

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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BOE TECHNOLOGY GROUP CO., LTD.,

Petitioner,

v.

OPTRONIC SCIENCES LLC,

Patent Owner.

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Case No.: IPR2024-01130

Patent 7,168,842

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**PATENT OWNER'S RESPONSE**

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**Patent Owner's Exhibit List for IPR2024-01130**

Pursuant to 37 C.F.R. § 42.63(e), Patent Owner Optronics Sciences LLC hereby submits its exhibit list associated with the above-captioned *inter partes* review of U.S. Patent No. 7,168,842.

Ex. No.	Description
2001	Docket Control Order from <i>Optronic Sciences LLC v. BOE Tech. Group Co., Ltd.</i> , No. 2:23-cv-00549-JRG, Dkt. 33 (E.D. Tex. Aug. 5, 2024).
2002	Optronic Sciences LLC's Infringement Contentions from <i>Optronic Sciences LLC v. BOE Tech. Group Co., Ltd.</i> , No. 2:23-cv-00549-JRG (E.D. Tex. July 19, 2024).
2003	BOE Technology Group Co., LTD's Invalidity Contentions from <i>Optronic Sciences LLC v. BOE Tech. Group Co., Ltd.</i> , No. 2:23-cv-00549-JRG (E.D. Tex. Oct. 25, 2024).
2004	Machine translation of JP2004-279262, retrieved from <a href="https://patents.google.com/patent/JP2004279262A/en?q=JP2004-279262">https://patents.google.com/patent/JP2004279262A/en?q=JP2004-279262</a> on October 26, 2024.
2005	Declaration of Benjamin T. Wang in Support of Motion to Appear <i>Pro Hac Vice</i>
2006	Declaration of Andrew D. Weiss in Support of Motion to Appear <i>Pro Hac Vice</i>
2007	Declaration of Christian W. Conkle in Support of Motion to Appear <i>Pro Hac Vice</i>
2008	Time to Trial for Rodney Gilstrap Report from Docket Navigator, accessed December 12, 2024.
2009	Declaration of Paul Kroeger in Support of Motion to Appear <i>Pro Hac Vice</i>
2010	<i>POS Solutions</i> , Cirque: Innovative Touch Solutions, available at <a href="https://web.archive.org/web/20131109010416/http://www.cirque.com/solutions/posSolutions.aspx">https://web.archive.org/web/20131109010416/http://www.cirque.com/solutions/posSolutions.aspx</a> (archived by the Wayback Machine on Nov. 9, 2013).
2011	Gu et al., <i>White LED Performance</i> , Lighting Research Center.
2012	Specifications for Nichia Chip Type White LED, NICHIA CORPORATION.
2013	Excerpts from <i>Optoelectronics Data Book</i> 1995-1996, SIEMENS.

2014	TONY KORDYBAN, HOT AIR RISES AND HEAT SINKS: EVERYTHING YOU KNOW ABOUT COOLING ELECTRONICS IS WRONG (1998).
2015	C.O. BENNET& J.E. MYERS, MOMENTUM, HEAT, AND MASS TRANSFER (3d ed. 1982).
2016	FRANK INCROPERA & DAVID DEWITT, FUNDAMENTALS OF HEAT AND MASS TRANSFER (4th ed. 1996).
2017	SHUNSUKE KOBAYASHI ET AL., LCD BACKLIGHTS (2009).
2018	ALLAN KRAUS & AVRAM BAR-COHEN, DESIGN AND ANALYSIS OF HEAT SINKS (4th ed. 1996).
2019	<i>Connect</i> , MERRIAM-WEBSTER, <a href="https://www.merriam-webster.com/dictionary/connect">https://www.merriam-webster.com/dictionary/connect</a> (last visited Apr. 21, 2025).
2020	Declaration of Dr. Eric Bretschneider in support of Patent Owner's Response ("Bretschneider Decl.")
2021	<i>Curriculum vitae</i> of Dr. Eric Bretschneider
2022	Deposition Transcript of Dr. Jacob Baker, <i>IPR2024-01130</i> , <i>IPR2024-01133</i> , <i>IPR2024-01134</i> , Volume 1.
2023	Deposition Transcript of Dr. Jacob Baker, <i>IPR2024-01130</i> , <i>IPR2024-01133</i> , <i>IPR2024-01134</i> , Volume 2.
2024	Deposition Transcript of Dr. Jacob Baker, <i>IPR2024-01130</i> .

## **I. INTRODUCTION**

The Petition challenges claims 3–9 of U.S. Patent No. 7,168,842 (the “’842 Patent”). *See* Petition at 1. To simplify this IPR, Patent Owner disclaimed claims 3 and 4. Claims 5–9 remain pending review (the “challenged claims”).

The Petition uses hindsight to stretch the references beyond their teachings. Accordingly, the Petition must fail. The Petition relies on Dr. Baker’s declaration, which is a mirror image of large portions of the petition. Dr. Baker lacks expertise in designing LED packages for displays, which is the technology of the ’842 Patent. *See* Ex. 1001, title. Dr. Baker’s work merely involved the use of LEDs already designed by others. His expertise does not involve the design of the LED packages themselves, much less in the context of LED backlights for a display. Claims 1, 6, and 9 involve heat dissipation, requiring further expertise in thermal management. Dr. Baker has no thermal management expertise at all. In summary, Petitioner’s primary evidence, the declaration of Dr. Baker, is inadmissible and unreliable due to his lack of expertise. Fed. R. Evid. 403; *See Kyocera Senco Indus. Tools Inc. v. ITC*, 22 F.4th 1369, 1377 (Fed. Cir. 2022) (excluding an expert’s testimony because “to be qualified to offer expert testimony on issues from the vantage point of an ordinarily skilled artisan in a patent case, an expert must at a minimum possess ordinary skill in the art”).

In contrast, Dr. Bretschneider worked on LED package design for displays and has firsthand knowledge of the issues that were present in the industry and of the considerations a POSITA had when designing LED packages. Ex. 2020, ¶¶ 8–29. Dr. Bretschneider opines that Dr. Baker demonstrates a profound lack of understanding of the considerations a POSITA would have had in their grounds, as well as a misunderstanding of what the applied references disclose. *Id.*, ¶¶ 75–90.

The use of hindsight is clear from the Petition itself. For example, in ground 5, the primary reference (Kurokawa) is an entirely different structure and does not have a fastener at all.

The Petition relies on the expert testimony of one who was not a POSITA for the '842 and illustrates the fact that the grounds in the petition are not based on what the references teach to a POSITA, but that the Petitioner and its expert worked backwards from the language of the claims. *See* Ex. 2024, 11:2–4 (“Q[:] Did you review the '842 patent before you looked at the prior art references? A[:] Yes.”).

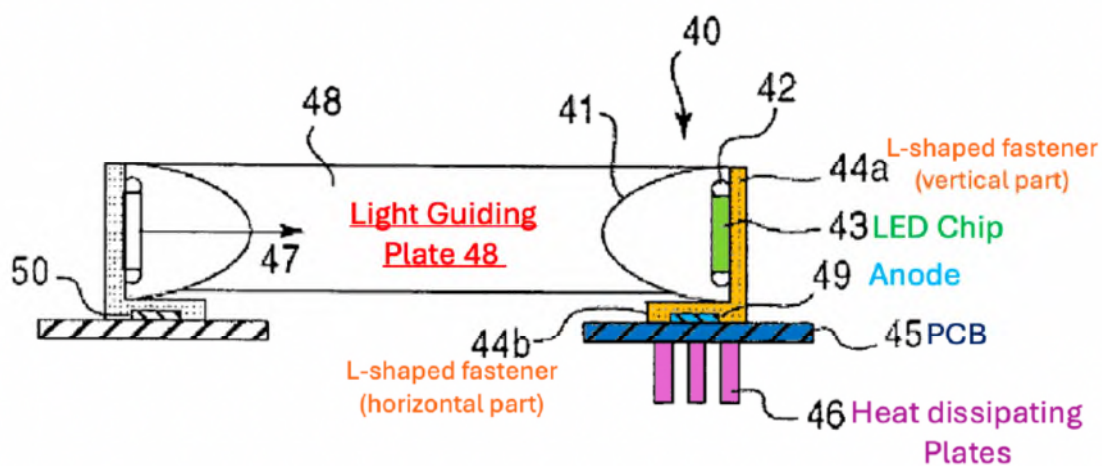
None of the secondary references cited by Petitioner cure the shortcomings of the primary references, and the proposed combinations are based purely on hindsight. Accordingly, all challenged claims are patentable.

## **II. BACKGROUND OF THE '842 PATENT**

Patent 7,168,842 to Chou et al. teaches an innovative LED design that “requires minimal space while producing maximum luminosity.” Ex. 1001 at 1:10–



11. The space is minimized using a design where an L-shaped fastener causes the LED to be vertically stacked over other components, including heat dissipating plates. The heat dissipating plates allow more current and better thermal performance, producing maximum luminosity. Figure 4 below shows an example of the design:



Ex. 1001 at Fig. 4 (annotated by Patent Owner).<sup>1</sup> This design starts at the bottom right with a horizontal printed circuit board (“PCB”) 45. Below the PCB 45 are vertical heat-dissipating plates 46 that dissipate heat in a space-efficient design. Compare Ex. 1001 at Fig. 4, with Fig. 2 (showing conventional horizontal layout for plates 23). The horizontal part 44b of the L-shaped fastener is mounted to the top of the horizontal PCB 45 and an anode 49. An LED chip 43 is vertically mounted on

<sup>1</sup> All colors herein are annotations by one of the parties.

the vertical portion 44a of the L-shaped fastener. The LED chip 43 emits light toward the lens 41 and longitudinally into the light guiding plate 48.

The L-shaped fastener 44a+44b provides many benefits. First, mounting the LED chip 44 vertically above the PCB 45 and vertically extending the heat-dissipating plates 46 reduces the footprint of the device because the LED chip 44, PCB 45, and heat-dissipating plates 46 are vertically stacked. Second, light is emitted longitudinally into the light guiding plate 48 to improve luminosity. Third, the heat-dissipating plates 46 efficiently dissipates heat for improved thermal performance, allowing greater power delivery and luminosity.

### III. PERSON OF ORDINARY SKILL

#### A. POSITA Needs LED Design and Thermal Management Experience

A POSITA for the '842 Patent would have had specific experience designing LED packages for displays with backlights, which is distinct from circuit design and mere experience using LED packages that have already been designed. *See* Ex. 1001, Title, 1:6–7 (“The present invention generally relates to the packaging of light-emitting device backlights.”), 2:21–24; Ex. 2020, ¶¶ 72, 77–80. Petitioner’s definition requiring one year or more of “electronic and optoelectronic system design” is inadequate because it is too broad. Ex. 2020, ¶¶ 77–80. For example, the field of “optoelectronics” broadly encompasses solar cells, optical fiber, LED detectors, LED signaling devices, and any application of LEDs. Designing LED

packages for displays presents unique challenges that are not present in other subfields of optoelectronics, and specific experience in LED package design is necessary. *Id.*, ¶¶ 78–79. For instance, an understanding of the design of packages encompasses a range of problems that would not generally arise in the broad field of electronics and optoelectronics, including a detailed knowledge of heat transfer. *Id.*, ¶¶ 78–80; *see also, e.g.*, Ex. 1001, 1:63–2:11 (describing the need to dissipate heat). Petitioner’s definition is overly broad and “would not necessarily give person a grasp of the problems or technology specific to LED packages or thermal management.” Ex. 2020, ¶ 85.

Accordingly, a POSITA would be one who held a person of ordinary skill in the art would have a bachelor’s degree in engineering or physics and at least one year of practical experience in design of LED packages and one year of practical experience in design of thermal management systems for LEDs. In some instances, a formal education could substitute for practical experience and *vice versa*. *Id.*, ¶ 86.

The following types of people would not qualify as a POSITA: those who used prepackaged LEDs but did not design LED packages; those without experience in thermal management; those without relevant experience around the patent filing in 2004; and those who did not use LEDs for display applications. *Id.*, ¶ 88.

The relevant factors support this definition of a POSITA, and each will be addressed in turn. *See, e.g., In re GPAC*, 57 F.3d 1573, 1579 (Fed. Cir. 1995) (listing factors).

**1. Type of Problems Encountered in the Art;**

Dr. Bretschneider explains the types of problems encountered in the art. Ex. 2020, ¶ 80. A simply, yet crucial, understanding is that the use of LEDs is very different from the design of LEDs—design relates to the fabrication and materials of the semiconductor and packaging of the LED itself, while use requires an understanding of circuits and implements already existing LEDs. *Id.*

Another concept Petitioner’s expert does not address is that designing LEDs for displays presents challenges that were not present in other applications of LEDs, such as signaling and detecting, or in other display technologies, such as cathode ray tubes (CRT). *See Id.*, ¶ 80. Dr. Bretschneider explains that the power levels required in other LED applications, such as signaling, require “fundamentally different” thermal management. *Id.* The power levels of LEDs used in displays require additional thermal management, power delivery, and pose unique form problems in comparison to other applications of LEDs, such as signaling and detecting. *Id.*, ¶¶ 72, 80. Poor thermal management noticeably impacted the resulting visible light and radically affected the lifespan of the LEDs, which was crucial for displays. *Id.*, ¶ 80. Further, the form factor required by displays presented challenges in LED

packaging design, and it was difficult to balance the form factor, efficient, light delivery, and adequate thermal management. *Id.*

Thus, a POSITA would have had a knowledge of the problems associated with designing “the packaging of light-emitting device backlights,” including an understanding of thermal management. *See* Ex. 1001, 1:6–11; Ex. 2020, ¶ 80.

