

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 PRELIMINARY RESPONSE

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. THE '263 PATENT	2
III. CLAIM CONSTRUCTION	6
A. Limitation [1g] is not a product-by-process limitation.	7
B. All Grounds Are Defective in Showing [1g].	10
IV. PETITIONER'S GROUNDS FAIL TO PRESENT A REASONABLE LIKELIHOOD OF SUCCESS.	14
A. Grounds 1A-1C: Petitioner Fails to Establish a Reasonable Likelihood of Prevailing.....	15
1. Ground 1A: Petitioner Fails to Show that Claim 1's Features Are Disclosed in Vinciarelli-664.....	15
a. 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."	15
(i) Petitioner's analysis of [1f] fails as a legal matter.	15
(ii) Vinciarelli-664 literally depicts carriers outside of [1f]'s height range.....	18
(iii) Petitioner's attempt to rely on other references like Vinciarelli-269 for [1f] also fails.....	22
2. Ground 1A Fails Because Petitioner Applies Obviousness Analysis.	29
a. Ground 1A, [1b]: Petitioner uses an obviousness analysis.	31
b. Ground 1A, [1d]: Petitioner uses an obviousness analysis.	32

TABLE OF CONTENTS (CONTINUED)

	Page
c. Ground 1A, [1e]: Petitioner uses an obviousness analysis.	39
3. Grounds 1B-1C: Petitioner’s Various Secondary References Do Not Cure the Deficiencies of Vinciarelli-664.....	40
a. Grounds 1B-1C fail to cure the deficiencies of Ground 1A with respect to [1f].	40
b. Ground 1B fails to present a proper motivation to combine.....	43
c. Ground 1C: Petitioner’s motivation to combine Vinciarelli-664 and Zeng-014 fails.	44
B. Ground 2: Petitioner Fails to Establish a Reasonable Likelihood of Prevailing.	50
1. Ground 2 Fails to Teach [1f].....	50
2. Ground 2: Petitioner Lacks a Motivation to Combine.....	56
a. A POSITA could not succeed using Zeng-014’s lead frame wrapping on Vinciarelli-218’s modules.	56
b. Petitioner presents no valid motivations for combining Vinciarelli-218 and Zeng-014.	63
C. Petitioner Fails to Establish a Reasonable Likelihood of Prevailing on Ground 3.	65
1. Ground 3 Fails to Teach [1f].....	65
2. A POSITA Would Not Have Been Motivated to Combine Zeng-014 and Vinciarelli-218.	69
3. Ground 3 Fails to Teach the Claimed Arrangement of [1c], [1d], and [1e].	73

TABLE OF CONTENTS (CONTINUED)

	Page
V. CONCLUSION.....	78

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”)

I. INTRODUCTION

Vicor Corp. (“Petitioner”) has challenged claims 1-6 of U.S. Patent No. 9,819,263 (“the ’263 Patent”) under five grounds in its petition for *inter partes* review (“Petition”) Delta Electronics, Inc. (“Delta” or “Patent Owner”) hereby submits its preliminary response to the Petition.

For all grounds, Petitioner fails to address the quantitative limitation that the “carrier is disposed at $1/3$ to $2/3$ of a height of the power converter.” First, Petitioner relies solely upon its own eye-ball interpretation of prior art figures to guess that this quantitative limitation is met. This is legally improper and also factually incorrect once precise measurements are taken. Later, Petitioner focuses exclusively on symmetrical components on either side of prior art carriers, but this also misses the mark. This quantitative limitation requires more, particularly with the carrier’s thickness, which embodies the inventive and innovative solutions captured in the ’263 Patent. None of Petitioner’s grounds succeed in showing this limitation in the prior art.

Further, the purported motivations to combine in respective grounds are all flawed and unreasonable. In Ground 1C, Petitioner pieces together disparate and incompatible manufacturing processes, modifying one where modules are produced in bulk to instead produce those modules one-by-one. A POSITA would be disincentivized to do so. In Ground 2, Petitioner modifies a module to include

wrapped contacts under textbook hindsight that disregards major design concerns that a POSITA would have. In Ground 3, Petitioner forces two separate form factors together to render key features inoperable. Petitioner's obviousness grounds thusly fail.

Furthermore, in each ground, Petitioner uses a product-by-process construction for "a first connection part is fabricated by mechanical support of the first electronic component" but then performs legally deficient analysis (or no analysis at all) that falls far short of a proper product-by-process patentability analysis. None of Petitioner's grounds sufficiently show that this limitation is met by the prior art.

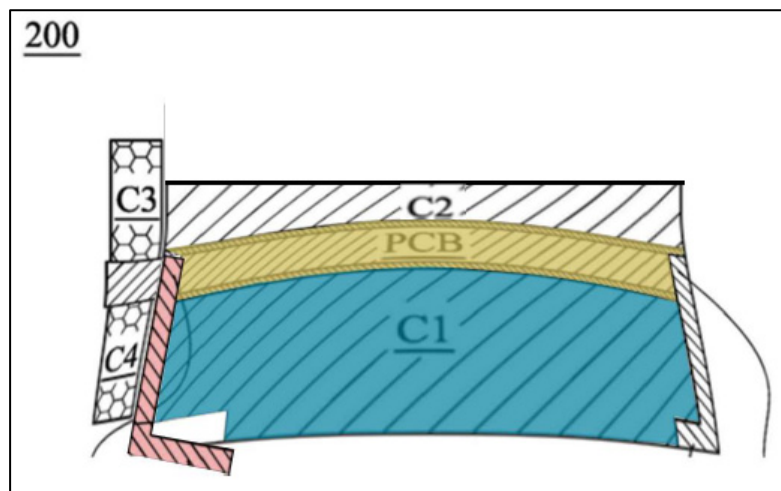
The Petition should therefore be denied.

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 identifies two key metrics that drive power converter design: efficiency and power density. '263 Patent, 1:17-25. In their active efforts to maximize these parameters, the inventors uniquely recognized that mechanical support and stress within a power converter presented challenges to be addressed: carriers in existing converters were susceptible to warping as the converters inevitably heated up during operation. Phinney, ¶¶38-39. Generally, warping can

be caused by releasing of uneven stresses, and can lead to electrical connection failures and less durability. *Id.*; see also '263 Patent, 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. Phinney, ¶39



Accordingly, the inventors recognized that optimization of efficiency and power density must be simultaneously considered along with these unwanted mechanical effects within the converter. Phinney, ¶¶41-44. The '263 Patent inventors conceived of the claimed configurations to achieve high power density while avoiding these unwanted mechanical effects. As demonstrated herein, *no* prior art on the record revealed or suggested such unique configurations.

The inventors' solution for simultaneously controlling power density and structural/mechanical integrity is embodied in "the carrier is disposed at 1/3 to 2/3

of a height of the power converter.” Phinney, ¶41. This unique height range incorporates *both*: (i) a thickness ratio requirement for components mounted above and below the carrier, which controls mechanical stress, and (ii) a carrier thickness requirement, which controls power density.

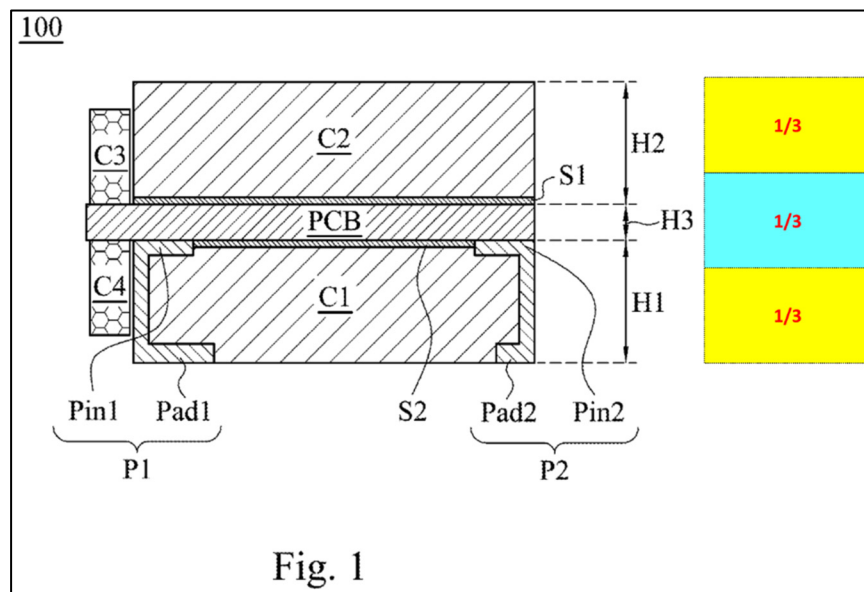
Specifically, the thickness ratio requirement contributes to *mechanical integrity* by allowing for uniform stress distribution. Phinney, ¶¶43-45. The ’263 Patent explains that uniform stress distribution is improved by requiring that the height or thickness of upper components “is not greater than twice” that of the lower components, and *vice versa*. *Id.*; ’263 Patent, 5:45-57. Otherwise, significantly different thicknesses for upper/lower components cause non-uniform stress distribution, which potentially results in the warping issues. *See* ’263 Patent, 5:45-57.

Meanwhile, the carrier thickness requirement contributes to *power density*. The carrier thickness requirement enforces a maximum thickness for the carrier, thus ensuring that power density is not sacrificed too far by the carrier occupying too much space. Phinney, ¶¶40, 43.

Indeed, as Dr. Phinney shows, this unique height range solution is directly derivable from the both the thickness ratio requirement and the carrier thickness requirement. Phinney, ¶¶43-44. First, in order to maintain high power density, the thickness of the carrier should be limited to a maximum of a third of the power

converter's total height. *Id.* Second, because the carrier has limited thickness and can even be thinner as far as power density is concerned, there is a risk of warping and compromised device integrity. *Id.* To avoid this risk, the difference of component thicknesses above and below the carrier is limited, for example, by a component thickness ratio less than two, to benefit uniformity of stress distribution. The maximum carrier thickness and the limited difference in upper/lower component thicknesses results in “the carrier [being] disposed at 1/3 to 2/3 of a height of the power converter.” *Id.*

Therefore, the unique 1/3 to 2/3 height range *simultaneously* embodies both power density device design and durable/non-warping device design. This two-pronged effect can also be understood from the following annotated figure.



In at least these respects, Patent Owner's inventions in the '263 Patent advance the field of power converter design and manufacture. Phinney, ¶46.

As discussed *infra*, Petitioner has fundamentally failed to appreciate these inventive aspects of the '263 Patent's claimed solutions, proposing grounds that ignore this specific *quantitative* limitation. Petitioner also fails to factor any of the power density and/or mechanical integrity/durability considerations into their proposed grounds, exhibiting a complete lack of incentives to combine.

Thus, the Petition does not sufficiently demonstrate that the '263 Patent's claims are unpatentable.

III. CLAIM CONSTRUCTION

In IPR proceedings, 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 At this preliminary stage and because the deficiencies of the Petition can be addressed absent construction, Patent Owner presents no constructions other than rebutting Petitioner's argument that [1g] is a product-by-process limitation.

¹ As described by Dr. Phinney, 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." Phinney, ¶16.

Patent Owner reserves the right to present constructions with the Patent Owner Response should the Board institute the Petition.

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

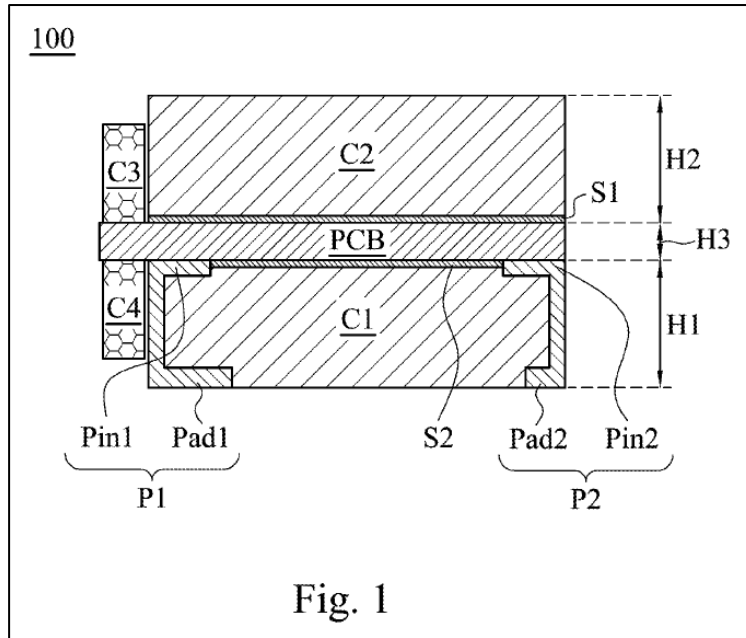
Limitation [1g] recites “wherein the first connection part is fabricated by mechanical support of the first electronic component.” Petitioner argues that “[t]his is a product-by-process limitation because it specifies the method of fabrication and therefore is not entitled to patentable weight when evaluating patentability.” Petition, 3-5.² This contravenes caselaw, which holds that a description of process alone does not necessarily imply a product-by-process interpretation. Petitioner’s product-by-process construction is also at odds with the structural description in the ’263 Patent. For the reasons discussed below, the Board should reject Petitioner’s product-by-process construction.

Claim language in a product claim may only be found as a process limitation if it does not describe structure. *See Purdue Pharma L.P. v. Epic Pharma, LLC*, 811 F.3d 1345, 1353 (Fed. Cir. 2016) (finding that the claim language at issue “does not describe the structure of 14-hydroxy and thus is a process limitation”). If

² Only for Grounds 1A-1C, Petitioner also applies what it refers to as “Patent Owner’s Apparent Construction” that it bases solely upon Patent Owner’s infringement contentions in the co-pending litigation. Petition, 5-7.

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 the Petitioner’s cherry-picking of the ’263 Patent’s specification to find process in [1g], [1g] nonetheless describes structure. *See* Phinney, ¶¶52-54; *cf.* Petition, 3-4. As Dr. Phinney describes, the “mechanical support of the first electronic component” for the first connection part is a structural feature or relationship. Phinney, ¶52. This “mechanical support” is describable via illustrations of structure. *See, e.g.*, ’263 Patent, FIG. 1 (reproduced below).



The '263 Patent also discloses “curving the connection part by mechanical support of the first electronic component to fix the connection part at the first electronic component.” *Id.*, 10:48-50. 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. Phinney, ¶54. Fixture, attachment, and securement of one object to another object is structure. *Id.*

Accordingly, “wherein the first connection part is fabricated by mechanical support of the first electronic component” is not devoid of structure. To the contrary, 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. *See Nordt*, 881

F.3d at 1375-76.

As such, 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 disclosed in the '263 Patent but neglects the other structural description that Patent Owner has identified above. *See* Petition, 3-4. 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. All Grounds Are Defective in Showing [1g].

None of Petitioner's grounds satisfy their burden in analyzing [1g]. If [1g] were to be construed as product-by-process, Petitioner was required to still show that the structure resulting from [1g]'s alleged process existed in the prior art. And if [1g] is not interpreted as product-by-process, Petitioner was also required to show those structural features in the prior art. All of Petitioner's grounds are devoid of any structural analysis for [1g]. The Board should deny institution even just for this legal defect.

Petitioner's product-by-process construction does not automatically preempt its burden in showing that [1g] existed in the prior art. Petitioner's characterization

that “once construed as a product-by-process limitation, the limitation may be ignored in a patentability analysis” is entirely incorrect. *See* Petition, 5; *see also id.*, 35 (“Under the product-by-process construction, the element is not entitled to patentable weight. *Amgen Inc. v. F. Hoffman-La Roche Ltd.*, 580 F.3d 1340, 1369-70 (Fed. Cir. 2009).”).

