

Page 1

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

VICOR CORPORATION

Petitioner,

V.

DELTA ELECTRONICS, INC.,

Patent Owner.

Case Number IPR2024-00705

DEPOSITION OF
JOSHUA PHINNEY, PHD
Zoom Recorded Videoconference
03/13/2025
9:57 a.m. (EDT)

REPORTED BY: AMANDA GORRONO, CLR
CLR NO. 052005-01

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03/13/2025

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9:57 a.m. (EDT)

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REMOTE DEPOSITION OF JOSHUA PHINNEY, PhD,

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held virtually via Zoom Videoconferencing, before

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Amanda Gorrone, Certified Live Note Reporter, and

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Notary Public of the State of New York.

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I N D E X

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WITNESS

EXAMINATION BY

PAGE

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JOSHUA PHINNEY, PHD

MR. KATZ

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E X H I B I T S

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EXHIBIT

DESCRIPTION

PAGE

8

Exhibit

14

9

1001

U.S. Patent Number 9,819,263.....

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Exhibit

139

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1005

U.S. Patent Number 10,264,664.....

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Exhibit

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1009

U.S. Patent Number 2014/0355218.....

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1 JOSHUA PHINNEY, PhD, called as a witness, having
2 been first duly sworn by a Notary Public of the
3 State of New York, was examined and testified as
4 follows:

5 THE WITNESS: I do.

6 THE COURT REPORTER: Can you state
7 your name and address for the record.

8 THE WITNESS: Joshua Phinney,
9 P-H-I-N-N-E-Y; and my business address is
10 420 -- oh, I'm going to give my address in
11 Garden City -- 75 Kenwood Road Garden City,
12 New York.

13 THE COURT REPORTER: I'm going to go
14 off camera.

15 You may proceed.

16 I'll be here if you need me.

17 MR. KATZ: All right. Thank you.

18 EXAMINATION

19 BY MR. KATZ:

20 Q. Welcome back, Dr. Phinney. You
21 understand that you're here to testify in regard
22 to an IPR proceeding involving U.S. Patent

1 9,819,263?

2 A. Yes.

3 Q. And if I refer to the '263 patent,
4 you'll know what I mean?

5 A. Yes.

6 Q. So this is a remote deposition.
7 Have you taken -- or participated in a remote
8 deposition before?

9 A. Yes.

10 Q. Okay. So, you know, the ground
11 rules are -- I understand you're not going to be
12 communicating with counsel for Delta while we're
13 on the record.

14 Do you understand that?

15 A. Yes.

16 Q. Okay. And if -- is there any sort
17 of text communication or instant messaging or
18 other communication apps open on your computer?

19 A. No.

20 Q. Okay. And so your e-mail is closed
21 as well?

22 A. Yeah. I'm going to check and -- it

1 is closed.

2 Q. Okay. And so can we agree that
3 while we're on the record the only open documents
4 you'll have on your computer or in front of you
5 will be your declaration or any exhibit that is
6 part of this proceeding?

7 A. Yes.

8 Q. Okay. And do you have any notes
9 with you or any annotations that I should know
10 about --

11 A. No.

12 Q. Yeah.
13 -- that you'll be referencing during
14 the deposition, I should say?

15 A. No.

16 Q. Okay. Great.

17 With those preliminaries out of the
18 way, we can just begin.

19 Let me first just ask: Have you
20 ever used Vicor power converters?

21 A. I believe so, yes.

22 Q. Okay. Do you recall which ones?

1 A. No.

2 Q. Okay. And what about Delta power
3 converters? Have you ever used any of those?

4 A. I don't -- I don't believe so. Not
5 for any PCB mount.

6 Q. Okay. So I guess let me clarify.
7 So the Vicor power converters you recall using
8 were mounted on a printed circuit board?

9 A. What I'm recalling is like
10 half-brick form factor.

11 Q. And just for the record, a
12 half-brick form factor is a power supply that
13 would be mounted on to a printed circuit board?

14 A. They could be. My recollection is
15 that had through-hole mounting.

16 Q. And in this proceeding, you offer a
17 slightly different description of the level of
18 ordinary skill in the art than presented in the
19 petition.

20 Let me ask you: Do the differences
21 in how the level of ordinary skill in the art is
22 described, does that influence your opinions at

1 all?

2 A. I don't think so.

3 Q. Okay. So whether the board adopts
4 your level of ordinary skill in the art or the
5 Petitioner's level of ordinary skill in the art,
6 your opinions wouldn't change?

7 A. I think that's right.

8 Q. Okay. And because "a person with
9 ordinary skill in the art" is such a long phrase,
10 I'm going to use the phrase "skilled artisan."
11 And throughout this deposition may I use the word
12 "skilled artisan" to mean a person of ordinary
13 skill in the art at the time of the invention of
14 the '263 patent?

15 A. Agreed.

16 Q. Okay. That will be easier to say.
17 Seconds ago we just discussed
18 printed circuit boards. And I take it you're
19 familiar with two-layer printed circuit boards?

20 A. Yes.

21 Q. And they would normally have
22 components on either one or two sides plus

1 conductive runs that would connect the various
2 components?

3 A. Yeah. That's typically the case.

4 Q. Are you also familiar with
5 multilayer boards that have more than two layers
6 on them?

7 A. Yes.

8 Q. Okay. And why -- can you tell me
9 what is the internal layers used on a
10 multilayered board? What are they used for?

11 A. Well, it depends. But you often see
12 people advising others to put power in ground
13 at -- at -- at layers that are otherwise
14 unpatterned. So, for instance, ground or shield
15 layers can sometimes surround signal layers and
16 separate some signals from others.

17 So it's kind of a complicated
18 question. There is no one answer. But you do
19 see a lot advice about how to handle a lay-up.

20 Q. Okay. Is it fair to say that
21 internal signal layers are used in multilayer
22 boards to free up surface space on the surface of

1 the multilayer board?

2 A. That's a way of looking at it, is
3 that you're able to realize a higher density
4 design in terms of component placement because of
5 the multiple layers to the point where you could
6 put packages cheek to jowl on external surfaces
7 and, yet, have enough freedom to route all of the
8 interconnections internally.

9 Q. Just so the record is clear, are you
10 saying interconnections that would otherwise have
11 to be conductive runs on the surface, you can
12 push down to internal layers so that those runs
13 are not taking up real estate on the surface?

14 A. Yeah. That's one -- one benefit, in
15 addition to the shielding and isolation kind of
16 things that I was mentioning.

17 Q. Okay. And for the four signal
18 traces that are running inside the board, in the
19 middle, those signals are brought to the surface
20 of the boards through vias or some other
21 mechanism?

22 A. They can be. A via is the name for

1 something that goes sort of up and down
2 vertically between layers. And you can have
3 through vias or you can have blind vias or you
4 can have like a buried via. So both buried -- a
5 buried will never go to the top or bottom. But a
6 blind will go to the top or bottom, but not both.

7 Q. But if you have a component on the
8 surface communicating to another component on the
9 surface using a buried conductive run, there's
10 going to have to be some sort of electrical
11 connection from the surface down to that buried
12 conductive run?

13 A. If you need to make that connection,
14 yeah, you got to go vertically. Yes, you would
15 need some sort of vertical connection, for
16 instance, through a via.

17 Q. Is it fair to say that many
18 components in a power supply would have
19 connections to power in ground?

20 I'll take out the word "many." I
21 don't want to bog you down on that. I will
22 reword the question.

1 Would you agree that some components
2 on a power supply have to have connections to
3 power in ground?

4 A. Yes.

5 Q. Okay. So the power in ground
6 internal planes you were just giving as an
7 examples, those planes would be connected to the
8 surface of the PC board so that components could
9 access that power in ground?

10 A. If they were -- if they were down
11 below, yes, you know, it's quite typical that --
12 that a ground plane will be on the surface
13 already.

14 But, yeah, if it were an internal
15 plane, it would often be the case that it would
16 include a connection to components through a via.

17 Q. And would it be standard practice
18 that if you had ground traces on the surface,
19 that they would be connected to a ground plane
20 internal to the PC board if there was an internal
21 ground plane?

22 A. It would depend.

1 Q. What would it depend on?

2 A. So sometimes you wish to isolate
3 ground planes to -- to control the flow of
4 current that travels on different ground planes.
5 You know, you -- maybe you've heard of things
6 like there is an analog ground or there is a
7 power ground, you want to do things like minimize
8 what's called the common impedance between
9 multiple possible ground return paths.

10 Q. All right. If you have traces for
11 an analog ground on the surface and you also have
12 an analog ground plane, the surface traces would
13 be connected to the plane?

14 A. They would likely be connected
15 somewhere.

16 Q. I wonder if we can turn to Exhibit
17 1001, which I understand you have in front of
18 you, which is the '263 patent.

19 (Whereupon, Exhibit 1001, U.S.
20 Patent Number 9,819,263, was identified.)

21 A. Okay. I'm there.

22 Q. All right. Just so we have all the

1 same understanding here, if you can turn to
2 Figure 1.

3 A. Okay. I'm there.

4 Q. Okay. And just so the record is
5 clear, I'm going to ask a series of questions
6 that you may be wondering why I'm asking them,
7 but we just want a clear record.

8 If you look at Figure 1 it has -- do
9 you see the three Hs on the side on the right
10 side of the figure?

11 A. Yes.

12 Q. Okay. Am I correct that H1 is the
13 height of the bottom component?

14 A. Yes, that's what it's showing.
15 There is a paragraph if we want to reference to
16 the description in the spec, but yes.

17 Q. And H2 is the height of the upper
18 component?

19 A. Yes. Again -- again, you know, if
20 you don't mind, if I can just quickly, quickly
21 just look at -- I think it's -- what is it,
22 column 5. But yeah, I agree with that.

1 Q. And H3 is the height of the printed
2 circuit board?

3 A. Yeah, the carrier. Yeah, that PCB.

4 Q. Throughout the patent, H1, H2 and H3
5 have that same -- their respective meanings
6 throughout the patent?

7 A. That's my recollection, yeah.

8 Q. Okay. And if you want the total
9 height of the power module, you would just add up
10 H1, H2, and H3?

11 A. Yeah, I think that's right.

12 Q. Okay. And then do you recall that
13 in your declaration at various points, you cite
14 to a paragraph in column 5 -- let me get it -- at
15 Lines 43 to 59?

16 A. Yeah, I think I recall this
17 one-third to two-third -- disposed at one-third
18 to two-third of the height. I think I quoted
19 that.

20 Q. Okay. Let me ask you some things
21 about this entire paragraph, if I may.

22 So first sentence says that "...the

1 connection parts P1 and P2 may be directly bonded
2 to the first electronic component C1 through an
3 adhesive."

4 Do you see that?

5 A. Can you direct me? You said column?

6 Q. Column 5 starting -- in the
7 paragraph starting at Line 43.

8 A. Okay. Yes, sorry about that. Yes,
9 I see that.

10 Q. Okay. And would you agree that
11 bonding -- directly bonding connection parts to
12 electronic components with adhesives was known in
13 the prior art? That's not an invention of the
14 '263 patent?

15 A. Yes, I would agree with that.

16 Q. Next sentence says, "In a further
17 embodiment, the first electronic component C1 and
18 the second electronic component C2 are symmetric
19 with respect to the carrier PCB."

20 Is it your understanding in general,
21 unless it's defined otherwise, "symmetric" means
22 identical placement on the top and bottom?

1 A. It could include that. There's
2 other places in the specification that describe a
3 relationship of height of not more than two times
4 as sort of being enough in service of that goal
5 of symmetry, to realize the -- the strain
6 benefit.

7 Q. Okay. And that's actually later in
8 the paragraph.

9 Okay. So how would you -- if the
10 word "symmetric" wouldn't imply components of
11 equal height on either side of the PCB, what
12 phrase would you use to describe that?

13 A. So what I go back to capture this
14 idea is the claim and the claim language. In
15 particular this limitation we've been calling 1f
16 where it says the carriers disposed at one-third
17 to one-half. And, you know, in the context of
18 there being other components on both side, that
19 you might say, captures this, this symmetry or
20 close to symmetric concept.

21 Q. Okay. And you say "close to
22 symmetric." So would you say that if I used the

1 word "perfect symmetry" to reflect components
2 that are equal height on the top and bottom?

3 A. If you did that, I would understand
4 that you would mean like, yeah, they are sort of
5 100 percent the same.

6 Q. Okay. I'll try to make that clear,
7 but okay. If I use the word "perfect symmetry"
8 in this deposition, you will understand I mean
9 symmetry with equal height components?

10 A. Agreed.

11 Q. And the next line says, "As such,
12 the resource of the carrier PCB can be quite
13 utilized, and the uniform strain distribution of
14 throughout the converter can be benefited."

15 Can you get a uniform strain
16 distribution without perfect symmetry?

17 A. I think it goes back to what I had
18 said about there being -- there being symmetry
19 that's close enough as described by -- well,
20 don't make components on one side more than twice
21 the height of the components on the other.

22 You might think of that as the line

1 in the sand, you know, the patentee made as
2 reflected in that -- that 1f limitation.

3 Q. But would you agree that to get true
4 uniform strain distribution, you would need
5 symmetry with equal height components?

6 A. I wouldn't necessarily agree with
7 that. It would depend.

8 Q. What would it depend on?

9 A. So, you know, in power electronics,
10 what you're often thinking about is, well, what
11 are those components for and how much heat are
12 they generating? So, you know, one of the first
13 things your mind goes to is -- a person of
14 ordinary skill would be thinking about is, you
15 know, are we having about the same kind of heat
16 made on either side? That's under the hood.
17 That would be part of the reason, you might say,
18 of having components of roughly equal height on
19 both sides of a carrier.

20 It's operational, not just merely
21 physical.

22 Q. Okay. You agree that -- so in this

1 patent, as you said, it has this line in the sand
2 of, you know, the -- not more than twice. But
3 let me ask you: Just in general, would the term
4 "symmetry" convey to a skilled artisan identical
5 components on the top and bottom?

6 A. So, first of all, it would depend.
7 And it would depend in what context we're talking
8 about. And when I said "line in the sand," I
9 meant really the claim limitation.

10 Q. No, all right. Okay.

11 Let me just ask you this: If you
12 have components of equal height on the top and
13 bottom, that is certainly sufficient to meet the
14 symmetry in limitation 1f?

15 A. Okay. So there's no symmetry, as
16 I've understood it, in limitation 1f. It's
17 talking about the carrier being disposed at
18 one-third to two-thirds the height of this -- of
19 the power converter.

20 Q. Okay. So when it's talking about
21 where C1 and C2 are symmetric with respect to the
22 carrier, certainly if you have equal height

1 components on either side, that would be
2 symmetric with respect to the carrier as that
3 phrase is used in this patent?

4 A. I guess we'd have to look at all the
5 instances where -- where -- we were looking at
6 Figure 1, and C1 and C2, you know, seem to be
7 drawn with the same height. And we are then
8 looking at this part of the spec at column 5.
9 And symmetric could be used to describe those
10 equal heights, yes.

11 I don't know that I could answer
12 throughout the patent. We could visit all of
13 those if you want.

14 Q. Let's put it this way: If you look
15 at Figure 1, if C1 and C2 are equal height, you
16 would agree that they are symmetric with respect
17 to the PCB as that phrase is used in the patent?

18 A. What I was trying to say with my
19 answer is, you know, I don't know about every
20 instance. That's not an exercise I did to go
21 through and look at that at every place. So I
22 can't recall, but certainly with -- you know, I

1 understand, that is an instance of symmetric that
2 I could understand as we're looking at this
3 Column 5. That would be an instance of them
4 being symmetric.

5 But my point is that, you know,
6 there's also in this passage a description that
7 things can be symmetric and get the strain
8 benefit of the invention by not having components
9 that are too much -- too asymmetric. Like, they
10 can be twice as high but not more than components
11 on the other side, for instance.

12 Q. Okay. And I understand there are
13 other examples in the patent. I'm just simply
14 asking that you would agree that in Figure 1, if
15 C1 and C2 are equal height, that would be an
16 example, not the only example but an example of a
17 symmetric -- of the symmetry that's being
18 mentioned in this paragraph that we're
19 discussing?

20 A. Yeah, that, I think I'd agree with
21 that. Certainly a physical symmetry.

22 Q. Okay. And then it says, "Therefore,

1 no additional strain solution is needed, for
2 avoiding the problem of increasing of the power
3 converter volume resulting from using an
4 additional strain solution."

5 Do you see that sentence?

6 A. Yes.

7 Q. Do you know what it's talking about?
8 Do you know what an additional strain solution
9 would be?

10 A. Yeah, so a person of ordinary skill,
11 you know, they would say, oh, well, I've got sort
12 of a balanced carrier, you know, where I'm not
13 making it so lopsided that the entire carrier
14 could flex, rather it's one -- it is sort of at a
15 neutral axis between the components. And I don't
16 have to put a Band-Aid on this in some other way
17 to increase stiffness. So for instance, some
18 other, you know, something else that's
19 stiffening -- you know, pay some other penalty in
20 order to get the desired stiffness or the lack
21 of.

22 Q. Okay. And the next sentence says,

1 "In a further embodiment, the definition of
2 symmetry mentioned above may be that, the second
3 height H2 is not greater than twice the first
4 height H1, or the first height H1 is not greater
5 than twice the second height H2."

6 Do you see that?

7 A. Yes.

8 Q. This is what you were referring to
9 earlier?

10 A. Yeah. That's right. It's a way of
11 saying, hey, don't make this too lopsided.

12 Q. Okay. And so am I correct that the
13 patent here is teaching that, for example, the
14 height of the top component can be twice the
15 height of the bottom component?

16 A. That's at the very limit. But,
17 yeah, that -- that's sort of a guideline here in
18 the specification for a degree of asymmetry.

19 But, you know, that's really just a
20 spec. That's not -- this isn't the line in the
21 sand. And that's what I was trying to explain
22 earlier, is that what I meant with the line in

1 the sand, was the limitation 1f.

2 Q. All right. And limitation 1f says
3 that it would be okay if the upper component is
4 twice the height of the lower component?

5 A. I think you said limitation 1f at
6 the beginning of that question.

7 Q. Yes, I did.

8 A. No. That limitation 1f is talking
9 about the carrier being disposed at one-third to
10 two-thirds --

11 Q. You're right. You're right. I
12 wasn't looking at it. I got distracted.

13 All right. So let me ask it again.

14 This requirement that we're
15 discussing here in the '263 patent says that you
16 can have a power converter with an upper
17 component that is twice the height of the lower
18 component.

19 A. I wouldn't necessary characterize it
20 as "requirement." You know, it's part of the
21 explanation in the spec, but I think I understand
22 what you're saying.

1 Q. Okay. Well, did you call it a
2 criteria perhaps? In your declaration you
3 discuss this. Do you remember how you described
4 this -- this idea?

5 A. Yeah. I didn't go on as in as much
6 length as I did in the declaration for the
7 preliminary Patent Owner's response. But I
8 described there that the height of the first
9 component would be between one-third and
10 two-thirds the height of the total power
11 converter and likewise with the second component
12 and that would result in a constraint that the
13 height of a power converter -- sorry -- the
14 height of the first component is less than twice
15 the height of the other component.

16 Q. So you -- so I believe you just --
17 let me ask you: Is it your opinion that this
18 symmetry discussed in the patent provides certain
19 benefits?

20 A. That's a way of looking at it.
21 Because it's like I say, this is an answer I was
22 giving with heat and placing the carrier along

1 sort of a neutral plane, is that if a person of
2 ordinary skill would understand if you load up
3 that -- that carrier in a -- in a way so that
4 you're getting roughly equal heat on either side,
5 you know, the bending or warping would be -- it
6 would sort of naturally not have so much strain.
7 And you wouldn't have to pay a penalty in terms
8 of another -- another strain solution.

9 Q. Okay. Well, right now I just want
10 to focus on this and get what -- I don't want to
11 put words in your mouth. So I just want to get
12 what your opinions are.

13 So the patent describes this
14 definition of symmetry, where the second height
15 H2 is not greater than twice the first height H1
16 or the first height H1 is not greater than twice
17 the second height H2.