## **2. Prior Art Solutions to those Problems;**

The prior art, such as the references offered by Petitioner illustrate that solutions included attempting to design physical modifications to LED packages and specific heat management solutions. *See, e.g.*, Ex. 1008; Ex. 1004; *see also* Ex. 2020, ¶ 81. The problems go beyond the use of prepackged LEDs in larger circuits.

## **3. Rapidity with which Innovations are Made;**

As Dr. Bretschneider explains, LED packaging techniques were slow changing, and the structures used in “the mid-1990s that remained in use until the mid 2000-time frame.” Ex. 2020, ¶ 82.

## **4. Sophistication of the Technology;**

LED package design, particularly in the context of backlights for displays, is a sophisticated technology that requires significant experience with complex subjects due, in large part, to the thermal management required to efficiently operate an LED, the power required to use an LED as a backlight (which increased the heat generated by the LED), and the form factor constraints that existed in displays. Ex.

2020, ¶ 83. Claims 6 and 9 explicitly recite a “heat dissipating means.” This technology requires a POSITA to understand heat transfer physics. *Id.*, ¶¶ 37–48.

### **5. Educational Level of Active Workers in the Field.**

Those designing LED packages, particularly in the context of backlights for displays, held a degree in mechanical engineering, chemical engineering, or related field. Ex. 2020, ¶ 83.

Accordingly, a POSITA at the time of the invention of the ’842 Patent in 2004 would have at least a Bachelor’s degree in a field of engineering or physics and at least one year of practical experience in design of LED packages and one year of practical experience in design of thermal management systems for LEDs. Ex. 2020, ¶ 86. Additional graduate education provided it included relevant semiconductor manufacturing or flat panel display technology could reduce but not eliminate the time requirement for professional experience. *Id.*

### **B. Petitioner’s Expert Lacks the Requisite Experience to be Considered a POSITA**

Petitioner’s expert proposes a definition of a POSITA that fits with his own background but is inconsistent with the subject matter of the ’842 Patent. Dr. Baker’s experience in the use of LEDs was for the wrong applications and at the wrong times. Dr. Baker has no experience in LED design, especially in the 2004-time frame. *See* Ex. 1021 at 2-3; Ex. 2020, ¶¶88–90. Dr. Baker has no experience

designing systems for thermal management. *See* Ex. 2024 at 27:10–11 (“Well, when I have something that’s dissipating a lot of power I just buy the heat sink . . .”); Ex. 2020, ¶¶ 89–90.

Further, Dr. Baker does not have experience designing LEDs for the backlights of displays. Ex. 2020, ¶¶ 89–90. When asked what experience he had designing LED packages, Petitioner’s expert responded that he “worked on the design of detectors. . . . [and] would design light sources for characterizing the detectors.” Ex. 2024 at 15:20–24. When asked what experience he had around 2004, Petitioner’s expert explained work he did over two decades prior to the relevant time frame. *Id.* at 16:7–18 (“Back in the ’80s, I worked on the design of a touch screen, for example, which packaged infrared LEDs and infrared photodetectors in a grid around a CRT display.”). The work he described was not packaging LEDs for the backlight of a display. Instead, he used LEDs for signaling in conjunction with photosensors that were placed adjacent to a CRT display. *Id.* Additionally, Petitioner’s expert’s experience describes working in the context of designing capacitive touch sensing. *See* Ex. 2022 at 37:19–41:24; Ex. 1021 at 2 (“Consulting on the design of analog-to-digital interfaces for capacitive touch displays and pads”); Ex. 2010 (describing “capacitive touch solutions”).

Petitioner’s expert consistently described experience with technology adjacent to the requisite knowledge but failed to describe any experience with the

design of the physical LED packaging itself, much less in the context of a backlight for a display. *See* Ex. 2024 at 15:20–28:22; Ex. 2020, ¶ 90. Thus, Petitioner’s expert lacks the experience necessary to opine on a POSITA who designed of LED packages for displays. Ex. 2020, ¶ 90.

**C. Dr. Bretschneider Qualifies as a POSITA**

Dr. Bretschneider meets both parties’ proposed qualifications of a POSITA. He earned a bachelor’s degree in chemical engineering in 1989 and earned a Ph.D. in 1997. *Id.* ¶ 25. His graduate work focused on the development of LEDs. *Id.* Since then, he has been continuously involved in the LED industry and now has over 30 years of experience with LEDs and displays, including LED chip and packaging, testing, fabrication, design, and thermal management. *Id.*, ¶¶ 9–24, Appendix A. Dr. Bretshneider has thermal management experience and knowledge. Ex. 2020 ¶¶ 9–10, 37–49, 80, Appendix A.

**IV. PETITIONER RELIES ON HINDSIGHT**

All of Petitioner’s challenges rely on hindsight and the declaration of an unqualified expert.

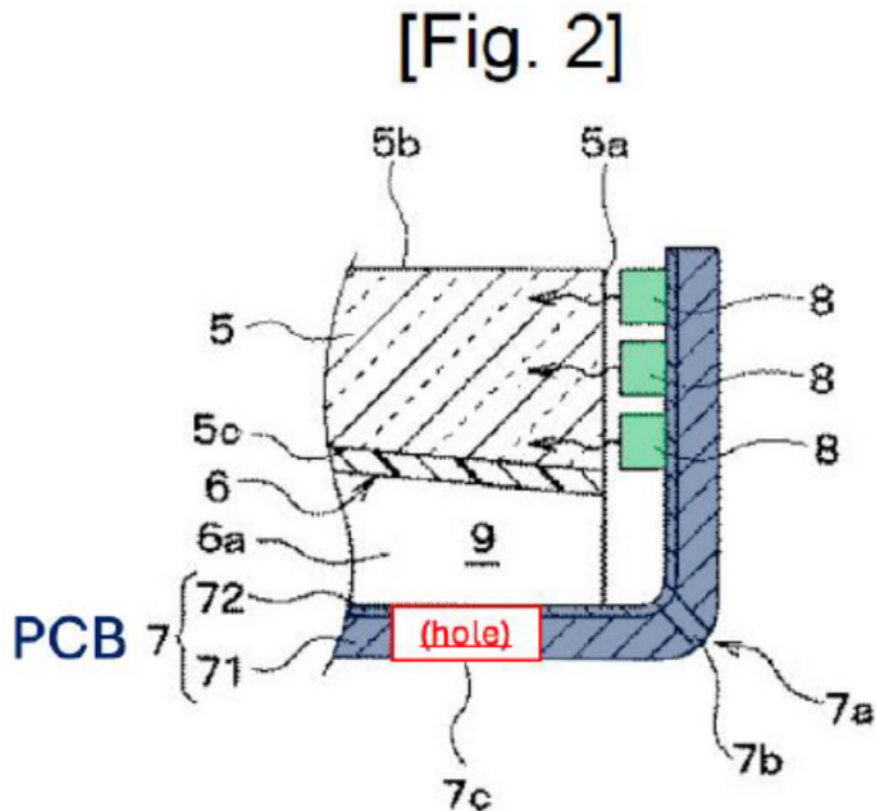
Dr. Baker started by reviewing the ’842 Patent before looking at the prior art to forming an opinion about what was obvious. Ex. 2024 at 11:2–4. Thus, he looked at the solution before looking at the problem and became infected with hindsight.



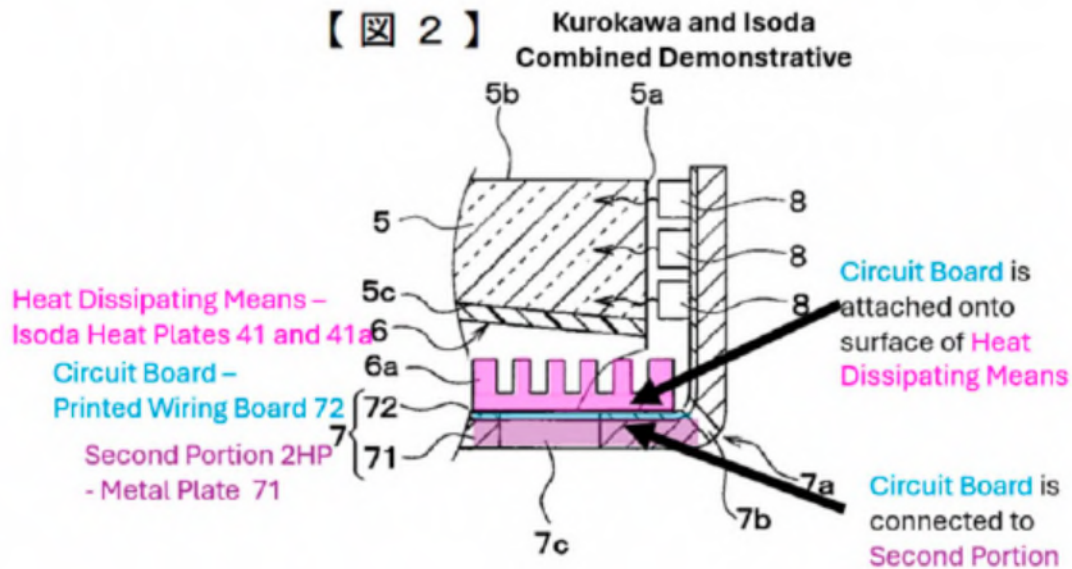
This is not just academic; he exemplified his hindsight methodology during deposition regarding Patent 9,263,509, which covers related technology. *See* Paper 6 § II (IPR2024-01133 related). When asked how he would combine prior art references, Dr. Baker looked not only to the prior art, but he actively used the patent claims as a roadmap to decide how to modify the prior art. *See* Ex. 2022 at 199:24–200:2 (“Okay. I have exhibit [9] -- let me look at the claim language again. Make sure that the second auxiliary electrode doesn’t have to connect to the anode.”); 204:22–207:9; *see also* IPR2024-01133, Exhibit 2022 at 5:04–5:45, 6:55–7:12, Exhibit 2023 at 1:28–39, and Exhibit 2024 at 8:23–30 (deposition excerpt videos from IPR2024-01133 showing Dr. Baker actively using hindsight to reconstruct Patent No. 9,263,509).

Further, evidence of hindsight is visible throughout all the grounds of the Petition. The most egregious example is Petitioner’s use of Kurokawa to search for the L-shaped fastener and to propose a heatsink. As explained in the POPR, Kurokawa uses a flexible PCB, and “[b]ending the entire PCB itself to reorient the chip is a fundamentally different technology” than an L-shaped fastener. Paper 7 at 17. The Institution Decision sympathetically acknowledged this. Paper 16 at 26 (“We are sympathetic . . . that Kurokawa’s printed wiring board 72 cannot satisfy both the L-shaped-fastener and circuit-board limitations of claim 5”). Then, to forcibly create something that meets the “heat dissipating means” element of claim

6, Petitioner uses hindsight to add a heatsink to Kurokawa's design in a location that covers the ventilation holes dissipates heat inside of an enclosed device.



Ex. 1004 at Fig. 2 (annotated to show its “ventilation holes (7c)”).



Petition at 72 (annotated by Petitioner to add a heatsink covering ventilation hole 7c). Accordingly, the Petition improperly relies on the hindsight of an unqualified expert.

## V. CLAIM CONSTRUCTION

The Federal Circuit has held that “only those terms need be construed that are in controversy, and only to the extent necessary to resolve the controversy.” *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999). This principle applies equally to IPR proceedings. *See, e.g., Apple Inc. v. Uniloc Luxembourg S.A.*, IPR2018-00420, Paper 7 at 8 (PTAB, Aug. 6, 2018).

### A. “Fastener” (all claims)

The proposed construction of “fastener” is “an article whose primary purpose is to attach or fasten one object to another.” Using common sense, things like tape,

glue, staples, nails—their primary purpose is to fasten one object to another. In compliance with the Institution Decision, this construction of the term does not require that the fastener be made from a single material that is “integrally formed.” Paper 16 at 21.

The proposed construction is consistent with the specification of the ‘842 Patent: the purpose of the fastener is to provide surfaces onto which other components attach. *See* Ex. 1001, 2:31–35 (describing a “fastener” that “provides a first surface to which a chip and light emitting device module attach, while also providing a second surface for attachment of a second fastener, or a PCB.”); *see also* Ex. 2020, ¶ 116.

The claims in the ‘842 Patent supports this definition of the term “fastener.” For example, claim element [3b] recites “a first fastener having a first portion and a second portion, the first portion disposed adjacent to the first side of the light guiding plate, wherein the first portion and the second portion are arranged in a substantially perpendicular relationship to form a substantially L-shaped structure” and [3c] recites “a light emitting device disposed on the first portion.” Ex. 1001, 4:40–46. Claim 5 further describes a “circuit board . . . connecting the second portion.” *Id.*, 4:52–53. Thus, the claims clearly describe the “first fastener” has “a first portion and a second portion” whose purpose is to fasten two different objects: an LED and a circuit board.

**B. “heat dissipating means ... for conducting a heat generated thereon” (claims 6 and 9)**

An element in a claim expressed as a means or step for performing a specified function without the recital of structure shall be construed to cover the corresponding structure described in the specification. 35 U.S.C. § 112(6) (pre-AIA). This term uses the words “heat dissipating means” and recites the function of either “for conducting a heat generated thereon” and “heat dissipating.”

Here, a POSITA would have understood from the corresponding structure performing includes at least one of the heat dissipating plates 46, such as annotated in Figure 4 below, that dissipate heat into the surrounding air. *See* Ex. 1001, Fig. 4, 2:9-11, 3:25-32, 3:51-58; Ex. 2020, ¶ 118. A POSITA would have understood that the heat dissipating means are configured to dissipate heat away, to protect a material from overheating, usually by dissipating the heat into the air. Ex. 2020, ¶ 118.

