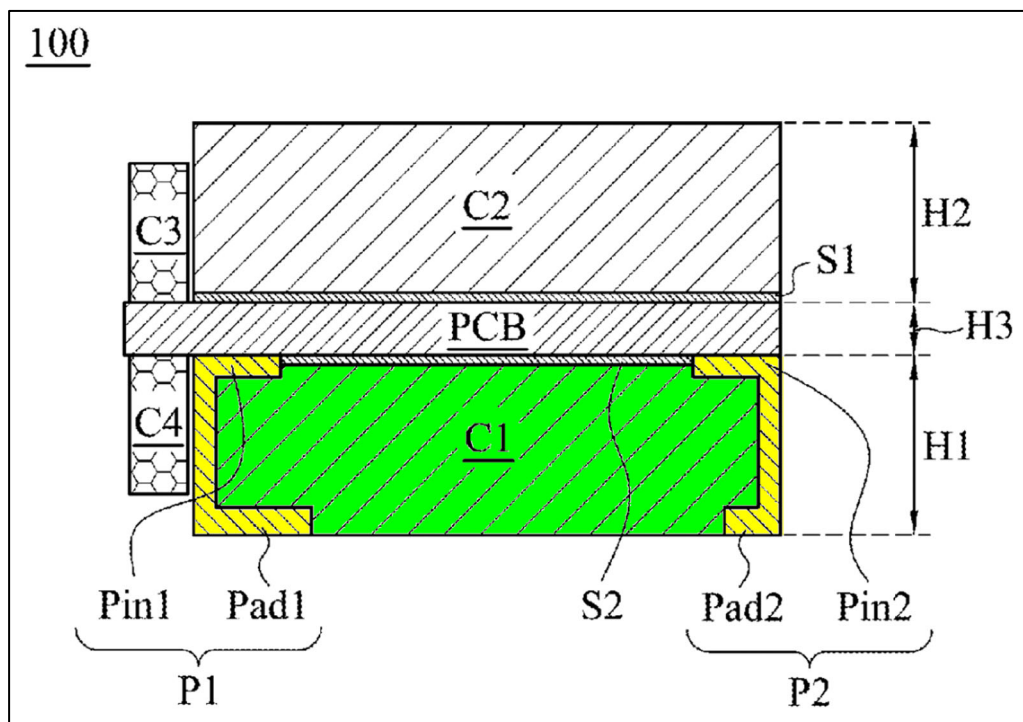


The optimization of efficiency, power density, and device integrity is embodied in many limitations, including [1f] “the carrier is disposed at 1/3 to 2/3 of a height of the power converter” and [1g] “wherein the first connection part is fabricated by mechanical support of the first electronic component.” (EX2005 at ¶¶40-42.)

The thickness ratio requirement of [1f] contributes to mechanical integrity by allowing for uniform stress distribution. (EX2005 at ¶¶41-42.) Uniform stress distribution is improved by requiring that the height or thickness of upper components “is not greater than twice” that of the lower components, and *vice versa*. (*Id.*; ’263 Patent at 5:45-57.) Otherwise, significantly different thicknesses for upper/lower components cause non-uniform stress distribution, which could result in warping. (*Id.* at 5:45-57.) Meanwhile, the carrier thickness requirement contributes to power density. The carrier thickness requirement enforces a thickness for the carrier, thus ensuring that power density is not sacrificed too far

by the carrier occupying too much space. (EX2005 at ¶¶40-42.)

Further, [1g] describes “the first connection part is fabricated by mechanical support of the first electronic component.” The connection part P1, for example, (annotated yellow, below) “is curved by mechanical support of the first electronic component” (green). (’263 Patent at 11:2-4.) This is so “the connection parts P1 and P2 themselves can be determined according to electrical requirements without additionally considering their mechanical strengths and mounting requirements.” (*Id.* at 5:29-32.) In other words, the first electronic component provides support.



The Petition fails to demonstrate that the ’263 Patent’s claims are unpatentable.

III. CLAIM CONSTRUCTION

The Board construes claims in accordance with their ordinary and customary meaning as understood by one of ordinary skill in the art. 37 C.F.R. § 42.100; *see also Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005).¹

Patent Owner presents the two constructions below.

A. Limitation [1g] is not a product-by-process limitation.

Limitation [1g] which recites “wherein the first connection part is fabricated by mechanical support of the first electronic component” is not a product-by-process limitation. As described by the institution decision, “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.” (Paper 11 at 10.)

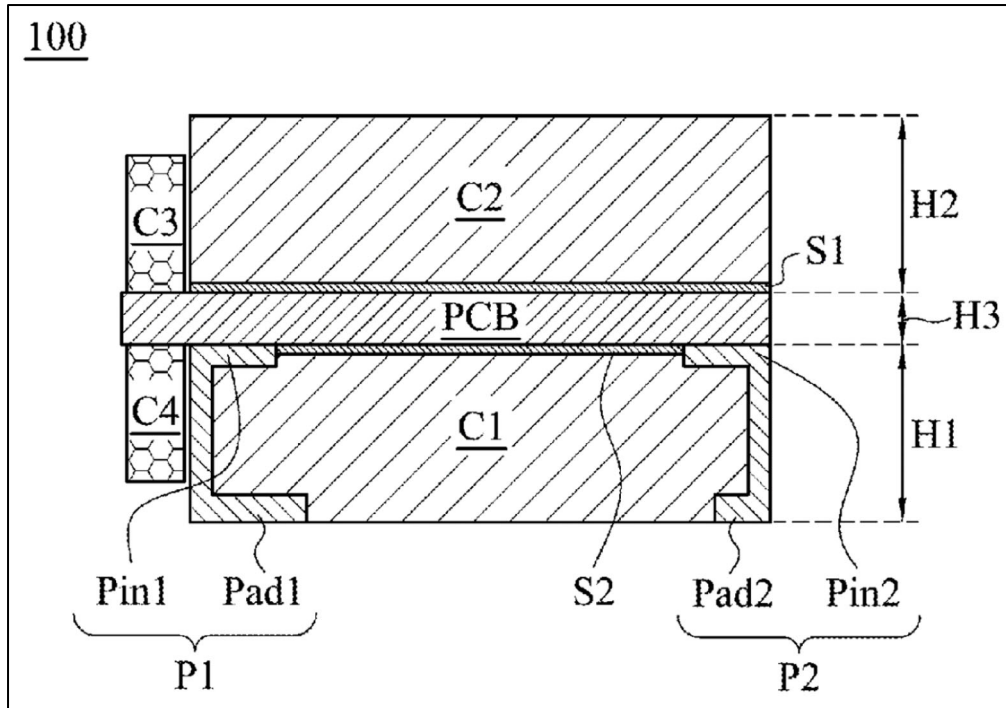
¹ A POSITA at the time of the inventions of the ’263 patent “has a Bachelor’s degree in electrical engineering, or a related field, and one to two years of experience with the design or implementation of integrated power converters or packaging. A higher level of education or skill can make up for less experience, and vice-versa.” (EX2005 at ¶16.)

Petitioner argues that “[t]his is a product-by-process limitation because it specifies the method of fabrication and therefore is not entitled to patentable weight.” (Pet. at 3-5; *see also id.* at 35 (element [1g] analysis for Ground 1A), 47-48 (providing no further analysis for [1g] for Ground 1B), and 48-52 (same for Ground 1C).) Petitioner’s position contravenes caselaw, which holds that a description of process alone does not necessarily imply a product-by-process interpretation. It is also at odds with the structural description in the ’263 Patent.

Claim language in a product claim may only be found as a process limitation if it does not describe structure. *Purdue Pharma L.P. v. Epic Pharma, LLC*, 811 F.3d 1345, 1353 (Fed. Cir. 2016). If 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.***” *In re Nordt Dev. Co., LLC*, 881 F.3d 1371, 1375-76 (Fed. Cir. 2018) (emphasis added). “Indeed, since *Garnero*, we have in numerous instances held such limitations to convey structure even when they also describe a process of manufacture.” *Id.* Thus, a limitation should not be construed as product-by-process merely for some suggestion of a method/process; the limitation’s interpretation depends upon whether or not the limitation describes any structure.

Despite Petitioner’s cherry-picking of the ’263 Patent’s specification to find process in [1g], [1g] nonetheless describes structure. The “mechanical support of

the first electronic component” for the first connection part is a structural feature or relationship. (EX2005 at ¶¶45-48.) This “mechanical support” is illustrated in the structure of FIG. 1 (below). The specification, for example, discloses “curving the connection part [(annotated yellow)] by mechanical support of the first electronic component [(green)] to fix the connection part at the first electronic component.” (’263 Patent at 10:48-50.) This is so “the connection parts P1 and P2 themselves can be determined according to electrical requirements without additionally considering their mechanical strengths and mounting requirements.” (*Id.* at 5:29-32.) Here, this description conveys structure by describing that a connection part fabricated by “mechanical support of the first electronic component” is fixed at the first electronic component. Fixture, attachment, and securement of one object to another object is structure.



Accordingly, “wherein the first connection part is fabricated by mechanical support of the first electronic component” is not devoid of structure. This claim language connotes sufficient structural characteristics that preclude a product-by-process interpretation. Caselaw holds that [1g] should be construed according to its structural meaning, at least by default. *Nordt*, 881 F.3d at 1375-76.

Petitioner’s product-by-process construction is incorrect and should not be accepted by the Board. Petitioner presents only process description associated with [1g] in a flowchart method but neglects the other structural description identified above. That same structural description that the Petitioner passes over makes [1g] interpretable as structure and disqualifies the product-by-process interpretation by default.

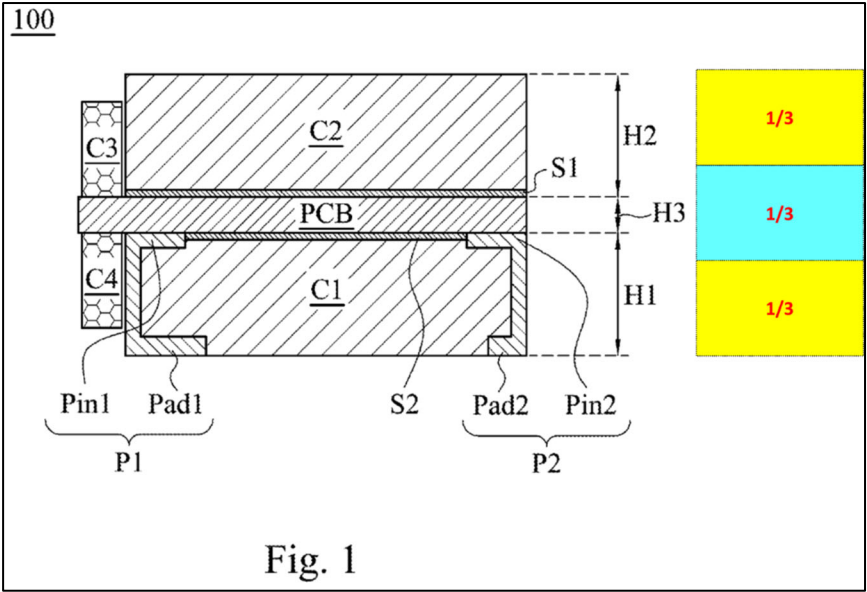
Therefore, the Board should reject Petitioner’s product-by-process construction of [1g].

B. Limitation [1f]: “wherein the carrier is disposed at 1/3 to 2/3 of a height of the power converter”

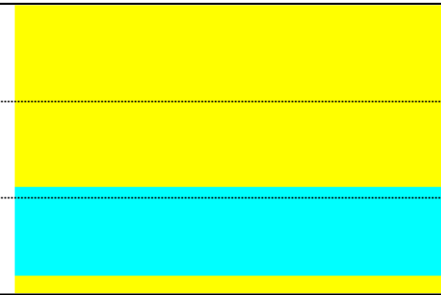
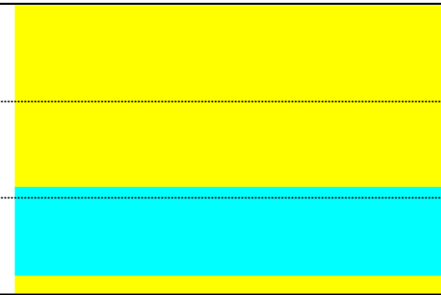
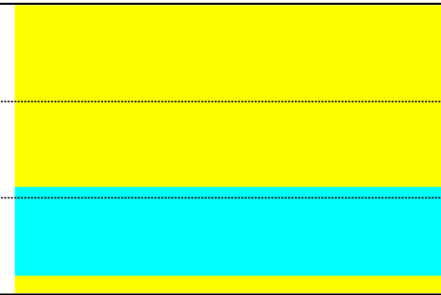
Limitation [1f] should be construed to describe the carrier’s location to be at 1/3 to 2/3 of the height of the power converter, not that only a portion of the carrier is located at 1/3 to 2/3 of the power converter’s height. (EX2005 at ¶¶45-48.)

This interpretation is supported by both the claim language and specification. The claims define the carrier’s exact location without qualifier: “the carrier is disposed at 1/3 to 2/3 of a height of the power converter.”

This interpretation is further confirmed by all embodiments of the specification; each depicts the carrier’s location at 1/3 to 2/3 of the height of the power converter. (’263 Patent at FIGS. 1- 13, 15-23, 11:14-18.) An example is shown in the annotated FIG. 1, below, where the carrier has a thickness H3 that is at 1/3 to 2/3 of the height of the power converter. (*Id.* at 5:14-18; *see also id.* at 5:54-57 (“the second height H2 is not greater than twice the first height H1, or the first height H1 is not greater than twice the second height H2”).) Every single embodiment is consistent with Patent Owner’s construction, which is consistent with the plain language, and should accordingly be adopted. (EX2005 at ¶47.)



Petitioner applies the phrase to mean that only a portion of the carrier need be within the above-annotated 1/3rd region. (Pet. at 31, 78.) This interpretation is impermissibly broad, and provides for a wide array of carrier positions that are out of line with the specification, *e.g.*, if the carrier encompasses nearly 100% of the device, or is in the bottom 1/3rd portion of the device. A few examples of this incorrect interpretation are shown below, with the yellow portions depicting a component and the aqua components depicting the carrier. Petitioner’s application of [1f] renders it mostly meaningless. (EX2005 at ¶48.)

		1/3	
		1/3	
		1/3	

Consistent with the intrinsic record, [1f] should be construed to describe the

carrier's location to be at 1/3 to 2/3 of the height of the power converter, not that only a portion of the carrier is located at 1/3 to 2/3 of the power converter's height.

IV. PETITIONER'S GROUNDS FAIL

A. Grounds 1A-1C: Petitioner Fails to Establish a Reasonable Likelihood of Prevailing.

Grounds 1A-1C all rely upon Vinciarelli-664 as an anticipatory reference (Ground 1A) or as a primary reference (Grounds 1B and 1C) in combination with others. These grounds fail.

1. Ground 1A: Petitioner Fails to Show that Claim 1's Features Are Disclosed in Vinciarelli-664.

a. Anticipation Requires All Elements

"A patent claim is invalid for anticipation under 35 U.S.C. § 102 when one prior art reference describes 'each and every claim limitation and enable[s] one of skill in the art to practice an embodiment of the claimed invention without undue experimentation.'" *In re Chudik*, 851 F.3d 1365, 1372 (Fed. Cir. 2017). "[U]nless a reference discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations arranged or combined in the same way as recited in the claim, it cannot be said to prove prior invention of the thing claimed and, thus, cannot anticipate under 35 U.S.C. § 102." *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008).

"All of the elements and limitations of the claim must be shown in a single prior reference, arranged as in the claim." *Karsten Mfg. Corp. v. Cleveland Golf*

Co., 242 F.3d 1376, 1383 (Fed. Cir. 2001). “It is not sufficient to constitute an anticipation that the device relied upon might, *by modification*, be made to accomplish the function performed by the patent in question.” *In re Chudik*, 851 F.3d at 1372.

b. Ground 1A, [1c], [1d], [1e], [1g]: Vinciarelli-664 does not teach the “connection part” with all limitations of [1c], [1d], [1e], [1g]

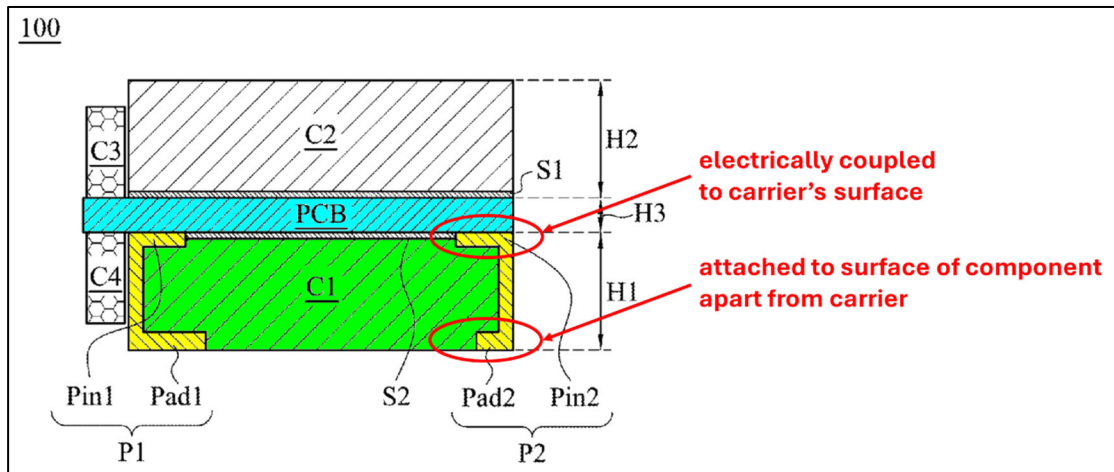
Petitioner has failed to demonstrate that Vinciarelli-664 anticipates the connection part’s elements described in [1d], [1e], and [1g].

The “connection part” of [1c] has several requirements; it requires:

- [1d]: “a first terminal electrically coupled to the upper surface or the lower surface of the carrier”
- [1e] “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”
- [1g] “wherein the first connection part is fabricated by mechanical support of the first electronic component”

The connection part’s claimed configuration is illustrated in FIG. 1, where the pin (yellow) has two terminals (red) with one terminal coupled to the carrier’s (aqua) surface and the other on the opposite side of the carrier on the component C1 (green). ([1d] and [1e]; EX2005 at ¶¶54-55.) Shown below, the “connection

part” has structure where it is supported by the component C1. ([1g].)

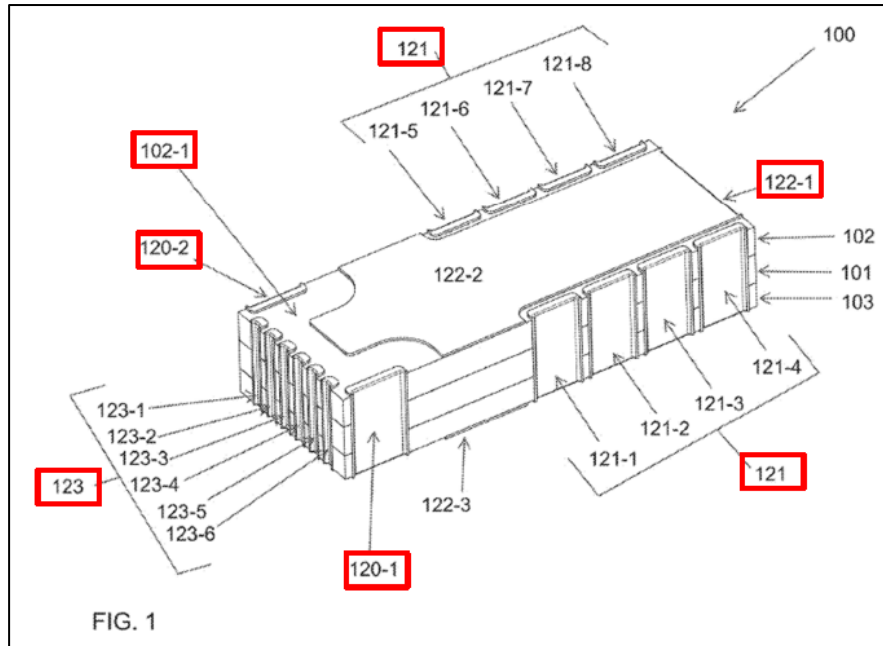


Petitioner’s deficiencies are described in more detail below.

- (i) **Petitioner fails to show that Vinciarelli-664 teaches the connection part’s two terminals of [1d] and [1e]**

Ground 1A fails to demonstrate that [1d] and [1e] are anticipated.

Petitioner alleges that the power converter’s contacts 120-1, 120-2, 121, and 122-1 teach the “connection part” of [1c]. (Pet. at 21.) The Petition, however, fails to demonstrate that Vinciarelli-664 anticipates the connection part’s two terminals as required by [1d] and [1e]. (Paper 11 at 16-18 (holding that the Petition failed to present a reasonable likelihood for these limitations).)



