

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VICOR CORPORATION,
Petitioner,

v.

DELTA ELECTRONICS, Inc.,
Patent Owner

Case IPR2024-00705
Patent 9,819,263

PETITIONER'S REPLY

TABLE OF CONTENTS

I. INTRODUCTION 1

II. CLAIM CONSTRUCTION.....2

 A. [1g]: “is fabricated by mechanical support of the first electronic component” 2

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

III. GROUND 3 5

 A. Motivations For the Combination 6

 B. Limitation [1f] 9

 C. Zeng-014 Does Not Require a Tall Inductor for Attachment.....12

IV. GROUND 1.....15

 A. First Terminal 16

 B. Second terminal 18

 C. Responses to Additional Arguments in POR 22

 1. Limitation [1g] 22

 2. Limitation [1f] 23

 3. Additional Criticisms 25

 D. Ground 1B 27

 E. Ground 1C 27

V. GROUND 2.....28

 A. The Combination was Obvious and Feasible.....29

 1. The Stacking Motivation.....31

VI. CONCLUSION 32

PETITIONER’S UPDATED EXHIBIT LIST

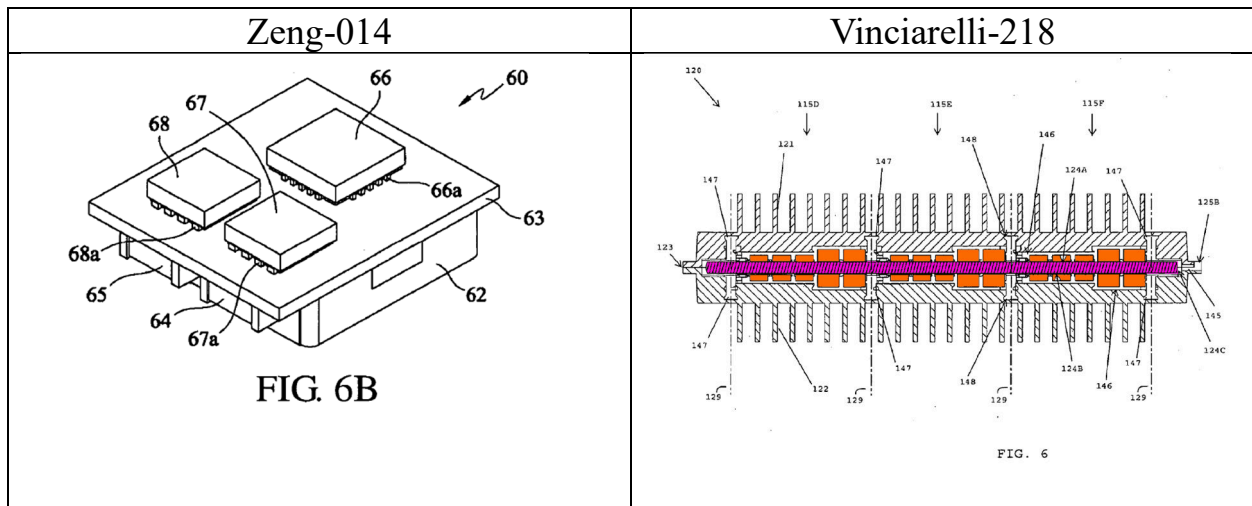
VICOR-1001	U.S. Patent No. 9,819,263 to Jian-Hong Zeng, et al. (“the ’263 Patent”)
VICOR-1002	The Prosecution History of the ’263 Patent (“the Prosecution History”)
VICOR-1003	Declaration and Curriculum Vitae of Dr. R. Jacob Baker, Ph.D., P.E.
VICOR-1004	Complaint, <i>Delta Electronics, Inc. v. Vicor Corporation</i> 6-23-cv-00726, W.D. Tex., filed October 23, 2023
VICOR-1005	United States Patent No. 10,264,664 to Vinciarelli et al. (“Vinciarelli-664”).
VICOR-1006	United States Patent No. 8,427,269 to Vinciarelli et al. (“Vinciarelli-269”).
VICOR-1007	United States Patent No. 7,361,844 to Vinciarelli et al. (“Vinciarelli-844”).
VICOR-1008	United States Patent Application Publication No. 2009/0175014 to Zeng et al. (“Zeng-014”).
VICOR-1009	United States Patent Application Publication No. 2014/0355218 to Vinciarelli et al. (“Vinciarelli-218”).
VICOR-1010	United States Patent No. 8,966,747 to Vinciarelli et al. (“Vinciarelli-747”)
VICOR-1011	Exhibit A to Patent Owner’s Infringement Contentions served on February 26, 2024 (“Infringement Contentions”)
VICOR-1012	U.S. Patent No. 6,934,166 to Vinciarelli et al. (“Vinciarelli-166”)

VICOR-1013	“Design Guide & Applications Manual for VI-200 and VI-J00 Family DC-DC Converters and Configurable Power Supplies,” Rev. 3.5, Vicor Corporation (2013) (“Design Guide”)
VICOR-1014	Transcript of Board Call held August 6, 2024
VICOR-1015	Supplemental Declaration of Dr. R. Jacob Baker, Ph.D., P.E.
VICOR-1016	Deposition Transcript of Dr. Phinney held March 13, 2025
VICOR-1017	Datasheet for the VTM2308 product
VICOR-1018	Philips Technical Note
VICOR-1019	Amazon page for DZS buck converter found at Amazon.com: DZS Elec 2PCS LM2596 DC-DC Step Down Variable Volt Regulator Input 3.2V-40V Output 1.25V-35V Adjustable Buck Converter Electronic Voltage Stabilizer Power Supply Module : Electronics
VICOR-1020	Digikey website screenshot from NCP1216AFORWGEVB onsemi Development Boards, Kits, Programmers DigiKey
VICOR-1021	NCP1216AFORWGEVB Evaluation Board Manual from Digikey at EVBUM2133 - Implementing a DC/DC Single-ended Forward Converter with the NCP1216A Evaluation Board User's Manual
VICOR-1022	U.S. Patent 10,877,534 to Zeng (“Zeng”)

I. INTRODUCTION

The Petition presented three grounds establishing unpatentability of the challenged claims of U.S. Patent No. 9,819,263. At the Institution stage, the Board determined that Ground 3 established a reasonable likelihood that claims 1-6 were unpatentable, and instituted review on that basis. The Board raised concerns regarding the remaining two grounds based on assertions raised in a POPR. This Reply responds to the POR and responds to the concerns raised by the Board—and provides ample citations to the cross-examination of Patent Owner’s expert, Dr. Phinney.

Ground 3 establishes that the challenged claims would have been obvious over Zeng-014 in view of Vinciarelli-218. It is undisputed that Zeng-014 discloses each limitation of claim 1 except limitation [1f], which requires a carrier (printed circuit board) to be “disposed at 1/3 to 2/3 of a height of the power converter.” Zeng-014 does not specify the height of its carrier, and its figures are not drawn to scale. The Petition established that it would have been obvious to center the Zeng-014 carrier, as depicted, for example, in the profile figure from Vinciarelli-218:



Vinciarelli-218 teaches the very benefit allegedly taught by the '263 patent for centering the PCB, which is to reduce stress on the carrier. Ex. 1009, [0143].

The Petition further establishes unpatentability under two other grounds (Grounds 1 and 2). After discussing Ground 3, this Reply will respond to the issues raised with respect to Grounds 1 and 2.