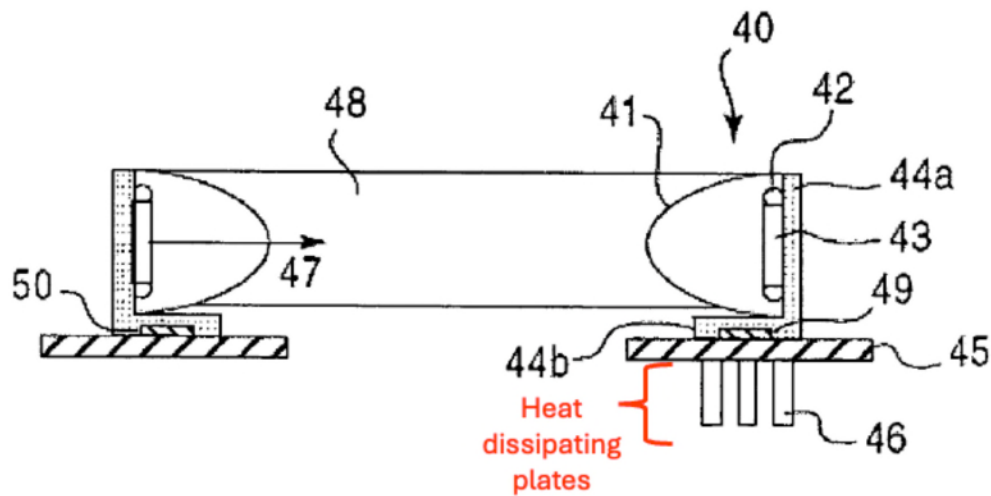


Fig.4

For this IPR, the Board need not resolve whether 1, 2 or 3 plates is needed or which direction they face or their precise orientation and location. However, the Board should reject any implicit construction by Petitioner that anything “conducting a heat” qualifies, including a small corner of an electrode that covers and radiates heat into an insulator (as opposed to radiating heat into the air). Petition at 23. Petitioner’s implicit proposal should be rejected because literally every material in the universe conducts heat to some degree (even insulating ice chests will eventually let heat in), and Petitioner’s implicit construction makes the limitation meaningless. *In re Power Integrations, Inc.*, 884 F.3d 1370, 1376 (Fed. Cir. 2018) (citing cases for the rule that a claim should not be construed in a way to make an element meaningless).

**C. “circuit board connecting the second portion” (claims 5, 7)**

In this phrase, the plain and ordinary meaning of the term “connecting” requires something more than just touching, such as attachment. *See, e.g.*, Ex. 2019 at 1 (“to become joined” or “to join or fasten together usually by something intervening”).

The claims and the specification, as the claims describe the “circuit board connecting the second portion” (Ex. 1001, 4:52–53) while the specification describes that second portion and the circuit board are “attached,” not just touching. *See* Ex. 1001, 4:1–4 (“light emitting device backlight package includes a fastener having a first surface to which to attach a chip and a second surface for attachment of a printed circuit board.”), 3:27–28 (“PCB 45 is attached on one side to the second portion 44B of the L shaped fastener”), 3:53–54.

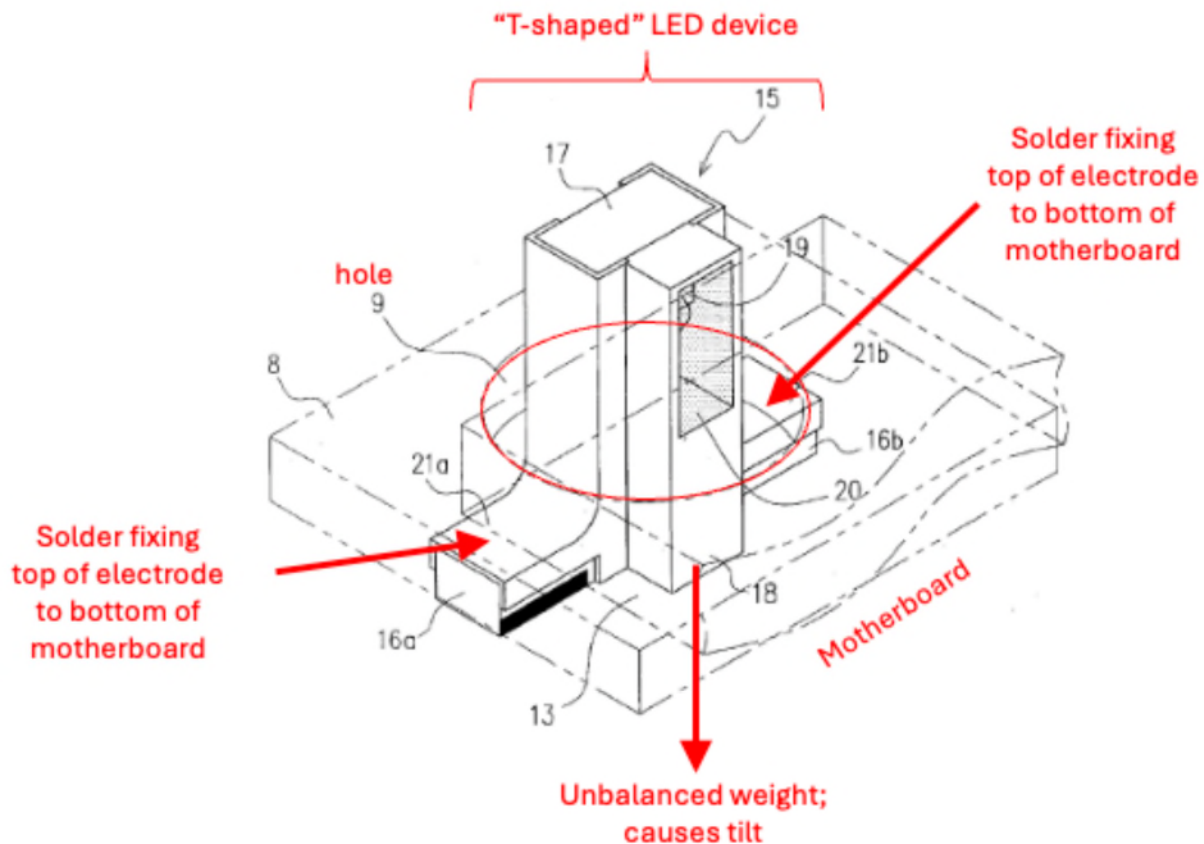
## **VI. GROUND 1 (UEKUSA § 102, CLAIMS 5–9)**

### **A. Summary of Uekusa: Anti-Tipping Technology**

Uekusa improves the prior art JP2002-0164583 by improving the balance of the LED setup. Ex. 1008, 1:11–2:49. In the prior art system, “a light emitting diode of a generally T-shaped character as shown in FIG. 11” was inserted through a hole in the motherboard. *Id.*, 1:49–55, 1:66–2:2. Then, “upper surfaces of the base sections 16*a* and 16*b* are disposed upon the motherboard at two positions on a peripheral edge of the hole 9 in order to fix substrate electrodes 21*a* and 21*b* of the base sections 16*a* and 16*b* to a print wiring of the motherboard 8 by soldering and to

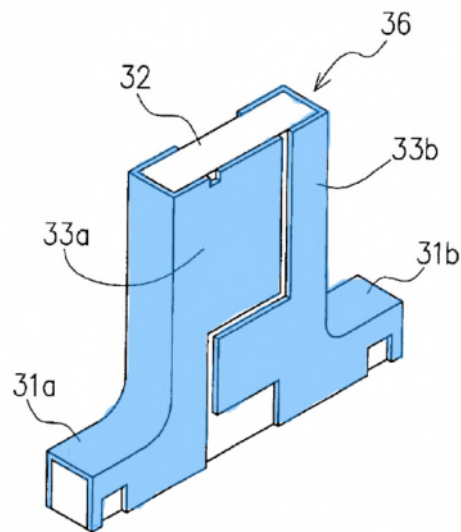
conduct electrically them.” *Id.*, 2:3–8. Uekusa recognized that the problem with this arrangement was that the protrusion 18 formed on the front surface offsets the center of gravity, causing “unbalance for inclining the light emitting diodes.” *Id.*, 2:16–23. In other words, the T-shaped structure tended to tilt forward as shown in the picture below. If the diagram were flipped, it would still tilt on the same side.



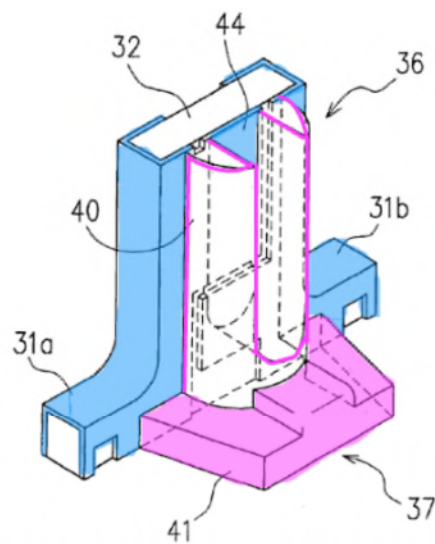


*Id.* at Fig. 11 (annotated conventional system that Uekusa improves on)

To fix the stability problem, Uekusa proposed to modify the protruding frame of the T-shaped body portion have a third point of stability. *Id.*, 2:25–49. Uekusa’s resulting structure can be understood from Figures 4–8, which show progressive steps of the manufacturing process. First, Figure 5 shows the body section 36 is “formed into a generally T-character shape from a glass epoxy resin material,” and then [substrate electrodes 33a and 33b](#) (e.g., copper) are formed on the surface. *Id.*, 3:48–51, 5:39–54.



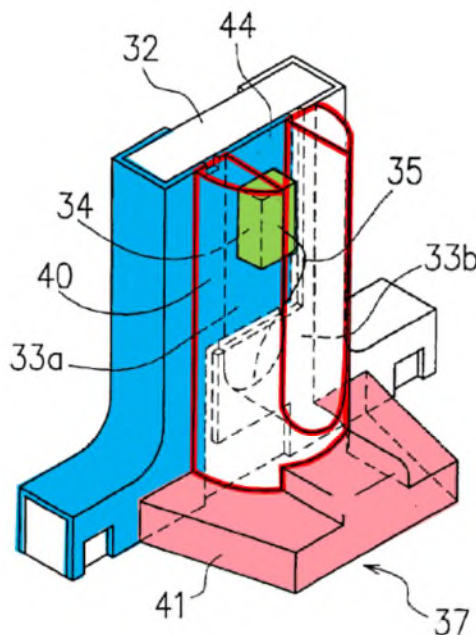
*Id.* at Fig. 5 (colored). In the next manufacturing step, the resin forming section 37 and U-shaped frame 40 are formed using a technique called “transfer forming.” *Id.* at 3:1–11, 5:55–65.



Ex. 1008, Fig. 6. The U-shaped frame is formed from a non-translucent, white resin. *Id.*, 2:41–42, 2:59–60. The U-shaped frame has a concave shape. *Id.*, 4:22–60. The purpose of the white resin, U-shaped frame and the extension part 41 is to “reflect

effectively the light from the light emitting diode element 34” that is added in the next step, thereby “obtaining a high efficiency of irradiation of light in the forward direction of the light emitting diode.” *Id.*, 4:54–60.

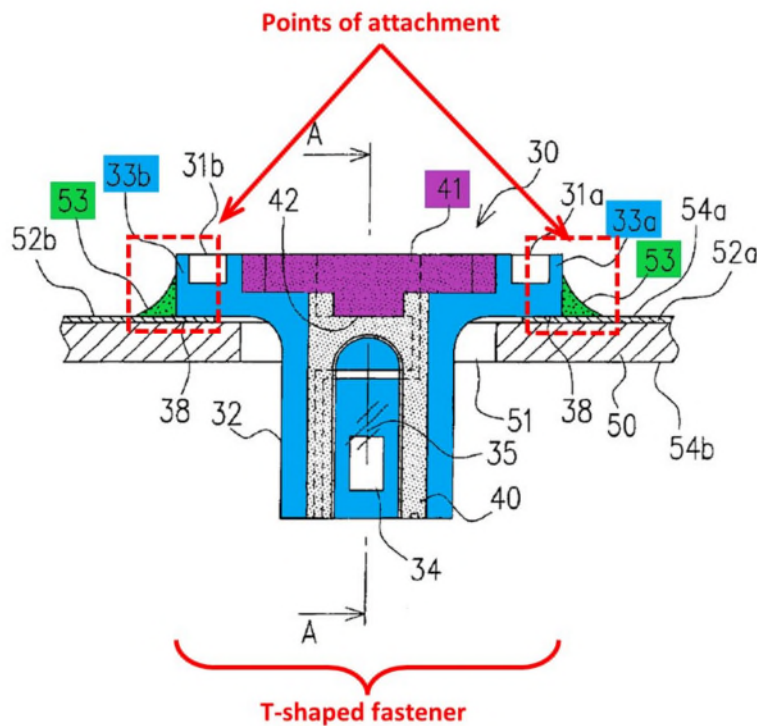
In the next manufacturing step, an LED is mounted on one electrode 33a within the concave portion of the frame. *Ex. 1008*, 4:36–53, 5:66–7:12.