18 Do you have an opinion as to whether
19 that criteria provides any benefits to a power
20 converter?

21 A. Yeah. Like I was saying it's like
22 a -- it's -- you don't want to go make a lopsided

1 converter where your big power dissipating
2 components are all on one side. You want to
3 match that with something on the other. The --
4 you could say the particular line in the sand,
5 again, you know, the way to give definition to
6 that idea quantitatively was done in a certain
7 way, but -- in the patent, and -- and that's the
8 limitation. So -- but -- yeah, that -- that --
9 that -- that play at -- that benefit -- the
10 benefit you get from that placement is better
11 controlled strain.

12 Q. Okay. And one potential way to
13 accomplish this is you could have equal height
14 components, as stated in the final sentence of
15 that paragraph?

16 A. That could be part of it.

17 Q. Well, hold on. I don't mean to
18 interrupt. I'll let you finish your thing, but
19 that's not -- go ahead and finish and I'll reask
20 the question.

21 A. That can be part of it. I'm just
22 saying that this goes back to what I said

1 earlier, that there's also an operational aspect.

2 Q. Okay. Would you agree that if, as
3 stated in the last sentence, the height of an
4 upper component is equal to the height of the
5 lower component that would be an example of a
6 symmetry within what this paragraph is
7 discussing?

8 A. I think that's right because it --
9 the second height would not be greater than twice
10 the first height. There would be equal heights.
11 Yeah. So in the context of this paragraph, that
12 would be symmetric.

13 Q. Okay. And this paragraph also
14 teaches that if you're twice the height -- if the
15 upper component is twice the height of the lower
16 component, that still meets the symmetry that's
17 being described in this paragraph?

18 A. I suppose it does say that. It
19 says: Not greater than twice the height.

20 You know, that's right at the
21 border, you might say. I know this sounds silly,
22 but in my -- in the preliminary response, I

1 believe there was a -- I actually described that
2 condition as being a less than rather than a less
3 than or equal. But it's right at the border,
4 being at twice the height.

5 Q. Okay. As the patent is worded, it
6 says not greater than, right? So I mean what is
7 your -- is your opinion that this paragraph means
8 that it cannot be twice the height? That the
9 upper cannot be, is that your opinion?

10 A. That's -- that's the very, very
11 limit. That leaves on a dwindlingly small room
12 for any carrier. This goes back, again, I keep
13 on referencing my declaration in support of the
14 preliminary patent --

15 Q. I'm going to please ask you not to
16 do that. It's not actually part of this official
17 record. And so you can't be -- it's like, if you
18 didn't -- you know, this is limited to this
19 current declaration. If you chose to leave stuff
20 out of this current declaration, it's not part of
21 this proceeding.

22 MR. BOMBACH: I'll object to that

1 soliloquy.

2 MR. KATZ: Okay.

3 BY MR. KATZ:

4 Q. In any case I will -- let me just be
5 clear. In this deposition I'm only asking about
6 the opinions you have provided in Exhibit 2005.
7 That's the only thing I'm interested in. Okay?

8 A. Okay.

9 Q. Okay. Setting all of that aside
10 just so that we can get back on track here. This
11 paragraph, you would agree this paragraph says
12 that an upper component that is twice the height
13 of the lower component is within the symmetry
14 range discussed in this paragraph?

15 A. That's what it says, not greater
16 than twice the height. And it's talking about
17 that, yes, with respect to the definition of
18 symmetry mentioned above, as it says.

19 Q. And according to you, that provides
20 benefits in terms of strain?

21 A. You know, that's the far limit. I
22 think you're asking when you say "that," you're

1 referring to the case where components on one
2 side are twice the height. Is that what you
3 meant with "that" in your question?

4 Q. Oh, let me ask it again. And it's
5 your opinion that if you're within the symmetry
6 mentioned here where the upper component is not
7 greater than twice the height of the lower
8 component or vice versa, that your opinion is
9 that provides benefits in terms of strain?

10 A. Yeah, that's -- that's basically
11 right. It's sort of -- an -- it's sort of a
12 physical symmetry part of the picture. You know
13 there's also this operational part that relates
14 to heat; and by putting a carrier there at the
15 middle, not thinking about putting components on
16 one side but rather matching them on both sides
17 more or less, that's -- that's sort of a natural
18 strain solution that doesn't require additional
19 volume penalties.

20 Q. Okay. And so the patent further
21 teaches that you want the printed circuit board
22 in the device that it should be disposed at

1 between one-third and two-third the height of the
2 power converter?

3 A. So limitation 1f -- we can look at
4 it -- I think it says the carrier's disposed at
5 one-third to two-thirds the height of the power
6 converter.

7 Q. And you assert that the patent
8 provides structural benefits from both of these
9 criteria?

10 A. Okay. Just so I'm totally clear.
11 You said "both of these criteria," can you just
12 make it completely clear to me what you're asking
13 about when you say "both."

14 Q. Right. I believe your opinion is
15 that the patent provides structural benefits by
16 providing the symmetry criteria and the one-third
17 to two-third the height criteria?

18 A. Okay. This goes back to what I was
19 saying with the line in the sand idea. The way
20 of sort of quantifying or codifying all of this
21 symmetry stuff is limitation 1f. So I see 1f as
22 sort of summarizing all of that and providing it

1 in a -- in a form that are called, you know, the
2 line in the sand that's in the claim. So it's
3 not a both issue, necessarily.

4 Q. Well, let me just ask you maybe a
5 simpler question. You in your -- in your
6 declaration, you talk about these two relations,
7 the symmetry relation and where the PCB is
8 disposed.

9 A. Yes.

10 Q. All right. The symmetry relation is
11 the not greater than twice the height discussed
12 in the paragraph in Column 5?

13 A. That's -- yeah, that's one
14 expression of it, yes.

15 Q. All right. And the -- and the PCB
16 relation is the one-third to two-third that's
17 expressed in limitation 1f?

18 A. Just can you ask that question
19 again? I just want to hear it all again.

20 Q. Oh, sure.

21 In your declaration you discuss two
22 relations you believe are relevant to strain, I

1 believe.

2 Do you recall doing that?

3 A. Yes, correct.

4 Q. And the first relation is the
5 symmetry relation of Column 5?

6 A. Okay. Yes.

7 Q. And the second relation is where the
8 PCB is disposed at, as found in limitation 1f?

9 A. So what I'm trying to say is that
10 the limitation 1f and this disposed at limitation
11 is the way of summarizing all of that. So it's
12 the -- the idea of components on one side not
13 being too much higher than components on the
14 other gets, you might say, codified in terms of
15 the limitation.

16 Q. But you understand that the symmetry
17 limitation -- I think you said it earlier -- is
18 different from the PCB disposed at limitation?
19 Forget I used the word "limitation." I don't
20 want to confuse you.

21 As you testified earlier, the
22 symmetry criteria is a different criteria than

1 the one-third to two-third criteria of limitation
2 1f, right?

3 A. They are written differently. They
4 are related, though.

5 Q. But they are different?

6 A. I mean, the words are different,
7 sure.

8 Q. And one doesn't necessarily -- you
9 know, one -- it's not just different words,
10 right? They don't mean the same thing, do they?

11 A. I think I could agree with that
12 because I think we could find instances where we
13 make something symmetric, yet a carrier is not
14 disposed at one-third to two-third the height of
15 the power converter.

16 Q. Okay. So just to kind of close the
17 loop on this. Is it your opinion that -- that
18 you get stress and strain benefits from a
19 combination of the symmetry requirement of Column
20 5 and the one-third to two-third requirement of
21 limitation 1f?

22 A. You're putting these in parallel in

1 your questions. And the way I see it is that the
2 -- any benefit that you get is really -- it's
3 sort of codified in terms of that limitation 1f.
4 Just the way you're asking these questions, you
5 seem to -- to elevate something, a discussion --
6 elucidating discussion in the specification to
7 the level of a limitation. And I'm disagreeing
8 with that.

9 Q. Okay. I certainly didn't mean to
10 elevate anything to a limitation.

11 So I guess what I don't understand
12 is if you're telling me that the 1f limitation is
13 all you need to focus on, what's the relevance of
14 your symmetry discussion if they aren't
15 independent?

16 A. Well, it's like anything in a
17 specification. The specification explains
18 things, elucidates things, illustrates things.
19 And if you have, for instance, components that
20 can be within a height range, for instance,
21 one-third to two-thirds the height of the power
22 converter, what you find is if that height range

1 pertains to the height of components on both
2 sides, that the components on one side not being
3 greater than or being less than twice the height
4 of the other is -- goes hand in hand with the
5 carrier being disposed at one-third to two-thirds
6 the height of the power converter.

7 Q. So are you saying that if you
8 disposed the carrier between one-third and
9 two-third of the height of the power converter,
10 you're going to get the symmetry benefits
11 discussed in Column 5?

12 A. You know, more or less. I mean, if
13 you put a carrier there and you look at the
14 remaining space that you'd have, you'll see that
15 the two times hyper chron is the very, very
16 bleeding edge of how much space is left for the
17 carrier.

18 But, yeah, if you place the carrier
19 there, you will see you can't -- you can't -- you
20 can't go too far astray from the two times height
21 criterion.

22 Q. And you say -- actually turn to your

1 Paragraph 42, if you could, in your declaration.

2 A. Okay.

3 Q. Okay. Are you there?

4 A. Yes.

5 Q. Okay. Just look in the second
6 sentence of Paragraph 42. It says "...the '263
7 Patent discloses requirements that the height or
8 thickness of upper components 'is not greater
9 than twice' that of the lower components, and
10 vice versa."

11 Do you see that?

12 A. Yes.

13 Q. And then you say "The 1/3 to 2/3
14 height range of the carrier defines carrier
15 thickness and component thickness ratios, in
16 consideration of structural integrity and power
17 density factors."

18 Do you see that?

19 A. Yes.

20 Q. And then you say, "A precise
21 location of the carrier can also be derived from
22 those two relations..."

1 Do you see that sentence?

2 A. Yes.

3 Q. Am I correct that to find the
4 precise location, the two relations you're
5 referring to is, one, the not greater than twice
6 requirement; and, two, the one-third to two-third
7 height requirement?

8 A. Yeah, I think that's right.

9 Q. If you go to Paragraph 48 of your
10 declaration.

11 A. Okay. I'm there.

12 Q. Okay. You write --

13 A. I'm sorry. What?

14 Q. I said "You write," but then I
15 noticed that it kind of starts in the middle of a
16 thought. Bear with me one second. Oh, I'm
17 sorry, misread.

18 So you're at Paragraph 48?

19 A. Yes.

20 Q. You write, "It is incorrect as
21 Petitioner does to apply the phrase" -- and this
22 is the one-third, two-third -- "to mean that only

1 a portion of the carrier need to be within the
2 middle 1/3rd region."

3 Do you see that?

4 A. Yes.

5 Q. Okay. And then the last sentence,
6 which I believe is referring to your description
7 of what you say is incorrect, "Such an
8 application renders" limitation "[1f]
9 meaningless."

10 Do you see that?

11 A. Yes.

12 Q. Why does your --

13 MR. KATZ: Strike that.

14 BY MR. KATZ:

15 Q. How does such an application render
16 limitation 1f meaningless?

17 A. When I look at the phrase "disposed
18 at one-third to two-thirds" and then, you know,
19 if you're providing examples where the carrier
20 can lie outside of that, it's just like, well,
21 then what -- it -- it's like it just overstepped
22 the boundaries. Like, if you really think it

1 means that, then why have it there at all?

2 Q. Would you agree that the definition
3 that you state here for the incorrect
4 construction is not superfluous, it is bounded?

5 A. Okay. So when you say "it is
6 bounded," do you mean the definition is bounded?

7 Q. Okay. Let's back up. I believe
8 you're saying -- you're saying it would be
9 meaningless to interpret limitation 1f to mean
10 that only a portion of the carrier needs to be
11 within the middle third. That's what you're
12 saying?

13 A. Yeah, that last sentence of
14 Paragraph 48.

15 Q. I'm pushing back on the word
16 "meaningless." In fact, there is a meaning to
17 such a limitation, right? It's not unbounded.
18 It's not really -- you don't really mean it's
19 meaningless, do you?

20 A. Well, like I say, why have it there
21 at all if you can, you know, step outside, I
22 mean, the -- you know, the claim is essentially

1 providing goalposts and then, you know, you're
2 talking about kicking a football outside the
3 goalpost all the time and saying, well, that's
4 okay. And it's -- I guess I'd agree that you're
5 articulating, though -- you know, I suppose
6 you're articulating that a portion would be
7 within the middle third as a way to sort of
8 articulate this incorrect position.

9 Q. So would you agree that the -- what
10 you described as the incorrect position still has
11 goalposts, they are just not in the same place as
12 your goal posts?

13 A. I don't know that I would agree with
14 that. It's more like you're in what I'd regard
15 as this incorrect position. It's like getting
16 things outside the goalposts still counts or
17 still meets this limitation, and I just don't see
18 it that way.

19 Q. I tried to use your language, and
20 you seem to get a little confused or bothered by
21 that, so I won't try to use words like
22 "goalpost."

1 The construction whereby only a
2 portion of the carrier needs to be of the middle
3 third still has boundaries attached in that
4 carriers that are entirely outside the middle
5 third would not be covered, right?

6 A. I think I see what you're saying.
7 It would exclude carriers with no overlap.

8 Q. It would exclude any carrier that
9 was outside the middle third?

10 A. I think that's right. I think
11 that's a synonym with what I -- how I answered.
12 Like, if it's with no overlap, you know, of that
13 middle -- middle third, but yeah.

14 Q. And so, again, the term -- the
15 construction you are criticizing has meaning, it
16 is not indefinite?

17 A. I think I can agree with that. It
18 is -- it is a -- it is a -- you know, it's able
19 to distinguish among possibilities. I think I
20 agree with that. It's -- I disagree that it --
21 you know, it was how a person of ordinary skill
22 would interpret this claim language.

1 Q. Okay. Let's turn to limitation 1g
2 of your Paragraph 49.

3 A. Okay. I'm there.

4 Q. You write a "The proper construction
5 of [1g], quote, wherein the first connection part
6 is fabricated by mechanical support of the first
7 electronic component - is its plain meaning, as
8 understand by POSITAs."

9 Do you see that?

10 A. Yes.

11 Q. Am I correct that what you say the
12 plain meaning of this phrase is would be if the
13 artisan -- a skilled artisan interpreted it as is
14 fabricated by mechanicals or the first electronic
15 component would mean is supported by the first
16 electronic component?

17 Do you equate those two?

18 A. I don't know if I would necessarily
19 do that. I regard the -- the claim language
20 itself as the best guide for the -- its scope and
21 meaning.

22 Q. Am I correct that when you say you

1 understand the plain meaning of this phrase, is
2 it essentially that a first connection part is
3 supported by a first electronic component?

4 A. I think it would include things like
5 there being mechanical support of the first
6 electronic component, you know, so that -- I
7 would really focus, yes, on that mechanical
8 support.

9 Q. Is anything else in your
10 understanding of this claim -- excuse me -- in
11 your understanding of this limitation 1g, is
12 anything else required other than that the first
13 electronic component is supported by -- excuse
14 me. Let me ask it again. Sorry.

15 In your understanding of limitation
16 1g, is anything else required in addition to that
17 the first -- that the connection part is
18 supported by the first electronic component?

19 A. Well, what I was trying to explain
20 is that, you know, I'm -- I don't think this
21 needs to be construed. I think its plain meaning
22 is correct. You're substituting "supported by"

1 with this "mechanical support." I think I agree
2 is absolutely whether or not there is mechanical
3 support, you know, evaluating that could, you
4 know, I think it would depend on the situation.

5 Q. All right. Well, how would a
6 skilled artisan determine if there's a mechanical
7 support from a first electronic component for the
8 connection part?

9 A. You know, it would depend on a
10 situation. I don't think it's something we could
11 talk about abstractly, so well, but it could
12 include things like looking at the relative
13 placement of components and are they touching or
14 things like that.

15 Q. Do you think -- all right. Not do
16 you think.

17 In your opinion is there a
18 difference between mechanical support and
19 support?

20 A. You know, in this context, where
21 we're talking about these structures anyway, you
22 know, I don't know sitting here that some big

1 difference is occurring to me. I haven't really
2 thought about that issue though, if there is a
3 difference between mechanical support and just
4 support.

5 Q. Okay. So when you were answering my
6 questions using the phrase "mechanical support,"
7 you viewed that as meaning the "support" term
8 that's found in the claim?

9 I'm sorry. I don't mean to confuse
10 you. Let me tell you where I'm going.

11 You brought up the term "mechanical
12 support" in answer to my questions when I asked
13 you questions about support, as used in the
14 claim. I'm just trying to ascertain, you didn't
15 intend to mean anything different by that when
16 you were answering my questions. You were
17 answering my questions about the support as that
18 term is used in the '263 patent?

19 A. All I'm trying to say is that I
20 think the clearest guide to the scope and the
21 meaning of these words, is the words that are in
22 the claim. And so I was just trying to preserve

1 the words that are in the claim -- you know, if
2 we're talking about by mechanical support and if
3 you're taking sort of part of the phrase, just
4 "support," you know, I'm just urging us to use
5 the words in the claim as the best guide.

6 Q. Okay. No. That's fair. Okay. I'd
7 like to jump to ground -- your analysis on Ground
8 3. And ask you a few questions about that, if I
9 may. And I think Paragraph 185 might be a good
10 one.

11 Actually, before we do that, I think
12 we've been going just about an hour. We started
13 just before the hour. I'm about to switch gears.
14 Why don't we take a five-minute break and
15 reconvene.

16 MR. KATZ: So, Amanda, why don't we
17 go off the record.

18 THE COURT REPORTER: Off the record.
19 (Recess taken.)

20 BY MR. KATZ:

21 Q. If we turn to your declaration
22 2005 --

1 THE COURT REPORTER: Back on the
2 record.

3 BY MR. KATZ:

4 Q. Sorry. Welcome back, Dr. Phinney.

5 If you turn to your declaration,
6 2005, and we look at your discussion on Ground 3.
7 And in particular I want to direct your attention
8 to Paragraph 185.

9 A. I'm there.

10 Q. Let me find the first question here.
11 Wait a minute. I lost my place.

12 Paragraph 189 -- excuse me. We've
13 come to 189.

14 A. Okay. I'm there.

15 Q. Okay. And you say in 189, "As can
16 be seen in the below left, FIG. 6 has a heat sink
17 panel 121 (yellow)."

18 Do you see that?

19 A. Yes.

20 Q. You write, "This heatsink would
21 disallow connection of conductors as Petitioner
22 advocates for in [1g]."

1 A. Yes, I see that.

2 Q. So your analysis for limitation 1g
3 in Exhibit 3 -- for Ground 3 assumes that the
4 combination includes the heat sink of Figure 6?

5 A. No. That's my point is there's
6 these material differences between internally
7 218, Figure 4 and -- or sorry -- Figure 6 and
8 Figure 33.

9 But I understand that, for instance,
10 for limitation 1g Petitioner is saying that the
11 entire power converter would take a shape similar
12 to the module of Figure 33, but without the
13 adapter.

14 Q. And without the heat sink, correct?

15 A. Yeah. That's my understanding is
16 that the -- is that's the proposal is to, you
17 know, take a shape similar to Figure 33 that
18 doesn't have the -- the heat sink panel, like
19 121.

20 Q. Okay. And if the Figure 6 -- the
21 module Figure 6 from Vinciarelli-218 were used
22 without the finned heat sink, it would resemble

1 the cuboid shape shown in Figure 33?

2 A. No. I disagree with that. That's
3 part of what I'm explaining in Figure [sic] 189 I
4 say that the two devices -- comparing the two
5 devices -- this is, I think, in the fourth
6 sentence -- "moreover have different size
7 components and FIG. 6 has an uneven surface..."

8 That's that red arrow pointing to
9 the idea of it's not cuboidal or something like
10 that -- it's got -- it's got highs and lows.

11 Q. Okay. I'm just trying to understand
12 what your position is here.

13 So in your view if the Figure 6
14 embodiment were made without the heat sink, it
15 would have a bumpy surface as opposed to a smooth
16 surface?

17 A. Well, it's made with that heat sink
18 as a way that it -- it -- it forms the
19 encapsulant, you know, that's injected in there.
20 But if you were to remove the heat sink, yeah, it
21 would be not a rectangular prism. It would have
22 highs and lows.

1 Q. Okay. So, again, let me clarify
2 that. So your analysis for limitation 1g in
3 Ground 3 assumes that in the proposed
4 combination, the Figure 6 embodiment would not be
5 cuboid?