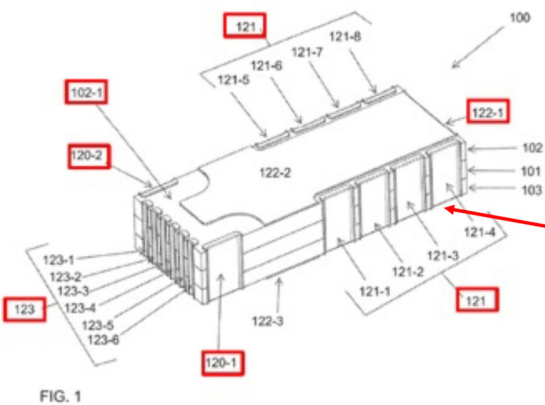
The “first terminal” has not been shown

Petitioner fails to demonstrate [1d]’s “first terminal” and that it is “electrically coupled to the upper surface or the lower surface of the carrier.” (EX1005 at ¶58.) The Petition is devoid of any identification of the “first terminal” in Vinciarelli-664. (Paper 11 at 18 (“Petitioner does not point to any portion of Vinciarelli-664 for disclosure of such terminals”).) “Terminal” is mentioned only in reference to “contacts 120-1, 120-2, 121, and 122.” (Pet. at 22.) The remainder of the analysis of [1d] does not mention the “terminal” and does not mention where on those “contacts 120-1, 120-2, 121, and 122” any such terminal exists. (Pet. at 22-23.) The Petition is insufficient to demonstrate that Vinciarelli-664 anticipates the “connection part” which has “a first terminal [that is] electrically coupled to the upper surface or the lower surface of the carrier.”

The “second terminal” has not been shown

Petitioner’s attempt to identify the “second terminal” of [1e] also fails. (EX2005 at ¶59.) Petitioner argues that the “second terminal” is on “the bottom end of each contact” of “contacts 120-1, 120-2, 121, and 122” and continues that Vinciarelli-664 teaches an “‘exposed core’ transformer[.]” that is the “exemplary electronic component.” (Pet. at 28.)

Petitioner fails to demonstrate that the “second terminal” is literally disclosed in its relied-upon embodiments of FIGS. 1 and 2. Indeed, Petitioner’s expert (Dr. Baker) testified that he did not know the physical orientation of conductor 122 on the bottom surface. (EX2006 at 21:2-16 (“all I can see is a piece of metal on top of the package ... It could just go beyond the top or wrap around the side. I don’t know specifically what that piece of metal is doing”).) Petitioner thusly fails to demonstrate that Vinciarelli-664 teaches the “second terminal.”



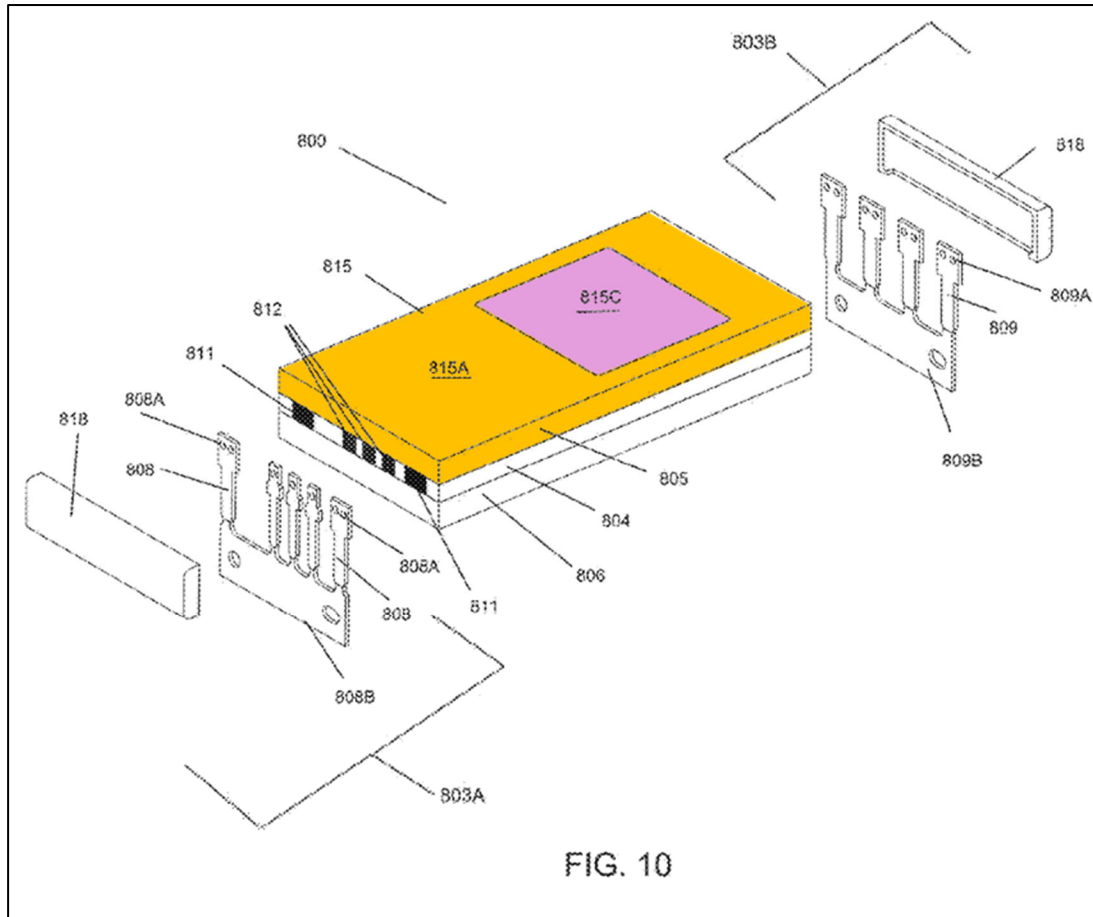
**“contacts 120-1, 120-2, 121, and 122”
“has a second terminal
(the bottom end of each contact)”
(Pet. at 28.)**

The “second terminal” “attached to a surface of the first electronic

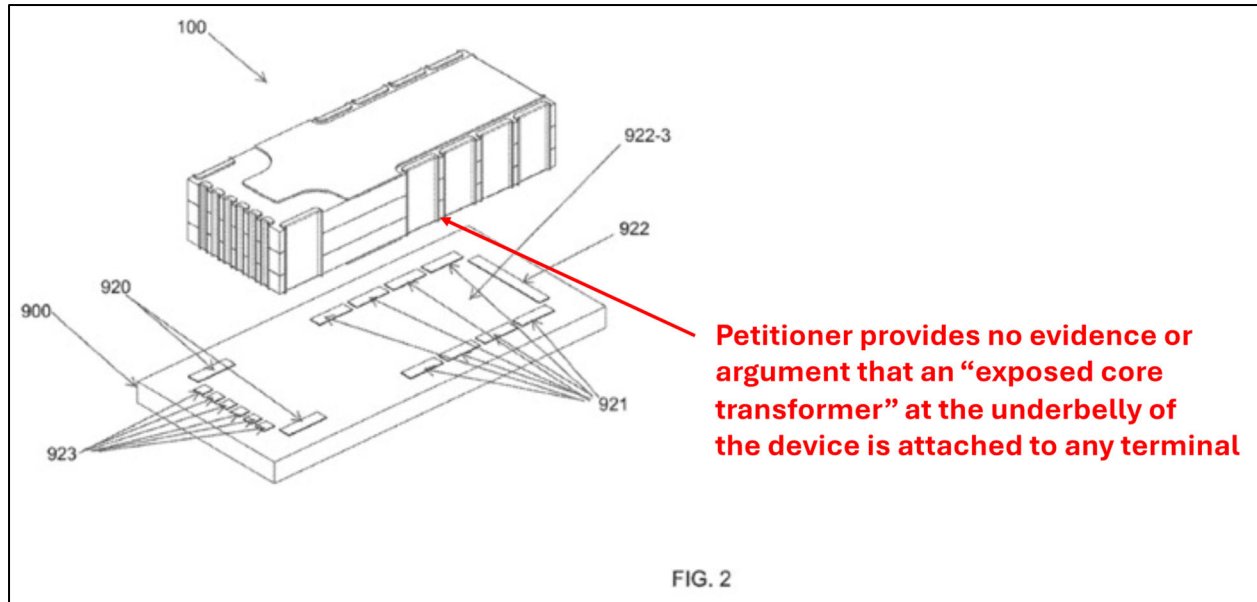
component apart from the carrier” has not been shown

Petitioner further fails to demonstrate that the “second terminal” is “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” as required by [1e]. (EX2005 at ¶¶60-66.)

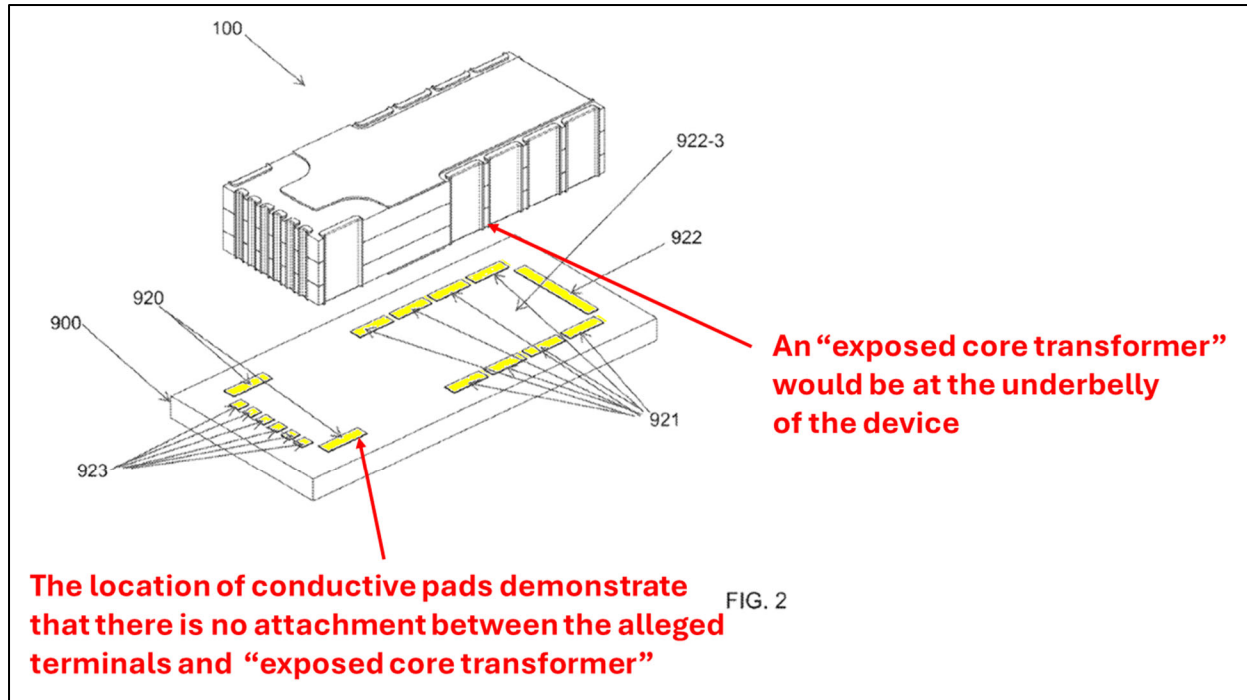
To understand Petitioner’s deficiency, the location of the supposed “exposed core transformer” which is allegedly at the same level as the surrounding encapsulant” is first described. (Pet. at 28.) Petitioner provides no illustration, but FIG. 10 illustrates an exposed magnetic core 815C (lavender) surrounded by encapsulant 815A (orange). (EX1005 at 7:13-22.) The exposed core is centrally located and surrounded by encapsulant.



Translating the above to Petitioner’s allegations of FIG. 2, the central portion of the underbelly of the module 100 would allegedly have an exposed core. Petitioner, however, provides no argument that this exposed core transformer’s exposed surface is attached to the bottom end of any of “contacts 120-1, 120-2, 121, and 122.” (*See generally* Pet. at 28-31.) The Petition is thusly deficient with respect to [1e]’s requirement that the “second terminal” be “attached to a surface of the first electronic component apart from the carrier.” (EX2005 at ¶62.)

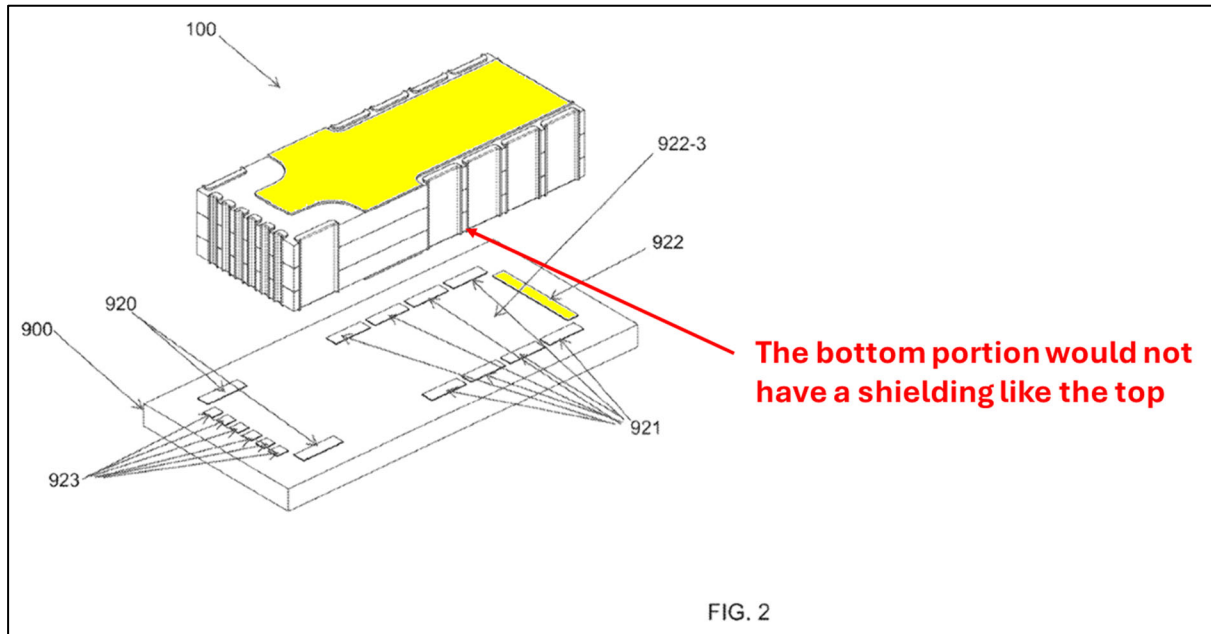


The lack of attachment between the surface of the supposed magnetic core and Petitioner’s identified “second terminal” is evident from Vinciarelli-664’s conductive pads (920-923). None of those conductive pads extend to the central portions of the module 100, indicating that there is a lack of attachment to any presumed exposed core on the device’s bottom surface. (EX2005 at ¶63.)

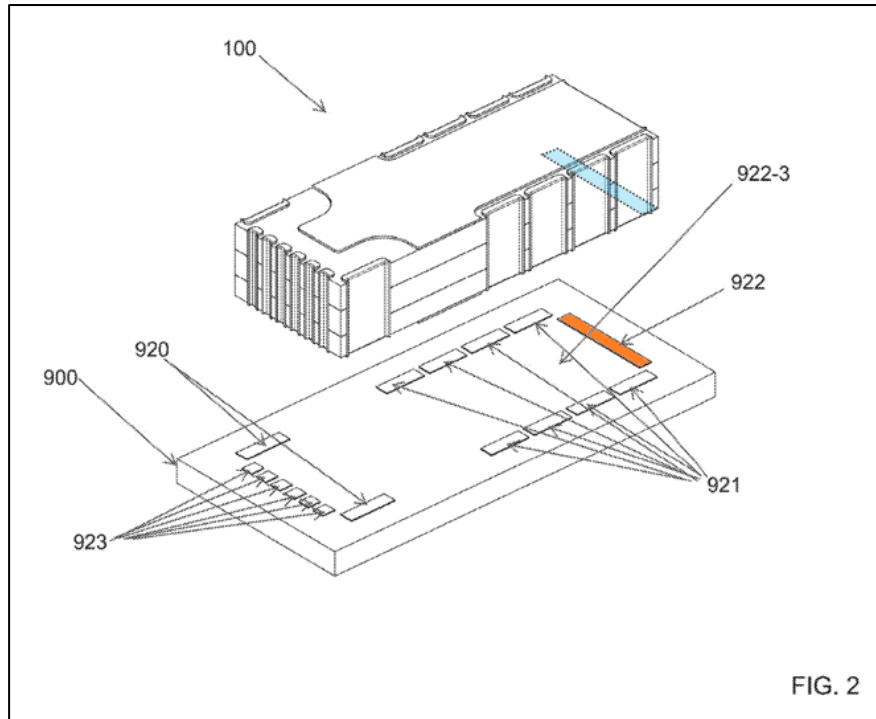


In acknowledgment of this deficiency (but without addressing it head-on), Petitioner argues that “the bottom common contact would be comparable in size to the top contact.” (Pet. at 29.) This is incorrect, and a POSITA would have not understood this to exist with respect to FIG. 2. (EX2005 at ¶64.) Specifically, the location of the solder pad 922 (yellow) indicates that contact 122-1 (also yellow) would not extend across the bottom surface. (*Id.*) If contact 122-1 extended as Petitioner alleges, the reflow of solder would cause solder to extend beyond the solder pad 922 causing issues with the board and connectivity. (*Id.*) A POSITA would be discouraged from making the bottom shield/contact 122-3 large for the purpose of attaching to a surface of the exposed core due to the numerous practical problems; otherwise, the bottom shield/contact 122-3 could not function as a

bonding pad that mates with pad 922. (*Id.*) A POSITA would not have had contact 122-1 extend across the bottom portion of the device. (*Id.*)



Instead, at most, a POSITA would have understood the bottom shield/contact 122-3 to be shaped as demonstrated (in blue) in the annotated version of Vinciarelli-664's FIG. 2. (EX2005 at ¶65.)



Petitioner’s argument that a POSITA would have had contact 122-1 extend across the bottom surface is not literally taught by Vinciarelli-664. (EX2005 at ¶66.) If anything, this represents a modification to Vinciarelli-664, which is not a proper analysis under anticipation. As a consequence, the alleged “second terminal” is not “attached to a surface of the first electronic component apart from the carrier” as required by [1e].

The “second terminal of the connection part is a bonding pad” has not been shown

Petitioner’s identification, moreover, fails to demonstrate that the “second terminal of the first connection part is a bonding pad” required by [1e]. This is evident from the figures which illustrate no such bonding area on the board for

Petitioner’s alleged “second terminal.” As noted immediately above in FIG. 10, any “exposed magnetic core” would be centrally located in the encapsulant. Even assuming that this exists in Vinciarelli-664’s other figures, that terminal that is allegedly attached to the exposed magnetic core would not constitute a bonding pad. (EX2005 at ¶67.)

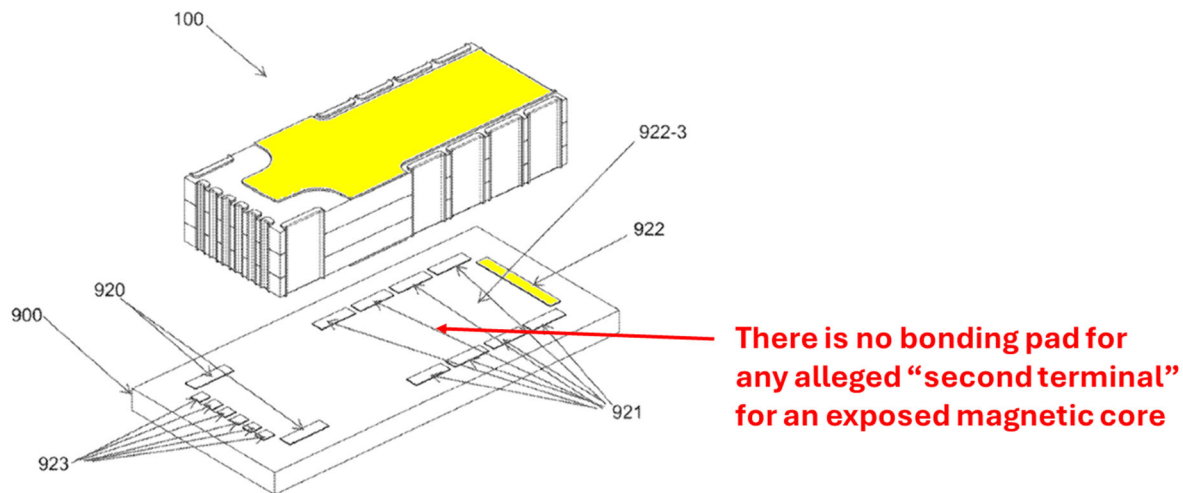


FIG. 2

The Petition thusly fails to demonstrate that Vinciarelli-664 anticipates [1d] and [1e]. (*See also* Paper 11 at 19 (describing failures of the Petition).)