Contrary to Petitioner’s citation of *Amgen*, Federal Circuit caselaw requires that, while the construed **process** is exempt from a patentability analysis, the resulting **structure/product** still be shown in the prior art. *See Greenliant Sys, Inc. v. XICOR LLC*, 692 F.3d 1261, 1268 (Fed. Cir. 2012) (clarifying *Amgen*’s holding). “[I]f the process by which a product is made imparts ‘structural and functional differences’ distinguishing the claimed product from the prior art, then those differences ‘are relevant as evidence of no anticipation.’” *Id.*; *see also Amgen*, 580 F.3d at 1369 (“the focus is on the product and not on the process of making it”).

Therefore, under its proposed construction, Petitioner is required to show that the prior art teaches the structure resulting from the process of “curving a piece of metal against the first electronic component.” As discussed above, this resultant structure includes the structural relationship of “mechanical support,” or the curved piece of metal being “fixed at the first electronic component.”

Phinney, ¶¶52-54.

Petitioner has not satisfied its burden even under its own product-by-process construction. Throughout its five grounds, Petitioner does not attempt to show that the prior art teaches any structure for [1g]. Further, in some grounds, Petitioner offers only that the construed process can be found in the prior art, but this contradicts the very point of product-by-process analysis. *See Amgen*, 580 F.3d at 1369 (“the focus is on the product and not on the process of making it”).

In Ground 1A, Petitioner impermissibly bypasses any and all analysis under the product-by-process construction. *Id.*, 35 (“Under the product-by-process construction, the element is not entitled to patentable weight.”). Petitioner cannot pretend that [1g] does not exist simply based on a product-by-process construction. *See Greenliant Sys.*, 692 F.3d at 1268. Nonetheless, Vinciarelli-664 does not disclose that the resultant structure exists in its power converter modules: contacts extend vertically on the side surfaces of Vinciarelli-664’s power converter module, but Vinciarelli-664 is silent regarding those contacts being mechanically supported by or fixed to electronic components. Phinney, ¶¶81-84. Ground 1A therefore fails.

In Ground 1B, Petitioner does not specifically address [1g]. *See id.*, 48-53. Analysis of [1g]’s structure is absent, and therefore Ground 1B also fails to satisfy its burden in showing [1g] in the prior art. Furthermore, as explained *infra*, the lack of specific discussion on [1g] is legally deficient in itself.

In Ground 1C, Petitioner appears to solely rely upon its product-by-process construction of [1g]. Petitioner argues that “[t]he combination with Zeng-014 **wraps** the module of Vinciarelli-664 using a lead frame and **bending** the contacts against the electronic component . . . such that the first connection part is fabricated by mechanical support of the first electronic component.” Petition, 61-62 (emphasis added). That is, Petitioner seems to argue that the prior art combination discloses the construed process of “curving a piece of metal against the first electronic component.” *See id.*

However, this is immaterial to Petitioner satisfying its burden. *Amgen*, 580 F.3d at 1369 (“the focus is on the product and **not on the process** of making it”). Setting aside Petitioner’s irrelevant focus on Zeng-014’s process, the Petition lacks any structural analysis. *See* Petition, 61-62. Moreover, the combination of Vinciarelli-664 and Zeng-014 fails to teach that the contacts are mechanically supported by or fixed at the module’s components. Phinney, ¶¶147-149. Therefore, Ground 1C is defective in showing [1g].

In Ground 2, Petitioner again appears to rely upon its “curving process” construction of [1g]. Petitioner argues that “[i]n the [prior art] combination, the first connection part is **curved against** the power converter and its components, and is thus **curved against** the ‘first electronic component.’” Petition, 80 (emphasis added). Again, it is insufficient and irrelevant for Petitioner to find a curving

process in the prior art. *See Amgen*, 580 F.3d at 1369 (“the focus is on the product and not on the process of making it”). At no point does the Petitioner contend that the prior art combination teaches the **resultant structure** of [1g]’s alleged process, nor does the prior art combination actually teach that resultant structure.

Phinney, ¶¶155-156. Therefore, Ground 2’s analysis of [1g] is legally deficient.

In Ground 3, Petitioner repeats these same errors. Petitioner appears focused on the construed “curving” process existing in the prior art and avoids the relevant analysis of structure. *See* Petition, 93. While Petitioner argues that Zeng-014 discloses a curving of metal, there is no evidence that the combination of Zeng-014 and Vinciarelli-218 results in the same structure of [1g] in which curved contacts are fixed at components. Phinney, ¶¶198-199. Petitioner has not satisfied its legal burden in Ground 3 for [1g].

This legal defect in each ground is sufficient for the Board to deny institution, and the Board should do so. Notwithstanding, even more reasons for denying institution are described below.

IV. PETITIONER’S GROUNDS FAIL TO PRESENT A REASONABLE LIKELIHOOD OF SUCCESS.

Each of Petitioner’s five grounds challenged the patentability of claims 1-6, where only claim 1 is independent. None of Petitioner’s grounds present a reasonable likelihood of success for their failures on claim 1.

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

Grounds 1A-1C all rely upon Vinciarelli-664 as the sole anticipatory reference (Ground 1A) or as a primary reference (Grounds 1B and 1C) in combination with other references.

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

a. 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.”

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

Petitioner misapplies the caselaw, and its analysis is founded upon an incurable 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 citing caselaw.

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.” Petition, 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 squarely 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. Phinney, ¶55. Indeed, [1f] embodies the precise inventive endeavors by the ’263 Patent inventors to simultaneously control carrier thicknesses and component thickness ratios. Phinney, ¶¶41-45. Again, [1f] requires that “the carrier [being] disposed at 1/3 to 2/3 of a height of the power converter,” clearly including 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. Phinney, ¶55. Vinciarelli-664 is

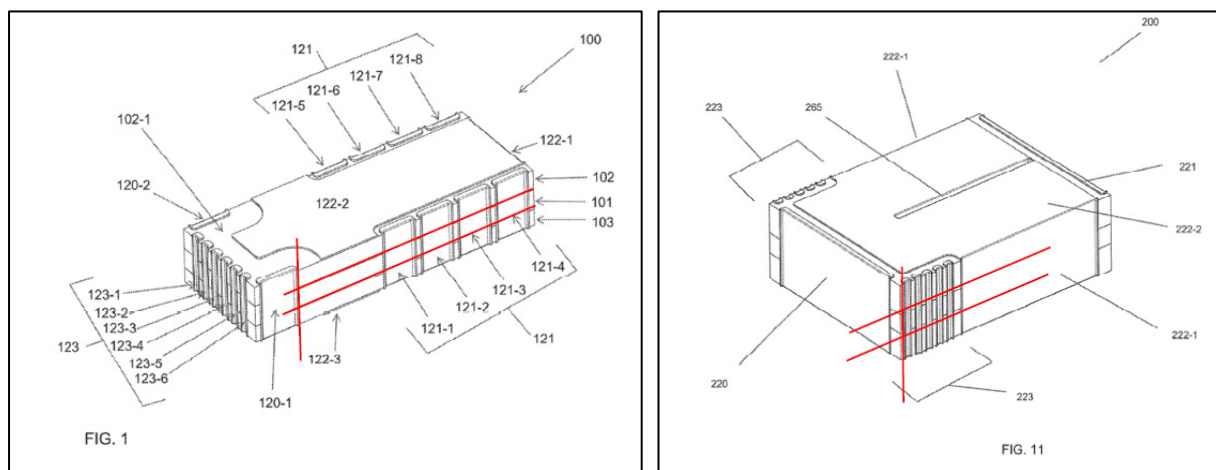
entirely devoid of specific quantitative teachings directed to [1f]. *Id.*, ¶56.

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’s eye-ball test based on FIG. 1 does not arrive at [1f], and this is apparent when FIG. 1 is put under scrutiny. 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 scientific 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.³

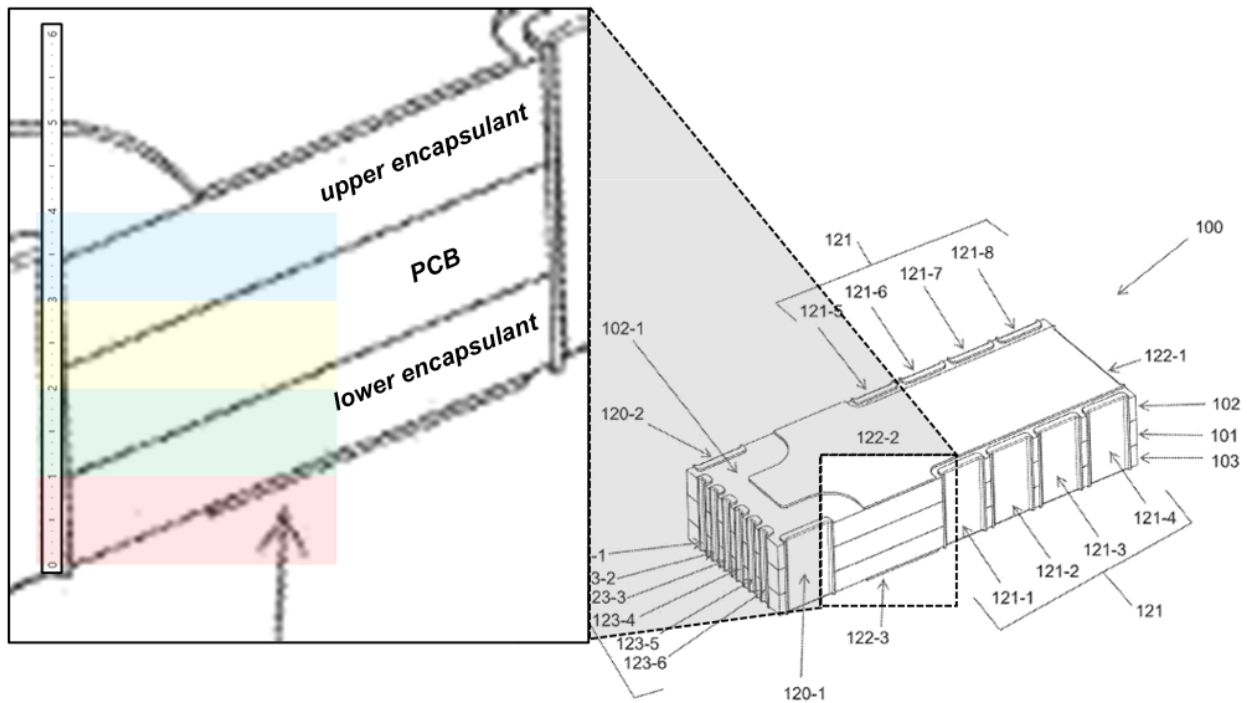


FIG. 1

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 /

³ The actual measurements are not inches, but an inch has been discussed for demonstration purposes, as detailed in Dr. Phinney's declaration.

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 measurements based on measuring a printout. *See* Phinney, ¶¶58-60.

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. This violation of [1f]'s requirements has non-trivial effects: the illustrated carrier fails on the power density aspect that is required by this quantitative limitation. 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, power density has not been optimized relative to mechanical stress in the manner embodied by [1f]. Phinney, ¶61. [1f] is therefore not met.

Petitioner's expert Dr. Baker provides no additional detail that would reveal otherwise 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. He provides no measurements (in contrast to the above) or further analysis beyond those bald statements that [1f] is “clearly” met. Limitation [1f] requires *precise* locations that are not taught by Vinciarelli-664 nor demonstrated by Petitioner's expert.

Petitioner and Dr. Baker distract from the actual requirements of [1f] by

advancing the false premise that any PCB that occupies a central region satisfies [1f]. He states “[a] centered printed circuit board with components on both sides would meet this height requirement.” VICOR-1003, ¶63. This would effectively mean any PCB that has components on both sides meets [1f]; but, [1f] requires more. Phinney, ¶¶63-65. [1f] is not simply a PCB sandwiched between two components; [1f] requires exact locations that incorporates both power density considerations (via carrier thickness) and mechanical integrity/durability considerations (via component thickness ratio). Showing only a vertically centered PCB is deficient because it fails to consider the PCB’s thickness, a critical aspect of the claims and [1f]. Phinney, ¶¶63-65.

Finally, Petitioner’s attempt to rely on an eyeballing of FIG. 1 is due to Vinciarelli-664 being utterly silent regarding exact dimensions. 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 only is improper, and its impropriety is apparent here. *Hockerson-Halberstadt, Inc. v. Avia Grp. Int’l, Inc.*, 222 F.3d 951, 956 (Fed. Cir. 2000).

The Petition thusly fails to demonstrate a reasonable likelihood of prevailing with respect to Ground 1A because Vinciarelli-664 cannot demonstrate “carrier is disposed at 1/3 to 2/3 of a height of the power converter.” Instead, the portions

cited by the Petition show the carrier being disposed outside of the claimed height range.

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

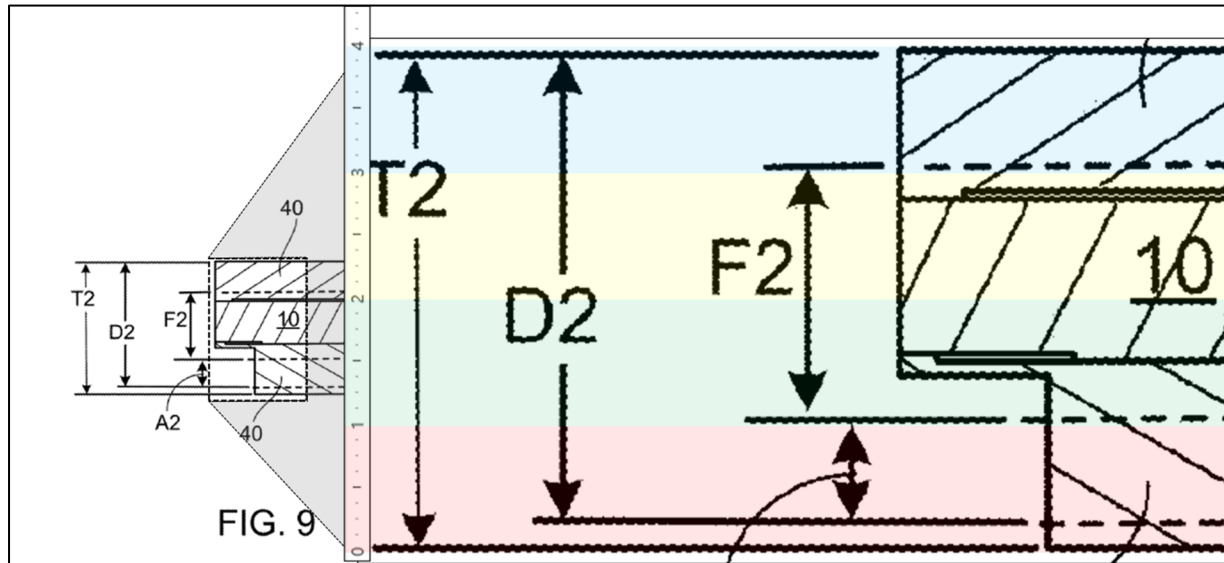
As described above, Vinciarelli-664 does not meet [1f]. As implicit acknowledgement of this failure, Petitioner turns to Vinciarelli-269, whose disclosure is incorporated by reference into Vinciarelli-664. Petition, 33-34; Vinciarelli-664, 1:37-44. Vinciarelli-269 does not cure Ground 1A.

As an initial point, Petitioner's reliance on Vinciarelli-269 fails as a legal matter under anticipation. 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. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008) (holding that a document must disclose all the claim's limitations in the same arrangement or combination as recited in the claim to anticipate). 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.

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.