6 A. It isn't.

7 Q. Okay. Let me ask it one more time
8 with a slight difference. So your analysis of
9 Ground 3 limitation 1g assumes that in the
10 combination proposed by Petitioner, that Figure 6
11 would be used without the heat sink but would
12 retain these bumpy surfaces as depicted in Figure
13 6?

14 A. So the first par- -- first sentence
15 of Paragraph 188 "For [1g], the Petitioner argues
16 that 'the entire power converter would take the
17 shape similar to the module of FIG. 33...'"

18 So I understand that's what
19 Ppetitioner is saying as part of this combination.
20 What I'm getting at is looking at other
21 embodiments, like that in Figure 6, to find
22 features to describe something else about the

1 embodiment, that fails at a threshold level
2 because there's material differences between
3 these different embodiments in Vinciarelli-218.

4 Q. You understand that the Petitioner
5 relies on Figure 6 to show the cross-section
6 height of components, a feature not shown in
7 Figure 33?

8 A. I'd agree with that. What I'm just
9 adding is, in a different embodiment. A
10 materially different embodiment.

11 Q. And you're not -- would you agree
12 that you can have a cross-section arrangement of
13 components as shown in Figure 6, but without a
14 heat sink and with a smooth cuboid shape of
15 encapsulant?

16 A. You maybe could. And if you want me
17 to assume that, I can understand that.

18 Q. Okay. But when -- in your analysis
19 for your declaration, that's not the assumption
20 you made. You assume that Figure 33 -- excuse me
21 -- Figure 6 wouldn't necessary provide a bumpy
22 surface?

1 A. Well, it does provide a bumpy
2 surface, and so I'm pointing out material
3 differences between embodiments where features of
4 those embodiments are -- are combined, but where
5 that -- that's not something suggested by the
6 reference itself, Vinciarelli-218.

7 Q. You don't -- and so you believe that
8 Vinciarelli-218 does not suggest having either
9 heat sinks or no heat sinks or different types of
10 heat sinks added to its various embodiments?

11 A. It describes various embodiments --

12 Q. Okay.

13 A. -- so like you said.

14 Q. Right.

15 Is it -- in fact, doesn't
16 Vinciarelli-218 say that for its various
17 embodiments, you could either have a heat sink or
18 not have a heat sink?

19 A. We're looking at two examples that I
20 understand, yeah, are showing it with and
21 without, in Figure 6 and Figure 33.

22 Q. I have a different question. Is it

1 your understanding that Vinciarelli not only has
2 different examples, but teaches that for any
3 example, you can either have a heat sink or not
4 have a heat sink depending on the needs of the
5 design?

6 A. I don't recall that specifically.

7 Q. Okay. And am I correct that your
8 analysis in your declaration assumed that the
9 embodiments without heat sinks were distinct
10 embodiments from embodiments with heat sinks?

11 A. Yeah, they are distinct because one
12 has a heat sink and another doesn't.

13 Q. Okay. Would your analysis change if
14 you had an understanding that Vinciarelli-218
15 discloses that each and any embodiment might have
16 heat sinks or might be made without heat sinks?

17 A. I don't think so. What I recall
18 considering is that whether or not the lead frame
19 wrapping technique would happen on a module
20 without a heat sink getting in the way.

21 Q. I'm going to just ask some general
22 questions, and then I'll dig into the patents.

1 What are the basic components of a
2 buck converter?

3 A. So a buck converter is one of the
4 six types of converters that can have a
5 controlled switch and an uncontrolled switch.
6 And it has an inductor. And then as you will
7 usually see in a textbook, it will often include
8 a capacitor as well. But you could include a
9 voltage source. But two switches and an inductor
10 would be kind of the bare bones.

11 Q. Okay. And what is the height of an
12 inductor in a buck converter?

13 A. It depends.

14 Q. Okay. What does it depend on?

15 A. The magnetics design and how large
16 that component is.

17 Q. Okay. Are inductors as a rule
18 taller than switches or capacitors?

19 A. It depends.

20 Q. Could an inductor be the same height
21 as a switch or capacitor?

22 A. Could be.

1 Q. Okay. And are you familiar with the
2 term "planar inductor"?

3 A. Yes.

4 Q. And does a planar inductor have
5 identical core halves on either side of the
6 printed circuit board?

7 A. It depends.

8 Q. What does that depend on?

9 A. The degrees of freedom in a
10 magnetics design are manifold. I mean, it would
11 be an understatement to say tens. You know, I
12 mean ultimately with all the freedom you have,
13 there's hundreds of parameters. And so it would
14 depend on, for instance, is there a core or not,
15 one big question right off the bat. A lot of
16 planar inductors don't have cores. Some do.

17 Then once you get to cores, there
18 are so many different ways to have cores. You
19 can have EI cores and pod cores and other types
20 of PCB integrated cores.

21 So it's just there's so many, so
22 many variables to answer that question.

1 Q. Okay. Planar inductors with and
2 without cores was known prior to 2015?

3 A. Yes.

4 Q. And were buck converters using
5 planar inductors known prior to 2015?

6 A. Yeah.

7 Q. And if you turn to Paragraph 194 of
8 your declaration now.

9 A. I am there.

10 Q. And you state there that Zeng has
11 "...a singular larger component, the inductor
12 62."

13 Do you see that in the middle of
14 Paragraph 194?

15 A. Yes.

16 Q. And then at the bottom, you say --
17 you refer to a "...single, large inductor," the
18 very bottom of that page.

19 A. Oh, yes, I see that.

20 Q. Okay. What is your basis for
21 determining that the inductor in Zeng is
22 necessarily large?

1 A. Well, that's how it's shown. You
2 know, the Zeng-014 assemblies are really
3 lopsided. And that inductor is so big, but it's
4 used to form with a lead frame connections, for
5 instance, to another printed circuit board below.
6 So it's sort of like leveraging this huge
7 inductor in this lopsided assembly to also, you
8 know, hold up a smaller daughterboard, you might
9 think of it.

10 Q. Okay. Does Zeng-014 specify the
11 size of the inductor?

12 A. No, I don't think it really gives
13 us -- I don't recall a measurement. You know,
14 it's just shown as being pretty, pretty, pretty
15 big.

16 Q. All right. But you understand that
17 the figures in Zeng are not drawn to scale?

18 A. I think -- well, we could check. I
19 don't recall one way or another.

20 Q. All right. And can a large inductor
21 be made kind of short and squat?

22 A. It depends.

1 Q. And so even if you do have a large
2 inductor, as you -- as you say, it could be a
3 short but wide inductor?

4 A. You can -- you can -- you have so
5 many parameters to play with. You could do that.
6 As a commercial component, you know, that gets to
7 be like really troubling to designers, right,
8 because you want -- you care about things like
9 footprint.

10 So, you know, what Zeng is showing
11 is sort of a kind of a situation that power
12 electronics designers would have found themselves
13 in a lot where the inductor is the biggest thing
14 in, like, a simple switcher where you maybe have
15 an entire integrated control and you have a
16 switch and all of this stuff gets integrated.
17 It's so small and your capacitors are so small,
18 but then it's dwarfed literally by one inductor.
19 This just happened a lot since the early 2000s.

20 So you have so many degrees of
21 freedom. If you're designing the inductor, if
22 you're buying that inductor, you know, you know,

1 you could maybe find one that's squatter and
2 broader.

3 Q. And what about the use of two
4 inductors in a series instead of a single
5 inductor? Is that something power supply
6 designers do?

7 A. You might do that in some
8 circumstance. Generally speaking, from a -- a
9 material inductor optimization standpoint, that's
10 the worst thing you can do because the flux from
11 one inductor will tend to be confined to that
12 core and the flux from the second inductor will
13 be confined to its core. And had you had mutual
14 coupling between the two, you could have had two
15 times increase in inductance compared to the
16 series combination which is like shooting
17 yourself in the foot as a designer.

18 Q. You're saying you want mutual
19 inductance or you don't want mutual inductance?

20 A. Generally speaking with an inductor,
21 subject to the loss which can be key, you want as
22 much flux linkage as possible for a given

1 current. So, you know, if you're giving up
2 mutual flux, and, you know, by separating two
3 flux pads and not allowing the flux from one
4 winding to link the turns of the other, you get
5 suddenly 50 percent of the impedance generated by
6 the inductor. Your filter is half as -- you
7 know, twice as bad. Your ripple is twice as bad.
8 These are all horrible choices is what I'm trying
9 to say.

10 Q. I'm sorry. I'm not following. Are
11 you saying that mutual inductance is a good thing
12 or a bad thing?

13 A. In the context of what you were
14 saying of splitting something up to decrease
15 mutual inductance, it would generally be quite
16 bad. To get rid of mutual inductance would be
17 bad.

18 Q. So mutual inductance is good if I'm
19 trying to use two inductors in a series to
20 replace one?

21 A. Yes. In any situation where you're
22 trying to create an inductor, let's say you're

1 somehow forced to do that, the mutual induction
2 between the two would be good. It would serve to
3 increase the reactance of the series combination
4 which is generally what you're wanting from an
5 inductor is to, you know, block voltage, provide
6 an impedance to current lower ripple and things
7 like that.

8 Q. Okay. If you take two inductors and
9 place one -- and place them symmetrically on
10 opposite sides of a PC board, that will tend to
11 increase the mutual inductance between the two;
12 isn't that correct?

13 A. Yeah, it would, especially if you
14 had a way to guide the flux so that one -- so
15 that all the flux from one winding links in terms
16 of the other winding, you could have quite
17 excellent coupling between those -- those --
18 those two.

19 Q. Okay. Paragraph 197 -- oh, hold it
20 right there.

21 If we go back just to your Paragraph
22 189 where you repeat Figure 33 from

1 Vinciarelli-218.

2 A. Okay. I'm there.

3 Q. You see Figure 33 from

4 Vinciarelli-218?

5 A. Yes.

6 Q. And that figure shows an exposed
7 core, magnetic core, is that correct, that's what
8 is shown in that little square box?

9 A. If I could -- I could check
10 Vinciarelli-218. Is that -- do we --

11 Q. You know what, we'll wait until we
12 get to the reference. I don't want -- this isn't
13 a memory test. We'll get there.

14 Oh, let me just clarify one thing.
15 Before we were discussing placing two inductors
16 in a series, but one on top of the board and one
17 on the bottom of the PC board --

18 A. Okay.

19 Q. -- that had mutual inductance
20 between them.

21 Do you remember that discussion
22 seconds ago?

1 A. Yes.

2 Q. That technique was known prior to
3 2015, correct?

4 A. Yes.

5 Q. Okay. I just wanted to clarify
6 that. Thanks.

7 Okay. If we just go back to look at
8 Figure 33, 218 -- Vinciarelli-218 again really
9 quick. Maybe instead of looking at it in your
10 declaration, how about get the actual document
11 out.

12 A. Okay. Do you happen to know the
13 exhibit number?

14 Q. Oh, yes, Vinciarelli-218 is
15 Exhibit 1009.

16 (Whereupon, Exhibit 1009, U.S.
17 Patent Number 2014/0355218, was identified.)

18 A. Okay. All right. I'm there.

19 Q. And here is confirmed for me the box
20 shown as 815C in Figure 33 is an exposed core?

21 A. I think I would agree with that
22 because I'm looking at Paragraph 159 and it says

1 the magnetic core surfaces 815C are exposed.

2 Q. Okay. And you also understand that
3 that power converter will have other components
4 in it that are -- have lower height than the
5 exposed core?

6 A. It makes sense that there would be
7 other stuff in there.

8 Q. More than makes sense. I mean, can
9 you confirm that your understanding of
10 Vinciarelli-218 is that the power converter shown
11 in Figure 33 would have the exposed core and
12 other components under the encapsulant?

13 A. Yeah. That's right.

14 Q. Okay. But the exposed core is on
15 the surface of the encapsulant and that is what
16 it means to be exposed, that you can physically
17 see the core?

18 A. I think it could mean that.

19 Q. And then if we turn the page to
20 Figure 34, which is the underside of that same
21 embodiment. Can you just confirm that the box
22 shown as 815D is also an exposed core?

1 A. I'd give the same answer, yeah, I
2 think I would agree with that. That same part
3 that I was referencing also mentioned 815D. All
4 the same words and it.

5 Q. Okay. If we can turn to
6 paragraph -- excuse me. If you can turn to
7 Paragraph 197 of your declaration, again,
8 Exhibit 2005.

9 A. Okay. I am there.

10 Q. And if you can just read that
11 paragraph to refresh your recollection of what it
12 says.

13 A. Okay. Okay.

14 Q. Do you see in the middle of that
15 paragraph you say that "Zeng-014 and
16 Vinciarelli-218...have different form factors
17 dictated by their interconnections"?

18 A. Yes.

19 Q. What do you mean by that?

20 A. So when we were looking at Figure
21 33, for instance, we saw connections at an edge.
22 When we look at Zeng-014 that's that situation

1 that I was telling you about where there's kind
2 of a lopsided assembly with this larger inductor,
3 but that larger inductor is itself subject to
4 this lead frame wrapping. So that it can in turn
5 provide a way to mount -- you might think of it
6 like a daughterboard -- on top of that inductor
7 onto another printed circuit board.

8 Q. Are you saying that the
9 interconnections in Zeng-014 requires a lopsided
10 power converter?

11 A. That's how it's depicted throughout
12 that reference. You know, that you have this,
13 like we were talking about, a big inductor, which
14 kind of is doing double duty of not just being
15 the biggest component around, but being part of
16 how you mount the whole assembly.

17 Q. But does having the inductor for
18 mounting in Zeng-014 dictate a lopsided DC-to-DC
19 converter?

20 A. Yeah. More or less -- in Zeng-014
21 that's how it's shown. It's like, here's this
22 big inductor that's, you know, it carries the

1 other components almost like little -- we call it
2 a daughterboard sometimes. It's like a little
3 assembly. It's like a little miniature printed
4 circuit board with all of the smaller components
5 on there. That's how it's consistently depicted.

6 Q. I understand that's how it is
7 depicted. Is it your testimony that the
8 connection -- the interconnection mechanism shown
9 in Zeng 014 precludes components of equal height
10 to the inductor from being put on the top of the
11 PC board?

12 A. I wouldn't say precludes it. I
13 think, though, that's a complete hindsight
14 modification. I mean the idea that you, oh, put
15 another huge thing on the other side isn't, you
16 know, something an engineer is thinking of. I
17 think it's someone, you know, motivated by, you
18 know, trying to find invalidity grounds would
19 come up with.

20 I just don't see that as really a
21 good engineering thing, to add yet another large
22 component.

1 Q. Okay. Let me ask it again. I
2 wasn't talking about adding large components.

3 A designer wishing to use the
4 interconnect system described in Zeng, would not
5 reach the conclusion that that interconnect
6 dictates that the components on the top surface
7 be of a smaller height than the components on the
8 bottom surface, correct?

9 A. I think you're kind of getting it
10 backwards in your question, because -- I guess I
11 would agree it doesn't dictate. That doesn't,
12 you know, make it impossible to have that. But
13 the whole reason you have the solution in the
14 first place is you're living with a very large
15 component that you're, you know, you're sort of
16 mitigating its volume by having it do double duty
17 at least and provide an interconnection to that
18 daughterboard.

19 Q. And, in fact, if you made the Zeng
20 inductor both shorter and squatter, that would,
21 in fact, increase the surface area for
22 interconnecting to other devices; isn't that

1 right?

2 A. It could. You know, you may have
3 that option to make something shorter and
4 squatter. I would just go back to what I said
5 this idea of real estate is really quite an
6 important one, especially if you're willing to
7 put a daughterboard above an assembly mounted on
8 a component. You know, you really do care about
9 area, right. So you -- but, yeah, you can -- you
10 can make something shorter or squatter and maybe
11 have more room to connect something.

12 Q. And Zeng-014 it doesn't specify a
13 minimum or maximum height for any of the
14 components; isn't that correct?

15 A. I don't recall that it did that, no.

16 Q. Paragraph 198, if you turn to that.

17 A. Okay. I'm there.

18 Q. Okay. And just so we don't get too
19 far afield. I do understand your statement that
20 in the Zeng figures the inductor seems relatively
21 large, right. I understand that you're relying
22 on the Zeng figure. I'm now going to ask you a

1 question that is not limited to Zeng.

2 You state in Paragraph 198, about
3 five lines down, "A POSITA would appreciate that
4 this inductor is the largest component of the
5 power supply assembly."

6 My question to you is: How from
7 what Zeng depicts -- isn't it correct that the
8 inductor is not necessarily the largest component
9 in a power supply assembly?

10 A. I would agree that it's not
11 necessarily, but it -- just to put you in the
12 shoes of a person of ordinary skill -- this
13 inductor volume minimization issue was one that
14 was ongoing in lots of -- lots of innovation in
15 the early 2000s with some of the biggest things
16 that happened in power electronics from Vultara
17 and things like this, and stuff I worked on, was
18 about getting rid of those big inductors,
19 mitigating the penalty of having magnetics be
20 such a large portion of a switching power
21 converter.

22 Q. So you're saying starting in the

1 early 2000s there was a push to shrink conductors
2 for power converters?

3 A. Yeah. Broadly speaking, the
4 industry did this -- the -- you know, switching
5 frequencies were going up and the pain points
6 were really that, well, gee, a lot of my
7 inductor -- or -- sorry -- a lot of my power
8 converter is just a hunk of metal and it's a heat
9 sink and, you know, the other big hunk that I
10 wish I could shrink is the inductor. And as it
11 turns out, inductors, unlike capacitors, they
12 really have some limits where you're not going to
13 be able to decrease their loss too much.
14 Something called Q. The switch piece got better,
15 there's something called soft switching and all
16 of this. And so a lot of the heat that was
17 coming off of a switches got smaller. So
18 everything was getting smaller except the
19 inductor was still this pain point.

20 And so when you look at, you know,
21 the biggest things in the past decades, they were
22 absolutely, in my perspective, from volume

1 minimization were some tricks to decrease the
2 size of inductors.

3 Q. And depending on the application,
4 some power supplies might need a large inductor
5 and others might be able to use a much smaller
6 inductor?

7 A. Generally speaking, that's true.
8 You know, if you have requirements that -- in
9 switching power supplies, there's something
10 called ripple, and if you can tolerate more
11 ripple, yeah, you can -- you can have a smaller
12 inductor and less performance, yeah.

13 Q. And, in fact, are you aware of buck
14 converters prior to 2015 that had inductors that
15 had a lower height than other components?

16 A. Yeah. I designed some specifically
17 that were made to do that. You know, I was
18 trying to accomplish exactly that goal that we're
19 mentioning and ended up making things that were
20 not only small, but I was able to fit them inside
21 the printed circuit board.

22 Q. Oh, so prior to 2015, you had power

1 converter designs that put the inductor inside
2 the printed circuit board?

3 A. Yeah, yeah. So I mean, that was
4 part of the research I did was -- was inductors
5 and transformers that were integrated into
6 multilayer printed circuit boards.

7 There is a guy -- he's now at
8 Dartmouth, and he came up with this idea of
9 coupled inductors. And it's sort of an
10 interleaving idea, and it was just such a huge
11 win. And it's really something that's enabled to
12 this day, you know, small DC-to-DC converters at
13 high amps for processors and things like that.

14 Q. I just want to clear up a point.
15 When you say put an inductor -- that you put
16 inductors in PC boards prior to 2015, are you
17 referring to a planar inductor or taking like a
18 box inductor and just sticking it inside the PC
19 board?

20 A. So I did several types. Some were
21 planar in the sense of like pancake coils, but
22 most of what I was interested is getting the flux

1 perpendicular -- sorry -- parallel to the
2 substrate. So I build them into, you know, get
3 the area of the inductor, essentially the -- what
4 you call like the flux path actually in the
5 board. So it was planar, but not with -- looking
6 down, it would look like a toroid.

7 Q. Okay. In Paragraph 199, if you
8 could turn to that for a minute.

9 A. Okay. I'm there.

10 Q. You write, "...Petitioner's
11 combination requires added connective adaptors
12 (and manufacturing steps)."

13 Do you see that?

14 A. Yes.

15 Q. And you're referring to adding --
16 when you say "added adaptors," what are you
17 referring to, added connective adaptors?

18 A. So my understanding is that, you
19 know, in lieu of the solutions that are already
20 presented in these references, so, for instance,
21 where there's adaptors at the side, there's like
22 a block of encapsulant that includes a power

1 converter and then the entire thing is wrapped
2 with this sort of lead frame thing a la Zeng-014.