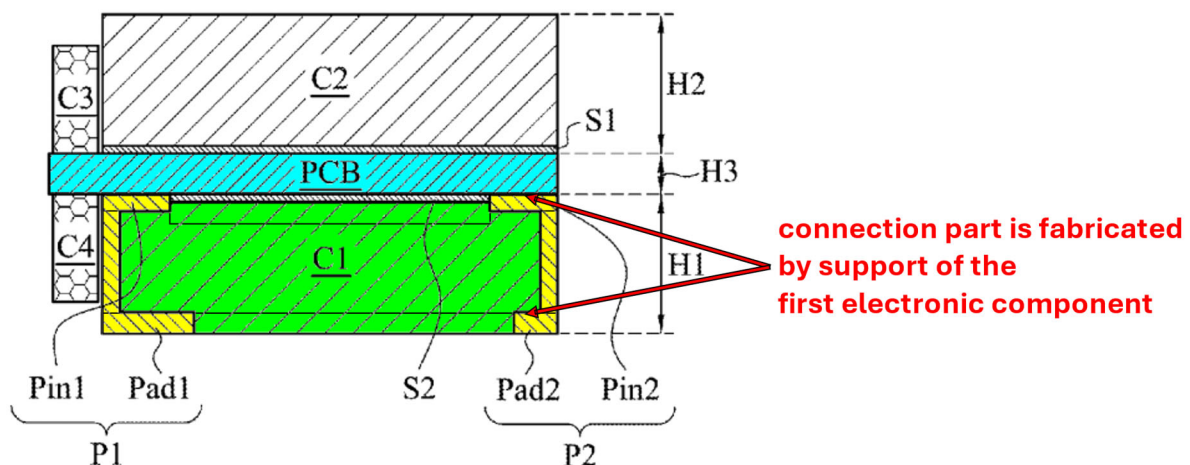
(ii) Petitioner failed to show that Vinciarelli-664 teaches the connection part’s limitations of [1g]

The Petition fails to demonstrate the “connection part” [1c] “wherein the first connection part is fabricated by mechanical support of the first electronic component” of [1g].

Petitioner’s analysis ignores the constituent parts of the “connection part”

described in [1d]-[1e] when analyzing [1g]. (EX2005 ¶71.) 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.” (Paper 11 at 10 (describing the limitations of the connection part).) As shown in the ’263 Patent specification, the connection part P1 (annotated yellow, below) “is curved by mechanical support of the first electronic component” (green). (’263 Patent at 11:2-4.) This is so “the connection parts P1 and P2 themselves can be determined according to electrical requirements without additionally considering their mechanical strengths and mounting requirements.” (*Id.* at 5:29-32.) Petitioner has not shown that Vinciarelli-664 anticipates [1g].

100



As an initial matter, Petitioner argues that “[u]nder the product-by-process

construction, the element is not entitled to patentable weight.” (Pet. at 35.) As described in the claim construction section at III.A, this is incorrect and [1g] requires analysis. (EX2005 at ¶72.)

The Petition provides alternative argument, but this too fails to demonstrate the anticipation of [1g]. As depicted in section IV.A.1.b.(i), Petitioner relies on an “exposed magnetic core” as the alleged claimed “electronic component,” but fails to describe the magnetic core’s location or its connection to the conductor. The Petition’s analysis under [1c]-[1e] fails to identify [1g]’s required structural relationship between connection part and electronic component. (Pet. at 21-31, 55-61, 69-77, 88-90.)

At best for Petitioner, these relied-upon portions identify a contact that is positioned to cover a magnetic core. This, however, fails to make any demonstration that the core mechanically supports the “connection part” according to [1g], nor does it provide any analysis for the physical attachment and bonding pad of [1e] and how those components provide the structural relationship of [1g]. (*Id.* at 28, 61, 76-77 (arguing under [1e]).) The Petition is silent regarding this connection. Moreover, there is no demonstration that there is any type of physical attachment between these portions of the connection part and the electronic component. (EX2005 at ¶74.)

At most and assuming all of Petitioner’s arguments for [1d] and [1e] are

correct (which they are not), the magnetic core would be centrally located in the device and would make electrical contact. Shown below-left is a presumed magnetic core (lavender) centrally located encapsulant (orange) annotated onto FIG. 1 from FIG. 10. Petitioner fails to describe how Vinciarelli-664 teaches a physical attachment between the conductor and the core, and moreover fails to describe how there would be mechanical support. (EX2005 at ¶75.)

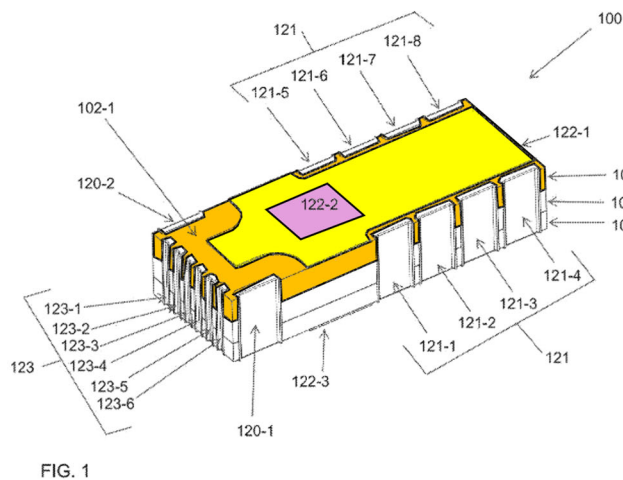


FIG. 1

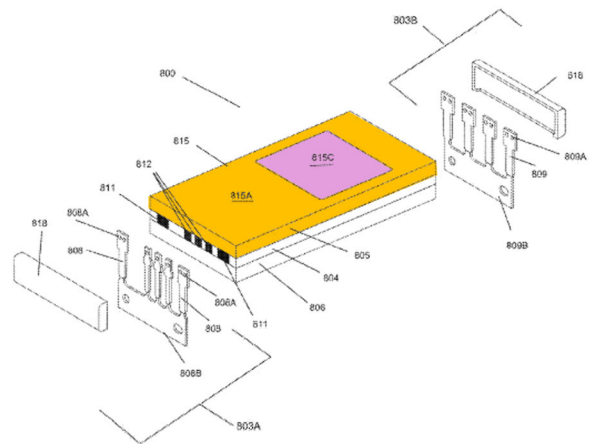


FIG. 10

Consequently, the Petition fails to demonstrate that [1g] is anticipated by Vinciarelli-664.

- c. **Ground 1A, [1f]: Vinciarelli-664 does not teach that “carrier is disposed at 1/3 to 2/3 of a height of the power converter”**

Vinciarelli-664 does not anticipate [1f] as described below.

- (i) **Petitioner’s analysis of [1f] fails as a legal matter.**

Petitioner misapplies the caselaw and its analysis is founded upon legal error. While caselaw allows using images to support positional relationships (*e.g.*,

component B is disposed between component A and C), it does **not** allow relying on images for precision of sizings. *Hockerson-Halberstadt, Inc. v. Avia Grp. Int'l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000). Petitioner conflates the two distinct concepts.

In support of its annotations of Vinciarelli-664's figures, Petitioner cites *Ex parte Gengrinovich*, Appeal 2015-001194 (June 15, 2016) for the proposition that "drawings can be used to determine positional relationships, even if not precise proportions." (Pet. at 31.) This cited authority works against Petitioner, however, and prohibits Petitioner from using Vinciarelli-664's figures to reach the precision of sizings that is required by [1f].

In *Gengrinovich*, Appellants argued against the Examiner's sole reliance on a prior art patent figure for their claimed configuration of "a height of the manifold being lower than a level of the fluid in the tank." *Gengrinovich* at 4-5. In other words, the dispute was on a positional relationship, not exact precision. *Id.* Appellants pointed out the lack of textual description accompanying the cited prior art patent figure and argued that the Examiner cannot solely rely upon the prior art patent figure when there lacked corresponding specification description. *Id.*, 6.

While the *Gengrinovich* panel affirmed the Examiner's use of figures for a positional relationship, it repeatedly emphasized caution about such use for precise quantitative values. *Id.*, 7-8. The *Gengrinovich* panel reiterated long-held law on

the limited use of patent drawings as prior art:

‘Patent drawings [however] do not define the *precise proportions* of the elements and may not be relied on to show *particular sizes* if the specification is completely silent on the issue.’ *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000) (emphasis added). And, ‘[a]bsent any written description in the specification of *quantitative values*, arguments based on measurement of a drawing are of little value.’ *In re Wright*, 569 F.2d 1124, 1127 (CCPA 1977) (emphasis added).

Id.

Because the issue was “[a] positional relationship of the elements required by the claims” and not a quantitative claim requirement, the *Gengrinovich* panel ultimately determined that the Examiner’s use of the prior art patent figure was not in reversible error. *Id.* The claim limitation at issue simply placed the manifold height at a relative position from the fluid level but was not directed to precise and quantitative positioning. *See id.*, 4-5.

Gengrinovich is in-line with well-established caselaw which prohibits against using dimensions of figures as prior art for limitations that require particular sizes. “Under [Federal Circuit] precedent [] it is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.” *Hockerson-Halberstadt*, 222 F.3d at 956.

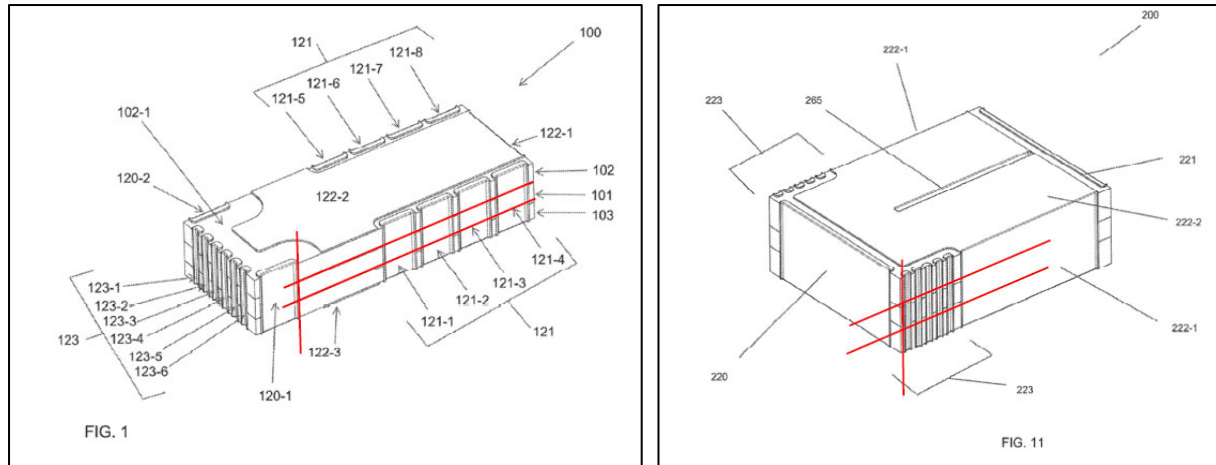
Here, [1f] recites quantitative values and requires “particular sizes” of multiple claimed elements. (EX2005 at ¶¶45-48.) It requires that “the carrier [being] disposed at 1/3 to 2/3 of a height of the power converter” which is a quantitative requirement.

The legal authority holds that drawings alone cannot meet the quantitative features of [1f]. The Petition solely relies upon its own annotated figures which is both factually incorrect and legally improper. (EX2005 at ¶¶78-84.) Vinciarelli-664 is entirely devoid of specific quantitative teachings directed to [1f]. (*Id.*) Ground 1A thusly fails.

(ii) Vinciarelli-664 literally depicts carriers outside of [1f]’s height range.

Notwithstanding Petitioner’s incurable legal error, Petitioner also makes factual errors. Vinciarelli-664 does not literally depict a carrier disposed within the claimed 1/3 to 2/3 height range in any embodiment, as is required for anticipation.

Petitioner provides an eye-ball test looking at FIG. 1, but this does not arrive at [1f]. Petitioner relies *solely* on its own marked-up figures (reproduced below) to argue that the sandwiched PCB is centered within the electronic module’s height. Petition, 31-34. Petitioner then takes that generic PCB centering to allege that “a carrier [being] disposed at 1/3 to 2/3 of a height of the power converter” is met. *Id.*



A closer inspection reveals that [1f] is not met. Taken below is an excerpt of FIG. 1 with the specific area in question blown-up alongside a ruler in the Microsoft® PowerPoint software showing more precision. For the ease of demonstration, the first four inches are shaded; the first inch is red, the second inch is green, the third is yellow, and the fourth is blue.² (EX2005 at ¶¶80-81.)

² An inch has been discussed for demonstration purposes. (EX2005 at ¶¶78-84.)

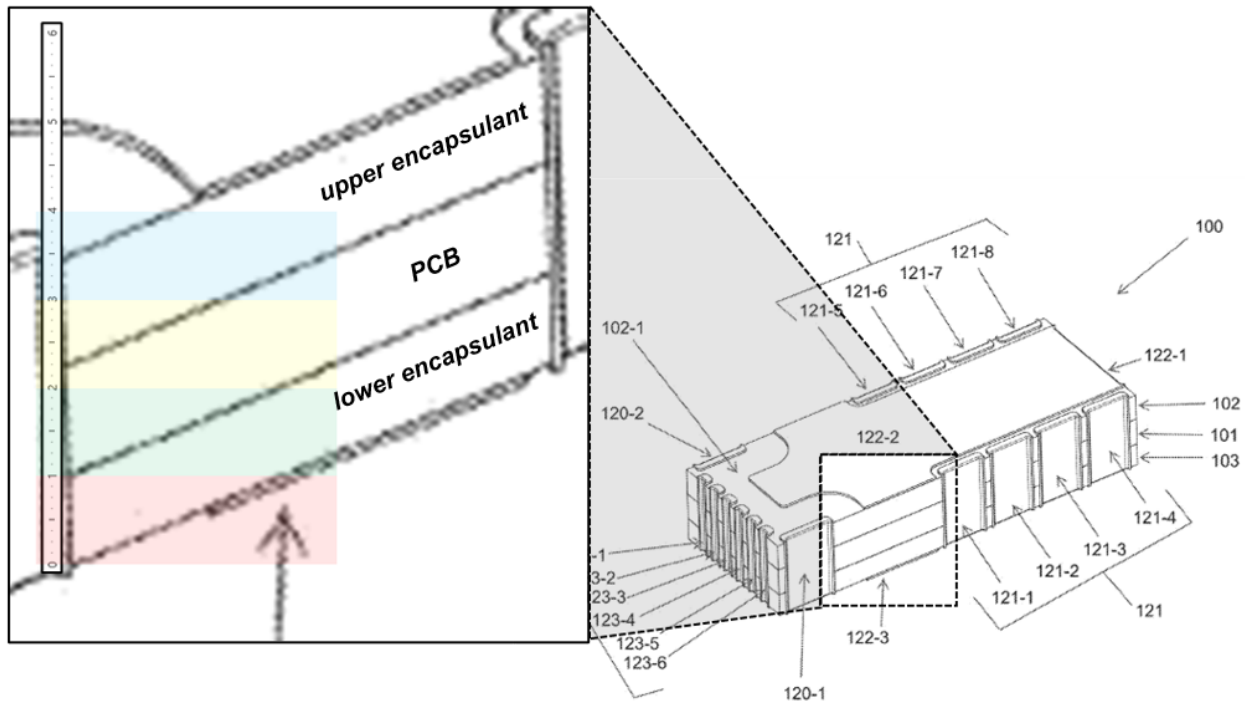


FIG. 1

As illustrated, the lower encapsulant layer is one inch high. The carrier thickness is, however, not an inch; it is bigger at approximately 1.25 inches. The upper encapsulant layer is approximately 1.125 inches. This makes the ratio $1 / 1.25 / 1.125$, and using percentages this works out to 29.6% / 37% / 33.3%. These precise findings are consistent with Dr. Phinney's printout measurements.

(EX2005 at ¶¶80-81.)

Thus, the percentage of the illustrated carrier is 37%, which is larger than $1/3$ (33.3%), and the carrier's bottom is below the $1/3$ height of the power converter. Because the illustrated carrier is larger than $1/3$ and too thick to be disposed entirely within the $1/3$ to $2/3$ height range, [1f] is therefore not literally

met by Vinciarelli-664 and it cannot anticipate.

Petitioner's expert Dr. Baker provides no additional detail that would reveal that [1f] is met. He repeats the Petition, generically pointing to Petitioner's annotations of FIGs. 1 and 11 and opining—without any support beyond those figures—that “the figure clearly shows that the carrier is within the claimed range.” VICOR-1003, ¶ 103. At deposition, however, he testified that “it looks like it is [within the middle third] but I’m not sure.” (EX2006 at 37:16-38:4.) He provides no measurements or further analysis. Limitation [1f] requires precise locations that are not taught by Vinciarelli-664.

Finally, Vinciarelli-664 is silent regarding exact dimensions of its carrier. Vinciarelli-664's PCB is positioned between two regions but has no specific location or thickness. *See, e.g., Vinciarelli-664*, 6:15-27 (stating only that the PCB is disposed between layers of encapsulant 102 and 103). Extrapolating exact dimensions from figures is improper, and its impropriety is evident here. *Hockerson-Halberstadt, Inc. v. Avia Grp. Int'l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000).

The Petition thusly fails to demonstrate that Vinciarelli-664 anticipates “carrier is disposed at 1/3 to 2/3 of a height of the power converter.”

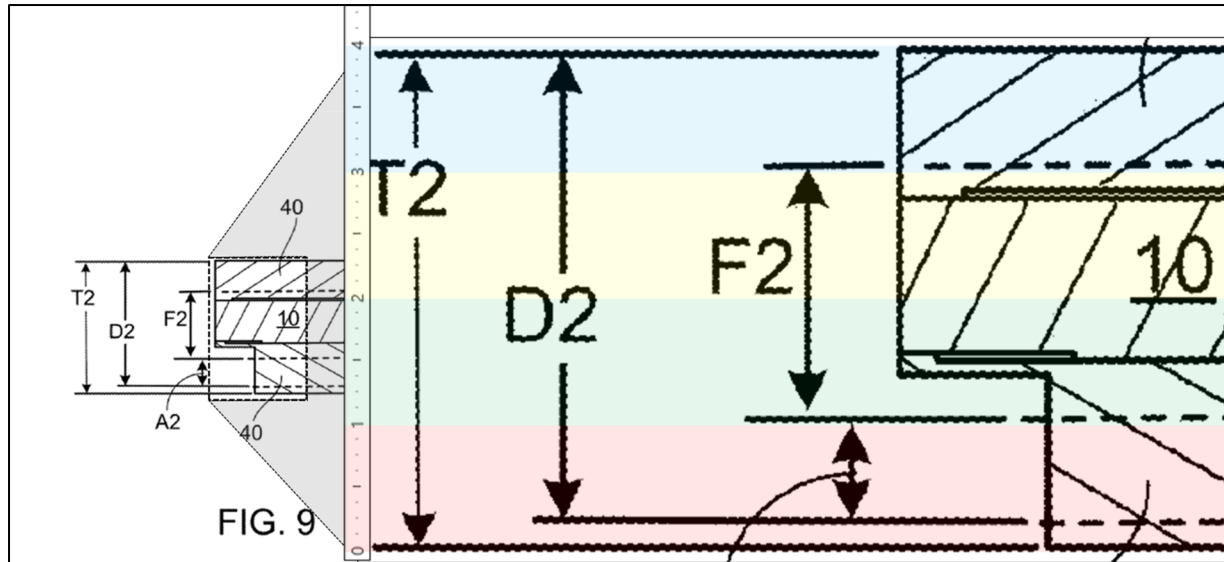
(iii) Petitioner’s attempt to rely on other references like Vinciarelli-269 for [1f] also fails.

As described above, Vinciarelli-664 does not meet [1f]. As implicit acknowledgement of this failure, Petitioner turns to Vinciarelli-269, whose disclosure is incorporated by reference into Vinciarelli-664. (Pet. at 33-34; Vinciarelli-664 at 1:37-44.) Vinciarelli-269 does not cure Ground 1A.

Initially, Petitioner’s reliance on Vinciarelli-269 fails as a legal matter. Petitioner relies on Vinciarelli-664’s FIGs. 1 and 11 to teach [1f], and more particularly Vinciarelli-664’s structure to teach other elements of the claims. *See, e.g.*, [1pre], [1a], [1b], [1c], [1d], [1e], [1g]. Vinciarelli-269 depicts an entirely different structure. *See, e.g.*, Vinciarelli-269, FIG. 9. Features of two disparate embodiments cannot merely be taken as an amalgamation to reach a claim under anticipation. *Net MoneyIN*, 545 F.3d at 1371. Ground 1A’s reliance on Vinciarelli-269 thusly fails at the threshold level.