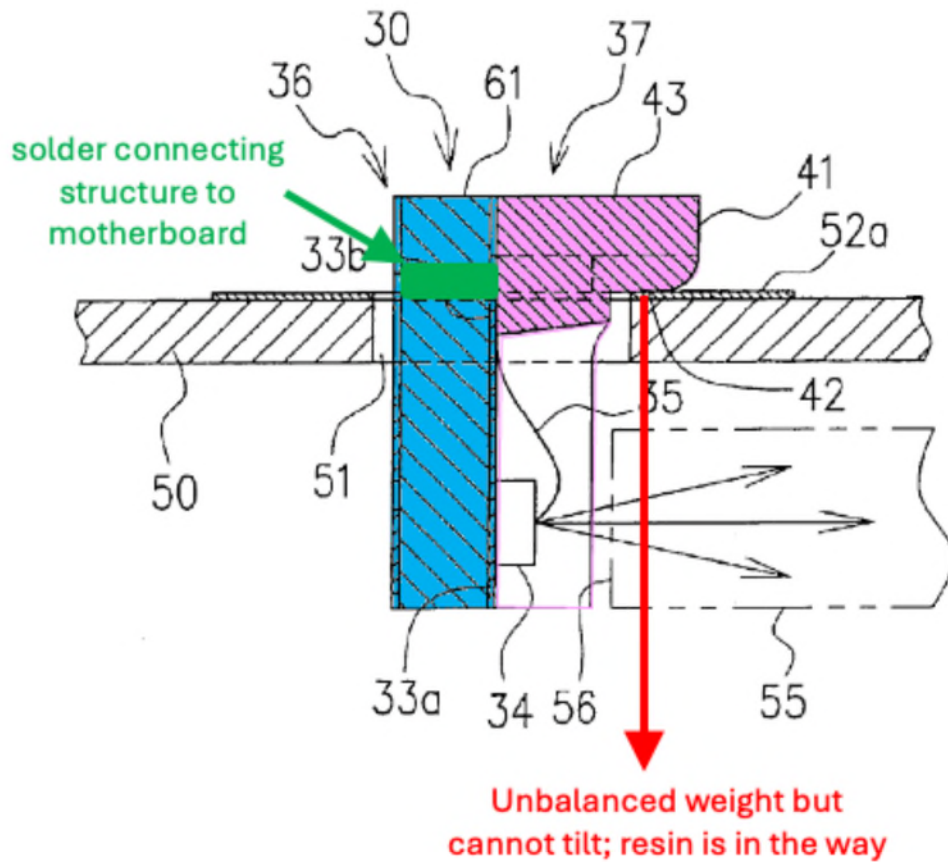
*Id.*, Fig. 7 (annotated).

As shown in the figure below, the assembly is then inserted through a hole, and the ends “are fixed by means of a solder 53” to the motherboard 50. *Id.*, 5:6–10. Only “the substrate electrodes 33a and 33b on the base portions 31a and 31b and circuit electrodes 52a and 52b ... are fixed by means of a solder 53 to secure firmly the light emitting diode to the motherboard.” *Id.* at 5:7–10. The resin sections (including the resin forming section 37 and U-shaped frame 40) are not soldered to

the motherboard. Ex. 2020 ¶¶ 125, 129 (showing damaged resin). These resin sections *cannot* be soldered or welded to the motherboard because the resin will melt and become damaged. *Id.*



Ex. 1008, Fig. 2 (annotated). The final assembly is shown from the side in Figure 3 below. Notably the resin forming section 37 and U-shaped frame 40 still have an unbalanced weight that is offset from the center of gravity (*see id.*, 2:16–23), but the structure will no longer tilt downward because the resin forming section 37 makes a third point of contact. *Id.*, 5:1–4.



### B. Independent Claim 3[b]: Uekusa Lacks an L-Shaped Fastener

Petitioner fails to show that the primary reference Uekusa discloses element [3b], which is “a first fastener having a first portion and a second portion, the first portion disposed adjacent to the first side of the light guiding plate, wherein the first portion and the second portion are arranged in a substantially perpendicular relationship to form a substantially L-shaped structure.” Instead, what the Petition points to as constituting the claimed L-shaped “first fastener” is at most a “T” shaped fastener. The resin portion is not a fastener and it is not part of a fastener. The resin does not fasten any two objects together. The resin is not and cannot be soldered to

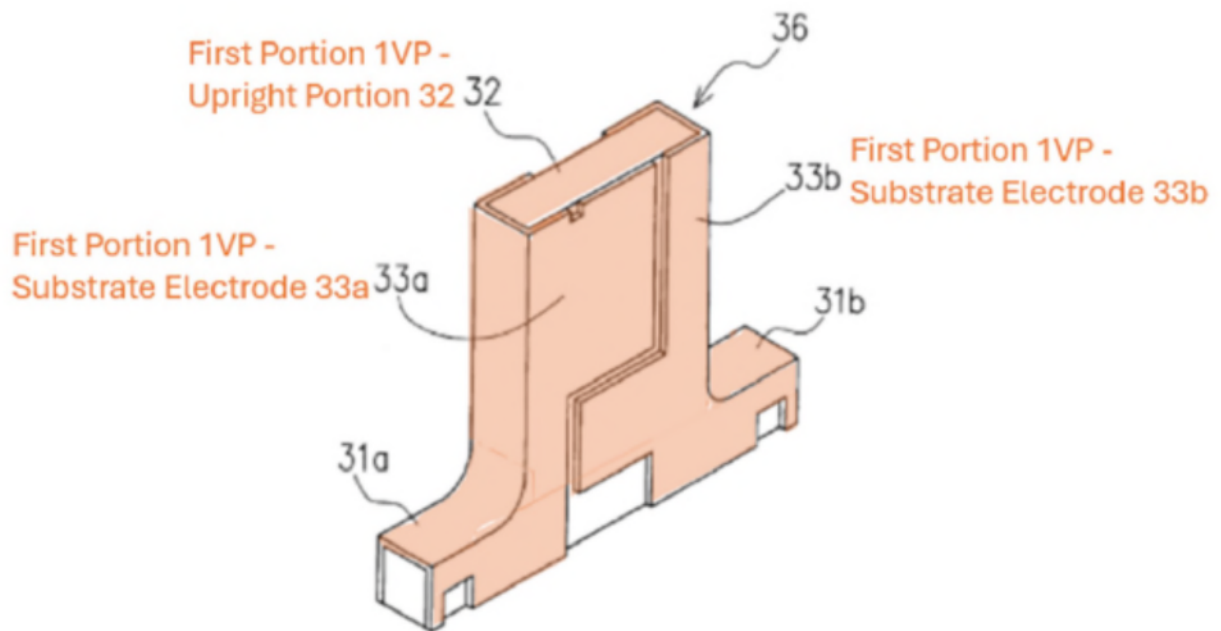
the circuit board. The purpose of the resin extension is to touch the circuit board to prevent tilting, similar to how a door may contact a doorstop on the wall to prevent further movement. The door may touch the doorstop, but the door is not fastened to the doorstop, and this action does not make the door or the doorstop a “fastener.”

The Petition presents two<sup>2</sup> alternative theories for how the L-shaped fastener is met. Petition at 10–13. Both theories fail because they include non-fastening resin as part of the L-shaped fastener.

Petitioner’s two theories rely on what it calls “vertical portion (1VP) upright portion 32,” either with or without electrodes 33a/33b in alternative theories, to be the claimed “first portion” of the L-shaped fastener. *Id.*

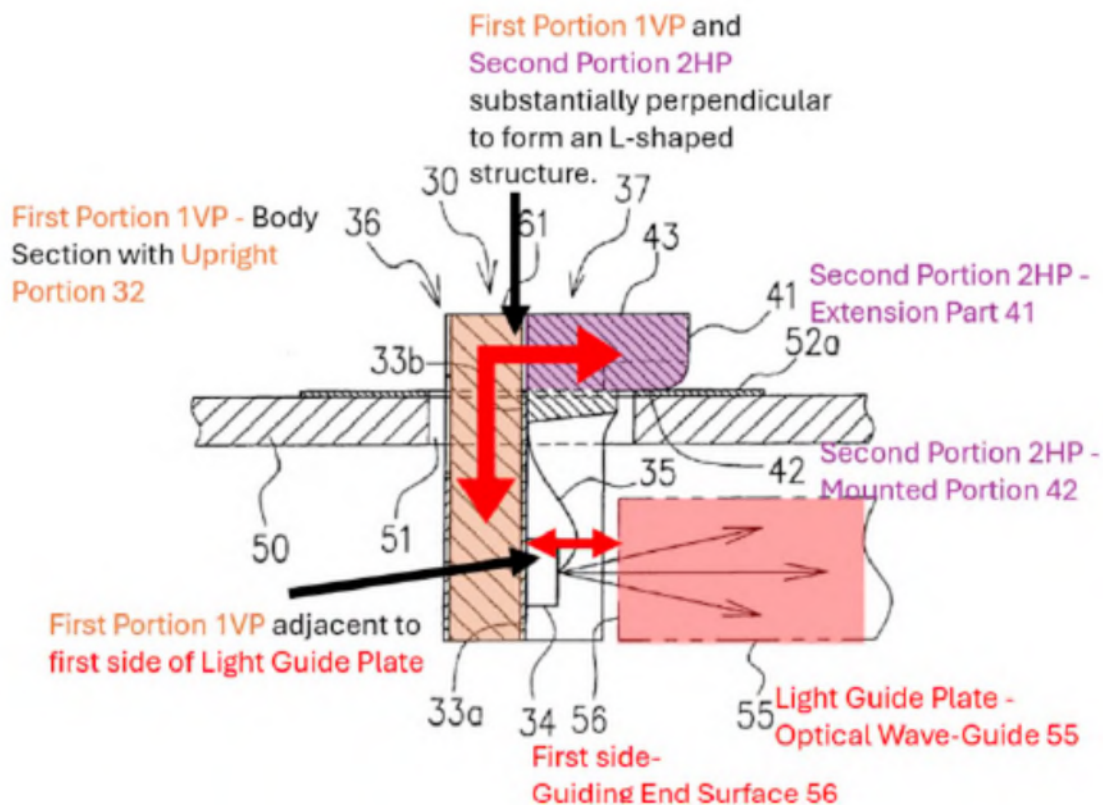
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<sup>2</sup> When asked leading questions, Dr. Baker testified that there were two alternative mappings in addition to a primary mapping for three total theories. Ex. 2009, 69:4–70:3. The Petition has either dropped the third theory or failed to clearly articulate it. Petition at 10–13. All variations appear to affect to the vertical portion only. Regardless, all of Patent Owner’s arguments fail because they all rely on the resin for the horizontal portion.



*Id.* All two or three of Petitioner’s theories further rely on Uekusa’s “[extension part 41 and mounted portion 42 2HP](#)” as the claimed “second portion” of the L-shaped fastener. *Id.* Petitioner’s annotated figure is provided below:





### 1. Resin does not fasten under the Board's construction

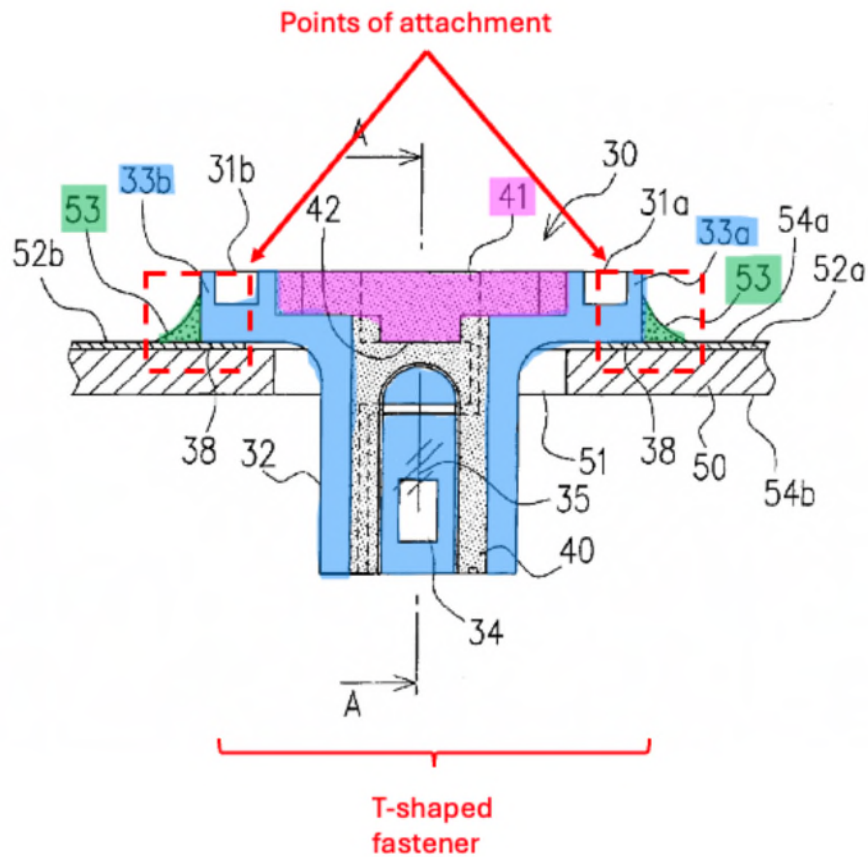
As noted in the Institution Decision, the “fasteners described in the ’842 patent . . . simply provide surfaces onto which other components, *e.g.*, an LED, may be attached.” Paper 16 at 22. The resin extension that Petitioner relies on to form the base of the “L” shape does not and cannot provide any type of attachment or fastening.