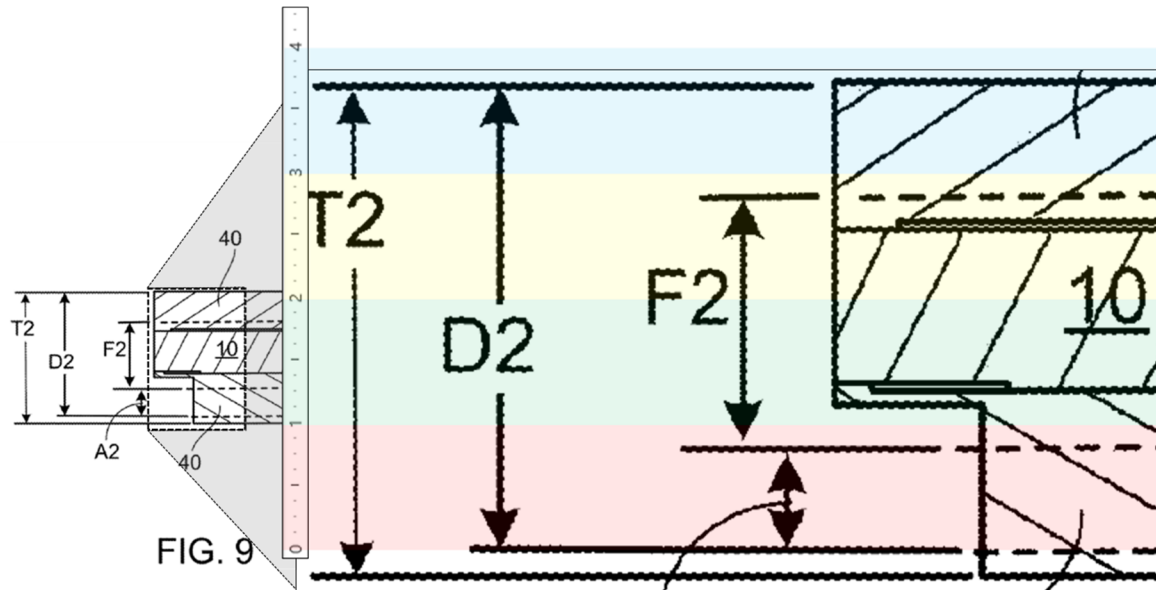


As depicted above, the lower encapsulant 40 is approximately 1.6 inches, while the PCB 10 extends from 1.6 inches to 2.8 inches on the ruler. The upper encapsulant above the PCB extends from 2.8 to 4 inches on the ruler. This makes the ratio 1.6 / 1.2 / 1.2, i.e., 40% / 30% / 30%. Dr. Phinney found similar ratios measuring the figures with a ruler. Phinney, ¶¶68, 71. 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 D2.⁴

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. Phinney, ¶¶69, 72. 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.

⁴ 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.*



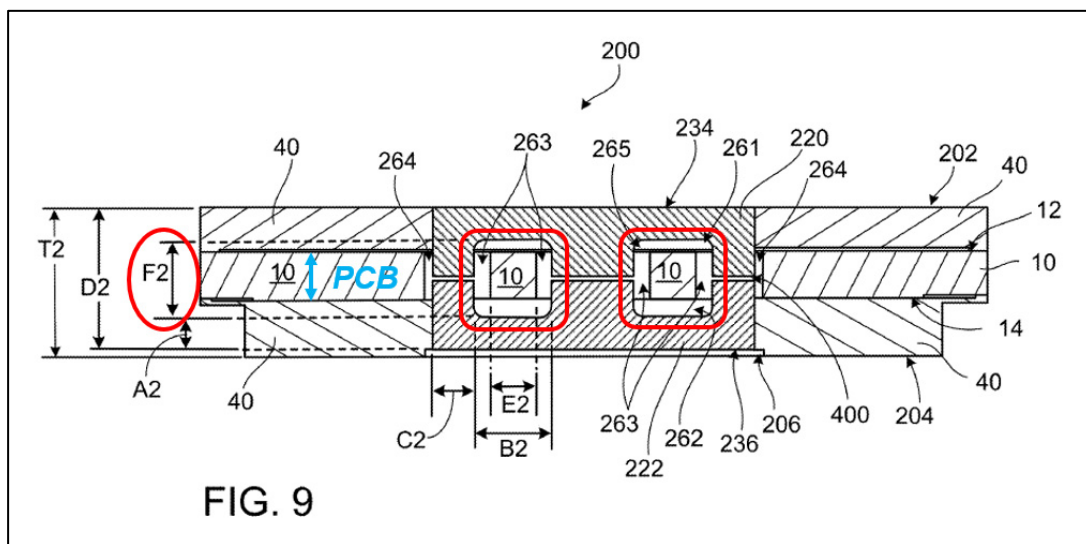
Therefore, whether taking total thicknesses T2 or D2, Vinciarelli-269 does not illustrate a PCB disposed within the $\frac{1}{3}$ to $\frac{2}{3}$ height range. Like with Vinciarelli-664, Petitioner’s analysis conflates Vinciarelli-269’s teachings of a general disposition between components as teaching the precision of sizings required by [1f]. Phinney, ¶75.

Worse yet, Vinciarelli-269 teaches away from the root of Petitioner’s flawed analysis. Petitioner’s analysis appears to hinge again on Dr. Baker’s false premise that “[a] centered printed circuit board with components on both sides would meet this height requirement.” See VICOR-1003, ¶63. Petitioner here argues that “transformers have ‘matching core halves’ and thus the circuit board would be $\frac{1}{2}$ way between them.” Petition, 34. As previously explained, [1f] requires exact locations that embody the inventive balancing of PCB thickness and component

thickness ratios. Phinney, ¶¶45, 55. Notwithstanding, Vinciarelli-269 does not even support Petitioner’s alleged finding of a halfway-positioned PCB because Vinciarelli-269 teaches the biasing and offsetting of the PCB away from a vertical center.

Vinciarelli-269 discloses that the “legs” of the two E-shaped core halves composing a transformer face each other, forming large interior spaces between those “legs.” See Vinciarelli-269, FIG. 9 (reproduced below with annotation).

Vinciarelli-269 discloses that the PCB is positioned somewhere within the interior spaces formed by the magnetic core halves. *Id.*

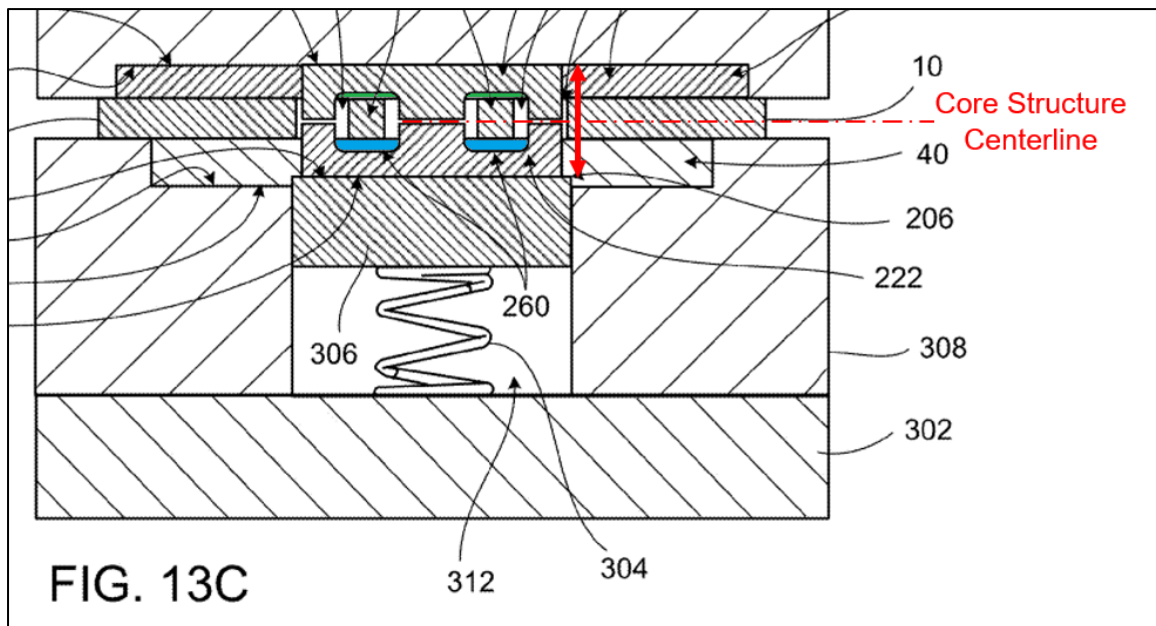
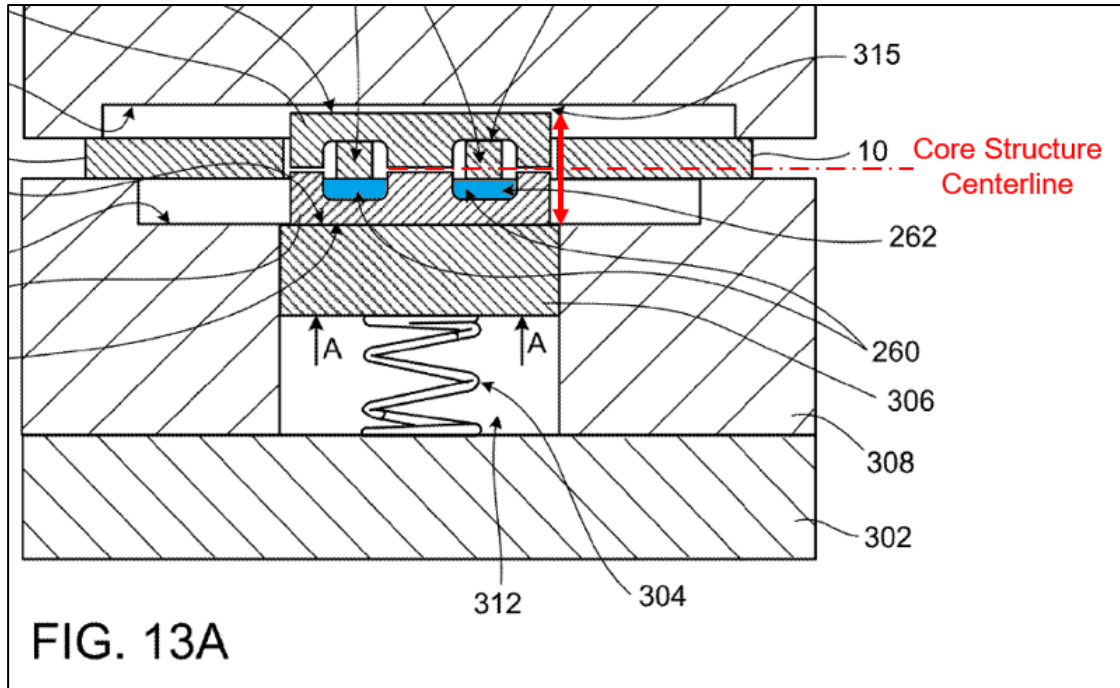


However, Vinciarelli-269 teaches that the PCB is not positioned halfway between the transformer’s matching core halves. Phinney, ¶¶78-80; *cf.*

Petition, 34. Instead, Vinciarelli-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. Phinney, ¶¶78-79. 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.

Indeed, Vinciarelli-269 discloses “clamping [the PCB] relative to the mold *and biasing* [the transformer] *in position* against a predetermined feature of the mold.” *Id.*, 3:15-34 (emphasis added). “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.* (emphasis added); *id.*, 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.*, 12:7-27, FIGs. 13A-13C (reproduced below with annotation). The transformer being 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. Phinney, ¶79.



Vinciarelli-269 does not disclose any configuration in which the PCB is positioned halfway between transformer core halves, and Petitioner and Dr. Baker's conclusions of a halfway positioned PCB are not based on any actual

evidence. Phinney, ¶80. As precisely measured above, FIG. 9 of Vinciarelli-269 also does not illustrate a PCB being positioned halfway, and *Gengrinovich* prohibits use of FIG. 9 alone to show precise PCB centering anyways. *See Gengrinovich*. Regardless, it is moot to discuss a centered PCB, because [1f] is not met simply by a centered PCB, as previously explained. The notion of a centered PCB, by itself, informs nothing about the PCB's thickness nor the relationships with component thicknesses that would possibly place the PCB within the claimed height range.

Centering of a PCB is not the right analysis for [1f], and Vinciarelli-269 does not teach even that. Petitioner's additional reliance on Vinciarelli-269 therefore does not cure the Ground 1A.

Ground 1A is defective because it fails to sufficiently show a carrier that is "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. In doing so, Petitioner mixes-and-matches features from disparate embodiments, jamming

them into the Vinciarelli-664.⁵ Ground 1A is therefore defective as a procedural matter for its failure to show that “Claims 1-6 are *Anticipated* by Vinciarelli-664.”

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); *see also Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008) (requiring that a single document must disclose the same arrangement or combination of claim limitations, *i.e.*, in a single embodiment). Inherency of a claimed element 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) (limiting *Kennemetal’s*

⁵ This was done with respect to [1f] using Vinciarelli-664 and Vinciarelli-269.

This has been previously described. This is further done by Petitioner with respect to Vinciarelli-664, U.S. Patent No. 8,966,747 (“Vinciarelli-747”) and obviousness arguments (guised as inherency arguments) described in detail herein.

“at once envisage” standard as specifically “address[ing] whether the disclosure of a limited number of combination possibilities discloses one of the possible combinations,” *see Kennemetal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015)). 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. Petition, 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. *See* 35 U.S.C. § 103 (defining legal obviousness on whether “a person having ordinary skill in the art” would understand “the differences between the claimed invention and the prior art” as obvious). This is incurably defective.

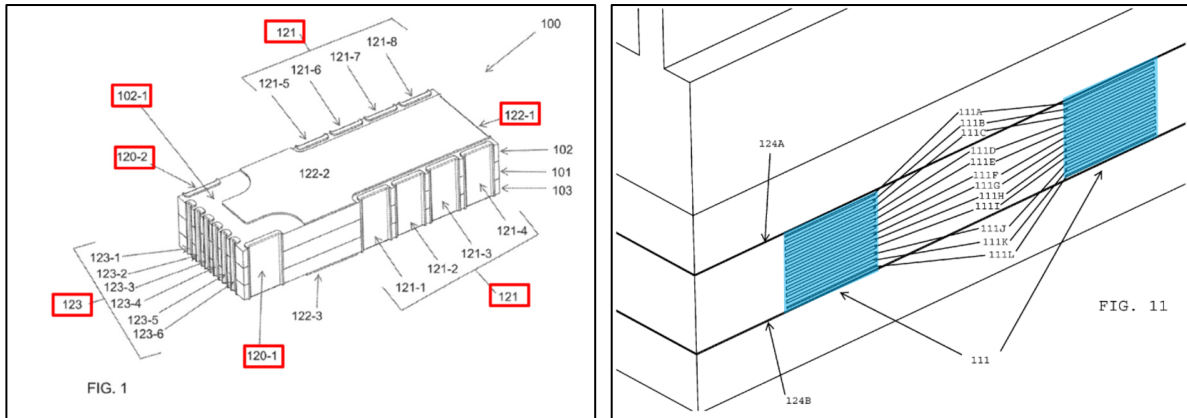
a. Ground 1A, [1b]: Petitioner uses an obviousness analysis.

Petitioner relies on an obviousness-type analysis in an attempt to cure Vinciarelli-664’s deficiency for the claimed “a first electronic component disposed at the lower surface of the carrier” and “a second electronic component disposed at

the upper surface of the carrier” (limitation [1b]). Petitioner acknowledges that Vinciarelli-664 only illustrates encapsulant layers, not how any components are disposed with respect to the PCB. Petition, 16-21. The Petition also notes that its cited portion of Vinciarelli-664 only states “components mounted on the printed circuit board 101.” *Id.*, 17. Components can exist on a singular surface of the carrier under certain scenarios (*e.g.*, Phinney, ¶87), and those scenarios render Petitioner’s inherency argument void. However, if limitation [1b] is missing in Vinciarelli-664, the Petition needed to show that it “*necessarily exist/s*” in Vinciarelli-664, and the Petition made no such showing. *See* Petition, 16-21.

b. 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. *See* Petition, 22-23 (including annotated version of Vinciarelli-664’s FIG. 1, reproduced here below); Vinciarelli-664, 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); *see also Wasica Finance GmbH v. Continental Automotive Systems Inc.*, 853 F.3d 1272 (Fed. Cir. 2017) (citing *Verve LLC v. Crane Cams Inc.*, 311 F.3d 1116,1120 (Fed. Cir. 2002)) (reiterating that “a single reference” must “describe the claimed invention with sufficient precision and detail to establish that the subject matter existed in the prior art”).