Nonetheless, the teachings of Vinciarelli-269 do not meet [1f], and Vinciarelli-269 also teaches the opposite of what Petitioner believes it does. (EX2005 at ¶¶88-97.)

The below excerpts of FIG. 9 follow the same exercise as demonstrated above using precisely measured shapes in a consistent PowerPoint scale with inch markers shaded.

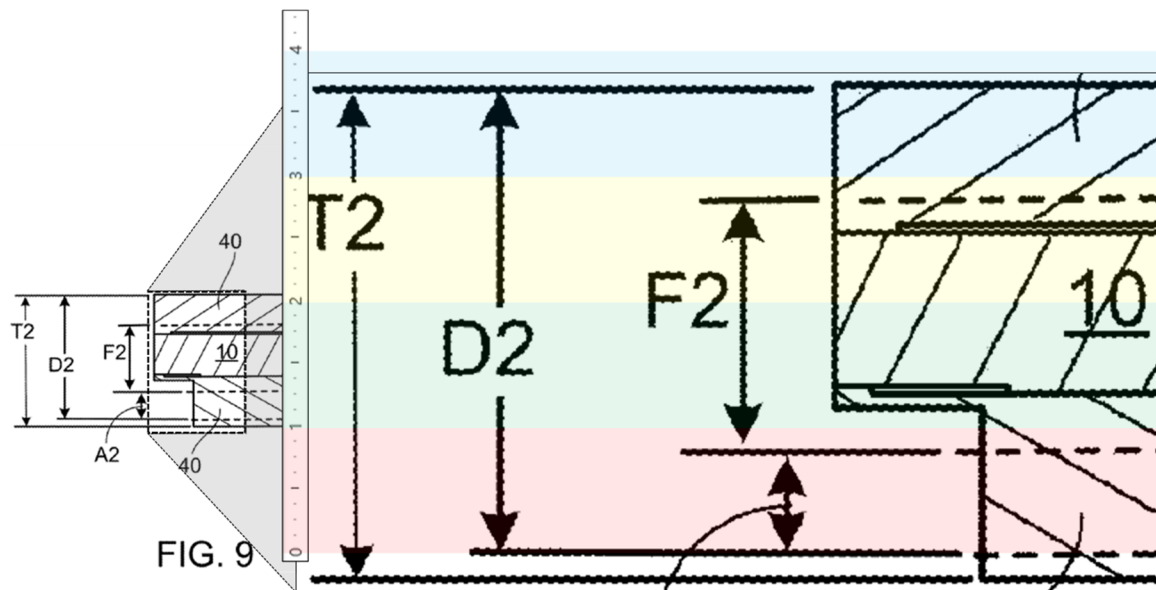


As depicted above, the lower encapsulant 40 is approximately 1.6 inches, while the PCB 10 extends from 1.6 inches to 2.8 inches on the ruler. The upper encapsulant above the PCB extends from 2.8 to 4 inches on the ruler. This makes the ratio 1.6 / 1.2 / 1.2, i.e., 40% / 30% / 30%. Dr. Phinney found similar ratios measuring the figures with a ruler. (EX2005 at ¶¶89, 93.) The PCB extends outside of the 1/3 to 2/3 height range, and [1f] is not met.

The same is true if the power converter is considered to span only D2.³

³ Vinciarelli-269 generally teaches making the core structure thickness (D2) and the assembly thickness (T2) approximately equal. Vinciarelli-269, 9:59-64, 10:4-25. Encapsulant may be shaved off (reducing T2 to reach D2), or a larger core structure may be used (increasing D2 to reach T2). *Id.*

Shown below (where the PowerPoint ruler starts at the bottom of D2), the bottom encapsulant is approximately 1.3 inches, the PCB is approximately 1.2 inches, and the upper encapsulant is approximately 1.2 inches. This results in a ratio of 1.3/1.2/1.2, i.e., 35% / 32.5% / 32.5%. Dr. Phinney found similar ratios measuring the figures with a ruler. (EX2005 at ¶¶89, 93.) This results in the top of the PCB extending above the 2/3 height of the converter (into the top third of the converter), and [1f] is not met.

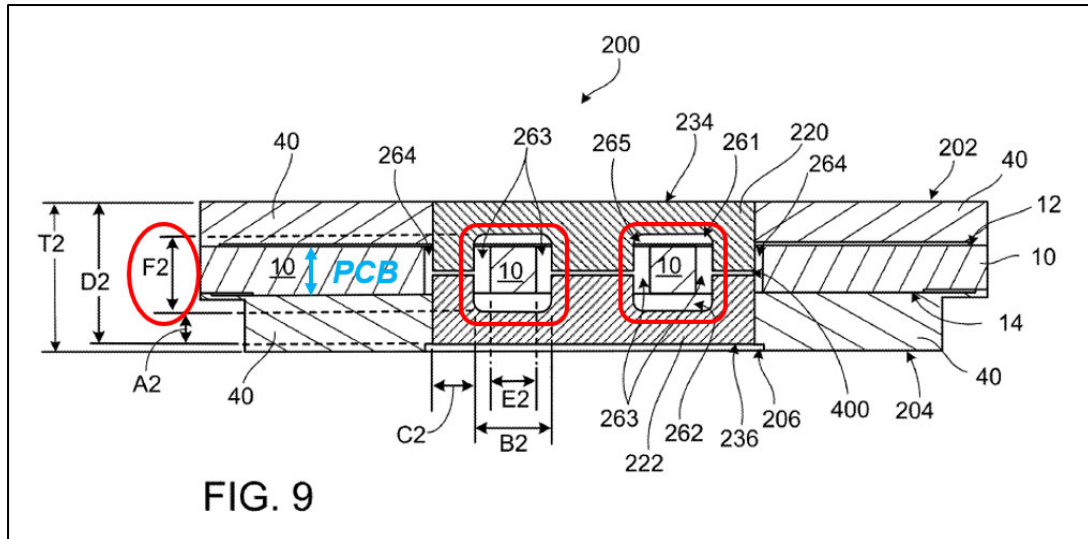


Therefore, whether taking total thicknesses T2 or D2, Vinciarelli-269 does not illustrate a PCB disposed within the 1/3 to 2/3 height range. Like with Vinciarelli-664, Petitioner's analysis conflates Vinciarelli-269's teachings of a general disposition between components as teaching the precision of sizings required by [1f].

Further, Vinciarelli-269 contradicts the root of Petitioner's analysis.

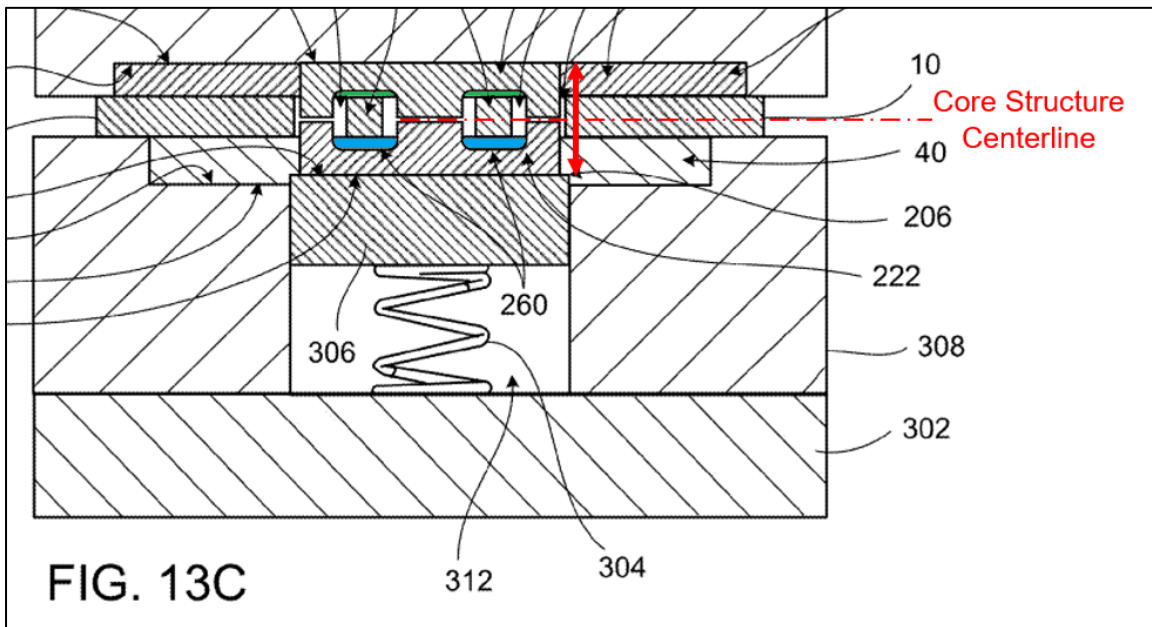
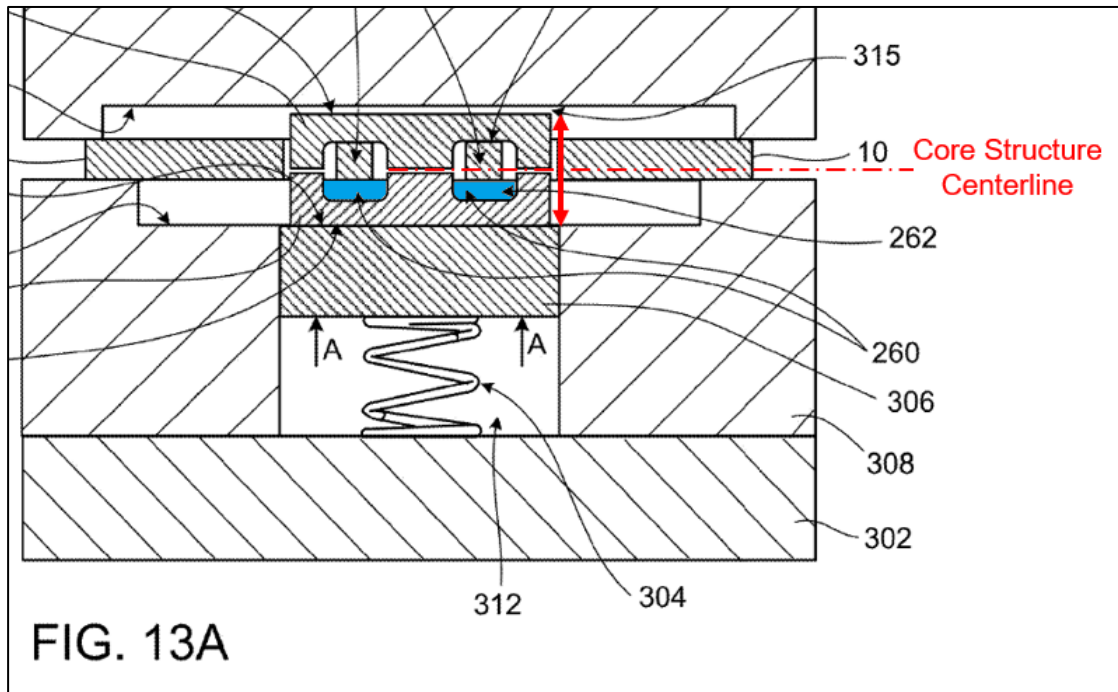
Petitioner argues that the PCB would be centered, which is unsupported by Vinciarelli-269 because it teaches offsetting the PCB away from center. Petitioner argues that "transformers have 'matching core halves' and thus the circuit board would be 1/2 way between them." (Pet. at 34; *see also* VICOR-1003, ¶63 (arguing that "[a] centered printed circuit board with components on both sides would meet this height requirement.") Vinciarelli-269 does not describe this.

Vinicarelli-269 teaches that the PCB is not positioned halfway between the transformer's matching core halves. (EX2005 at ¶99.) Vinicarelli-269 explains that the large interior spaces are intended to allow offset and biased positioning of the PCB from a center region between the matching core halves. (EX2005 at ¶¶98-102.) Vinciarelli-269 refers to a top interstitial gap 261 and a bottom interstitial gap 262 that give freedom in disposing the PCB away from the center between the core halves. Vinciarelli-269, 10:37-67, FIG. 9. Vinciarelli-269 discloses that the PCB is positioned somewhere within the interior spaces formed by the magnetic core halves. *Id.*



Vinciarelli-269 discloses “clamping [the PCB] relative to the mold and biasing [the transformer] in position against a predetermined feature of the mold.” (Vinciarelli-269 at 3:15-34.) “The minimum height F2 of interior space 260 is set to allow the assembled core 210 to move vertically relative to the PCB 10 which may be used during the manufacturing process to adjust the core surface 234 into a precise position relative to the PCB for encapsulation.” (*Id.*, *id.* at 11:1-12.) An example includes the core structure being moved upward relative to the PCB, so that the PCB is positioned below the vertical center of the core structure. *Id.* In another example, the core structure is moved to a lowered position, resulting in the PCB being positioned above a vertical center of the core structure. (*Id.* at 12:7-27, FIGs. 13A-13C (reproduced below).) The transformer made of two matching halves does not teach a centering of the PCB, and instead, Vinciarelli-269 teaches that the two matching halves are configured to position the PCB offset from the

center. (EX2005 at ¶101.)



Vinciarelli-269 does not cure any deficiencies of Vinciarelli-664. Ground 1A is defective because it fails to demonstrate [1f]’s requirement that the carrier be

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

2. Ground 1A Fails Because Petitioner Applies Obviousness Analysis.

Despite labeling Ground 1A as an anticipation ground, Petitioner uses an obviousness approach that relies on a POSITA (and other art) to gap-fill.

Petitioner mixes-and-matches features from disparate embodiments, jamming them into the Vinciarelli-664. Ground 1A is therefore defective as a procedural matter for anticipation.

The standard for anticipation requires that each and every claim limitation be “either expressly or inherently disclosed, in a single prior art reference.”

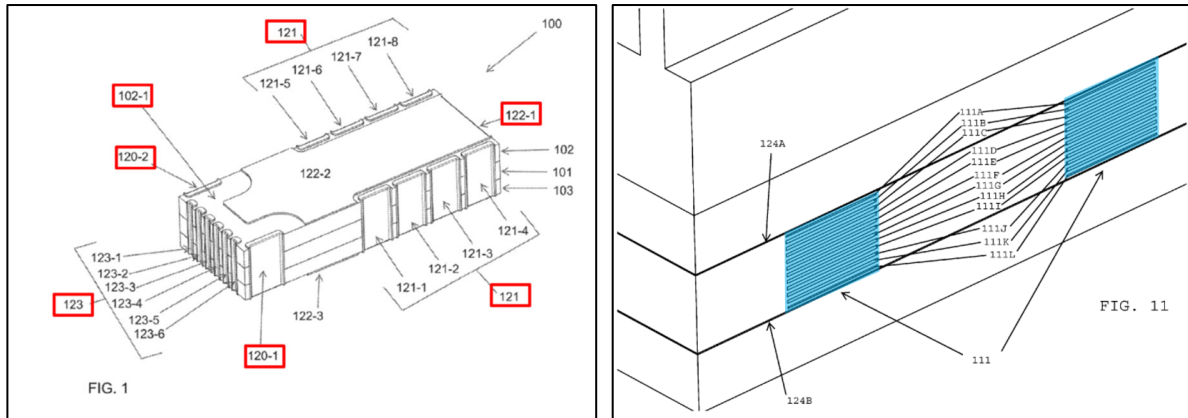
Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631 (Fed. Cir. 1987). Inherency requires that the claimed element, while missing from the disclosure, must “necessarily exist” and “may not be established by probabilities or possibilities.” *Pers. Web Techs., LLC v. Apple, Inc.*, 917 F.3d 1376, 1382-83 (Fed. Cir. 2019). Indeed, necessary existence is the stringent bar here; a reference that is missing a limitation does not anticipate just because “a skilled artisan would ‘at once envisage’ the missing limitation.” *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 851 F.3d 1270, 1274-75 (Fed. Cir. 2017). Missing limitations cannot be filled in “simply because a skilled artisan would immediately envision them.” *Id.*

Notwithstanding this later Federal Circuit law in *Nidec Motor*, Petitioner

appears to rely upon *Kennemetal*'s "at once envisage" standard because Vinciarelli-664's specific disclosures are inadequate for some limitations. Pet. at 20-21, 25 (citing *Blue Calypso, LLC v. Groupon Inc.*, 815 F.3d 1331, 1341 (Fed. Cir. 2016) for its application of *Kennemetal* prior to the *Nidec* holding). Practically, Petitioner's legal defect results in an obviousness-type analysis being applied, where Petitioner first identifies the prior art's deficiencies and then argues that a skilled artisan would (obviously) understand to bridge those differences. This is incurably defective.

a. Ground 1A, [1d]: Petitioner uses an obviousness analysis.

Limitation [1d] requires "a first terminal electrically coupled to the upper surface or the lower surface of the carrier." Vinciarelli-664 does not teach terminal connections on the upper/lower surfaces of its PCB. Petitioner relies on Vinciarelli-664's contacts 120-1, 120-2, 121, and 122 as the terminals, and these contacts extend from bar code interconnects on the PCB. Pet. at 22-23 (including annotated version of Vinciarelli-664's FIG. 1, reproduced here below); Vinciarelli-664 at 6:56-60. But, any connection point of these contacts is not the PCB's upper/lower surface. *See* Petition, 23-28 (referencing FIG. 11 of Vinciarelli-747, reproduced below). The bar codes (i.e., the interconnects) (annotated blue below-right) are on the side surfaces of the PCB.



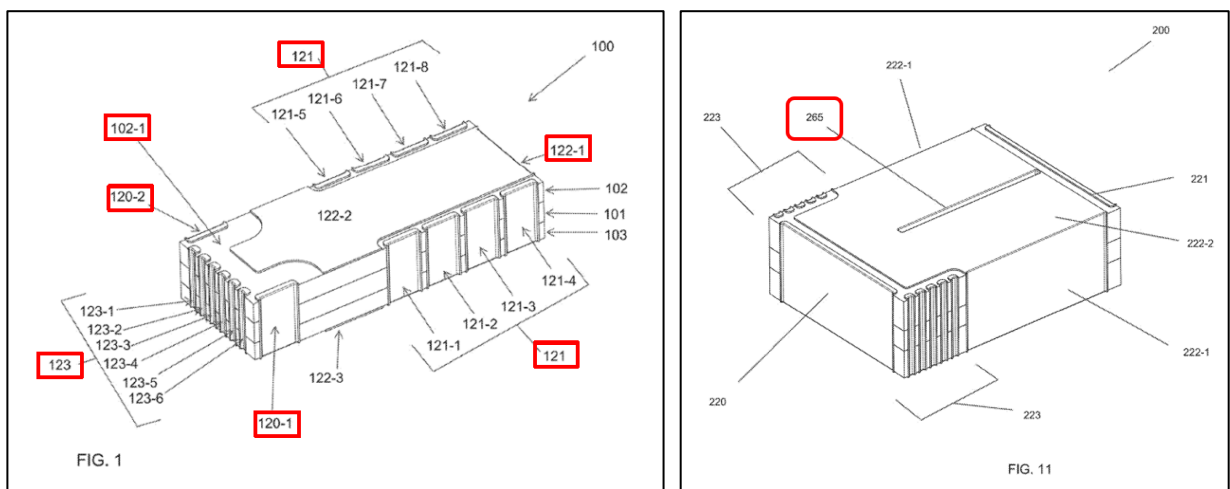
The contacts being electrically connected to side surfaces of the PCB does not necessarily mean that the contacts are connected to the upper or lower surface of the PCB. To account for Vinciarelli-664’s deficiency, Petitioner offers three different remedies but each one improperly relies upon a skilled artisan forming hypothetical and non-literal combinations of different prior art teachings. This type of analysis is not permitted in an anticipation argument, as explained above. *See Pers. Web Techs* and *Nidec Motor* (where “necessary existence” is the only accepted remedy for missing limitations in anticipation).

All of Petitioner’s proposed remedies fall short. In its *first* proposed remedy, Petitioner imagines that its skilled artisan would combine the teachings of Vinciarelli-747 with the embodiments of Vinciarelli-664. (Pet. at 23-25.) Petitioner proposes modifying Vinciarelli-664’s disclosed embodiment to replace its buried vias with conductive through-holes that are coupled to the contacts. *See* (Pet. at 25.) But this improperly implies an additional embodiment that is not literally disclosed anywhere in Vinciarelli-664 or Vinciarelli-747. The extent of

subject matter that is literally established in Vinciarelli-664 is the coupling of module contacts to buried vias, which may be the buried vias literally disclosed in incorporated Vinciarelli-747. (EX2005 at ¶110.) A combinatorial modification of an embodiment does not lend itself to anticipation.