Dr. Bretshneider explains that such a resin forming section cannot be considered a fastener because it does not fasten anything or otherwise provide any surfaces suitable for attaching other components. This resin forming section is not suitable for soldering to the motherboard because the resin will burn and become

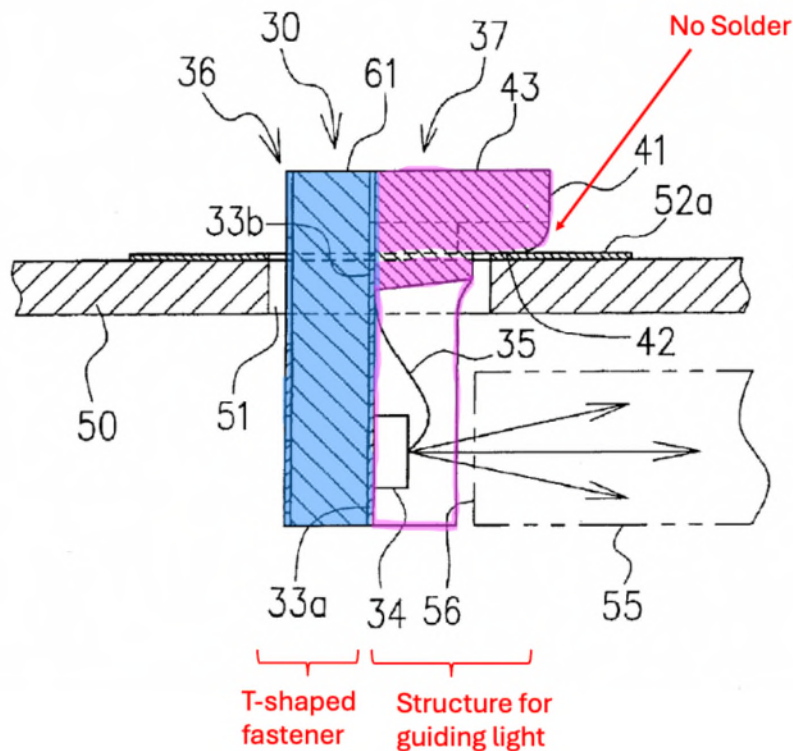


damaged. Ex. 2020, ¶¶ 127–132. Indeed, even Petitioner’s expert agreed, noting that resin cannot be soldered and that the resin forming section would simply be “placed” on the circuit board. Ex. 2024 at 52:7 (“You can’t solder to resin”), 53:23–24 (“Q[:] Are you aware of anywhere in Uekusa where it teaches how what you refer to as ‘2HP’ is attached to the circuit board?” “A[:] “I think it’s placed. Circuit board’s placed inside. . . . I think a [POSITA] would understand how to place the motherboard inside what I’ve called the second portion, 2HP.”).

Uekusa only discloses two points where the motherboard 50 uses solder 53 to attach to substrate electrodes 33a and 33b of the “T” shaped structure. Ex. 1008, 5:5–10, Fig. 2 (annotated below).



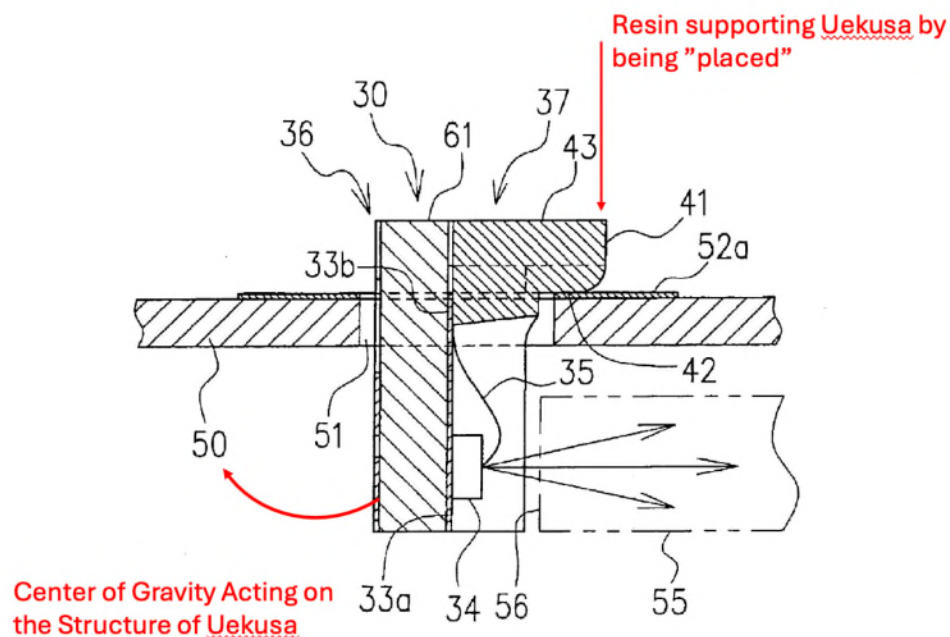
Uekusa does not disclose using solder 53 on resin forming section 37 (because resin is incapable of being soldered), nor does it describe any other means by which the resin attaches anything to the T-shaped fastener. *See* Ex. 1008, Fig. 3 (annotated below).



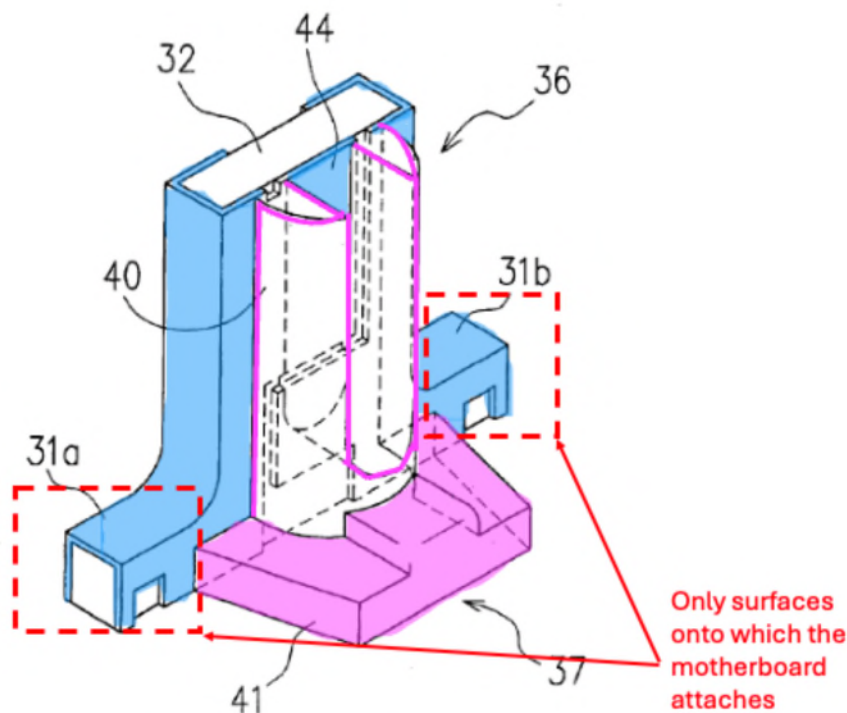
Although resin forming section 37 may be “placed” on the PCB, resin forming section 37 does not and cannot attach anything. *See* Ex. 2020, ¶ 132. Uekusa merely discloses that the LED “can be supported with at least three points when it is mounted on a peripheral edge of a hole in a motherboard to carry out stability of a posture . . .” Ex. 1008, 2:29–31.

Uekusa’s third contact point is the resin, which cannot be attached to anything, and it simply rests on the edge of a hole in the motherboard. *See* Ex. 1008, 2:16-24 (“However, because the aforementioned T-shaped light emitting diode 15 has such a structure that the protrusion 18 is formed on the front surface of the upright section 17, there is a problem that a center of gravity of the light emitting diode offsets

forwardly and therefore an unbalance for inclining the light emitting diode generates when the base sections 16a and 16b are mounted on the peripheral edge of the hole 9 provided in the motherboard 8.”), 2:26-31 (“It is, therefore, a first object of the present invention to provide a light emitting diode in which the light emitting diode can be supported with at least three points when it is mounted on a peripheral edge of a hole in a motherboard to carry out stability of a posture of the light emitting diode.”); Ex. 2020, ¶ 132; Ex. 1008, Fig. 3 (annotated below).



Thus, resin forming section 37 does not “provide surfaces onto which other components . . . may be attached” as described by the ’842 Patent. *See* Ex. 2020, ¶¶ 131–32; Ex. 1008, Fig. 6 (annotated below). It only provides a surface that touches the motherboard to prevent further tilting.



Additionally, Uekusa fails to disclose the claimed fastener if the Board maintains its construction that a fastener “simply provide[s] surfaces onto which other components . . . may be attached.” *See* Institution Decision at 22–23. As discussed above, the surfaces of **resin forming section 37** are incapable of attaching. *See* Ex. 2020, ¶¶ 127–35.

## **2. Resin does not fasten under Patent Owner’s construction**

Under the construction Patent Owner (*see* Section V(A) above), Uekusa’s **resin forming section 37** is not “an article whose primary purpose is to attach or fasten one object to another.” Uekusa’s **resin forming section 37** has two purposes, neither of which is fastening one object to another. One purpose of the white resin

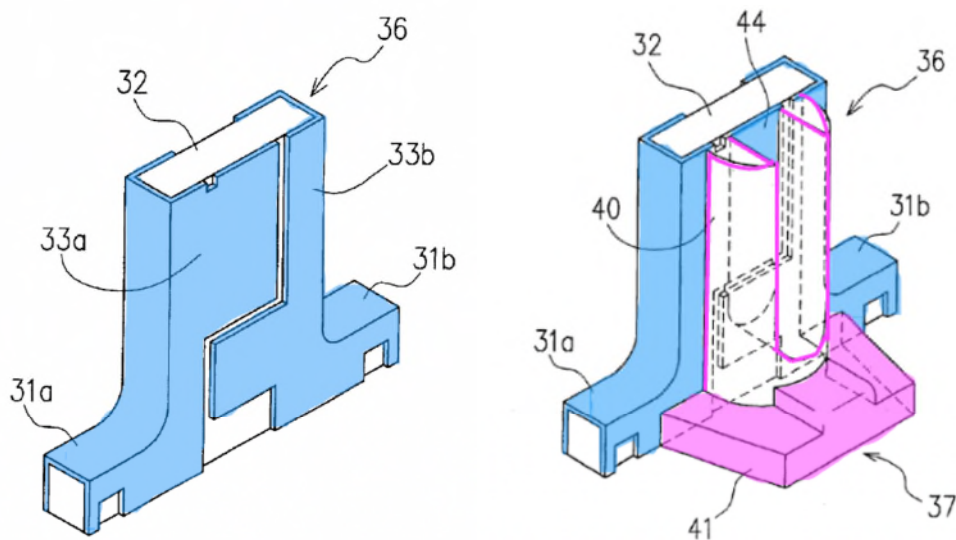
forming section 41 is, in conjunction with the white resin frame 40, to “reflect effectively the light from the light emitting diode element 34, thus obtaining a high efficiency of irradiation of light in the forward direction of the light emitting diode.” Ex. 1008, 4:54–60. The other purpose is to prevent tilting by stopping against the motherboard. *Id.*, 2:27–31, 5:1–4; *see* Section VI(A) above (explaining anti-tilting improvement). The **resin forming section 37** is not soldered or otherwise attached to the motherboard, so the resin does not connect or fasten the vertical portion to the motherboard.

In summary, a POSITA would not have considered **resin forming section 37** to be part of the claimed “fastener” because the purpose of the resin is to 1) reflect light and 2) act as a doorstop against tilting. Ex. 2020 ¶¶ 123–28 131.

### **3. “T” and “U” Disclosed; “L-shaped” Lacking**

Uekusa explicitly describes its body as T-shaped and frame as U-shaped or plate-shaped, not L-shaped. Ex. 1008, abstract (“a generally T-shaped body section), 2:35–37 (“a generally T-shaped body section”), 4:4–10 (“a generally U-shaped frame 40 . . . and a plate-shaped extension part 41”). “T,” “U,” and “plate” are the words that Uekusa (who was not plagued with hindsight) chose to describe the shape of its structures. Uekusa thus serves as unbiased evidence of 1) how a POSITA would have actually described the shapes of Uekusa’s components and 2) how a

POSITA would have separately grouped different components because they perform different roles, rather than collectively calling them a “fastener.”



Ex. 1008, Figs. 5 and 6 (showing T-shaped body and U-shaped resin frame with a plate-shaped extension).

Accordingly, the only structure in Uekusa that may be considered a “fastener” under any construction of the term is body section 36 that is “formed into a generally T-character shape from a glass epoxy resin material,” including substrate electrodes 33a and 33b not resin resin forming section 37. See Ex. 1008, 3:47–53. Thus, Uekusa does not teach the claimed “fastener” having a “substantially L-shaped structure.”

**C. Dependent Claim [5]: “the circuit board connecting the second portion”**

Claim 5 depends from claim 3, so Uekusa does not anticipate claim 5 for at least the reasons discussed above in Section VI(B). Further, under the construction “the circuit board connecting to the second portion” where “connecting” requires something more than touching, Uekusa’s resin forming section 37 is not connected to the circuit board. *See* Section V(C), above (construing “connecting”).

Unlike the electrodes that are connected to the circuit board via soldering, the resin forming section 37 cannot be soldered to and is not otherwise attached or connected to the circuit board. Ex. 1008, 2:1–8, 5:6–10; Ex. 2020, ¶ 136. Additionally, resin is an electrical insulator and does not provide an electrical connection when in contact with an electrical conductor. *Id.* Uekusa has no disclosure about the resin forming section 37 doing anything beyond touching the circuit board to prevent tilting. Petitioner has no evidence that the resin forming section forms any point of connection with the circuit board.

Thus, Uekusa’s resin forming section 32 touches but does not “connect” to the circuit board, and claims 5 is valid over Uekusa. *Id.*

**D. All claims 5–9: Not anticipated for reasons discussed above.**

Claims 5 and 6 depend from claim 3. Thus, claims 5 and 6 are not invalid for at least the same reasons discussed above for claim 3.

Independent claim 7[b]–7[d] recites elements similar to those discussed above for claims 3 and 5, and the Petitioner’s analysis of claim 7 merely cites back to its



argument for claims 3 and 5. Petition at 26–27. For at least the reasons discussed for claims 3 and 5 above, claim 7 is also not anticipated by Uekusa.

Claims 8 and 9 depend from claim 7. Uekusa fails to anticipate claims 6–9 for at least the reasons discussed for claim 7.

