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Transcript of Eric Bretschneider, Ph.D.

Date: July 17, 2025

Case: BOE Technology Group Co., LTD -v- Optronix Sciences LLC

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

Transcript of Eric Bretschneider, Ph.D.
Conducted on July 17, 2025

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2 (5 to 8)

5 1 DEPOSITION OF ERIC BRETSCHNEIDER, Ph.D. 2 Thursday, July 17, 2025 3 4 VIDEO TECHNICIAN: Here begins Media 5 Number 1 in the video deposition of Dr. Eric 6 Bretschneider in the matter of BOE Technology Group 7 Company Ltd. versus Optronic Sciences LLC, in the PT0 8 court, Case Number IPR2024-01130, 01131, 01132, 01133. 9 Today's date is July 17th, 2025. The time 10 on the monitor is 11:58. And I am the videographer, 11 James Levine, and this deposition is being taken 12 remotely at the witness's location. 13 Counsel, would you please identify 14 yourselves and state whom you represent. 15 MR. SAULNIER: This is Michael Saulnier 16 with DLA Piper on behalf of BOE Technologies. 17 MR. CUMMINGS: This is Jefferson Cummings 18 with Russ August & Kabat representing Optronic 19 Sciences, patent owner. 20 VIDEO TECHNICIAN: Thank you very much. 21 And our court reporter today will now swear 22 in the witness, please.	7 1 being here this morning. 2 ERIC BRETSCHNEIDER, Ph.D., 3 was thereupon called as a witness herein, and after 4 having first been duly sworn to testify to the truth, 5 the whole truth and nothing but the truth, was 6 examined and testified as follows: 7 EXAMINATION 8 BY MR. SAULNIER: 9 Q. How many times have you been deposed? 10 A. I stopped counting around 80. 11 Q. And so you're familiar with ground rules; is that fair 12 to say? 13 A. Yes. 14 Q. Let's briefly just go through a few just to put it on 15 the record. 16 Do you understand you're under oath and 17 have to tell the truth? 18 A. Yes. 19 Q. And that you're required to give full and accurate 20 testimony? 21 A. Yes. 22 Q. And you understand that because this is a transcript,
6 1 STENOGRAPHER: The attorneys participating 2 in this deposition and the witness have verified that 3 he is Eric Bretschneider, Ph.D. In lieu of an oath 4 administered in person, the witness will visually 5 affirm his testimony in this matter is under penalty 6 of perjury. 7 The parties and their counsel consent to 8 this arrangement and waive any objections to this 9 manner of reporting or admissibility of the 10 transcript. 11 If there any objections to proceeding in 12 this manner by any party, please state so now. 13 Hearing no objections, Dr. Bretschneider, 14 would you please raise your right hand. 15 Do you swear or affirm the testimony you 16 are about to give in this matter will be the truth, 17 the whole truth, and nothing but the truth? 18 DR. BRETSCHNEIDER: I do. 19 STENOGRAPHER: Thank you. 20 You may proceed. 21 MR. SAULNIER: Thank you. 22 Dr. Bretschneider, welcome. Thanks for	8 1 you need to respond orally? 2 A. Yes. 3 Q. And similarly, I'll do my best not to talk over you 4 and hopefully you'll do your best to not talk over me 5 either. 6 A. Works better that way. 7 Q. If you don't understand a question, will you let me 8 know? 9 A. Yes. 10 Q. If you answer my question, I'm gonna assume that you 11 understood it; is that fair? 12 A. Yes. 13 Q. And do you also understand that counsel may object, 14 but you still have to answer the questions that I ask? 15 Do you understand that? 16 A. Yes. 17 Q. Additionally, please let me know if you need a break. 18 I typically go for about an hour, but if you need a 19 break at a different time, just please let me know. 20 A. I will. 21 I will say, I am at home today. My wife's 22 not present. If you hear something that sounds like

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9 1 dogs that want attention and go outside, it's 2 probably a good time for a break. 3 Q. Understood. Well, if we hear the dogs, we'll take a 4 break. 5 And just to confirm, is there any reason 6 why you can't give full and accurate testimony today? 7 A. No. 8 Q. And other than your dogs, is there anyone in the room 9 with you? 10 A. No. 11 Q. Do you have any printed materials with you today? 12 A. I do have a clean hard copy of my declaration. 13 Q. And how did you prepare for today's deposition? 14 A. I met with Mr. Cummings last week, and also I 15 reviewed my declaration. 16 Q. How long did you spend with Mr. Cummings last week? 17 A. It was over several days. This is the third or 18 fourth deposition I had this week. 19 Q. And did you review any documents not listed in your 20 declaration to prepare for today's deposition? 21 A. No. 22 MR. SAULNIER: I'm going to put IPR	11 1 A. Yes. There are sections on applicable legal 2 standards that counsel drafted for me. I'm not an 3 attorney. I don't have legal training. So they 4 prepared those and I reviewed them to make sure that 5 I understood those legal standards. 6 Q. And who was involved in the preparation of this 7 declaration other than you? 8 A. Mr. Cummings. 9 Q. As far as you know, is this declaration accurate? 10 A. There are inevitably a few typographical errors which 11 we may or may not stumble across, but the technical 12 content is correct. 13 Q. Can you please turn to paragraph 4 of your 14 declaration? It states that, "I've reviewed the 15 papers and exhibits filed in this proceeding as of the 16 date my declaration is signed." 17 Which documents did you review? 18 A. Dr. Baker's declaration, the '842 patent, the prior 19 art references he cited. 20 Q. And do you recall -- 21 A. That's what -- that's what comes to mind. There may 22 have been a few other documents, but those were the
10 1 Exhibit 2020, which is your declaration in the 2 IPR2024-1130 matter. 3 ENTERED INTO THE RECORD: 4 PREVIOUSLY MARKED EXHIBIT 2020 5 12:02 p.m. 6 BY MR. SAULNIER: 7 Q. Do you see that? 8 A. Yes. 9 Q. And can you please open that document and confirm that 10 it's a correct copy of the expert declaration that you 11 submitted for the IPR -- in this IPR for U.S. Patent 12 Number 7,168,842? 13 A. It appears to be, although I will note that the file 14 name, there's only one T in my last name, not two. 15 Q. Apologies. 16 A. It happens. 17 Q. Is it okay if I refer to the patent at issue in this 18 as the '842 patent? 19 A. Yes. 20 Q. And IPR number 2024-1130 is the '842 IPR? 21 A. Yes. 22 Q. Did you prepare this declaration?	12 1 main ones that I was reviewing. 2 Q. And do you recall the order in which you reviewed 3 those documents? 4 A. I believe I started with Dr. Baker's declaration in 5 this one. 6 Q. Okay. And then did you review the patent and prior 7 art, or was it a different order? 8 A. I don't recall. It's been a few months. 9 Q. Could you please turn to paragraph 32 of your expert 10 report? 11 In that paragraph you state that, "The 12 images below" represent -- "show a typical surface 13 mount LED for use with waveguides from the mid-1990s." 14 Is that correct? 15 A. Yes. 16 Q. And then you cite to Exhibit 2013; is that correct? 17 A. Yes. 18 Q. If you take a look at the Chat, I've uploaded 19 Exhibit 2013. Can you please open and review the 20 document? 21 ENTERED INTO THE RECORD: 22 PREVIOUSLY MARKED EXHIBIT 2013

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12:07 p.m. BY MR. SAULNIER: Q. And is this a true and correct copy of the document? A. It appears to be, yes. Q. And you submitted this with your expert declaration. Correct? A. Yes. Q. So in the next sentence in your declaration, paragraph 32, you state, "This [LED] package was nominally 'C' shaped" -- referring to the figures in Exhibit 2013 -- "with the LED chip mounted on one side and directed [to] the light from the edge of the LED package towards the waveguide." Is that fair? A. Yes. Q. Now, looking at the image on page 4 of Exhibit 2013, what makes that nominally C-shaped? MR. CUMMINGS: Objection. Form. A. If you look at the top right dimensional drawing you can see there are two horizontal members, one vertical member, and the way they're connected is approximately a C.	A. It has -- BY MR. SAULNIER: Q. Let me -- let me rephrase that. In the image to the left on page 4 of Exhibit 2013, the front view of the LED, you describe that as a square shape? A. It's approximately square. Q. So when you refer to "nominally C-shaped," what view of the LED are you taking? MR. CUMMINGS: Objection. Form. A. The side view. BY MR. SAULNIER: Q. But the front view is not nominally C-shaped; is that correct? MR. CUMMINGS: Objection. Form. A. The profile viewing from the front is not nominally C. BY MR. SAULNIER: Q. And if you looked at the back, from the back of the package, so instead of the LED facing you, the other side, would that also be nominally -- or would that be -- strike that.
BY MR. SAULNIER: Q. And so are you saying that those are three separate members? MR. CUMMINGS: Objection. Form. A. No, it's one integrated package. BY MR. SAULNIER: Q. What do you mean by "package"? A. It's an LED package. It's a solid object. It doesn't come apart. Q. So turning back to the image on the top right, what -- is that a side view of the LED package? A. Yes. Q. If you look at the image to the left of that, what view of the LED package is that? A. That's looking down the optical axis of the package. Q. In other -- would you say that that's looking from the front of the LED package into the LED package? A. You could say that. The small square represents the LED chip. Q. So from this direction, you would describe that as square-shaped? MR. CUMMINGS: Objection. Form.	If you looked at the back of the package, so instead of the LED facing you from the other side, that would not be nominally C-shaped either. A. And to be more specific, we're talking about profiles, so the profile is approximately square. The overall package itself still looks like a thick C. Q. But you just said when you're looking at the front of the LED package, from the front of the LED package, that's a square shape. Correct? MR. CUMMINGS: Objection. Form. A. It's a square profile. The shape is three-dimensional. [Simultaneous speaking] BY MR. SAULNIER: Q. And so the side profile is nominally C-shaped? A. You didn't let me finish. The shape is three-dimensional. You're looking at profiles, which is a two-dimensional projection of a three-dimensional object. Q. But if you look from the side profile, that's C-shaped. Correct?

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17 1 A. No, it's a profile. Again, you're mixing up a 2 two-dimensional projection of a three-dimensional 3 shape. 4 Q. Well, Dr. Bretschneider, in your declaration you say 5 that the LED package is "nominally C-shaped." What 6 are you referring to with that? 7 A. It's -- if you look at the three-dimensional shape, 8 it's a thick C. You have a C, nominally C 9 cross-section that's extruded at 90 degrees to form a 10 thick C-shaped profile. 11 Q. But when you look at the package from the front, 12 that's not a C shape, is it? 13 MR. CUMMINGS: Objection. Form. 14 A. When you look at the package from the front, you're 15 looking at a two-dimensional projection. If you look 16 from the front, you can't see the third dimension. 17 BY MR. SAULNIER: 18 Q. If you look from the side, do you see the third 19 dimension? 20 A. You still -- you see a profile, but, again, that 21 profile is extruded. When you look at the actual 22 picture of the package, you can see the	19 1 BY MR. SAULNIER: 2 Q. But for the rightmost image, that's not three 3 dimensions; is that correct? 4 A. I believe we've established that that's a face view, 5 that's a profile view. It's not a shape. And, 6 again, I feel like you want to talk about one word 7 instead of a whole paragraph. 8 Q. So what makes the nominal shape of an LED package? 9 MR. CUMMINGS: Objection. Form. 10 A. You look at the LED package and -- 11 BY MR. SAULNIER: 12 Q. From what -- I'll let you finish. 13 A. You look at the LED package and you can determine it. 14 You see a three-dimensional object. I guess I'm 15 struggling. If you look at an object and you can't 16 tell the shape, that doesn't seem to imply you're 17 looking at the object. 18 Q. But we've just established, when you look at the 19 profile views, some of the profile views do not show a 20 C shape; is that correct? 21 MR. CUMMINGS: Objection. Form. 22 A. Again, profile is not the shape. You keep going to,
18 1 three-dimensional shape, an orthographic projection. 2 Q. So when you refer to the side profile of the LED on 3 page 4 of Exhibit 2013 in the top right corner, that's 4 not a three-dimensional depiction, is it? 5 MR. CUMMINGS: Objection. Form. 6 A. I guess I'm confused because there are three images 7 representations of the LED, and you seem to be 8 focusing on one and ignoring the other two parts of 9 the figure that I included. 10 BY MR. SAULNIER: 11 Q. Dr. Bretschneider, to be specific, I'm asking you 12 about the top right profile in Exhibit 2013. Is that 13 a side profile of the LED package? 14 A. It's a side -- 15 MR. CUMMINGS: Objection. Form. 16 A. It's a side view which shows that profile. 17 BY MR. SAULNIER: 18 Q. But you don't see the three dimensions of the package 19 in that side profile; is that correct? 20 MR. CUMMINGS: Objection. Form. 21 A. You see the three dimensions in the image, leftmost 22 image that I included in my declaration.	20 1 saying the profile is a shape. The profile is a 2 two-dimensional profile. It's equivalent to a 3 cross-section. The shape is three-dimensional. You 4 ask, the two-dimensional isn't the three-dimensional. 5 No, of course it's not. It represents one aspect of 6 a three-dimensional object. 7 BY MR. SAULNIER: 8 Q. So is the letter C a three-dimensional object? 9 A. I haven't offered an opinion on that. 10 Q. But you say a three-dimensional object is C-shaped; is 11 that correct? 12 A. I state this LED package was nominally C-shaped with 13 the LED chip mounted on one side and directed the 14 light from the edge of the LED package towards the 15 waveguide. 16 Q. So how is a three-dimensional object a two-dimensional 17 shape? 18 MR. CUMMINGS: Objection. Form. 19 A. The three-dimensional object is the shape. The two 20 dimensions is a projection or it's a profile view. 21 It's a face view. Your question is technically 22 incorrect.

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21 1 BY MR. SAULNIER: 2 Q. Is a C a three-dimensional object? 3 MR. CUMMINGS: Objection. Form. 4 A. Again, I haven't offered an opinion on that. I 5 stated the LED package was nominally C-shaped. 6 BY MR. SAULNIER: 7 Q. What would a -- strike that. 8 In Exhibit 2013 on page 4, when you're 9 looking at the profile view at the bottom of the 10 square, what shape would you describe that as? 11 MR. CUMMINGS: Objection to form. 12 A. Again, it's a profile. The shape is 13 three-dimensional. The profile, I would say, is 14 nominally rectangular. You can see the nominal 15 dimensions indicated with the arrows. 16 BY MR. SAULNIER: 17 Q. And what are -- sorry. 18 What do you mean by "nominally"? 19 A. When you look at that profile, you can see there are 20 different parts. You can see the sides. The left 21 and right sides are not a single contiguous collinear 22 feature. There's a slight break in taper towards the	23 1 BY MR. SAULNIER: 2 Q. So what components need to be a part of a package for 3 it to be an LED package? 4 MR. CUMMINGS: Objection. Form. 5 A. There needs to be an LED chip. There needs to be 6 electrical connections to the LED chip internal, and 7 also external for supplying power to the LED chip. 8 There can be more than one LED chip. I would say 9 those are the minimum. There are typically many 10 other features, but there are also a very wide 11 variety of different types of LED packages. 12 So your question, from that perspective, is 13 difficult to answer. Are we talking about a surface 14 mount package? Are we talking about a PLCC package? 15 BY MR. SAULNIER: 16 Q. I'm specifically asking about an LED package, 17 Dr. Bretschneider. 18 A. And I just told you there's a wide variety of types 19 of LED packages so I'm trying to give you the bare 20 bones features, but you seem to be implying that 21 there is a single type of LED package. There has to 22 be an electrical -- an LED chip. There has to be
22 1 end. So if you look at the four corners, they're not 2 90 degree angles. 3 Q. You agree that the -- that the object shown in 4 Exhibit 2013 is an LED package; is that correct? 5 MR. CUMMINGS: Objection. Form. 6 BY MR. SAULNIER: 7 Q. On page 4 of Exhibit 2013, that shows -- 8 A. I think that -- 9 Q. -- that shows -- excuse me. Strike that. 10 On page 4 of Exhibit 2013, does that show 11 an LED package? 12 MR. CUMMINGS: Objection. Form. 13 A. It's very clear it is an LED package. If you read 14 the text, if you consider the context of it, it's 15 very clear that it's an LED package. 16 BY MR. SAULNIER: 17 Q. What makes it an LED package? 18 MR. CUMMINGS: Objection. Form. 19 A. It's a surface mount package that includes an LED. 20 Your question almost answers itself. If it's not a 21 package, then it can't be an LED package. If it 22 doesn't have an LED, then it can't be an LED package.	24 1 internal connections to the LED chip, electrical 2 connections. You have to have external electrical 3 connections because part of the reason for the 4 package is the LED chip by itself is too small to 5 handle, it can't be connected to other things. 6 The chip in this particular package is -- 7 would typically be about 300 microns across, so 8 .3 millimeters. You can't solder something that size. 9 Even picking it up and handling it requires 10 specialized equipment. The package makes it easier to 11 do. 12 The package also needs to -- or I will say, 13 should include some form of thermal management, not 14 all LED packages do, but if I don't have electrical 15 connections to the LED chip and external connections 16 that I can supply power to, I don't have an LED 17 package. Those are the bare minimum requirements. 18 Again, if you want to give me a more 19 specific type of package I can give you more details, 20 but those are the absolute requirements. 21 Q. Let's talk about the LED package in Exhibit 2013 on 22 page 4. Does this LED package include a circuit

25 1 board? 2 MR. CUMMINGS: Objection. Form 3 A. No. 4 BY MR. SAULNIER: 5 Q. Does this LED package include a heat sink? 6 MR. CUMMINGS: Objection. Form 7 A. There are thermal management features to the package, 8 but any person of ordinary skill in the art would not 9 consider an LED package to include an integral heat 10 sink. That's not a standard requirement. That would 11 be a -- at best, a highly specialized package. 12 BY MR. SAULNIER: 13 Q. But this package, what thermal management features 14 does this package include? 15 MR. CUMMINGS: Objection. Form 16 A. Portions of the lead frame serve to conduct heat 17 generated by the LED chip to the periphery of the 18 package where it can be dissipated to other 19 components, where it can be transferred to other 20 components and eventually dissipated into the 21 environment. 22 BY MR. SAULNIER:	27 1 person of -- strike that. 2 Dr. Bretschneider, this is an exhibit that 3 you've looked at and considered in rendering your 4 opinions. Correct? 5 A. Yes. 6 Q. So you do not have any opinion on nominally what shape 7 the lead frame in the image in the top right in 8 Exhibit 2013 on page 4 is? 9 MR. CUMMINGS: Objection. Form 10 A. I said I haven't formed an opinion. The purpose was 11 to show what a typical LED package designed for use 12 with a light guide structure looked like in the 1990s 13 time frame. 14 BY MR. SAULNIER: 15 Q. You stated that the package included in 2013 is 16 nominally C-shaped. Correct? 17 A. As I stated, this LED package was nominally C-shaped 18 with the LED chip mounted on one side and directed 19 the light from the edge of the LED package towards 20 the waveguide. 21 Q. And as a person of skill in the art, you -- what is 22 your opinion as to the shape of the lead frame on
26 1 Q. And could you please point me to what the lead frame 2 in this LED package is? 3 MR. CUMMINGS: Objection. Form. 4 BY MR. SAULNIER: 5 Q. Excuse me, let me rephrase that. 6 Can you please point me to what the lead 7 frame in the LED package shown in 2013 on page 4 is? 8 A. You can see in the top right image there's a series 9 of parallel lines that extend from the top of the 10 package, go directly behind the LED chip, make a 90 11 degree turn at the bottom, turn up at the left edge 12 of the package, and then fold into the central cavity 13 or recess. It's not really a recess. It's more of a 14 channel. 15 Q. Nominally, what shape would you describe the lead 16 frame to be in the top right image in Exhibit 2013, 17 page 4? 18 MR. CUMMINGS: Objection. Form. 19 A. I haven't given that consideration. I haven't formed 20 an opinion on that. 21 BY MR. SAULNIER: 22 Q. Sitting before you as an expert in the field or a	28 1 page 4 of Exhibit 2013 in the right -- top right 2 corner? 3 MR. CUMMINGS: Objection. Form 4 A. Again, I stated I haven't formed an opinion on this. 5 I'm serving as an expert, which means I should not 6 offer opinions off-cuff. Things need to be carefully 7 considered. The purpose of the exhibit was to show 8 the typical side mount package for use with 9 waveguides in the 1990s. 10 BY MR. SAULNIER: 11 Q. You render opinions on other lead frames throughout 12 your expert report; is that correct? 13 MR. CUMMINGS: Objection. Form 14 A. I can see I do mention the -- a lead frame in the 15 '842 patent. 16 BY MR. SAULNIER: 17 Q. So you can identify the structure in the '842 patent 18 as the lead frame; is that correct? 19 MR. CUMMINGS: Objection. Form 20 A. What I state is, in paragraph 124 of my declaration, 21 "A POSITA would have readily understood the L-shaped 22 structure of the '842 Patent is what is referred to