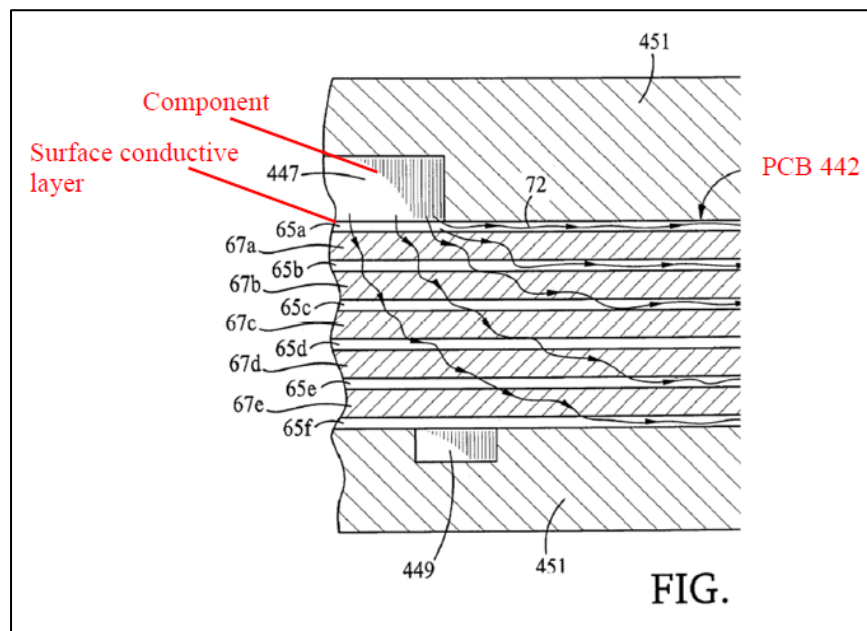
Nonetheless, the evidence falls short of providing an obviousness combination because Vinicarelli-747 points away from having upper/lower connections on its PCB. (EX2005 at ¶110.) Vinicarelli-747 suggests “[i]n the alternative to buried conductive features, conductive through-holes . . . may be used . . . to form interconnects extending through the thickness of the PCB from top surface to bottom surface” but later states that “[a] penalty of using through-holes for the interconnects is the loss of surface area on the top and bottom of the PCB which may otherwise be used for setback or other safety and agency approval requirements.” (Vinicarelli-747 at 16:40-49.) So, Vinicarelli-747 provides drawbacks for providing connections at the top/bottom surfaces, and Petitioner does not explain why a POSITA would have made the modification despite said drawback, which also enlarges the module’s height and decreases the module’s power density. (EX2005 at ¶110.) Vinicarelli-747 and Vinciarelli-664 do not present a motivation to arrive at Petitioner’s suggested modification for an obviousness analysis, and this falls far short as an argument that Vinciarelli-664 somehow anticipates.

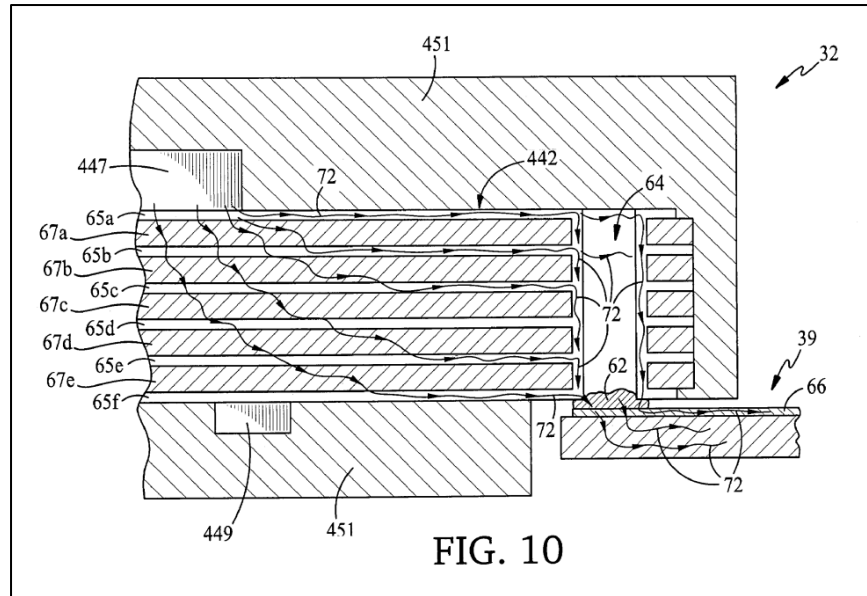
In its *second* remedy, Petitioner would have the skilled artisan import a thermal conduit or slot feature from a different embodiment within Vinciarelli-664 into its cited embodiment. (Pet. at 25-26.) In particular, Vinciarelli-664 discloses two different power converter modules. *Compare* Vinciarelli-664, FIG. 1 (Petitioner-annotated version reproduced below (Pet. at 22)) *with* Vinciarelli-664, FIG. 11 (annotated to show thermal conduit). Notably, these are distinct devices (as visibly clear) and different configurations. (EX2005 at ¶¶112.) Yet again, Petitioner solely and improperly relies upon what “[a] skilled artisan would have understood” from these separate teachings together, instead of what is literally taught or what necessarily exists. Pet. at 25-26. Additionally, Petitioner does not identify any incentive why a POSITA would modify the buried vias with conductive through-holes with a thermal conduit or slot feature. (EX2005 at ¶112.)



In its *third* remedy, Petitioner argues that a skilled artisan would read in a

configuration disclosed in Vinciarelli-844. (Pet. at 26-28.) Petitioner reproduces an excerpt of Vinciarelli-844's FIG. 10 to apparently suggest that multiple conductive layers are electrically coupled together, and buried runs would be electrically coupled to surface runs where components are mounted. Pet. at 27 (Petitioner-annotated excerpt of FIG. 10 reproduced below, followed by original FIG. 10 in full).





It is unclear how Petitioner’s annotated excerpt proves the alleged electrical coupling between multiple conductive runs 65; Vinciarelli-844 states that the arrows 72 represent heat, and not electrical flow or connection. (EX2005 at ¶113; Vinciarelli-844, 14:63-15:3.) But further, Petitioner commits the error again by requiring that a skilled artisan insert Vinciarelli-844’s depicted configuration into Vinciarelli-664’s separate disclosure. Again, this is legally deficient—the relevant inquiry is whether this depicted configuration of Vinciarelli-844 necessarily exists in the relied-upon embodiment of Vinciarelli-664.

The following is representative of Petitioner’s *anticipation* analysis of limitation [1d], improperly relying upon a skilled artisan’s understanding to gap-fill the missing features:

- “A skilled artisan would have understood that a ‘common’ contact forms a common potential that, if not isolated, would be considered ‘ground’

and would be coupled to various components in the power converter.”

Petition, 25-26.

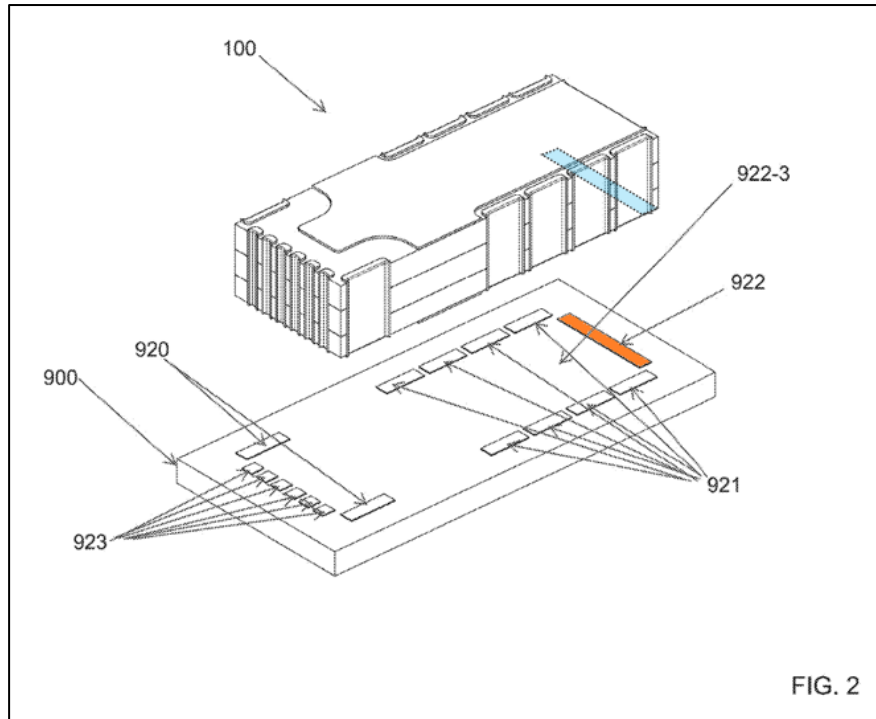
- “A skilled artisan would understand that Vinciarelli-664 discloses through its incorporation of prior patents various internal structures that may be within the module, such as the structure of printed circuit boards and arrangements of components on the printed circuit boards.” *Id.*, 26.
- “In addition, a skilled artisan would further have understood that internal conductive runs are coupled to the top and bottom surfaces of the PCB through vias to couple components mounted on the surface of the printed circuit board.” *Id.*, 26-27.
- “At the very least, a skilled artisan reading Vinciarelli-664 would have at once envisaged a printed circuit board with power, ground, and signal traces that are coupled to the surface of the PCB and the module external interface.” *Id.*, 27.
- “A skilled artisan would have understood that the circuit board described in Vinciarelli-844 is exemplary of a circuit board that would be within the power converter module of Vinciarelli-664.” *Id.*, 27-28.

These are conclusory gap-filling statements that cannot properly form an anticipation analysis. Petitioner knows that “a skilled artisan would have understood . . .” is an obviousness argument, as Petitioner uses this exact same

argumentation in its obviousness grounds. *See, e.g.*, Petition, 75 (Ground 2, limitation [1d]), 79 (Ground 2, limitation [1e]), 93-94 (Ground 3, limitation [1g]). Petitioner cannot hide an obviousness argument under the cloth of anticipation. Ground 1A cannot prevail.

b. Ground 1A, [1e]: Petitioner uses an obviousness analysis.

The Petition also fails to establish that limitation [1e] necessarily exists in Vinciarelli-664. Vinciarelli-664's bottom shield/contact 122-3 cannot satisfy both "a second terminal attached to a surface of the first electronic component" and "the second terminal . . . is a bonding pad." According to Vinciarelli-664's disclosure, the bottom shield/contact 122-3 would, if anything, be shaped as demonstrated (in blue) in the annotated version of Vinciarelli-664's FIG. 2 shown below. (EX2005 at ¶¶65-66.) A POSITA would be discouraged from making the bottom shield/contact 122-3 large for the purpose of attaching to a surface of the exposed core due to numerous practical problems identifies; otherwise, the bottom shield/contact 122-3 could not function as a bonding pad that mates with pad 922. (EX2005 at ¶66.) As such, Vinciarelli-664 cannot meet both prongs of [1e] at the same time.



3. Grounds 1B fails

a. Ground 1B fails to cure the deficiencies of Ground 1A

As described above, Vinciarelli-664 fails to anticipate [1d], [1e], [1f], and [1g]. Ground 1B does not cure any of the deficiencies.

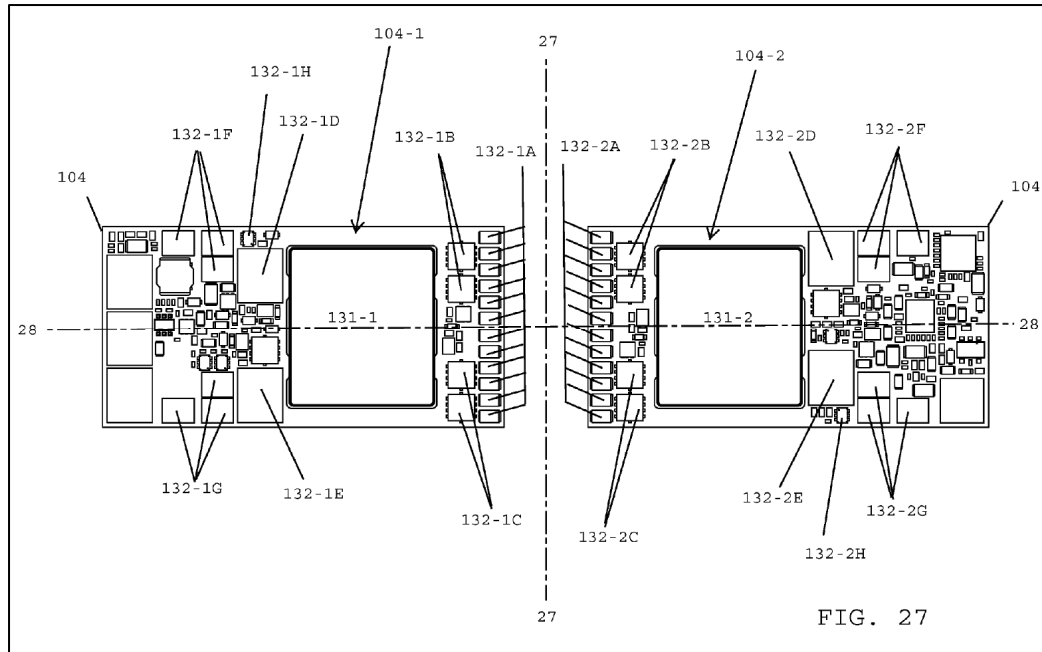
With respect to [1d] and [1e], Petitioner’s combination of Ground 1B fails to address the deficiency of its failure to identify the “first terminal.” Moreover, Ground 1B fails to address [1e]’s requirement that the “second terminal” is “attached to a surface of the first electronic component apart from the carrier, wherein the second terminal of the first connection part is a bonding pad.” Instead, Petitioner generally describes high-level motivations to combine (without specifically referencing any limitations of [1d] and [1e]).

Ground 1B fails to cure the deficiencies of [1f]. (EX2005 at ¶¶115-119.)

Petitioner does describe [1f] in passing but does so in a wholly deficient matter (both procedurally and technologically). Ground 1B repeats Ground 1A’s analysis of [1f] by alleging that a skilled artisan would find it obvious to have “roughly equal size component on both sides.” (Pet. at 52 (citing VICOR-1003, ¶129).)

This, however, is an unsupported statement lacking rationale and not referring to any art; Petitioner only appears to describe the general rough centering of a PCB, which is defective to meet the precise sizings of [1f]. Moreover, Petitioner’s citation to Dr. Baker (VICOR-1003, ¶129) that supports this statement is not even related to [1f], and describes placing power converters near loads and making them small.

Petitioner’s only citation to art arguably related to [1f] is misplaced and incorrect. It vaguely cites two whole columns of Vinciarelli-747. (Pet. at 52 (citing Vinciarelli-747, 22:46-24:49).) This section refers to Vinciarelli-747’s FIG. 27 (excerpted below) which does not describe the particular sizing requirements of [1f]. And, Dr. Baker only generically repeats Petitioner’s statements and broad recitation to two whole columns of Vinciarelli-747. VICOR-1003, ¶131. Vinciarelli-747 does not cure the deficiencies of Ground 1A.



Petitioner further does not provide any analysis to cure the deficiencies of [1g] described in the analysis of Ground 1A.

Ground 1B fails to cure the deficiencies of Ground 1A.

b. Ground 1B fails to present a proper motivation to combine.

Ground 1B is a relabeling of Ground 1A as obviousness. Ground 1A misses limitations, and fails to provide a limitation-by-limitation analysis or motivation to incorporate certain features. Ground 1B merely repeats the analysis with general discussion which fails to provide motivations to arrive at certain limitations with the requisite clarity.

Most specifically evident in the failure in motivation is Petitioner's failure to address Vinicarelli-747's language dissuading combination. Vinicarelli-747 states

that “[a] penalty of using through-holes for the interconnects is the loss of surface area on the top and bottom of the PCB which may otherwise be used for setback or other safety and agency approval requirements.” Vinciarelli-747 at 16:40-49. Yet, Petitioner baldly provides combination of Vinciarelli-747’s through-holes. (EX2005 at ¶110.) A POSITA would not have made said combination. *Id.*

Ground 1B thusly fails to demonstrate that the claims are obvious.

4. Ground 1C fails to demonstrate that the challenged claims are obvious

a. Ground 1C fails to cure the deficiencies of Ground 1A

As described above, Vinciarelli-664 fails to anticipate [1d], [1e], [1f], and [1g]. Ground 1C does not cure any of the deficiencies. If anything, Ground 1C propounds the problems of the “connection part” and [1d], [1e], [1f], and [1g] as discussed in Ground 1A. (EX2005 at ¶¶124-139.)

As described in Ground 1A for [1d] and [1e], Petitioner failed to identify the “first terminal” of Vinciarelli-664’s alleged “connection part” and where the “second terminal” was “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.” Petitioner’s combination takes Zeng-014’s conductor to replace Vinciarelli-664’s conductor as the “connection part.” (Pet. at 55-61.) Petitioner, however, makes no attempt to describe the terminals of Zeng’s conductor, and how they cure the deficiencies of Ground 1A with respect to [1d] and [1e]. (Pet. at 61.)

The exact terminals and physical locations of the “attachment” and “bonding pad” as required by [1d] and [1e] are wholly absent from the Petition. Ground 1C accordingly fails for the same reasons as Ground 1A.

Ground 1C does not address any of the deficiencies of [1f] described above. (Pet. at 61.) Instead, it relies on previously discussed theories of Ground 1A, which is deficient. It thusly fails for the same reason.

Ground 1C’s analysis of [1g] also propounds the problems discussed in Ground 1A. Namely, Petitioner removes Vinciarelli-664’s conductor and replaces it with Zeng-014’s conductor (and recites curving it against the module). (Pet. at 61-62.) Petitioner provides no discussion regarding how the alleged exposed magnetic core would connect to Zeng-014’s conductor and thereafter constitute a bonding pad. (EX2005 at ¶124.)

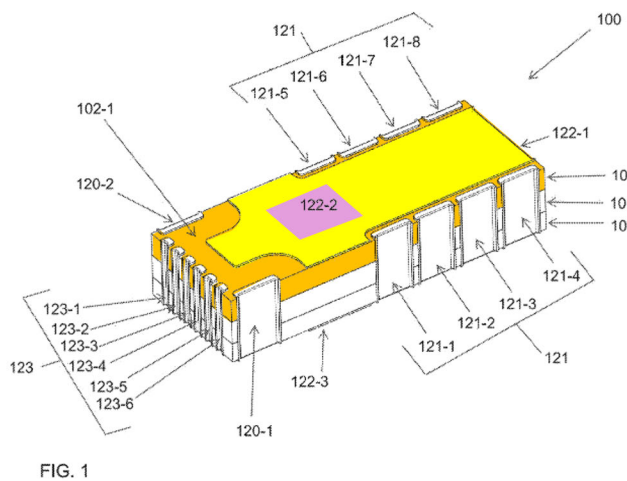


FIG. 1

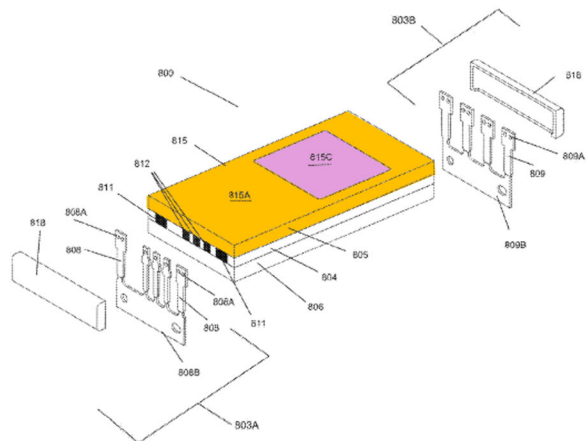


FIG. 10

Ground 1C thusly fails for the same reasons as Ground 1A.

b. Petitioner’s motivation to combine Vinciarelli-664 and Zeng-014 fails.

A POSITA would not be motivated to form the proposed combination of Vinciarelli-664 and Zeng-014 and Ground 1C is therefore defective. (EX2005 at ¶¶125-140.)

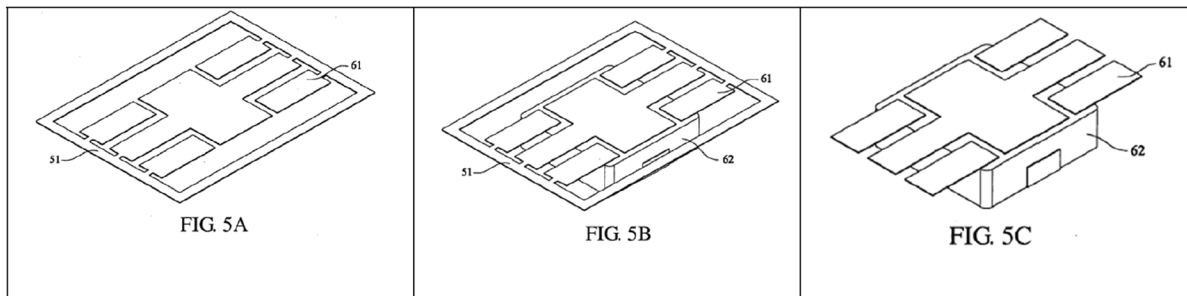
The Petition improperly dismisses and disregards aspects inherent in Vinciarelli-664 that would destroy the proposed combination. The proposed combination ignores preferences in Vinciarelli-664 for bulk panel-based production.