Ground 1 establishes that Vinciarelli-664—a patent that describes the product accused of infringement—anticipates the claims (after all, that which infringes if later, anticipates if earlier). Ground 2 established that it would have been obvious to modify Vinciarelli-218 to use Zeng-014's wrapped conductors.

II. CLAIM CONSTRUCTION

A. [1g]: “is fabricated by mechanical support of the first electronic component”

Patent Owner and the Board interpret this term as structural—effectively to mean the connection part “has mechanical support [from] the first electronic

component.” Institution Decision at 10. Because this limitation is met by each of Grounds 1, 2, and 3 regardless of its construction, this Reply will use the structural construction of the limitation.¹

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

The prior art discloses this limitation regardless of its construction—the prior art discloses embodiments with the entire carrier disposed in the 1/3 to 2/3 range. Thus, the Board may rule in Petitioner’s favor without a claim construction.

Regardless, Patent Owner’s construction is incorrect. Essentially, Patent Owner seeks to rewrite the claim so that the actual words in the claim—“the carrier is **disposed at** 1/3 to 2/3 of a height”²—are effectively replaced by the following phrase: the **entire** carrier is disposed **within** 1/3 to 2/3 of a height. POR, 12. A claim construction that rewrites the claim language is not correct. *K-2 Corp. v. Salomon S.A.*, 191 F.3d 1356, 1364 (Fed. Cir. 1999). If the patentee had intended its invention to be more narrowly defined, it could easily have said so.

Patent Owner argues that “all embodiments of the specification” are within (and thus confirm) its narrow reading of the claim. POR at 12. Patent Owner is incorrect. For example, Patent Owner cites embodiments described at column 5,

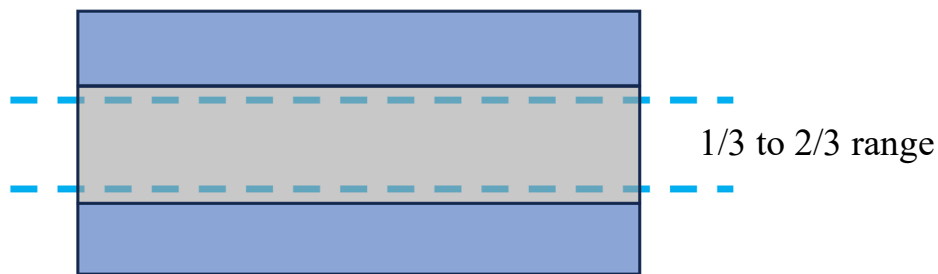
¹ Petitioner maintains that the term is a product-by-process limitation.

² Emphasis added throughout unless otherwise stated.

lines 54-57. The embodiment requires “symmetric” components, but does **not** require the entire carrier to be within the middle third of the power converter.

Compare ‘263 patent, 5:3-21 with ‘263 patent, 5:45-59.

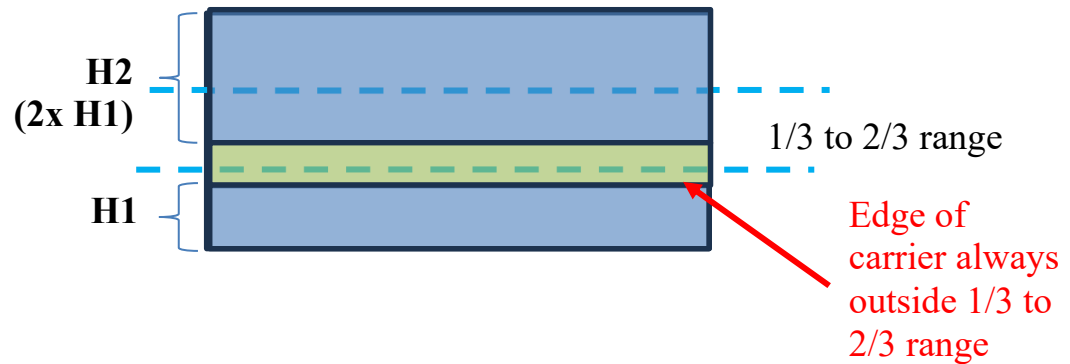
The “symmetry” teaching clearly encompasses embodiments outside of Patent Owner’s construction. For example, the following hypothetical converter has equal sized upper and lower components (and thus consistent with the patent’s “symmetrical” teaching), but has a carrier that extends outside the 1/3 to 2/3 range:



Vicor-1015, ¶4.

In another example, a hypothetical converter could have an upper component (height H2) that is exactly twice the height of the lower component (height H1), which would be consistent with the patent’s “symmetrical” teaching that “H2 is not greater than twice...H1.” ‘263 patent, 5:55-56. In this case it is actually **impossible** to place the entire carrier within the middle third of the power converter. On the contrary, the lower edge of the carrier will always be within the

bottom third of the converter, contrary to Patent Owner's construction.³ Vicor-1015, ¶¶5-10.



A skilled artisan would thus interpret limitation [1f] according to its ordinary meaning: the carrier—**regardless of thickness**—must be found at a location that is between 1/3 and 2/3 the height of the power converter. Vicor-1015, ¶¶9-10. It need not be entirely within the middle third.

III. GROUND 3

There is no dispute that Zeng-014 discloses each limitation of claim 1 except for limitation [1f]. The Petition (and supporting declaration) explained that whereas Zeng-014 appears to depict a carrier off-center, Vinciarelli-218 teaches the

³ This is simple arithmetic. The '263 patent teaches that the "the height of the power converter 100 is calculated by adding the first height H1, the second height H2 and the thickness H3 of the carrier PCB." '263 patent, 5:15-17. If H2 were twice H1, then the total height would be 3*H1+H3. One third of that height would be H1 + H3/3. Because the carrier would extend upward from height H1 (which is less than H1 + H3/3) to H1+H3, it would necessarily extend outside of the 1/3 to 2/3 range. Vicor-1015, ¶7.

benefits of having symmetry of components on the top and bottom sides of the carrier such that the carrier is centered. Petition, 77-79.

Vinciarelli-218 contains a section entitled “Symmetrical Distribution Between PCB Surfaces,” which teaches that “[m]any of the larger components may be distributed equally between both faces of PCB 104 as shown in FIG. 27.” Vicor-1009, [0143], [0151] (discussing “structural integrity”). Vinciarelli-218 explains that distributing “larger components between the two surfaces of the PCB may decrease stresses on the PCB.” Vicor-1009, [0143]. This is the same reason for the centered PCB in the ’263 patent. Vicor-1001, 5:45-59; Vicor-1015, ¶11.

This prior art teaching of stress reduction by centering a PCB is sufficient to render the challenged claims unpatentable as it provides the motivation for a skilled artisan to center the carrier of Zeng-014 which would place it well within the claimed range. The motivation comes not from “hindsight,” but from Vinciarelli-218. Petition, 90-93. Moreover, stress reduction by balancing heat generating components was a known issue. Ex. 1016, 20:3-21, 27:16-28:8.