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29 1 in the industry as a 'lead frame.' The external 2 surface of a lead frame is used to attach the LED 3 package to a circuit board using solder.' 4 BY MR. SAULNIER: 5 Q. Paragraph 31 of your expert report, you say, "The 6 L-shaped structure of the '842 patent is what is 7 referred to as a 'lead frame.'" 8 Is that correct? 9 A. I believe I said paragraph 124, not 34. 10 Q. Let me take you to paragraph 31 of your expert report, 11 Dr. Bretschneider. In that paragraph -- 12 A. Oh. 13 Q. -- you say, "The L-shaped" -- 14 A. I thought you said -- I thought you said 15 paragraph 34. That's why I was confused. 16 Q. No. 17 A. Okay. 18 Q. In paragraph 31 of your expert report you state that, 19 "The L-shaped structure of the '842 patent is what is 20 referred to as a 'lead frame.'" 21 Is that correct? 22 A. Yes.	31 1 What is the shape of the lead frame in the -- in the 2 LED package that you considered in Exhibit 2013 on 3 page 4? 4 MR. CUMMINGS: Objection. Form. 5 A. Respectfully, you're not asking a simple question. 6 You're asking me to render an opinion, a technical 7 opinion, an expert opinion on the spot without 8 considering all the issues in this matter. It's not 9 a simple question. It may sound like a simple 10 question, but you are asking for a technical opinion. 11 I have stated I haven't formed that 12 opinion. If you want to give me time to review all 13 the materials in this matter I can do that, but that's 14 going to take time. I'm not going to be able to do 15 that in just a few minutes. 16 BY MR. SAULNIER: 17 Q. In Exhibit 2013 on page 4, under the Features column, 18 can you see that it states that the LED package is, 19 quote, "Ideal for Backlighting, Optical Coupling Into 20 Light Pipes and Lenses," quote? 21 A. Yes. 22 Q. So this LED could be used in a backlight package.
30 1 Q. So the structure, you would agree, of that lead frame 2 in the '842 patent is L-shaped. Correct? 3 A. The '842 patent talks about an L-shaped structure, 4 and that structure is a lead frame. 5 Q. And so you would agree that it is an L-shaped lead 6 frame. 7 A. Yes. 8 Q. Going back to Exhibit 2013, page 4, the top right 9 figure, sitting here today, you have no opinion on 10 what shape the lead frame in that package is. 11 A. I will reiterate, I haven't formed an opinion on 12 that. 13 Q. So you cannot look at this structure and render an 14 opinion on if this is -- at what shape the lead frame 15 is on Exhibit 2013 on page 4. 16 MR. CUMMINGS: Objection. Form. 17 A. I'm saying I have not taken the time and effort to do 18 that. This is a technical matter, and to make a snap 19 judgment would not be within the scope of my tasks in 20 this matter. 21 BY MR. SAULNIER: 22 Q. I'm just asking a simple question, Dr. Bretschneider.	32 1 A. It could be used for backlighting applications. 2 Q. Okay. Thank you. 3 In paragraph 34 of your expert declaration, 4 you discuss the Nichia -- excuse me -- strike that. 5 In paragraph 34 of your expert declaration, 6 you discuss the Nichia NSCW215 LED; is that correct? 7 A. Yes. 8 MR. SAULNIER: I'm going to put 9 Exhibit 2012 in the Chat. 10 BY MR. SAULNIER: 11 Q. Dr. Bretschneider, can you please pull up 12 Exhibit 2012? 13 ENTERED INTO THE RECORD: 14 PREVIOUSLY MARKED EXHIBIT 2012 15 12:35 p.m. 16 A. Okay. 17 BY MR. SAULNIER: 18 Q. Is this a specification for a Nichia chip type white 19 LED, model number NSCW215T? 20 A. Yes. 21 Q. Going to page 11 of Exhibit 2012, would you consider 22 this an LED package?

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33 1 A. I want to clarify that there's -- I think that's 2 page 10 at the bottom, is what you're talking about, 3 or page 11? 4 Q. I think it's page -- exhibit -- I think it's page 11 5 of the exhibit. 6 A. I'm just trying to confirm because -- I just want to 7 be clear what I'm looking at. The page I'm looking 8 at has "10" at the bottom, and I just want to make 9 sure that we're in sync on that. I believe that is 10 page 11 of the exhibit, but I just want to clarify. 11 Q. Yes. I guess the page has -- let me -- let's be clear 12 about this. 13 Whenever I'm referring to a page in one of 14 the exhibits that I put there, I'm going -- I'm 15 referring to the number -- the exhibit page numbering, 16 not the document page numbering. 17 A. Okay. Again, I just wanted to be clear because if I 18 look at the following page, I'm seeing discussions on 19 the taping, how it's portrayed there. 20 Page 11 shows various views of the Nichia 21 LED package we've been talking about. 22 Q. And you agree that this is an LED package. Correct?	35 1 A. It's difficult to highlight all of them. On the 2 middle figure -- now, if we start with the top left 3 figure -- 4 Q. Uh-huh. 5 A. -- there are two small rectangles on either side that 6 would be portions of the lead frame. The image 7 below, you can see the two lower corners would be 8 portions of the lead frame. The image below that, 9 where it's labeled cathode and anode, would be 10 portions of the lead frame. 11 The middle image, what would be the second 12 column, there is, again, portions of the lead frame 13 that match up with the anode and cathode we just 14 talked about, and then the rightmost figure shows 15 portions of the -- external portions of the lead 16 frame that correspond to the left center image. 17 Q. Dr. Bretschneider, what would you describe the shape 18 of the lead frame as -- 19 MR. CUMMINGS: Objection. Form. 20 BY MR. SAULNIER: 21 Q. -- in the Nichia NxCW215 as shown in Exhibit 2012? 22 A. Complex.
34 1 A. Yes. 2 Q. And in this LED package there's no circuit board; is 3 that correct? 4 MR. CUMMINGS: Objection. Form. 5 A. That's correct. 6 BY MR. SAULNIER: 7 Q. And there is no heat sink; is that correct? 8 A. There are thermal management features. Just trying 9 to be precise. But not something a person of 10 ordinary skill in the art would consider a heat sink. 11 Q. And can you please describe those heat management 12 features for the Nichia NCxW2015 [sic] on page 11 of 13 Exhibit 2012? 14 MR. CUMMINGS: Objection. Form. 15 A. Portions of the lead frame structure, there are some 16 internal details of the LED package that are not 17 represented in this image, but portions of the lead 18 frame serve for thermal management. 19 BY MR. SAULNIER: 20 Q. Can you show me where the lead frame -- or can you 21 show me what the lead frame would be in this -- on 22 page 11 of Exhibit 2012?	36 1 Q. Is it an L shape? 2 MR. CUMMINGS: Objection. Form. 3 A. It's an extremely complicated shape. If you look at 4 the dimension of these packages, you can see the 5 outside dimension, the lateral dimension is 6 2.8 millimeters. This is only 1.2 millimeters deep, 7 and the height is just about 1 millimeter. 8 When we talked previously, the dimension of 9 LED chips is on the order of a few tenths of a 10 millimeter, so to be able to mount the LED chip on the 11 portions of the lead frame, given the outside -- what 12 you see on the outside of a package, there's a lot of 13 complexity to designing the lead frame. 14 An x-ray image would show more, but it's a 15 complicated shape that doesn't have an easy 16 description. 17 BY MR. SAULNIER: 18 Q. You wouldn't characterize it as a C shape, for 19 example. 20 MR. CUMMINGS: Objection. Form. 21 A. No, I would not. 22 BY MR. SAULNIER:

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37 1 Q. Or an L shape? 2 MR. CUMMINGS: Objection. Form. 3 A. Those are both simple descriptions and it is, again, 4 a highly complicated shape. 5 BY MR. SAULNIER: 6 Q. Turning back to page 11 of Exhibit 2012, there is a 7 table that says Item and Materials. Do you see that? 8 A. Yes. 9 Q. So it says that the package is a heat-resistant 10 polymer. Do you see that? 11 A. Yes. 12 Q. What is the package that is being referred to there? 13 A. It's the plastic material that's molded around the 14 lead frame. 15 Q. So when it says "package" here, it's not referring to 16 the lead frame; is that correct? 17 MR. CUMMINGS: Objection. Form. 18 A. No, it's not. 19 BY MR. SAULNIER: 20 Q. And additionally, on page 11 of Exhibit 2012, it 21 points to an encapsulating resin. Where is that shown 22 in the figures?	39 1 BY MR. SAULNIER: 2 Q. So not the heat-resistant polymer. 3 MR. CUMMINGS: Objection. Form. 4 A. The heat-resistant polymer is an insulating material. 5 The electrodes are the anode and cathode illustrated 6 in the bottommost figure. 7 BY MR. SAULNIER: 8 Q. I'm just trying to be clear here. When you say "the 9 LED package," what are you referring to from these 10 images in Exhibit 2012 on page -- on page 11? 11 MR. CUMMINGS: Objection. Form. 12 A. I will take a step back. Nichia Corporation is a 13 Japanese company. Sometimes their translations make 14 things a little awkward. So when they list the 15 package as being a heat-resistant polymer, that would 16 more typically be described as the housing, but 17 they're talking about a specific subset. 18 In general, when I talk about an LED 19 package, I'm talking about the entirety of the 20 package which, based on page 11, would be what's 21 described there as the package, the encapsulating 22 resin, and the electrodes. The physical object you
38 1 A. The only figure where it's evident where you would be 2 able to see it is the center figure on the left 3 column, that roughly oval shape in the center that's 4 identified as having vertical dimensions of 5 .7 millimeters and horizontal dimension of 6 2.2 millimeters. 7 Q. Thank you. 8 And additionally, it says there's an item, 9 it's an electrode, and it is "Ag Plating Copper 10 Alloy." Are the lead frames also potentially made of 11 a copper alloy here? 12 MR. CUMMINGS: Objection. Form. 13 A. The lead frames -- just to be clear, the 14 understanding, the lead frame would be a copper 15 alloy. The silver plating is referring specifically 16 to the external electrodes for making electrical 17 contact to the package. 18 BY MR. SAULNIER: 19 Q. And when you say "electrical contact to the package," 20 what package are you referring to? 21 MR. CUMMINGS: Objection. Form. 22 A. The LED package.	40 1 could hold in your hand, if you will. 2 BY MR. SAULNIER: 3 Q. Thank you, Dr. Bretschneider. 4 Turning back to your declaration, on 5 page -- excuse me. In paragraph 14 you state that, "I 6 recently led the work group that revised [the] TM-21 7 which is an internationally accepted standard for 8 predicting reliability of LED packages." 9 You see that? 10 A. Yes. 11 Q. So what do you mean here by "LED packages"? 12 A. The entire component that can be soldered to a 13 circuit board, there are different types of packages. 14 Some of them are not designed to be soldered and 15 would not be soldered. There is a particular class 16 of package referred to as a chip on board, or COB, 17 package. The method of construction, the design, 18 doesn't allow for soldering those to a circuit board. 19 Q. And how would you connect those to a circuit board? 20 MR. CUMMINGS: Objection. Form. 21 BY MR. SAULNIER: 22 Q. Excuse me. Strike that.

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41 1 How would you attach the chip on board to a 2 circuit board? 3 MR. CUMMINGS: Objection. Form. 4 A. You typically don't. There are -- the anode and 5 cathode are on the top of the package and you would 6 solder wires to those and then those wires would be 7 connected to a power supply, in some manner. 8 BY MR. SAULNIER: 9 Q. And so the LED's just not attached to anything? 10 MR. CUMMINGS: Objection. Form. 11 A. I believe you were referring to an LED package. The 12 LED package is mechanically attached to a thermal 13 management system. 14 BY MR. SAULNIER: 15 Q. And how would it be a mechanically -- how would the 16 LED package be mechanically attached to a thermal 17 management system? 18 MR. CUMMINGS: Objection. Form. 19 A. There is a variety of ways. Thermal grease could be 20 a thermal epoxy, could be a simple mechanical 21 attachment. Inevitably, there is some form of 22 thermal interface material between the chip on board	43 1 The issue is that you have to dissipate the 2 heat generated by the LEDs, so you need some form of 3 thermal management material. 4 BY MR. SAULNIER: 5 Q. Paragraph 20 of your expert report, Dr. Bretschneider, 6 you state that in your work for Toyoda Gosei 7 North America, "The support I provided included design 8 of LED packages and design of lighting fixtures [and 9 products] that incorporated LED packages. Notable 10 successes at Toyoda Gosei included expanding market 11 niches [and] applications for LED based backlights for 12 LCD displays." 13 Could you give just a brief summary of the 14 different types of LED packages that you designed 15 while at Toyoda Gosei? 16 A. Some of them are what would be considered side view 17 LED packages similar to the Nichia and the Siemens 18 LED packages we were discussing previously, LEDs that 19 were designed to be mounted to a circuit board and 20 emit light in a direction parallel to the circuit 21 board. 22 Some of them were standard what would be
42 1 package and the thermal management system. There's 2 not one fixed way to do it. That would be up to the 3 lighting fixture designer, the end-user, to decide 4 how they wanted to do that. 5 BY MR. SAULNIER: 6 Q. So just so I'm clear, simple mechanical ways to attach 7 an LED to some other object are thermal epoxy? 8 A. We're talking about -- 9 MR. CUMMINGS: Objection. Form. 10 A. We're talking about chip on board LED packages. 11 You've made a very broad general statement. 12 BY MR. SAULNIER: 13 Q. Right. Dr. Bretschneider, I'm just trying to 14 understand it generally. If you had to come up with a 15 list of ways that those could be mechanically attached 16 other than the epoxy, how else might you do that? 17 MR. CUMMINGS: Objection. Form. 18 A. Again, if we're talking about chip on board LEDs, COB 19 LED packages, thermal epoxy, there's usually some 20 type of mechanical clamping force, thermal grease or 21 using a thermal interface material, but in some cases 22 it would be called a gap filler pad.	44 1 called top view LED packages. They emit light 2 perpendicular to the direction of the plane of the 3 circuit board they're mounted on. 4 There were some high-powered packages for 5 custom applications, ones that did not include a 6 polymer housing. 7 Q. And so you designed a variety of components. Correct? 8 A. Yes, it would depend on the end application. If 9 there was a product in the catalog already I would 10 try to direct customers there, but in some cases the 11 customers were purchasing the LED die, the actual 12 chips, the semiconductor component that emits light, 13 and they had an idea for an LED package and typically 14 they needed help at that time frame. 15 Q. So the composition of the LED package depended heavily 16 on the application. Correct? 17 MR. CUMMINGS: Objection. Form. 18 A. I will say, the requirement for the LED package 19 performance depended on the application, and then you 20 work from those requirements. 21 BY MR. SAULNIER: 22 Q. So within even, for example, phone backlights, did the

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45 1 application -- strike that. 2 Did any of the LED packages that you used 3 include heat fins while you were designing for Toyoda 4 Gosei North America? 5 MR. CUMMINGS: Objection. Form. 6 A. Did they have fin structures? No. 7 BY MR. SAULNIER: 8 Q. Did they -- excuse me. Strike that. 9 Did any of the LED packages that you used 10 include heat sinks? 11 MR. CUMMINGS: Objection. Form. 12 A. Not in the understanding of a person of ordinary 13 skill in the art. 14 BY MR. SAULNIER: 15 Q. And just to be clear, what do you mean when you say 16 "not in the understanding of a person of ordinary 17 skill in the art" in relation to heat sinks? 18 A. If people aren't familiar with design of LED packages 19 they can say, oh, this dissipates heat so it's a heat 20 sink. It's not that simple. Heat sinks have a 21 specific design and intent. They're considerations. 22 That's the best I can say.	47 1 A. Yes. 2 Q. I'd like to draw your attention to Figure 4 of the 3 '842 patent. Is there an LED package illustrated in 4 Figure 4? 5 MR. CUMMINGS: Objection. Form. 6 A. Yes. 7 BY MR. SAULNIER: 8 Q. And what components in Figure 4 comprise the LED 9 package? 10 MR. CUMMINGS: Objection. Form. 11 A. The '842 patent uses the phrase light-emitting device 12 module 40, so 41, 42, 44a, 43, 43b, 49, and 50. 13 BY MR. SAULNIER: 14 Q. Is PCB 45 a part of the LED package in Figure 4? 15 MR. CUMMINGS: Objection. Form. 16 A. The PCB is what the LED package is mounted to. 17 BY MR. SAULNIER: 18 Q. If you go to column 3, lines 6 to 8, it states -- 19 could you please read that out? 20 A. "Figure 4 illustrates a light-emitting device (LED) 21 package incorporating light-emitting device (LED) 22 modules 40 according to an embodiment of the present
46 1 If I walked down the street and asked 2 someone, is this a heat sink, they might say yes, 3 they might say no, no matter what I show them. 4 Q. But the use or nonuse of heat fins or heat sinks would 5 depend on the application that the LED was going to be 6 used in; is that correct? 7 MR. CUMMINGS: Objection. Form. 8 A. Thermal management considerations depend on the 9 application, and, again, I haven't seen an LED 10 package that includes fins. 11 BY MR. SAULNIER: 12 Q. I've got one more little brief section if you're okay 13 with going for another 10, 15 minutes before we take a 14 break. 15 A. I'm okay. 16 Q. Okay. I've dropped 1001 in the Chat. 17 ENTERED INTO THE RECORD: 18 PREVIOUSLY MARKED EXHIBIT 1001 19 12:58 p.m. 20 BY MR. SAULNIER: 21 Q. Could you please open that up, Dr. Bretschneider? 22 Do you recognize this as the '842 patent?	48 1 invention." 2 Q. So the patent describes everything in Figure 4 as an 3 LED package; is that correct? 4 MR. CUMMINGS: Objection. Form. 5 A. I don't see that I considered that or expressed an 6 opinion in my declaration. 7 BY MR. SAULNIER: 8 Q. Dr. Bretschneider, you read the '842 patent in 9 rendering your opinions; is that correct? 10 MR. CUMMINGS: Objection. Form. 11 A. Yes. 12 BY MR. SAULNIER: 13 Q. Had you considered the teachings of the '842 patent in 14 rendering your opinions? 15 A. Yes. 16 Q. And you also rendered an opinion on what a person of 17 skill in the art in the field of the '842 patent would 18 have -- would have required. Correct? 19 MR. CUMMINGS: Objection. Form. 20 A. Would you repeat the question, please? 21 BY MR. SAULNIER: 22 Q. You also rendered an opinion on the characteristics of