All of Petitioner’s proposed remedies fall short. In its *first* proposed remedy, Petitioner imagines that its skilled artisan would combine the teachings of

Vinicarelli-747 with the embodiments of Vinciarelli-664. Petition, 23-25.

Petitioner effectively proposes modifying Vinicarelli-664's disclosed embodiment to replace its buried vias with conductive through-holes that are coupled to the contacts. *See* Petition, 25. But this improperly implies an additional embodiment that is not literally disclosed anywhere in Vinciarelli-664 or Vinicarelli-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. Phinney, ¶92. 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. Phinney, ¶92. 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, 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,

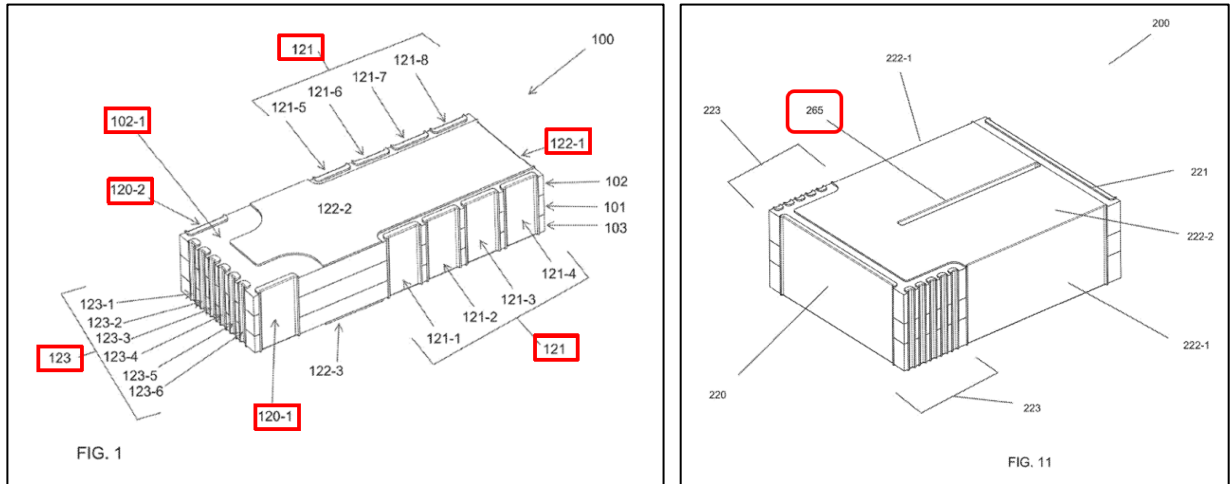
which also enlarges the module's height and decreases the module's power density. Phinney, ¶92. Vinicarelli-747 and Vinciarelli-664 do not present a motivation to arrive at Petitioner's suggested modification for an obviousness analysis, and this falls far short as an argument that Vinciarelli-664 somehow 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. Petition, 25-26. In particular, Vinciarelli-664 discloses two different power converter modules. *Compare* Vinciarelli-664, FIG. 1 (Petitioner-annotated version reproduced below (Petition, 22)) *with* Vinciarelli-664, FIG. 11 (annotated to show thermal conduit). Notably, these are distinct devices (as visibly clear) and different configurations.⁶ Phinney, ¶¶93-94. Yet again, Petitioner solely and improperly relies upon what “[a] skilled artisan would have understood” from these separate teachings together, instead of what is

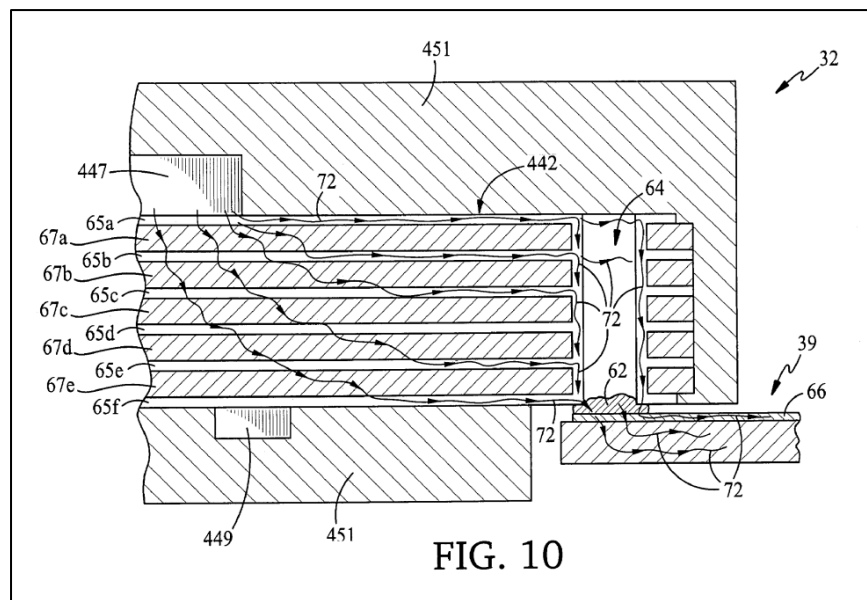
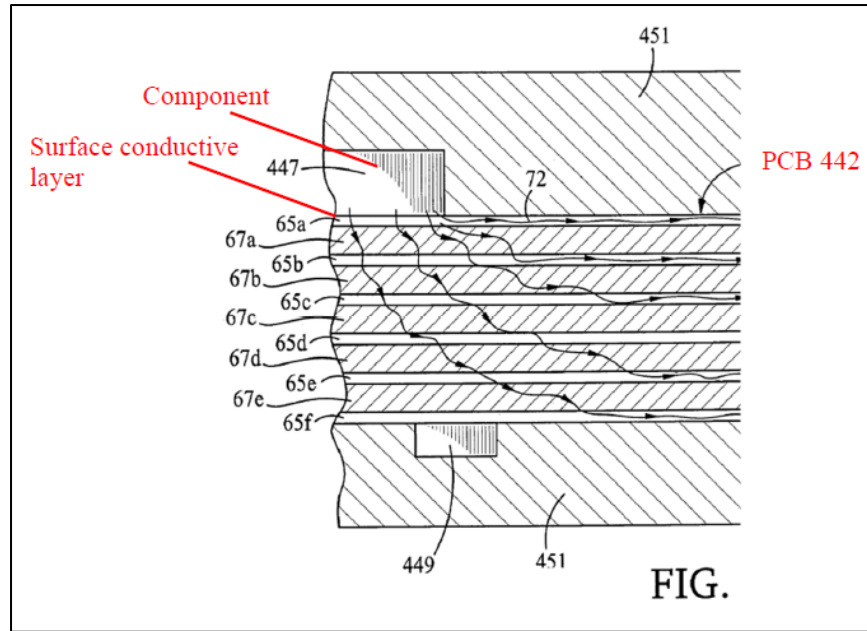
⁶ The FIG. 1 device has a top shield 122-2 “separated from the input contacts 120-1 and 120-2, output contacts [121-X], and control contacts [123-X].” Vinciarelli-664, 10:62-11:5. The FIG. 11 device has “a conductive shield 222-2 on the top of the module which may as shown be electrically and connected to the common contacts 222-1.” *Id.*, 13:7-10.

literally taught or what necessarily exists. *See* Petition, 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.

Phinney, ¶94.



In its *third* remedy, Petitioner argues that a skilled artisan would read in a configuration disclosed in Vinciarelli-844. Petition, 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. Petition, 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. Phinney, ¶95; Vinciarelli-844, 14:63-15:3. But further, Petitioner commits the thematic 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.

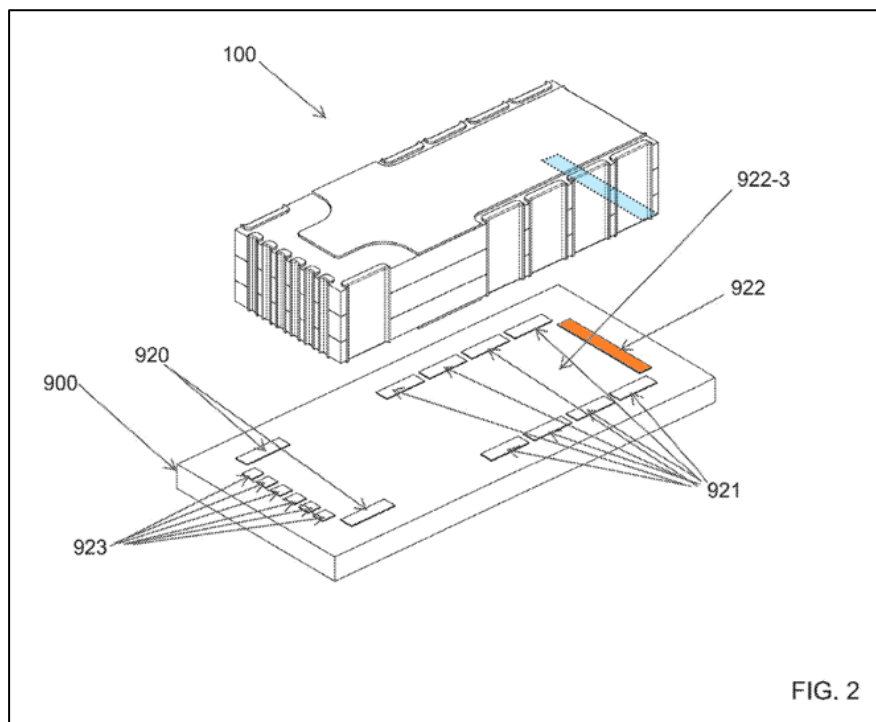
- “A skilled artisan would have understood that the circuit board described in Vinciarelli-844 is exemplary of a circuit board that would be within the power converter module of Vinicarelli-664.” *Id.*, 27-28.

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.

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

The Petition also fails to establish that limitation [1e] necessarily exists in Vinciarelli-664. Vinicarelli-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.” Phinney, ¶106. According to Vinciarelli-664’s disclosure, the bottom shield/contact 122-3 would be shaped as demonstrated (in blue) in the annotated version of Vinciarelli-664’s FIG. 2 shown below.

Id., ¶¶99-104. As explained by Dr. Phinney, POSITAs 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 Dr. Phinney identifies; otherwise, the bottom shield/contact 122-3 could not function as a bonding pad that mates with pad 922. *Id.*, ¶106. As such, Vinciarelli-664 cannot meet both prongs of [1e].



3. Grounds 1B-1C: Petitioner's Various Secondary References Do Not Cure the Deficiencies of Vinciarelli-664.

a. Grounds 1B-1C fail to cure the deficiencies of Ground 1A with respect to [1f].

As described above, Vinciarelli-664 (and Vinciarelli-269) fail to teach [1f].

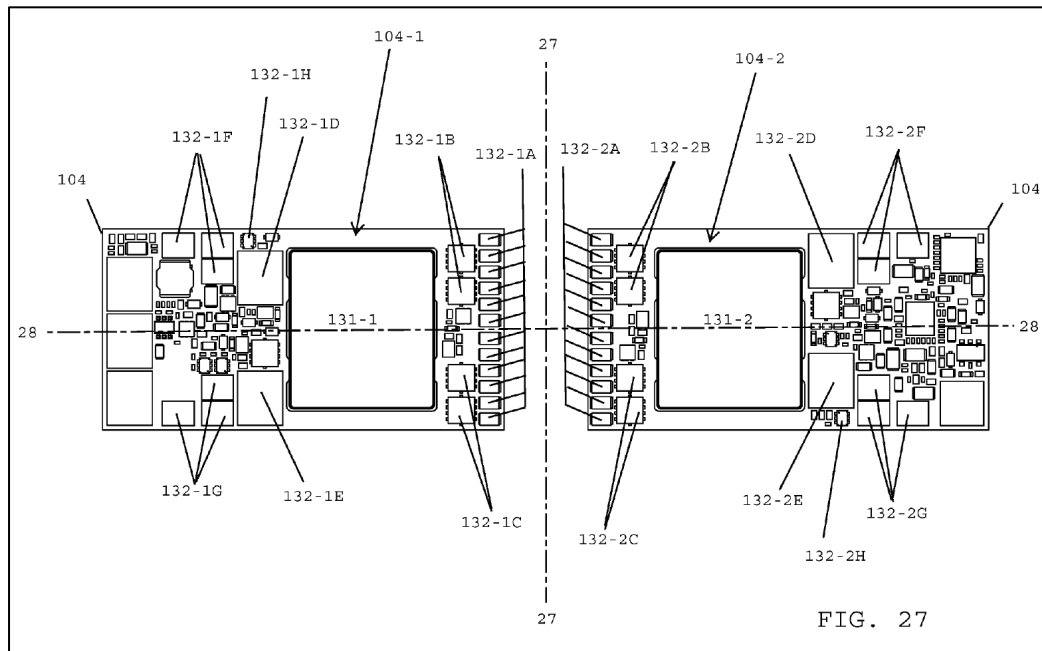
Petitioner does not use Grounds 1B-1C to cure those deficiencies via its identified

references (Vinciarelli-269, Vinciarelli-844, and Vinciarelli-747) for Ground 1B (Petition, 48-52) or from the identified references (Vinciarelli-269, Vinciarelli-844, and Vinciarelli-747 and Zeng-014) for Ground 1C (Petition, 53-62). Petitioner does not particularly identify that [1f] is being addressed in either ground via combination—and via specific motivation to modify Vinciarelli-664—and thusly fails to cure Ground 1A’s deficiency.

Petitioner does describe [1f] limitation in a passing under Ground 1B, 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.” Petition, 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], as Patent Owner explained with Ground 1A. 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. Petition, 52 (citing Vinciarelli-747, 22:46-24:49). This section refers to Vinciarelli-747’s

FIG. 27 (excerpted below) which does not describe the symmetry of component sizes in the vertical direction relevant to the analysis, and instead refers to symmetrical components. 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.



Ground 1C does not analyze Zeng-014 at all for [1f] or make any arguable reference to this limitation, only referring to Vinciarelli-664. Petition, 61 (“See Ground 1A, [1d]-[1f].”). Ground 1C accordingly fails to meet [1f] for the same reasons that Ground 1A fails. Phinney, ¶117.

Grounds 1B and 1C each are based upon prior art combinations in which Vinciarelli-664 is the primary reference to teach [1f]. Because Petitioner repeats

its prior defective analysis of Vinciarelli-664 with respect to [1f], Grounds 1B and 1C fail for the same reasons discussed *supra*.

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

Ground 1B is a relabeling of Ground 1A as an obviousness argument.

Ground 1A admits missing limitations, but Petitioner's Ground 1A analysis fails to provide a limitation-by-limitation analysis or motivation to incorporate those features. Ground 1B merely repeats the analysis with general discussion. This fails to provide motivations to arrive at certain limitations with the requisite clarity.

Petitioner's challenge to the claims under Ground 1B is essentially boiled down to this statement:

It would have been obvious to a skilled artisan to look to [the '269 patent], [the '844 patent], and [the '747 patent] to *provide details concerning power converters that may be absent from Vinciarelli-664 for all the reasons discussed in Ground 1A*. VICOR-1003, ¶¶123-132. See discussion for each claim in Ground 1A regarding the combination of Vinciarelli-664, [the '269 patent], [the '844 patent], and [the '747 patent].

Petition, 48-49 (emphasis added).