A. Motivations For the Combination

Patent Owner first argues that the petition “lacks any motivation whatsoever to apply wrapped conductors of Zeng-014 to Vinciarelli-218.” POR, 76-78. However, that is not the combination of Ground 3 (it is the combination of Ground 2). Ground 3 **starts with Zeng-014**. In Ground 3, the wrapped conductors of

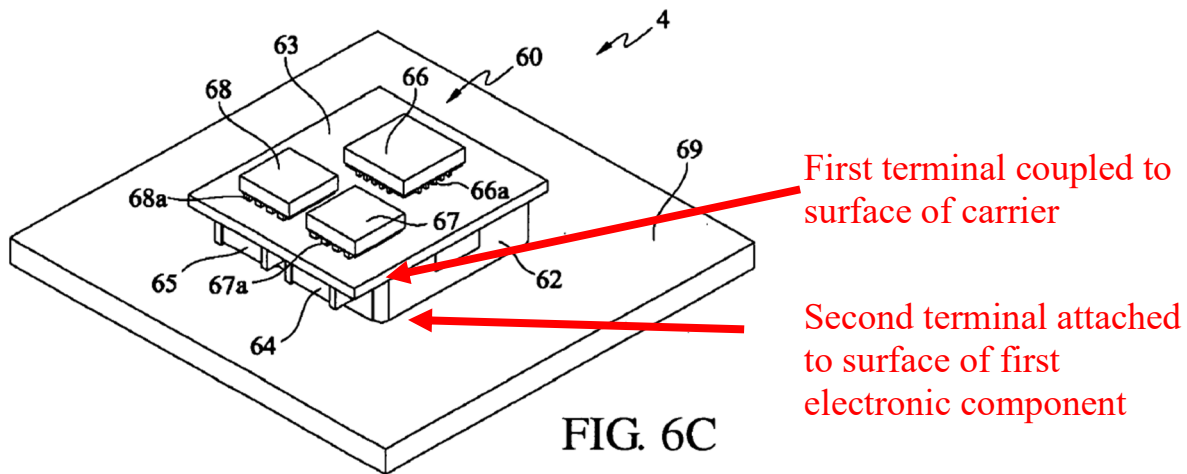
Zeng-014 are applied to the power converter of Zeng-014 as modified by the teachings of Vinciarelli-218. Petition, 90-93. *See also, e.g.,* Vicor-1003, ¶¶190, 199, 202-205.

Patent Owner asserts that there is no motivation to wrap the entire power converter with Zeng-014's contacts (as opposed to wrapping individual components as disclosed in Zeng-014). POR, 76-78. However, Patent Owner and Dr. Phinney ignore Dr. Baker's explanation that a "skilled artisan would have recognized that the DC to DC converter module of Zeng-014 as modified by the module teachings of Vinciarelli-218 **is an 'electronic component'** well suited for the conductive layer 61 of Zeng-014." Vicor-1003, ¶205.

Patent Owner further suggests that in the combination, Zeng-014's wrapped components remain and wrapped conductors would not be applied to the entire power converter. POR, 76-78; Ex. 2005, ¶183. Even if Patent Owner were correct, the resulting combination still meets the connection part (and terminal) limitations of claim 1. Vicor-1015, ¶¶12-22.

For example, even if the power converter of the combination used component wrapping as taught by Zeng-014, the connecting conductors on individual components would provide the "connection part" [1c], "first terminal" [1d], "second terminal" [1e], and "mechanical support" [1g] limitations of claim 1. Using Fig. 6C as illustrative (and envisioning the figure as being modified to

provide symmetrical components), the wrapping on the lower component is sufficient to disclose limitations [1c], [1d], [1e], and [1g].



Device wrapping is not required, and component wrapping is sufficient. Accordingly, even if Patent Owner's alternate framing is accepted, the combination nonetheless renders the challenged claims unpatentable. *Vicor-1015*, ¶¶12-22.

Patent Owner next asserts that the Board should not rely on motivations articulated for Ground 2 when considering Ground 3. *POR*, 78. No legal citation is provided for this theory. Regardless, the Petition provides motivations for Ground 3 and thus reliance on material from Ground 2 is unnecessary.

Patent Owner next accuses Petitioner of relying on “inconsistent” embodiments from *Vinciarelli-218*, relying on Fig. 6 for limitation [1f] and Figs. 33-34 for limitation [1g]. *POR*, 79-80. There is no inconsistency. Both figures

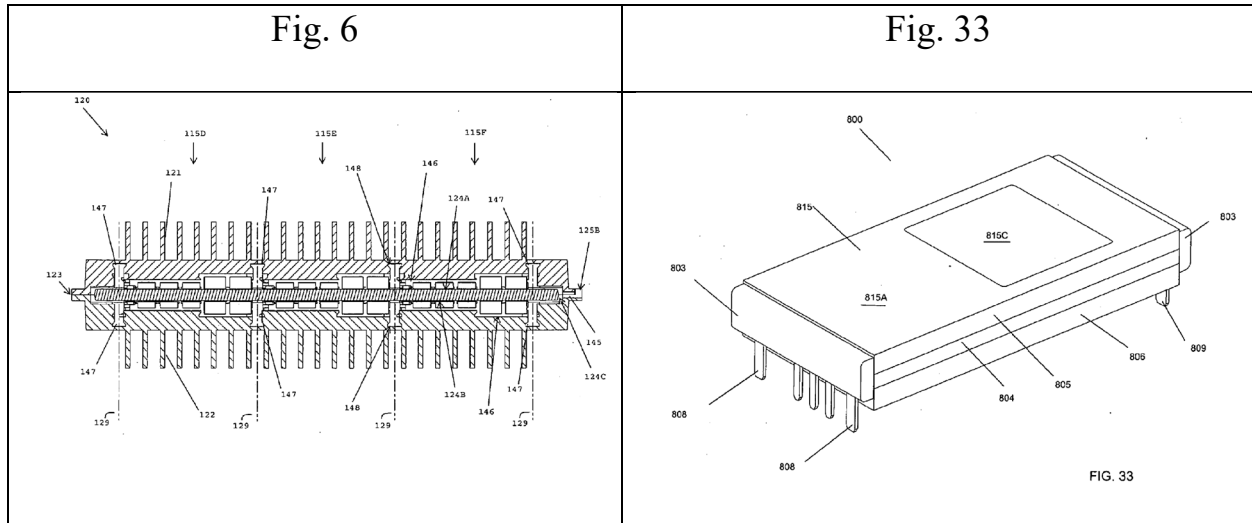
show the same general form factor of a cuboid body. Figure 6 was chosen because it illustrates the internal symmetry of the internal components, whereas Figure 33 was chosen because it depicts the external form factor of a single power converter. The profile of the internals of Figure 33 would resemble the profile shown in Figure 6 (although component sizes may vary). The optional heatsink would not be part of the combination. Petition, 92-93; Vicor-1015, ¶¶23-27. Patent Owner's expert confirmed that he understood the Petition in this way. Vicor-1016, 51:20-52:19. Moreover, Vinciarelli-218 expressly discloses that the "heat-sinkless module" of Fig. 33 would use the same "center plate molding" as modules with heatsinks. Vicor-1009, [0162], Figs. 38-40.

Vinciarelli-218 explains that when the heatsink is not used, a reusable mold would provide the flat surfaces shown in Figs. 33 and 34 (with the encapsulant at the level of the exposed core). Vicor-1009, [0159]. The "uneven surface" Patent Owner references (POR, 80-81) in the internals shown in Figure 6 would likewise be present underneath the encapsulant in the Figure 33. As seen in Figure 33, the "exposed core" 815C is shown. Shorter components are hidden under the encapsulant. Vicor-1009, [0159], *see also* [0177]; Vicor-1015, ¶27.