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49 1 a person of ordinary skill in the art in the field of 2 the '842 patent; is that correct? 3 A. Yes. 4 Q. And in coming to any of those opinions, did you 5 consider the full scope of the specification of the 6 '842 patent? 7 MR. CUMMINGS: Objection. Form. 8 A. My declaration and opinions were responsive to 9 Dr. Baker, and I don't recall Dr. Baker stating any 10 opinions on the topic we're discussing here, so I 11 didn't have a reason to delve into that and form a 12 formal opinion. 13 BY MR. SAULNIER: 14 Q. So let me get this right. You didn't consider the 15 full scope of the specification in rendering an 16 opinion on the educational level of a person of skill 17 in the art in the '842 patent. 18 MR. CUMMINGS: Objection to form. 19 A. That's not what I stated. 20 BY MR. SAULNIER: 21 Q. Did you consider the '842 patent in coming to your 22 opinions on the requirements for a person of skill in	51 1 A. The more consistent is that the module is just 2 attached to the PCB and it's not useful if it's not 3 attached. 4 Q. But the specification states that module 40 includes 5 PCB 45. 6 MR. CUMMINGS: Objection. Form. 7 A. The specification states that the module is attached 8 to the PCB with solder. So if you look at the 9 specification in its entirety, that would be the 10 understanding. 11 BY MR. SAULNIER: 12 Q. Going back to column 3, lines 6 to 8, it says, 13 "Figure 4 illustrates a light-emitting device [LED] 14 package"; is that correct? 15 A. It states, "Figure 4 illustrates a light-emitting 16 device (LED) package." 17 Q. And going up to Figure 4, Figure 4 includes 48, the 18 light guide plate; is that correct? 19 A. Figure 4 does include a light guide plate. 20 Q. And Figure 4 also includes PCB 45; is that correct? 21 MR. CUMMINGS: Objection. Form. 22 A. PCB 45 is in Figure 4 and also in Figure 5.
50 1 the art? 2 MR. CUMMINGS: Objection. Form. 3 A. A person of ordinary skill in the art, yes. 4 BY MR. SAULNIER: 5 Q. Let's go back to Exhibit 1001, the '842 patent. Could 6 you please read column 3, lines 8 to 11 out loud? 7 A. "Basic components of LED modules 40 include a 8 LENS 41, conducting wires 42, chip 43, an L-shaped 9 fastener formed of a first portion 44A and a second 10 portion 44B, and a PCB 45." 11 Q. So would you agree that the specification of the '842 12 patent states that an LED module could include a PCB 13 45? 14 A. Reading from column 3 at line 59, "Figure 5 15 illustrates a view of the LED module 40 of Figure 4, 16 showing the anode lead 49 attached to the PCB 45 with 17 solder 51." 18 So if the module's attached to the PCB, 19 then I would say the PCB isn't a part of the module. 20 Q. But you don't -- but you see that in column 3, lines 8 21 to 11, it states that modules 40 include a list 22 including PCB 45; is that correct?	52 1 BY MR. SAULNIER: 2 Q. And Figure 4 also includes heat dissipating plates 46; 3 is that correct? 4 A. Column 3, at line 25, states, "In addition, heat 5 dissipating plates 46 are attached to the underside 6 of the horizontally oriented PCB 45." 7 Q. But you agree that Figure 4 illustrates a 8 light-emitting device (LED) package; is that correct? 9 MR. CUMMINGS: Objection. Form. 10 A. It includes one. Your question seems to imply that 11 that's all it shows. 12 BY MR. SAULNIER: 13 Q. So in your opinion, what is included in LED -- in the 14 LED package in Figure 4? 15 MR. CUMMINGS: Objection. Form. 16 BY MR. SAULNIER: 17 Q. Excuse me. Strike that. 18 In your opinion, in Figure 4 of the '842 19 patent, what components make up the light-emitting 20 device package, LED package? 21 MR. CUMMINGS: Objection. Form. 22 A. Again, reviewing the entirety of the specification,

53 1 41, 42, 43, 44a, 45b, 49, and 50. 2 BY MR. SAULNIER: 3 Q. So how is the LED package different from the claimed 4 LED module 40? 5 MR. CUMMINGS: Objection. Form. 6 MR. SAULNIER: Strike that. 7 BY MR. SAULNIER: 8 Q. How is the LED package described in Figure 4 different 9 from the light-emitting device module 40? 10 MR. CUMMINGS: Objection. Form. 11 A. Could you repeat the question, please? 12 BY MR. SAULNIER: 13 Q. How is the LED package described in Figure 4 different 14 from the light-emitting device module 40? 15 MR. CUMMINGS: Objection. Form. 16 A. I have been reviewing, and I can't find a number that 17 clearly corresponds to the '842 patent's description 18 of an LED package. 19 BY MR. SAULNIER: 20 Q. Figure 4 -- excuse me. 21 Column 3, lines 6 through 8, could you 22 please read that to me?	55 1 A. Yes. 2 Q. And you're saying you didn't consider or render an 3 opinion on what an LED package disclosed in the '842 4 specification at column 3, line 6 through 8, is. 5 MR. CUMMINGS: Objection. Form. 6 A. I'm saying my opinions expressed included the 7 consideration of the entirety of the '842 patent, not 8 a few lines. Because, again, column 3, starting at 9 line 59, states, "Figure 5 illustrates a view of an 10 LED module 40 of Figure 4 showing the anode lead 11 attached to the PCB 45 with solder 51." 12 BY MR. SAULNIER: 13 Q. The question -- 14 A. So that -- that's the same module -- I have to 15 consider the entirety of the patent. I can't take a 16 few lines out of the patent and say that's 17 everything. That's not my job and it's my 18 understanding that that's not proper. 19 Q. But you can't tell me the difference between what is a 20 light-emitting device package and was incorporated in 21 a light-emitting device package, an LED module, 22 according to the specification.
54 1 A. Again, "Figure 4 illustrates a light-emitting device 2 (LED) package incorporating light-emitting device 3 (LED) modules 40 according to an embodiment of the 4 present invention." 5 Q. So let me ask one more time, Dr. Bretschneider, what 6 is the difference between the LED package and 7 light-emitting device module 40 that is incorporated, 8 supposedly, into light-emitting device (LED) package? 9 MR. CUMMINGS: Objection. Form. 10 A. And, again, I'm going to state I didn't consider that 11 because Dr. Baker didn't raise that as an issue or 12 offer an opinion on that, and, again, my declaration 13 is largely responsive to his. 14 BY MR. SAULNIER: 15 Q. You do offer an affirmative opinion on what a person 16 of skill in the art -- excuse me. Strike that. 17 On page 86 -- sorry. On paragraph 86 of 18 your report, you state that a part -- not the entire 19 definition, but a part of the definition for a person 20 of ordinary skill in the art would include at least 21 one year of practical design -- of experience in 22 design of LED packages; is that correct?	56 1 MR. CUMMINGS: Objection. Form. 2 A. It's not that I can't. As I stated, Dr. Baker didn't 3 form an opinion, did not express an opinion, and I 4 haven't formed an opinion on that. There's a 5 difference -- 6 BY MR. SAULNIER: 7 Q. But you -- 8 A. -- between not forming an opinion and not being able 9 to answer. If you want to give me the time to review 10 all the materials in this case, I can get back to 11 you. I'm not going to do it in a matter of minutes 12 or seconds. 13 Q. So sitting here today, you don't have an opinion? 14 MR. CUMMINGS: Objection. Form. 15 A. I believe I have stated many times that I have not 16 formed an opinion yet. 17 MR. SAULNIER: All right, I think this is a 18 good time to take a break. Thank you so much, 19 Dr. Bretschneider. Ten minutes? 20 THE WITNESS: Ten minutes? My dogs thank 21 you as well. 22 MR. SAULNIER: Of course.

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57 1 VIDEO TECHNICIAN: We're off the record at 2 1:23. 3 (Off the record at 1:23 p.m.) 4 (Back on the record at 1:33 p.m.) 5 VIDEO TECHNICIAN: We are back on the 6 record at 1:33. 7 BY MR. SAULNIER: 8 Q. Dr. Bretschneider, can you please go to paragraph 22 9 of your declaration? 10 In that paragraph you state you worked at 11 Uniroyal Optoelectronics. Right? 12 A. Yes. 13 Q. And at Uniroyal Optoelectronics, you provided 14 technical support and assistance to customers on 15 topics related to the use of LED chips, design of LED 16 packages, and design of LED based -- lighting-based 17 systems and products; is that correct? 18 A. Products and systems, but, yes, correct. 19 Q. And so optoelectronics is a broad field. Correct? 20 A. Optoelectronics is a broad field, correct. 21 Q. But it does include LED, LED packaging, backlighting. 22 A. Yes.	59 1 tools? 2 A. There was a lot of thermal management involved. Part 3 of the issues at the time -- compared to today, LEDs 4 weren't very efficient, and two things primarily 5 dated entry of LEDs into different lighting market 6 niches of any kind. One is the efficiency, are they 7 more energy efficient than the incumbent technology, 8 and the other is price. 9 With LEDs, usually they hit the 10 efficiency, they would save you energy before they 11 would save you money. If it costs -- if it costs a 12 lot more to save money, you look at your overall 13 economics. 14 Q. And just -- so going back to paragraph 20, for the LED 15 based backlights for LCD displays, what other heat 16 dissipation means or forms were used to dissipate heat 17 in those systems? 18 A. In some cases it was passive, simple heat sink fin 19 structures, heat pipes, active cooling. In some 20 cases, the thermal management didn't involve fins but 21 was still passive. 22 Q. But those weren't a part of the LED packages.
58 1 Q. Did -- apologies. 2 For the -- can you please go to 3 paragraph 20 of your expert report? 4 A. Yes. 5 Q. You state that you had "notable successes at Toyoda 6 Gosei" that included "expanding market niches and 7 applications for LED based backlights" and for LED 8 [sic] displays." 9 I think earlier you stated that the LED 10 packages that you used did not have any heat 11 dissipation means, is that correct, fins or heat sinks 12 specifically? 13 A. I was going to say, heat sinks or fins. There is -- 14 there are LED packages that have almost no thermal 15 management. Surface mount packages typically do. 16 The archetypal LED that most people think of, the 17 bullet-shaped structure with the two leads coming 18 out, it's known as a T1-3/4 package, has almost no 19 thermal management. You put all your heat generation 20 material inside a great thermal insulator. 21 Q. So for those LED displays, do you know if they used 22 any kind of external thermal management means or	60 1 Correct? 2 MR. CUMMINGS: Objection to form. 3 A. It was part of the module, the system design. 4 BY MR. SAULNIER: 5 Q. In those backlight systems that you designed that you 6 described in paragraph 20, were there other components 7 that generated a substantial amount of heat in those 8 systems other than the LEDs? 9 MR. CUMMINGS: Objection. Form. 10 A. It would depend. 11 BY MR. SAULNIER: 12 Q. But in those systems specifically, were there any 13 other components that generated substantial amount of 14 heat other than LEDs? 15 A. In some, yes. I'm trying -- it's not a -- it's not 16 an answer -- single answer that applies to 17 everything. 18 Q. Could you just give an example of components that 19 would generate heat that aren't LEDs -- 20 MR. CUMMINGS: Objection. 21 BY MR. SAULNIER: 22 Q. -- in those backlight systems?

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61 1 MR. CUMMINGS: Objection. Form 2 A. One particular challenge was aviation instrument 3 displays. The entire systems are modular. They, to 4 a large extent, plug into the cockpit at various 5 portions, so you -- to make it simple, you have a box 6 you pull in and pull out. The dimensions of the box, 7 the power connections, the information is all -- 8 those interfaces are known, and then you have to meet 9 the performance and reliability requirements for the 10 systems. 11 The phrase "glass cockpit" came about 12 because old instruments were analog, if you will, in 13 some cases, very crude ways of displaying 14 information, and a glass cockpit referred to a 15 programmable display replacing those instruments. 16 Because of the form factor of the modules, 17 you're extremely limited on what you could do. 18 Everything was close together. So there was a lot of 19 other hardware in the same housing with the LEDs and 20 the backlights. 21 BY MR. SAULNIER: 22 Q. What other hardware was in there that generated heat	63 1 efficiency than AC to DC, but going off 120 volts AC 2 versus a 12 volts DC, you're going to have -- you're 3 going to generate heat in both cases. It's the 4 amount of heat per power delivered to the LEDs that 5 would be different. 6 Q. So depending on the application, you might have a 7 power -- a circuit that's driving the LEDs that's 8 generating quite a bit of heat? 9 A. I will say, the amount of heat generated by those 10 circuits would depend on the application. The amount 11 of heat generated by those circuits relative to the 12 amount of heat generated by the LEDs would depend on 13 the time frame. 14 Today, LEDs are very, very energy 15 efficient. Early 2000s, the industry thought they 16 were energy efficient, but I will say, not compared to 17 today. It's tremendous improvements in efficiency. 18 Q. So as you're designing the electronic circuits that 19 you include with the LED system, do you need to 20 consider heat management issues? 21 MR. CUMMINGS: Objection. Form 22 A. If you're talking about just the drive circuits, the
62 1 in the cockpit -- strike that. 2 What other hardware was in the modular 3 aviation instrument displays that generated heat? 4 MR. CUMMINGS: Objection. Form 5 A. You basically had a complete computer inside each 6 module, so the CPU, the memory, power conditioning 7 for the CPU for the back lights. 8 BY MR. SAULNIER: 9 Q. What are other -- strike that. 10 Do power driving circuits generate heat? 11 MR. CUMMINGS: Objection. Form 12 A. No electrical circuits are 100 percent efficient, so 13 they would generate heat. 14 BY MR. SAULNIER: 15 Q. And I'm specifically describing circuits that would 16 drive the LEDs, for example. Would those generate 17 heat? 18 A. Some amount of heat. It would depend on the 19 requirements and what the input power was. If it's 20 coming from a DC source, those circuits tend to be 21 much more efficient. LEDs are primarily DC-operated 22 devices, so DC-to-DC conversion is much more energy	64 1 best I can say is, it would depend. For example, 2 early 2000 time frame, LEDs would be between 20 and 3 30 percent efficient, so for every watt of heat you 4 put in, you generate 700 to 800 milliwatts of heat. 5 That dwarfed what was being generated by 6 the power supply circuits. And like I said, it 7 depends on what else is there. When we're talking 8 about the cockpit aviation displays, there's a lot of 9 extra components there. 10 BY MR. SAULNIER: 11 Q. And those components might be generating a 12 substantial -- excuse me. Strike that. 13 So in the cockpit aviation display example, 14 extra components might be generating a substantial 15 amount of heat too; is that correct? 16 MR. CUMMINGS: Objection. Form 17 A. Yes, it's an application specific requirement, I 18 would say. You can't make a global statement. The 19 best I can say is, it depends. 20 BY MR. SAULNIER: 21 Q. So if you're designing a -- strike that. 22 When designing a system that uses

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65 1 electrical components, there may be, depending on the 2 application, thermal considerations. Correct? 3 MR. CUMMINGS: Objection. Form 4 BY MR. SAULNIER: 5 Q. Well, let me -- let me -- let me rephrase. 6 For at least some circuit design you need 7 to consider heat management issues when designing the 8 circuits. Correct? 9 MR. CUMMINGS: Objection. Form 10 A. For -- it's a difficult question to answer because 11 design of a circuit generally results in a schematic 12 diagram and a list of specifications for components. 13 How that schematic is turned into an actual circuit 14 and what it goes into are somewhat divorced from each 15 other in terms of thermal management. You don't 16 really consider thermal management when you're 17 developing a circuit schematic. 18 BY MR. SAULNIER: 19 Q. So when you do system design using circuits, you do 20 need to consider thermal management depending on the 21 components included and other factors. Correct? 22 MR. CUMMINGS: Objection. Form	67 1 the concern is the performance of the circuit. Does 2 it meet the requirements? What happens after that is 3 handled by people other than the circuit designer? 4 You have to build it, test it, measure 5 temperatures, and once you're at that stage it's not 6 the circuit designer anymore, that's a thermal 7 management engineer or a certifications engineer, 8 someone who's dealing with UL or ETL or an equivalent 9 agency. 10 BY MR. SAULNIER: 11 Q. So for electronic system design, not just electronic 12 circuits, there needs to be some consideration of 13 thermal management. 14 MR. CUMMINGS: Objection. Form 15 A. I'm not clear where you're drawing the line because 16 we've been talking about designing circuits, now 17 you're saying designing the system. 18 BY MR. SAULNIER: 19 Q. That's correct. If you include an electronic circuit 20 in a system, that system design requires -- electronic 21 system design requires some consideration of thermal 22 management; is that correct?
66 1 A. The best I can say is, it would depend. 2 BY MR. SAULNIER: 3 Q. But depending on the application, you would need to at 4 least consider thermal management. Correct? 5 MR. CUMMINGS: Objection. Form 6 A. The best I can say is, it's possible. 7 BY MR. SAULNIER: 8 Q. Let me make a -- ask a more general question. When 9 designing electronic systems, thermal management is 10 something that an electronics designer must at least 11 be aware of; is that correct? 12 MR. CUMMINGS: Objection. Form 13 A. I would say, when designing electronics, the designer 14 is probably aware they're going to generate some 15 amount of heat. How they handle that is usually you 16 go talk to a thermal management engineer and say, I 17 need to get rid of this, it's your problem now. 18 BY MR. SAULNIER: 19 Q. But electronics system design inherently requires some 20 consideration of thermal management; is that correct? 21 MR. CUMMINGS: Objection. Form 22 A. If you're talking electronic circuits, again, usually	68 1 MR. CUMMINGS: Objection. Form 2 A. Try to make sure -- so are we talking I'm designing a 3 circuit board or I'm putting a circuit board into 4 something? 5 BY MR. SAULNIER: 6 Q. You're putting a circuit board into something. 7 A. So that would be, again, where a thermal management 8 engineer or a certifications engineer would look at 9 the circuit board, consider the temperatures, measure 10 the temperature of components, and then they would 11 evaluate a need for a heat sink or some cooling 12 method. 13 Q. What are components on a circuit board that would 14 require consideration -- strike that. 15 What are components that you would put on a 16 circuit board that would require thermal management 17 considerations? 18 MR. CUMMINGS: Objection. Form 19 A. The best I could say is, it depends. 20 BY MR. SAULNIER: 21 Q. Just give me an example of a few components that you 22 would put on a circuit board and you would have to

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69 1 consider the thermal management characteristics of 2 them. 3 MR. CUMMINGS: Objection. Form. 4 A. Again, it just depends. It -- you have to do -- 5 after the circuit's designed, you have to measure the 6 temperatures, look at the safety certification 7 requirements, look at the temperature ratings and 8 requirements of the individual components. 9 Depending on the product, if you want to 10 project a lifetime, then you have to go through and 11 do an analysis through a MIL spec standard 217 HD -- 12 I believe, 217 FHD, to project your mean time between 13 failure based on operating current and temperatures. 14 BY MR. SAULNIER: 15 Q. So you stated in your response that you would have to 16 look at the "temperature ratings and requirements of 17 individual components." What kind of components are 18 those that you would include on a circuit board? 19 MR. CUMMINGS: Objection. Form. 20 A. You could have a lot of different components on a 21 circuit board. You seem to be just asking what can 22 you put on a circuit board. And if you are making a	71 1 Your question's backward because it's not, 2 I put something on so I have to worry; it's, I've 3 built it, I did a thermal analysis, now I have to 4 worry. That's the -- why I'm struggling here is, it's 5 out of sequence and it doesn't make sense. 6 BY MR. SAULNIER: 7 Q. So to be clear, there are a lot of components that you 8 could include on a circuit board that might affect how 9 you do thermal management for that board. 10 A. To be -- 11 MR. CUMMINGS: Objection. Form. 12 A. You've asked an open-ended question that doesn't make 13 sense because your question is premised, I put a 14 component on the board and I have to worry because of 15 the type of component. That's simply not how thermal 16 management -- how a thermal analysis is done. 17 It's not the individual component, it's 18 the evaluation of the entire circuit, to be more 19 specific. Swapping one component probably isn't 20 going to fix your problem if you have a problem with 21 thermal management. It's the entire system. So I 22 can't pick out one part and say, here's the problem
70 1 circuit, you can have transistors, resistors, 2 capacitors, inductors, transformers, integrated 3 circuits. It's kind of a broad question. If you buy 4 an electronic component, it's going to have 5 specifications for voltage current, operating 6 temperature relative to humidity. 7 BY MR. SAULNIER: 8 Q. What components might you put on a circuit board that 9 generates heat that you would have to consider in 10 thermal management once you are using it in an 11 application afterwards? 12 MR. CUMMINGS: Objection. Form. 13 A. Again, there's not a clear answer. Potentially 14 anything you put on a circuit board, it's -- it's 15 not -- I'm using a resistor so I have to worry about 16 thermal management. I'm using a capacitor, I have to 17 worry about thermal management. Oh, here's an 18 inductor, now I have to worry. Here's a capacitor, 19 now I have to worry. Here's a transistor, I have to 20 worry. Here's a power transistor, now I have to 21 worry. It depends on the thermal analysis of the 22 board.	72 1 BY MR. SAULNIER: 2 Q. Thank you, Dr. Bretschneider. 3 So in paragraph 80 of your report, you 4 state -- scratch that. 5 Do you have a degree in electrical 6 engineering? 7 MR. CUMMINGS: Objection. Form. 8 A. No, I do not. 9 BY MR. SAULNIER: 10 Q. Do you know what the requirements are for to get a 11 degree in electrical engineering, any particular 12 college? 13 MR. CUMMINGS: Objection. Form. 14 A. I am particularly familiar with the University of 15 Florida. 16 BY MR. SAULNIER: 17 Q. What about any other electrical engineering degree 18 programs around the country? 19 MR. CUMMINGS: Objection. Form. 20 A. I'm going to answer because what I think is 21 important, it's not a question of specific 22 requirements to any individual university. Programs