Ground 1B also focuses on the same missing limitations that Petitioner specially and improperly addresses in Ground 1A, and thus is essentially a rewriting of the “a skilled artisan would have understood/envisaged” language, without specific motivation. Ground 1B fails to meet the requirements of

37 C.F.R. § 42.104(b)(4). Those requirements state that the Petition must identify “[h]ow the construed claim is unpatentable under the statutory grounds identified in [§ 42.104(b)(2)]. *The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon.*” 37 C.F.R. § 42.104(b)(4) (emphasis added). Contrary to this requirement, Ground 1B simply refers to Ground 1A and does not specifically identify any claim limitation of claim 1, and motivations to arrive at any of those claim limitations.

Most specifically evident in the failure in motivation is Petitioner’s failure to address Vinciarelli-747’s language dissuading combination, discussed above with Ground 1A, [1d]. Vinciarelli-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. Phinney, ¶115. A POSITA would not have made said combination. *Id.*

Ground 1B should thusly be rejected.

c. Ground 1C: Petitioner’s motivation to combine Vinciarelli-664 and Zeng-014 fails.

Ground 1C is based upon a proposed combination of Vinciarelli-664 and Zeng-014; however, a POSITA would not be motivated to form the proposed

combination. Ground 1C is therefore defective.

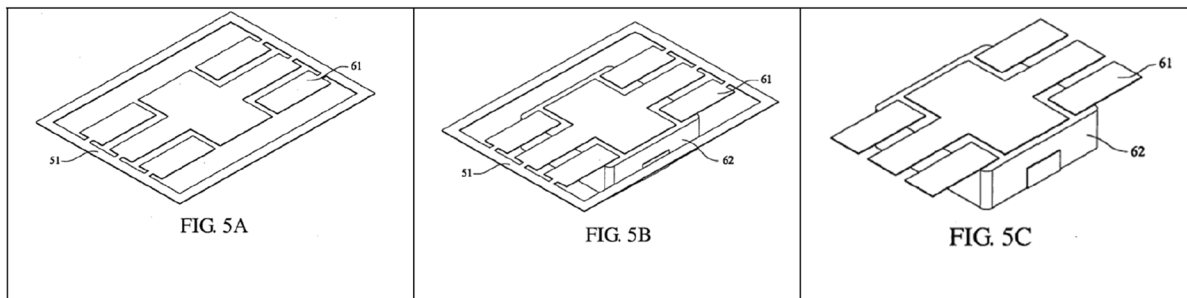
The Petition improperly dismisses and disregards aspects inherent in Vinciarelli-664 that would destroy the proposed combination. The proposed combination ignores clear preferences in Vinciarelli-664 for bulk panel-based production.

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, 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.*, 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.*, FIGs. 4-9.

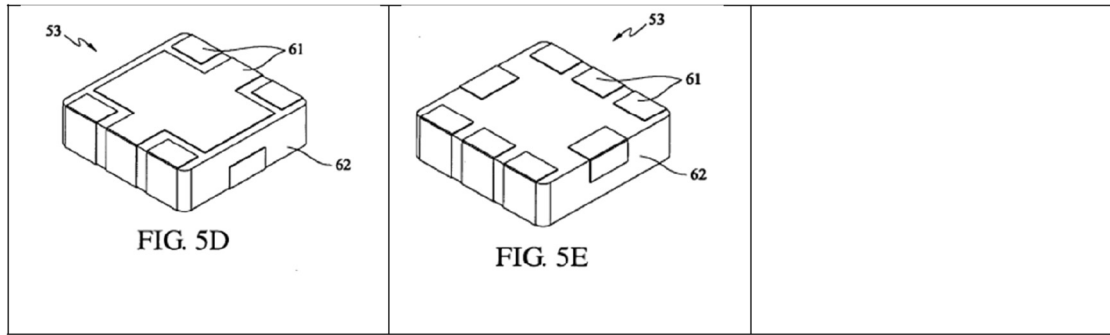
Importantly, Vinciarelli-664 discloses that the “complex contact structures” are formed prior to singulation during this manufacturing method. Phinney, ¶119. Forming these contacts while the modules are un-singulated and part of a large panel has a clear purpose and clear benefits. *Id.* For one, the 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.” Petition, 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. Phinney, ¶124. 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.” Petition, 60-61 (emphasis added); VICOR-1003, ¶144. Dr. Baker provides another alleged motivation in support of the proposed combination:

“a skilled artisan would have been motivated to use such established manufacturing technologies which would lower the risk factors involved in the manufacturing process from using a newer technology (and of course, the skilled artisan would have been motivated to use new technology as well—both motivations exist and the deciding factor would be the available manufacturing equipment).

VICOR-1003, ¶144.

This is far from reasonable or accurate. 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. *See* Petition, 60-61. Indeed, it would be physically impossible to wrap Vinciarelli-664's electronic module using a frame if those side surfaces are not exposed. Phinney, ¶123.

And so, Petitioner would have the Board believe that a 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"). *See* Phinney, ¶124. Indeed, Petitioner imagines that a POSITA would abandon a process that forms contacts on thousands of modules in effectively one pass, 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. Phinney, ¶124. 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. Phinney, ¶124.

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).

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) ("A proposed modification [is] inappropriate for an obviousness inquiry when the modification render[s] the prior art reference inoperable for its intended purpose.").

Finally, a POSITA would understand that the current level of the lead is proportional to its thickness. A thinner lead may be easier to bend, but would not be unable to convey higher currents. For higher currents, thicker leads would be used, but those leads would have to be thicker. A POSITA would have understood that, with thicker leads, curving may cause damage to the body. Phinney, ¶133. Yet, there is no discussion in the Petition regarding such considerations and how a

POSITA would be motivated to resolve lead thickness and current level issues when modifying Vinciarelli-664 as proposed. *Id.*

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: Petitioner Fails to Establish a Reasonable Likelihood of Prevailing.

Petitioner's Ground 2 is based upon a combination of Vinciarelli-218 and Zeng-014. According to Petitioner, a POSITA would modify a module disclosed in Vinciarelli-218 by performing Zeng-014's lead frame wrapping on it.

Petition, 73. Ground 2 fails firstly because the modified module does not meet the quantitative limitation of [1f]. Ground 2 fails further because a POSITA would not be motivated to make this modification for a multitude of reasons.

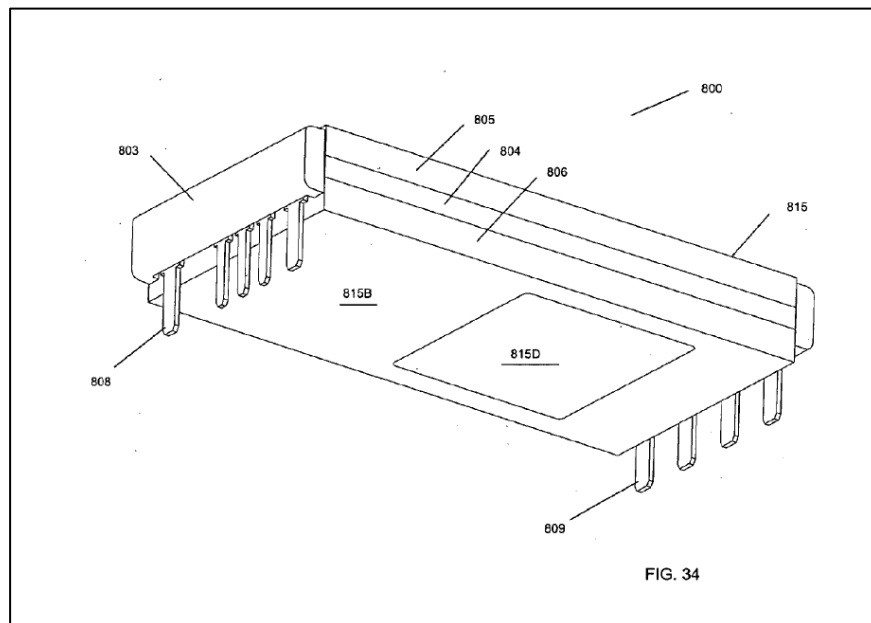
1. Ground 2 Fails to Teach [1f].

As already discussed, [1f] requires specific locations and sizings that simultaneously incorporate requirements for power density and for mechanical integrity/durability for a power converter module. *See* Phinney, ¶45. Just as in Grounds 1A-1C, the prior art here in Ground 2 fails to teach a carrier “disposed at 1/3 to 2/3 of a height of the power converter” and fails to consider the simultaneous design considerations embodied within this precise quantitative limitation. Ground 2's prior art does not meet [1f] and does not motivate a

POSITA to reach [1f].

For [1f], Petitioner appears to rely on two teachings within Vinciarelli-218 , but both teachings (and Vinciarelli-218 as a whole) fall far short of [1f]. Petitioner copies Vinciarelli-218’s FIG. 34 (reproduced below) and states that it shows “the printed circuit board is mounted in the middle of the power converter.”

Petition, 78. Petitioner additionally cites Vinciarelli-218’s discussion of “Symmetrical Distribution Between PCB Surfaces” which suggests that the upper/lower components have the same thicknesses. *Id.*, 79. Neither teaches [1f], and these deficiencies represent Petitioner’s repeated error in avoiding the carrier thickness requirement included within [1f].



With respect to FIG. 34, long-held caselaw allows only positional relationships to be gleaned. *See Hockerson-Halberstadt*, 222 F.3d at 956. FIG. 34

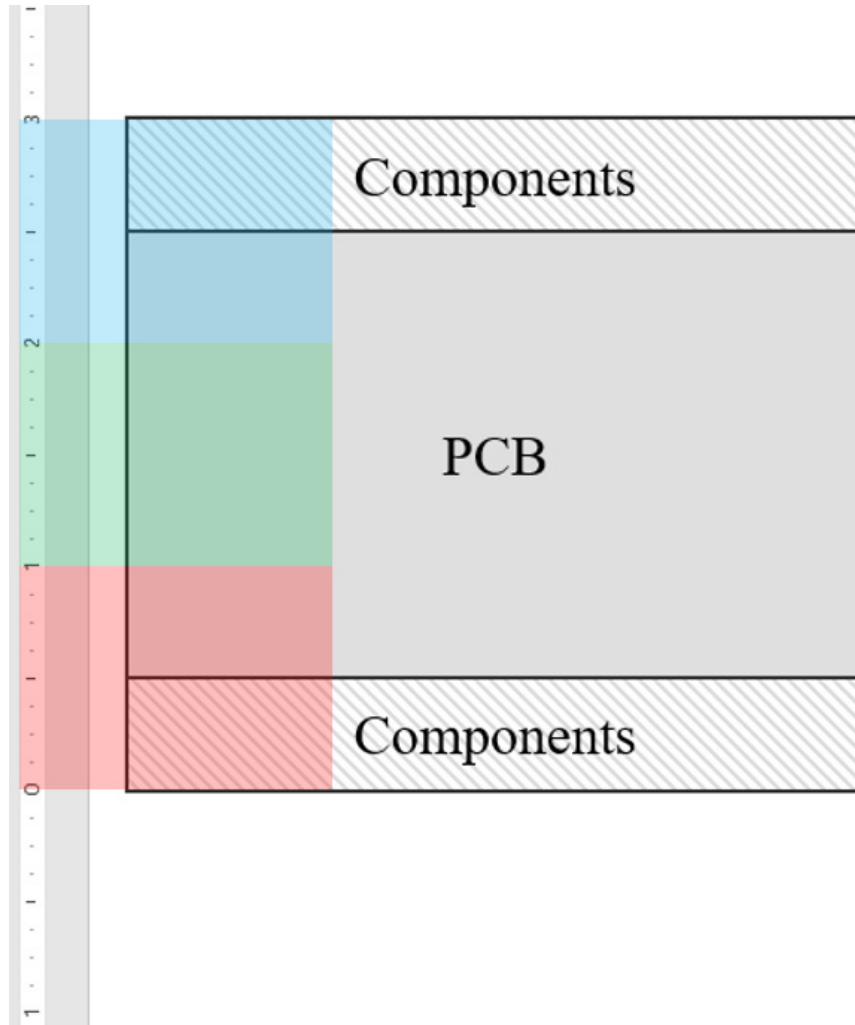
is a non-scale drawing, and Vinciarelli-218's text is silent on any thicknesses or sizes for any portion of the illustrated module. Phinney, ¶146. As such, the extent of what FIG. 34 can convey is a PCB 804 being located *somewhere* between an upper encapsulant 805 and a lower encapsulant 806. *Id.* That is, FIG. 34 cannot teach exactly where the PCB is sandwiched by two encapsulant layers or whether the PCB is within or outside any given height range. *Id.* FIG. 34 is therefore incapable of meeting [1f].

Vinciarelli-218's description of component symmetry on both sides of a PCB does no better than FIG. 34; the extent of Vinciarelli-218's teachings still falls short of [1f]. The component symmetry taught by Vinciarelli-218 involves mirroring the components on one side of the PCB to the other side of the PCB. Vinciarelli-218, [0147]-[0148]. At a given point along the horizontal plane of the PCB, the component mounted above and the component mounted below may have approximately the same individual thickness due to being the same component (e.g., the same capacitor). Phinney, ¶147.

Vinciarelli-218's symmetry may imply a component thickness ratio of around one, but still, the other critical requirement of [1f] in carrier thickness is left untaught. Phinney, ¶¶148-149. The discussed symmetry can result in the same as a centered PCB, but as discussed throughout herein, a centered PCB does not meet [1f] without further defining carrier thickness. *Id.*, ¶149. And that is exactly

missing from Vinciarelli-218's discussion of component symmetry. *Id.* Indeed, there is no direct discussion of carrier thickness nor any discussion of other proportions or ratios with any sized components from which carrier thickness can be inferred. *Id.*

It should again be emphasized that [1f] is not met by a centered PCB without a discussion of PCB thickness, because a centered PCB with undefined thickness is not within the claimed $1/3$ to $2/3$ height range. An example showing a centered PCB failing to satisfy [1f] is demonstrated in the below drawing. As shown below, a PCB is centered or halfway in the converter's height, but extends well past the claimed $1/3$ to $2/3$ height range (shaded in green) below the $1/3$ height (in red) and above the $2/3$ height (in blue). Phinney, ¶152.



As there is no discussion of carrier thickness, Vinciarelli-218’s teachings of component symmetries also do not meet [1f]. Phinney, ¶154.

Vinciarelli-218’s failures to meet [1f] are evident from the hollow obviousness arguments made by Petitioner. Petitioner again appears to rely on Dr. Baker’s false premise that “[a] centered printed circuit board with components on both sides would meet this height requirement.” Specifically, this reliance forms when Petitioner argues that “it would have been obvious based on the disclosures

in Vinciarelli-218 to place the circuit board within the range of $1/3$ to $2/3$ of the height of the power converter, at least because Vinciarelli-218 discloses the value of symmetry in placing components on either side of the printed circuit board.” Petition, 79-80.

This reasoning is fatally flawed, and to the contrary, a POSITA would not have found it obvious to arrive at [1f] only from a one-dimensional teaching of component symmetry. Phinney, ¶¶144-154. Again, [1f] is multi-dimensional and simultaneously incorporates both a power density requirement (via carrier thickness) and a mechanical integrity requirement (via component thickness ratio). *Id.*, ¶45. Neither Petitioner nor Dr. Baker explains how the POSITA would arrive this two-pronged aspect of [1f]. Petitioner’s and Dr. Baker’s arguments for the obviousness of [1f] is nothing more than impermissible hindsight bias.

Moreover, not only does Dr. Baker falsely present a centered PCB as satisfying [1f] but here also fails to establish actual motivations for a POSITA to reach [1f]. Instead, Dr. Baker simply plays a **guessing** game of probabilities that cannot support any argument of obviousness. Dr. Baker states “There are only a finite number of possible placements. . . . When there are components on both sides of the board, the board would generally be in the middle **and more often than not** would fall within the claimed range.” VICOR-1003, ¶175 (emphasis added). There is no evidentiary support for this, and this conclusion is no more

than an unfounded guess. And given the lack of prior art teaching of PCB thickness, only the exact opposite of Dr. Baker’s reasoning is true: there are an *infinite number* of possible carrier configurations, including a 2/3 thick PCB, a 5/12 thick PCB, a 6/15 thick PCB, and so on, none of which satisfy [1f]. *See* Phinney, ¶153. Dr. Baker’s statement that the board would simply “fall within the claimed range” is nothing more than a dart throw. *See* Phinney, ¶153.