B. Limitation [1f]

Patent Owner next argues that limitation [1f] is missing from the combination (POR, 81), notwithstanding the fact that the PCB in Fig. 6 and Fig. 33

of Vinciarelli-218 is centered by two core halves and placed in the middle third of the power converter:



Vicor-1009, Figs 6, 33. Dr. Phinney admitted that printed circuit boards are usually much thinner than power supply components. Vicor-1016, 115:9- 116:8 (“they [PCBs] are normally quite a bit thinner, yeah, four times or more thinner than a lot of the components. That’s – that’s a lot of what I saw in the -- the 2000 to 2015 time range”); *see also*, Vicor-1019, Vicor-1020, and Vicor-1021. Dr. Phinney further admitted that Vinciarelli-218’s figures appear to depict printed circuit boards within the middle third of the power converter. Vicor-1016, 145:8-19.

Patent Owner next asserts that the combination fails because Zeng-014 has a “singular large component, the inductor 62” and argues that the Petition “fails to consider the actual components” of Zeng-014. POR, 82. However, Patent Owner has an exceedingly narrow—and incorrect—view of obviousness. Obviousness

concerns the **teachings** of references to a skilled artisan and does not require bodily incorporation of one device into another. *See Allied Erecting & Dismantling Co. v. Genesis Attachments, LLC*, 825 F.3d 1373, 1381 (Fed. Cir. 2016).

Thus, the combination need not rely on the precise arrangement of components of Figure 6. There is no suggestion in Zeng-014 that the particular circuit, component count, or component selection, is special or provides particular benefits. In the combination, a skilled artisan motivated by Vinciarelli-218 to modify Zeng-014 to provide the benefits of symmetry, Vicor-1009, [0143], [0151], would recognize that the shape of the inductor may be changed to accomplish this goal. As Dr. Phinney admitted, even “large” inductors can be short and wide and “squatter and broader.” VICOR-1016, 62:1-63:2. Dr. Phinney also admitted that a single large inductor can be replaced with two smaller inductors, one on the top of the PCB and one on the bottom. VICOR-1016, 65:8-67:6.

Thus, there is no question that a skilled artisan would not feel bound or constrained by the depiction in FIG. 6B when designing a power converter based on Zeng-014’s teachings. A skilled artisan seeking the benefits of symmetry would, for example, select an inductor that matches the height of components placed on the top surface or the skilled artisan would choose a planar inductor with matching core halves (planar magnetics are taught in Vinciarelli-218). Vicor-1003,

¶175; Vicor-1015, ¶¶28-29; Vicor-1018. Dr. Phinney acknowledged that real-world prior art buck converters used inductors of varying heights that could be matched to the height of other components, and also used planar inductors with cores. Vicor-1016, 58:11-60:6.

C. Zeng-014 Does Not Require a Tall Inductor for Attachment

Patent Owner asserts that the inductor must remain “large” because it provides the attachment point to the customer board. POR, 83. Patent Owner misreads Zeng-014. For attachment, the relevant dimension is the lateral distance of the contact points, not height. Thus, the attachment would be **strengthened** by making a shorter and squatter inductor, which would also help provide the symmetry desired by centering the printed circuit board. In addition, Zeng-014 teaches that multiple smaller components may be used for attachment to other boards and thus a single large component is not required, as depicted in FIG. 10.

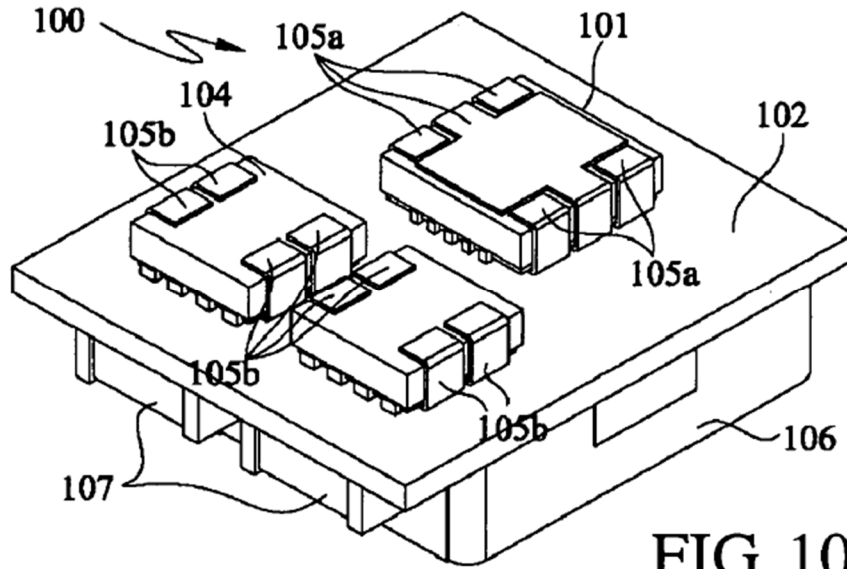


FIG. 10

The “conductive layers 105a, 105b wrap surfaces of the electronic components 101, 103, 104 to provide an electrical connection between the DC to DC converter 100 and a first carrier (which is a circuit board herein and not shown).” Vicor-1008, [0086].

Thus, Patent Owner is wrong when it states that “the inductor’s size would preclude the carrier from meeting [1f].” POR, 83. A skilled artisan would select appropriately sized and shaped components to meet the symmetry objective. “A person of ordinary skill is also a person of ordinary creativity, not an automaton.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007).

Patent Owner is also wrong when it states that the combination requires extra “manufacturing steps” and “added connective adapters.” POR, 85. This

criticism assumes that the combination attaches **both** Vinciarelli-218 adapters and Zeng-014's wrapped conductors. However, the combination does not use Vinciarelli-218's adapters and thus the combination requires fewer steps than Vinciarelli-218 (conductor bending without adapter manufacture) and no "added adapters." The "adapters" of Vinciarelli-218 are not brought into the combination—which starts with Zeng-014 as the primary reference. Petition, 93 (would take shape similar to "Fig. 33 of Vinciarelli-218 **without the adapter.**"); Vicor-1015, ¶61.

Next, Patent Owner incorrectly asserts that the combination is "hindsight" because it "adds several electrical components (an inductor and connective adapters) for no reason." POR, 84. Patent Owner misunderstands the combination. In the combination, the Zeng-014 power converter is repackaged to provide the symmetry expressly taught by Vinciarelli-218. Petition, 90-93. Nowhere does the Petition suggest adding a second unnecessary "additional inductor." POR, 84.

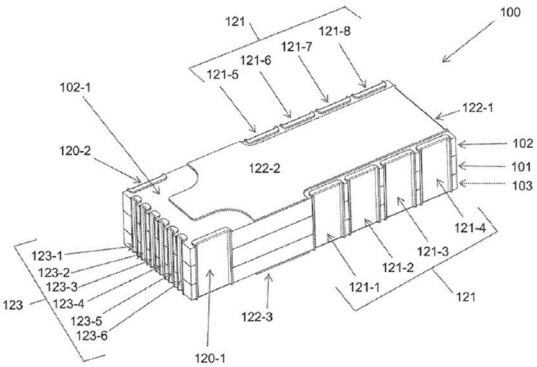
That said, following the teachings of Vinciarelli-218, a skilled artisan would alternatively be motivated to use a transformer in the power converter to create an isolated power converter should an isolated converter be desired for a particular application. The use of transformers (and planar transformers in particular) was common knowledge in the art and specifically disclosed in Vinciarelli-218. Vicor-

1009, [0138], [0147]-[0148]. Also, a single large inductor could be replaced by two smaller inductors to provide symmetry. Thus, no unnecessary components would be added. Vicor-1016, 59:1-60:6, 63:3-67:6; Vicor-1015, ¶¶28-29.