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73 1 of interest are ABET accredited, and there are -- you 2 can think of it as a quality control for a degree 3 program, and if an electrical engineering department 4 is ABET accredited, their requirements are going to 5 be similar to any other program that is also ABET 6 accredited. 7 BY MR. SAULNIER: 8 Q. But you have not gone through an ABET accredited 9 electrical engineering program, have you? 10 A. No, I have not. 11 MR. CUMMINGS: Objection. Form. 12 BY MR. SAULNIER: 13 Q. And you also aren't aware of degree requirements or 14 class requirements for any programs other than the 15 University of Florida; is that correct? 16 MR. CUMMINGS: Objection. Form. 17 A. That's not my statement. Not what I stated. 18 BY MR. SAULNIER: 19 Q. Have you looked at the classes that an electrical 20 engineer is required to take at any school other than 21 the University of Florida? 22 MR. CUMMINGS: Objection. Form.	75 1 several electrical engineering programs. The 2 requirement for electrical engineering programs 3 related to anything dealing thermal is a single 4 semester of thermal dynamics which, despite its name, 5 the first semester of thermal dynamics does not teach 6 you any adequate skill set for dealing with thermal 7 management for dissipating heat. 8 It's more the statistical thermal dynamics 9 that was formulated around the 1900s, and we've 10 gotten a lot better back then, but there are thermal 11 dynamics textbooks that actually specifically call 12 out that if you want to learn thermal management, you 13 need transport phenomenon and actual heat 14 dissipation, heat transfer classes. 15 Those classes are typically the purview of 16 mechanical engineering and chemical engineering 17 programs. There are some physics programs that 18 include that, but I have yet to see an electrical 19 engineering program that has those requirements. 20 BY MR. SAULNIER: 21 Q. Some electrical engineers do have to take classes on 22 heat transfer; is that correct?
74 1 A. Yes. 2 BY MR. SAULNIER: 3 Q. What school? 4 A. University of Michigan, Michigan State University, 5 Tulane University, Rensselaer Polytechnic, University 6 of Wisconsin, University of Texas at Austin. 7 Q. So you're aware that electrical engineers design 8 physical electronic systems. Right? 9 A. Yes. 10 MR. CUMMINGS: Objection. Form. 11 BY MR. SAULNIER: 12 Q. And we just discussed earlier, physical electronic 13 systems can have thermal management issues and 14 considerations. Correct? 15 MR. CUMMINGS: Objection. Form. 16 A. They can. 17 BY MR. SAULNIER: 18 Q. So electrical engineers designing physical electronic 19 systems might have to consider thermal management 20 issues and considerations; is that correct? 21 MR. CUMMINGS: Objection. Form. 22 A. I don't think it's typical because I've reviewed	76 1 A. No, they do not. 2 MR. CUMMINGS: Objection. Form. 3 BY MR. SAULNIER: 4 Q. Or, excuse me, let me rephrase that. 5 Some electrical engineers need to take a 6 class related to thermal dynamics; is that correct? 7 MR. CUMMINGS: Objection. Form. 8 A. What is known as classical thermal dynamics. 9 BY MR. SAULNIER: 10 Q. Thank you, Dr. Bretschneider. 11 Can you please turn to paragraph 80 of your 12 expert report, Dr. Bretschneider? 13 A. Okay. 14 Q. In that paragraph you state on page 34, "Poor thermal 15 management noticeably impacted the resulting" 16 lights -- "[visible] light and radically affected the 17 lifespan of LEDs, which was crucial for displays. 18 Just one example of the problems I encountered was 19 managing the heat introduced to the system through 20 soldering, as LED packages must be soldered to the 21 larger circuit - if the thermal conductivity of the 22 package is too high, the heat introduced during

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77 1 soldering would destroy the LED and if the thermal 2 connectivity is too low, the heat generated by the LED 3 during operation would not be dissipated properly, 4 leading to the degradation or destruction of the LED." 5 What kind of LED package are you describing 6 here? 7 MR. CUMMINGS: Objection. Form. 8 A. There are a few different types. In some cases they 9 were axial lead packages and in most cases they were 10 surface mount packages. 11 BY MR. SAULNIER: 12 Q. And just so we're clear, what components would a 13 surface mount package typically include? 14 MR. CUMMINGS: Objection. Form. 15 A. It would depend on the construction of the package. 16 BY MR. SAULNIER: 17 Q. But what are typical components included in a surface 18 mount package? 19 MR. CUMMINGS: Objection. Form. 20 A. Again, it depends on the type of package. If you're 21 just saying surface mount package, there are 22 different types of surface mount packages.	79 1 so you have molten solder, a hot, molten metal in 2 contact with the package. 3 Q. So the degradation here you're talking about in this 4 example is degradation caused by the soldering 5 process. 6 MR. CUMMINGS: Objection. Form. 7 A. There can be -- if the package isn't properly 8 designed, that could be the issue. You have a 9 portion of the package that's in contact with a 10 molten metal. Heat's going to be transferred into 11 the package. If the thermal resistance is too low, 12 too much heat gets in, the inside of the package gets 13 too hot, and depending on the construction of the 14 package, that can cause problems. 15 So there are packages that are specifically 16 designed to limit heat flow into the package during 17 the soldering process. 18 BY MR. SAULNIER: 19 Q. But this specific example isn't talking -- excuse me. 20 The example that you talk about in 21 paragraph 80 from the just one example of the problems 22 to tombstoning in the field, that is just referring to
78 1 BY MR. SAULNIER: 2 Q. Would it be a surface mount package like Exhibit 2012? 3 MR. CUMMINGS: Objection. Form. 4 A. That's one type of package that's known as a PLCC 5 package. There are also ceramic packages and CLCC 6 packages, among others. 7 BY MR. SAULNIER: 8 Q. But the LED packages you're referring to -- strike 9 that. 10 In talking about LED packages in 11 paragraph 80, when you discuss LED packages being 12 soldered to the larger circuit and the thermal 13 conductivity, what types of packages other than 14 surface mount packages and axial lead packages might 15 that include? 16 MR. CUMMINGS: Objection. Form. 17 A. Those are the ones that come to mind. 18 BY MR. SAULNIER: 19 Q. What do you mean by "heat introduced during soldering" 20 in paragraph 80 of your expert report? 21 A. When you solder a package, the solder has to melt. 22 It takes -- the solder has the melting point it has,	80 1 the soldering -- heat introduced during the soldering 2 process. 3 MR. CUMMINGS: Objection. Form. 4 A. It's not just that because, again, if the package 5 does survive the soldering process, then during 6 operation the heat generated by the LED potentially 7 could ream out the solder, and that's what the 8 tombstoning process is. I aligned -- I put my 9 packages where I want them, everything was good with 10 solder, something else happened during operation, the 11 solder melted, the package is shifted. 12 It's one of the types of problems. You 13 have to balance things out. You have to look at a lot 14 of different factors for thermal management. It's a 15 complicated topic. 16 BY MR. SAULNIER: 17 Q. So in paragraph 80, in describing both the tombstoning 18 and the heat introduced during soldering, that's from 19 a defect introduced during manufacture, correct, of 20 the package? 21 MR. CUMMINGS: Objection. Form. 22 A. No. It's an implication. It's something you have to

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81 1 consider when you design a package. If it's a defect 2 during manufacturing, that's a quality control issue, 3 someone did something wrong. This is talking about 4 design issues. 5 BY MR. SAULNIER: 6 Q. Soldering -- in paragraph 80, when you're talking 7 about soldering, that occurs during the manufacturing 8 process. Correct? 9 MR. CUMMINGS: Objection. Form. 10 A. Not during the manufacturing process of the LED. 11 Again, I'm talking about what you have to consider 12 when you design thermal management for an LED 13 package. You don't finish the package and put it on 14 the shelf. It's going to be used at some point. 15 BY MR. SAULNIER: 16 Q. In paragraph 80, when you're talking about soldering, 17 this is related to the manufacture of the system that 18 you're putting the LED package in. 19 MR. CUMMINGS: Objection. Form. 20 A. It's related to the use of the LED package. 21 BY MR. SAULNIER: 22 Q. Okay. In paragraph 81, you state that in "the prior	83 1 opinion on that. I don't recall Dr. Baker bringing 2 that up. I need more context because there's -- 3 there are different ways to make LED chips, there are 4 different material systems, is the best I can say 5 right now. 6 BY MR. SAULNIER: 7 Q. Would prior art that was focused on the LED chip 8 composition be relevant to LED backlight package 9 design? 10 MR. CUMMINGS: Objection. Form. 11 A. That's one, again, you haven't clarified because if 12 I'm worried about LED chip composition then I'm 13 focusing on an LED chip, and the -- how I make the 14 chip, that -- the people who design the chips seldom 15 care about how it's used in a package. There's often 16 a, well, I made the chip, you figure out how to use 17 it type attitude. 18 So what you're asking is, I'm making a 19 semiconductor structure, would that be relevant to 20 design of an LED package. Am I understanding that 21 correct? 22 BY MR. SAULNIER:
82 1 art, such as the references offered by Petitioner, 2 illustrate that solutions included attempting to 3 design physical modifications to LED packages and 4 specific heat management solutions." 5 Do you see that? 6 A. Yes. 7 Q. Would prior art that focused on the size of an LED be 8 related to the field of a POSITA? 9 MR. CUMMINGS: Objection. Form. 10 A. I'm not sure what you mean by "size" of the LED. 11 BY MR. SAULNIER: 12 Q. Would prior art that was focused on the LED 13 composition be relevant to the field of a POSITA? 14 MR. CUMMINGS: Objection. Form. 15 A. I need you to be more specific about "LED 16 composition." Are we talking about the chip? The 17 package? 18 BY MR. SAULNIER: 19 Q. Would prior art that was focused on the LED chip 20 composition be relevant to the field of a POSITA? 21 MR. CUMMINGS: Objection. Form. 22 A. I will say, I didn't -- don't recall offering an	84 1 Q. Yes. 2 A. Again, you have to give me more context because 3 nowhere do I recall seeing in the '842 patent, 4 Dr. Baker's opinions, or the prior art references 5 discussions on issues associated with the composition 6 of the LED chip. 7 Q. So you agree that the composition of the LED chip is 8 not relevant to the '842 patent. 9 MR. CUMMINGS: Objection. Form. 10 A. I've stated you've asked a question that isn't clear 11 and is difficult to answer at best. I need an 12 example. I have really no idea what you're talking 13 about. 14 BY MR. SAULNIER: 15 Q. In the '842 patent, are there any issues associated -- 16 excuse me. Strike that. 17 Does the '842 patent discuss any issues 18 associated with the composition of an LED chip? 19 MR. CUMMINGS: Objection. Form. 20 A. I don't see discussions of composition of the LED 21 chip in the '842 patent. And I'll note column 1 22 under Field of Invention, "The present invention

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85 1 generally relates to the packaging of light-emitting 2 device backlights. In particular, the present 3 invention relates to a light-emitting device 4 backlight package which requires minimal space while 5 producing maximum luminosity." 6 BY MR. SAULNIER: 7 Q. Dr. Baker -- excuse me. It's been a long day. It's 8 just going to get longer. 9 Dr. Bretschneider, looking at column 1, 10 lines 6 to 11, does that discuss heat dissipation at 11 all? 12 A. It's implied. 13 Q. The text of column 1, lines 6 to 11, does not discuss 14 heat dissipation, though, does it? 15 MR. CUMMINGS: Objection. Form. 16 A. It's not explicit, but to a person of ordinary skill 17 in the art it's clear that it's important because if 18 you're minimizing the space, you're making things 19 smaller, which tends to make thermal dissipation more 20 difficult, and the most important portion of that is 21 at the end, "producing maximum luminosity." 22 A person of ordinary skill in the art	87 1 A. -- clearly implied -- you're not letting me finish. 2 It's clearly implied that thermal 3 management is a consideration there. 4 Q. Dr. Bretschneider, does Claim 3 require a heat 5 dissipation means by its terms? 6 MR. CUMMINGS: Objection. Form. 7 A. Could you clarify what it means "by its terms"? 8 Because I believe I just answered that question. 9 BY MR. SAULNIER: 10 Q. Could you read the text of Claim 3 to me? 11 A. "A backlight package comprising: a light guiding 12 plate having a first side; a first fastener having a 13 first portion and a second portion, the first portion 14 disposed adjacent to the first side of the light 15 guiding plate, wherein the first portion and the 16 second portion are arranged in a substantially 17 perpendicular relationship to form a substantially 18 L-shaped structure; and a light-emitting device 19 disposed on the first portion of the first fastener 20 for emitting a light toward the light guiding plate." 21 Q. I'll ask you again. Does Claim 3 require a heat 22 dissipating means?
86 1 would know that the higher the operating temperature 2 of an LED, the lower the efficiency will lower the 3 luminosity, so the statement "while producing maximum 4 luminosity" necessarily brings in thermal management 5 is important. 6 BY MR. SAULNIER: 7 Q. If you look at the claims of the '842 patent, does 8 Claim 3 include any explicit discussion of heat 9 dissipation or heat dissipating means? 10 MR. CUMMINGS: Objection. Form. 11 MR. SAULNIER: Actually, let me rephrase 12 that. 13 BY MR. SAULNIER: 14 Q. Does Claim 3 of the '842 patent require a heat 15 dissipation means? 16 MR. CUMMINGS: Objection. Form. 17 A. Claim 3 talks about the fastener and the 18 specification talks about the fastener being disposed 19 on the other side of PCB relative to heat dissipating 20 plates. It's -- 21 BY MR. SAULNIER: 22 Q. So Dr. Bretschneider --	88 1 MR. CUMMINGS: Objection. Form. 2 A. Again, I answered that. After reviewing the claim 3 language in consideration of the teachings and the 4 content of the specification, it's my understanding 5 that that's the proper way to do it. You don't read 6 the claims in isolation. 7 BY MR. SAULNIER: 8 Q. To practice Claim 3, is a heat dissipation means 9 required? 10 MR. CUMMINGS: Objection. Form. 11 A. I don't think I've offered an opinion on that yet, 12 and I'm not sure if Dr. Baker has either. 13 BY MR. SAULNIER: 14 Q. Are there any words in the text of Claim 3 that would 15 require a heat dissipation means? 16 MR. CUMMINGS: Objection. Form. 17 A. I can state the phrase "heat dissipating means" 18 doesn't appear in Claim 3, but, again, you seem to be 19 asking me to consider the language of Claim 3 in 20 isolation and divorcing it from the content and 21 teachings of the specification. 22 BY MR. SAULNIER:

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89 1 Q. What word in Claim 3 do you interpret to require a 2 heat dissipating means, if any? 3 MR. CUMMINGS: Objection. Form. 4 A. Again, I believe I stated I haven't formed an opinion 5 that Claim 3 requires a heat dissipating means. I 6 did point out the discussions of a fastener. A 7 fastener is clearly in Claim 3, and the specification 8 does discuss the fastener having a heat dissipating 9 function. 10 BY MR. SAULNIER: 11 Q. So are you saying that the fastener has to dissipate 12 heat by the plain language of Claim 3? 13 MR. CUMMINGS: Objection. Form. 14 A. That's not what I stated. Again, you're asking me 15 questions about the plain language, you're asking me 16 questions about the text of a claim completely 17 divorced from the teachings and content of the 18 specification. 19 BY MR. SAULNIER: 20 Q. Is the function of a fastener having a heat 21 dissipating function claimed in Claim 3? 22 MR. CUMMINGS: Objection. Form.	91 1 BY MR. SAULNIER: 2 Q. Does Claim 5 -- could you please read the text of 3 Claim 5? 4 A. "The backlight package as claimed in Claim 3, further 5 comprising a circuit board and a conducting wire, the 6 circuit board connecting the second portion, and the 7 conducting wire electrically coupling the 8 light-emitting device to the circuit board." 9 Q. Is there any claimed heat dissipation means in 10 Claim 5? 11 MR. CUMMINGS: Objection. Form. 12 A. Claim 5 does not contain the phrase "heat dissipating 13 means," is the best answer I can give. 14 BY MR. SAULNIER: 15 Q. Can you please read the text of Claim 7? 16 A. "A backlight package comprising: a light guiding 17 plate having a first side; a first fastener having a 18 first portion and a second portion, the first portion 19 extending along the first side of the light guiding 20 plate, and the second portion extending above the 21 light guiding plate wherein the first portion" -- 22 scroll down -- "and the second portion are arranged
90 1 A. The best I can state is that Claim 3 does not contain 2 the phrase "heat dissipating function." 3 BY MR. SAULNIER: 4 Q. Does Claim 4 require -- excuse me. Strike that. 5 Does the text of Claim 4 require any -- 6 strike that, please. 7 Please read the text of Claim 4 for me. 8 A. "The backlight package as claimed in Claim 3, wherein 9 the second portion extends above the light guiding 10 plate." 11 Q. Does anything in the text that you read require any 12 heat dissipation or heat dissipating function? 13 MR. CUMMINGS: Objection. Form. 14 A. The terms "heat dissipation" or "heat dissipation 15 function" do not appear in Claim 3. 16 I will reiterate as well that my 17 declaration is largely responsive to Dr. Baker, and 18 from memory, Dr. Baker frequently and commonly 19 discussed heat dissipating means or heat dissipating 20 plates throughout his opinions, and I believe he 21 asserted that as being relevant to most if not all of 22 the challenged claims.	92 1 in a substantially perpendicular relationship to form 2 a substantially L-shaped structure; a light-emitting 3 device disposed on the first portion of the first 4 fastener for emitting a light toward the light 5 guiding plate; and a circuit board connecting the 6 second portion of the first fastener; and a 7 conducting wire electrically coupling the 8 light-emitting device to the circuit board." 9 Q. Do you interpret any term in Claim 7 to require heat 10 dissipation or a heat dissipating means? 11 MR. CUMMINGS: Objection. Form. 12 A. Again, my opinions are stated in my declaration, and 13 my discussions on heat dissipating means are largely 14 responsive to Dr. Baker's frequent discussion and 15 opinions. 16 BY MR. SAULNIER: 17 Q. So sitting here today, do you interpret any claim in 18 Claim 7 to require heat dissipation or a heat 19 dissipating means? 20 MR. CUMMINGS: Objection. Form. 21 A. Looking at pages 67 and 68 of my declaration, this is 22 where I address challenge 2, which is Dr. Baker's

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93 1 obviousness theory based on the Uekusa reference and 2 Isoda reference fails to disclose all elements of 3 Claim 9. 4 In paragraph 154, I state, "Dr. Baker 5 argues that a POSITA would modify Uekusa following the 6 teachings of Isoda," and give a citation, 7 paragraph 118 of this declaration. "It would have 8 been obvious to a POSITA to modify Uekusa in view of 9 Isoda's teachings to add a plurality of heat 10 dissipating plates to further increase the heat 11 dissipation of Uekusa's electronic components." 12 So my opinions following the discussion 13 following is clearly a response to Dr. Baker's opinion 14 that at least Claims 5 through 9 require heat 15 dissipating means or functions. 16 BY MR. SAULNIER: 17 Q. What term in Claim 7 requires heat dissipation? 18 MR. CUMMINGS: Objection. Form. 19 A. Again, I haven't offered an opinion on that, but I 20 did just point out that clearly Dr. Baker believes 21 Claims 5 through 9 require that. I can search 22 through other challenges and I believe I will find	95 1 Which claims did you ask again? Sorry, it 2 was a long -- 3 BY MR. SAULNIER: 4 Q. Claims 3 to 9. 5 A. I can state Claim 9, the language, "The backlight 6 package as claimed in Claim 7, further comprising a 7 heat dissipating means attached onto the surface of 8 the circuit board for conducting a heat generated 9 thereon." 10 Q. Are there any other claims in Claims 3 to 9 that 11 specifically claim a, quote, "heat dissipating means"? 12 A. I, again, as I have stated repeatedly, do not see the 13 words "heat dissipating means" in other claims, and, 14 again, I will reiterate that Dr. Baker repeatedly 15 offered opinions on the challenge claims that relied 16 on heat dissipating means or heat dissipating 17 functions. 18 So I'm responding to his opinions, and it 19 is evident that it is his opinion that that function 20 is relevant to Claims 3 through 9. 21 Sorry, let me correct that. Claims 3 and 5 22 through 9. I don't think Claim 4 was actually
94 1 similar arguments that Dr. Baker made, so it is his 2 firm opinion that heat dissipating means or heat 3 dissipating functions is highly relevant to the 4 claims. 5 BY MR. SAULNIER: 6 Q. So are heat dissipation means required for any claims 7 other than Claim 6 or Claim -- Claim 6 or Claim 9? 8 MR. CUMMINGS: Objection. Form. 9 A. Again, what I just stated was about Dr. Baker's 10 opinions for Claims 5 through 9, and I believe his 11 first challenge was Claims 5 through 9, 5 through 12 9... 13 And in those challenges, he analyzes 14 Claims 3, 5, 6, 7, 8, and 9, so I can see multiple 15 challenges where he repeatedly discusses heat 16 dissipating means. 17 BY MR. SAULNIER: 18 Q. If you look at the text in the patent of Claims 3 to 19 Claims 9, which claims state that they require a, 20 quote, "heat dissipating means"? 21 MR. CUMMINGS: Objection. Form. 22 A. Let me review the claims.	96 1 challenged. 2 Q. Can you please read the text of Claim 6? 3 A. I was just about to get that because I saw something 4 in the Table of Contents. "The backlight package as 5 claimed in Claim 3, further comprising a circuit 6 board and a heat dissipating means, the circuit board 7 connecting the second portion, and the heat 8 dissipating means attached onto the surface of the 9 circuit board for conducting a heat generated 10 thereon." 11 Q. So only Claim 6 and 9 require a, quote, "heat 12 dissipating means"; is that correct? 13 MR. CUMMINGS: Objection. Form. 14 A. That's not an opinion I've offered, and I will state 15 that Claims 6 and Claims 9 include the word "a heat 16 dissipating means." 17 BY MR. SAULNIER: 18 Q. Thank you, Dr. Bretschneider. 19 Could you please look at Figure 1 of the 20 '842 patent? 21 A. Okay. 22 Q. Does Figure 1 illustrate an LED package?