3 And so, you know, it's adding --
4 it's like an additive process to take a
5 singulated module and add this connector to it
6 and then -- and mount that further.

7 Q. Okay. And you refer to
8 Vinciarelli-218 Figure 34 as just kind of an
9 example here. And so why don't we just take a
10 look at that. Let me know if you have Figure 34
11 in front of you.

12 A. Okay. I'm there. Yeah, I probably
13 even meant to say 33 there. Yeah, 33 and 34, you
14 know, two views of the same -- same device.

15 Q. And perhaps it might be easier to
16 look at Figure 35 for a minute, which is another
17 device with another adaptor which I think is a
18 through-hole adaptor, if I'm correct?

19 A. Yes, I see that.

20 Q. So Figure 35 I think shows the
21 module, you know, separated from the adaptor at
22 least in somehow -- you know, a blowout view; is

1 that correct?

2 A. Yeah, I would agree with that.

3 Q. Right. And while Figure 33 or 34
4 shows a module with the Vinciarelli-218 adaptor
5 already on it?

6 A. Yeah, I think that's right.

7 Q. In your analysis, did you assume
8 that the entirety of Figure 33 and 34 would be
9 the form factor, in other words, you would wrap
10 components that already had adaptors connected?

11 A. No, I didn't see it that way. I
12 understood that Petitioner was really saying
13 something more like from that exploded view of
14 Figure 35, just the rectangular prism that that
15 block, I had called it earlier, was the sort of
16 basis for doing more.

17 Q. Okay. Right. The cuboid structure
18 without the adaptors shown in Vinciarelli-218 in
19 Figures 33 or 34 is how you understood the
20 teaching that was being used in the combination?

21 A. I think I would agree with that.

22 Q. Okay. If you turn to Paragraph 200

1 of your declaration.

2 A. Okay. I'm there.

3 Q. So you talk about the combination.

4 Then you say, "This combination would require
5 several additional manufacturing steps, which
6 Petitioner has failed to provide any rationale
7 for."

8 What are the additional
9 manufacturing steps you're referring to here?

10 MR. KATZ: Well, let me just strike
11 that and ask a slightly different question to
12 get more grounding.

13 BY MR. KATZ:

14 Q. When you say "additional
15 manufacturing steps," additional -- additions to
16 what? What are the baseline manufacturing steps
17 you're saying you now need additional steps to --
18 to add additional steps to?

19 A. So I think before -- before coming
20 to steps that involve adhesive in lead frame
21 wrapping, there's first, you know, an issue about
22 how Zeng-014 would have to be modified because

1 Zeng-014 describes like how an inductor with
2 magnetic material molded around it has the
3 winding conductor that comes out and forms pins.
4 So the connections to that inductor are via --
5 via other connector structures that are placed on
6 the board.

7 So as you know from Zeng-014, those
8 are conductors that are on Zeng's 014 inductor
9 itself. So there's, first of all, just some
10 ambiguity with what this combination is and what
11 it really means. And so that's the first maybe
12 three sentences that I put here in Paragraph 200,
13 you know, where I'm quoting what Dr. Baker said.

14 Q. And so are there any specific
15 manufacturing steps you're saying the combination
16 would add that are -- that would not be needed in
17 Zeng-014?

18 A. So they would include things like
19 having to redesign the -- you know, change how
20 interconnections are made on the Zeng-014
21 inductor because that's, you know, somehow now in
22 this Vinciarelli-218 form factor in a single

1 module. So that -- that's what I was getting at
2 in my previous answer.

3 Something about those interconnects
4 has to change. That could involve different
5 manufacturing steps. There's overmolding that
6 has to include things that aren't in Zeng-014.
7 You know, there would be some sort of overmold
8 process where there's encapsulant.

9 Then we would come to what I had
10 mentioned previously about like adhesive applied
11 to either a surface or part of a lead frame and
12 then this lead frame wrapping technique with
13 additional manufacturing steps required to
14 connect -- you know, actually create connections
15 to the internals of this -- I'm going to call it
16 block.

17 Q. Okay.

18 A. That's the Zeng-014 device in the
19 single module form as taught by Vinciarelli-218
20 which is what Dr. Baker seems to be proposing.

21 Q. And then the bottom of that
22 paragraph, you state -- last sentence, "Neither

1 the Petition nor Dr. Baker explain why a POSITA
2 would remove compact interconnect or thermal
3 features of Zeng-014, then re-apply Zeng-014's
4 lead-frame wrapping technique to the resulting
5 'single module' without the benefits that
6 Zeng-014 teaches."

7 Do you see that?

8 A. Yes.

9 Q. What are the thermal features of
10 Zeng-014 that you're referring to?

11 A. I would need to look specifically,
12 but my recollection is that it revolves around
13 the lead frame being around the magnetic
14 component more specifically, rather than around a
15 bigger thing like an entire module.

16 Q. And why would you say that you --
17 actually, and then what are the benefits that
18 Zeng-014 teaches that you're referring to there?

19 A. Well, you know, a person of ordinary
20 skill reading Zeng-014 is seeing, oh, that isn't
21 this great, you know. This large inductor is
22 doing double duty and it's providing a way to

1 interconnect to this sort of daughterboard module
2 that can be mounted on top of the large inductor.

3 And so, you know, we're kind of
4 erasing all of that in this combination because
5 we -- it's no longer that type of, you know, big
6 inductor sort of carrying the interconnects. The
7 big inductor or whatever inductor it is, is now
8 just part of a larger assembly that's in the form
9 factor in this proposed combination of
10 Vinciarelli-218.

11 So you're really modifying a lot to
12 the point where it kind of looks at the end of
13 the day, a lot like the Vinciarelli-218 block.
14 And then you're reapplying the lead frame
15 technique around that, but you didn't get that
16 cool double duty idea of using the inductor to
17 hold stuff plus the thermal.

18 Q. Let me ask you about that, the
19 thermal piece. The thermal benefit that Zeng
20 teaches is that by adding this conductive
21 wrapping out of which is metal, the metal helps
22 conduct heat away from the device; is that

1 correct?

2 A. I just don't remember correctly --
3 that that rings a bell. I'd have to review a
4 little bit. I just can't quite remember that.

5 Q. Okay. Well, rather than holding you
6 to what Zeng teaches -- you can read that later,
7 if you wish -- would you agree with me that if
8 you wrap a device with metal conductors, that
9 metal will help dissipate heat from a device?

10 A. I generally agree with that.
11 Especially if you had a filler material to -- to
12 make sure that the two were, you might say,
13 intimate or intimate contact.

14 Q. And, in fact, the Zeng-014 has that
15 filler material around its inductor and then
16 applies the metal wrapping to that filler
17 material?

18 A. So my recollection distinctly with
19 Zeng-014 it said applying an adhesive, for
20 instance, a thermo set to one surface. And then
21 the lead frame to that, I believe.

22 So just to be clear, what I'm

1 talking about with filler material would be
2 something like a thermoset adhesive. There is
3 different kinds of compounds that are used for
4 this type of application. And I'm not talking
5 about like powder core material.

6 Q. Okay. But, in fact, doesn't Zeng
7 have the material around the actual inductive
8 element that makes its cuboid shape and that will
9 help dissipate heat to the wrapped conductor?

10 A. Okay. And just to be clear, I think
11 what you're asking me is like -- like if you were
12 to have x-ray vision, we would look inside the
13 Zeng-014 inductor and see a winding. And I think
14 you're talking about the -- like the powder
15 magnetic material that surrounds all of that.
16 And I think you're asking me does that powder
17 material help dissipate heat?

18 Q. In conjunction with the wrapping.
19 Does it help dissipate heat to the wrapping and
20 then the wrapping being metal helps dissipate
21 heat to the air?

22 A. A person of ordinary skill seeing

1 that is going to think of the core material as
2 more as the source of heat. You know, there's
3 going to be copper loss and core loss and it
4 would depend on what material that is. But there
5 could be a lot of heat coming out of that core
6 sort of diffusely. So it would depend on the
7 material.

8 But you kind of think of that as
9 more of a problem, you know, a heat source and
10 then things around it, like -- but, yes, it does
11 conduct heat -- I mean, it does conduct heat
12 outward.

13 Q. And in the proposed combination
14 where the wrapping is used around the device,
15 that metal wrapping will help dissipate heat as
16 taught by Zeng?

17 A. I bet it would, but I think it could
18 depend. But generally I think that would be a
19 good thing, because it would tend to conduct heat
20 away; however, it doesn't have such great surface
21 area, you know, like normal -- you know when we
22 talk about heat sinks, they often have fins. And

1 part of that idea is to really increase the
2 surface area and get all kinds of cooling
3 convective effects with that plus increase
4 radiative heat dissipation.

5 So I think it could help somewhat by
6 conducting heat away. It's not like this big fin
7 that you see with heat sinks that have a shape
8 that's more designed not for connecting, but for
9 removing heat.

10 Q. Okay. I hear you're saying there
11 are fin heat sinks which may work much better
12 than what Zeng is describing. But at least can
13 you confirm that using the Zeng wrapping on -- in
14 the combination proposed does provide some
15 benefit of heat dissipation over not using the
16 wrapping?

17 A. I just don't know that I could say
18 yes. It would be kind of -- it could. The
19 source of my hesitation is I think about the
20 emissivity of the magnetic material. Frequently
21 they are dark. They are quite black. They can
22 be emissive over a wide range.

1 Do you compound upon them? Do you
2 make it worse? Do you somehow trap heat by
3 putting a more reflective surface over it?

4 There is a little, you know -- it's
5 not like this clear win, but the metal is surely
6 more conductive -- thermally conductive. There
7 may be sort of a counter balancing issue of
8 emissivity. It's not like I can give you a clear
9 yes.

10 Q. Okay.

11 MR. KATZ: You know what, we've been
12 going about another hour. Should we take a
13 ten-minute break? Let's be more realistic.
14 If you need something longer, it's totally up
15 to you.

16 THE WITNESS: That's fine. Ten
17 minutes is fine.

18 MR. KATZ: Okay. Great. Thanks.

19 THE COURT REPORTER: Off the record.

20 (Recess taken.)

21 BY MR. KATZ:

22 Q. All right. Welcome back,

1 Dr. Phinney.

2 I'd like to ask you questions about
3 the '263 patent, which is Exhibit 1001. If you
4 would turn to that, please.

5 A. Okay. I'm there.

6 Q. Okay. And if we can turn to claim
7 1, you see it refers to a first connection part
8 comprising two terminals.

9 Do you see that?

10 A. Yes.

11 Q. And can you tell me -- you can use
12 Figure 1 if you'd like -- what is -- what's an
13 example of a first terminal in the '263 patent?

14 A. Yeah. So looking at Figure 1, a
15 first -- you asked about first terminal, right?

16 Q. Yeah. Can you identify in Figure 1
17 or anywhere else, wherever you want, the first
18 terminal. What would correspond with a first
19 terminal?

20 A. I think something like Pin1 that's
21 labeled in Figure 1.

22 Q. What makes that a terminal?

1 A. So a terminal is a place that's for
2 connection typically. And it -- it may be at the
3 end of a conductor. So, when we say like Grand
4 Central terminal, that's sort of the end of the
5 line. It doesn't have to be there. But it's a
6 person of ordinary skill would understand it's
7 often there for connection.

8 Q. And so when a person of ordinary
9 skill in the art, you're saying, would look at
10 Figure 1 and recognize that connection part on
11 the left has two terminals, one on either side of
12 the connection part?

13 A. Yeah.

14 So like, in column 12 it says:
15 First connection part P1 includes a first
16 terminal Pin1 and a second terminal Pad1.

17 Yeah, so I think I would agree with
18 how you're saying that.

19 Q. And would you -- would you agree
20 that even without that description, someone just
21 looking at that connection part being told that's
22 just a strip of metal in that C shape, that there

1 are at least two terminals, one at the top, one
2 at the bottom?

3 A. I think in the context of the
4 whole -- the whole disclosure, that would become
5 apparent. You know, when you think about what's
6 this all for? You know, I don't know that a
7 person of ordinary skill would be, you know, ever
8 looking at this Figure 1 in isolation.

9 Q. Would you say in general, if I have
10 a conductor that is forming a -- that is used to
11 connect two devices, that there would be -- each
12 end of the conductor would be considered a
13 terminal?

14 A. I think it depends on the shape and
15 what they are for. You know, maybe we can see
16 examples where you really wouldn't quite think of
17 it that way. But, you know, if it were a long,
18 thin wire you often do refer to it that way.

19 Q. You mean, where you have a wire used
20 to attach two devices, you would consider each
21 end of the wire to be a terminal?

22 A. That's quite often done in just how

1 people talk is that wires have terminals. And
2 when people are -- when people talk about like
3 conductors, they sometimes -- what they sometimes
4 mean is like a wire. Like they mean a wire with,
5 like, you know, it could be solid or stranded.
6 You know, it's -- it's often flexible. You know,
7 that's -- in that type of setting, the ends of
8 that wire are -- are -- are -- which is sometimes
9 called just a conductor, are -- are terminals.
10 That's very common.

11 Q. And in claim 1 it says: The first
12 terminal electrically coupled to the upper
13 surface or lower surface of the carrier.

14 Do you see that language?

15 A. Yes.

16 Q. Okay. Am I correct that the word
17 "electrically coupled" does not require a direct
18 connection?

19 A. I don't know that anyone construed
20 this. I think all we have to go on is just the
21 plain meaning. Electrically coupled could
22 include, you know, if there was a so-called

1 electrical connection that's like physical
2 through a filler material like solder, that would
3 be an example of an electrically coupled and
4 connected. But I don't know that we have a real
5 construction, to answer your question.

6 Q. But would a skilled artisan, just
7 upon the ordinary meaning "electrically coupled,"
8 understand that to require a direct connection or
9 no?

10 A. Gosh, in this world of patents, I
11 really -- it's hard for me to answer you,
12 because -- because so frequently -- I must have
13 been on like three or four different cases where
14 this exact issue comes up.

15 And sometimes people make
16 distinctions between connections and coupled, and
17 electrically coupled can include intervening
18 components in the specific constructions that are
19 usually offered to resolve this.

20 So, unfortunately, our person of
21 ordinary skill is literally reading this sort of
22 hybrid engineering legal disclosure, right, so

1 I'm not quite sure how to answer you.

2 Q. Well, would you agree with me that
3 the connection part shown, for instance, in
4 Figure 1, you see the one that has a Pin1 and
5 Pad1?

6 A. Yeah.

7 Q. Would you agree with me that Pin1 is
8 electrically coupled to Pad1 through the middle
9 of the connection part?

10 A. Yeah, that makes sense to me.

11 Q. And so all right. I do have a
12 question about your Paragraph 38, if we can turn
13 to that. Oh, and before we get there, just a
14 clarifying question, and, in fact, would you
15 agree that Pin1 of the connection part
16 illustrated in Figure 1 is electrically coupled
17 to every other part of the connection part, not
18 just to Pad1?

19 A. I think I'd agree with that, and
20 generally, if we can -- you know, I think there's
21 enough flexibility in the words of our claim that
22 if we can trace through metal, you know, that,

1 you know, we should be able to -- you know, all
2 of those things are electrically coupled around
3 that pad.

4 Q. Paragraph 38, you say, "The '263
5 Patent identifies the concepts of efficiency and
6 power density..."

7 And then you cite to the patent for
8 those two concepts.

9 Do you see that?

10 A. Yes, I see that.

11 Q. Okay. Then further down on the
12 paragraph you write -- well, you say that "The
13 optimization of these key metrics is a challenge
14 in this field." Then you say, "Another challenge
15 in this field is structural integrity and
16 durability of a power converter, particularly
17 with respect to mitigating mechanical stress
18 within a power converter."

19 Do you see that?

20 A. Yes.

21 Q. Now, you do not provide a cite to
22 the '263 patent for this concept of structural

1 integrity and durability, correct?

2 A. That's right. I don't have a cite
3 there.

4 Q. Right. And, in fact, you're not
5 suggesting by this paragraph that the patent
6 discusses those concepts; this is your gloss on
7 what you see in the patent?

8 A. I don't say it in the same exact
9 words, but I think we were looking at Column 5 of
10 the '263 patent, I was talking about the strain
11 solutions. And -- and, yeah, you could say
12 I'm -- I'm paraphrasing. I didn't say like -- I
13 didn't use strain solution here and I was talking
14 about stress, which you can think of as something
15 that leads to strain. But so, yeah, I'm
16 paraphrasing or describing. But there are -- you
17 know, the kind of thing I'm talking about is what
18 we saw on Column 5.

19 Q. Okay. So when you're referring to
20 structural integrity and durability, you're
21 referring to that paragraph in Column 5 that we
22 discussed earlier and specifically just so the

1 record is clear, paragraph -- Column 5, Line 43
2 to 59?

3 A. Yeah, that is what I was thinking
4 of, that part and, you know, some of the -- that
5 and yes, some of the background that a person of
6 ordinary skill would have in thinking about
7 strain -- what a strain solution meant there.

8 Q. And so the concept you're discussing
9 here is just keeping the PC board flat so it
10 doesn't work and potentially disrupt electrical
11 connections?

12 A. That's a pretty good way of putting
13 it. That would be -- that's front and center
14 what I'm thinking.

15 Q. Okay. And in Paragraph 39 and the
16 very end of 38, you discuss potential warping of
17 a PCB; is that correct?

18 A. Yes.

19 Q. And, again, no citation is given to
20 the '263 patent?

21 A. I think that's a fair way of putting
22 it. I have this sort of altered version of

1 Figure 2 to sort of explain what I'm saying, but
2 yeah.

3 Q. I think it's clear in your report,
4 but just in case there's any doubt, the figure in
5 your patent [sic] is an altered version of Figure
6 2 that is not -- that figure is not found in the
7 patent?

8 A. Yeah. That's accurate.

9 Q. Okay. And, in fact, the patent
10 itself doesn't use the word "warping" at all,
11 does it?

12 A. I can search quickly. I don't
13 recall that it does.

14 Q. And so the kind of warping
15 commentary is again your gloss on what you read
16 in the patent?

17 A. I would agree with that, and I'm
18 paraphrasing what's there and providing some
19 background that would be in the mind of a person
20 of ordinary skill.

21 Q. And right. And, in fact, prior to
22 the invention of this patent, a skilled artisan

1 would have been aware of the warping issue when
2 designing a PC board-based product?

3 A. Yeah, yeah, that it was something
4 you could model in different ways. You know,
5 actually, you know, model the mechanical
6 displacement of a board and things like that.

7 Q. One way to mitigate board warping is
8 by placing components symmetrically on the top
9 and bottom sides of the PC board, right?

10 A. That's part of what the '263 says as
11 part of an effective strategy. There's also that
12 operational piece, not merely put them the same
13 size. It's not like their weight or mechanical
14 load is really the issue as much as the heat that
15 they generate.

16 Q. Okay. And right now, I'm referring
17 to what a skilled artisan would know in the prior
18 art.

19 A. Oh.

20 Q. Can you agree that prior to the
21 invention date of the '263 patent, a skilled
22 artisan would have been aware that one -- one way

1 to mitigate warping or stress on the PC board is
2 to symmetrically place components on the top and
3 bottom of the PC board?

4 A. So many of the designs I'm familiar
5 with really had one-sided placement. You know, I
6 don't know that I would say that that symmetry
7 was -- I mean, it's certainly not something we
8 taught to people in power electronics.

9 And many of the designs I can think
10 of were populated effectively on one side. And
11 they utilized other sides for big fat traces and
12 things that, you know, crowded. You wouldn't
13 want components there because you're sort of
14 using that real estate. So I don't know that I
15 can answer that yes.

16 Q. Okay. Well, are you personally
17 aware of power supply designs prior to 2015 that
18 put components on both sides of the boards
19 instead of just these thick traces that you're
20 talking about?

21 A. I think there are, you know,
22 depictions of those, yes.

1 Q. Were you familiar -- were you aware
2 of those prior to 2015?

3 A. I'm just not sure. The ones I can
4 think of were populated on one side. They tended
5 to be quite lopsided. So I am -- I guess I'd --
6 I'm not sure I was aware. I don't know.

7 Q. Okay. Are you aware that the
8 Vinciarelli-218 disclosure or 1009 discusses the
9 symmetrical placement of components between PC
10 board surfaces as a way to reduce stress on the
11 PC board?