In sum, none of the criticisms of Ground 3 have merit. A skilled artisan motivated by the stress-reducing benefits of symmetry taught by Vinciarelli-218 would have been motivated to center the Zeng-014 carrier by providing equal height components on both sides of the carrier. The Petition asserts that the entire power converter would be a component wrapped as taught by Zeng-014; however, even if this final step were not to occur—as Patent Owner argues—the wrapped components of Zeng-014 would still meet the connection part and terminal limitations of claim 1. Vicor-1015, ¶¶12-22.

IV. GROUND 1

Patent Owner accused the prior art of infringement, and Ground 1 is based on a Vicor patent that describes the accused product:

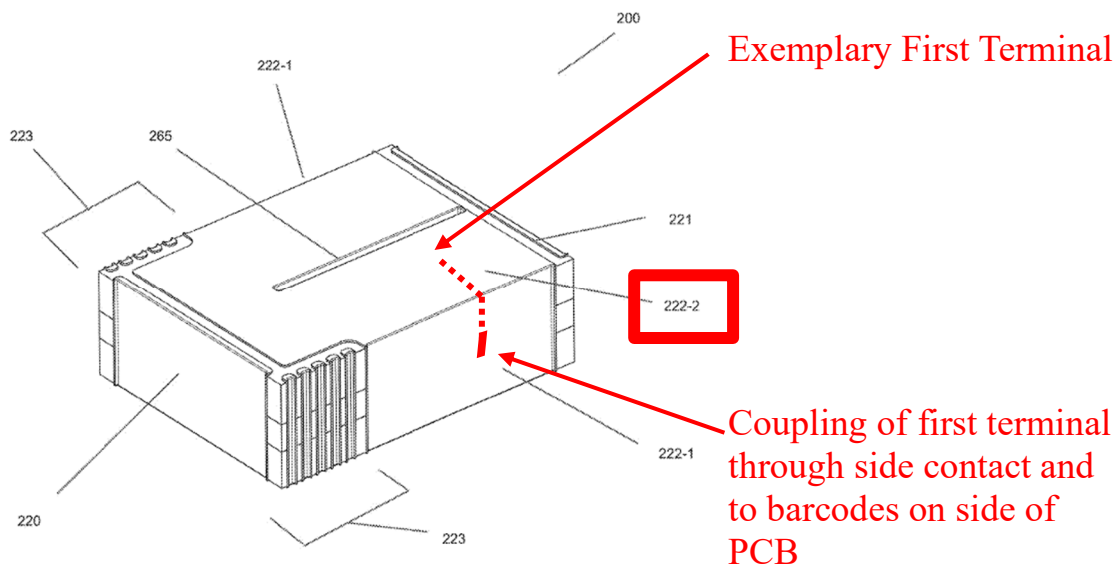
Accused Product	Vinciarelli-664
	 FIG. 1

Patent Owner asserts that the Petition failed to identify the “first terminal” of limitation [1d] and the “second terminal” of limitation [1e]. The Board tentatively agreed, stating that “Petitioner does not point to any portion of Vinciarelli-664 for disclosure of such terminals.” Paper 11 at 18. Respectfully, Petitioner submits that the Board overlooked passages of the Petition and supporting declaration that identify the terminals.

A. First Terminal

The first terminal is an end of a conductor that is “coupled” to the surface of the carrier. The Petition states that the “connection part” with the two terminals are “contacts 120-1, 120-2, 121, and 122.” Petition, 22. Each contact has portions on the “top and ... bottom surfaces of the module.” Petition, 23; Vicor-1003, ¶¶88, 92. These portions are the two terminals and either can be the “first” or “second” terminal (although not at the same time). The Petition treats the bottom terminal as the “second” terminal and therefore the opposite (top) terminal is necessarily the “first” terminal. Patent Owner’s expert confirmed that “terminals” are just portions of a conductor, typically the ends, usable to make an electrical connection. Vicor-1016, 91:22-92:7, 93:9-94:10. The Petition establishes that the top surface of the contacts meets that definition, and Vinciarelli-664 discloses that “**the top surface of the contacts may form conductive pads** so that modules may be stacked,” Petition, 14.

The Petition further identifies “conductive shield 222-2 on the top of the module” in FIG. 11 as an exemplary “first terminal” coupled to the surface of the internal PCB (and the symmetrical conductive shield on the bottom surface would be the second terminal). Petition, 25. Of note, the first terminal need not be “connected” (directly or otherwise) to the surface of the PCB, but merely “coupled” to it. The Petition establishes this coupling through the barcodes to the surface of the PCB. Petition, 22-26. The following annotated figure reflects the words in the petition at pages 22-26.



As shown here, the Petition adequately identified the “first terminal.” Moreover, Patent Owner’s expert confirmed that the requisite coupling would be found in Vinciralli-664. Specifically, the expert admitted that one end of a connection part

is “electrically coupled” to the other end of the conductor “through the middle” of the connection part. Vicor-1016, 96:2-10. Thus, given that it is undisputed that Vinciarelli-664’s contacts are “connection parts,” the terminals are electrically coupled to each other and to the middle of the connection part—which is where the barcodes are. Moreover, Dr. Phinney acknowledged that at least some of the barcodes in Vinciarelli-664 are coupled to the surface of the PCB. Vicor-1016, 175:16-176:14. Thus, at least contact 122-2 and 222-2 are exemplary first terminals and portion of those contacts attached to the bottom surface of the module (including the exposed core) are each second terminals, respectively.

B. Second terminal

The Petition explains that the second terminal is “the bottom end of each contact.” Petition, 28. These bottom portions are attached to, and are mechanically supported by, a “first component” in at least two ways. First, the entire bottom half of the device may be considered a “first component” as explained in the Petition, wherein each identified contact is plated onto the bottom surface of the module. Petition, 28, 62; Vicor-1001, 6:21-30, 11:52-67. Moreover, contact 122, which “extends over much (e.g., 50% or more) of the top and bottom surfaces of the module[,] [includes] shields 122-2 and 122-3[,] either or both of which may ... be used to establish electrical connections....” Vicor-1005, 6:5-9. Second, the exposed cores are also a “first component.” Petition, 28. The shields

are formed by “coat[ing]” the surfaces of both exposed cores “with electrically (and thermally) conductive material such as copper.” Vicor-1005, 7:13-26; Petition, 17, 29-30. The Petition thus clearly identified multiple examples of the “second terminal” in Vinciarelli-664. Moreover, the POR **concedes** that Vinciarelli-664 discloses yellow shields that would extend over the lavender exposed core, as depicted below. The shield is therefore touching (and is plated on) the surface of the exposed core and would be supported by it. Vicor-1016, 48:5-14.