97 1 A. Under Description of Drawings in column 2, the '842 2 patent states, "Figure 1 illustrates a conventional 3 LED backlight package." 4 Q. Does it also include an LED package? 5 A. I don't think I've offered an opinion on that. 6 Q. It includes an LED -- you agree that Figure 1 includes 7 an LED module; is that correct? 8 MR. CUMMINGS: Objection. Form. 9 A. I don't see that I've offered any opinions on 10 Figure 1 of the '842 patent. 11 BY MR. SAULNIER: 12 Q. Is there anywhere in the specification that describes 13 the components that are included in Figure 1 of the 14 '842 patent? 15 A. Yes. 16 Q. What does the specification say is included in 17 Figure 1, the conventional LED backlight package? 18 A. The text runs from column 1, lines 34 to 50. 19 Q. And does Figure 1 include an LED module 10? 20 A. The text states, "Figure 1 illustrates a conventional 21 LED backlight package. In Figure 1, the LED modules 22 10 are shown in a conventional configuration, i.e.,	99 1 BY MR. SAULNIER: 2 Q. Then would you agree that a conventional LED backlight 3 package is within the field of invention? 4 MR. CUMMINGS: Objection. Form. 5 A. As I state in paragraph 71, "The field of endeavor of 6 the '842 Patent is plainly LED package design and, 7 more specifically, LED package design for backlight 8 applications." 9 BY MR. SAULNIER: 10 Q. Do you agree that Figure 1 is within the field of 11 endeavor? 12 MR. CUMMINGS: Objection. Form. 13 A. Again, I don't believe I've stated that opinion, and 14 I'm not here to offer off-the-cuff opinions. I need 15 to carefully consider a lot of information and the 16 context. 17 BY MR. SAULNIER: 18 Q. So it's your opinion that you can't offer an opinion 19 on if something described as a, quote, "conventional 20 LED backlight package," is within the field of 21 invention? 22 MR. CUMMINGS: Objection. Form.
98 1 they are placed at the bottom of the LGP 11, at each 2 of the two ends of the LGP 11. Each LED module 10 3 emits light via a ray 12 toward the top of the LGP 11 4 enclosure, which then reflects as ray 13 to the end 5 of the LGP 11 enclosure closest to the LED module 10, 6 and then reflects back along ray 14 to travel along 7 the length of the LGP 11. 8 "For this conventional example, the 9 emitted light must encounter two reflections prior to 10 traveling the length of the LGP 11. For each of 11 these reflections, energy losses are incurred due to 12 the native imperfect reflectivity of the surfaces. 13 "These energy losses, in addition to the 14 inherent inefficiencies they introduce, also lead to 15 poor luminosity along the length of LGP 11. This 16 situation is clearly undesirable and methods have 17 been sought to solve these problems." 18 Q. Would you agree that Figure 1 is within the field of 19 invention? 20 MR. CUMMINGS: Objection. Form. 21 A. Figure 1 is described explicitly as a conventional 22 LED backlight package.	100 1 A. No, I can't do it quickly. This is a technical 2 matter, and if I make a snap judgment and don't 3 consider things properly, I will not be able to 4 answer properly. There's a difference between can't 5 and your not giving me enough time to. 6 BY MR. SAULNIER: 7 Q. How long would it take you to do that, 8 Dr. Bretschneider? 9 MR. CUMMINGS: Objection. Form. 10 A. At a minimum, I would have to carefully review the 11 patent and Dr. Baker's declaration to search for his 12 relevant opinions. Again, my declaration is 13 responsive to his. 14 BY MR. SAULNIER: 15 Q. Your declaration also provides a definition for the 16 field of endeavor or requirements that a POSITA would 17 have to understand the invention in the '842 patent; 18 is that correct? 19 MR. CUMMINGS: Objection. Form. 20 A. Do I list what I believe the qualifications for a 21 POSITA are? Yes. 22 BY MR. SAULNIER:

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101 1 Q. How did you come to that opinion, Dr. Bretschneider, 2 as to what the qualifications of a POSITA would be? 3 MR. CUMMINGS: Objection. Form. 4 A. I reviewed the patent, the teachings of the patent. 5 I also used my knowledge and experience in the field 6 performing essentially the same type of work. I gave 7 consideration to -- my background to the background 8 of individuals in industry who I've interacted with 9 who performed similar tasks and had similar 10 responsibilities. 11 BY MR. SAULNIER: 12 Q. And your testimony today is that a figure that is 13 described as related art and is labeled a backlight 14 package, in the patent at issue you don't have an 15 opinion -- or you haven't formed an opinion on whether 16 that is within the field of invention. 17 MR. CUMMINGS: Objection. Form. 18 A. I haven't formed an opinion on that figure at this 19 time and I don't believe Dr. Baker has either. If he 20 had, then I would have a reason to consider that and 21 provide a response. 22 BY MR. SAULNIER:	103 1 MR. CUMMINGS: Objection. Form. 2 A. I did review the entire specification. Again, it -- 3 the specification states the field of invention. It 4 also describes a summary of the invention. It 5 includes a detailed description of the exemplary 6 embodiment. All of those factor in. And again, that 7 has to be weighed against my own experience in the 8 field and individuals in the field that I've worked 9 with, their backgrounds, understanding, their 10 perspectives. 11 BY MR. SAULNIER: 12 Q. Did you consider the related art portion of the 13 specification in rendering your opinion on what the 14 qualifications of a POSITA would be? 15 MR. CUMMINGS: Objection. Form. 16 A. The best I can say is that I did review the entire 17 specification. But in terms of the task saying what 18 the problem is, or that they're trying to solve, is 19 more relevant than what you're asking. 20 If you don't know the issues that are being 21 addressed, then I don't think you can do it properly. 22 And the section describing -- or related to Figure 1
102 1 Q. Did you consider Figure 1 in determining your 2 definition of what a -- scratch that. 3 Did you consider Figure 1 in determining 4 what the qualifications of a POSITA would be? 5 MR. CUMMINGS: Objection. Form. 6 A. I considered the field of the invention, the summary 7 of the invention, the stated goals and motivation. 8 And, again, I also relied on my background and 9 experience in industry doing this type of work. 10 BY MR. SAULNIER: 11 Q. So in the specification of the '842 patent, what did 12 you consider in determining what your opinion -- 13 scratch that. Strike that. 14 What in the specification of the '842 15 patent did you look at in determining what the 16 qualifications of a POSITA would be? 17 MR. CUMMINGS: Objection. Form. 18 A. I believe I previously answered that. 19 BY MR. SAULNIER: 20 Q. Did you consider the entire specification in 21 consider -- in determining what the qualifications of 22 a POSITA would be?	104 1 in column 1, lines 34 to 50, illustrate several 2 problems. 3 BY MR. SAULNIER: 4 Q. But you don't have an opinion on if the figures 5 described -- the figure described on column 1, lines 6 34 to 50, are within the field of invention. 7 MR. CUMMINGS: Objection. Form. 8 A. Again, I haven't formed an opinion on that yet. 9 BY MR. SAULNIER: 10 Q. Thank you, Dr. Baker -- or Dr. Bretschneider. 11 One more question about Figure 2 -- or 12 Figure 1. Does Figure 1 in the '842 patent disclose 13 any heat fins or heat dissipation means? 14 A. The description, column 1 lines 34 to 50, does not 15 discuss heat dissipation means. 16 Q. And there's no heat sink on Figure 1 as far as you can 17 tell. Correct? 18 MR. CUMMINGS: Objection. Form. 19 A. There is nothing illustrated, but the LED was 20 described as LED module 10 is also shown as not being 21 supported or connected to something, so this is 22 clearly just a portion.

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105 1 What's shown in Figure 1 wouldn't be able 2 to operate, so it's understood this is an excerpt, if 3 you will. 4 BY MR. SAULNIER: 5 Q. So Figure 1 does state that it illustrates a 6 conventional LED backlight package; is that correct? 7 MR. CUMMINGS: Objection. Form. 8 A. Column 1 at line 34 states, "Figure 1 illustrates a 9 conventional LED backlight package." 10 BY MR. SAULNIER: 11 Q. Does the specification of the '842 patent discuss 12 Fourier's law? 13 MR. CUMMINGS: Objection. Form. 14 A. I don't recall seeing Fourier's law in the '842 15 specification. 16 BY MR. SAULNIER: 17 Q. Does the '842 specification describe any equation 18 governing conductive heat transfer? 19 MR. CUMMINGS: Objection. Form. 20 A. The '842 patent includes discussions on heat 21 dissipation, and in order to understand that you 22 should be aware of the information you're asking	107 1 Column 2, line 9, "Additionally, heat 2 dissipating plates [36] are placed underneath of the 3 PCB 35, to channel the heat generated by the 4 electronics." 5 There's another discussion about heat 6 dissipating and heat dissipating plates, column 2, 7 lines 37 to 40; column 3, lines 25 to 31; column 3, 8 lines 51 to 58; column 4, lines 4 to 7. 9 Q. Dr. Bretschneider, could you please look at Figures 3 10 and 4 of the '842 patent? 11 A. Okay. 12 Q. Now, if you kept everything the same in between these 13 two figures, using the same materials, the same LED 14 chip, the same wires, if you keep everything the same 15 and the only change that you make is the shape of the 16 frame, which configuration is better for heat 17 transfer? 18 MR. CUMMINGS: Objection. Form. 19 A. It's an incomplete question. 20 BY MR. SAULNIER: 21 Q. I'm asking you to assume that everything is the same 22 between those two figures, the only difference is the
106 1 about. 2 BY MR. SAULNIER: 3 Q. Does the specification of the '842 patent disclose a 4 Nusselt number, or Nusselt? I'm not exactly sure how 5 to say that. 6 A. Nusselt. 7 MR. CUMMINGS: Objection. Form. 8 A. Discussions of a Nusselt number are not there, but, 9 again, if you are to understand heat dissipation 10 functions, you need to know that information. 11 BY MR. SAULNIER: 12 Q. What disclosures in the specification of the '842 13 patent discuss heat dissipation or transfer? 14 A. Column 1, starting line 62. However -- sorry, let me 15 back this up. 16 "The new configuration has, however, 17 created another drawback. For conventional LED 18 backlights, heat dissipating plates [23] are typically 19 placed underneath of PCB [24] to dissipate the heat." 20 Then at the bottom, "For the example of 21 Figure 2, the heat dissipating plates [23] extend from 22 the end of the LGP 21."	108 1 shape of the fastener. Which configuration is better 2 for heat dissipation? 3 MR. CUMMINGS: Objection. Form. 4 A. So if you're only changing the fastener, is that 5 correct, what you were stating? 6 BY MR. SAULNIER: 7 Q. That's correct. 8 A. I would have to know the differences between the 9 fasteners. That's why I said it's an incomplete 10 question. There's not enough information to answer. 11 Q. So let's go to Figure 3. At column 2, line 6 to 11 12 describe Figure 3 and states that there is a fastener 13 included in Figure 3, 33. Do you see that? 14 A. Yes. 15 Q. So I'm -- there's a fastener in Figure 3 and there's a 16 fastener in Figure 4; is that correct? 17 A. Yes. 18 Q. Assuming that the fasteners are made up of the exact 19 same material and the only difference is that you have 20 the -- and the only difference between the two figures 21 is the shape of the fastener, which configuration is 22 better for heat dissipation?

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109 1 MR. CUMMINGS: Objection. Form 2 A. Again, the problem is the heat dissipation depends on 3 the shape, so without knowing the specific details of 4 the shape, it can't be answered. It would be a guess 5 at best. 6 BY MR. SAULNIER: 7 Q. If you are dissipating heat from the LED to the heat 8 dissipation means and everything is the same except 9 the fastener shape, which configuration would 10 dissipate heat better from the LED? 11 MR. CUMMINGS: Objection. Form 12 A. Apologies for laughing, but what you literally said, 13 if everything is the same except for the most 14 important consideration, which would be better. You 15 literally asked to change the most important feature, 16 the one that would drive the answer and then say, 17 which is better, but -- so if I change the most 18 important thing and I don't have the details of the 19 change, as I said, at best it's a guess. 20 BY MR. SAULNIER: 21 Q. What details of the change would you need to answer 22 that question?	111 1 emissivity? I don't know that. You haven't given me 2 that. You just said, I changed the most important 3 thing, which is better? I'm not going to tell you 4 exactly how I changed it, which is better? 5 BY MR. SAULNIER: 6 Q. The configuration -- 7 A. It's an improper question that doesn't have an 8 answer. The best answer anyone could give in the 9 time frame you've asked is pure speculation. 10 Q. Is the invention in the '842 patent related to 11 optimizing heat transfer? 12 MR. CUMMINGS: Objection. Form 13 A. Going back to my declaration, paragraph 51, I state, 14 "The '842 Patent relates to an LED package for 15 backlight applications." 16 And then I quote from the patent, lines 17 [sic] 1, 7 through 11, "The present invention 18 generally relates to the packaging of light-emitting 19 device backlights. In particular, the present 20 invention relates to a light-emitting device 21 backlight package which requires minimal space while 22 producing maximum luminosity.
110 1 A. The composition and geometry of the fastener in both 2 cases. There is also intervening materials to the 3 heat dissipating means. That's important as well. 4 Not quite as important as the shape, but that's 5 important too. 6 Q. So you see that the geometry of the fastener has 7 changed to an L shape from just a piece on the back of 8 the LED, that the LED is attached to, and the -- and 9 we're assuming that the material is the same in both 10 fasteners, which configuration would be better for 11 dissipating heat from the LED to the heat dissipating 12 plates? 13 MR. CUMMINGS: Objection. Form 14 A. Again, respectfully, you're asking, I'm going to 15 leave out the most critical detail for you to be able 16 to answer this question; I'm going to give you 17 everything except the most important thing, and 18 please answer. It doesn't have an answer as you've 19 phrased it. 20 Okay, I see the geometry. What are the 21 dimensions? What's the thickest? What's the 22 composition? I don't know any of that. What's the	112 1 As I responded earlier, that maximum 2 luminosity necessarily requires careful consideration 3 of thermal management. Anyone who has designed an LED 4 package, you tell them maximum luminosity, they 5 automatically understand thermal management's 6 important. 7 BY MR. SAULNIER: 8 Q. But in your opinion, is the '842 patent directed to 9 optimizing heat transfer? 10 MR. CUMMINGS: Objection. Form 11 A. I can go to page 54 -- or, sorry, paragraph 54 of my 12 declaration. "The '842 patent summarizes that it 13 would be desirable to have an LED package that emits 14 light in a longitudinal direction into a light guide 15 plate" while maximizing -- sorry, "while minimizing 16 the space required for packaging and heat 17 dissipation." 18 BY MR. SAULNIER: 19 Q. Does the '842 patent give details other than the 20 location of the heat fins in relation to maximizing 21 heat -- excuse me. Let me strike that. 22 Does the specification of the '842

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113 1 patents -- does the specification of the '842 patent 2 provide any information other than the location of the 3 heat dissipating plates for optimizing or -- for 4 optimizing heat dissipation? 5 MR. CUMMINGS: Objection. Form. 6 A. Could you repeat the question, please? 7 BY MR. SAULNIER: 8 Q. Other than the location of the heat dissipation 9 plates, does the specification of the '842 patent 10 provide any other information about optimizing heat 11 transfer? 12 MR. CUMMINGS: Objection. Form. 13 A. I have to say, the location of the heat dissipating 14 plates is actually a pretty significant factor 15 because if you say maximize heat dissipation, you 16 will probably end up with a different configuration 17 and one that would not minimize the space. 18 I'm reading from the '842 patent, 19 column 2, starting at line 35. "In this way, the 20 light-emitting device emits light longitudinally 21 along a light guiding plate, thus optimizing the 22 travel path of the emitted light, while maintaining a	115 1 Q. So if you look at figure -- 2 A. The question isn't clear. 3 Q. So in Figure 4 of the '842 patent, the heat plates 4 have been moved from behind the LED to now below the 5 LED. Is there any disadvantage to moving the heat 6 fins in that way? 7 MR. CUMMINGS: Objection. Form. 8 A. It's unclear what you mean by "disadvantage." If 9 you're looking at maintaining a compact shape, it's 10 an advantage. 11 BY MR. SAULNIER: 12 Q. For heat dissipation, would it be disadvantageous? 13 Are there any aspects that it would be disadvantageous 14 for -- to move them? 15 MR. CUMMINGS: Objection to form. 16 A. I would say that depends what the package shape, the 17 construction. I will say that it makes differences, 18 is the best I can say, whether they're an advantage 19 or disadvantage in terms of making the LED package. 20 I don't think that can be answered without a careful 21 review. I can just say, it's a different 22 construction process.
114 1 compact shape by placing the PCB and heat dissipating 2 plates away from the longitudinal axis of the light 3 guiding plate." 4 So I'm struggling with your question 5 because you're asking about the '842 patent maximizing 6 heat dissipation, which I don't believe I offered an 7 opinion on, but the '842 patent is trying to create a 8 compact package. They're trying to minimize the space 9 required, which normally goes contrary to maximizing 10 heat dissipation. 11 So there are reasons to change the 12 location, which the patent outlines, and you can't 13 ignore that compact shape requirement. 14 BY MR. SAULNIER: 15 Q. Sir, could you please explain -- strike that. 16 In the event -- strike that. 17 Would there be any disadvantages to moving 18 the heat fins to the -- below the frame as the '842 19 patent discloses? 20 MR. CUMMINGS: Objection. Form. 21 A. I'm not clear what you're talking about. 22 BY MR. SAULNIER:	116 1 BY MR. SAULNIER: 2 Q. Does the '842 patent talk about any advantages or 3 disadvantages other than the luminosity and compact 4 shape -- 5 MR. CUMMINGS: Objection. Form. 6 BY MR. SAULNIER: 7 Q. -- that are disclosed by the claims? 8 MR. SAULNIER: Objection. Form. 9 A. I'm confused by your question because I just did a 10 search for the '842 patent and "disadvantage" doesn't 11 show up. So if you are asking about the advantages 12 and disadvantages disclosed by the '842 patent, 13 there's a disconnect. 14 How can I ask about something -- how can I 15 answer about something the patent doesn't discuss? If 16 it doesn't disclose it, I can't answer about 17 disadvantages that aren't disclosed. 18 BY MR. SAULNIER: 19 Q. Are there any advantages that the '842 patent 20 discusses other than the package size and improved 21 luminosity? 22 MR. CUMMINGS: Objection. Form.