**E. Claims 6 and 9: Uekusa Lacks a “Heat Dissipating Means”**

Under the construction of “heat dissipating means” that means “heat dissipating plates,” Uekusa plainly fails to disclose the claimed limitation—there are no heat dissipating plates in Uekusa. Ex. 2020, ¶ 137; Compare Ex. 1001, Fig. 4 with Ex. 1008, Fig. 3 (illustrating a lack of heat dissipating plates in Uekusa):

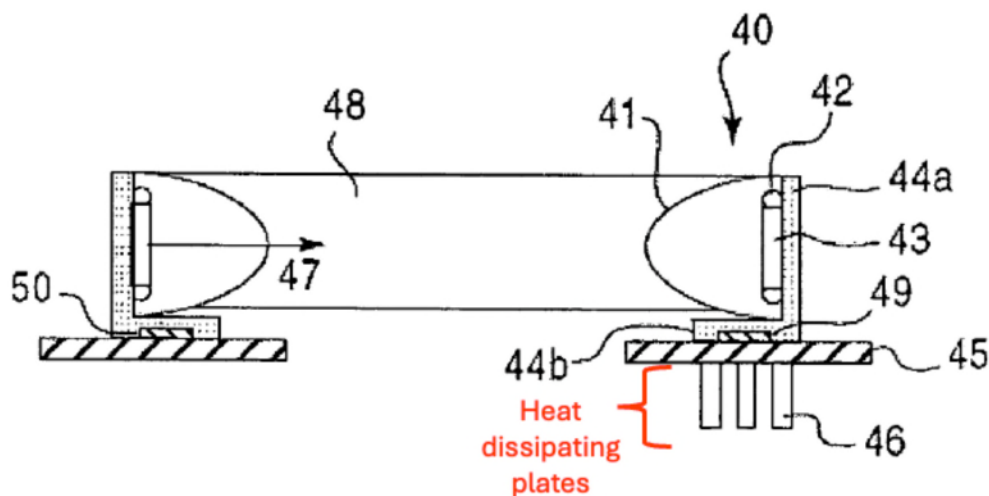
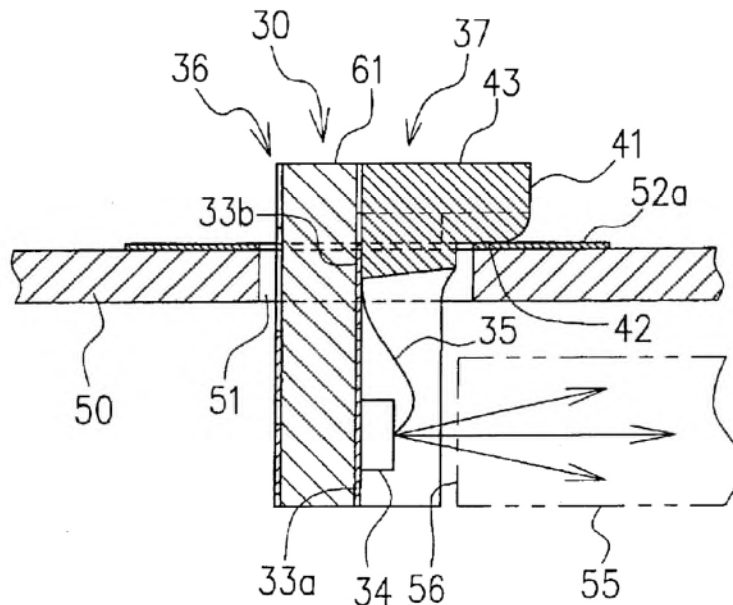


Fig.4

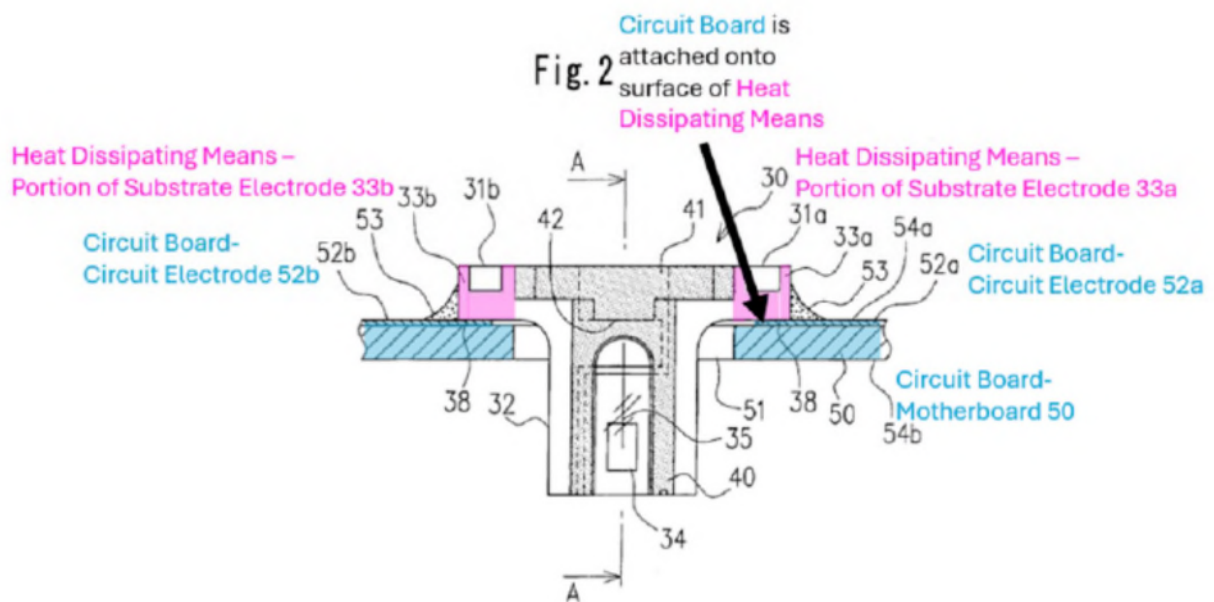


Petitioner’s assertions that Uekusa’s electrical contacts “inherently performs the function” of a “heat dissipating means attached onto the surface of the circuit board for conducting a heat generated thereon” have no merit. *See* Petition at 25. In making this argument, Petitioner relies on the law of entropy to argue that literally every physical material in the universe inherently conducts heat. Petitioner’s broad construction of “heat dissipating means” impermissibly makes “heat dissipating means” meaningless. *In re Power Integrations, Inc.*, 884 F.3d at 1376. At minimum, the claimed “heat dissipating means” refers to a heat-dissipating plate, for example, as shown in Figure 4 or as described at Ex. 1001, 4:26–31, 4:51–48, or 4:4–6.

As Dr. Bretshneider explains in depth, Uekusa’s substrate electrodes are wholly inadequate to act as a heat dissipating means as claimed. Ex. 2020, ¶¶ 138–

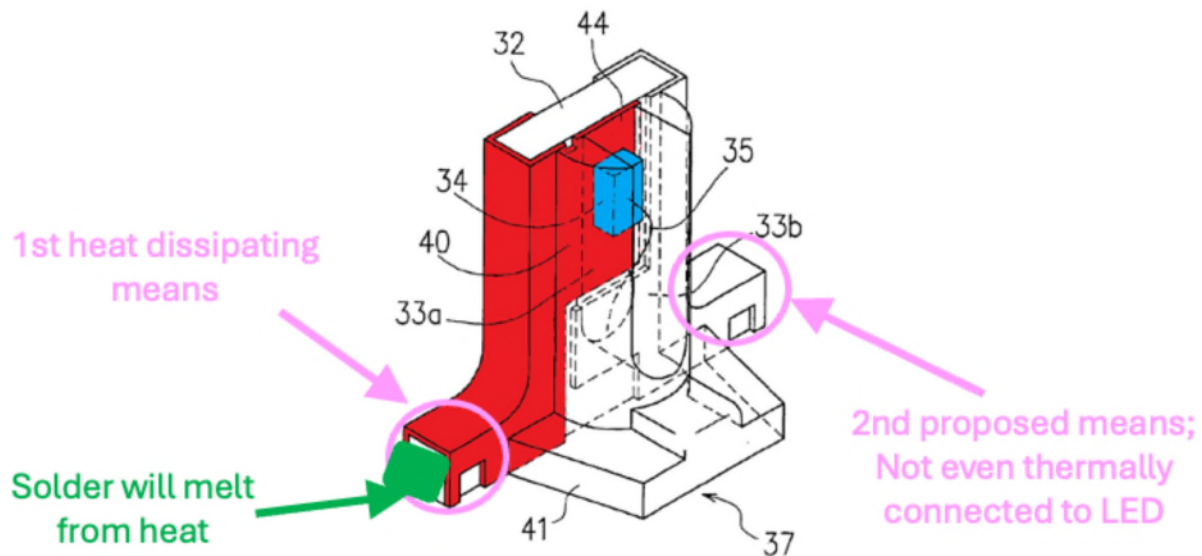
46. For example, Uekusa's upright section 36 comprises a glass epoxy substrate, which is a thermal insulator and cannot perform the function of effective heat dissipation. Ex. 1008, 3:49–50; Ex. 2020, ¶ 145; Ex. 1005, 1:30–31 (“heat emitted from the LED 3 [is] scarcely transmitted to the print substrate 6”). Normally, heat dissipators will dissipate heat into the air—they will not be insulated with a glass epoxy, even on one side. Ex. 2020 ¶ 144.

Petitioner offers a theory where only corner “portions of substrate electrodes 33a and 33b would inherently perform the function of” heat dissipation, but even this theory remains unreasonable. *See* Petition at 25; Ex. 2020, ¶¶ 138–46.



As Dr. Bretschneider notes, heat dissipation is a function of cross-sectional area, and the cross-sectional area of “portions of substrate electrodes 33a and 33b” is simply too small to act as a heat-dissipating means in the system. Ex. 2020, ¶¶ 142, 146.

Not only that, but one of the two electrodes identified by Dr. Baker is not even connected to the LED.



Ex. 2020 ¶ 141–42, 144 (annotating to show only one electrode connected to the LED).

The plates of a heat-dissipating means should normally be surrounded on both sides by air, so that it can radiate heat; it should not contact an insulator or material that is easily damaged by heat. Ex. 2020 ¶ 144. If a significant amount of heat was somehow radiated by the electrode, then the solder next to it would be at risk of melting, and the device might fall apart. *Id.*

Dr. Baker's interpretation has a heatsink that has an insulator (glass epoxy) on one side. Although Petitioner identifies only one corner of Uekusa's electrode as the heat dissipating means, the rest of the Uekusa's electrode further extends to

Uekusa’s resin, which, like solder, is also easily damaged by heat. *Id.* A POSITA would have understood “heat radiating means” to radiate heat away from structures (e.g, into the air) to prevent their overheating, not to dissipate heat into sensitive materials like solder or resin.

A POSITA understood that a thin substrate electrode disposed on the surface of a thermal-insulating resin body, without more, would not be a “heat-dissipating means” in the context of LED display design. Ex. 2020, ¶ 146. Any attempt to construe it as such is plainly impermissible hindsight that stretches the teachings of Uekusa to map to the challenged claims. *Id.* Indeed, Petitioner’s only evidence is the declaration of someone who does not have the experience required to be considered a POSITA or any experience designing thermal management systems—this is insufficient to carry Petitioner’s burden of proof. *See* § III.B above; Ex. 2024 at 26:23–25 (“Q[:] And have you ever designed a heat sink for an LED package?” “A[:] I don’t know. Maybe if I did, it was crude.”), 27:10–11 (“[W]hen I have something that’s dissipating a lot of power I just buy the heat sink.”).

Accordingly, Uekusa does not anticipate claims 6 or 9.

## **VII. GROUND 2 (UEKUSA, ISODA § 103, CLAIMS 5–9)**

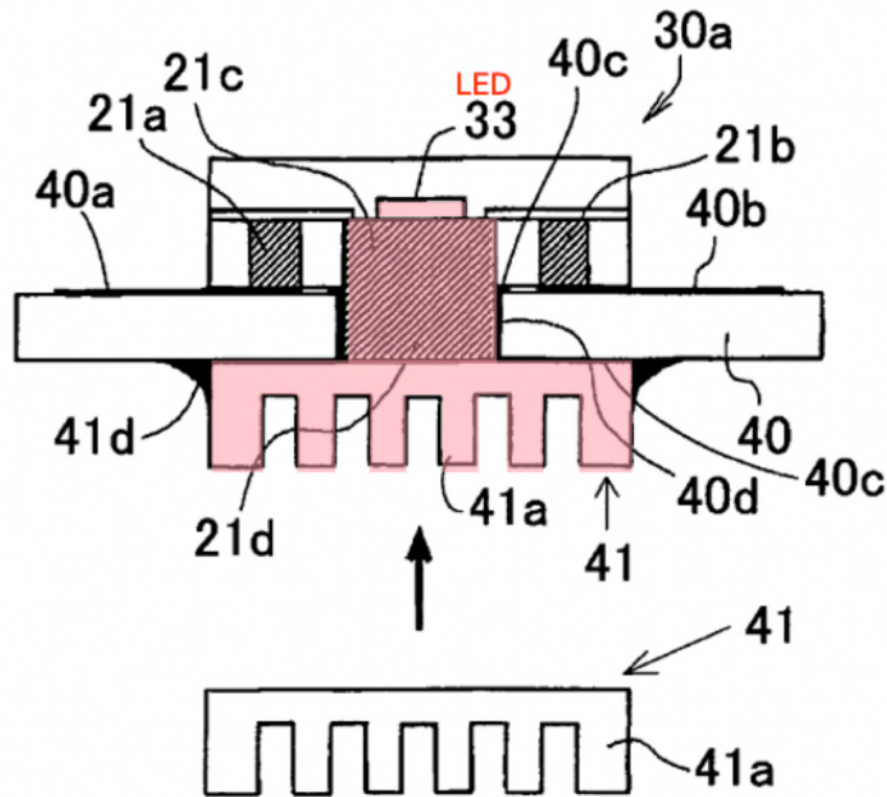
In Ground 2, Petitioner uses hindsight to propose strange and nonsensical locations to add heatsinks from Isoda to Uekusa’s system. Petition at 28–29. Petitioner’s proposed heatsink locations rely on the transmission of heat through the

insulating PCB. A POSITA would have had no reason to place the heat dissipating means in the locations Petitioner suggest because Isoda explicitly teaches that heat is “scarcely transmitted to the [PCB]”, which results in “high temperature, which causes junctions in the LED to degrade.” Ex. 1005, 1:30–36.