12 A. I know it depicts that type of
13 symmetric arrangement. I'd have to go look
14 again, you know, if it's discussing particular,
15 you know, benefits of that, you know, as a way of
16 doing something. I'd have to check again.

17 Q. So as you sit here today anyway, you
18 don't recall whether Vinciarelli-218 actually
19 taught that as a benefit of symmetrical design?

20 A. It rings a bell. I just -- I --
21 I -- I can see in my mind the figures depicting
22 it. As far as the text, and, you know, I just --

1 I'd have to -- I'd have to go look again. I'm
2 not -- I'm not recalling it distinctly.

3 Q. Okay. And even if, you know, you
4 may not be able to recall a specific power supply
5 design, would you agree that a skilled artisan
6 looking at the symmetrical designs of
7 Vinciarelli-218 would have understood that that
8 sort of a symmetrical design would mitigate
9 warping and stress on the PC board?

10 A. I think what they would -- they
11 would see is using available real estate first, I
12 think that's really -- they would see it as
13 primarily a power density issue. Like, if you
14 can -- if you can have all surfaces of this power
15 converter of these substrates doing something for
16 you and if you have to live with X number of
17 components, you can really decrease volume by
18 populating both sides.

19 Q. And if we look -- if you look at the
20 cover of Vinciarelli-218 which includes a copy of
21 one of the figures we've been talking about, it's
22 Figure 6.

1 A. All right. I am there.

2 Q. So someone looking at Figure 6 would
3 recognize that you have effective use of board
4 real estate because you have components on both
5 sides of the PC board, right? That's what you
6 were just getting at?

7 A. Yes, that's what I was saying
8 because often you need to put the components
9 somewhere. They are part of the design.

10 Q. So then my follow-up question is:
11 Would it have been apparent to a person of skill
12 in the art back in 2015 that the symmetrical
13 placement of equal size components above and
14 below the PC board would help in reducing stress
15 on the PC board?

16 A. I think it has this operational
17 piece. And I really see this as principally like
18 a power density issue and then also there's
19 something that interties with electrical
20 symmetry, which is so key for -- for many -- for
21 many designs.

22 Q. Well, you mention that warping and

1 stress was a known issue presented to a power
2 supply -- excuse me -- power supply designer,
3 correct?

4 A. It -- it -- it was something that
5 modeled that could potentially be a problem.

6 Q. Well, prior to 2015 what sort of
7 ways to address that PCB stress and strain did
8 people use?

9 A. What I've seen with this is that
10 people often modeled it as part of a thermal
11 design and just to meet a spec. They would often
12 have a modeling where they sort of, you might
13 say, artificially clamped one side and then
14 looked at cantilevered flexion of an assembly.
15 And, you know, that could play potentially into
16 the choice of a substrate thickness or mounting.

17 Q. Well, would you at least agree with
18 me that a skilled artisan would have recognized
19 that placing components on both sides of a PC
20 board would help reduce stress more than placing
21 components all on one side?

22 A. You know, I don't know that they

1 would think that necessarily. It would depend on
2 the operational piece. I think it would -- it
3 would help to point it out to them, that, you
4 know, the point of the design is to evolve heat
5 to the same degree on either side, for instance,
6 as a way of having this thermal symmetry, you
7 might say.

8 Q. Right.

9 And one of skill in the art would
10 have recognized if all the components were on one
11 side, then you have no thermal symmetry and that
12 could be a problem, in terms of warping?

13 A. You know, I don't know that they are
14 thinking about it in terms of what symmetry could
15 exist or not. They -- what I've frequently seen
16 with qualification or acceptance of power supply
17 assemblies is they sort of were tested
18 mechanically or sometimes modeled from the
19 standpoint of how thick to make a substrate or
20 where to affix a substrate. Like how many
21 mechanical supports would it need.

22 You know, and people would do

1 vibration testing and other things like this.
2 There's sort of this thermal mechanical piece
3 that a person of ordinary skill who's more on the
4 electrical side of things, that kind of -- you
5 know, I don't know that they are seeing a problem
6 necessarily with components on one side. They
7 are seeing it as, you know, part of something you
8 maybe need to mitigate mechanically.

9 Q. Let me just clarify something you
10 side earlier. You referred to the operational
11 piece as well as just the size piece. And I
12 believe you used that term much earlier in the
13 deposition.

14 A. Yeah.

15 Q. By "operational piece" you meant the
16 amount of heat that parts generate?

17 A. Yes.

18 Q. Okay.

19 A. Yeah. I was like, not merely that
20 they are there, but they are there and doing
21 something that is making heat, as being really
22 one of the key considerations.

1 Q. And so you're saying -- you're not
2 just balancing kind of physical mass of
3 components on either side of the PC board, you
4 want to balance the heat generation as well?

5 A. Yeah. That's -- that's what I was
6 getting at.

7 Q. Okay. And if you look kind of
8 matching heat generation sources on the top and
9 bottom of a PC board, you're saying that will
10 help mitigate the stress on the PC board?

11 A. It would. But I think that's
12 something that you would need to explain to a
13 person of ordinary skill. Like they would -- you
14 could say, look, a benefit of this design -- this
15 is what I think the '263 is doing. Is, you know,
16 explaining that, hey, you can actually have this
17 sort of balanced design by having components on
18 both sides that are, you know, roughly the same
19 height. And that ultimately is a win because you
20 don't have to have as much other -- you don't pay
21 a penalty otherwise to decrease strain.

22 Q. And it's your opinion that a person

1 of ordinary skill in the art back in 2015 would
2 not know that mirroring components on the top and
3 bottom of a PC board would mitigate -- help
4 mitigate stress by matching heat generation and
5 physical size mass?

6 A. Yeah. I think that's right. I
7 think they could recognize it. But I don't -- I
8 don't think we've seen something where that's
9 been explained to them in prior art references.
10 And I think they would be able to recognize the
11 benefit but it wouldn't be front in their --
12 front of mind for them just observing something
13 that happens to be symmetric or even symmetric in
14 terms of heat.

15 Q. And that assumption on what a person
16 of ordinary skill in the art would know was one
17 of your considerations when forming your opinions
18 on obviousness in this proceeding?

19 A. I suppose that's true. Yeah, I'm
20 trying to put myself in the shoes of a person of
21 ordinary skill in the art.

22 Q. If you look at Paragraph 42 of your

1 declaration.

2 A. All right. I'm there.

3 Q. In your -- throughout your
4 declaration, am I correct that you use the terms
5 "height" and "thickness" interchangeably?

6 A. Reading this Paragraph 42, that
7 seems, yeah, to be the case. Maybe if we find
8 some other situation where there's some doubt, we
9 can look at it. But I think you're right.

10 Q. Okay. If in the course of this
11 deposition you believe you've used the terms
12 differently, please let me know. Okay?

13 A. Okay. Agreed.

14 Q. Okay. In this sentence -- in this
15 paragraph you also say "The 1/3 to 2/3 height
16 range for the carrier defines carrier thickness
17 and component thickness ratios..."

18 Do you see that phrase?

19 A. Yes.

20 Q. First of all, I want to clarify the
21 understanding. Is ratios modifying component
22 thickness only or is your reference to a carrier

1 thickness referring to a carrier thickness ratio?

2 A. I meant that to only modify
3 "component thickness."

4 Q. Okay. How does the
5 one-third/two-third height range define the
6 carrier thickness?

7 A. I think it means that the carrier
8 needs to be less than a third of the total power
9 converter height.

10 Q. So it defines a maximum carrier
11 thickness? Would that be more accurate?

12 A. Yeah. That makes sense. It's like
13 I was saying with those goalposts. It's got to
14 fit between the two is my view.

15 Q. Okay. How thin can a PC board be in
16 a power converter?

17 A. I think it depends.

18 Q. What does it depend on?

19 A. Well, power converters can be very
20 small. They can be very large. And right there
21 off the bat, you know, there could -- substrate
22 thicknesses can really vary. You know, they can

1 be sort of mass production or they can be very
2 high spec. And, you know, if you, like if you
3 work on like satellite stuff, it's, you know,
4 they really care about -- about the substrate and
5 how it's moving. And we use special materials
6 and mounting and all of this. And they care a
7 lot about things going out of spec because they
8 are moving.

9 You know, and then there's mass
10 produced designs, where you know it's probably
11 very different considerations. So, you know,
12 there's such a range in -- in -- in the
13 application-specific considerations.

14 Q. Would you say that prior to 2015 a
15 typical buck converter would have a printed
16 circuit board that was substantially thinner than
17 the components being mounted on it?

18 A. Most of the designs that, you know,
19 pop into my head when they think of stuff all
20 throughout the 2000s that was the case. The
21 substrate was quite -- quite thin and a lot of
22 the assembly techniques were, you might say,

1 traditional. You know, there was a -- you know,
2 without any kind of panel molding or mass
3 fabrication, it was often normal bare PCB comes
4 and is populated in an assembly plant. And til
5 this day a lot of power converters are made this
6 way.

7 Q. What kind of thicknesses are we
8 talking about? What would a typical bare PCB --
9 what would its thickness be?

10 A. Oh, gosh. This is the kind of thing
11 that we actually probably have in the record
12 right now. I think because I think my thesis is
13 in there. You know, it's stuff around a tenth of
14 an inch thick, there is specific numbers when
15 you're ordering PCBs you get really familiar
16 with. And I think it's like -- it's often
17 measured in mills and I'm -- around a tenth of an
18 inch or thinner.

19 Q. And what about like buck converter
20 or inductor, how big would they typically be?

21 A. Well, it, again, would depend really
22 on what kind of product we're talking about. You

1 know I have made magnetics that are inches thick
2 and they are huge and that was -- you know, that
3 was that was okay for some applications. Others
4 tend to be more -- there's such a range. I mean,
5 power electronics is really -- it has so many
6 free parameters in it, that it's -- people
7 frequently use spreadsheets and all kinds of
8 things to play with all the parameters.

9 Q. I guess would you say that a skilled
10 artisan would expect that a typical buck
11 converter, for example, may have components that
12 are, what, four times thicker than the PC board?
13 More?

14 A. Certain -- what I'm thinking of
15 might -- the single -- the single-side populated
16 kinds of designs. You know, this would be stuff,
17 you know, that we did in research or we had from
18 different manufacturers. When I started at
19 Exponent, yeah, components were bigger and PCBs
20 were often off to the side. And you know, when a
21 PCB gets to be really fat and heavy, it's
22 extremely expensive, you know.

1 So I once as a special thing had a
2 four-layer board with 2-ounce copper which it is
3 just ridiculous. And it was heavy. It's way too
4 expensive for any production design. So that
5 they are normally quite a bit thinner, yeah, four
6 times or more thinner than a lot of the
7 components. That's -- that's a lot of what I saw
8 in the -- the 2000 to 2015 time range.

9 Q. And in the few designs you had seen
10 where components were mounted on both sides of
11 the board, that same would be true?

12 A. What's populating into my head is
13 very frequently, there would be power components
14 on one side so larger capacitors, heat sinks and
15 inductors that were designed to be matched in
16 height. And this is actually, I think, in our
17 record. Again, I think I have a -- I maybe even
18 have a depiction of a power converter in my
19 thesis that's trying to demonstrate some of this.

20 And often when the underside was
21 used, it could be for control. You know, you
22 frequently try to isolate control or gate drives

1 and things like this on the other side of a PCB.
2 So what you see so frequently -- what I remember
3 seeing quite frequently is components on one side
4 were substantially thinner than on the other
5 side.

6 It's like the power big stuff,
7 chunky stuff was on one side. More dense stuff
8 was on the other because there's just no way
9 you're going to assemble tiny chip resistors for
10 control and all of this stuff down in the
11 interstices of these big chunky components. A
12 lot of designs separate things that way.

13 Q. I'd like to shift gears and talk
14 about stacking. So first of all, can you just
15 tell me, was stacking of components -- electronic
16 components something that was known to a skilled
17 artisan prior to 2015?

18 A. Generally speaking, yes, people did
19 it. People did it often with connectors, with
20 daughterboards in particular. Or are you asking
21 smaller components than that? Like a chip
22 capacitor on top of another chip capacitor?

1 Q. I wasn't limiting it to size, just
2 whether the concept of stacking one component on
3 top of another was something known in the art.

4 A. Okay. So daughterboards you can
5 think of as stacking -- you know, you're stacking
6 entire modules on top of one another, and that,
7 yes, occurred. There were certain form factors
8 of things where it made sense to actually parse
9 designs in terms of smaller things that got
10 stacked on top of others.

11 It's actually been very important in
12 the development of embedded controllers. I can
13 go on about that if you ask.

14 But as far as particular components,
15 when I recall seeing that, it was sort of a hack
16 or it was used in rework. And I don't recall
17 seeing too much stacking that was ever done by
18 design. Like people -- like, in other words,
19 like a good clean design, people were trying to
20 just basically put components and they each had
21 real estate.

22 Automated assembly plants wouldn't

1 really have supported putting one thing on top of
2 another, but I have seen it in rework.

3 Q. Well, in the first part of that
4 answer, you mentioned something about, you know,
5 footprint considerations. So tell me why was
6 someone design stacking outside of a rework
7 situation for footprint considerations?

8 A. So it had to do with like parsing a
9 design into -- into common parts that were common
10 across many designs versus parts that were
11 specific to designs. So you could have a more
12 engineered module with more attention to its
13 optimization, and that could be parsed separately
14 and created separately as effectively a module, a
15 daughterboard, to be put on a larger design.

16 Q. And what about stacking just to save
17 board space? Is that something that was known
18 prior to 2015?

19 A. Yeah, I think that's right.
20 Stacking -- stacking in terms of daughterboards,
21 that was simply -- it's like high-rise buildings.
22 Yeah, you can add a whole other level and

1 potentially mount twice the number of components.

2 Q. So for a given service area on the
3 PCB, stacking allows you to use less surface area
4 and the tradeoff is increased height of the
5 stacked series of components; is that right?

6 A. Yeah. I would say that's roughly
7 correct. What I'm referring to there with
8 stacking is like daughterboards.

9 Q. But, you know, independent of the
10 method of stacking which you're clarifying there
11 which is fine, but just the concept of stacking
12 generally is reduced board space as a consequence
13 of more height?

14 A. That's certainly a salient feature.

15 Q. If you look at Paragraph 171 of your
16 declaration.

17 A. Okay. I'm there.

18 Q. So you say that "This combination
19 would lead to the exact opposite result
20 Petitioner argues for. Placing lead frames atop
21 (and below) Vinciarelli-218's embodiment
22 increases size, not decreases it."

1 Do you see that statement?

2 A. Yes.

3 Q. Okay. By this phrase, tell me, what
4 do you mean by that?

5 A. "Atop and below" means that you're
6 increasing how thick the total component is above
7 the surface of the board. So it -- you know, you
8 have the thickness of a lead frame atop and below
9 so that extra lead framed thickness added to the
10 original thickness of the component.

11 Q. All right. Because the metal
12 wrapping, you're saying, is going around the
13 component so it's adding a thickness of the metal
14 contact?

15 A. Yes.

16 Q. But I take it you weren't suggesting
17 that stacked components would increase board
18 space usage over having two components side by
19 side? You weren't trying to suggest that?

20 A. Can you repeat that? I'm sorry.

21 Q. Oh, yeah, sure.

22 When -- your statement that the

1 combination would increase size, not decrease it,
2 was not at all meant to suggest that two stacked
3 components would take up more space on the board
4 than two components side by side?

5 MR. BOMBACH: Objection. Form.

6 BY MR. KATZ:

7 Q. You know, I'm going to take that
8 back, and I'm just going to turn it into a
9 positive statement for you.

10 Can you agree with me, Dr. Phinney,
11 that if I stack one component on top of another,
12 it will certainly take up less real estate than
13 if I put those two components side by side on the
14 board?

15 A. That makes sense to me, yeah. The
16 footprint of the stack would be lower than the
17 two side by side.

18 Q. Right. Now, going back to the
19 statement you make in Paragraph 171, again, you
20 were saying that when you add conductors to a
21 cuboid structure, the conductors will add a
22 little bit of height above and below because they

1 have a thickness?

2 A. Yeah, that's right.

3 Q. That's what you meant?

4 A. Yeah.

5 Q. But if we look at Vinciarelli-218,
6 again, Figure 33, our favorite figure.

7 A. Okay. I'm there.

8 Q. Okay. So that adaptor has a portion
9 of it that is actually thicker than the
10 conductors that are embedded within the adaptor;
11 isn't that correct?

12 A. I'm not sure I quite understand what
13 you're asking. I think you're asking me about
14 like something like 803. And are you referring
15 to like how pins like 808 extend down further
16 than the bottom of --

17 Q. Okay. Thank you. I'll clarify the
18 question, yeah.

19 In that exemplary adaptor 808, the
20 adaptor is formed with 803 which is some kind of
21 structure that has pins 808 embedded inside it,
22 correct?

1 A. Yeah, I think that's right.

2 Q. Okay. And I'm saying the thickness
3 of 803 is larger than the thickness of the
4 embedded conductors 808?

5 By "thickness," I mean the
6 horizontal thickness.

7 A. Okay. So horizontal thickness,
8 okay. Let's just -- let's be careful. I just
9 want to make sure I'm understanding.

10 Q. Sure.

11 A. I've been using "thickness" to be
12 how high up and down, and I think when you say
13 "horizontal thickness," do you mean what you
14 could call a width?

15 Q. I'm sorry. Width, yes. Let me
16 reask the question. Thank you for that. Let's
17 have a clear transcript.

18 The width of 803 is larger than the
19 width of 808?

20 A. Yeah, individually and 808 can be
21 like that, all of them together. I think 803
22 extends to the sides, is wider.

1 Q. Is wider, yeah. Okay. That's what
2 I was trying to get at. Thank you.

3 And so clearly a wrapped conductor
4 would not certainly increase the width of the
5 cuboid that is being -- that would be wrapped
6 instead of the use of those adaptors; isn't that
7 correct?

8 A. I think I see what you're saying
9 because you -- in the wrapping situation, you'd
10 be starting from that -- what we've sometimes
11 referred to as the block.

12 Q. Yes.

13 A. So I think that would quite likely,
14 you know, that could be the case. It would
15 depend on the relative thickness. But -- but
16 given how this is drawn, 803 does seem to be, you
17 know -- it would be -- you know, extend further
18 away from the block than lead frames that are
19 thinner than 803 is -- than 803's thickness.

20 Q. And if we turn to the examples you
21 include at the end of your Paragraph 152.

22 A. Okay. I'm there. 152.

1 Q. Yeah. If you turn the page to your
2 Page 74 of your declaration, you have six figures
3 from Vinciarelli-218?

4 A. Okay. Yes, I see those.

5 Q. So, for instance, in Figure 17 there
6 you have surface mount leads that extend below
7 the cuboid box?

8 A. Yes, I see that.

9 Q. And if I remove those adaptors and
10 put on a wrapped conductor, that would decrease
11 the height of that cuboid box because you
12 wouldn't have the gap present in Figure 17; is
13 that correct?

14 A. Assuming you could tolerate not
15 having the gap, assuming that the lead frame
16 would be sort of as thick as we see the, you
17 know, 308 to be thick, yeah, I think that's
18 right. You could make the cuboid shape sort of
19 nestled down or settled down closer to the
20 substrate.

21 Q. Okay. And Figure 21, that's an
22 example Vinciarelli-218 where you take your

1 cuboid box we've been talking about and you stick
2 it in the adaptor box, right?

3 A. Yes, with the little spring
4 contacts.

5 Q. Yeah.

6 And if the adaptor box were removed
7 and replaced with wrapped conductors, the height
8 of the cuboid box above the PCB would be reduced
9 not increased?

10 A. If, indeed, the lead frame were
11 thinner than the box, the outer box is proud of
12 the inner cuboid. Yeah. That would be the case.
13 Depends on the relative thickness, but yeah.

14 Q. And certainly Vinciarelli-218's
15 leads are thinner than the boxes displayed?

16 A. I think I can answer this is that
17 those spring -- the sort of the spring-loaded
18 little things that fit in that box in those
19 grooves, they seem to be thinner than the
20 distance between the outer wall of the cuboid and
21 the outer wall of the container that has that red
22 arrow in Figure 21.

1 Q. And likewise in Figure 19, which you
2 show here, the leads coming out of the adaptor
3 box are definitely thinner than the thickness of
4 the adaptor box itself?