117 1 A. Column 2, starting around line 25, "It is another 2 feature of an embodiment of the present invention to 3 provide a light-emitting device backlight package, 4 which transmits light along the light guiding plate 5 with minimal energy losses." 6 So there -- it's not just luminosity, it's 7 also better efficiency inside the light guide plate. 8 And then it's doing all of this while moving the heat 9 dissipating plates away from the longitudinal axis. 10 BY MR. SAULNIER: 11 Q. Moving the heat dissipating plates from the 12 longitudinal axis would increase the form factor in 13 the other axis. Correct? 14 MR. CUMMINGS: Objection. Form. 15 A. I don't think I formed an opinion on that, and the 16 best I can say is, it would depend. 17 BY MR. SAULNIER: 18 Q. Keeping all things equal, moving the heat dissipating 19 plates from the longitudinal axis to the location that 20 they're put in Figure 4 -- actually, strike that. 21 In Figure 4, if you had the heat 22 dissipating plates put directly behind -- strike that.	119 1 and the bezel is more narrow, would that increase the 2 space, I guess, behind the bezel -- 3 MR. CUMMINGS: Objection. Form. 4 BY MR. SAULNIER: 5 Q. -- if you had to move the heat dissipation plates? 6 MR. CUMMINGS: Objection. Form. 7 A. There's other components related to the operation of 8 a backlight, and that's the missing information. It 9 has to be put into a case of some sort anyways. But 10 you're asking me about a component in isolation from 11 how it's being used, is the difficulty. I'm not 12 aware of backlights hanging free and suspended in the 13 air. 14 BY MR. SAULNIER: 15 Q. At that point, does the '842 specification describe 16 what kind of device the backlight package is used in; 17 for example, a computer screen? 18 MR. CUMMINGS: Objection. Form. 19 A. Under related art, starting at column 1, line 13, 20 there's a discussion, "Liquid crystal displays (LCDs) 21 are commonly used in televisions, computers, and 22 cellular [phones] to display information to their
118 1 In your definition of a POSITA which 2 requires one year of practical experience in design of 3 thermal management systems for LEDs, would a POSITA 4 understand how heat transfer is impacted by moving the 5 heat sink or heat dissipating plates from directly 6 behind an LED to below an LED? 7 MR. CUMMINGS: Objection. Form. 8 A. They would understand that it would depend on the 9 implementation. Backlight units are called a 10 backlight for a reason. It's a backlight. There is 11 something more to it. There's other components 12 around it, and that's why your question is incomplete 13 and doesn't have an exact answer. It depends on the 14 rest of the system design. 15 And if you've designed displays, you 16 understand that having a narrow bezel is a desirable 17 thing and that's a significant advantage that the 18 '842 patent allows. That's quite clear when it's 19 saying about minimal space. 20 BY MR. SAULNIER: 21 Q. But if you still had to include -- strike that. 22 If you still need heat dissipation plates	120 1 users. The most basic function of the LCD is to act 2 as a light switch, applying transmission of light in 3 one mode and blocking transmission of light in a 4 second mode." 5 So there is a description of some backlight 6 applications. 7 BY MR. SAULNIER: 8 Q. And do you agree that the -- would you agree that the 9 application that you're using the backlight in would 10 affect how you design the system? 11 MR. CUMMINGS: Objection. Form. 12 A. Could you repeat the question, please? 13 BY MR. SAULNIER: 14 Q. Depending on the device that you're designing the 15 backlight system for according to the '842 patent -- 16 strike that. 17 Would the type of device that you are 18 putting the backlight package in affect the design 19 characteristics of the backlight package? 20 MR. CUMMINGS: Objection. Form. 21 A. That's an incomplete question because it's not the 22 application that sets everything. If you are

121 1 designing this, you have a set of specifications that 2 you have to meet one way or another. Those 3 specifications determine what you do for a design, 4 not the application. 5 I can tell you from experience working with 6 Apple for a long time, I knew that I was working on a 7 9.9-inch display. It was only after the iPad was 8 announced that I knew what the application was. I 9 literally did not know what the display was going to 10 be used for. I didn't know the end application. 11 There was performance specifications, there were 12 requirements, and that was it. 13 BY MR. SAULNIER: 14 Q. So is it fair to say that the performance 15 specifications would affect the design of a backlight 16 package? 17 MR. CUMMINGS: Objection. Form. 18 A. It's fair to say that the totality of specifications, 19 if it's only performance, it can literally be 20 something as, I need 300 nits. That's it. That's a 21 performance spec. I need a backlight that gives me 22 300 nits.	123 1 A. That's a part of the design considerations. That's 2 what drives the design. So there are physical 3 specifications, there are electronic specifications, 4 there are performance specifications, there's 5 reliability specifications. 6 Q. But -- and so just to be clear, the use drives the 7 specifications which informs design. 8 MR. CUMMINGS: Objection. Form. 9 A. I'm trying to say the specific use -- I'm trying to 10 avoid, oh, it's a computer display. That could be a 11 use that needs to be the specific. It's a 17-inch 12 diagonal display, 16-by-9 form factor with these 13 requirements, this power input, luminosity, lifetime 14 expectation, that type. I just -- I'm trying -- it's 15 not a broad use. It's not -- what exactly are you 16 using it for? That's what drives the design. 17 BY MR. SAULNIER: 18 Q. If you turn to the specification at column 3, lines 29 19 to 31. 20 STENOGRAPHER: Counsel, we've been going 21 about two hours. 22 MR. SAULNIER: Could I just do -- I just
122 1 BY MR. SAULNIER: 2 Q. So the totality of the specifications for a system 3 would affect the design of a backlight package. 4 MR. CUMMINGS: Objection. Form. 5 A. Yes, the totality of the specifications is what would 6 be given to the designer or the design team. They 7 would work from those specifications. 8 BY MR. SAULNIER: 9 Q. And those specifications would vary depending on the 10 end application; is that correct? 11 MR. CUMMINGS: Objection. Form. 12 A. I would have to say it would depend on the end use. 13 If I'm saying a computer display, that's an 14 application. That's a field of application. You 15 still haven't given me the rest of the 16 specifications. What's the color gamut? What's the 17 brightness level? What's the lifetime expectations? 18 What's the power requirements? What's the form 19 factor? So... 20 BY MR. SAULNIER: 21 Q. So the end use determines the specifications that 22 would be used in designing the backlight package.	124 1 have a couple more questions. 2 Is that okay, Dr. Bretschneider? 3 THE WITNESS: That's okay. 4 BY MR. SAULNIER: 5 Q. So the specification states that, The heat dissipating 6 plates 46 conduct, or dissipate, heat produced by 7 electronics disposed on the PCB 45." 8 What electronic components other than the 9 LED might generate heat that needs to be dissipated? 10 MR. CUMMINGS: Objection. Form. 11 A. At the time frame of the '842 patent, the LEDs 12 themselves are the only ones I can fathom that would 13 have the need. Part of it is largely the design and 14 standard construction approaches for a backlight. 15 You have the LEDs placed on a circuit board, and 16 that's essentially all that's there. 17 There might be a connector at one end or 18 could be a wire at either end, some way to bring in 19 power, but that's typically what your -- the circuit 20 board for a backlight application. 21 BY MR. SAULNIER: 22 Q. So --

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125 1 A. With the light -- with a light guide plate. 2 Q. So when the specification says "electronic 3 components," you don't read that to be anything other 4 than the LED; is that correct? 5 MR. CUMMINGS: Objection. Form. 6 A. I'm trying to think of other components that would be 7 on the PCB with the LEDs that would need to have heat 8 dissipated, and that's why, again, the application 9 drives a few things. 10 If we go outside of backlights and light 11 guide plates I might have a circuit board that has a 12 lot of components other than an LED, but for this 13 application and the configurations, other than some 14 form of electrical connection, I'm struggling to think 15 what else would -- would there even be room for on the 16 printed circuit board. 17 BY MR. SAULNIER: 18 Q. Do you agree that it's possible, depending on the 19 application, that there are other electronic 20 components that might need heat dissipation that be 21 attached to a PCB? 22 MR. CUMMINGS: Objection to form.	127 1 The LEDs are purely decorative. It's not a backlight 2 application. 3 That's why I'm trying to get the scope when 4 you say, "another application." 5 Q. Another backlight application. 6 A. Is this a backlight application or a light guide 7 plate? Is this a hollow body wave guide or a solid 8 body wave guide application? 9 MR. SAULNIER: I think this is a good time 10 to take a break. It's -- do you need lunch, 11 Dr. Bretschneider? 12 THE WITNESS: I'm fine with a short lunch. 13 MR. SAULNIER: Okay. You want to come back 14 in, like, 20 minutes? 15 THE WITNESS: That works for me if it works 16 for everyone else. 17 MR. SAULNIER: Does that work for the court 18 reporter and everyone? 19 MR. CUMMINGS: Let's go off the record and 20 then we'll discuss. 21 VIDEO TECHNICIAN: We're off the record at 22 3:43.
126 1 A. Could you repeat the question, please? 2 BY MR. SAULNIER: 3 Q. Do you agree that it's possible, depending on the 4 application, that there are other electronic 5 components that might need heat dissipated that are 6 attached to a PCB? 7 MR. CUMMINGS: Objection. Form. 8 A. So outside the field of the '842 patent, I believe 9 you're asking could I have a printed circuit board 10 without any LEDs that still needed heat dissipation? 11 Is that the question you're asking? 12 BY MR. SAULNIER: 13 Q. No. The question I'm asking is, do you agree that 14 it's possible, depending on the application, there are 15 other electronic components that might need heat 16 dissipated that are attached to a PCB? 17 A. I just described another application and you said no. 18 That's why I'm trying to get the scope when you say, 19 "another application." 20 So I have a motherboard, a computer behind 21 me. It does happen to have LEDs on it. Do those -- 22 some of those components need heat dissipation? Yes.	128 1 (Off the record at 3:43 p.m.) 2 (Back on the record at 4:11 p.m.) 3 VIDEO TECHNICIAN: Okay, we're back on the 4 record at 4:11. 5 BY MR. SAULNIER: 6 Q. Dr. Bretschneider, while on break did you speak to 7 anyone? 8 A. No. 9 Q. I want to go back to the specification of the '842 10 patent. Is there any specific disclosure of the type 11 of LCD -- excuse me. Strike that. 12 Is there any specific disclosure of the 13 type of LED that is required to practice the claims of 14 the '842 patent? 15 MR. CUMMINGS: Objection. Form. 16 A. I don't think I've offered an opinion on that. I 17 don't think Dr. Baker did either. 18 BY MR. SAULNIER: 19 Q. Dr. Bretschneider, do you see anything in the 20 specification, looking now, that discloses a specific 21 type of LED? 22 MR. CUMMINGS: Objection. Form.

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129 1 A. I'm struggling because I'm not sure how to interpret 2 your question. Could be is it a gallium nitrate LED? 3 Is it a phosphate LED? Is it phosphate converted? 4 There's a lot of different ways to classify types of 5 LEDs, so... 6 BY MR. SAULNIER: 7 Q. And the -- just to -- just to be clear, the LED -- 8 excuse me. 9 The disclosures in the '842 patent don't 10 describe any specific type of LED gallium nitride, 11 LED, or phosphate covered or anything like that; is 12 that correct? 13 MR. CUMMINGS: Objection. Form. 14 A. The best I can say is, the patent is clearly about 15 LEDs for use with backlights that include a light 16 guide plate. 17 BY MR. SAULNIER: 18 Q. Does the specification of the '842 patent describe any 19 specific composition of an LED? 20 MR. CUMMINGS: Objection. Form. 21 A. I don't think I offered an opinion on that in my 22 declaration and I don't think Dr. Baker did either.	131 1 specific design of any components that are included in 2 the backlight package? 3 MR. CUMMINGS: Objection. Form. 4 A. I'm trying to understand what you mean by 5 "specifications." Are you asking about a part number 6 that I can go order off-the-shelf? 7 BY MR. SAULNIER: 8 Q. I'm asking, does the specification of the '842 patent 9 describe the specific design of any components that 10 are explicitly called out, for example, in Figure 4? 11 MR. CUMMINGS: Objection. Form. 12 A. I guess, again, I'm struggling on the issue of 13 specific design. It describes the functionality and 14 some relationships, and that's enough for a person of 15 ordinary skill in the art. Why [ph] I feel like 16 you're asking, is there a part number I can go order 17 from. 18 BY MR. SAULNIER: 19 Q. Is there any specific disclosure in the '842 20 specification of the material that a fastener must be 21 made of? 22 MR. CUMMINGS: Objection. Form.
130 1 I'd have to re-read the specification at best. 2 BY MR. SAULNIER: 3 Q. Is there any disclosure in the '842 specification that 4 describes what the composition of the PCB 45 must be? 5 MR. CUMMINGS: Objection. Form. 6 A. I don't recall offering an opinion on that. 7 BY MR. SAULNIER: 8 Q. Does the specification of the '842 patent describe the 9 characteristics -- strike that. 10 Does the specification of the '842 patent 11 describe what material heat dissipating means must be 12 made of? 13 MR. CUMMINGS: Objection. Form. 14 A. Again, I don't think I've offered an opinion on that. 15 BY MR. SAULNIER: 16 Q. Does the specification of the '842 patent disclose the 17 design of a heat dissipating plate? 18 MR. CUMMINGS: Objection. Form. 19 A. Again, I'll say I don't think I've offered an opinion 20 on that. 21 BY MR. SAULNIER: 22 Q. Does the specification of the '842 patent disclose the	132 1 A. Again, I don't think I've offered an opinion on that. 2 BY MR. SAULNIER: 3 Q. Dr. Bretschneider, you offered a construction of a 4 "fastener," quote. Correct? 5 A. Yes. 6 Q. And what was that construction, Dr. Bretschneider? 7 A. Reading from my declaration, paragraph 116, "In my 8 opinion, the term 'fastener,'" as it is in use -- "as 9 it is used in the claims of the '842 Patent, means 10 'one feature whose primary purpose is to attach 11 something.' This construction of the term does not 12 require that the fastener be made from a single 13 material that is 'integrally formed.' Further, it is 14 consistent with what a POSITA would have understood a 15 fastener to mean based on the specification of the 16 '842 Patent - that a fastener provides surfaces onto 17 which other components may attach." 18 And then I cite the patent, column 2, lines 19 31 to 35, and there's a few other citations in 20 column 4. 21 Q. Are there any other portions of the specification that 22 describe the fastener?

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133 1 MR. CUMMINGS: Objection. Form. 2 A. That's the portions of the specification I cited in 3 my declaration. I did also reference the institution 4 decision. 5 BY MR. SAULNIER: 6 Q. Dr. Bretschneider, does the word "fastener" appear 7 anywhere else in the specification? 8 MR. CUMMINGS: Objection. Form. 9 A. I believe it's 11 times in the specification. 10 BY MR. SAULNIER: 11 Q. And did you consider any of those other parts of the 12 specification when rendering your opinion -- your 13 opinion on what a fastener should be construed as? 14 MR. CUMMINGS: Objection. Form. 15 A. I considered the entirety of the specification, I 16 just cited to one particular passage. 17 BY MR. SAULNIER: 18 Q. Is there any part of the specification -- actually, 19 strike that. 20 Did you apply any other claim constructions 21 for the word "fastener"? 22 MR. CUMMINGS: Objection. Form.	135 1 state, "Indeed, as explained below, a POSITA 2 understood that the structure identified by Dr. Baker 3 as the second portion 2HP does not provide surfaces 4 that attach anything and therefore also is not a 5 fastener under the alternate construction 'a 6 structure that provides surfaces for attachment.'" 7 I'm trying to search through the rest. 8 A related paragraph 190, I state, "I have 9 reviewed Patent Owner's Preliminary Response (POPR) 10 and agree with the arguments therein with respect to 11 Kurokawa. I have reviewed the Institution Decision 12 and agree with the Board's initial position that 13 Kurokawa's printed wiring board 72 cannot satisfy both 14 the L-shaped fastener and circuit-board limitations of 15 Claim 5." 16 And paragraph 192 relates to Dr. Baker's 17 opinion where he identified Kurokawa's metal plate as 18 the "842 Patent's L-shaped structure with a first and 19 second portion," talking about it serving as the 20 fastener. And that continues into paragraph 193, at 21 least through to paragraph 196, and again addressing 22 Dr. Baker's opinion and apparent construction.
134 1 A. At the end of paragraph 116 I also state, "Thus, the 2 claims clearly describe the 'first fastener' has 'a 3 first portion and a second portion' whose purpose is 4 to fasten an LED and a circuit board." 5 BY MR. SAULNIER: 6 Q. In paragraph -- Dr. Bretschneider, can you please turn 7 to paragraph 120 of your report? 8 Did you also consider and apply a 9 construction of "fastener" as a structure that 10 provides surfaces for attachment? 11 MR. CUMMINGS: Objection. Form. 12 A. I state in paragraph 120, "I have also been asked to 13 consider the term 'fastener' as 'a structure that 14 provides surfaces for attachment.'" And then state, 15 "Under both interpretations of the term fastener, the 16 result is the same and Uekusa does not anticipate any 17 of the claims of the '842 Patent." 18 BY MR. SAULNIER: 19 Q. Are there any other constructions of "fastener" that 20 you applied in rendering your opinions? 21 MR. CUMMINGS: Objection. Form. 22 A. And there's a similar section, paragraph 123, where I	136 1 That's what I've found so far. I could do 2 a more thorough read and I might find other sections 3 where I discuss -- 4 Q. The only two -- 5 A. -- the construction of "fastener." 6 Q. The only two constructions that you apply were the two 7 that we previously discussed; first, one feature whose 8 primary purpose is to attach something and separately 9 a structure that provides services for attachment; is 10 that correct? 11 MR. CUMMINGS: Objection. Form. 12 A. Again, I was trying to be clear because Dr. Baker 13 used constructions that weren't consistent with those 14 two in forming his opinions. So without fully 15 reviewing his declaration, I cited different portions 16 where it appears that I was responding to a different 17 construction used by Dr. Baker. 18 BY MR. SAULNIER: 19 Q. But in rendering your opinion on noninfringement, you 20 only applied the construction of -- one feature whose 21 primary purpose is to attach something and then, 22 separately, a structure that provides surfaces for

137 1 attachment. 2 MR. CUMMINGS: Objection. Form. 3 A. Those are the constructions listed in -- or described 4 in paragraph 116 and 120 of my declaration. 5 BY MR. SAULNIER: 6 Q. What do you mean by "attach something"? 7 A. That's related to my opinion in paragraph 119, where 8 I deal with the circuit board connecting the circuit 9 portion -- the -- sorry, the circuit board connecting 10 the second portion. 11 I state, "In my opinion, a POSITA would 12 interpret the term 'the circuit board connecting the 13 second portion' as 'the circuit board connecting to 14 the second portion.' Further, it is my opinion that 15 a POSITA would understand that the term 'connecting' 16 requires something more than just touching, such as 17 attaching or completing an electrical connection. 18 "My opinions are based on the plain 19 language of the claims as a POSITA would have 20 interpreted them. My opinions are further supported 21 by the specification, which disclose that the second 22 portion and PCB are attached."	139 1 So I'll ask again, what does attachment 2 require, physical adhesion? 3 MR. CUMMINGS: Objection. Form. 4 A. We're talking about a fasten. If something is 5 fastened to something else, there is a solid 6 connection. It's not just touching. 7 BY MR. SAULNIER: 8 Q. Does a solid connection require neither object to be 9 allowed to move? 10 MR. CUMMINGS: Objection. Form. 11 A. I'm unsure of what you're saying. If I glue two 12 things together, they're attached. I can throw them, 13 they're still attached. They're both moving. 14 BY MR. SAULNIER: 15 Q. Are two things that are attached using Velcro, 16 attached? 17 MR. CUMMINGS: Objection. Form. 18 A. I don't recall offering any opinions related to 19 Velcro in my declaration so I haven't considered 20 that. 21 BY MR. SAULNIER: 22 Q. Is soldering an example of attachment?
138 1 So it's a solid physical connection, it's 2 not just two items touching. 3 Q. What is a "solid physical connection"? Are the -- 4 excuse me -- strike that. 5 Would something be attached if one of the 6 objects was allowed to move even if there was a solid 7 physical connection? 8 MR. CUMMINGS: Objection. Form. 9 A. I'm not following the question. If I set my phone 10 down on a table and I can pick it up again without a 11 problem if I don't glue it down, it's not attached to 12 the table, it's just resting on the table. 13 BY MR. SAULNIER: 14 Q. So gluing something would be an example of an 15 attachment. Correct? 16 MR. CUMMINGS: Objection. Form. 17 A. Attaching is, again, as I state in paragraph 119, 18 related to connecting. It's more than just touching. 19 BY MR. SAULNIER: 20 Q. Your definition of "connecting" includes the word 21 "attaching." I'm trying to figure out what you view 22 attaching as requiring.	140 1 MR. CUMMINGS: Objection. Form. 2 A. I can quote from the patent, column 3, starting at 3 line 59, "Figure 5 illustrates a view of the LED 4 module 40 of Figure 4, showing the anode lead 49 5 attached to the PCB 45 with solder 51. 6 BY MR. SAULNIER: 7 Q. Is your view on what can provide -- strike that. 8 Other than solder, how else would you 9 attach components together? 10 MR. CUMMINGS: Objection. Form. 11 A. In paragraph 131, this is talking about the Uekusa 12 reference. "In contrast, the resin forming 13 section 37 of Uekusa is not performing any fastening. 14 The resin is not fastened to the motherboard 50. 15 Uekusa does not disclose any way to attach resin 16 forming Section 37 to anything. Other methods of 17 attachment were inadequate, such as glue (which would 18 not hold up during the soldering process) and 19 snap-fit connections (which required an additional 20 component to be fixed to the PCB)." 21 BY MR. SAULNIER: 22 Q. Would --