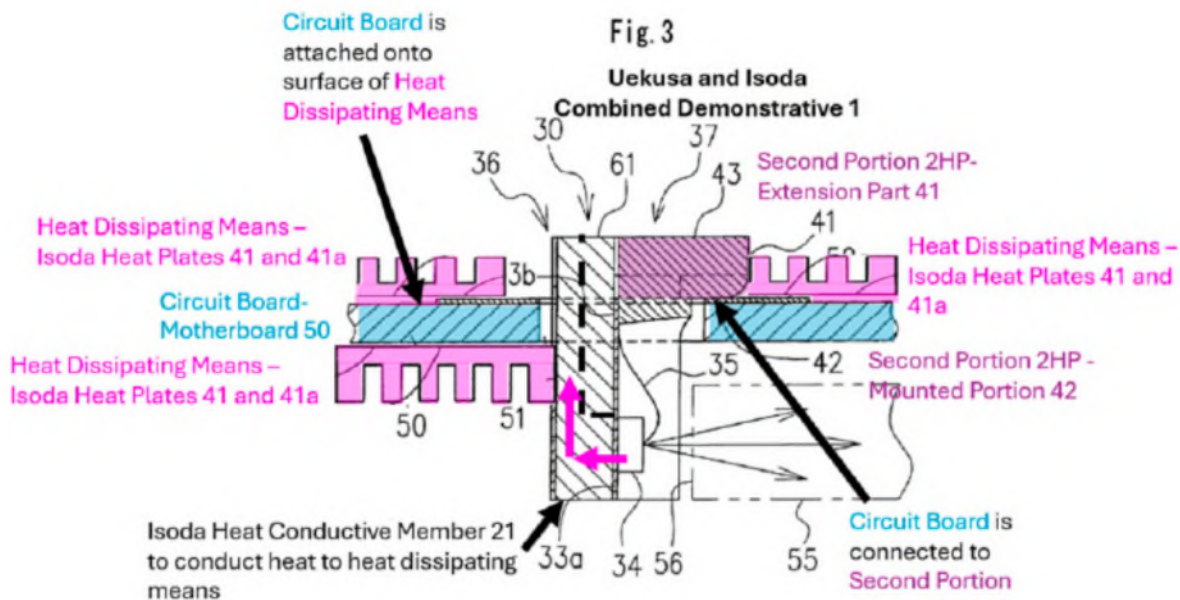
Thus, Isoda itself shows that Petitioner and its expert impermissibly rely on hindsight bias in shaping their arguments because Isoda explicitly teaches away from what Dr. Baker proposes to do. *See, e.g.*, Ex. 1005, 1:30–36 (“heat emitted from the LED 3 [is] scarcely transmitted to the print Substrate 6. Consequently, when a high current is applied to the LED in order to produce high brightness, the emitted heat becomes high temperature, which causes junctions in the LED to degrade”), 1:57–64 (“As described above, the epoxy resin has low heat conductivity”); Ex. 2020, ¶ 154.

Isoda teaches a means of directly connecting the heat dissipating means to a heat conductive material via a through-hole in the epoxy resin PCB. *See, e.g.*, Ex. 1005, 4:7–25, 57–60 (“Thus, the LED 33 is thermally connected with the cooling member 41 through the exposed portion of the heat conductive member 21c, projection 21d, and heat radiation pattern 40c”); Ex. 2020 ¶ 160.

FIG. 4



*Id.* at Fig. 4 (annotated to show short, direct thermal pathway from LED 33 to heatsink). Rather, Petitioner rejects this key teaching of Uekusa to propose distant locations to heatsinks, using pink arrows to annotate how heat is supposed to travel from the LED chip through a glass epoxy substrate that has poor thermal conduction. Ex. 2020, ¶¶ 145, 162–63.



Petition at 28 (proposing locations for heatsinks). Petitioner’s proposed structure exemplifies the hindsight used to reconstruct the claims after consulting with an electrical engineer with no experience in heat management. Accordingly, ground 2 of the Petition must fail.

#### **A. Isoda Fails to Cure Any of the Above Deficiencies of Uekusa**

Nothing in Isoda discloses an L-shaped fastener. *See* Ex. 2020, ¶¶ 120–35, 153; Ex. 1005. Isoda teaches installing the LED with a conductive member projecting through a hole in the PCB, then attaching a thermal dissipation means directly to the LED package via the conductive member. Ex. 2020, ¶ 162; Ex. 1005, 4:7–25, Figs. 4 and 8 (reproduced below).



FIG. 4

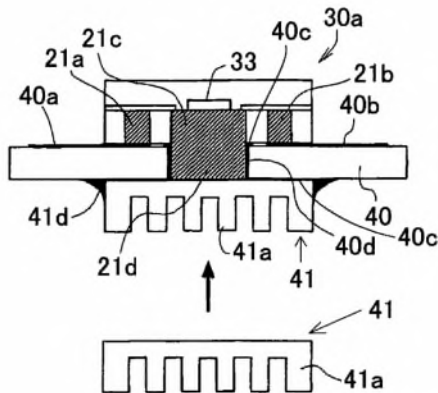
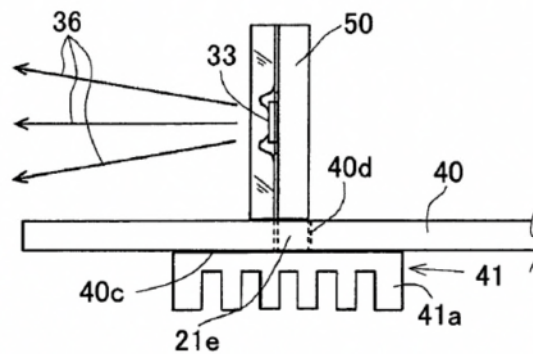


FIG. 8



Therefore, Isoda fails to cure the above deficiencies of Uekusa with respect to independent claims 3 and 7, and dependent claim 5 because there is no L-shaped fastener resulting from any combination of the references. Accordingly, all claims are valid over any combination of Uekusa and Isoda.

#### B. The Proposed Combination of Uekusa and Isoda Is Not Obvious

A POSITA would not arrive at the '842 Patent following any teaching of Isoda or Uekusa because the '842 patent claims, for example, “the heat dissipating means attached onto the surface of the circuit board for conducting a heat generated thereon.” Ex. 1001, claims 6, 9. The only evidence Petitioner provides is the declaration of someone who does not have the experience required to be considered a POSITA or any experience designing thermal management systems—this is insufficient to carry Petitioner’s burden of proof. *See, e.g.*, §III.B above.

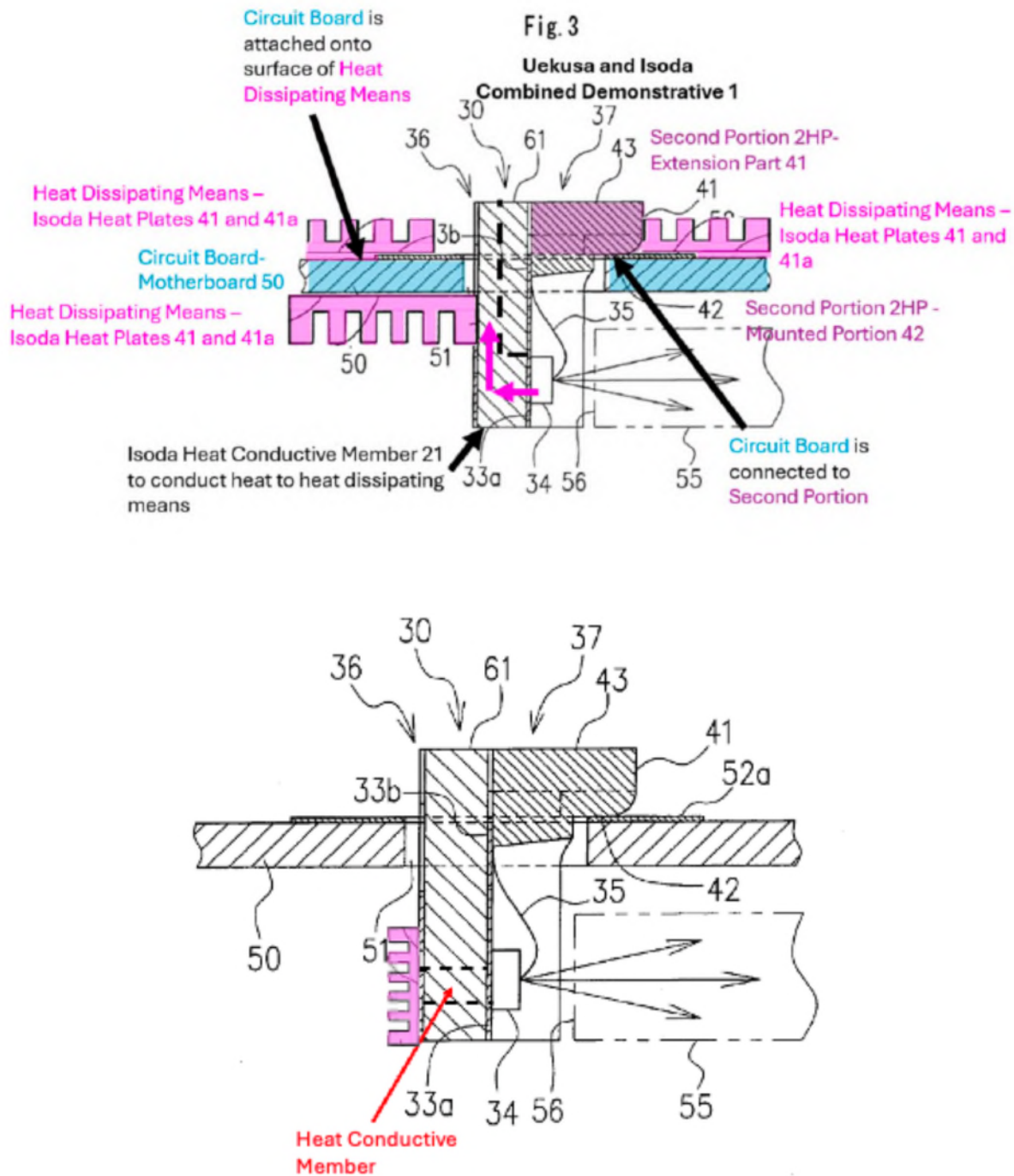
Even assuming a POSITA were to attempt to combine Uekusa and Isoda despite difficulties in manufacturing and cost, the resulting structure would not render the claims '842 Patent obvious. Ex. 2020, ¶ 159. Specifically, the illustrations created by Petitioner and its expert are not supported by the disclosures of Uekusa or Isoda. *See* Petition at 29. Both Uekusa and Isoda teach a structure that protrudes through the circuit board, and a POSITA would have no motivation to attach a heat dissipation means to the less thermally conductive circuit board rather than to the portion directly connected to the LED that protrudes through the circuit board (as taught by Isoda). *See* Ex. 2020, ¶ 161–62.

As an initial matter, Dr. Bretshneider posits that the illustrations of the proposed Isoda/Uesuka combination are “ridiculous and correspond almost precisely to the locations identified by Isoda as resulting in inefficient heat transfer.” Ex. 2020, ¶ 159 (citing Ex. 1005, 1:57–67). Additionally, the '842 Patent teaches away from placing heat dissipating means in a horizontal direction because it “caus[es] critical space to be occupied by what is essentially a maintenance device, instead of using that space to contribute to the primary goal of achieving efficient light production.” Ex. 1001, 2:1–5; Ex. 2020, ¶ 163. However, the petition’s proposed combination plainly illustrates heat dissipating plates extending in a horizontal direction and taking up “critical space”:

Isoda Heat Conductive Member 21  
to conduct heat to heat dissipating  
means

Petition at 28; *see* Ex. 2020, ¶ 163.

If a POSITA attempted to modify Uekusa based on Isoda without hindsight, the POSTIA would have done so differently. *See* Petition at 28; Ex. 2020, ¶ 161–62. Isoda discloses that the “LED is directly mounted on a conductive member having a high heat conductivity.” Ex. 1005, 6:46–48. No reasonable POSITA would place the heatsinks on the circuit board of Uekusa—even assuming a POSITA combined Uekusa and Isoda as the Petitioner suggests, the resulting structure would add cost and complexity and not yield anything resembling the figure in the Petition. *See* Ex. 2020, ¶ 161–62; *compare* Petition at 28 (annotated figure reproduced below) *with* Ex. 1008, Fig. 3 (annotated below).



If a POSITA were to combine Uekusa and Isoda, the POSITA would have placed the heatsink in the position shown in the second figure above, with a thermally conductive connection (not shown) between the heatsink and the LED chip 34. Ex.

2020, ¶ 160–62. This proposal was not put forth by Petitioner, likely because this proposal does not map to the claims of the '842 Patent. This further illustrates the hindsight required by Petitioner and its expert to reach the claimed structure of the '842 Patent.