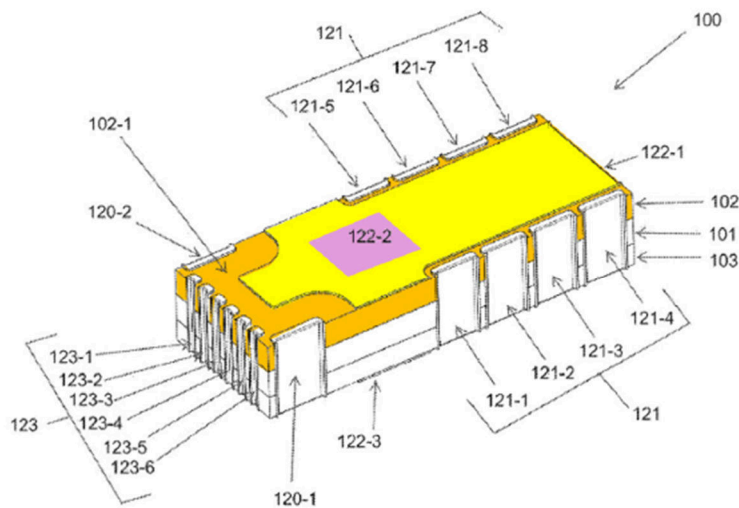


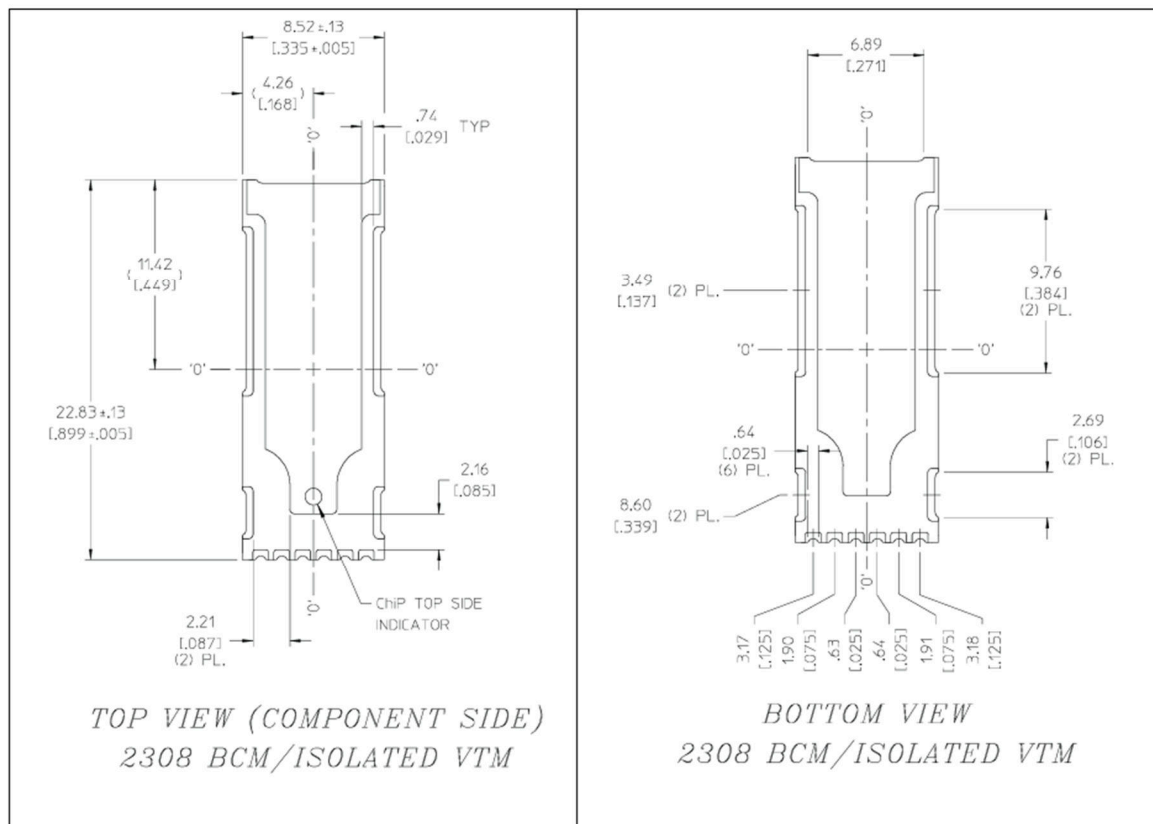
FIG. 1

POR, 28, 54. A symmetrical shield is likewise plated onto the lower exposed core.

Vinciarelli-664, 6:5-9; 7:13-23.⁴

⁴ The POR states, without citation to evidence, that the magnetic core would make “electrical contact.” POR, 28. This is incorrect. The magnetic core is “ferrite”

Finally, the POR misrepresents the testimony of Dr. Baker to suggest there is some doubt about the disclosure of shielding on both sides of Vinciarelli-664. The POR asserts that Dr. Baker did not know if Vinciarelli-664 had a bottom shield. That is incorrect. Patent Owner asked Dr. Baker if he knew whether the **accused product** had a bottom shield. He said he could not tell from the photograph. Ex. 2005, 20:19-21:16. Dr. Baker has since reviewed a datasheet for the depicted product and confirmed it had a bottom shield similar to the disclosure in Vinciarelli-664:



Vicor-1005, 10:17, which is a non-conductive ceramic material. Vicor-1005, 10:13-26; Vicor-1015, ¶¶30-31.

Vicor-1015, ¶¶32-36; Vicor-1017. This actual device with symmetrical shields is objective evidence disproving the POR's statement that, due to unspecified problems, those in the art "would not have had contact 122-1 extend across the bottom portion of the device." POR, 23. They would—and they did.

The POR further asserts that the Petition provides "**no argument**" that the "exposed core transformer's exposed surface is attached to the bottom of any" contact. POR, 20. On the contrary, the Petition explained that both exposed cores are "coated" with the contact metal to provide shielding. Petition, pp. 28-30; Ex. 1003, ¶10; Vicor-1005, 10:12-11:15 (discussing plating process). This plating attaches the shield to the exposed core, which provides mechanical support to the shield.

The POR further suggests that the bottom shield (122-3) of contact 122 of does not extend beyond the width of pad 922 on the customer board in Fig. 2 (and thus would not cover the bottom exposed core). POR, 23-24. This is incorrect, and Patent Owner's expert walked back on that position at deposition when presented with the actual disclosure of Vinciarelli-664 and clarified that he was referring only to the portion of 122-3 that touches contact 922. Vicor-1016, 143:6-144:5.

Moreover, although not necessary, Vinciarelli-664 expressly discloses that "contact 922 may be enlarged to extend below module 100 to provide greater

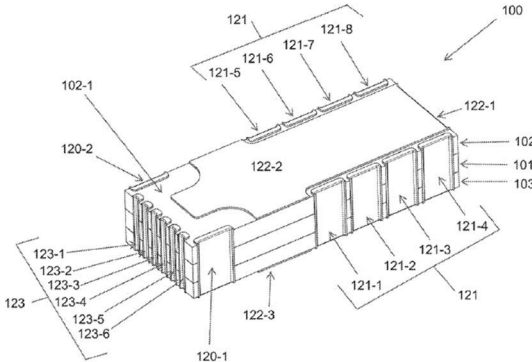
contact area with the contact 122-3 on the bottom of the module.” (7:2-4). This passage confirms that the shield 122-3 extends beyond the size of contact 922.

Vicor-1015, ¶¶35-36.