141 1 A. And the following paragraph, I continue on, "The 2 resin forming section 37" is not fastening -- "is not 3 fastening the T-shaped fastener to anything. The 4 resin forming Section 37 is merely resting against, 5 but not fastened to, the motherboard 50." 6 Q. Can you go to paragraph 58 of your expert report? 7 When pointing to a part of Uekusa's 8 specification it states that, "The light-emitting 9 diode 1 has a structure in which a pair of substrate 10 electrodes 3 and 4 is patterned on an upper surface of 11 a glass epoxy substrate 2, a light-emitting diode 12 [element] 5 is fixed on one electrode [3] by means of 13 conductive adhesive (not shown) and an upper electrode 14 5a of light-emitting diode element 5 and the other 15 electrode 4 are connected by a bonding wire 6." 16 Would a conductive adhesive -- strike that. 17 Would the conductive adhesive described in 18 paragraph 58 of your report provide attachment? 19 MR. CUMMINGS: Objection. Form. 20 A. I haven't considered that question and I don't think 21 Dr. Baker did either. 22 BY MR. SAULNIER:	143 1 MR. CUMMINGS: Objection. Form. 2 A. The question is awkward because as I state in 3 paragraph 116, "In my opinion, the term 'fastener,' 4 as it is used in the claims of the '842 Patent, means 5 'one feature whose primary purpose is to attach 6 something.'" 7 BY MR. SAULNIER: 8 Q. So is the fastener structure itself required to do any 9 adhesion in attaching to something? 10 MR. CUMMINGS: Objection. Form. 11 A. It sounds like you're asking, can I fasten to 12 something without the fastener. If I don't have the 13 fastener, I don't have the feature whose primary 14 purpose is to attach something. 15 BY MR. SAULNIER: 16 Q. My question is a little bit different. Is the feature 17 whose primary purpose is to attach something required 18 to provide the means of adhesion? For example, glue. 19 MR. CUMMINGS: Objection. Form. 20 A. I'm just struggling because you basically asked is 21 the fastener required to provide the glue, which 22 makes it sound like the fastener is a tube of glue.
142 1 Q. It does state that "a light-emitting diode [element] 5 2 is fixed on one electrode [3] by means of a conductive 3 adhesive." 4 Is fixing something on something else not 5 an attachment? 6 MR. CUMMINGS: Objection. Form. 7 A. Again, I don't think I've offered or formed an 8 opinion on that yet. 9 BY MR. SAULNIER: 10 Q. You're providing a construction for the structure of a 11 fastener, is that correct -- strike that. 12 In paragraph 116 of your expert report you 13 provide a construction for a, quote, "fastener"; is 14 that correct? 15 A. Yes. 16 Q. Is the fastener, in your -- in your opinion, is the 17 fastener required to provide adhesion? 18 MR. CUMMINGS: Objection. Form. 19 A. Could you repeat the question, please? 20 BY MR. SAULNIER: 21 Q. In your opinion, is the fastener structure required to 22 provide the adhesion between multiple components?	144 1 If I don't have the fastener, I can't attach 2 anything. The purpose of the fastener is to provide 3 the place and location for attaching something. 4 BY MR. SAULNIER: 5 Q. So the feature's purpose isn't to attach something, 6 it's to provide a place to attach something? 7 MR. CUMMINGS: Objection. Form. 8 A. As I stated clearly in paragraph 116, "In my opinion 9 the term 'fastener,' as it is used in the claims of 10 the '842 patent," mean -- "means 'one feature whose 11 primary purpose is to attach something.'" 12 BY MR. SAULNIER: 13 Q. So the fastener doesn't need to do the attachment 14 itself, it just needs to provide a place to attach 15 something. 16 MR. CUMMINGS: Objection. Form. 17 A. To clarify, in paragraph 124, I state, "A POSITA 18 would have readily understood the L-shaped structure 19 of the '842 Patent is what is referred to in the 20 industry as a 'lead frame.' The external surface of 21 a lead frame is used to attach the LED package to a 22 circuit board using solder."

145 1 BY MR. SAULNIER: 2 Q. So is it your opinion that the L-shaped fastener has 3 to be a lead frame? 4 MR. CUMMINGS: Objection. Form. 5 A. That's not what I stated. 6 BY MR. SAULNIER: 7 Q. Is a lead frame an example of what an L-shaped 8 fastener could be? 9 MR. CUMMINGS: Objection. Form. 10 A. The best answer I can give is that a person of 11 ordinary skill in the art would understand that the 12 L-shaped structure described in the '842 patent is 13 consistent with a lead frame. 14 BY MR. SAULNIER: 15 Q. What other structures would a POSITA understand the 16 L-shaped fastener to be, other than a lead frame? 17 MR. CUMMINGS: Objection. Form. 18 A. I gave that opinion. I haven't considered what other 19 structures it could be. 20 BY MR. SAULNIER: 21 Q. Does the specification of the '842 patent limit the 22 L-shaped fastener to be a lead frame?	147 1 Q. So what other materials could a fastener be made of in 2 your understanding of the scope of the disclosures in 3 the '842 patent? 4 MR. CUMMINGS: Objection. Form. 5 A. I'll repeat that I haven't offered an opinion on 6 that. I don't think Dr. Baker has offered a clear 7 opinion on that. 8 BY MR. SAULNIER: 9 Q. Do the words "lead frame" show up anywhere in the 10 specification of the '842 patent? 11 MR. CUMMINGS: Objection. Form. 12 A. The phrase "lead frame" does not show up, although 13 there is discussion of an anode lead and a cathode 14 lead. 15 BY MR. SAULNIER: 16 Q. Those aren't parts of the frame, though, are they -- 17 excuse me. Strike that. 18 In the specification of the '842 patent, 19 the described anode leads and cathode leads are not 20 described as part of the frame; is that correct? 21 MR. CUMMINGS: Objection. Form. 22 A. Your question's difficult to answer and it's awkward.
146 1 MR. CUMMINGS: Objection. Form. 2 A. I'll start off first saying it's my understanding 3 that the scope of claims in a patent aren't limited 4 to specific embodiments described in the 5 specification, and I do say in paragraph 116, "This 6 construction of the term does not require that the 7 fastener be made from a single material that is" 8 integrally -- "integrally formed." 9 BY MR. SAULNIER: 10 Q. So with your understanding that the scope of a claims 11 in a patent are limited to specific embodiments 12 described in the specification, the L-shaped fastener 13 is not limited to a lead frame; is that correct? 14 MR. CUMMINGS: Objection. Form. 15 A. What I stated previously was that the L-shaped 16 structure described is consistent with a person of 17 ordinary skill in the art's understanding of a lead 18 frame, and I did also state that the construction of 19 the term "fastener" does not require that the 20 fastener be made from a single material that is 21 integrally formed. 22 BY MR. SAULNIER:	148 1 If the described package didn't have a lead frame, 2 then the normal description would just be an anode or 3 cathode, not an anode lead or a cathode lead. 4 BY MR. SAULNIER: 5 Q. In the specification of the '842 patent, is the frame 6 described -- strike that. 7 In the specification of the '842 patent, is 8 there any specific mention of the material that the 9 frame would be made of? 10 MR. CUMMINGS: Objection. Form. 11 BY MR. SAULNIER: 12 Q. Actually, strike that one more time. In the 13 specification of the '842 patent, is there any 14 specific mention of the material that the fastener 15 would be made of? 16 A. There is nothing explicit, but there are a fair 17 number of descriptions of the functionality for the 18 fastener that play some bounds on the materials that 19 it could be composed of. 20 Q. Would you go to the specification column 3, paragraphs 21 14 to 17, and read that out loud? 22 A. You mean lines 14 to 17?

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149 1 Q. Yes. 2 A. Okay. Thank you. 3 "However, the president" – sorry. 4 "However, the present invention is not 5 limited to the configuration shown in Figure 4, and 6 different configurations may be used without departing 7 from the scope of the present invention." 8 Q. Could you also read column 3, lines 64 to 67? 9 A. However, the – thanks. 10 "However, the present invention is not 11 limited to the configuration shown in Figure 5, and 12 different configurations may be used without departing 13 from the scope of the present invention." 14 Q. Would the fastener in the '842 patent need to be 15 comprised of metal? 16 MR. CUMMINGS: Objection. Form. 17 A. I'll say the fastener would need to include some 18 metal. 19 BY MR. SAULNIER: 20 Q. What do you mean by "some metal"? 21 A. At the top of column 2, starting at line 6, "Figure 3 22 shows in greater detail a" conventional –	151 1 connected to the anode lead and the cathode lead of 2 the chip respectively. Therefore, the PCB 45 is able 3 to apply proper electrical signals for light 4 emission. 5 "In addition, heat dissipating plates 46 6 are attached to the underside of the horizontally 7 oriented PCB 45. Thus, PCB 45 is attached on one side 8 of the second portion 44B of the L-shaped fastener and 9 on the other side to the heat dissipating plates 46. 10 "The heat dissipating plates 46 conduct, or 11 dissipate, heat produced by electronic components 12 disposed on the PCB 45." 13 So the -- some of the functionality of a 14 fastener is common with Figure 3 and also the 15 embodiments in Figure 4, but you didn't let me 16 explain. 17 The fact that electrical signals need to be 18 conducted through portions of the fastener means it 19 would be highly beneficial to include a metal. Also 20 the fact that the L-shaped fastener is disposed on the 21 other side of the circuit board from the heat 22 dissipating plates means that it should have a high
150 1 "conventional LED module 30, which includes LENS 31, 2 a chip 32 on top of fastener 33, and a conductive 3 wiring 34 connecting the chip 32 to PCB 35 underneath 4 the fastener." 5 Q. Is Figure 31 one of the embodiments of the claimed 6 invention? 7 MR. CUMMINGS: Objection. Form. 8 A. That was a description of a fastener, some of the 9 functionality of a fastener, and – 10 BY MR. SAULNIER: 11 Q. Is Figure 3 -- 12 A. And I wasn't finished. 13 Q. Apologies. 14 A. Go ahead. 15 Q. Is Figure 3 one of the embodiments of the claimed 16 invention? 17 A. No. But if I continue in column 3, starting at 18 line 19, which relates to Figure 4, "The chip 43 and 19 the PCB 45 are respectively disposed on the first and 20 second portions 44A, 44B of the fastener 44. The 21 conducting wire 42 runs from the vertically oriented 22 chip [43] to the horizontally oriented PCB 45 and is	152 1 thermal conductivity and it should have a low thermal 2 resistance to be able to get heat to the circuit board 3 so it can get to the heat dissipating plates and be 4 dissipated. 5 Materials that have high electrical 6 conductivity and high thermal conductivity are metals. 7 I could use something that wasn't a metal, but it – 8 I'll just say it would be incredibly bizarre because 9 then I'm severely degrading the performance of the LED 10 package in multiple ways. I would be increasing the 11 resistance, which means a higher operating voltage, 12 which means a lower efficiency, which means low 13 luminosity. 14 If I don't have the high thermal 15 conductivity, it's a high operating temperature, which 16 is an even lower efficiency and lower luminosity. 17 Q. Fasteners, as described by the '842 patent, do not 18 necessarily need to be completely made of metal. 19 MR. CUMMINGS: Objection. Form. 20 A. What I stated, they would likely include at least 21 some amount of metal, and also, as we discussed in 22 paragraph 116 of my declaration, the construction

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153 1 does not require the fastener be made from a single 2 material that is integrally formed. 3 BY MR. SAULNIER: 4 Q. What are ways that -- going to the specification lines 5 19 through 21 -- 6 A. Which column? 7 Q. Column 3, lines 19 to 21. How might a chip be 8 disposed on a frame or a fastener? 9 MR. CUMMINGS: Objection. Form. 10 BY MR. SAULNIER: 11 Q. Well, scratch that. 12 What materials might be used to dispose a 13 chip on the portion of the fastener as described in 14 column 3, lines 19 to 21? 15 MR. CUMMINGS: Objection. Form. 16 A. I don't recall that I've offered an opinion on that 17 in my declaration. 18 BY MR. SAULNIER: 19 Q. Do you just put an LED chip on the side of a frame and 20 expect it to stay in place? 21 MR. CUMMINGS: Objection. Form. 22 A. There are different methods that could be used.	155 1 chip, and the best I can say is the most common 2 method of attachment would be a eutectic solder. 3 BY MR. SAULNIER: 4 Q. What would uncommon methods of attachment be? 5 A. You'd -- 6 MR. CUMMINGS: Objection. Form. 7 A. You'd have to give me time to think about that. 8 BY MR. SAULNIER: 9 Q. I'll give you as much time as you need. I just am 10 interested in other examples. Doesn't need to be an 11 exhaustive list. 12 A. It could be a regular solder. 13 Q. Could it be anything other than solder? 14 A. Again, I'd have to think and consider, and I don't 15 think you have enough time left for me to properly 16 address it. 17 Q. So it's your opinion today, the only thing that could 18 be used for attachment in the figure disclosed in the 19 '842 patent is solder? 20 MR. CUMMINGS: Objection. Form. 21 MR. SAULNIER: Excuse me. Strike -- strike 22 that.
154 1 BY MR. SAULNIER: 2 Q. What methods could be used to keep the LED chip in 3 place on a frame? 4 MR. CUMMINGS: Objection. Form. 5 A. It would depend on the type and construction of the 6 LED chip. 7 BY MR. SAULNIER: 8 Q. Taking the example in Figure 4 of the '842 patent, 9 what methods could be used to keep the LED chip on a 10 metal frame? 11 MR. CUMMINGS: Objection. Form. 12 A. I'm not sure I can give an exhaustive list, but from 13 the description, the most common would be a eutectic 14 solder. 15 BY MR. SAULNIER: 16 Q. Is there anything else other than solder that could be 17 used? 18 MR. CUMMINGS: Objection. Form. 19 A. Again, if you want an exhaustive list I would have to 20 think about it, but the description, "the conducting 21 wire 42 runs from the vertically oriented chip," that 22 informs me of some of the construction details of the	156 1 BY MR. SAULNIER: 2 Q. You have not rendered an opinion on -- based on the 3 disclosures of the '842 patent whether anything except 4 solder could attach -- provide attachment for an LED 5 chip to a frame. 6 MR. CUMMINGS: Objection. Form. 7 A. You asked for an example, I gave you one. I will 8 repeat again that my declaration and my opinions are 9 responsive to Dr. Baker. Dr. Baker, to the best of 10 my recollection, failed to even consider this issue. 11 So you asked for an example, I gave you an 12 example. If you want an exhaustive list, I will 13 consider it carefully and we will be waiting some 14 time for that. 15 But again, you're asking for opinions 16 that -- show me in my declaration where I offered an 17 opinion on this, please. 18 BY MR. SAULNIER: 19 Q. Let's go back to paragraph -- let's go back to 20 paragraph 58 of your expert report. 21 In paragraph 58 of your expert report you 22 point to a part of this Uekusa specification that

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157 1 states "a light-emitting diode [element] 5 is fixed on 2 one electrode 3 by means of a conductive adhesive (not 3 shown)." 4 Would that conductive adhesive have to be 5 solder? 6 MR. CUMMINGS: Objection. Form. 7 A. I'd have to review Uekusa. I gave a specific 8 citation from the patent. We only have one excerpt 9 here. 10 BY MR. SAULNIER: 11 Q. Dr. Bretschneider, I'll ask one more time. In your 12 opinion, as a person of skill in the art looking at 13 the disclosures of the '842 patent, is there any 14 material -- and it can be any material other than 15 solder -- that could provide the attachment for an LED 16 chip to a frame? 17 MR. CUMMINGS: Objection. Form. 18 A. Again, if you can show me where Dr. Baker formed or 19 expressed any opinions on this topic it would help 20 because that would mean it would most likely be 21 expressed in my report. 22 This is a somewhat lengthy report of 110	159 1 BY MR. SAULNIER: 2 Q. Would you agree with me that solder is not a fastener 3 as described by the '842 patent? 4 MR. CUMMINGS: Objection. Form. 5 A. I'll say I don't recall expressing an opinion on 6 that. I don't recall Dr. Baker expressing an opinion 7 on that. I will point out that one of the sections 8 of the '842 patent we discussed previously, column 3, 9 starting at line -- I'm sorry, line 59, "Figure 5 10 illustrates a view of the LED module 40 of Figure 4, 11 showing the anode lead [49] attached to the PCB with 12 solder 51." 13 As we discussed previously, the anode lead 14 is a part of the fastener. If the fastener is 15 attached with solder to the PCB but the fastener is 16 made of PCB, you've asked a very strange question, at 17 best. The fastener would melt. It wouldn't be 18 fastener. 19 Q. And just to confirm, the construction that you 20 provided -- excuse me. Strike that. 21 Per paragraph 116 of your expert report, 22 the construction that you offered for a "fastener" is
158 1 pages. I was careful and precise writing it, so the 2 opinions expressed in my report are carefully thought 3 out. And, respectfully, you're asking me to answer 4 off the top of my head, and I don't think that's 5 appropriate for a technical expert. 6 BY MR. SAULNIER: 7 Q. So you don't have an opinion -- 8 MR. CUMMINGS: Objection. 9 BY MR. SAULNIER: 10 Q. -- at the current time of -- 11 A. I haven't formed one, and you could consider a solder 12 a conductive adhesive. So we can keep going round 13 and round on this, but, again, I'm not going to 14 speculate. That would not be an opinion, that would 15 be speculation. 16 Q. Would you agree with me that solder is not frame -- 17 excuse me. Strike that. 18 Would you agree with me that solder is not 19 a fastener as described by the '842 patent? 20 MR. CUMMINGS: Objection. Form. 21 A. Could you repeat the question? I just want to make 22 sure I heard it correctly.	160 1 one feature whose primary purpose is to attach 2 something, is that correct? 3 MR. CUMMINGS: Objection. Form. 4 A. I state in my opinion the term "fastener," as it is 5 used in the claims of the '842 patent, means one 6 feature whose primary purpose is to attach something. 7 BY MR. SAULNIER: 8 Q. Can you please turn to paragraph -- 9 MR. SAULNIER: Actually, I think it's 10 probably a good time to take a break. Can we go off 11 the record? 12 MR. CUMMINGS: Sure. 13 VIDEO TECHNICIAN: We are off the record at 14 5:26. 15 (Off the record at 5:26 p.m.) 16 (Back on the record at 5:37 p.m.) 17 VIDEO TECHNICIAN: All right, we're back on 18 the record at 5:37. 19 BY MR. SAULNIER: 20 Q. Dr. Bretschneider, I think we've discussed this a 21 little bit earlier, but would you agree that a heat 22 sink would properly be considered a heat dissipating