Vinciarelli-664 discloses forming multiple electronic modules “by encapsulating panels containing pluralities of electronic modules delineated by cut lines and having conductive interconnects buried within the panel along the cut lines.” (Vinciarelli-664 at Abstract.) Vinciarelli-664 discloses: its module formation method “start[s] with an encapsulated and preferably lapped panel [of un-singulated modules]” and then finishes with singulation “to separate individual modules from the panel.” (*Id.* at 8:27-11:63.) Each of the figures via which Vinciarelli-664 teaches its module formation method depicts a panel that includes multiple un-singulated modules. (*Id.* at FIGs. 4-9.)

Importantly, Vinciarelli-664 discloses that the “complex contact structures” are formed prior to singulation during this manufacturing method. (EX2005 at

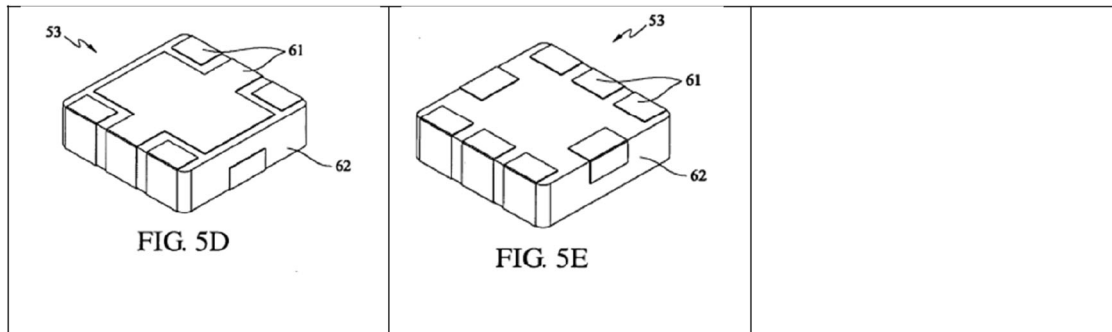
¶¶126-127.) Forming these contacts while the modules are un-singulated and part of a large panel has a clear purpose and clear benefits. *Id.* For one, the top shields 122-2 for every module in a panel can be substantially formed at the same time, via the depositing of the material layers that form the top shield 122-2 across the entire panel. *Id.* Additionally, as Vinicarelli-664 demonstrates through FIGs. 7-9, castellation and cutting along a cut line allows for production of the sidewall contacts for both modules on either side of the cut line simultaneously. *Id.*

Turning then to Zeng-014, Petitioner particularly relies upon a “process of fabricating a curved connection part [as] depicted in FIGs. 5A-5E of Zeng-014.” Pet. at 54-55. These figures of Zeng-014 first depict a frame 51 that includes multiple conductors (i.e., portions of a first conductive layer 61). Zeng-014, [0062], FIGs. 5A-5C. This frame has a wider area than a body surface of an individual electronic component (e.g., an inductor) that is to be wrapped with the conductors. *Id.*



As a result, the frame can be compressed onto the surface of the component, and the multiple conductors are bent and wrapped onto the side surfaces of the

component. *Id.*; *id.*, FIGs. 5D-5E.



A POSITA would immediately recognize that Petitioner’s application of Zeng-014’s wrapping *contradicts* Vinciarelli-664’s teachings of bulk production. (EX2005 at ¶¶125-140.) Petitioner and Dr. Baker imagine that “[i]n the combination, a skilled artisan would modify the method of manufacture disclosed in Vinciarelli-664 to replace the process of cutting slots between the modules in the panel and filling the slots with conductive material, and instead apply the lead frame of Zeng-014 *after the modules are singulated*, and thus make the manufacturing process *less sophisticated and more suitable* for factories making prior art products.” Pet. at 60-61 (emphasis added); VICOR-1003, ¶144. Petitioner appears to recognize that, in order to use Zeng-014’s frame wrapping process on an individual electronic module of Vinciarelli-664, the individual electronic module would need to be singulated first from the panel. Indeed, it would be physically impossible to wrap Vinciarelli-664’s electronic module using a frame if those side surfaces are not exposed.

And so, Petitioner wrongly argues that reasonable POSITA would depart from a panel-wide formation process to a formation process that operates on a module-to-module basis (“after the modules are singulated”). Indeed, Petitioner imagines that a POSITA would abandon a process that forms contacts on thousands of modules in effectively one pass (*e.g.*, (EX2006 at 30:19-31:7), in favor of doing a wrapping of one module after a wrapping of another module after a wrapping of yet another module, and so on. The purpose and benefits of bulk production are evident, and a POSITA would not significantly slow that process (and add significant cost) by changing it to a per-unit process. (EX2005 at ¶132.)

Even if a reasonable POSITA somehow lacked a natural appreciation of bulk production, Vinciarelli-664 itself explicitly emphasizes how intrinsic and of critical importance bulk production is to its teachings. Vinciarelli-664 discloses:

The slots or holes, *e.g.* 160, 161, 162, 163, may preferably be cut vertically down, from a surface, *e.g.* top surface 102-1 or bottom surface 103-1 (not shown) of the encapsulated panel 150 along the cut-lines in the areas where ***the contacts will be formed preferably before the panel is singulated to facilitate bulk processing of common sized panels compared with individual modules of varying sizes and shapes.***

Vinciarelli-664, 8:53-60 (emphasis added); EX1005 at ¶133.

Replacing Vinciarelli-664’s pre-singulation contact formation with a post-singulation contact formation based on Zeng-014’s teachings would be a

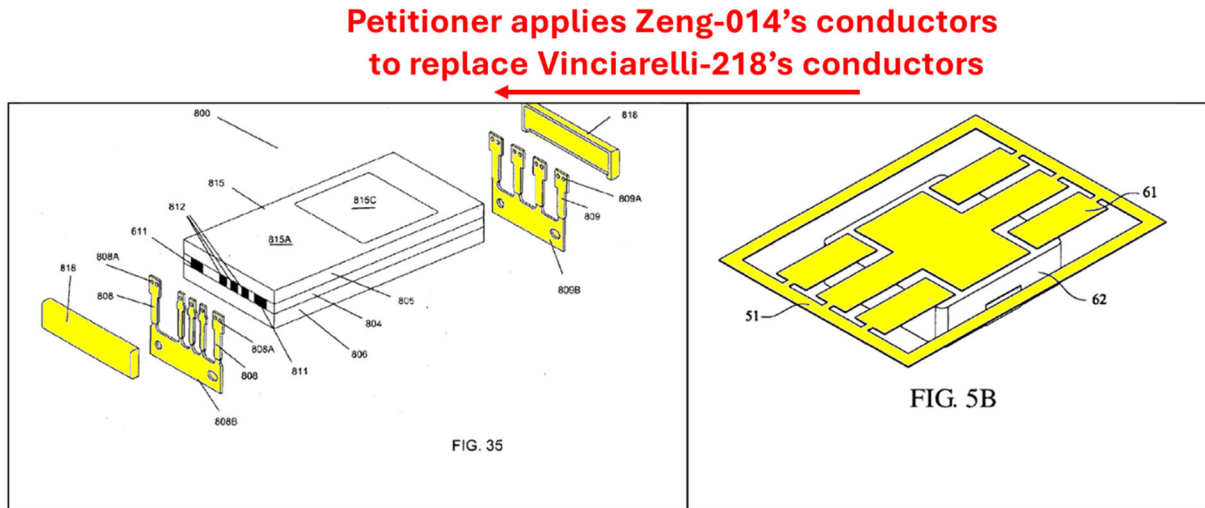
significant modification that conflicts with the purpose and preferences disclosed in Vinciarelli-664. A POSITA would not make a modification to a prior art reference when said modification would defeat the stated purpose of that prior art reference. *See In re Fritch*, 972 F.2d 1260, 1265 n.12 (Fed. Cir. 1992).

Ground 1C's proposed combination of Vinciarelli-664 and Zeng-014 are founded on incorrect and unexplained POSITA motivations. As a result, Ground 1C is defective.

B. Ground 2 Fails to Demonstrate Zeng-014 / Vinciarelli-218 Renders Obvious Claims 1-6

1. A POSITA Would Not Have Been Motivated to Combine Zeng-014 and Vinciarelli-218 for the “Connection Part” of [1c]

Petitioner's Ground 2 combination fails to demonstrate that a POSITA would have combined Zeng-014 and Vinciarelli-218. Petitioner's combination replaces Vinciarelli-218's conductors (e.g., FIG. 35) (below-left, yellow) with Zeng-014's conductors (e.g., FIG. 5B) (below-right, yellow). (Pet. at 74; *see also id.* at 77.) Petitioner reasons that a POSITA would have been motivated to wrap Zeng-014's conductors around Vinciarelli-218's power module. Petitioner is incorrect.



A POSITA would not have made Petitioner’s proposed combination because: **(a)** Vinciarelli-218 teaches power modules with PCB side edges (called “bar codes”) that have specific considerations that Vinciarelli-218’s conductive adaptors are specifically suited to address; and **(b)** providing Zeng-014’s wrapped conductors onto Vinciarelli-218’s devices would not reliably establish and maintain electrical contact with the PCB side edge bar codes.

Petitioner’s combination is motivated by hindsight bias and lacks a motivation. This was detailed in the institution decision. (*See also* Paper 11 at 25 “Petitioner’s alleged motivations to modify the modules [of] Vinciarelli-218 to use the ‘connection part by curving a piece of metal against an electronic component’ of Zeng-014 [] reflect impermissible hindsight bias”); *id.* at 26 (“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”); *see also InTouch Technologies, Inc. v. VGO Communications, Inc.*, 751 F.3d 1327, 1348–49 (Fed. Cir. 2014).

Further detail is provided below.

a. Vinciarelli-218’s Conductors are Specifically Created for Vinciarelli-218’s Modules

A POSITA would not have used Zeng-014’s conductors with Vinciarelli-218’s power modules because Vinciarelli-218 discloses optimal conductors for its power modules. (EX2005 at ¶¶142-148.)

Petitioner’s rationale ignores the power module conductors already disclosed in Vinciarelli-218. Petitioner argues that a POSITA would have been motivated to look at Vinciarelli-218’s power modules and use Zeng-014’s surface mount conductors because “Vinciarelli-218 does not have surface mount conductors.” (Pet. at 71-74.) This is incorrect. Vinciarelli-218 discloses surface mount conductors that are specifically designed for the unique features of its power modules.

A POSITA would not have looked to Zeng-014’s connection techniques and would have instead used Vinciarelli-218’s connectors because they are specifically designed for Vinciarelli-218’s unique features (PCB bar codes) that are a result of its bulk production of devices in a panel. Each of Vinciarelli-218’s device modules first exist as part of a larger panel. (EX1009 at Title, Abstract, [0085]-[0087].) From this panel, individual power modules are singulated, *i.e.*, cut. (*Id.*)

Shown below is a panel assembly 120 showing an individual device module (annotated yellow) that is cut along lines 128 / 129 (red). (EX1009 at [0105].)

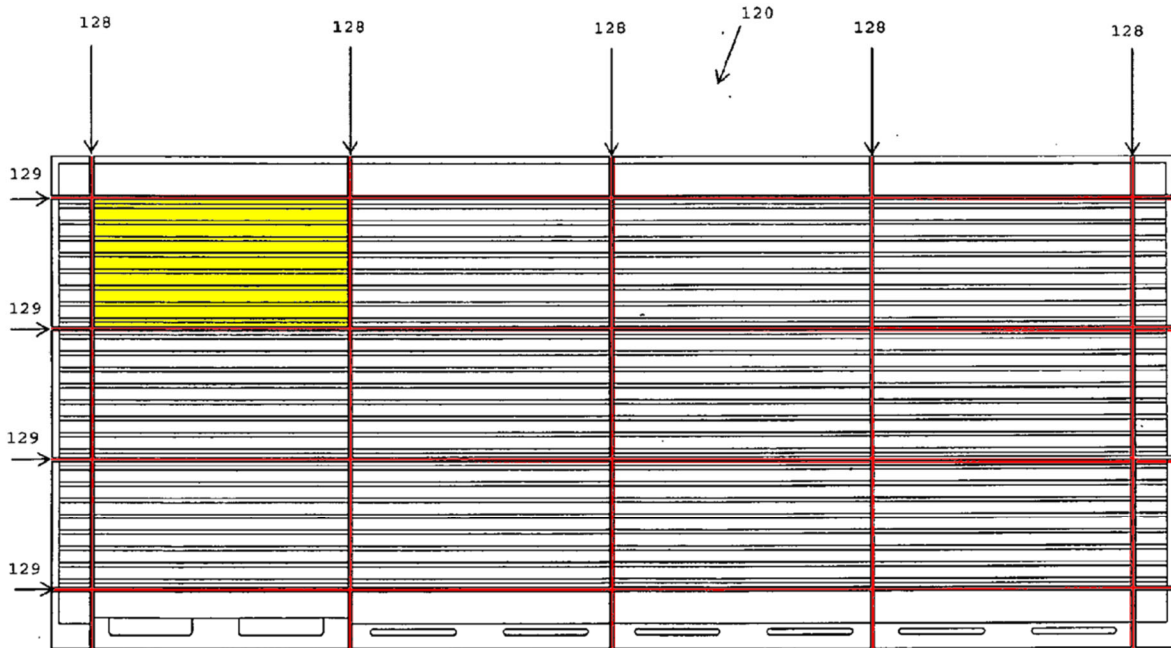
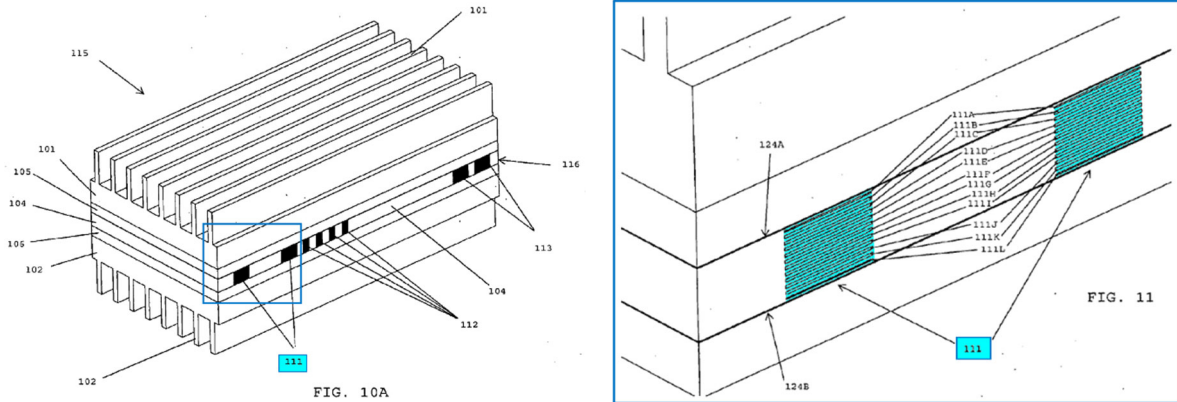


FIG. 9A

Cutting Vinciarelli-218's panel to extract a power module exposes its sides, which exposes the power module's conductors (PCB bar codes). FIGS. 10A and 11 illustrate individual modules' PCB bar codes 111 (aqua) exposed after singulation of the individual module from the panel. (EX1009 at [0108] (stating that conductive features 111 are "formed along the cut line on a plurality of the conductive layers of the PCB [that] form a stack of conductive strips resembling a bar code after singulation"); *see also id.* [0107] (stating that these interconnection features "may be embedded in the PCB panel 124, preferably along the boundaries of the individual circuits" and are exposed on the PCB side edges when a module

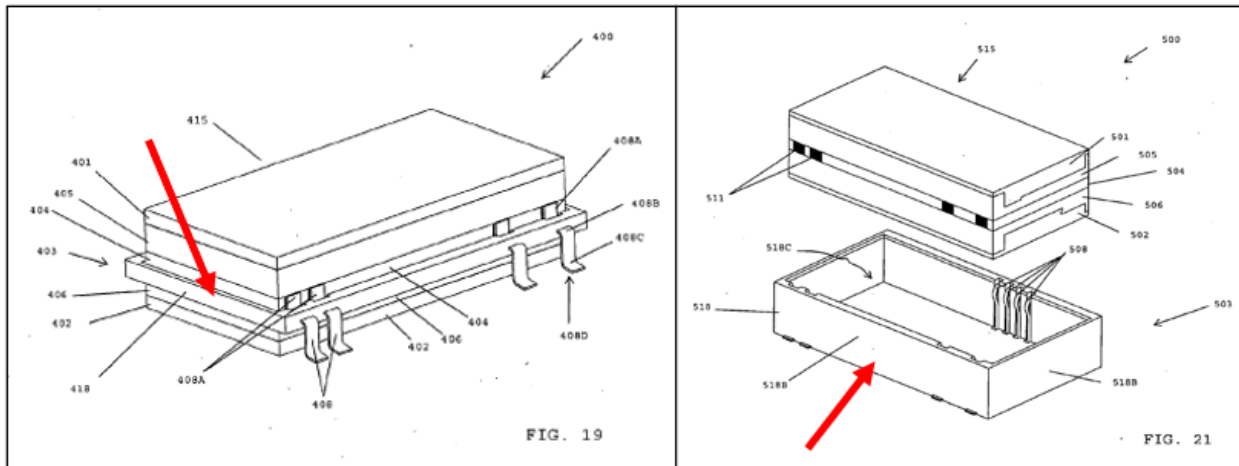
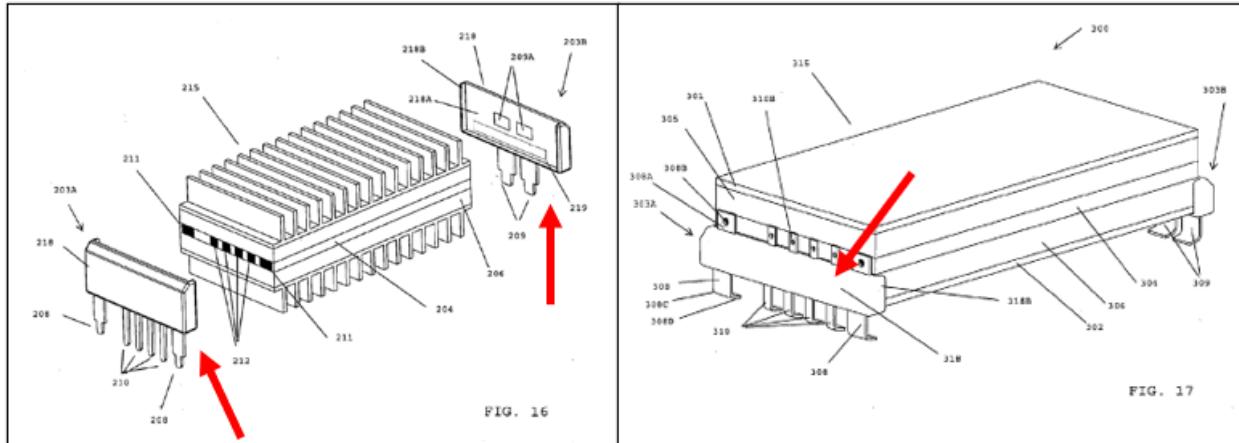
is singulated from the panel).) The PCB bar codes 111 (aqua) are illustrated in FIG. 10A's depiction of a singular module (below-left) and FIG. 11 (below-right) shows an enlarged portion of that module (the approximate portion in the blue-box). (*Id.*)

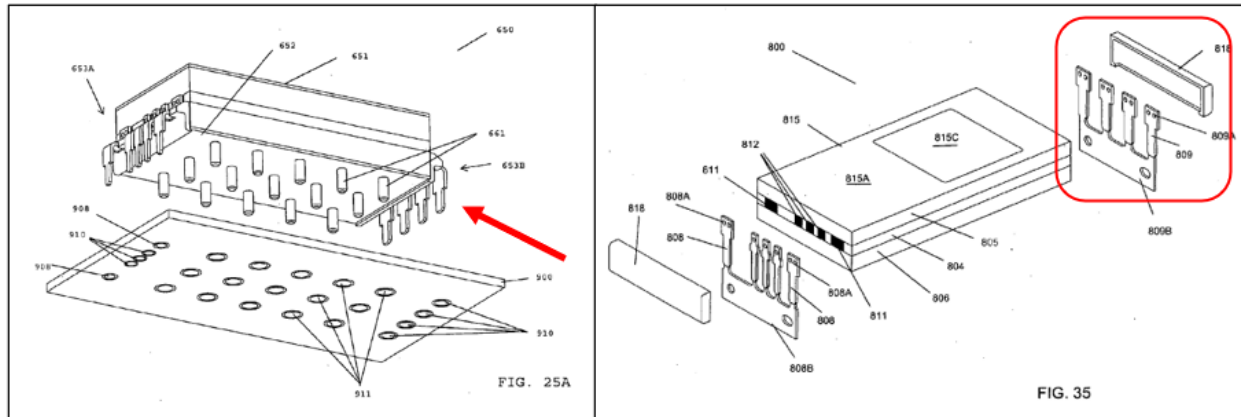


Vinciarelli-218's power module's PCB bar codes are on its sides because the top and bottom portions of the device are covered with encapsulant prior to being singulated from the panel. Vinciarelli-218's panel molding process results in encapsulant covering the top and bottom surfaces of the panel (and its modules) prior to singulation. (Vinciarelli-218 at [0087] (describing a mold cavity that "may be filled at least in part by an encapsulant encapsulating the surfaces of the PCB panel 124 and the electronic components on the PCB panel 124.")).) As a result, the interconnection features for each individual module are necessarily located along the side edges of the power modules. (EX2005 at ¶146.)