C. Responses to Additional Arguments in POR

1. Limitation [1g]

In addition to the terminal limitations (limitations [1d] and [1e]), the POR asserts that the Petition fails to establish that Vinciarelli-664 discloses limitation [1g]. POR, 25. That is not possible, given that Vinciarelli-664 discloses the same “connection part” as that accused of infringement:

Accused Product	Vicor's Vinciarelli-664 Patent
 A photograph of a black and gold power module. The gold top surface features the Vicor logo, the part number VM2308XXXXXXX, and the serial number AP0341EN0046085P. A QR code is also visible on the right side of the top surface. The module has multiple gold-plated pins on the left and right edges.	 FIG. 1 A technical drawing showing a cross-sectional view of a power module. The drawing includes various components labeled with reference numerals: 100 (top surface), 101 (side surface), 102 (bottom surface), 103 (right side surface), 120-1 (left side surface), 120-2 (top surface), 120-3 (bottom surface), 121 (top surface), 121-1 (bottom surface), 121-2 (bottom surface), 121-3 (bottom surface), 121-4 (bottom surface), 121-5 (bottom surface), 121-6 (bottom surface), 121-7 (bottom surface), 121-8 (bottom surface), 122-1 (top surface), 122-2 (bottom surface), 122-3 (bottom surface), 123-1 (left side surface), 123-2 (left side surface), 123-3 (left side surface), 123-4 (left side surface), 123-5 (left side surface), 123-6 (left side surface).

If limitation [1g] is a process limitation, then it is ignored for invalidity. If limitation [1g] is structural, then the “first connection part,” (e.g., contact 122) which is plated against the encapsulant and the exposed cores, is mechanically supported by the first component (the first component being the exposed core

and/or the entire bottom portion of the power converter). Either way, limitation [1g] is necessarily present in Vinciarelli-664. Plating attaches the contact directly to the “first component” and thus receives “mechanical support” from the “first component.” Petition, 35; Vicor-1005, 10:12-37 (discussing plating); Vicor-1003, ¶¶65, 100-102, 108-109; Vicor-1015, ¶¶30-31.

2. Limitation [1f]

The POR asserts that the Petition relies on figures for “precise proportions” and “precision of sizings.” POR, 29. That is incorrect. Limitation [1f] provides a broad range for the placement of the carrier and facially lacks precision. It recites placement in terms of a “positional relationship”—namely, placing the carrier in the middle third of the power converter. Vinciarelli-664 clearly shows such a carrier. For example, FIG. 11 discloses a carrier within the claimed range under either party’s proposed construction, and the “particular size” of the carrier is irrelevant—it is sufficient that it clearly depicted as falling in the claimed range.

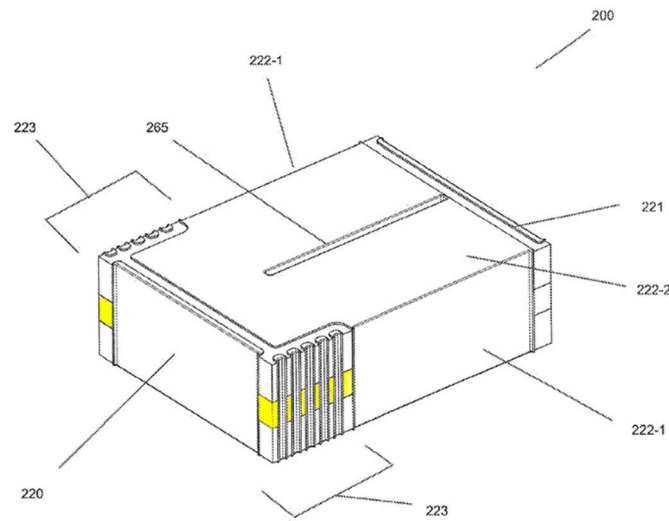


FIG. 11

Notably, the POR acknowledges that the Petition relies on Figures 1 and 11, but the POR only provides analysis for Figure 1 (and Patent Owner carefully asked Dr. Baker only about Figure 1 and not Figure 11). POR, 34.⁵

Finally, even assuming anticipation requires Vinciarelli-664 to provide “precise” dimensions (the law does not so require), the Petition includes backup obviousness grounds (Grounds 1B and 1C), and Dr. Phinney acknowledges that PCBs are generally thinner than power converter components. Vicor-1016, 115:9-116:8; Petition, 48ff.

⁵ The POR spends pages (POR, 35-40) discussing measurements from a figure in Vinciarelli-269. The POR misunderstands the relevance of Vinciarelli-269, which discloses matching top and bottom core halves.

3. Additional Criticisms

The POR concludes its critique of Ground 1 with a rapid-fire list of baseless criticisms. For limitation [1d], Patent Owner asserts that the barcodes “do not necessarily” connect the contacts to the surfaces of the PCB. POR, 43. Such connections are necessary to couple components to the external world, as Dr. Phinney admitted. Vicor-1016, 175:2-176:14. Thus, the coupling of at least some barcodes to the surface is inherent in Vinciarelli-664.

The POR also asserts that Petition relies on “replac[ing]” buried vias in Vinciarelli-664 with “through holes” to meet limitation [1d]. POR, 43. That is incorrect. Barcodes in Vinciarelli-664 are necessarily coupled to the surface to reach the components, and no “replace[ment]” is necessary or suggested. The typical way in the art to couple internal conductive layers to the surface is using conductive vias. Thus, citing an incorporated reference, the Petition explains that “‘conductive vias [are] used to electrically connect the components on the PCB surfaces to internal conductive layers.’ VICOR-1010, 23:45-48.” Petition, 24. Moreover, Dr. Phinney acknowledged that conductive vias are used to couple internal layers to the surface of a PCB. Vicor-1016, 11:17-12:16.

The POR asserts that Vinciarelli-747 “points away” from using “through holes.” POR, 44. First, this is irrelevant even if true, as conductive vias would typically be used. Second, the POR is incorrect. The alleged “point[ing] away” is

the use of “through holes” at the edge of the board to form vertical barcodes.

(Vicor-1010, 15:62-16:2, 16:40-45).

The POR criticizes the Petition’s discussion of both Figure 1 and the “thermal conduit” of Vinciarelli-664’s Figure 11. POR, 45. The two figures are not being combined. Each depicts an anticipating device.

The POR next suggests that the Petition relied on the squiggly arrows (which depict heat flow) in Figure 10 of Vinciarelli-844. POR, 46-47. It did not. On the contrary, the Petition uses Figure 10 for its disclosure of surface conductors to couple surface mount components to internal conductive runs. Petition, 26-27. The relevant text explains that the conductive runs form connections “between converter circuitry and interface contacts 33.” Vicor-1007, 14:55-62.

The POR criticizes the Petition’s discussion of what a skilled artisan “would understand” a reference to teach. POR, 47-48. This is entirely proper because a reference is read from the perspective of a skilled artisan. “Anticipation is established when ‘one skilled in the art would reasonably understand or infer from the prior art reference’s teaching that every claim [limitation] was disclosed in that single reference.’” *CRFD Research, Inc. v. Matal*, 876 F.3d 1330, 1338 (Fed. Cir. 2017) (quoting *Akamai Techs., Inc. v. Cable & Wireless Internet Servs., Inc.*, 344 F.3d 1186, 1192–93 (Fed. Cir. 2003)).

Finally, the POR circles back to limitation [1e]. The POR's criticisms have been fully addressed with regard to the "second terminal" discussion above.

D. Ground 1B

Ground 1B establishes that in addition to anticipation, there are ample motivations to combine Vinciarelli-664 with its incorporated references such that the challenged claims would have been obvious. The POR argues that the Petition's description of "roughly equal size components" on the top and bottom of the PCB is "unsupported." POR, 51. On the contrary, it is amply supported—even by figure provided in the POR. POR, 52. Figure 27 of Vinciarelli-747 discloses two equally sized and symmetrically arranged core halves (131-1 and 131-2). *See, e.g., Vinciarelli-747, 22:38-64, Petition, 19, 49-53.*

The POR again argues (at 52) that Vinciarelli-747 has "language dissuading combination," but as explained for Ground 1A, Vinciarelli-747 does not criticize "conductive vias." The through hole discussion in Vinciarelli-747 is irrelevant.