Petitioner has not shown [1f] under Ground 2, and Ground 2 thusly fails.

2. Ground 2: Petitioner Lacks a Motivation to Combine

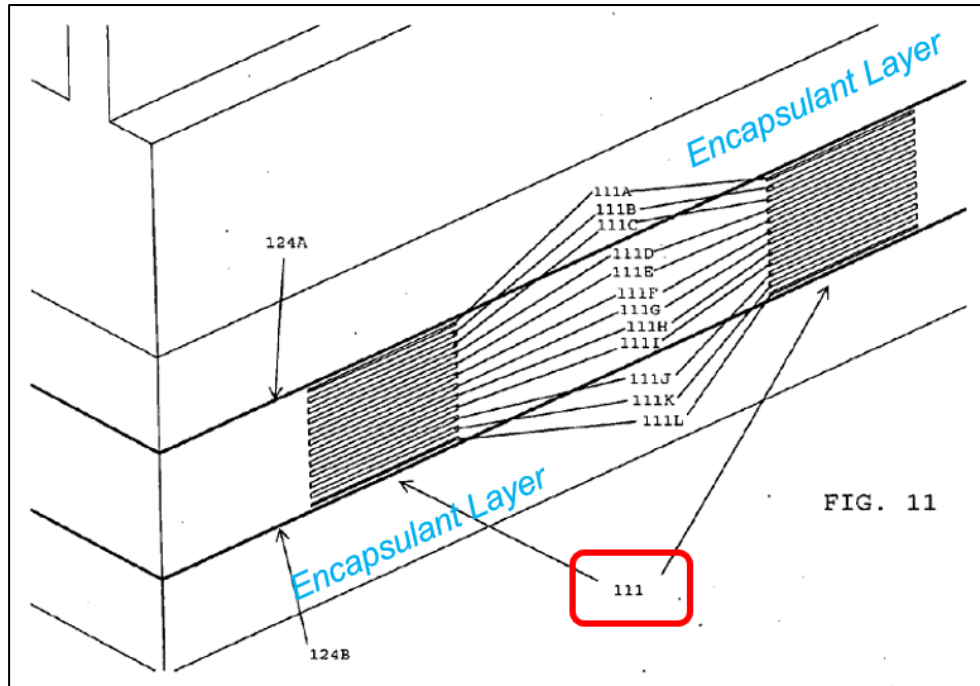
a. A POSITA could not succeed using Zeng-014’s lead frame wrapping on Vinciarelli-218’s modules.

Petitioner’s proposed combination hinges upon an unreasonable proposal to incorporate Zeng-014’s teachings as an inferior alternative to solutions already described in Vinciarelli-218. In particular, a POSITA would consider Zeng-014’s lead frame wrapping to be infeasible for contacting PCB side edge “bar codes,” compared to Vinciarelli-218’s adapters specially suited for that purpose. A POSITA would not have made such combination, and Ground 2 is defective for at least this reason.

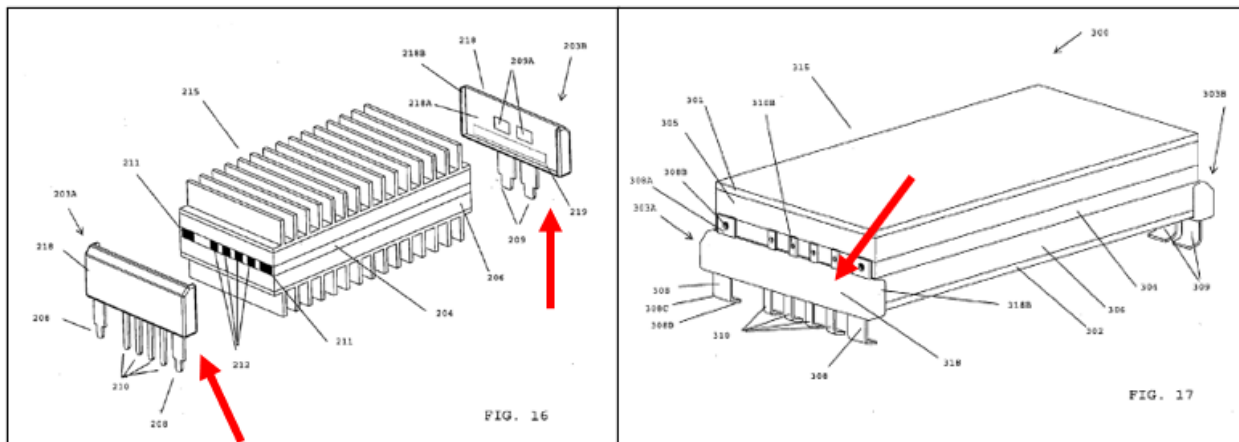
Vinciarelli-218 initially discloses a need to connect to interconnection features that are disposed on the side edges of a module’s PCB (“bar codes”) and exposed through panel singulation. Vinciarelli-218’s disclosure exists in a molding process that starts with a panel of un-singulated power converters, later

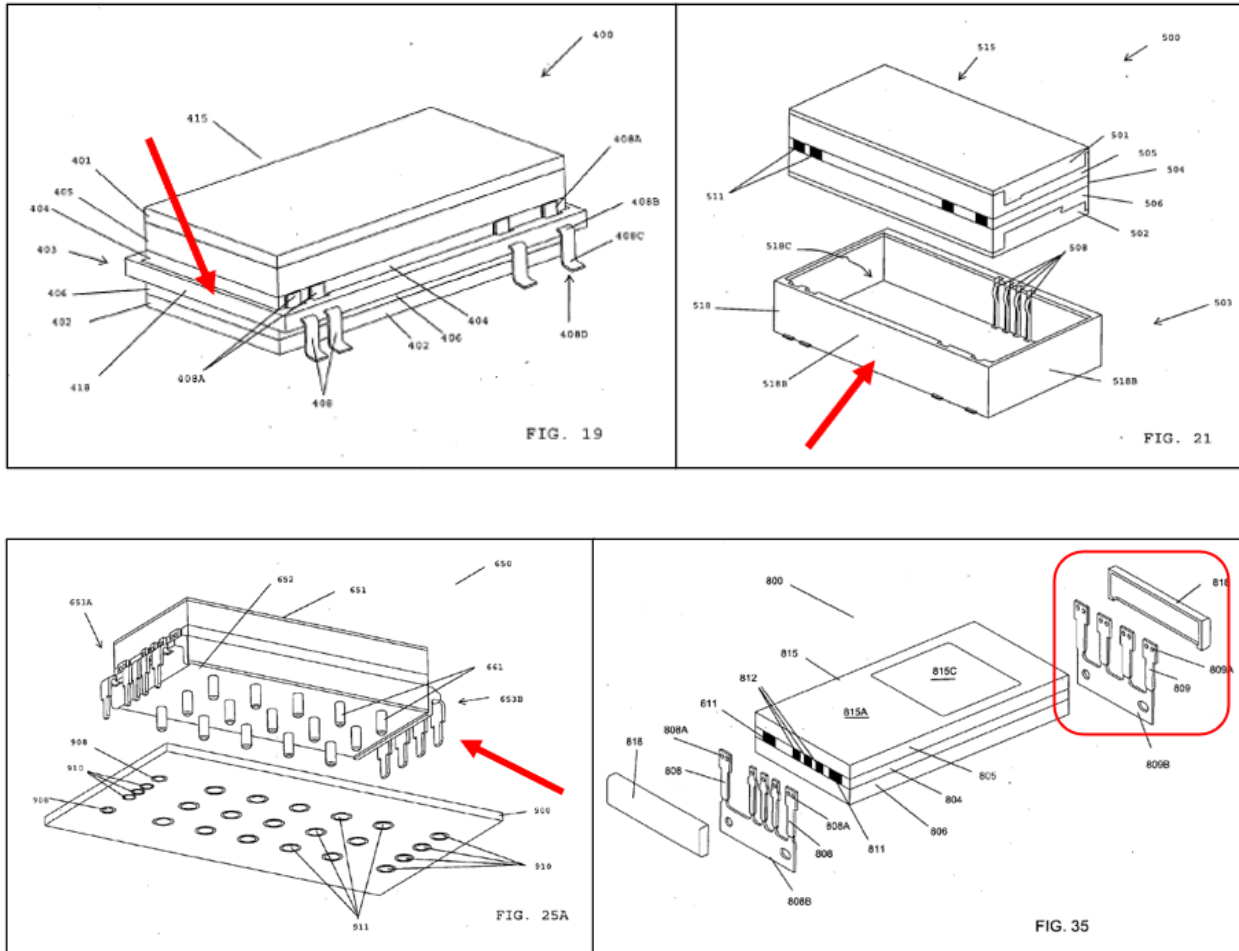
singulated to produce many individual power converter modules. *See* Vinciarelli-218, Title, Abstract, [0085]-[0087].

Vinciarelli-218's molding process covers the top and bottom surfaces of the panel (and its modules) with encapsulant. *Id.*, [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 of this molded encapsulant, the interconnection features for each individual module are necessarily located along the side edges of its PCB. Phinney, ¶159. 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. Vinciarelli-218, [0107]. Specifically, these interconnection features are described as “bar codes,” with multiple conductive strips arranged vertically along the edge of the PCB. *Id.*, [0108], FIG. 11 (reproduced below with annotation).



Vinciarelli-218 provides solutions to the need to connect to the bar codes’ small footprint. Within its own four corners, Vinciarelli-218’s disclosure provides “various types of connectors or adapters [that] may be coupled to the exposed interconnects . . . at the edges of the singulated module.” *See Vinciarelli-218*, [0160]; *see also id.*, [0112]-[0133], FIGs. 13-26, 35 (selectively reproduced below).





For example, the Horizontal Through-Hole Mount adapter shown in FIG. 16 includes “exposed areas [of two power terminals that] align with their respective interconnects when the adapters 203A, 203B are assembled onto the module 215.” *Id.*, [0116]. As another example, the Surface-Mount Lead Frame includes a frame body that “leave[s] a portion of the terminals exposed for making connections to their interconnects during assembly and for post assembly inspection.” *Id.*, [0124]. In heat-sink-less embodiments (FIGs. 33-35), adapters 803A, 803B are attached to the horizontal ends of the module where the bar codes are exposed. *Id.*, [0158]-

[0160], FIGs. 33-35.

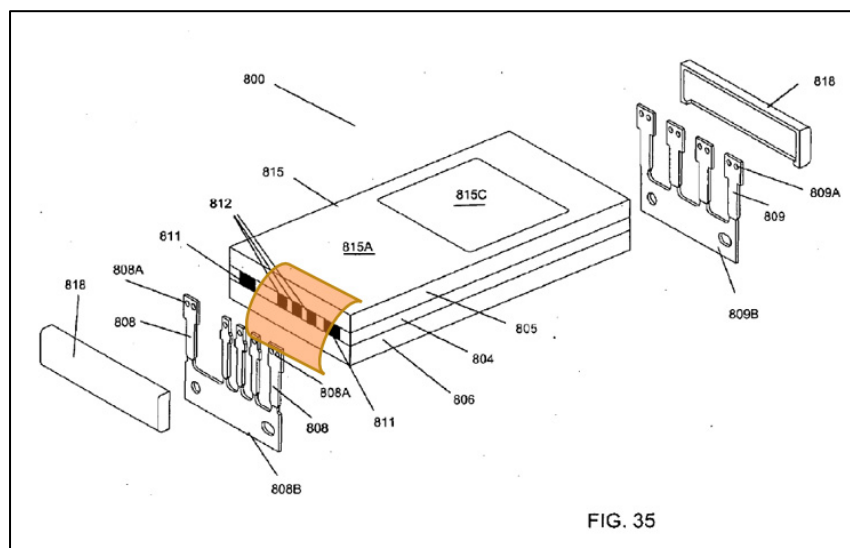
A POSITA would readily appreciate that the wide variety of these adapters are well-suited for providing electrical contact to the small bar codes, while also providing versatility to different customer needs. Phinney, ¶162. Importantly, the POSITA would also have their concerns regarding the usability of the small bar codes, introduced in the first portion of Vinciarelli-218, assuaged by these adapter solutions, disclosed in the second portion of Vinciarelli-218. *Id.*

Petitioner argues that Zeng-014’s lead frame wrapping should be incorporated into Vinciarelli-218 to electrically connect to the bar codes. Petition, 74 (“the conductive layer 61 would provide contacts to the interconnects”). However, this is hindsight driven, as lead frame wrapping is an inferior and unnecessary means of contacting the interconnects compared to Vinciarelli-218’s own adapters. Phinney, ¶163. Lead frame wrapping causes additional contact problems whereas Vinciarelli-218’s own adapters do not. *Id.*

Specifically, Petitioner’s imagined combination is based upon “applying Zeng-014’s lead frame to the module of Vinciarelli-218 and ***curving the contacts against the module*** such that the modules form a unitary structure with contact surfaces on the top, bottom, and sides of the module, as taught by Zeng-014.” Petition, 73 (emphasis added). Petitioner further explains that “the lead frame in Zeng-014 . . . would be ***curved over module 800 from the bottom to the top***” to

replace Vinciarelli-218's adapters. Petition, 73-74 (emphasis added). Petitioner justifies this imagined combination based upon Vinciarelli-218's general disclosure of press-fit and flush-mount adapters. *See id.*, 71-72. Petitioner concludes that this exercise would be "a simple mechanical modification." *Id.*, 74.

To the contrary, a reasonable POSITA would recognize that curving and wrapping a lead frame onto Vinciarelli-218 would not reliably establish and maintain electrical contact with the PCB side edge bar codes of Vinciarelli-218's FIG. 35 embodiment. Phinney, ¶166. 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, never flush when applied to Vinciarelli-218's FIG. 35 embodiment. *Id.* (annotated version of FIG. 35 reproduced below). From this bowing and bending, there would be a significant gap between the lead frame contact and the side edge bar codes. *Id.*



Furthermore, Vinciarelli-218's own adapters/connectors do not suffer from such bowing and imprecision that a POSITA would consider as a possible drawback of applying a lead frame wrapping. Phinney, ¶171. None of Vinciarelli-218's adapter/connectors rely upon wrapping, curving, or bending, and can be directly applied onto the side edge bar codes. *Id.* For instance, the adapters 803A, 803B having terminal portions formed from a lead frame are directly attached or pressed to a heat-sink-less module's side edge bar codes. Vinciarelli-218, [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. *Id.*

Finally, as pointed out by Dr. Phinney, the purported combination would cause many issues unaddressed such as the need for sawing precision in the manufacturing process. *See* Phinney, ¶¶135-139 (generally discussing sawing precision and challenges in panelized modules, such as those in Vinciarelli-664 and in Vinciarelli-218). It is clear hindsight as POSITAs could not overlook these practical issues and cherry-pick features to create an inoperable assembly. The Petition does not identify anywhere in either Vinciarelli-664 or Zeng-014 to address these practical concerns. *Id.*

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.

b. Petitioner presents no valid motivations for combining Vinciarelli-218 and Zeng-014.

Petitioner’s combination is textbook hindsight bias. Petitioner takes Vinciarelli-218’s encapsulated embodiment and states that a POSITA would have placed conductors atop it. Petitioner has no valid motivations, and attempts to hide 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.” Petition, 71. This combination, however, would lead to the exact opposite result. Placing lead frames atop (and below) Vinciarelli-218’s embodiment *increases* size, not decreases it. Phinney, ¶174. 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. *Id.* Petitioner’s first reason for combination rings hollow.