5 A. I don't -- I don't really know. I
6 could look at that accompanying text more, but I
7 don't know that that's clear from --

8 Q. Okay. Yeah. I'm not referring to
9 any text. I'm not sure they describe the actual
10 dimensions. But if you look at Figure 19, do you
11 have any question that the thin leads 408, I
12 believe, are much thinner than the kind of the
13 base of that box kind of which is near label 402
14 perhaps? Just visually.

15 A. If we compare those two, I would
16 agree with that. So I'm -- yeah. I'm looking at
17 the vertical sort of thickness of 402 that goes
18 higher up than the thickness of the 408.

19 Q. Okay. Let's now turn to, I think,
20 Paragraph 55 of your declaration.

21 A. Did you say 55?

22 Q. 55.

1 A. I am there.

2 Q. This is not quite right.

3 Actually Paragraph 64 where you have
4 that little highlighted figure from
5 Vinciarelli-664.

6 A. Okay. I'm there.

7 Q. Okay. There is a discussion of the
8 shield in this section. Let me just ask you
9 first: What is your under -- what would be a
10 person of ordinary skill in the art's
11 understanding of a shield in this context?

12 A. A shield is often at the exterior of
13 a module and is typically conductive. And people
14 think about it as helping radiated emissions,
15 lowering them. They are also doing things like
16 decreasing leakage inductance.

17 Q. And how does a shield function to
18 lower radiated emissions, for example?

19 A. Well, if you consider an AC electric
20 field that can really induce charge on the shield
21 in a way that can block electric fields more or
22 less. So radiated emissions out of a circuit

1 will be lower generally if that's enclosed in a
2 shield. You know, there's often little silver
3 boxes around various circuits in a -- in a larger
4 assembly.

5 Q. And must a shield cover most of the
6 surface in question to be effective as a shield?

7 A. It really depends on what it's used
8 for. You know, maybe it -- you know, it's so
9 application-specific, but it will hopefully be
10 around things that you'd want to experience the
11 shielding of that.

12 Q. So, for example, in the highlighted
13 figure you have there, you have this yellow on
14 the top and then a little yellow strip shown on
15 the board that the converter 100 is being mounted
16 to; is that correct?

17 A. Yes.

18 Q. Okay. And the yellow on the top is
19 a shield?

20 A. It's -- we can find the words used
21 to describe it. It's -- it's the -- I recall it
22 being described as a shield and heat spreader or

1 something like that. I can look.

2 Q. Okay. We'll get there, I guess.

3 But I guess in your annotated Figure 2, you
4 write, "The bottom portion would not have a
5 shielding like the top."

6 Do you see that?

7 A. Yes.

8 Q. Okay. And I believe actually it's
9 on the next page you show a little blue
10 rectangle.

11 A. Yeah, I see that.

12 Q. Okay. And is that blue rectangle
13 not a shield because it covers such a small
14 portion of the surface of the device, if you
15 assume that blue rectangle is a contact?

16 That's a bad question. Let me
17 clarify what I'm asking.

18 That blue rectangle is something you
19 added to the figure, right?

20 A. That's right.

21 Q. You're saying that's your
22 understanding of what the contact would look like

1 on the device based on the burnt orange rectangle
2 922 that's on the customer board?

3 A. That's a fair way to put it.

4 Q. Okay. And this blue rectangle that
5 you have hypothesized on the bottom of the
6 device, you contend is not a shield?

7 A. Yeah. That -- I mean, it -- the
8 patent refers to things as like a shield/contact
9 that uses multiple sort of nouns together
10 sometimes when it talks about these. But, yeah,
11 I think that's right. It's -- it's really not a
12 shield at that point. I mean, de minimis you
13 could say okay, yeah. Maybe. But I'm
14 highlighting the part that's really there for
15 contact, given the size of the land, 922, on the
16 customer board.

17 Q. Am I correct that you're saying it's
18 not a shield because it covers a much smaller
19 area in certain -- way less than 50 percent less
20 of the area of the surface that you're
21 hypothesizing this blue strip is on?

22 A. You could say it's a shield, but it

1 would have very minimal -- that portion -- a
2 conductor there at that portion would have, you
3 know, sort of minimal effect because it is small.
4 But, you know, I guess it still has some effect
5 as a shield.

6 Q. Okay. So going back to the previous
7 page of your declaration, Page 26. Are you
8 revising the opinion presented there? In your
9 declaration you write "The bottom portion would
10 not have a shielding like the top." Would not.

11 Are you now saying it would?

12 A. No. What I'm saying there is that
13 what a person of ordinary skill would have
14 understood the bottom shield/contact 122-3 to be
15 shaped as demonstrated.

16 So I think it's okay to call it a
17 shield. I'm just saying that it -- certainly as
18 far as its contact, the contact portion of it
19 would be like that blue -- that blue rectangle
20 that I added.

21 Q. All right. Actually what you say is
22 "...the bottom shield/contact 122-3 would be

1 shaped as demonstrated (in blue)..."

2 Right?

3 A. That's what I say, yes.

4 Q. Okay. So you're hypothesizing that
5 instead of this big yellow thing on the top,
6 you've got a small blue rectangle which would be
7 the shield/contact 122-3?

8 A. Yeah. Certainly as far as the
9 contact part of it, given -- given the
10 corresponding land 922 on the customer board.

11 Q. Okay. So you're now changing your
12 opinion from what's in the declaration, correct?

13 MR. BOMBACH: Objection. Form.

14 A. I don't think so. And so I'm trying
15 to understand --

16 BY MR. KATZ:

17 Q. Okay. You keep injecting the word
18 "portion" now. So let me understand.

19 Your declaration says that "...the
20 shield/contact 122-3 is shaped as demonstrated
21 (in blue)..."

22 Are you standing by that statement

1 or are you now saying only a portion of the
2 shield/contact 122-3 is shaped as demonstrated
3 (in blue)?

4 A. When I wrote this I was thinking
5 that the -- any part of a contact 122-3 would be
6 a person of ordinary skill would understand that
7 it's shaped like that blue.

8 And a part of what I'm getting at is
9 in the next paragraph in 66 I say "a POSITA" --
10 sorry -- "Petitioner's argument that a POSITA
11 would have had contact 122-1 extend across the
12 bottom surface..."

13 So I'm referring to, like, how
14 that's functioning as a -- as a contact. And I
15 think that that contact part, that's what I'm
16 really trying to show with the blue.

17 Q. So let me -- in this analysis,
18 you're responding to something that Petitioner
19 argued in the petition. At the top of 64,
20 Paragraph 64, you write, "In attempts to remedy
21 this, the Petitioner argues that, quote, the
22 bottom common contact would be comparable in size

1 to the top contact."

2 Do you see that?

3 A. Yes.

4 Q. Now I am going to change a word and
5 see if that changes your answer in your analysis.
6 If the quote, instead of the word "contact," had
7 been the bottom metallized area would be
8 comparable in size to the top metallized area,
9 would you then agree that that statement would
10 make this correct?

11 A. Well, I think the one problem is the
12 shape of that 122-3 isn't shown. So it's always
13 behind stuff, so you never really see it. It's
14 not depicted, and it's not described as being the
15 same.

16 But I recall one issue that I had
17 with this statement was because it was saying
18 that the bottom contact was this big thing when,
19 no, in fact, the bottom contact is really
20 confined to something above 922.

21 Q. Well, would you agree that it's at
22 least -- wouldn't it have been at least obvious

1 to make the bottom metal layer the same as the
2 top?

3 MR. BOMBACH: Objection. Form.

4 A. I don't -- I don't necessarily agree
5 with that because of the reasons I'm giving in
6 Paragraph -- Paragraph 64.

7 Q. Can you explain why you believe it
8 wouldn't at least have been obvious to have
9 matching metal shield/contacts?

10 A. Well, first of all, the lack of
11 depiction; second, the lack of description in
12 words; and then third is, as I explain here at
13 the end of Paragraph 64, the way that a person of
14 ordinary skill would expect to connect, be it
15 with solder to the bottom of contact 122-1, you
16 know, they would expect -- they wouldn't want
17 solder to move laterally along the underside of a
18 component where there's no pad or if it didn't
19 reflow -- if it didn't wick up underneath the
20 component, you'd kind of worry that it wasn't
21 getting hot enough. In other words, this is
22 indeed part of a thermal dissipation layer, and

1 if it's not able to -- if it's in -- if it's not
2 wicking, I would be worried about there being a
3 cold solder joint there.

4 Q. Okay.

5 A. That's sort of -- that's the kind of
6 thing what I'm getting at here in Paragraph 64.

7 Q. And your opinions regarding
8 Vinciarelli-664 concerning the size of the bottom
9 contact, you know, are based on the assumptions
10 you've just told me?

11 A. I think that's right. You know, I'm
12 talking about the lack of depiction, really,
13 first and foremost. You know, we don't see that
14 shape.

15 I know -- I know that Petitioner,
16 you know, mentioned that top and bottom, you
17 know, things can sort of flip around. And the
18 '664 describes that, like you can just flip the
19 whole module.

20 Q. Okay. But your -- so your opinions
21 regarding Vinciarelli-664 are based on this --
22 you say is a lack of depiction of what's on the

1 bottom?

2 A. Yeah, that's part of it.

3 Q. Okay. I'd like to direct your
4 attention to the Vinciarelli '664 patent which is
5 Exhibit Vicor 1005.

6 (Whereupon, Exhibit Vicor Exhibit
7 1005, U.S. Patent Number 10,264,664, was
8 identified.)

9 BY MR. KATZ:

10 Q. Let me know when you have that in
11 front of you.

12 A. Okay. I'm there.

13 Q. I'd like to direct your attention to
14 Column 6, Lines 3 through 9. And let me know
15 when you're at Column 6, and I'll read it into
16 the record.

17 A. Yes, I'm there.

18 Q. Do you see the second sentence where
19 it says, "As shown, the common connection extends
20 laterally along a substantial portion of one side
21 of the module 100 forming contact 122-1, and also
22 extends over much (e.g., 50% or more) of the top

1 and bottom surfaces of the module forming shields

2 122-2 and 122-3..."

3 Do you see that text?

4 A. Yes.

5 Q. Okay. Given that text, would you

6 now agree that your statement that the bottom

7 metal layer is not the same as the top metal

8 layer was an error?

9 A. No. I -- I -- I don't agree with

10 that just because this -- this all still doesn't

11 show that any bottom layer is a terminal that has

12 a bonding pad, you know, that is a contact. And

13 the shape is still not depicted.

14 Q. Okay. So you still stand by your

15 declaration that the bottom portion of the device

16 100 would not have shielding like the top,

17 correct?

18 A. Its shape is not shown.

19 Q. And you still -- even though I

20 showed you this section of Vinciarelli-664, you

21 still stand by your statement in Paragraph 65

22 that "...if anything, a POSITA would have

1 understood the bottom shield/contact 122-3 to be
2 shaped as demonstrated (in blue) in the annotated
3 version of Vinciarelli-664's FIG. 2."

4 Is that correct?

5 A. That's the contact portion. That's
6 how the contact is made. It doesn't -- again,
7 there's multiple nouns that are used to describe
8 these. They are called like shield/contact, and
9 I'm showing with that blue that that's where I
10 think the contact would be made.

11 Q. Right. And that's -- so I'll go
12 back to my question I asked before. I want to
13 know what your position is. So you're now
14 modifying your opinion in Paragraph 65 from that
15 a POSITA would have understood at the bottom
16 shield/contact 122-3 to be shaped as demonstrated
17 to the contact portion of the shield/contact
18 122-3 would be associated; is that correct?

19 A. And I really apologize. If we can
20 just -- I just need to hear that again, if you
21 don't mind, and if I just can look at my
22 declaration when you ask.

1 Q. Sure.

2 A. So I'm sorry. I just got to get the
3 window open.

4 Q. Let me know when you're ready.

5 A. Sorry. And I think in your
6 question, you're going to ask about paragraph --
7 did you say 64?

8 Q. 65.

9 A. Oh, okay. Okay. You're going to
10 ask about 65. Okay. I apologize. Could you ask
11 that again?

12 Q. Some preliminary questions maybe
13 help the matter.

14 You have highlighted in yellow in
15 your annotated Figure 2 what Vinciarelli refers
16 to as the top shield or contact 122-1, correct?

17 I'm sorry. Let me get the number
18 right. Let me correct that and ask it again. I
19 got the number wrong because it's not on that
20 figure. Let's get it right. One second.

21 Ah, sorry. You refer to Figure 1 as
22 well if that helps.

1 A. Okay.

2 Q. You've highlighted in yellow what
3 Vinciarelli-664 refers to as the top shield
4 122-2.

5 A. Yes.

6 Q. Okay. And then Vinciarelli
7 identifies that there is also a shield called
8 122-3 on the bottom of that device?

9 A. Yeah, I think that's right.

10 Q. So 122-3 is a structure identified
11 in the '664 patent?

12 A. Yeah. It uses 122-3.

13 Q. Okay. And in your declaration at
14 Paragraph 65, you said that 122-3 would be shaped
15 as demonstrated in blue. However, I believe you
16 are now saying that only a portion of 122-3 would
17 be shaped as illustrated in blue. And so I'm
18 wondering, are you changing your opinion or are
19 you not?

20 A. When I wrote this, I was thinking
21 about what is the contact of 122-3 and I'm
22 highlighting -- I'm highlighting what that would

1 be with blue. And if there are other parts of
2 122-3, it doesn't mean that these are a terminal.
3 That is a bonding pad. Because the part that is
4 the contact or the bonding pad, I think would
5 have to be where I show in blue.

6 Q. Okay. I think your testimony is
7 pretty clear on that, that we don't need to
8 belabor the point.

9 MR. KATZ: I don't know how long
10 we've been going since the last break.

11 THE WITNESS: About an hour and 30.

12 MR. KATZ: Oh, wow. Let's -- I
13 don't know. Do you want to break for -- take
14 a little longer break for lunch like half an
15 hour? I don't know if you have food there or
16 what you need. You let me know.

17 THE WITNESS: I don't really need to
18 eat, but a little bit longer break would be
19 good --

20 THE COURT REPORTER. Off the record.

21 (Whereupon a lunch recess was taken
22 at 1:50 p.m.)

1 A F T E R N O O N S E S S I O N

2 (Time noted: 2:22 p.m.)

3

4 * * *

5 THE COURT REPORTER: Back on the
6 record.

7 BY MR. KATZ:

8 Q. Welcome back, Dr. Phinney. If we
9 turn to Vinciarelli-218, which is Exhibit 1009
10 again. And you look at Figures 33, 34, 35, 36,
11 for example. And without doing, you know,
12 detailed measurements as you did for one of the
13 figures, would you agree that the printed circuit
14 boards in these figures appears to be within the
15 middle third of the power converter?

16 MR. BOMBACH: Objection. Form.

17 A. Eyeballing it, that seems to be
18 right because 805 and 806 seem to have pretty
19 close thickness, which is thicker than 804.

20 BY MR. KATZ:

21 Q. And question about the '664 patent
22 now. If you pull that out, the '664 patent,

1 which is Exhibit 1005.

2 A. Okay. I'm there.

3 Q. And just refresh your recollection,
4 I'm going to direct you to Figure 13 of that
5 patent.

6 A. Okay. I'm there.

7 Q. And 12. Both.

8 At least '664 patent, which is prior
9 art to the '263 patent, does disclose the direct
10 stacking of power converters, one on top of
11 another, correct?

12 A. I think that's right. You can put
13 them on top of one another.

14 Q. And I don't know if you have them in
15 front of you. You're familiar with the '534
16 patent, which was at issue in other IPRs?

17 A. I can find it.

18 Q. If not I can put it in the chat.

19 A. I must have it. Okay. I have it.

20 Q. Actually, you know what we're going
21 to put it in the chat so we have an official
22 copy. Actually that's not necessary.

1 Okay. And so the '534 patent which
2 was, you know, filed in 2018 and is a division of
3 an application that was filed in 2015 also
4 discloses stacking power converters one on top of
5 the other.

6 MR. BOMBACH: And I'll object to the
7 questioning on this '534 patent as it's
8 outside the scope of his declaration in this
9 proceeding.

10 MR. KATZ: Hold on a second.
11 Because of the objection, I'm going to do a
12 prefatory question just to make sure that
13 we're all staying onboard here. Bear with me
14 one second.

15 BY MR. KATZ:

16 Q. In your declaration if you turn to
17 Paragraph 176, I believe --

18 A. Okay. I'm there.

19 Q. Bear with me. I'm looking for a
20 comment on stacking which I forgot to write down
21 on my notes where it was -- ah. Paragraph 172.
22 Sorry. Wrong. That explains it.

1 A. Okay. I'm there.

2 Q. Okay. So in Paragraph 172 you say,
3 you know, "Petitioner's second reason" -- for the
4 combination, that is -- "is that for devices
5 where heat is not a consideration, stacking is
6 viable to save board space."

7 You cite the Pet. at 172.

8 A. And this is in Ground 1 A. Oh, no.
9 It's in Ground 2. Sorry.

10 Q. Yeah. It's Ground 2.

11 All right. This is the combination
12 of -- so this Vinciarelli would have --
13 potentially '218 would be modified by Zeng to
14 have contacts on the top.

15 A. Okay. So your question about 172 is
16 what?

17 Q. Okay. So 172 you state
18 "Petitioner's argument" -- referring to that
19 stack -- stacking is viable to save board
20 space -- "demonstrates the failure of this
21 rationale. There are heat considerations when
22 stacking devices."

1 Do you see that?

2 A. Yes.

3 Q. And you write "A POSITA looking at
4 Vinciarelli-218 would have understood that heat
5 is a significant consideration of its
6 disclosure."

7 And then you say, you know, stacking
8 conflicts -- then you talk about manufacturing
9 steps.

10 Let me just ask you this, maybe I --
11 I'm going to ask you a new question.

12 Is it your opinion in this case that
13 a skilled artisan would not see the benefit of
14 stacking power converters?

15 You know what I'm going to ask you
16 it in the positive. And so it's all very clear.

17 Would you -- hold on a second -- oh,
18 sorry. Sorry. Okay. Sorry for that
19 distraction.

20 You say -- you reference
21 Paragraph 172. Are you there in case you want to
22 reference it?

1 A. Okay. I'm there.

2 Q. Would you agree that a skilled
3 artisan at the time of the '263 invention would
4 have seen the benefit of directly stacking one
5 power converter on top of another?

6 MR. BOMBACH: Objection. Form.

7 A. Among other things, because there's
8 so many considerations in the design, but I think
9 a person of ordinary skill could appreciate that
10 one factor in a design could be saving board
11 space and could appreciate that where you can
12 possibly parallel conductors that could be a way
13 to, you know, if the design allows to, you know,
14 put them on top of one another. Build up rather
15 than out.

16 BY MR. KATZ:

17 Q. And would you agree that the fact
18 that power converters generate heat is not a
19 consideration that would dissuade a person of
20 ordinary skill in the art from stacking power
21 converters?

22 A. It would -- it would be a factor

1 weighing against that. And so, this is what I've
2 tried to say with so many designs, there's so
3 many considerations.

4 Q. All right. Wouldn't -- wouldn't a
5 person of ordinary skill in the art know how to
6 address the heat considerations by choosing a
7 power or efficiency of the power converters to
8 allow for stacking of power converters?

9 A. It depends. So, you know, for
10 instance, if there are, if there are modules that
11 are, you know, rated for a certain ambient, you
12 know, and are designed to be, you know,
13 convectively cooled, yeah, a person could be
14 dissuaded. They would say, I can't do that.
15 This thing has got to have some breathing room.

16 So you know, it would. It just
17 really depends on the situation. I'm not sure
18 there's a good general answer.

19 Q. All right. So there are some
20 situations where a person of ordinary skill in
21 the art would not be dissuaded by alleged heat
22 considerations from stacking power converters?

1 A. Heat is something that weighs
2 against. And so what I'm talking about with
3 these -- it's like the scales of justice kind of
4 thing. There's just so many factors that
5 interplay. And I think when you're asking
6 dissuade, you mean just like right off the bat
7 the person would say, oh, heat, there's no way to
8 do this because of heat. I think it's what you
9 mean when you're saying dissuade.

10 Q. Yes?

11 A. Off the table. Yeah.

12 Q. Would drive people in totally other
13 direction?

14 A. It does drive people in another
15 direction. Like with anything -- I mentioned
16 scales. There's tradeoffs. That's the heart and
17 soul of engineering. And some of these factors
18 weigh against others. Even if you come up with a
19 clever way to pack things closer, you know, are
20 you going to be able to handle heat removal.