161 1 means? 2 A. The accurate response is that the purpose of a heat 3 sink is to dissipate heat. 4 Q. And you say in paragraph 117 [sic] of your expert 5 report, "Thus, in my opinion the term 'heat 6 dissipating means' as claimed by the '842 patent 7 refers to heat dissipating plates. These are examples 8 of fins or plates of a heat sink." 9 Is that correct? 10 A. In the context of the patent, yes, that's the example 11 that's given. 12 Q. And so a heat sink would meet the heat dissipation 13 means limitation; is that correct? 14 A. Yeah. And the technically correct response is that a 15 heat sink -- the purpose of a heat sink is to 16 dissipate heat. 17 Q. I don't know if we disagree on this so I'm trying to 18 figure it out. 19 A. I will say we basically do, but because of the amount 20 of work I do with reliability and standards, I'll say 21 there's things outside of this that I'm aware of that 22 I'm just sticking to the official descriptions and	163 1 the second portion and only electrically connected by, 2 for example, wires, would that meet the limitation, 3 under your construction? 4 MR. CUMMINGS: Objection. Form 5 A. Could you be more specific? 6 BY MR. SAULNIER: 7 Q. Does your construction require that the circuit board 8 is physically attached to the claimed fastener? 9 MR. CUMMINGS: Objection. Form 10 A. As I state in paragraph 119, "Further, it is my 11 opinion that a POSITA would understand that the term 12 'connecting' requires something more than just 13 touching, such as attaching or completing an 14 electrical connection." 15 BY MR. SAULNIER: 16 Q. I guess I'm trying to understand what it would look 17 like for something that is not -- strike that. 18 What I'm trying to understand is, does 19 connecting require both physical touching as well as 20 completing the electrical connection? 21 MR. CUMMINGS: Objection. Form 22 BY MR. SAULNIER:
162 1 definitions. 2 Q. Okay. 3 A. But there is -- there's -- 4 [Simultaneous speaking] 5 Q. -- heat sink would meet the heat dissipation means 6 limitation. Correct? 7 A. Yes. 8 Q. Okay. 9 A. There's strange implications to the way you were 10 wording it. A little bit of a change in the wording, 11 and we would have agreed. 12 Q. Perfect. Okay. I think we're in agreement now. 13 In paragraph 119 of your expert report you 14 state that connecting could require, quote, 15 "completing an electrical connection," quote. 16 What do you mean by "completing an 17 electrical connection"? 18 A. In the context of an LED, you're able to provide 19 electrical power. If an LED is not connected, I'll 20 say the potential for light emission is there. If 21 it's connected, you can actually power it up. 22 Q. If the circuit board was not physically attached to	164 1 Q. Let's strike that one more time. 2 I'm trying to understand what "completing 3 an electrical connection" would look like or requires. 4 MR. CUMMINGS: Objection. Form. 5 A. It could be a solder connection between a solder pad 6 and a lead. An electrical connection could be a wire 7 connecting the circuit board to a lead. 8 BY MR. SAULNIER: 9 Q. And so in, for example, the scenario where a wire is 10 connecting the circuit board to a lead, is it your 11 opinion that the fastener would also have to be 12 physically touching the circuit board? 13 MR. CUMMINGS: Objection. Form. 14 A. I don't think I stated an opinion on that, and the 15 previous question discussion was about an electrical 16 connection. 17 BY MR. SAULNIER: 18 Q. So understanding that an electrical connection -- 19 so -- strike that. 20 Your construction says "something more than 21 [just] touching, such as attaching or completing an 22 electrical connection."

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165 1 You just stated that "completing an 2 electrical connection" could be -- let me find the -- 3 "an electrical connection could be a wire connecting 4 the circuit board to a lead." 5 A. I believe we were talking about electrical 6 connections in general because I think you had 7 questions about an electrical connection without a 8 physical contact. 9 Q. And does the "connecting" in Claim 5, "the circuit 10 board connecting the second portion," require a 11 physical contact? 12 MR. CUMMINGS: Objection. Form. 13 A. I'm reading Claim 3, and one of the elements -- this 14 is column 4 starting at line 40, "a first fastener 15 having a first portion and a second portion," and a 16 first portion is attached to the chip. And to be 17 more specific, column 3, line 19, "The chip 43 and 18 the PCB are respectively disposed on the first and 19 second portions." 20 So the PCB's on the second portion of the 21 fastener. It would be fastened. It would be a 22 physical and electrical connection.	167 1 A. In column 3 at line, roughly, 22, "The conducting 2 wire 42 runs from the vertically oriented chip 43 to 3 the horizontally oriented PCB [45], and is connected 4 to the anode lead [49] and the cathode lead [50] of 5 the chip, respectively." 6 And the following sentence, "Therefore, the 7 PCB 45 is able to apply proper electric signals for 8 light emission." 9 BY MR. SAULNIER: 10 Q. Okay, Dr. Bretschneider, I am dropping Exhibit 1008 11 Uekusa into the Chat. Would you please open it up and 12 confirm that that is a correct copy of the Uekusa 13 reference. 14 ENTERED INTO THE RECORD: 15 PREVIOUSLY MARKED EXHIBIT 1008 16 5:52 p.m. 17 A. It looks correct. 18 BY MR. SAULNIER: 19 Q. Dr. Bretschneider, going back to paragraph 57 of your 20 declaration, you state that Uekusa resolves -- strike 21 that. 22 In paragraph 57 of your declaration you
166 1 BY MR. SAULNIER: 2 Q. Okay. So just so I'm clear with that, your 3 construction of a circuit board connecting the second 4 portion requires both a physical and electrical 5 connection? 6 MR. CUMMINGS: Objection. Form. 7 A. Being a little more nuanced, if there's not a 8 physical connection, then it's not fastened. If 9 there's not an electrical connection, then we don't 10 have a light-emitting device. 11 BY MR. SAULNIER: 12 Q. Claim 5 includes a portion that notes "the conducting 13 wire electrically coupling the light-emitting device 14 to the circuit board." 15 Is that correct? 16 A. Yes. 17 Q. So is it your opinion that there both needs to be a 18 circuit board that provides an electrical connection 19 to the fastener and physical connection? And also 20 separately a conducting wire that couples the 21 light-emitting device to the circuit board? 22 MR. CUMMINGS: Objection. Form.	168 1 state that, "Uekusa seeks to resolve the issues with 2 the T-shaped design by adding an extension 3 perpendicular to the cross of the T to provide three 4 points of contact, thus increasing stability." 5 Is that correct? 6 A. Yes. 7 Q. So by saying "increasing stability," is the third 8 point of contact helping prevent the LED structure 9 from moving? 10 MR. CUMMINGS: Objection. Form. 11 A. The simpler statement is, it keeps it from wobbling. 12 BY MR. SAULNIER: 13 Q. At what direction does it keep it from wobbling 14 from -- wobbling in? 15 MR. CUMMINGS: Objection. Form. 16 A. I would say perpendicular to the T structure. So if 17 you look at Figure 3 from -- specifically from being 18 able to rotate in a clockwise direction. 19 BY MR. SAULNIER: 20 Q. So in other words, are you saying that the third point 21 of contact helps to hold the structure and LED in 22 place?

169 1 MR. CUMMINGS: Objection. Form 2 A. I believe I address that later on. It provides a 3 stabilizing force. 4 BY MR. SAULNIER: 5 Q. And that statement -- you -- Dr. Bretschneider, would 6 you agree that the structure in Uekusa stabilizing 7 force helps ensure that the LED emits light into the 8 optical wave guide 55? 9 MR. CUMMINGS: Objection. Form 10 A. No, I wouldn't. 11 BY MR. SAULNIER: 12 Q. Then in what way does it stabilize the structure? 13 MR. CUMMINGS: Objection. Form 14 A. Prior to soldering, Uekusa, column 5, starting at 15 line 5, "As a result, the light-emitting diode 30 can 16 be mounted correctly and firmly on the motherboard 17 50. On that basis, the substrate electrodes 33a and 18 33b on the base portions 31a and 31b and circuit 19 electrodes 52a and 52b print-wired on the motherboard 20 50 are fixed by means of a solder 53" to securely -- 21 "to secure firmly the light-emitting diode 30 on the 22 motherboard 50."	171 1 see, but what is the lead frame -- where is the lead 2 frame in the image below paragraph 129 of your report? 3 MR. CUMMINGS: Objection. Form. 4 A. Portions of it are the two structures extending down 5 and to the right. Inside the clear cylindrical shape 6 you can also see some additional metallic-looking 7 components. There is a cup; it's an integral part of 8 the lead frame that the LED chip sits in. 9 BY MR. SAULNIER: 10 Q. In paragraph 58 of your report you state that, "The 11 epoxy itself does not stick, fasten, or attach the 12 structure to a motherboard." 13 Are there any ways to physically attach 14 epoxy to a motherboard? 15 MR. CUMMINGS: Objection. Form. 16 A. I mention in paragraph 131 of my declaration, "The 17 resin is not fastened to motherboard 50. Uekusa does 18 not disclose any way to attach resin forming 19 section 37 to anything. Other methods of attachment 20 were inadequate, such as the glue (which would not 21 hold up during the soldering process) and snap-fit 22 connections (which required an additional component
170 1 So prior to soldering, again, more layman's 2 terms, the LED can wobble. It can rotate in that 3 plane direction clockwise or counterclockwise. With 4 three points of contact, it will be stable before and 5 during the solder operation. 6 Once the solder has cooled and solidified, 7 then the LED's stable. 8 Q. In paragraph 129 of your report you note that the 9 image below is an LED package. What components make 10 it an LED package? 11 MR. CUMMINGS: Objection. Form. 12 BY MR. SAULNIER: 13 Q. Strike that. 14 In paragraph 129 of your report, you note 15 that the image below is an LED package. What are the 16 components of that LED package? 17 MR. CUMMINGS: Objection. Form. 18 A. The primary component would be the lead frame, the 19 epoxy body, the LED chip, and integral with the body 20 is an epoxy lens as well. 21 BY MR. SAULNIER: 22 Q. And in that, what -- the image is a little bit hard to	172 1 to be fixed to the PCB.)" 2 You can't solder it. You can't glue. The 3 glue would melt during the soldering process. And I 4 can tell you I've done this myself, so I know very 5 well it doesn't work, and there's just no way to do it 6 following Uekusa. Uekusa only -- Uekusa only wants 7 three points of contact, basically a tripod, if you 8 will, during the soldering process. After that, the 9 solderer has fixed it in place. 10 BY MR. SAULNIER: 11 Q. What does the '842 patent disclose as the requirements 12 for a circuit board? 13 MR. CUMMINGS: Objection. Form. 14 A. I don't see that I've offered an opinion on that. 15 BY MR. SAULNIER: 16 Q. The specification in column 3, lines 29 to 31, states 17 that there are "electric components disposed on the 18 PCB." 19 Is that correct? 20 MR. CUMMINGS: Objection. Form. 21 A. It states, "The heat dissipating plates 46 conduct, 22 or dissipate, heat produced by electronic components

173 1 disposed on the PCB 45." 2 BY MR. SAULNIER: 3 Q. So electronic components can be disposed on PCB 45; is 4 that correct? 5 A. It's a strange question because the purpose of -- the 6 name PCB stands for printed circuit board. There are 7 conductors printed on the board, but until I add 8 components, it's not a circuit board. Technically, 9 it would be a printed board, so it's a -- apologies, 10 but it's a strange question. It's asking does a 11 printed circuit board -- is this printed circuit 12 board a form of a printed circuit. It's inherent in 13 the name. 14 Q. And additionally, the PCB in the '842 patent is 15 described as -- in column 3, lines 44 to 46, I guess, 16 "In operation, electrical signals pass from the PCB 45 17 through conducting wires [42] to the chip 43"; is that 18 correct? 19 A. Yeah, that's what the patent states. 20 Q. So the PCB also provides power to the LED; is that 21 right? 22 MR. CUMMINGS: Objection. Form	175 1 portion. Correct? 2 A. Yes. And I provide a citation to his declaration, at 3 paragraph 66 of his declaration. 4 Q. And what examples of materials does Kurokawa give that 5 can be used to make metal plate 71? 6 MR. CUMMINGS: Objection. Form. 7 A. There's a passage in paragraph 9 that states, "The 8 lighting device for a vehicle display unit 9 characterized in that the printed wiring board (7) is 10 a metal-based wiring board on a metal plate." 11 BY MR. SAULNIER: 12 Q. And I don't mean to cut you off -- 13 A. I'm just trying to go through paragraph 20. 14 "Examples of the materials that can be 15 used for the metal plate (71) include aluminum, 16 copper, and iron. If the metal plate (71) is made of 17 aluminum, as in the invention described in Claim 7, 18 it is advantageous with respect to heat dissipating 19 properties." 20 Q. That was the disclosure I was going to point you to, 21 so you read my mind, Dr. Bretschneider. 22 A. I'm just going through sequentially, so...
174 1 A. Specifically, the passage you read uses the 2 expression "electrical signals." That's consistent 3 with providing power to them. 4 BY MR. SAULNIER: 5 Q. And in the next sentence, "Light-emitting device 6 module 40 is thus powered to emit light." 7 Is that correct? 8 A. Yes. The patent just uses a little bit of an awkward 9 construction. Might have been a translation issue. 10 MR. SAULNIER: In the Chat, I've put 11 Exhibit 1004 Kurokawa. 12 ENTERED INTO THE RECORD: 13 PREVIOUSLY MARKED EXHIBIT 1004 14 6:10 p.m. 15 BY MR. SAULNIER: 16 Q. Can you please open up that and tell me if it's -- if 17 you recognize it to be a correct copy of the Kurokawa 18 reference. 19 A. It appears to be. 20 Q. And in paragraph 192 of your report, you understand 21 that Dr. Baker identifies Kurokawa's metal plate 71 as 22 the L-shaped structure with a first and second	176 1 Q. Understood. Just a chunk of metal or aluminum, 2 copper, or iron alone, is not a circuit board. Right? 3 A. No. 4 MR. CUMMINGS: Objection. Form 5 BY MR. SAULNIER: 6 Q. If you attached an LED directly to just a chunk of 7 metal and tried to run current through it, would it 8 short out the LED? 9 MR. CUMMINGS: Objection. Form 10 A. If the metal was in contact with the anode and 11 cathode of the package, it would be shorted out and 12 it wouldn't operate. 13 BY MR. SAULNIER: 14 Q. Thank you, Dr. Bretschneider. 15 In paragraph 195 of your report, you state 16 that "the metal plate of Kurokawa identified by 17 Dr. Baker cannot be the fastener of the '842 patent 18 because it is not a part of the LED package." 19 What do you mean here when you say "LED 20 package"? 21 A. Surface mount packages described by Kurokawa. I also 22 go on, in paragraph 196, to state, "Even ignoring

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177 1 this, the '842 Patent explicitly states that the 2 goals of the invention include 'a light-emitting 3 device backlight package having a fastener of a novel 4 shape, which provides a first surface to which a chip 5 and light-emitting device module attach, while also 6 providing a second surface for attachment of a second 7 fastener, or a PCB." 8 The printed circuit board can't be the 9 fastener and the PCB the fastener's attached to. 10 Q. Did any of the -- does any of the claim language in 11 the '842 patent use the word "ED package"? 12 A. The claims use the term "backlight package." 13 Q. Do the claims in the '842 patent use the word "LED 14 package"? 15 MR. CUMMINGS: Objection. Form. 16 A. "Package" in the claims of the '842 patent is only 17 used with "backlight." 18 BY MR. SAULNIER: 19 Q. In paragraph 222 of your expert report, you state that 20 "Kurokawa uses standard surface mount LED packages." 21 Is that correct? 22 A. Yes.	179 1 BY MR. CUMMINGS: 2 Q. Dr. Bretschneider, do you remember asking whether you 3 interpreted anything in Claims 3, 4, 5, or 7 to 4 require heat dissipating means? 5 A. I remember being asked that. 6 Q. Could you look at your Table of Contents maybe for 7 reference, and which claims did you opine on heat 8 dissipating means? 9 A. I am going through. Claims 6 and 9. On challenge 1 10 there's a heading, No Heat Dissipating Means. It 11 says Claims 6 through 9. And then there are 12 subsections under that, Claim 3, 5, 6, 7, 8, and 9. 13 Q. Well, maybe it would be helpful -- 14 A. Challenge -- challenge 4, relating to Claims 5 and 9, 15 there is a section on no heat dissipating means. 16 Q. And what does the parenthetical say? 17 MR. SAULNIER: Objection. Form. 18 A. Challenge 4, which is section 12, subsection (b), the 19 parenthetical says, "Claims 6 and 9." 20 BY MR. CUMMINGS: 21 Q. So which claims did you apply heat dissipating means 22 to?
178 1 Q. In your opinion as a POSITA, what would -- what 2 components would those LED packages include? 3 MR. CUMMINGS: Objection. Form. 4 A. There would be an LED chip, some sort of body or 5 housing around it, an encapsulant, and an anode and 6 cathode structure. 7 MR. SAULNIER: All right. Could you give 8 me like 10 or 15 minutes? Sorry, we can go off the 9 record. 10 VIDEO TECHNICIAN: Okay, we are off the 11 record at 6:19. 12 (Off the record at 6:19 p.m.) 13 (Back on the record at 6:33 p.m.) 14 VIDEO TECHNICIAN: We're back on the record 15 at 6:33. 16 MR. SAULNIER: That's all the questions I 17 have for you today, Dr. Bretschneider. Thank you. 18 THE WITNESS: You're welcome, and thank 19 you. 20 MR. CUMMINGS: I just have a short 21 redirect. 22 EXAMINATION	180 1 A. 6 and 9. 2 MR. SAULNIER: Objection to form. 3 MR. CUMMINGS: No further questions. 4 MR. SAULNIER: No further questions. 5 VIDEO TECHNICIAN: Alison, do you need 6 anything else on the record? 7 STENOGRAPHER: No, I'm good. Thank you. 8 VIDEO TECHNICIAN: And are all copy orders 9 existing? 10 STENOGRAPHER: We'll do that off the 11 record. 12 VIDEO TECHNICIAN: Okay. So this concludes 13 the deposition of Eric Bretschneider. We are off the 14 record at 6:36. 15 (Proceedings concluded at 6:36 p.m.) 16 17 18 19 20 21 22

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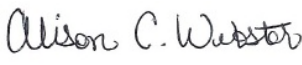
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Transcript of Eric Bretschneider, Ph.D.
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46 (181 to 184)

181 1 CERTIFICATE OF NOTARY 2 STATE OF MICHIGAN) 3) SS 4 COUNTY OF OAKLAND) 5 I, ALISON WEBSTER, Certified Reporter and Notary 6 Public within and for the State of Michigan do hereby 7 certify: 8 That ERIC BRETSCHNEIDER, Ph.D., the witness whose 9 deposition is hereinbefore set forth, was duly sworn 10 by me before the commencement of such deposition and 11 that such deposition was taken before me and is a true 12 record of the testimony given by such witness. 13 I further certify that the adverse party, BOE 14 TECHNOLOGY GROUP CO., LTD., was represented by counsel 15 at the deposition. 16 I further certify that the deposition of ERIC 17 BRETSCHNEIDER, Ph.D., occurred virtually on Thursday 18 July 17, 2025, commencing at 11:58 a.m. to 6:36 p.m. 19 I further certify that I am not related to any of 20 the parties to this action by blood or marriage, I am 21 not employed by or an attorney to any of the parties 22 to this action, and that I am in no way interested, financially or otherwise, in the outcome of this matter. 182	183 1 ACKNOWLEDGMENT OF DEPONENT 2 3 4 I, ERIC BRETSCHNEIDER, Ph.D., do hereby 5 acknowledge that I have read and examined the 6 foregoing testimony and the same is a true, correct, 7 and complete transcription of the testimony given by 8 me and any corrections appear on the attached errata 9 sheet signed by me. 10 11 12 13 14 15 16 _____ 17 (SIGNATURE) (DATE) 18 19 20 21 22
1 IN WITNESS WHEREOF, I have hereunto set my hand 2 this 28th day of July, 2025. 3  4 _____ 5 ALISON C. WEBSTER, CSR-6266, RPR, RMR, CRR, RDR 6 Notary Public, Oakland County, Michigan 7 My commission expires: May 1, 2029 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	