Petitioner’s *second* reason is that stacked devices will not overheat. Petition, 72. This whole passage on stacking Vinciarelli-218’s devices not causing overheating is spun from whole-cloth; there is no evidentiary citation for this. Nonetheless, stacking devices conflicts with the immediately preceding motivation of decreasing height. Phinney, ¶175.

Petitioner's *third* reason that the connection part provides flush mounting lacks evidentiary support. Petition, 72. Providing a conductor atop (and below) Vinciarelli-218's encapsulated device increases size and makes the device less flush. Phinney, ¶175.

Petitioner's *fourth* reason is simply a broad-stroke statement that a POSITA would have been combined because Zeng-014 states it applies to other electronic components. Petition, 73. A broad statement like this does not mean that Zeng-014's teachings can simply be combined with anything. Phinney, ¶176.

Petitioner's *fifth* reason which refers to increased power density and decreasing area is very generic and hollow. Petitioner provides no reason *why* its combination achieves this. Petitioner does appeal to space savings, but it does not reason why a position would have made a device that *increases* height through extra lead-frames atop and on the bottom of the structure, and made the device used in stacking. Phinney, ¶177.

Furthermore, as described below a POSITA would not have had a reasonable expectation of success as claimed by Petitioner (Petition, 74) due to warping issues. This is explained in more detail below.

Petitioner does not answer the question regarding *why* a POSITA would modify Vinciarelli-218 to add conductors atop it. Phinney, ¶179. Doing so goes against Vinciarelli-218's other teachings. *Id.* Vinciarelli-218 describes making its

devices compatible with heating dissipation, i.e., via heatsinks. Vinciarelli-218, [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 that does not dissipate heat. *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.

C. Petitioner Fails to Establish a Reasonable Likelihood of Prevailing on Ground 3.

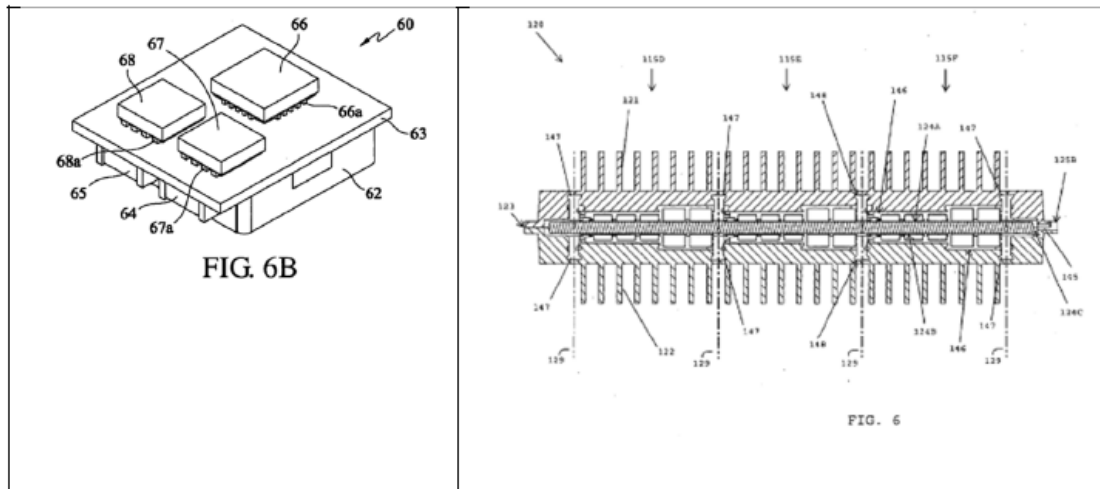
Ground 3 inverts the prior art combination of Ground 2. According to Ground 3, a POSITA would perform Vinciarelli-218's module encapsulation technique on an assembly disclosed in Zeng-014. Petition, 86. Ground 3 is incurably defective for the following reasons.

1. Ground 3 Fails to Teach [1f].

Petitioner has repeatedly missed the mark on the specific sizings required by [1f] in Grounds 1A-1C and Ground 2. Petitioner continues to do so here, and

Ground 3 cannot succeed.

Petitioner argues that a POSITA would have modified Zeng-014 to have its assembly and carrier to be exactly sized as depicted in Vinciarelli-218's FIG. 6. Petition, 91-92. Precisely, Petitioner focuses on the depicted "form factor"—Petitioner describes going "from the form factor on the left below to the form factor on the right" (referring to a side-by-side view of Zeng-014's FIG. 6B and Vinciarelli-218's FIG. 6, reproduced here). *Id.*



Assumed within Petitioner's form factor transformation is that Vinciarelli-218's FIG. 6 meets [1f], and that a modified Zeng-014 would automatically meet [1f] accordingly. Phinney, ¶185. These assumptions are wrong. *Id.* Moreover, Petitioner's form factor modification is completely proposed in hindsight, as explained in the next section. *Id.*

Firstly, Vinciarelli-218's FIG. 6 does not meet [1f], and Vinciarelli-218 as a

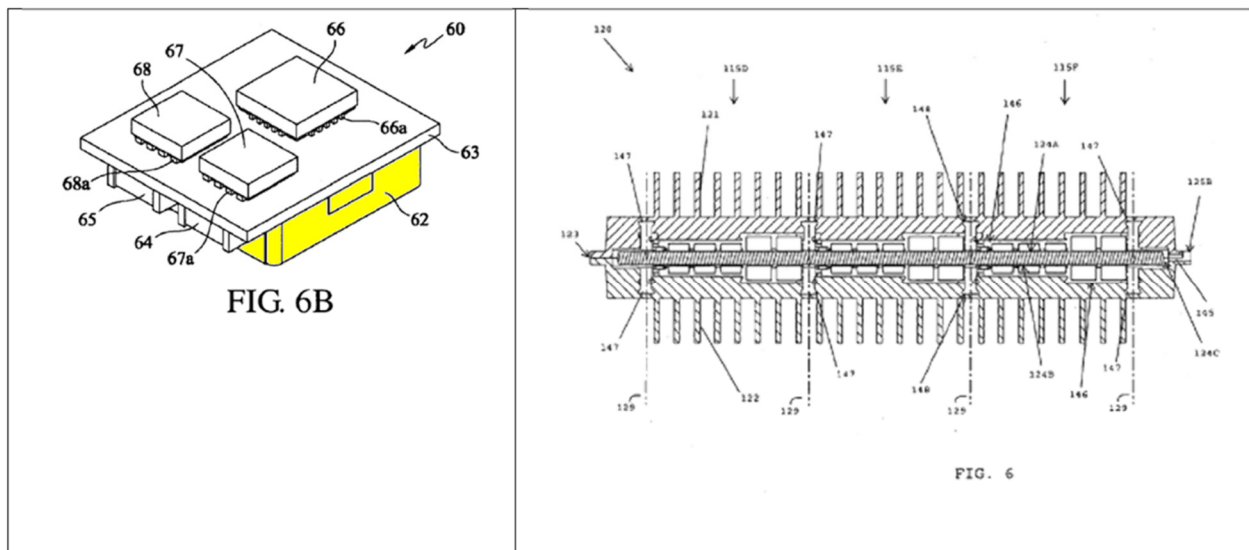
whole also fails to teach [1f], as previously explained. Phinney, ¶¶182-183.

FIG. 6 cannot be relied upon for [1f] because it is a non-scale drawing and because there lacks any corresponding description that teaches any dimensions, sizes, or thicknesses of the illustrated features. *See Hockerson-Halberstadt, Inc.*, 222 F.3d at 956. Then, Vinciarelli-218 as a whole fails to teach [1f] for its complete silence on carrier thickness. Phinney, ¶¶182-183. As previously discussed, [1f] cannot be met without a discussion of carrier thickness. *Id.*, ¶45. The claimed height range in [1f] is a simultaneous incorporation of a carrier thickness requirement and a component thickness ratio requirement. *Id.* A PCB with undefined thickness is not disposed within the 1/3 to 2/3 height range. *Id.*

Secondly, Petitioner fails to show that Zeng-014's assembly modified to be encapsulated according to Vinciarelli-218's FIG. 6 would meet [1f]. Petitioner's modification particularly relates to packaging Zeng-014's converter within encapsulation according to Vinciarelli-218, as well as overall form factor. Phinney, ¶186. These aspects of packaging and form factor are purely external aspects of a power converter and are irrelevant to the positioning and thickness of the PCB that is internal within the power converter. *Id.* Adding encapsulant on and around Zeng-014's converter would not bring or move the carrier in Zeng-014's converter into the claimed 1/3 to 2/3 height range. *Id.*

For instance, consider the sizing of Zeng-014's components and principally

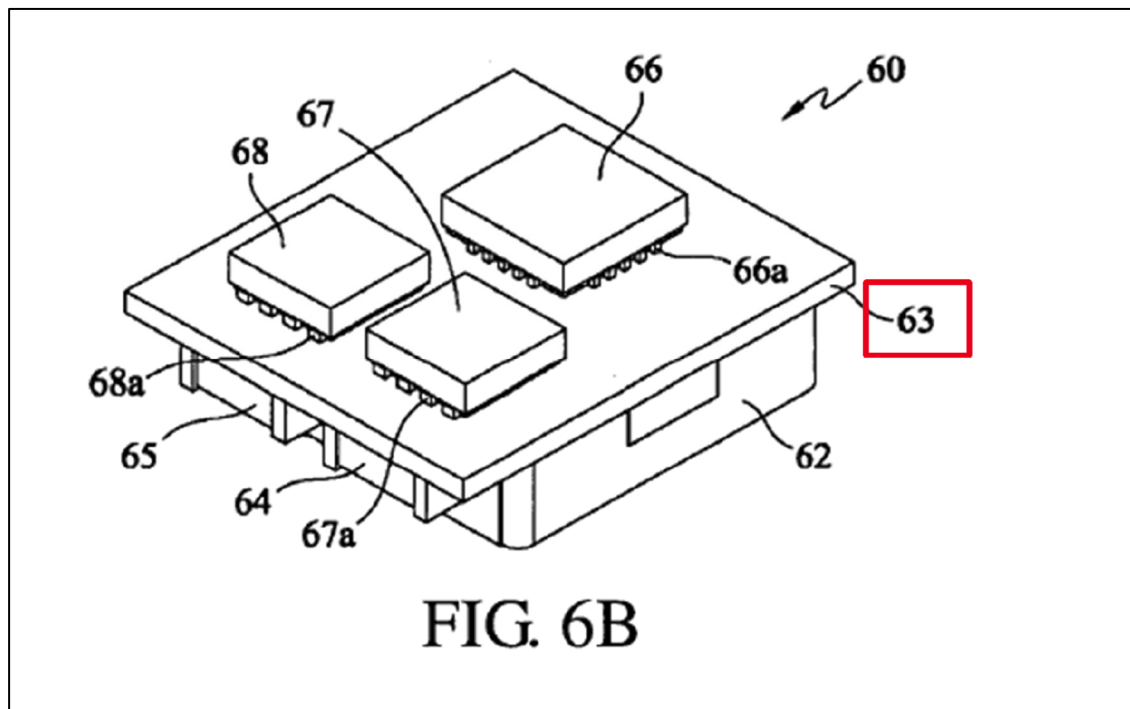
component 62 (annotated yellow) which Petitioner uses heavily for all other limitations relating to the first component. Phinney, ¶187; *see* Petition, 89-90 ([1g]), 88-89 ([1c]), 88 (1[b]). There is no indication in Zeng-014 that these components sizings and the carrier thickness place the carrier within the claimed height range, and by nature of its very reliance on Vinciarelli-218, Petitioner does not seem to think that the carrier in Zeng-014 is within the claimed height range. Phinney, ¶187. However, adding Vinciarelli-218's encapsulant on Zeng-014's assembly does not suddenly push the carrier from outside the claimed height range and into the claimed height range. *Id.* That is, encapsulating Zeng-014's power converter to change its external silhouette to cuboid does not change the sizes of the converter's components nor the thickness of the converter's carrier. *Id.*



As such, Petitioner's combination fails to teach [1f].

2. A POSITA Would Not Have Been Motivated to Combine Zeng-014 and Vinciarelli-218.

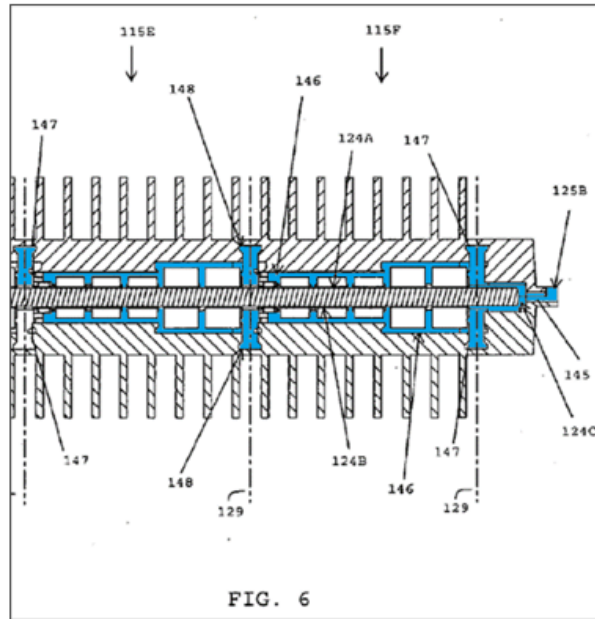
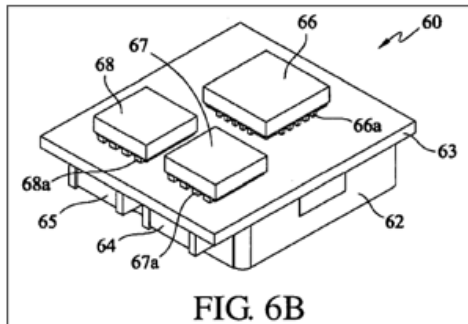
Beyond Petitioner’s combination failing to meet [1f], the purported combination of Zeng-014 and Vinciarelli-218 is clearly hindsight. The Petition begins with Zeng-014’s disclosure of a power converter assembly. Petition, 86-87. Zeng-014 discloses that this power converter, or a “DC to DC converter,” includes a carrier that supports electronic components, and these components can include inductors, control chips, capacitors, and transistors. *E.g.*, Zeng-014, [0085], FIG. 6B (reproduced below).



Zeng-014’s teachings relating to wrapping surface conductors onto components apply to this power converter assembly. Phinney, ¶191. That is, each of the components in the power converter, including but not limited to the

inductive component 62, can include surface conductors. *Id.* Because of the disclosed benefits of using wrapped surface conductors, a POSITA would likely wrap surface conductors on as many components within the assembly as possible. *Id.*

Petitioner then proposes adding encapsulation onto Zeng-014's assembly in the spirit of Vinciarelli-218, for the purpose of making Zeng-014's assembly cuboid shaped. Petition, 87. Vinciarelli-218 includes disclosure of adding encapsulant for an assembly based on enclosing the assembly in mold or heat sink panels and injecting the encapsulant. Vinciarelli-218, [0012]. The Petition states, "Vinciarelli-218 discloses an improvement to such a module ***by encapsulating the components to make a cuboid shaped module*** that provide [sic] ease of manufacturing, produce a multiplicity of modules at a time, and that may be of a small size and surface mounted to a customer board." Petition, 91 (emphasis added). The Petition presents the following figures from Zeng-014 and Vinciarelli-218 respectively in support of its alleged combination (Vinciarelli-218's encapsulant that "make[s] a cuboid shaped module" being annotated in blue). *Id.*, 92.



However, this modification to Zeng-014's assembly is plainly counter-productive, and this form factor motivation is not credible. A POSITA would recognize that making Zeng-014's assembly cuboid-shaped using encapsulant would lead to over-molding, burying, and covering of the assembly components. Phinney, ¶¶193-195. While Vinciarelli-218 does disclose some cuboid-shaped encapsulation that leaves an exposed core surface, a POSITA would understand that every other assembly component with a shorter height than the exposed core is fully buried underneath the encapsulant. *Id.* And assemblies such as those in Zeng-014 and Vinciarelli-218 typically include various different components (e.g., “inductors, control chips, capacitors, and transistors”) having different heights; nowhere does the Petition contend that the proposed combination start from an assembly that includes only uniform height components. *Id.*

Surface conductors of buried assembly components are inoperable.