21 Q. So it's a design consideration that
22 someone designing power supplies would have to

1 consider?

2 A. I think they would likely have to
3 consider it if they were serious. Yeah. Yeah.

4 Q. And there's nothing inherent in the
5 power supplies of the two -- Vinciarelli-218
6 disclosure that would preclude the stacking of
7 its power supplies due to heat considerations,
8 correct?

9 A. Well, things like the heat sinks and
10 all of these different -- we looked at the -- do
11 you remember those six different figures where we
12 were looking at how you could package these.

13 Q. Yep.

14 A. You know, those -- those aren't
15 really made to stack, you know, they've got
16 things like tabs or pins on the bottom or heat
17 sinks on the top. They are not -- they are not
18 made to stack.

19 Q. Right. Right now I'm just focusing
20 on your statement of heat considerations.

21 There's nothing inherent in the
22 power supplies disclosed in Vinciarelli-218 that

1 would preclude stacking because they would
2 necessarily overheat, correct?

3 A. I find your question to be kind of
4 abstract. What I'm saying is those -- the ones
5 that are disclosed aren't really for stacking.
6 And, well, you're saying well in isolation with
7 this one consideration, like somehow take it off
8 the table, just like straight up, like you could
9 know without investigating further. But, you
10 know, things aren't like that in engineering.
11 Right. There's always tradeoffs.

12 So, you know, it's -- something like
13 heat, something like size are never like, don't
14 provide easy answers. You know, you don't -- you
15 don't -- you don't -- I think the more concrete
16 point is that Vinciarelli's modules really aren't
17 made to do what you're suggesting.

18 Q. Okay. You're saying based on the
19 mechanical connections that are disclosed in the
20 patent -- I mean -- excuse me -- the mechanical
21 connections that are disclosed in
22 Vinciarelli-218?

1 A. Yeah, yeah, going back to that
2 figure that had the six subfigures in it. They
3 are not made for this stacking. They are made to
4 sort of accept one model. Some of these are
5 pretty large, by the way. You know, they are
6 not -- you know, they are -- you know, I don't
7 know if they can full brick, but we can look.
8 Some of them are not -- they are not tiny.

9 Q. Well, Vinciarelli-218 -- the power
10 supplies in Vinciarelli-218 do not have a minimum
11 wattage, for example?

12 A. We'd have to look. I'm not aware of
13 that sitting here. Switching power converters
14 often do have exactly that. They are not often
15 designed for light load operation. Many old
16 switching power supplies, for instance, won't
17 even turn on at no load.

18 Q. As far as the -- okay. Let's back
19 up. Commercial switching power supplies are sold
20 in a variety of wattage, right? There might be a
21 10-watt version. There might be a 100-watt
22 version. There might be a 400-watt version.

1 A. Yeah, that's fair.

2 Q. And Vinciarelli-218 is talking about
3 generic power supplies. It doesn't specify its
4 designs are only for high-wattage applications.

5 A. I'm going to have to look more to
6 answer your question. I don't recall now.

7 Q. Do you recall whether
8 Vinciarelli-218 disclosure states there is a
9 maximum efficiency that would work with its power
10 supplies?

11 A. So are you asking that the power
12 supplies disclosed do have a maximum efficiency
13 or maximum expected efficiency?

14 Q. There's no such disclosure in
15 Vinciarelli-218, right?

16 A. Well, I searched for -- I don't
17 recall exactly, but efficiency, I think appears
18 only -- and you have to sometimes watch out for
19 double Fs in PDFs because they're often a
20 ligature that doesn't show up when you search for
21 an F. I'm not finding efficiency in the sense of
22 electrical efficiency.

1 Q. Okay. But heat generation will
2 depend on both wattage and efficiency of the
3 power supply, right?

4 A. Yes, that's right. You know, very
5 efficient designs are in the high 90s, high
6 90 percent, in switching power supplies.

7 Q. And such designs would generate
8 lower heat than similar wattage designs having
9 less efficiency?

10 A. Yes, that's right. The degree to
11 which you fall short of 100 percent is evolved as
12 heat in the components of the power converter.

13 Q. And so there's nothing, again,
14 inherent in Vinciarelli-218 that would preclude
15 stacking based on heat considerations because the
16 amount of heat the power converters generated is
17 actually not specified?

18 A. You know, I just don't know that I
19 agree with you. We're talking about disclosures
20 that have things like heat sinks on them that are
21 clearly designed to be packaged as singular
22 modules in these various carriers. You know,

1 they are not designed for stacking. And so,
2 again, I find your question very abstract.

3 Q. Okay. But your answer, you're
4 referring to the disclosures that have heat sinks
5 on them -- the embodiments have heat sinks on
6 them?

7 A. Yeah. When I talk about heat sinks,
8 I mean the ones that have heat sinks.

9 Q. Yeah. Okay. And I take it you just
10 don't have -- haven't formed an opinion on the
11 embodiments that don't have heat sinks in the
12 Vinciarelli-218 disclosure?

13 A. So with your general question, you
14 know, that is related to stacking, you know, I
15 don't see a suggestion in Vinciarelli and I don't
16 think a POSITA would understand there to be a
17 suggestion that you could stack any of these
18 things. They would think the opposite. That
19 wouldn't even occur to them.

20 They would see a chassis mount
21 supply or a big board mounted converter. I mean,
22 they are looking at the details of that singular

1 supply rather than the stacking question.

2 Q. And I understand your opinion that
3 Vinciarelli-218 does not, in your opinion,
4 provide a motivation for stacking.

5 But let's assume someone had a
6 motivation to stack from outside Vinciarelli-218.
7 Would you at least agree with me that there's
8 nothing in the Vinciarelli-218 disclosure that
9 would preclude a skilled artisan from stacking
10 its power supplies, again recognizing that they
11 would have to consider heat generation as a
12 factor in making their determination?

13 MR. BOMBACH: Objection. Form.

14 A. I think your question was that there
15 was nothing in Vinciarelli that would preclude
16 someone from considering stacking? Is that what
17 you asked?

18 BY MR. KATZ:

19 Q. Yes.

20 A. How -- I mean, yeah. I think there
21 are things like that because the -- you know, all
22 of this packaging that we see in Exhibit 1009 are

1 for these assemblies that aren't stacked.

2 Q. Okay.

3 A. Why would you look at one -- why
4 would you look at a reference that doesn't have
5 stacking once?

6 Q. I'll tighten the question because I
7 understand your opinion on the structural
8 parameters. I want to focus just on -- on the
9 heat generation.

10 So let me ask it this way: Assuming
11 a skilled artisan had a motivation to stack that
12 granted, it received from outside
13 Vinciarelli-218, when looking at Vinciarelli-218,
14 there's nothing -- can you agree with me there's
15 nothing in Vinciarelli-218 that would preclude --
16 that describes heat generation in a way that
17 would preclude stacking because the power
18 converters would overheat? Right. There's no
19 actual disclosure that would lead a skilled
20 artisan to believe that's necessarily true?

21 A. I think I can agree that
22 Vinciarelli-218 doesn't, like, say that.

1 But a person of ordinary skill, I
2 mean, I'm going through these figures. I'm
3 looking at the one on the cover and then the
4 other big finned heat sink in the Figure 1,
5 Figure 2, Figure 3, Figure 4.

6 This -- you know, this reminds a
7 person of ordinary skill of hot, convectively
8 cooled, maybe even forced-air cooled power
9 converters.

10 Q. Okay.

11 A. So I mean, we can keep going.
12 Figure --

13 Q. Yes -- no. Let's jump right to
14 Figure 33.

15 A. Okay.

16 Q. Is it your testimony that a person
17 of ordinary skill in the art reading about a
18 power converter of Figure 33 which is a version
19 that does not require heat sink would conclude
20 that it would run too hot -- would necessarily
21 run too hot to stack. Is that your opinion or
22 not?

1 A. At that level of certainty, you
2 know, that's not how engineering is. Like, you
3 don't just, like, know it without studying it or
4 measuring it, but, you know, you don't just --
5 you don't just put a hot power supply next to a
6 node. People of ordinary skill are going to have
7 that notion, and if they see something that's got
8 a mounting option so it's designed to be on a
9 substrate, they are not just going to say, well,
10 I'm just going to -- you know, there's not that
11 dissuading sentence, you might say, in
12 Vinciarelli that said, oh, don't stack these or,
13 boy, these get hot and they really require
14 convective cooling. I don't think there's that
15 type of statement that would just sort of take it
16 off the table.

17 Q. Given that Figure 33 discloses one
18 of the embodiments of a power converter that does
19 not require heat sinks, a person of skill in the
20 art would not conclude that it would run too hot
21 to stack, right?

22 A. I'd think they -- if -- presuming

1 there was a thought in their mind to stack it in
2 the first place, I think they would want to study
3 it.

4 Q. Okay. Right.

5 A. Yeah.

6 Q. They have to look at the actual
7 power converter and see how much heat it was
8 generating, for example?

9 A. Yeah, that's about right. You know,
10 if -- you know, like let's put these on like
11 cheek to jowl. Will it work? You can ask the
12 question. You test it out. Measure it.

13 Q. And so, again, looking at Figure 33
14 and the disclosure in Vinciarelli-218, a skilled
15 artisan would not conclude that that power
16 converter must necessarily run hot, for example?
17 It could be any -- it could be on a whole
18 spectrum of heat generation?

19 A. I think they might regard it as an
20 open question, you know, something that could be
21 studied.

22 Q. And if someone did wish to stack

1 power converters, again, there's design choices.
2 You have to consider how much heat is being
3 generated, but there's nothing special you need
4 to do to stack them other than choose the proper
5 amount of heat generation. It's a design choice?

6 MR. BOMBACH: Objection. Form.

7 A. Well, you're starting to get outside
8 the disclosure of this Exhibit 1009. Because,
9 you know, there -- like, we were talking about,
10 these are -- power converters are not designed to
11 be stacked.

12 You know, there's a lot of issues.
13 They -- you know, we've talked about it
14 mechanically. There's also a control issue. I
15 mean, this is huge. I mean, there are
16 connections here. I mean, a lot of converters
17 cannot be put in parallel or their control can go
18 crazy. You know, when you talk about putting
19 them in parallel, do you also mean the control
20 connections are in parallel? There's a lot of
21 issues. And, again, these are engineering
22 issues.

1 But, you know, I don't see a
2 disclosure of something where these are, like,
3 made or designed or suggested to be in parallel.

4 Q. Right. Okay. Let me tighten my
5 question a bit and see if we can reach some
6 common ground here.

7 Assuming that there was a motivation
8 to stack, would a person of ordinary skill in the
9 art, you know, understand that that there are
10 certainly design considerations, but it's within
11 the level of skill to choose the power supplies
12 appropriately so that they could stack, you know,
13 cuboid power supplies that are in the cuboid form
14 shown in Vinciarelli-218?

15 MR. BOMBACH: Objection. Form.

16 A. Can you repeat that, please.

17 MR. KATZ: Amanda, can you read back
18 that question?

19 THE COURT REPORTER: Yes, sir.

20 (Record read.)

21 A. I think a person of ordinary skill
22 would rely on essentially a listing or a rating

1 or some suggestion that the power supplies could
2 be stacked. In the absence of that, I see this
3 as essentially like a science experiment. I
4 mean, I think you're making the person of
5 ordinary skill otherwise something of an
6 inventor.

7 So, you know, you don't go do -- if
8 you have to design a power converter for an
9 automobile, you just wouldn't, like, you know,
10 rely on one that doesn't have a listing or rating
11 or application that involves that type of
12 stacking or parallel connection.

13 Q. I take it you are not offering an
14 opinion that it is impossible to stack cuboid
15 power supplies such as that shown in Figure 33 of
16 Vinciarelli-218 because it would generate too
17 much heat? Right? That's not your opinion,
18 correct?

19 A. Well, my opinion about that was in
20 that paragraph that said a significant part of
21 the disclosure. That's a significant
22 consideration of a disclosure.

1 So in that Paragraph 172. I think
2 it's something that weighs against stacking heat
3 weighs against stacking. I think to use your
4 word, it doesn't dissuade like as a matter of
5 course. It's not a simple taken-off-the-table
6 kind of consideration.

7 Q. A skilled artisan desired to kind of
8 modify cuboid power supplies quarter-brick power
9 supplies that you mentioned in the prior -- for
10 stacking, it would be within their level of skill
11 to do so and they would know how to choose the
12 power supplies based on heat generation, right?

13 A. It's a part of the picture. Like I
14 was saying, I think a person of ordinary skill
15 would look for a power supply that had a rating,
16 a listing, an application for that purpose that
17 could be paralleled first of all. Electrical
18 aspects of paralleling are significant. You
19 can't just necessarily put power supplies next to
20 one another, you know, like are they going to act
21 like current sources if they are output or not?
22 Are they going to -- is their regulation going to

1 go haywire if they are both trying to regulate
2 voltage at different levels? You know, there's
3 those issues, those control issues.

4 And so I think there is a first step
5 of like finding a power supply that can do this
6 electrically. And then, you know, maybe they can
7 sort of look, they could look from a heat
8 standpoint whether those modules can be placed
9 right next to one another. You know, they
10 could -- they could answer that question from the
11 standpoint of heat.

12 Q. Okay. So you've identified two
13 considerations in that answer, one is how much
14 heat they are generating and the other is whether
15 they can placed electrically in parallel?

16 A. Right.

17 Q. And would it have been within the
18 level of ordinary skill in the art, in 2015, to
19 manage the heat considerations and design the
20 controls they can operate parallel?

21 A. I don't know for our person of
22 ordinary skill, the design of the control, is

1 really something we look to them for. What I
2 mean by that is, I think there would be -- you
3 can select power supplies that can be -- can be
4 placed in parallel in this manner. And they will
5 have a rating or a listing or application that
6 can guide a person of ordinary skill, hey, you
7 want more current? You know, put two of these in
8 parallel. But be sure to, you know, be sure to
9 provide extra, you know, or distinct control
10 signals or it will show you how to do it.

11 And that I think is kind of the
12 starting point for a person of ordinary skill.
13 They would -- they would see a guide about, you
14 know, or that's what I mean a listing or a rating
15 or something that's indicating that they can do
16 this. And once they can do that, the heat and
17 thermal part is really a more application issue
18 that I think they would be able to tackle.

19 Q. Okay. And that will bring me back
20 to the '534 patent, which you are familiar with,
21 correct?

22 A. Yeah. There is a whole other two

1 declarations I think, right, about that one.

2 Q. Okay.

3 A. Two IPR proceedings. Am I
4 remembering this right?

5 Q. Right. But the '534 patent was
6 drafted -- the initial application was drafted in
7 2015 -- actually in 2014, excuse me.

8 A. I don't really know, I mean.

9 Q. Okay. It's on the face. I don't
10 need you to agree or disagree with that
11 statement.

12 And the '534 patent discloses the
13 stacking of power converters?

14 MR. BOMBACH: And, again, I'll
15 object to the '534 patent as being outside
16 the scope of his original declaration.

17 A. Can I answer? Does that mean I
18 shouldn't answer or I need to answer?

19 BY MR. KATZ:

20 Q. No, you go ahead and answer.

21 A. Okay. We were looking at the last
22 two figures in the -- Figures 12 and 13. And,

1 yeah, those seem to show stacking of --

2 Q. Which -- oh, you're looking at the
3 '664 patent?

4 A. Oh, gosh. Sorry. I'm so sorry.

5 Q. I'm asking about the '554 patent
6 which is a Delta patent.

7 A. Okay. Sorry. Okay. I've got the
8 '534 open. I'm sorry. I had in front of me the
9 '664.

10 Q. Figure 1 is the figure I'd like to
11 direct your attention to.

12 A. Okay. I'm at Figure 1.

13 Q. Okay. So Figure 1 shows a control
14 unit onto which a power unit 120 is stacked and
15 then a power unit 120 is stacked on top of that,
16 right?

17 A. I see that, yes.

18 MR. BOMBACH: And I'll just lodge
19 another objection and just make it a
20 continuing objection with respect to the '534
21 patent as being outside the scope of the
22 original declaration.

1 MR. KATZ: That's fine. I accept
2 that. And will recognize every question as
3 objected to on this topic.

4 MR. BOMBACH: Okay. Thank you.

5 MR. KATZ: All right.

6 BY MR. KATZ:

7 Q. And you reviewed and analyzed the
8 '534 patent in the course of writing declarations
9 in two other IPR proceedings?

10 A. Last year, yeah.

11 Q. Yeah, okay. And I recognize this
12 isn't a memory test, but do you recall discussing
13 the '534 patent and its ability to stack power
14 units?

15 A. I don't recall that sitting here. I
16 just haven't -- I haven't studied this since -- I
17 think I looked at it last -- in August of last
18 year.

19 Q. Okay. Let me just ask you this: Do
20 you recall any technologies being disclosed in
21 the '534 patent regarding --

22 MR. KATZ: Or no. Strike that.

1 Figure out how to word this tersely.

2 BY MR. KATZ:

3 Q. Do you recall whether the '534
4 patent disclosed any special solutions to the
5 issues of heat generation or control of power
6 supplies? Did it offer anything that it claimed
7 was inventive with regard to those two issues?

8 A. The heat dissipation or control?

9 Q. Yeah.

10 A. Right.

11 Q. The two issues you raised that would
12 be considered by a person of ordinary skill in
13 the art when stacking.

14 A. I think you're asking me do I
15 remember right now?

16 Q. That's the best I can do.

17 A. I really don't remember right now.
18 I just haven't studied this. This hasn't been in
19 my -- I haven't looked at this for months. And
20 I -- I just don't remember right now.

21 Q. Okay. So at least as you sit here
22 today, you don't recall any discussion the '534

1 patent that offered inventive solutions to the
2 issues of heat generation or control?

3 A. Not -- not right now, I -- I don't.
4 Could I take --

5 Q. Oh, absolutely. You want to go off
6 the record?

7 A. Yeah.

8 MR. KATZ: Let's go off the record.

9 THE COURT REPORTER: Off the record.

10 (Discussion held off the record.)

11 THE COURT REPORTER: Back on the
12 record.

13 BY MR. KATZ:

14 Q. Dr. Phinney, I just want to make
15 sure we have a common understanding how the bar
16 codes work in the '664 and the '263 -- excuse
17 me -- Vinciarelli-264 --

18 MR. KATZ: Maybe we need a longer
19 break. Strike that.

20 BY MR. KATZ:

21 Q. I'm going to refer to first I think
22 to Vinciarelli-664. Okay?

1 A. Okay.

2 Q. I'd like to just make sure we have a
3 common understanding how the bar codes work
4 Vinciarelli-664.

5 Am I correct that the components on
6 the PC board would be coupled from the surface of
7 the PC board to internal traces or internal
8 conductive runs, if you want to call it that, to
9 the edge of the PC board where it would be
10 electrically coupled to the external contacts; is
11 that correct?

12 A. At a high level, yeah. I would
13 expect some connection through -- I think they
14 are called conductive lands in the '747, that
15 Exhibit 1010, or am I thinking of '844?

16 Q. Well, at this point, I'm just asking
17 about -- again, at a high level without regard to
18 precisely the physical mechanism, let me just ask
19 it this way. All right. A person of ordinary
20 skill in the art reading the Vinciarelli '664
21 patent would understand that there is a
22 connection from components on the surface of the

1 PC board to the internal conductive runs that
2 come to the edge of the PC board as the bar
3 codes?

4 A. At a high level, you -- there -- you
5 know, an example of that would exist somewhere in
6 the -- even if it's a, you know, roundabout path
7 up and down different layers, you should be able
8 to get from copper on some layer and arrive at
9 a -- a pin of a component. You know, that should
10 be the case, not necessarily all of them. But,
11 you know, some might go to merely like a
12 transformer winding or something that's maybe
13 even embedded in this -- in the PCB. But -- but
14 generally, that circumstance should exist.

15 Q. And likewise for the Vinciarelli
16 '218 patent, which also discloses bar codes,
17 right, that bar codes are internal to the PC
18 board, but there will be some electrical
19 connection from the internal bar codes to the
20 surface of the PC board?