Vinciarelli-218 provides conductors specifically designed for the PCB bar codes' small footprint. The specification provides "various types of connectors or

adapters [that] may be coupled to the exposed interconnects . . . at the edges of the singulated module.” (EX1009 at [0160]; *see also id.*, [0112]-[0133], FIGs. 13-26, 35 (reproduced below).) Several are disclosed below.





Vinciarelli-218's adaptors and conductors are designed specifically for its PCB bar codes. (EX2005 at ¶¶151-153.) While Petitioner argues "Vinciarelli-218 does not have surface mount conductors" (Pet. at 74), it explicitly does so. A POSITA looking to provide a surface mount adaptor that works with the PCB bar codes of Vinciarelli-218's embodiments (e.g., FIG. 33 from Petitioner's combination) would look to techniques already described in Vinciarelli-218. (EX2005 at ¶¶147, 154.) Vinciarelli-218's FIGS. 17-18, for example, illustrate surface mount adaptors 303A/B (yellow) for its PCB bar codes. (*Id.* at [0119]-[0120]; *see also id.* at [0122]-[0125] and FIGS. 19-20.) To provide connection, holes (red) are provided to control solder. (*Id.* at [0120].) An epoxy (green) is provided to secure the adaptors (yellow) to the module. (*Id.* at [0121].) A POSITA looking at Vinciarelli-218's FIG. 33 would use Vinciarelli-218's adaptors if it desired to use a surface mount device. (EX2005 at ¶¶147, 154.)

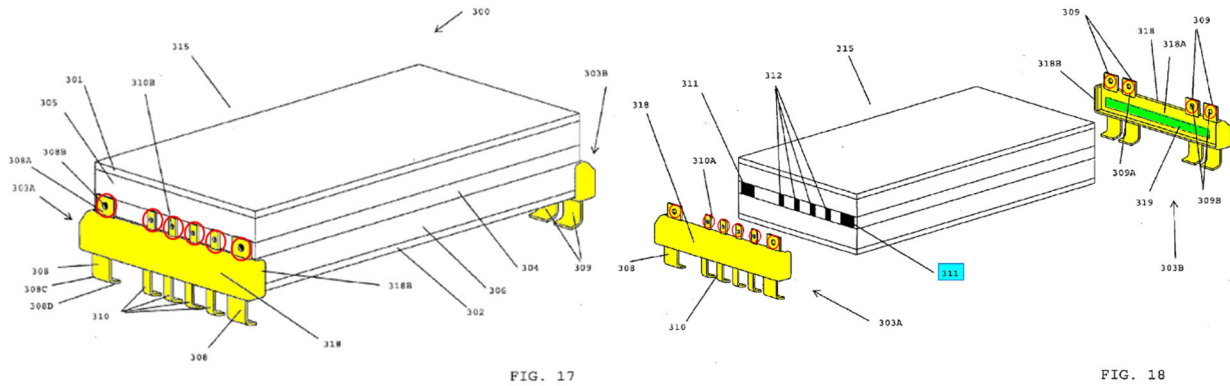


FIG. 17

FIG. 18

A POSITA would have understood that Vinciarelli-218's surface mount adapters provide the optimal choice for surface mount devices. (EX2005 at ¶148.). While Petitioner proposes wrapping a lead frame onto Vinciarelli-218's FIG. 33, this would lead to complications as discussed in the following section at IV.B.1.b. None of Vinciarelli-218's adapter/connectors rely upon wrapping, curving, or bending onto the module (all of which would be an extra manufacturing step) required by Zeng-014, but all can be directly applied onto the PCB bar codes of Vinciarelli-218. (EX2005 at ¶148.) For instance, adapters 803A, 803B have terminal portions formed from a lead frame directly attached or pressed to a heat-sink-less module's side edge bar codes. (EX1009 at [0160], FIG. 35.) By being attachable directly at the location of side edge bar codes, Vinciarelli-218's own adapters/connectors are superior in establishing and maintaining electrical connection and are attachable in fewer steps (with additional steps leading to potential defects). (EX2005 at ¶149.) A POSITA would have thusly chosen Vinciarelli-218's surface mounted adapters, rather than a wrapping process as

described by Zeng-014. (*Id.*)

Petitioner’s Ground 2 motivation is biased by hindsight. (EX2005 at ¶155.) Moreover, its premise that Vinciarelli-218 does not have surface mount conductors” (Pet. at 74) is wrong. A POSITA would not have looked at Zeng-014’s surface mount techniques when Vinciarelli-218 already teaches optimal techniques. Petitioner’s Ground 2 motivation to combine is deficient at least for this reason.

b. Zeng-014’s Wrapping Techniques are Infeasible with Vinciarelli-218’s Power Modules

Petitioner’s motivation to combine is further deficient because Zeng-014’s wrapping techniques are not feasible with Vinciarelli-218’s power modules. (EX2005 at ¶¶149-163.) Petitioner’s combination fails because: (1) it combines techniques from different device types that a POSITA would not have found equivalent; and (2) its combination results in manufacturing techniques that are inapplicable to Vinciarelli-218’s modules.

First, Petitioner takes techniques for conductors for an individual component (an inductor) (Zeng-014) and applies it to a whole power converter (Vinciarelli-218). Vinciarelli-218’s modules are power converters (EX1009 at [0003], [0082] (“an electronic module [] e.g., a power converter”) (annotated red, below-left) which are a collection of multiple individual components including a magnetic core structure 131 (lavender) (*id.* at [0086]), *i.e.*, an inductor (*id.* at

[0082]). (See also EX1009 at FIGS. 3-5, 27-28, 37, 39.) In contrast, Zeng-014's FIGS. 5A-E device is an inductor, not a whole power converter. (EX1008 at [0052] (stating that component 62 is an inductor).

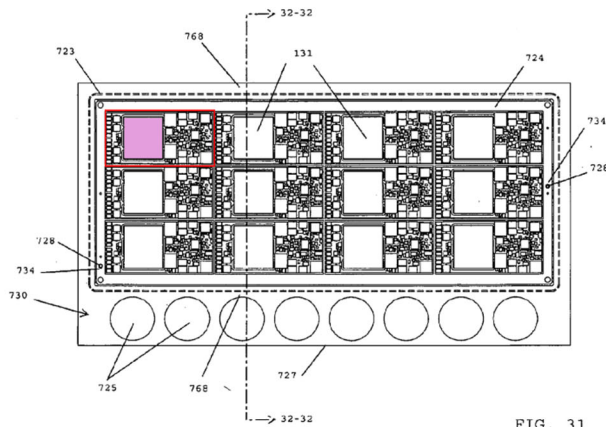


FIG. 31

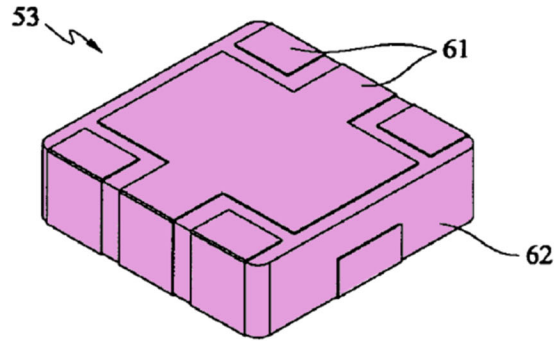


FIG. 5D

There are differences in materials that Petitioner fails to consider.

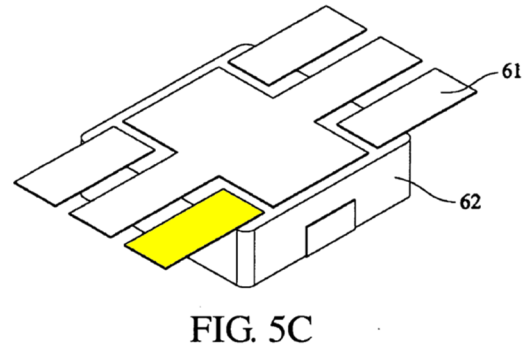
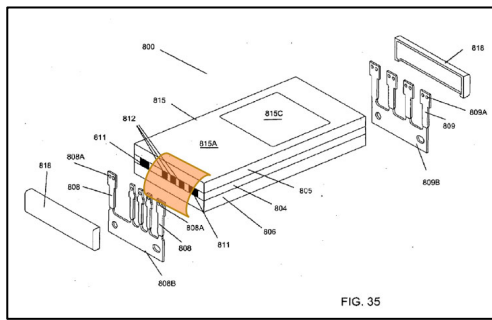
Conductive wrapping in Zeng-014 is feasible because the inductive component's body is made of a "co-fired magnetic material as a substrate" (EX1008 at [0073]-[0075]) which a POSITA would understand to include a hard ceramic. (EX2005 at ¶150; see also EX1008 at [0074].) The conductive material is compressed and bent around the substrate body (EX1008 at [0062]-[0063]) which a POSITA would understand to be feasible given the materials used. (EX2005 at ¶150.)

Furthermore, the conductor 61 of Zeng-014's FIG. 5B is "thermoset" with a "thermosetting adhesive" via a thermal process. (EX1008 at [0063].) Petitioner fails to consider these techniques, and further fails to consider bonding to the PCB bar codes of Vinciarelli-218 which makes the combination infeasible. (EX2005 at

¶150.)

Second, a POSITA would not have made Petitioner’s modifications to Vinciarelli-218’s power module of FIG. 33 because the conductors would suffer from bending and connectivity problems. (EX2005 at ¶¶157-163.) Petitioner argues that Zeng-014’s lead frame wrapping would electrically connect Vinciarelli-218’s PCB bar codes. (Pet. at 74.) Petitioner’s combination is based upon “curving the [Zeng-014] contacts against the [Vinciarelli-218] module such that the modules form a unitary structure with contact surfaces on the top, bottom, and sides of the module” to replace Vinciarelli-218’s adapters. (*Id.* at 73.) Petitioner concludes that this exercise would be “a simple mechanical modification.” (*Id.* at 74.)

To the contrary, a POSITA would recognize that curving and wrapping a lead frame onto Vinciarelli-218’s embodiment would not reliably establish and maintain electrical contact with Vinciarelli-218’s PCB bar codes. (EX2005 at ¶¶157-158.) The portions of the lead frame bent from the bottom (or top) onto the module’s side surface would retain a degree of bow and bend, and never flush when applied to Vinciarelli-218’s FIG. 35. (*Id.*) From this bowing and bending, there would be a significant gap between the lead frame contact and the side edge bar codes. *Id.* There would not be reliable electrical contact between the PCB bar codes and conductor via simple wrapping. (*Id.*)



There are further problems with making contact with the PCB bar codes that Petitioner does not discuss. For instance, Vinciarelli-218's PCB bar codes consist of metal-layer edges and non-wetting substrate; they do not have solder pads to reliably apply solder. (EX2005 at ¶159.) Solder wets to metal regions called pads to control the solder's location and ensure a reliable connection. (*Id.*) Instead, other embodiments apply reliable connection of the adapters via solder holes 310a (red) that guide and control solder points and adhesives 319 (green) to reliably attach adapter 318 (yellow) to PCB bar codes (aqua). (*Id.*) A POSITA would understand that it would be improbable to solder the PCB bar codes to a wrapped conductor as argued by Petitioner. (*Id.*)

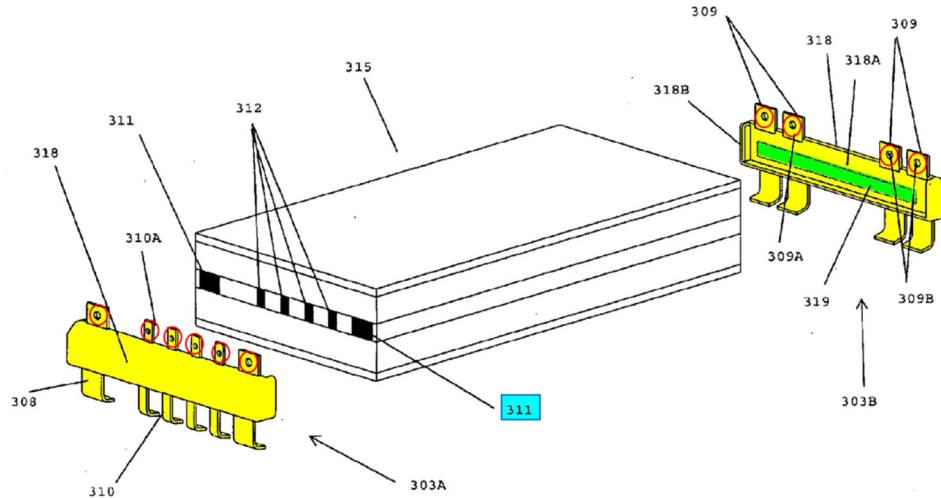


FIG. 18

Further, Petitioner does not describe the specific techniques described by Zeng-014 (*i.e.*, compressing and thermally heating, EX1008 at [0070]). (*See* Pet. at 70-74.) This is because, as noted above, these techniques are not applicable to the encapsulant of Vinciarelli-218. A POSITA would have understood that curving may cause damage to encapsulant, especially with thicker leads that require more compressive pressure. (EX2005 at ¶161.)

Finally, at deposition Petitioner's expert (Dr. Baker) argued that the conductor could be attached by: (1) physical attachment, (2) adhesive, or (3) solder. (EX2006 at 49:22-50:14.) All of these techniques fail, and are hindsight bias.

First, mechanical attachment via curving Zeng-014's conductors would fail as previously outlined because it would result in failed connections to Vinciarelli-218's PCB bar codes.

Second, while Dr. Baker argued that silver or tin could be used in an adhesive (*id.* at 62:4-12), he did not consider the drawbacks. Conductive adhesives are more expensive than solder and have less electrical and thermal conductivity. (EX2005 at ¶163; EX2007) A POSITA would not have used lesser, and more expensive, techniques. (EX2005 at ¶163.).

Third, solder would not work as outlined by Dr. Baker. While he suggested that solder could be applied to Zeng-014's conductor (or Vinciarelli-218's bar codes) prior to bending, he did not consider many factors that make this impractical. Specifically, there would be physical material (the solder) between Zeng-014's conductor and Vinciarelli-218's module prior to bending; the process of bending the conductor onto Vinciarelli-218's module would likely result in damage due to the solder creating a small pressure point between the conductor/module. (EX2005 at ¶163.) Dr. Baker did not consider any stand-off needed to alleviate that pressure point, or how standoff between conductor/module to allow for solder would be achieved when bending the conductor. (*Id.*) Furthermore, Dr. Baker stated that reflow (i.e., heating) would occur after bending (EX2006 at 49:13-21), but this does not consider that the PCB bar codes / conductor do not have wetting regions, and that the solder would migrate downwards due to gravity due to the lateral position of the PCB bar codes. (EX2005 at ¶163.) Indeed, Vinciarelli-218 teaches solder joints to control solder

flow for its own surface mount modules. (EX1009 at [0120].)

Dr. Baker's reasons (which were not in his original declaration) illuminate the hindsight nature of Petitioner's combination.

For at least these reasons, a POSITA would not have been motivated to make Petitioner's proposed modification to Vinciarelli-218 to incorporate Zeng-014.

c. Petitioner's Listing of Motivations

Petitioner's combination fails for the reasons described in subsections (a) and (b) above. Petitioner has no valid motivations and hides this through a long enumerated list of motivations. Inspection into each of Petitioner's motivations reveals that they ring hollow.

Petitioner *first* argues that Vinciarelli-218's encapsulated embodiment would have Zeng-014's lead frames to "provide a compact surface mount version of the module." (Pet. at 71.) Petitioner fails to present any evidence that modifying Vinciarelli-218's FIG. 33 with Zeng-014's conductors would lead to a "compact" version of the module (and Petitioner further ignores Vinciarelli-218's own disclosures of surface mount devices). Moreover, its arguments do not present any evidence that would demonstrate that a POSITA would not simply choose the surface mount conductors already taught in Vinciarelli-218. (EX2005 at ¶170.)

This combination, however, would lead to the exact opposite result Petitioner argues-for. Placing lead frames atop (and below) Vinciarelli-218's embodiment *increases* size, not decreases it. (EX2005 at ¶171.) Moreover, the only reason to have conductors both on top and bottom is to allow stacked modules. (*Id.*) Stacked modules (i.e., one Vinciarelli-218 module on top of another) also increases overall vertical size of the overall device, an issue Petitioner does not address. *Id.* Petitioner's first reason for combination fails.

Petitioner's *second* reason is that for devices where heat is not a consideration, stacking is viable to save board space. (Pet. at 72.) Petitioner's argument demonstrates the failure in its rationale; there would be heat considerations when stacking devices. (EX2005 at ¶172.) A POSITA looking at Vinciarelli-218 would have understood that heat is a significant consideration of its disclosure. (*Id.*) Indeed, nearly the entirety of the specification is dedicated to heat dissipating devices. (*Id.*) A POSITA would not have undertaken additional manufacturing steps to create a device for stacking when such device would have problems with heat dissipation. (*Id.*) Nonetheless, stacking devices conflicts with the immediately preceding motivation of decreasing height. (*Id.*)

Petitioner's *third* reason that the connection part provides flush mounting lacks evidentiary support. (Pet. at 72.) Nonetheless, providing a conductor atop (and below) Vinciarelli-218's encapsulated device increases size and makes the

device less flush. (EX2005 at ¶173.))

Petitioner's *fourth* reason is simply a broad-stroke statement that a POSITA would combined because Zeng-014 states it applies to other electronic components. (Pet. at 73.) A broad statement like this does not mean that Zeng-014's teachings can simply be combined with anything. (EX2005 at ¶174.)

Petitioner's *fifth* reason which refers to increased power density and decreasing area is generic and hollow. Petitioner provides no reason *why* its combination achieves increased power density and decreases area. It consequently fails. Petitioner does appeal to space savings, but this does not address why a POSITA would make a device that *increases* height through extra lead-frames atop and on the bottom of the structure. (EX2005 at ¶175.)

Petitioner does not answer the question regarding *why* a POSITA would modify Vinciarelli-218 to add conductors atop it. (EX2005 at ¶176.) A POSITA would not provide Zeng-014's conductors as described in IV.B.1.b. Moreover, providing conductors atop Vinciarelli-218's power modules contradicts its other teachings. (EX2005 at ¶176.) Vinciarelli-218 describes making its devices compatible with heating dissipation, i.e., via heatsinks. (Vinciarelli-218 at [0082], FIG. 1.) Vinciarelli-218 does have a singular embodiment lacking a heatsink (Vinciarelli-218, [0159]-[0160]) but a POSITA would not have read it outside of the context of the rest of the patent which is directed to heat dissipation. *Id.* A

POSITA would not view an embodiment of Vinciarelli-218 lacking a heatsink as being one where heat dissipation is no longer a concern. *Id.* Every other embodiment is directed to heat dissipation, and making one of those devices stackable via conductors on top, would cause heat to get trapped on the lower devices. *Id.* A POSITA would not have made that combination. *Id.*

Every single one of Petitioner’s motivations rings hollow. No valid reason for *why* a POSITA would have made the combination has been presented.

Ground 2 thusly fails.

2. The Petition fails to teach [1g]’s structure

As stated above, this structure includes the first connection part being fixed at the first electronic component for mechanical support. (EX2005 at ¶¶178-179.) This combination recites wrapping Zeng-014’s lead frame onto Vinciarelli-218’s module, but it is not explained how the combination would result in the lead frame of Zeng-014 contacting Vinciarelli-218’s module.