E. Ground 1C

Ground 1C establishes obviousness assuming limitation [1g] is a product-by-process limitation, as Zeng-014 discloses the same process as the '263 patent. In the combination, Vinciarelli-664's contacts are created using the Zeng-014 wrapping process. Thus, the POR's criticisms on pages 53-54 (which assume that the Zeng-014 wrapping patterns are used) misunderstand the combination. The

POR also asserts that using Zeng-014's wrapped contacts is inconsistent with panel molding. POR, 55-59. That is incorrect, and adding contacts after singulation is precisely how the Vinciarelli-218 and Vinciarelli-747 panel-molded devices are assembled. Vicor-1015, ¶37. Thus, the combination reverts to bulk panel manufacturing methods as disclosed in incorporated references (which allows for both through-hole and surface mount versions of the products).

V. GROUND 2

Ground 2 establishes that a skilled artisan would modify Vinciarelli-218 by replacing its surface mount adapters with Zeng-014's wrapped conductors. Petition, 71-74. The POR asserts that the combination is based on "hindsight." POR, 59-60. On the contrary, the reasons come from the prior art. Vinciarelli-218 teaches the desirability of flush mounting, but uses adapters to achieve it, and teaches the desirability of surface mounting, but again teaches adapters to achieve it. Both adapters add undesirable height and width, and Zeng-014 provides a solution. The Petition explains that replacing Vinciarelli-218's adapters with Zeng-014's wrapped conductors would "reduce the space used by the contact adapters of Vinciarelli-218" and make a "compact surface mount version of the module." Petition, 71, 73, and the undisputed record establishes that size reduction is a motivating goal when designing power electronics, particularly for the point of load. Vicor-1003, ¶129.

Vinciarelli-218 flush mount adapter	Zeng-014 wrapped conductors for improved flush-mounting
FIG. 21	FIG. 5D

At deposition, Dr. Phinney admitted that the combination would reduce the height and width of the power converter relative to the use of Vinciarelli-218 adapters (which have more thickness than bare conductors). Vicor-1016, 123:19-128:18. This known benefit did not come from the '263 patent, and is therefore not “hindsight.”

A second motivation is found in Zeng-014, which teaches that wrapped conductors enable stacking. Petition, 71-74.

A. The Combination was Obvious and Feasible

The POR asserts Vinciarelli-218 discloses “optimal conductors” that are “specifically designed” for the “unique features (PCB bar codes).” POR, 61. But the POR identifies no “unique” aspect of the bar codes or the adapters that make Zeng-014’s techniques inapplicable or without benefits.

The POR asserts that Zeng-014's wrapped conductors would "not be reliable" and would be "infeasible." POR, 68-76. The POR assertions rest solely on the speculation of Dr. Phinney, and not on any objective evidence. At deposition, Dr. Phinney admitted that an electrical connection can be made reliable with either solder or a contact force (both are described in Vinciarelli-218). Vicor-1016, 191:6-192:18 (for reliable electrical connections, "touching is not enough" and either "filler material" including "solder" or a "contact force" is needed). And, in the combination, solder or other filler such as conductive adhesive would be used to join the Zeng-014 wrapped conductors, just as solder is used in Vinciarelli-218 for its adapters. Vicor-1003, ¶152; Vicor-1015, ¶¶39-47. Dr. Phinney's own Declaration confirms conductors can be soldered to barcodes:

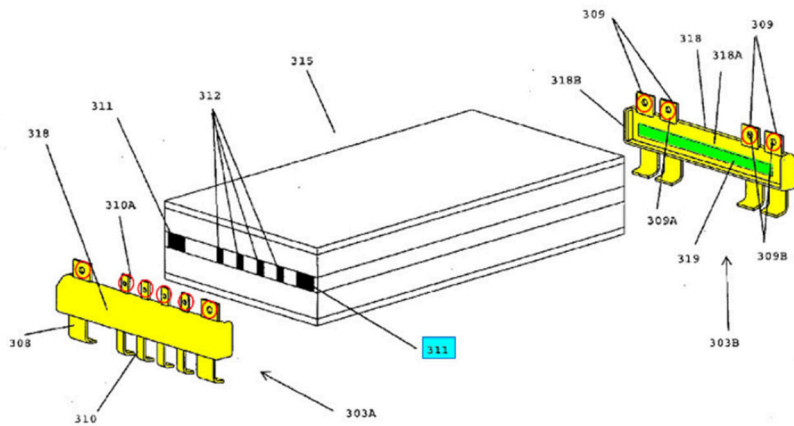


FIG. 18

Ex. 2005, ¶147, and no "damage" would result. Vicor-1015, ¶48. The POR next asserts Zeng-014's approach requires "hard ceramic." POR, 68. Not true. Zeng-

014 discloses wrapping of encapsulated devices. Vicor-1015, ¶40. Finally, the POR assumes that the vertical portion of the contact would be curved. POR, 69. That is incorrect. Vicor-1015, ¶44. Dr. Baker offers a full rebuttal to Dr. Phinney's baseless assumptions and speculation. Vicor-1015, ¶¶38-50.

1. The Stacking Motivation

The Petition asserts that stacking provides an independent motivation for the combination. The Board asked the parties to comment on Dr. Phinney's statement pre-institution that using Zeng-014's wrapping for stacked modules "increases size, not decreases it." Institution Decision, 26. Dr. Phinney compares the size of modules **without adapters** to a module with wrapped conductors. Ex. 2005, ¶171. He admitted at deposition that when Zeng-014's wrapped conductors are compared to Vinciarelli-218's modules **with adapters** (the proper comparison), Zeng-014 **decreases overall size** because the height and width of the adapters is avoided. Vicor-1016, 126:1-128:18; Vicor-1015, ¶¶56-58.

Dr. Phinney further admitted at his deposition that (a) stacking components uses **less board space**, and (b) it was known in the prior art to use stacking for that purpose. Vicor-1016, 119:16-120:14.

Patent Owner further argues that "heat considerations" would preclude stacking. POR, 74. There is no objective evidence supporting the "heat considerations" argument, and Dr. Baker fully refutes Dr. Phinney's false

assumptions and speculations. Vicor-1015, ¶¶51-60. Moreover, at deposition, Dr. Phinney admitted that there is nothing in Vinciarelli-218 that requires its power converters to run too hot to stack. Vicor-1016, 157:1-12, 162:17-163:12. Moreover, contemporaneous references discuss power module stacking—"heat considerations" are not preclusive. Vicor-1005, FIGs. 12-13; Vicor-1021, FIGs. 1, 18-20; Vicor-1015, ¶¶52-54.

VI. CONCLUSION

For the foregoing reasons and the reasons expressed in the Petition, the challenged claims should be held unpatentable.

Respectfully submitted,

Date: March 25, 2025

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CERTIFICATION UNDER 37 CFR § 42.24(d)

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner Response to Patent Owner Reply to Petition totals 5,599, which is less than the 5,600 allowed under 37 CFR § 42.24(c)(1).

Respectfully submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR § 42.6(e)(4), the undersigned certifies that on March 25, 2025, a complete and entire copy of this Petitioner's Reply and corresponding exhibits were provided via email to the Patent Owner by serving the correspondence email address of record as follows:

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