21 A. Some, it could be circuitous. In
22 other words, it could go around a bend and up to

1 a different layer, or, you know, it could
2 describe a kind of a long path. But, yeah, I
3 would expect that to be somewhere, you know, all
4 copper to copper conductive connection --

5 Q. Okay.

6 A. -- in a -- yeah.

7 Q. I mean, in the simplest way that a
8 person of ordinary skill in the art would
9 envision is the thing we started this deposition
10 with, that there could be a conductive via, a
11 vertical piece of metal, going from an internal
12 conductive run to the surface, correct?

13 A. Yeah, there -- there could be.

14 And, you know, what I put in the
15 declaration was this is a failure of proof. So,
16 for instance, you know, there's a discussion of
17 conductive vias that was made in the petition.
18 But, you know, in describing conductive vias, you
19 get -- you didn't include the word right before
20 it. It said "buried conductive vias." So those
21 buried vias don't even go to the top or the
22 bottom layers. They are specifically called

1 buried specifically because they don't go there.

2 Likewise, like these through holes,
3 this is why I say, well, it actually teaches a
4 way from using those through holes that do go
5 through the top and the bottom.

6 You know, there are depictions from
7 the '844 patent that, for instance, show a
8 component on the top layer going to those
9 conductive lands that extend laterally. You
10 know, you get that figure, but if you look at the
11 whole figure, it actually showed a connection
12 down through the bottom through a through hole to
13 a substrate.

14 So it's like this -- you know,
15 putting the pieces together didn't actually show
16 the connection with all the elements arranged in
17 the claim.

18 Q. I'd like to now ask you about
19 opinions you made regarding what would happen if
20 you tried to put the Zeng-014 wrapped connectors
21 onto a component or a device with bar codes. You
22 have that discussion starting maybe around

1 Paragraph 149. My first question, I think, is
2 going to be about the figures you attach at
3 Paragraph 152.

4 A. All right.

5 Q. My first question is actually
6 something you didn't discuss, but you do include
7 these figures.

8 So do you see figures like 19 and 21
9 and maybe even 17 on Page 74 of your declaration?

10 A. Yes, I see those.

11 Q. Okay. And all those figures show
12 contacts that are made out of metal and have
13 bends in them; isn't that right?

14 A. Yeah. I think you're referring to
15 like 308 and the bend that could be down at the
16 bottom of like a 308 in Figure 17?

17 Q. Or the 408 in 19 or the 508 in or
18 520 in Figure 21, all of those contacts have
19 bends in them. They are made out of bent metal?

20 A. Yeah, I think that's right. The one
21 I'm not seeing right now is the 520 that you
22 mentioned.

1 Q. I may have the number wrong. The
2 con- -- you know, I've got the number wrong
3 actually, my mistake.

4 A. Okay. I see that. The 508 are kind
5 of like a hairpin going --

6 Q. Yeah. In fact, it is quite typical
7 to have contacts with bends in them?

8 A. Those, when I see those, I recall
9 the ones at Figure 19 and Figure 17 that we
10 talked about. You would often call those pins or
11 leads. It's -- you know, contacts can sometimes
12 refer to -- to something a little bit more minute
13 like a smaller feature where electrical
14 connection is made sometimes.

15 Q. Okay. Well, if we turn to your
16 Paragraph 157 in your declaration.

17 A. Okay. I'm there.

18 Q. And you state that in your opinion a
19 skilled artisan "would immediately recognize the
20 curving and wrapping a lead frame like Zeng-014
21 onto Vinciarelli-218 would fail to reliably
22 establish and maintain electrical contact with

1 the bar codes interconnects."

2 Do you see that?

3 A. Yes.

4 Q. Okay. So that sort of contacts I'm
5 talking about, the contacts that would be on like
6 a lead frame of the sort in Zeng-014. I'm saying
7 wouldn't a person of ordinary skill in the art
8 expect that contacts of that sort would, in fact,
9 be bent?

10 A. That lead frame style, I think
11 that's what they are -- the lead frame style in
12 Zeng-014, they are designed to be bent.

13 Q. Okay. And I take it there's at
14 least two ways to bend the contacts. One is
15 before applying the lead frame to the device, and
16 the second way would be to bend it after
17 attaching the lead frame to the device.

18 A. Yeah, I suppose you could do both.
19 You'd either stamp it ahead of time or apply a
20 component and then put it into, you know, a
21 special dire stamp.

22 Q. And another way to form contact

1 would even be by like plating and etching?

2 A. That is another way that sometimes
3 -- it's definitely contemplated in some of these
4 disclosures, that kind of subtractive method.

5 Q. Okay. Or -- oh, I'm sorry.

6 A. I can't remember where I've seen it,
7 but yes.

8 Q. It's in Zeng. It's in Zeng.

9 Okay. Now, you say in Paragraph 157
10 that the -- the bending would not work because it
11 would, quote, not be flush against the module
12 sidewall.

13 Do you see that?

14 A. Yeah, I see that.

15 Q. Okay. Were you assuming that
16 when --

17 MR. KATZ: Strike that.

18 BY MR. KATZ:

19 Q. Your conclusion that the contact
20 would not be flush against the module sidewall,
21 is that based on an assumption that you are
22 bending the contact after attachment to the

1 module?

2 A. Well, you would always have to bend
3 to some degree after attachment to the module,
4 the way I've understood it, because it's
5 wrapping. But it's based basically on the idea
6 that this wrapping procedure doesn't include
7 biasing the lead frame against the sidewalls.
8 And I mean -- and also based on the idea that you
9 don't -- there aren't really ways in assembly
10 that I've seen to apply fillers or adhesives or
11 solder for that matter to sidewalls.

12 I mean, you just -- this -- this --
13 this to me is quite a cartoonish combination. I
14 don't think this is something that would be
15 considered in an assembly plant.

16 Q. You claim that you would have
17 this -- let me find it first. Give me a moment.

18 Okay. So let me just get this
19 straight. You believe that a person of ordinary
20 skill in the art reading Zeng would not know how
21 to apply a contact wrapping to a component?

22 A. And simultaneously establish

1 electrical connection with something on a
2 sidewall, that combination is not something
3 that's done in assembly --

4 Q. Okay.

5 A. -- that I'm aware of.

6 Q. And I believe you also just said
7 that you believe it's beyond the level of skill
8 to solder on a sidewall.

9 Did I get that correct?

10 A. It's something where you're
11 simultaneously assembling and, you know, it
12 includes something like applying solder to a
13 sidewall, which also is not done in assembly that
14 I've seen, and then, you know, almost like closed
15 the lead frame over this like a book. I mean,
16 this -- that's -- that's not -- that's not how --
17 that's not what people do in assembly. I mean,
18 I've been in all kind of IC assembly plants and
19 PCB assembly plants, and people don't do this.

20 Q. Do you offer any objective evidence,
21 documentary evidence you can point me to that
22 demonstrates that these techniques are something

1 people don't do?

2 A. I don't cite to anything here.

3 It's -- this is just what you see being around
4 assembly plants. So like, you know, even serial
5 robotic kind of deposition of solder cream or
6 paste or overmolding materials and things like
7 this, it's two-dimensional kind of process. And,
8 you know, applying these uncured materials to the
9 side of something, and then smooshing it, because
10 what option do you have? I mean you got to --
11 you can't slide a partially bent lead frame into
12 place that's, you know -- it can't be perfectly
13 flush with this thing that has stuff on it an
14 uncured material.

15 I mean, it's -- so anyway, no. To
16 answer your question, no, I don't cite anything.

17 Q. Okay. And so you can't just in your
18 view apply the metal contact on to the sidewall
19 and then solder it?

20 A. You got to introduce the solder into
21 this region. And so, for instance, if that
22 involves applying an uncured material or a solder

1 piece on that sidewall region and then joining
2 the -- joining the parts as if you're closing a
3 book. So I hope I'm being clear about that.
4 It's not like sliding them into position with one
5 another. But your -- that's why I used the word
6 smooshed. What I meant is like bending this lead
7 frame now against this uncured material. I mean
8 I just have never seen anything like that. I've
9 never seen an assembly machine work that way.

10 Q. Okay. And you say from this pulling
11 and bending, there would be a, quote, significant
12 gap, unquote, between the lead frame contact and
13 the side edge bar codes.

14 Do you see that?

15 A. Yeah.

16 Q. How big is this significant gap?

17 A. Well, if you consider Zeng-014, it's
18 not doing that wrapping to provide electrical
19 connection to what's inside. You know, Zeng-014
20 when it wants to provide electrical connection to
21 what's inside, it has that winding inside and it
22 has the leads come out. And they are already --

1 they are of one piece with the winding. And so
2 those leads, those end leads kind of come out and
3 are wrapped around. So when it now puts the lead
4 frame over that cuboidal kind of inductor. It's
5 not making electrical connections. These are
6 mechanical connections.

7 And so I would answer that the gap
8 is -- is -- the gap is something that would be
9 very significant electrically. You would need to
10 have a filler material and you moreover have this
11 assembly that isn't biased against the internal
12 cuboidal shape. You know, this doesn't have a
13 spring force. When I say bias, those hairpin
14 kind of springs. They are pushing.

15 Q. Hold it. But -- I'm sorry. I
16 didn't -- I -- you -- why when you were creating
17 this product, when you're putting the wrapping
18 around the cuboid structure, why can't you bias
19 the wrapping in a mold or something equivalent?
20 Why are you saying it's unbiased?

21 A. Going around a corner, like if you
22 go around a corner, you don't have a purchase

1 against that -- against the lateral forces that
2 would be against the sidewall. Like you don't --
3 you're not cantilevered out over the edge of the
4 component and then overbending, you know, so that
5 there's actually like a force holding it against
6 the sidewall.

7 Your -- you're merely bending a
8 thing around the corner.

9 Do you see what I mean by
10 cantilevered out? You don't -- you don't -- this
11 isn't described in terms of like making an actual
12 like compressive force.

13 Q. Why are you making that assumption?
14 If I told you -- not someone told you -- if
15 someone were to say, a POSITA implementing the
16 wrapping, would apply a compressive force to the
17 sidewall to ensure the wrapping is tight, why
18 would you say, no, that's not what would happen?

19 A. I think it's inventing stuff. I'm
20 not talking about at the time of assembly pushing
21 on it. I'm talking about making a design that is
22 itself biased.

1 Q. I see. Okay. So during assembly
2 there could be compressive force but then it
3 would absolutely be removed when the product was
4 made?

5 A. Yeah. Yeah.

6 Q. I didn't realize -- I thought you
7 meant unbiased during assembly. Okay.

8 So let's get back to your term
9 "significant."

10 So you're stating in your
11 declaration there would be a significant gap.
12 And now you have elaborated that is electrically
13 significant.

14 Again, what do you mean by that?
15 How many millimeters is significant? How much
16 centimeters? What is it you're talking about
17 here?

18 A. So in electrical connections in
19 contacts, even things that touch but without a
20 biasing force don't establish a reliable
21 electrical connection. The actual ability to
22 conduct electricity is -- there's often a

1 deformation of these contacts and -- so, in terms
2 of actual distance, what I'm saying is it's such
3 that you don't want to use that as an electrical
4 connection.

5 That could be -- it could be quite
6 microscopic, but when you don't form gas-tight
7 joints between two metals, it fails.

8 I mean this is just the number of
9 PCBs that you troubleshoot and something looks
10 connected and you're like, oh, wait. It wasn't.
11 You know, there's connectors and switches are
12 often designed to have this sort of wiping or a
13 biasing against one another to form gas-tight
14 connections.

15 Q. Certainly, in the prior art,
16 including probably dozens of electrical
17 appliances in your home, there are electrical
18 connections without a biasing force and they are
19 reliable, true?

20 A. Basically not. So what I mean is
21 like if you look at compression style connectors,
22 I mean, you know, these are pieces of, you know,

1 like, let's say it's like a lug that has some
2 sort of, you know, fits inside some other thing.
3 It's deforming. It has a natural spring force
4 where it's held in a biased position so that
5 there's actual contact force.

6 Q. Oh, yeah. No. I am not asking you
7 about compression connectors. I'm specifically
8 asking you about the thousands of other connector
9 connections that in fact don't you know for a
10 fact that you have maybe a toaster, appliances,
11 circuit boards in your house that predate 2015
12 that simply have little wires soldered to
13 connections without any biasing force holding
14 them in place?

15 A. Yes. Those have a filler material.

16 Q. With solder?

17 A. And it's not relying on the
18 mechanical -- the mechanical contact. It's
19 providing this filler material that's making,
20 again, a gas-tight joint between the two bonded
21 conductors.

22 Q. Which is solder?

1 A. Right. Right.

2 Q. Okay. So just to be clear, you
3 cannot quantify this alleged significant gap that
4 you're envisioning?

5 A. It could be quite microscopic, but
6 gas tight is really a key. Like if you're not
7 going to have a filler material, you better have
8 contact force. And you never make a connection
9 certainly for anything commercial that has more
10 or less two conductors just sort of --

11 Q. Touching?

12 A. -- touching, laying on top of one
13 another. That's not enough.

14 Q. Okay. So you need either this
15 filler material such as solder or a compression
16 source? Or excuse me, compression force. Sorry.

17 A. Yeah. We sometimes call it a
18 contact force, but yes.

19 Q. Switching gears to something else.
20 You -- if you go to Paragraph 132.

21 A. Okay. I'm there.

22 Q. I want to ask you a question on

1 that. In Paragraph 132 you state "...that a
2 POSITA would recognize that Vinciarelli-664's
3 bulk/scale production and Zeng-014's lead frame
4 wrapping for individual components are inherently
5 incompatible with one another."

6 Do you see that?

7 A. Yes.

8 Q. And you've highlighted two terms and
9 by that I assume you mean incompatibility is bulk
10 production with individual component wrapping?

11 A. Yes.

12 Q. You are aware that the
13 Vinciarelli-218 disclosure does exactly that, it
14 does bulk production with individual contact
15 assembly; is that true? Are you aware of that?

16 A. This is in Vinciarelli-664?

17 Q. No. No. I'm saying you are
18 aware -- my question was that in Vinciarelli-218
19 its disclosure is based on bulk production of a
20 cuboid power converters and then individual
21 application of the contact adaptors to individual
22 modules?

1 A. I think that's right. The six
2 subfigures we were looking at as examples of that
3 dropping the cuboidal guts of the power converter
4 into an adaptor something that provides leads to
5 the outside world.

6 Q. And so bulk production with
7 individual, you know --

8 MR. KATZ: Strike that. Let me make
9 a clearer question.

10 BY MR. KATZ:

11 Q. So the bulk production of power
12 converters with the individual application of
13 contact leads to individual units, those are not
14 incompatible processes, right?

15 A. More generally than my statement
16 here, no, they are not, you know, in all cases,
17 incompatible.

18 My statement here in Paragraph 132
19 is about Vinciarelli -- Vinciarelli's 664's
20 bulk/scale production.

21 Q. Okay. And by that I take it you
22 mean just that Vinciarelli says not only can you

1 make the power converters, but you can also make
2 the contacts at the same time?

3 A. Yeah. That's more or less it. It's
4 like you make a big panel of these and then dice
5 them and -- you know, what's the word -- you
6 singulate them. And then you at that point
7 practically have a finished product.

8 Q. All right. Give me just one second.
9 I'm looking for a figure. Go to Vinciarelli-664.

10 A. Okay. I'm there.

11 Q. Go to Figure 10.

12 A. Okay. I'm there.

13 Q. Okay. Here's -- you may recognize
14 this as a figure that is also found in
15 Vinciarelli-218. But would you agree with me
16 that this figure does depict a module that would
17 have contacts added after singulation.

18 A. That's what it looks like to me.

19 Q. Okay. Wrong question. All right.
20 If you go to Paragraph 148 and 149 of your
21 declaration.

22 A. I'm here.

1 Q. We're at the end here.

2 A. Okay. I'm there.

3 Q. And maybe just read Paragraph 148
4 and 149 to yourself. Let me know when you've
5 read them.

6 A. Okay.

7 Q. Okay. And just to be clear here for
8 this next few questions, I am not asking for any
9 new opinions or any pontifications or
10 explanations. I'm just asking about whether
11 there's -- whether you can point me to any
12 evidence supporting a statement you made. Okay?
13 So again, no need for explanation. Just whether
14 there's evidence. It will become clear when I
15 ask the question. Oh, sorry.

16 A. Understood.

17 Q. Okay. So in Paragraph 148 -- oh,
18 the Page 71, you make a statement and the
19 statement is that as compared to Zeng-014,
20 Vinciarelli-218, own adaptors/connectors -- and
21 here's the language I care about -- are superior
22 in establishing and maintaining electrical

1 connection.

2 And I'm wondering, are there any
3 statements in the references or any other
4 documentary evidence to support your conclusion
5 that Vinciarelli's own adaptors/connectors are
6 superior in establishing and maintaining
7 electrical connections?

8 You know, I'm going to read the
9 entire phrase actually because I don't want to
10 try to be misleading here.

11 Can you point to any statements in
12 the references or in other documents you might
13 rely on that Vinciarelli-218's, quote, own
14 adaptors/connectors are superior in establishing
15 and maintaining electrical connection and are
16 attachable in fewer steps with additional steps
17 leading to potential defects. And in relation to
18 Zeng-014 is what you're comparing this to.

19 MR. BOMBACH: Objection. Form.

20 A. The evidence I point to is the
21 description of Vinciarelli-218's own
22 adaptors/connectors so that's -- includes things

1 like the six subfigures we've been talking about
2 sometimes plus the text. It would be that type
3 of -- that would be the kind of evidence I would
4 cite to.

5 There's not, that I recall, any
6 statement or comparison that's stating that that
7 is superior to something like the proposed
8 combination.

9 Q. Is there any particular text that
10 you can point me to in Vinciarelli-218 that you
11 rely on to say this demonstrates these adaptors
12 are superior to what's in Zeng-014?

13 A. I think the answer there is I can't.
14 I don't think that there is a -- something
15 stating that superiority, making that comparison
16 or coming to that conclusion.

17 Q. And other than the bowing issue that
18 we've discussed -- actually let me find the right
19 paragraph. Bear with me one minute. Ah, yeah,
20 Paragraph 149.

21 A. Okay. I'm there.

22 Q. You state that "...a POSITA would

1 consider Zeng-014's lead frame wrapping to be,
2 quote, infeasible, unquote for contacting the PCB
3 side edge bar codes."

4 Do you have any -- you've discussed
5 this bowing issue. But is there any other
6 evidence you can point to to support your
7 infeasible opinion here?

8 A. So one thing is I referenced earlier
9 is that many -- the places in Zeng-014 where it
10 describes the lead frame wrapping, it describes
11 it with an adhesive on one surface and the
12 lack -- the lack of electrical connection through
13 that process, so there's -- you know, it's not
14 necessarily stated, but when you put all the
15 figures together with the description, you know,
16 that's a -- I think a characterization of it that
17 we can all agree on is that it's not making
18 electrical connection to things inside, that
19 those -- the electrical connections to things
20 inside the cuboidal conductor are a piece with
21 the winding inside. So that would be something
22 from Zeng-014 that I would cite.

1 Q. Now, Zeng-014 doesn't say exactly
2 where the adhesive is applied on the wrapped
3 conductors, does it?

4 A. It says, I believe, on one surface
5 and we can find it. I think it says one. I
6 could find it, if you want.

7 Q. And there in the relevant art or in
8 this relevant field, there are conductive
9 adhesives, aren't there?

10 A. There are conductive adhesives.

11 MR. KATZ: Okay. I have no further
12 question.

13 Thanks.

14 THE WITNESS: Thank you.

15 MR. KATZ: Miguel, it's all yours.

16 MR. BOMBACH: Yeah, give me a few
17 seconds to reacquaint myself. I don't think
18 I will have any further questions, but just
19 bear with me for a few seconds.

20 (Pause in proceeding.)

21 MR. BOMBACH: Yeah, I have no
22 further questions on my end.

1 MR. KATZ: Okay. Thank you for your
2 time, Dr. Phinney.

3 We can go off the record.

4 THE COURT REPORTER: Mr. Bombach, I
5 just need your order for the record.

6 MR. BOMBACH: I think we're fine
7 just standard, when it comes.

8 (Time noted: 3:51 p.m. EDT)

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13 IN WITNESS WHEREOF, I have hereunto
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4 San Diego, CA 92130-2080

5

6 Case: Vicor Corporation v. Delta Electronics, Inc.

7 Date of deposition: March 13, 2025

8 Deponent: Joshua Phinney, Ph.D.

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