C. Ground 3

1. A POSITA Would Not Have Been Motivated to Combine Zeng-014 and Vinciarelli-218 to Arrive at Limitation [1g]

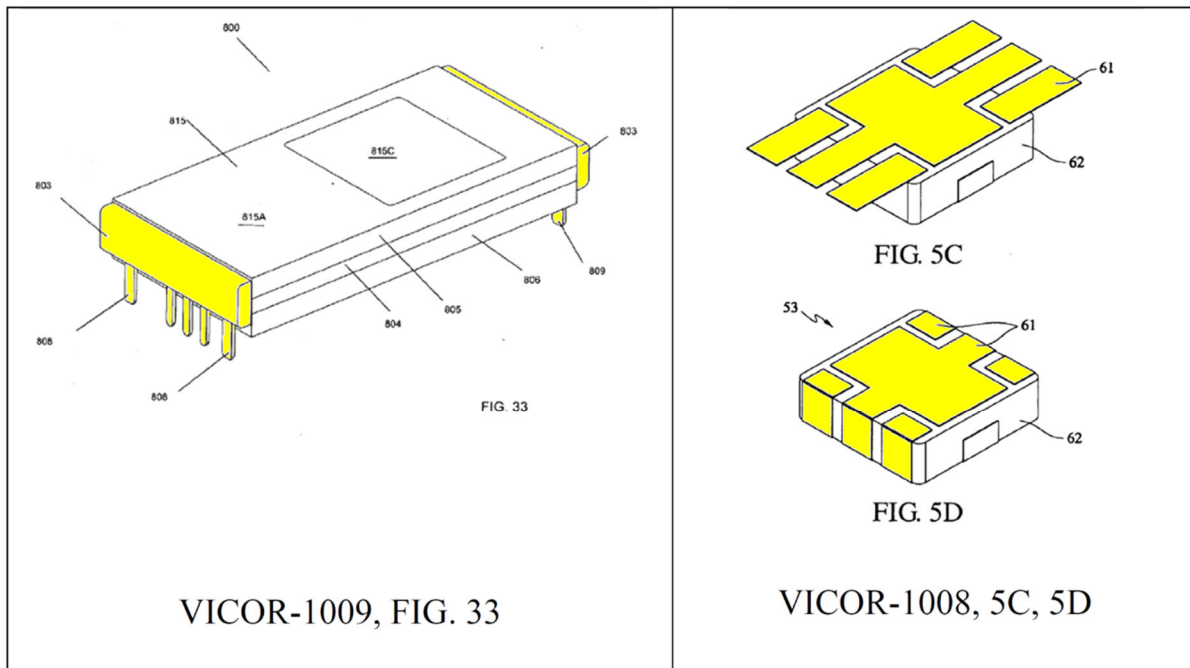
a. Petitioner’s Combination Fails at a Threshold Level

Petitioner’s combination for [1g] fails at a threshold level. (EX2005 at ¶¶180-183.)

Petitioner combines Vinciarelli-218’s FIG. 33 with Zeng-014’s FIG. 5C-5D

to arrive at claim [1g]. (Pet. at 93 “the entire power converter would take a shape similar to the module of FIG. 33 of Vinciarelli-218 without the adapter and instead with the Zeng-014 conductive layer 61, which would be applied to the entire module rather than one component.”) Petitioner, however, lacks any evidence demonstrating that a POSITA would have made this combination. (EX2005 at ¶181.)

**Petitioner applies Zeng-014's conductors
to replace Vinciarelli-218's conductors**



Importantly, the Petition’s presentation of Ground 3 is devoid of any rationale supporting wrapping Zeng’s conductor of FIGS. 5C/D onto Vinciarelli-218’s FIG. 33 (or any other module). (Pet. at 93.) The only motivations for combination provided by Petitioner are inapplicable to the limitations of [1g]; they

apply to [1f], which is an entirely different limitation relating the carrier location (“wherein the carrier is disposed at $\frac{1}{3}$ to $\frac{2}{3}$ of a height of the power converter”) that does not involve the conductor. (*Id.* at 90-92.) Moreover, that combination is on entirely different figures of Vinciarelli-218 (FIG. 6) and Zeng-014 (FIG. 6B). (*Id.* at 90-92.) Petitioner’s Ground 3 analysis thusly lacks any motivation whatsoever to apply wrapped conductors of Zeng-014 to Vinciarelli-218. (EX2005 at ¶182.)

Ground 3 accordingly fails at a threshold level because Petitioner fails to present any rationale to apply Zeng-014’s FIG. 5C/5D conductors to Vinciarelli-218’s FIG. 33.

b. Petitioner’s Combination Fails to Present a Motivation

The Board should not re-write the Petition to introduce motivations for Ground 3 that are not brought by Petitioner. To the extent the Board does so and applies motivations from Petitioner’s Ground 2 to its combination of Ground 3’s [1g], Petitioner’s motivations to wrap Zeng-014’s conductors to Vinciarelli-218’s power module in Ground 3 fail for the same reasons as described in Ground 2 as described in section IV.B.1 as the embodiments relied upon in Ground 2 are substantively similar to the embodiments relied upon in Ground 3. (EX2005 at ¶184.)

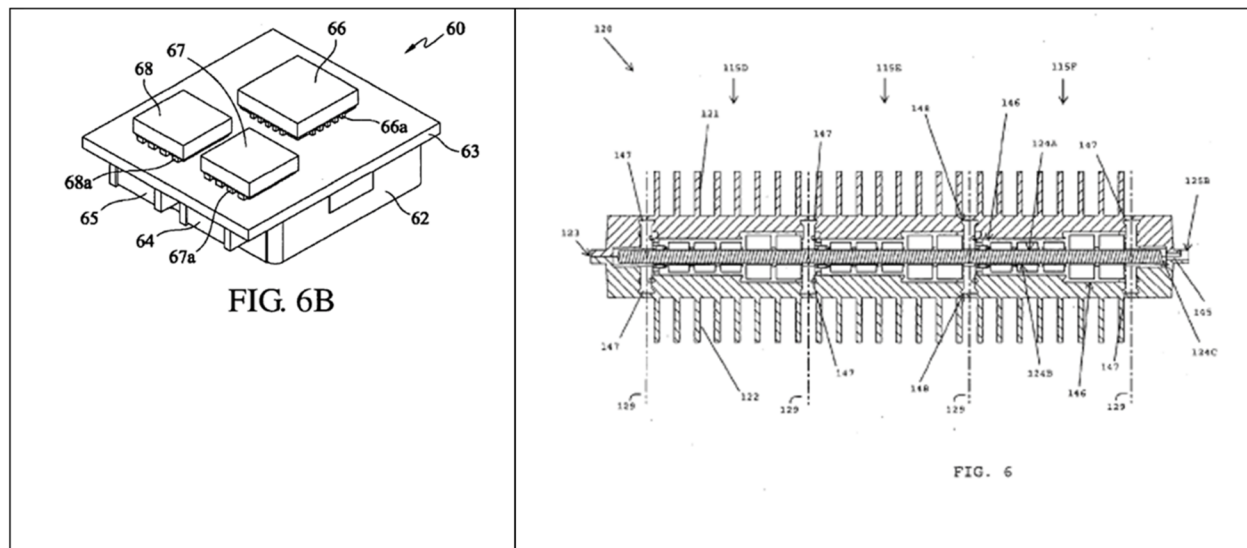
2. Petitioner’s Ground 3 Applies Different Teachings Across Limitations [1f] and [1g].

Petitioner’s Ground 3 relies on different and contradictory teachings of Vinciarelli-218 between limitations [1f] and [1g]. The Petition does not take consistent embodiments applied consistently across limitations. The Petition thusly fails to demonstrate a case for obviousness at a threshold level, even if its motivations to combine were adopted. (EX2005 at ¶¶185-190.)

Ground 3 relies on Vinciarelli-218’s FIG. 6’s form factor to satisfy [1f].

Petitioner’s analysis for [1f] purports to “package the DC to DC converter 60 of Zeng-014 within an encapsulated module as proposed by Vinciarelli-218—from the form factor on the left below to the form factor on the right.” (Pet. at 91)

Petitioner’s graphic from page 92 of the Petition showing FIG. 6 of Vinciarelli-218 is excerpted below.



Petitioner's combination utilizes the form factor of Vinciarelli-218's FIG. 6

to satisfy [1f] but then analyzes an entirely different form factor of Vinciarelli-218 (FIG. 33) to satisfy [1g].

For [1g], Petitioner argues that “the entire power converter would take a shape similar to the module of FIG. 33 of Vinciarelli-218 without the adapter and instead with the Zeng-014 conductive layer 61.” (Pet. at 93.) Petitioner’s Ground 3 creates a different device between [1f] and [1g] but provides no rationale describing how it can mix embodiments of Vinciarelli-218 between [1f] and [1g]. Ground 3 thusly fails at a threshold level.

The change from the form factor in FIG. 6 to the one in FIG. 33 is material. As can be seen in the below left, FIG. 6 has a heat sink panel 121 (yellow). This heatsink would disallow connection of conductors as Petitioner advocates for in [1g]. (EX2005 at ¶189.) The two devices (FIG. 6 and FIG. 33) moreover have differently sized components and FIG. 6 has an uneven surface (red arrow). FIG. 33 has flat upper and bottom surfaces, as would be required for the combination of [1g] to make sense with Zeng-014’s conductors. Petitioner’s change between form factors is material.

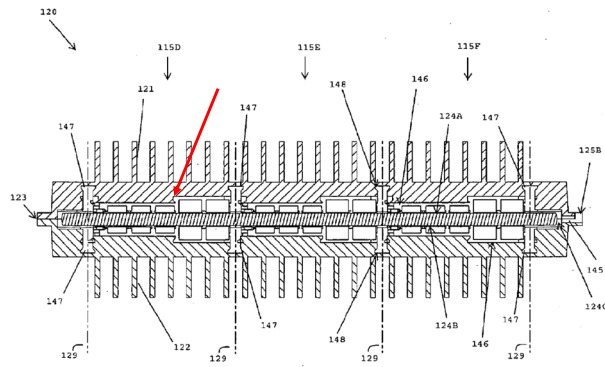


FIG. 6

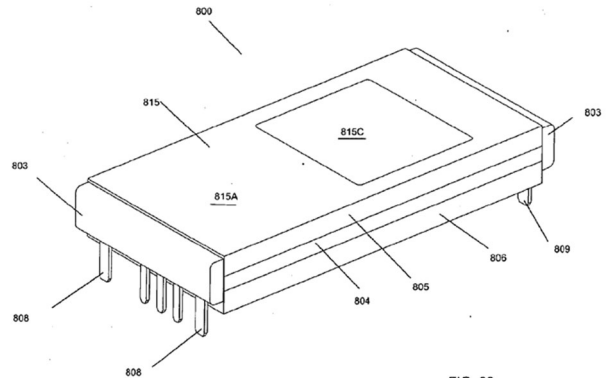


FIG. 33

As a consequence, Ground 3 fails at a threshold level because Petitioner relies on entirely different devices of Vinciarelli-218 between [1f] and [1g].

3. Petitioner's Combination Fails with Respect to [1f]

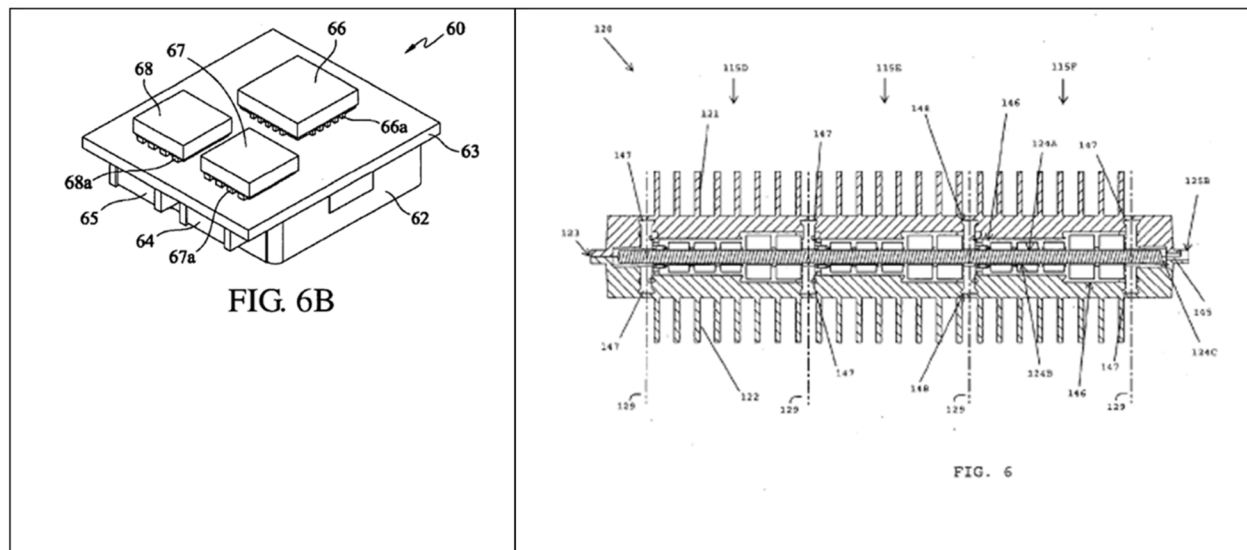
Petitioner's combination fails for two reasons. First, it fails to teach limitations of [1f] because Petitioner failed to consider the actual components of its combination. Second, to arrive at the limitation of [1f], an extra bulky component would need to be needlessly added to the circuit. A POSITA would not have added that component, and to do so is hindsight bias.

a. Petitioner's Combination Fails to Teach Limitations of [1f]

Petitioner's combination fails to arrive at the carrier-orientation limitation [1f] ("the carrier is disposed at 1/3 to 2/3 of a height of the power converter") because the components of Zeng-014 preclude it from being taught. Specifically, Zeng-014 has a single larger and necessary component (an inductor) that is on a singular side of the power supply that necessarily has one side of the power supply significantly bigger than the other and, consequently, the limitation of [1f] is not

met. (EX2005 at ¶¶192-199.)

As noted immediately above, Petitioner’s analysis for [1f] purports to “package the DC to DC converter 60 of Zeng-014 within an encapsulated module as proposed by Vinciarelli-218—from the form factor on the left below to the form factor on the right.” (Pet. at 91.) Petitioner’s graphic from page 92 of the Petition showing FIG. 6 of Vinciarelli-218 is excerpted below. (EX2005 at ¶193.)



Petitioner, however, fails to consider the actual components of Zeng-014’s FIG. 6B (and arrangement of those components) when it combines that device with the form factor of Vinciarelli-218’s FIG. 6. Specifically, Zeng-014’s FIG. 6B has a singular larger component, the inductor 62 (lavender, below),⁴ on one side of the

⁴ Below, component 66 is a control chip, components 64 and 65 are capacitors, and components 67 and 68 are FETs. (EX1008 at [0066].)

device. (EX1008 at [0065].) “[T]he body of the inductive component 62 ... serves as the mechanical support for the entire DC to DC converter.” (EX1008 at [0069].) Zeng-014, moreover, confirms that a singular inductor is used via its other figures. (*See, e.g.*, EX1008 at FIG. 1, 2A, 2B, 3A, 6A, 6B, 6C, 9B, 10, 11A, 11B, 12A, 13A, 13B.) Any combination of Zeng-014’s FIG. 6B would retain the same components and that singular large inductor. (EX2005 at ¶194.)

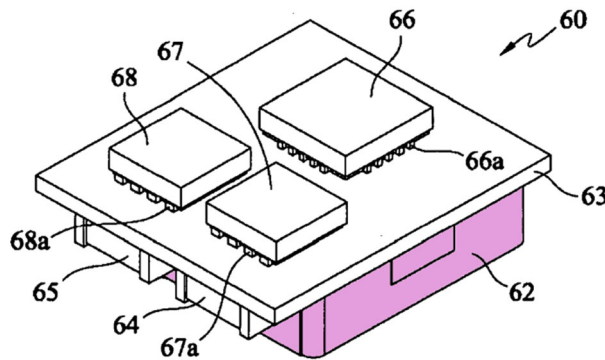


FIG. 6B

The inductor's size would preclude the carrier from meeting [1f]. [1f] requires that "the carrier is disposed at 1/3 to 2/3 of a height of the power converter." The inductor, however, is large and because there is only a singular inductor, the side that maintains the inductor will be significantly larger than the region of the carrier and the top region. [1f] is thusly not met by Petitioner's combination. (EX2005 at ¶195.)

b. Petitioner’s Combination Fails to Present Motivation to Arrive at [1f]

Petitioner's combination further fails to present motivation to arrive at the

limitations of [1f] for several reasons. Its combination adds several electrical components (an inductor and connective adaptors) for no reason and to the detriment of the device and its manufacturing process. Petitioner's combination is textbook hindsight bias. (EX2005 at ¶196.)

First, as detailed above, Ground 3 fails to demonstrate that [1f] is obvious because the inductor on one side of the power supply precludes [1f] from being met. Petitioner presents no motivation to remedy that situation to arrive at [1f], i.e., provide an inductor on the opposite surface of the circuit board to mirror inductor 62. Its motivations are generically directed to Zeng-014 and Vinciarelli-218 being directed to the same field of endeavor (Pet. at 90-91), which is insufficient. None of Petitioner's motivations specifically address the issue of adding an additional inductor on the opposite end of Zeng-014's FIG. 6B inductor 62. (Pet. at 90-91.) Consequently, the Petition fails to demonstrate that [1f] of Ground 3 is obvious. (EX2005 at ¶197.)

Further, a POSITA would not have added an additional inductor to mirror inductor 62 for several reasons. (EX2005 at ¶198.) An additional inductor is another bulky and unnecessary component that a POSITA would not desire to add. Adding this component would add to the cost of the device. Moreover, adding another inductor on the opposite end of the Zeng-014 surface would add to the height of the DC DC power supply, and there would be no functional reason to do

so.⁵ The only reason to do so is to arrive at the claims, which is hindsight bias.

Second, Petitioner’s combination requires added connective adaptors (and manufacturing steps). (EX2005 at ¶199.) As shown in FIG. 6C (below), Zeng-014’s DC DC converter is connected to the circuit board 69 via the conductors on the surface of the inductor 62 (lavender). (EX1008 at [0069].) Petitioner’s combination takes the DC DC converter of Zeng-014 and applies it into the form factor of Vinciarelli-218’s FIG. 34, which would result Vinciarelli-218’s FIG. 34 being encapsulated with additional connectors from Zeng-014. (EX2005 at ¶199.) As petitioner admitted, even with the connectors from Zeng-014, adaptors (described as conductors by petitioner) described in Vinciarelli-218 are still necessary for the converter to connect to the main board. (**Fourth**, Vinciarelli-218 discloses that conductors may be brought to the edge of 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. VICOR-1009, [0018], [0028], [0115]-[0129].) It appears that adding the Zeng-014 connectors offers no benefit. This combination would require several additional manufacturing steps, which Petitioner has failed to provide any rationale for. (EX2005 at ¶¶199-

⁵ Enlarging the device for the purposes of [1f] contradicts Petitioner’s rationale for [1g] which was to decrease device size.

200.) A POSITA would not have made this combination because it requires extra components and extra manufacturing steps. (EX2005 at ¶¶199-200.) As a consequence, its motivations fail to present a motivation to combine to arrive at [1f].

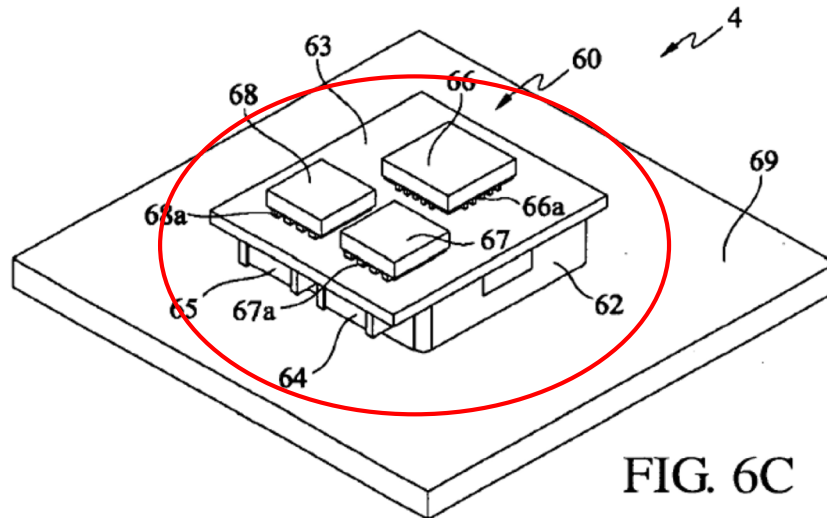


FIG. 6C

Ground 3 fails to demonstrate that [1f] is rendered obvious by Zeng-014 and Vinciarelli-218.

V. CONCLUSION

For the above reasons, all challenged claims are not invalid.

Dated: Dec. 30, 2024

Respectfully submitted,

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CERTIFICATE OF WORD COUNT UNDER 37 CFR § 42.24(d)

Under 37 C.F.R. § 42.24(d), the undersigned certifies that the word count for this Patent Owner's Response to the Petition for *inter partes* review totals 13,918 excluding the parts exempted by 37 C.F.R. § 42.24(a). The word count was made using the built-in word count function in the Microsoft® Word software used to prepare this document.

Dated: Dec. 30, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that I caused to be served a true and correct copy of the foregoing: **PATENT OWNER'S RESPONSE TO PETITION TO INSTITUTE INTER PARTES REVIEW** and accompanying exhibits by email to the electronic service addresses for Petitioner on the date indicated below:

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