Phinney, ¶¶193-195. If a surface conductor of an assembly component is buried under encapsulant, then nothing can contact the surface conductor to fulfill its purpose in forming electrical connections. *Id.* For instance, Zeng-014 discloses another electronic component “stack[ing] on and [being] electrically connected to [a wrapped] inductive component,” but this becomes impossible if the wrapped inductive component is buried under encapsulant. *See, e.g.,* Zeng-014, [0013].

Petitioner attempts to account for these hurdles by simply identifying Vinciarelli-218’s PCB edge connections: “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.***” Petition, 91. But bringing in this additional aspect of Vinciarelli-218 is a hindsight remedy that is only induced because of the unproductive incorporation of Vinciarelli-218’s encapsulation aspects. Phinney, ¶195. At best, it is circuitous engineering—it makes little sense to (1) form surface contacts on assembly components for interconnection capabilities, (2) cover the surface contacts with encapsulant thus obstructing those interconnection capabilities, and then (3) incorporate edge connections in the PCB to access those covered contacts to restore those interconnection capabilities. *Id.* As such, Petitioner’s prior art combination of

Zeng-014 and Vinciarelli-218 would not be formed by a reasonable POSITA. *Id.*

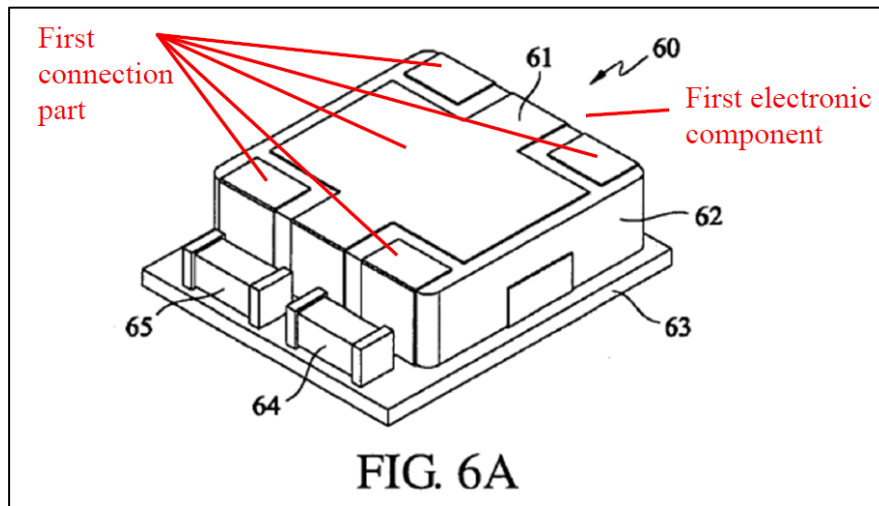
Ground 3 thusly fails.

3. Ground 3 Fails to Teach the Claimed Arrangement of [1c], [1d], and [1e].

[1c], [1d], and [1e] together recite “a first connection part, comprising” “a first terminal electrically coupled to . . . the carrier” and “a second terminal attached to a surface of the first electronic component apart from the carrier.” Petitioner generically identifies separated and isolated features for “[the] first terminal” and “[the] second terminal,” and those features do not together form one “connection part.” Ground 3 therefore fails to meet [1c]-[1e].

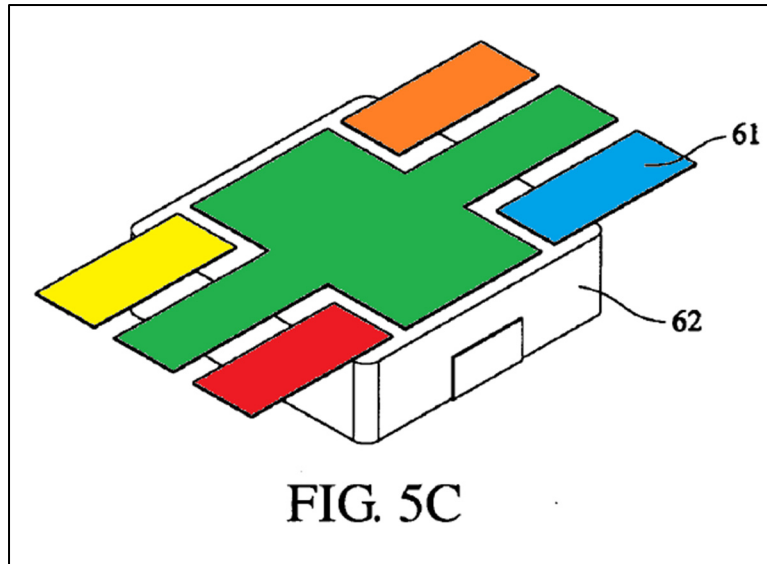
“All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970). To support its contention of obviousness, the petitioner must show claim elements “as set forth in the claim,” or “*as arranged or combined as in the claim.*” *See Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987) (holding this importance of claimed element arrangements for anticipation) (emphasis added). It does not suffice to simply identify the claim elements scattered throughout the prior art; the recited arrangement or combination of the claim elements must be demonstrated as well. *See Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008) (requiring that the prior art include the same arrangement or combination of the claimed limitations).

The Petition generally refers to the entirety of “a conductive layer” disclosed in Zeng-014 as the claimed “first connection part.” Petition, 88-89 (including an annotated version of FIG. 6A, reproduced below).

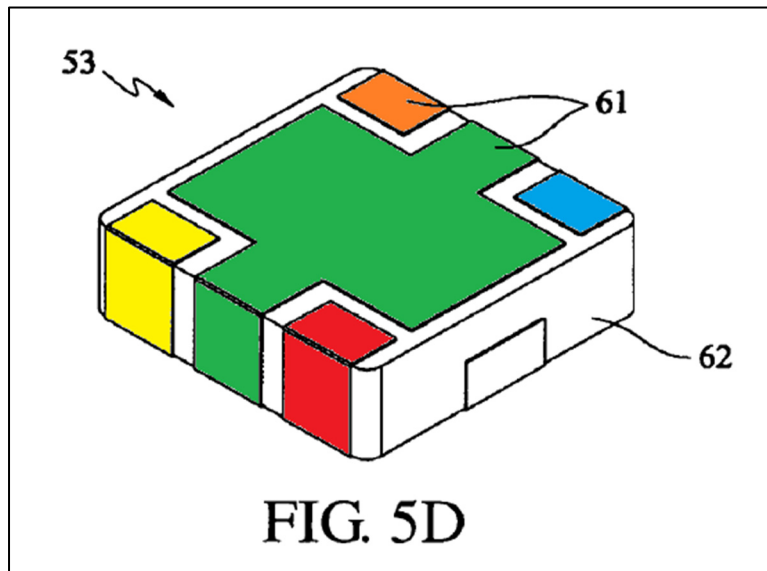


This conductive layer is not a continuous layer wrapped on the entirety of the component’s surface. Phinney, ¶204. Zeng-014 instead discloses that this conductive layer 61 is formed of multiple conductor islands that are separated from one another. *Id.*

An example of discrete and individual conductors or regions forming the conductive layer can be seen from FIG. 5C of Zeng-014 (annotated/reproduced below), which shows five separated conductors that together form the conductive layer. Each of the conductors making up the conductive layer occupies a different surface area of the component. Zeng-014, FIGs. 5C-5E.

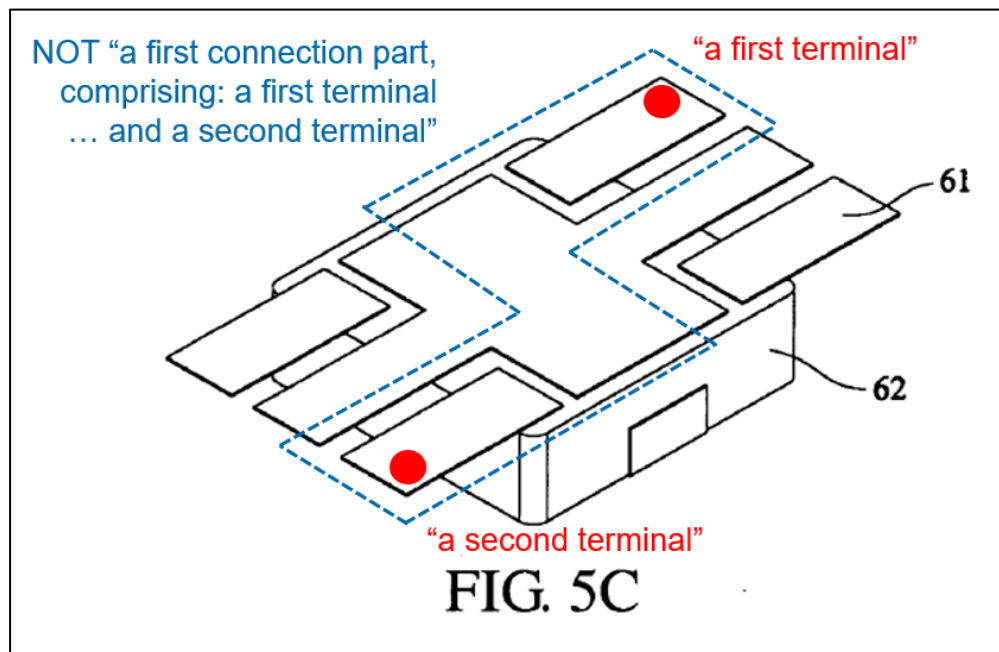


Each conductor “island” making up the conductive layer 61 stands alone, and two separated and individual conductor do not together form a continuous and unitary part. Phinney, ¶204.



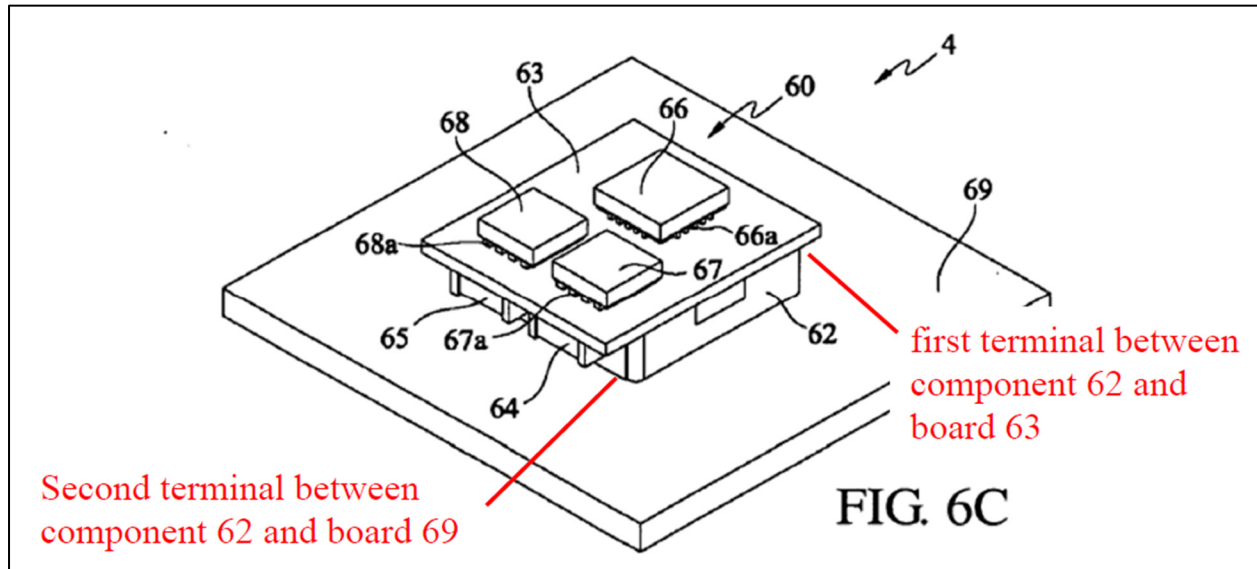
As conveyed in the '263 Patent and plainly understood by a POSITA, the “first connection part” is one individual feature or object, with the “first terminal” and “second terminal” being connected portions or ends of that contiguous body.

Phinney, ¶205; *see also* '263 Patent, FIG. 24. This is an arrangement or combination set forth in the claim at issue. Because Zeng-014's conductive layer is actually a group of individual conductors, the Petition must find the "first terminal" and the "second terminal" in the same individual conductor within Zeng-014's conductive layer. Otherwise, the "first terminal" being found on one individual conductor and the "second terminal" being found on another individual conductor does not meet the claimed arrangement or combination of elements. Phinney, ¶205. As demonstrated in the annotated version of Zeng-014's FIG. 5C shown below, the "first terminal" and the "second terminal" being on different conductors would fail to form one single "first connection part." *Id.*



The annotated version of Zeng-014's FIG. 5C that fails to meet [1c]-[1e] represents the defects in Petitioner's analysis. In particular, Petitioner's annotated

version of Zeng-014's FIG. 6C is reproduced below. Petition, 90. There is no specificity in Petitioner's annotations or analysis to show the claimed arrangement of [1c]-[1e], as evident below.



Petitioner does not meet its burden. The extent of Petitioner's analysis is that some "portion of 'conductive layer 61' facing 'circuit board 63'" is a first terminal" and that an "opposite side of 'conductive layer 61' from the first terminal" is a second terminal." Petition, 89-90. However, it is left detrimentally unclear and unresolved whether that board-facing portion and that opposite portion belong to a same individual conductor within Zeng-014's conductive layer. Phinney, ¶206. The Petition's silence on this claimed interrelationship between the "first terminal", the "second terminal", and the "first connection part" is an incurable defect.

The Petition fails to meet its burden in demonstrating limitations [1c]-[1e]

and the arrangements or interrelationships therebetween.

Ground 3 therefore fails.

V. CONCLUSION

Every ground presented by Petitioner is defective. The Board should accordingly deny institution.

Dated: July 10, 2024

Respectfully submitted,

/ John Schnurer /

John P. Schnurer, Reg. No. 52,196
Lead Counsel

PERKINS COIE LLP
11452 El Camino Real, Suite 300
San Diego, California 92130
(858) 720-5700

Back-Up Counsel
Miguel Bombach, Reg. No. 68,636
Yun (Louise) Lu, Reg. No. 72,766

Attorneys for Patent Owner
Delta Electronics, Inc.

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 Preliminary Response to the Petition for *inter partes* review totals 13,521 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: July 10, 2024

Respectfully submitted,

/John Schnurer/

John P. Schnurer, Reg. No. 52,196
Lead Counsel

PERKINS COIE LLP
11452 El Camino Real, Suite 300
San Diego, California 92130
(858) 720-5700

Back-Up Counsel
Miguel Bombach, Reg. No. 68,636
Yun (Louise) Lu, Reg. No. 72,766

Attorneys for Patent Owner
Delta Electronics, Inc.

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 PRELIMINARY RESPONSE and accompanying exhibits by email to the electronic service addresses for Petitioner on the date indicated below:

LEAD COUNSEL	BACK-UP COUNSEL
Steven Katz, Reg. No. 43,706 Fish & Richardson P.C. 60 South Sixth Street, Suite 3200 Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 Email: IPR25808-0012IP1@fr.com katz@fr.com	Lawrence Kolodney, Reg. No. 43,807 Ryan O'Connor, Reg. No. 60,254 60 South Sixth Street, Suite 3200 Minneapolis, MN 55402 Tel: 202-783-5070 Fax: 877-769-7945 PTABInbound@fr.com kolodney@fr.com; oconnor@fr.com

Dated: July 10, 2024

Respectfully submitted,

/Anita Chou/

Anita Chou, Paralegal
Perkins Coie LLP