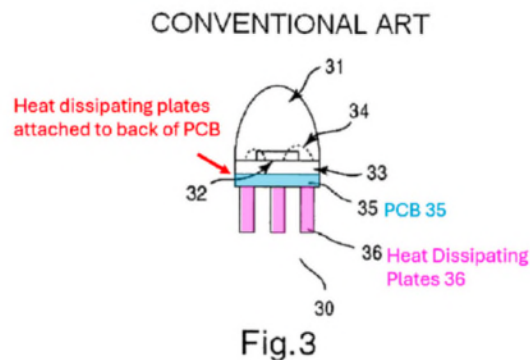
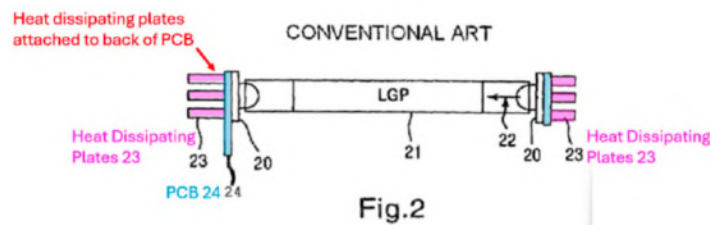
Thus, the proposed combination of Uekusa and Isoda fails to render any of the challenged claims obvious.

### **C. Conclusion**

A POSITA had no motivation to combine Isoda and Uekusa. Even assuming there was a motivation to combine Uekusa and Isoda, Isoda does not disclose an L-shaped fastener and thus fails to cure Uekusa's deficiencies with respect to claims 3, 5, and 7. Further, no reasonable combination would result in Petitioner's proposed heat dissipating structure. Thus, claims 5–9 of the '842 Patent are not rendered obvious by Uekusa and Isoda.

### **VIII. GROUND 3 (UEKUSA, AAPA § 103, CLAIMS 6, 9)**

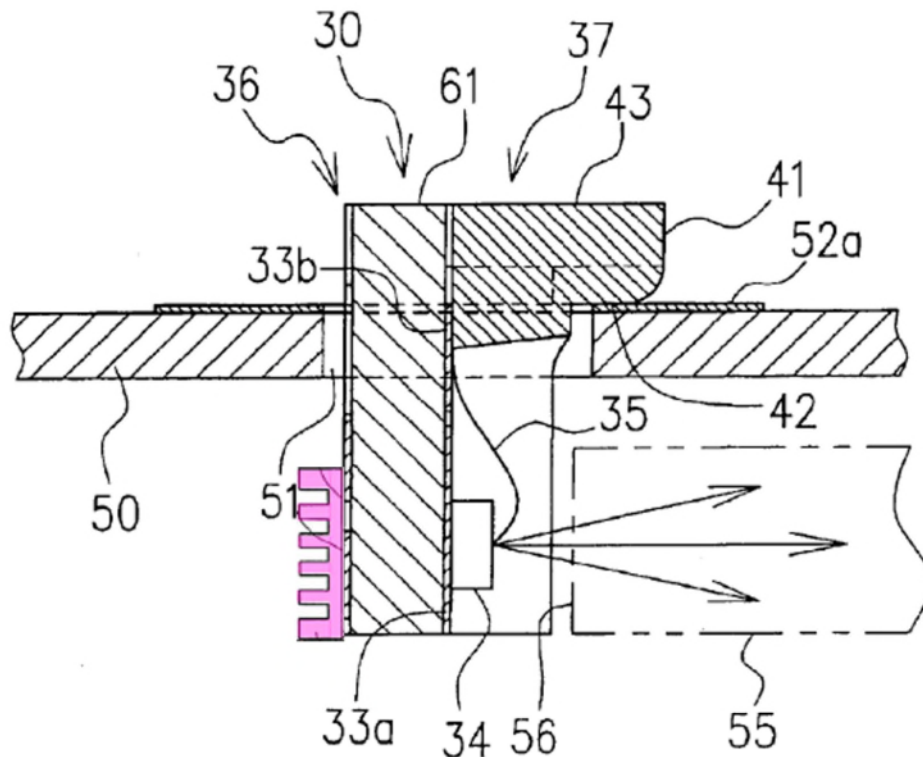
Uekusa cannot be combined with AAPA. AAPA shows heat dissipating means located on the PCB directly behind the LED:



Petition at 30 (annotated Figs. 2 and 3 of the '842 Patent).

The LED package of Uekusa is made of resin and protrudes through the circuit board. As discussed above, Petitioner cannot identify a motivation a POSITA would have had to place a heat dissipating means on Uekusa's circuit board as proposed. As was known in the art, the thermal conductivity of the resin-based PCBs is very low. *See, e.g.*, Ex. 1005, 1:30–36; Ex. 2020, ¶ 164. Adding the heat dissipating plates in the manner proposed would contradict Isoda's teaching that heat is “scarcely transmitted to the [PCB]” resulting in “high temperature, which causes junctions in the LED to degrade.” Ex. 1005, 1:30–36.

At most, a combination of AAPA would support the following modification to Uekusa:



Ex. 1008, Fig. 3 (annotated); Ex. 2020, ¶182. Such a structure was not presented by Petitioner or its expert, likely because it does not map to the challenged claims. This further demonstrates that the Petition started with the language of the claims and selectively worked backwards through the applied references to reach the resulting structure—in other words, the Petition is riddled with hindsight.

Further, AAPA does not cure the deficiencies of Uekusa because it does not disclose an L-shaped fastener. *See* Ex. 2020, ¶184.

Accordingly, the proposed combination of Uekusa and AAPA is impermissible and does not render claims 6 or 9 obvious.

**IX. GROUND 4 (KUROKAWA § 102, CLAIMS 5–9)**

Kurokawa does not have any L-shaped fastener—it teaches bending the PCB itself with LEDs directly disposed on the PCB. More specifically, Kurokawa teaches use of multiple top emitting surface mount LEDs on a flexible metal circuit board. Ex. 1004, [0010]–[0011]; Ex. 2020, ¶ 187. This is an altogether different technique and does not require the design of a fastener to attach LEDs to a PCB.



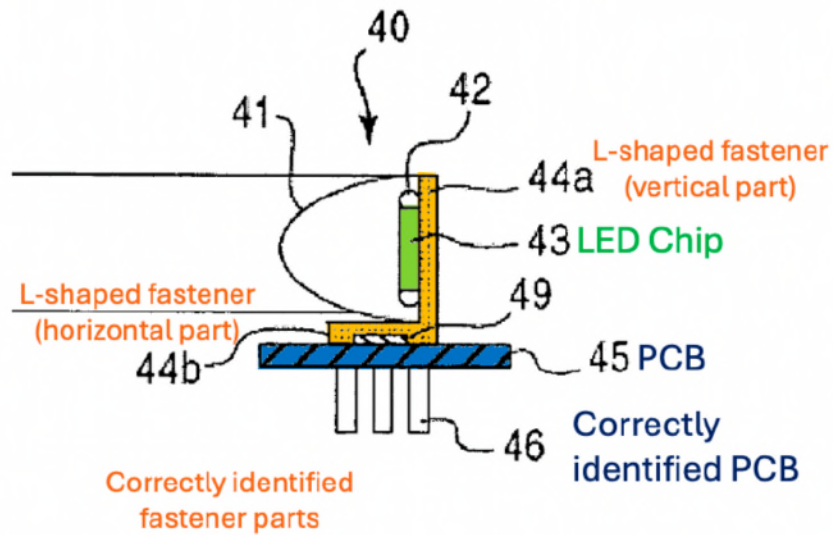
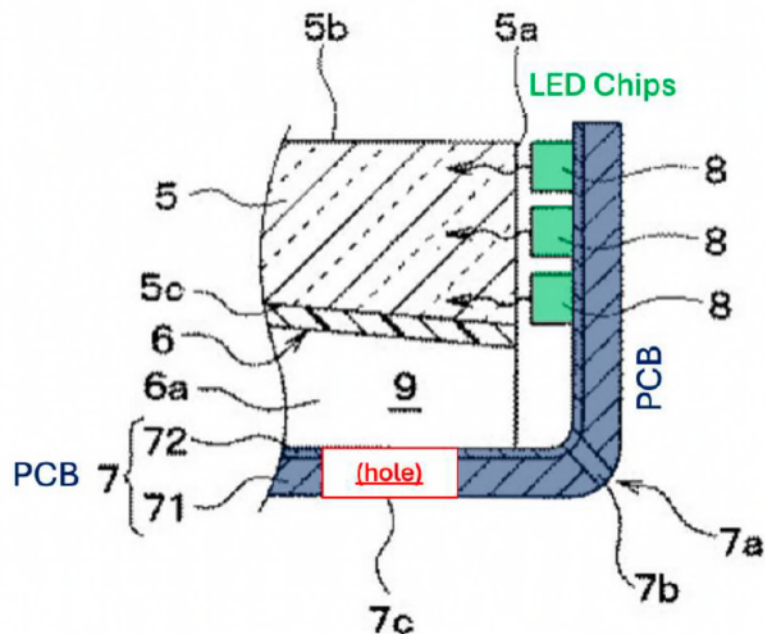


Fig.4



Compare Ex. 1001 at Fig. 4 (annotated above, showing fastener between PCB and chip), with Ex. 1004 at Fig. 2 (annotated above, bending the PCB itself). These are different techniques entirely.

- A. Independent Claim [3b]: “a first fastener having a first portion and a second portion, the first portion disposed adjacent to the first side of the light guiding plate, wherein the first portion and the second portion are arranged in a substantially perpendicular relationship to form a substantially L-shaped structure.”**

**1. Kurokawa’s Metal Circuit Board is not the Fastener**

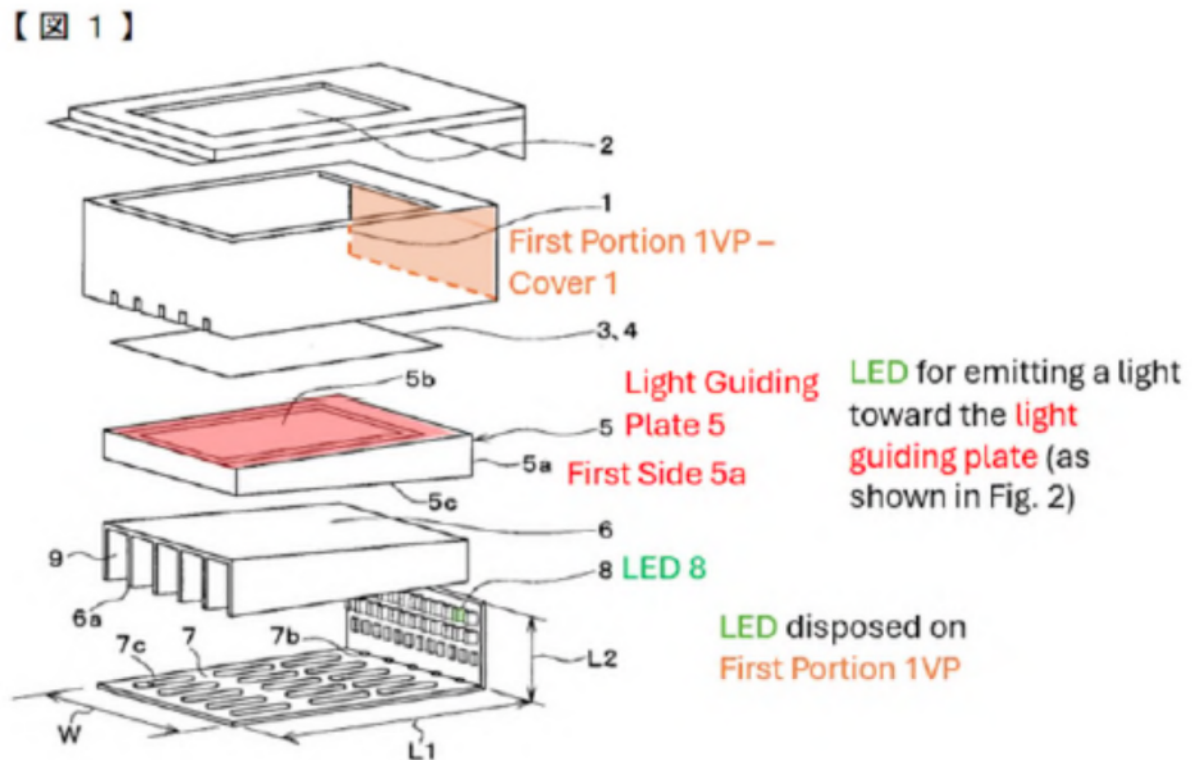
Kurokawa lacks the claimed “fastener” because Kurokawa teaches to bend a flexible printed circuit board instead of using an intermediate fastener between the PCB and the chip. Thus, there is no claimed fastener.

No reasonable construction allows for the fastener to be the entire PCB itself. Patent 7,168,842 shows that the “fastener” and the “circuit board” are different parts. Ex. 1001 at Fig. 4. The ’842 Patent describes the “fastener” and the “circuit board” as having different roles. *E.g.*, Ex. 1001 at 3:6–38. The claims separately recite the fastener and the circuit board. *Id.* at claims 1, 5, 6, 7.

Petitioner and its expert point to the circuit board itself as being both the first portion and second portion of the L-shaped fastener. *See* Petition at 54, 59. A POSITA would have recognized that Kurokawa’s circuit board cannot be the claimed a fastener. Ex. 2020, ¶ 187; Paper 16 at 26 (Institution Decision recognizing that “Kurokawa’s printed wiring board 72 cannot satisfy both the L-shaped-fastener and circuit board limitations of claim 5”). The attempt by Petitioner and its expert to stretch the teachings of Kurokawa to fit the language of the claims of the ’842 Patent are plainly tainted by hindsight. Ex. 2020, ¶ 197.

## 2. Kurokawa's Cover is not an L-shaped Fastener

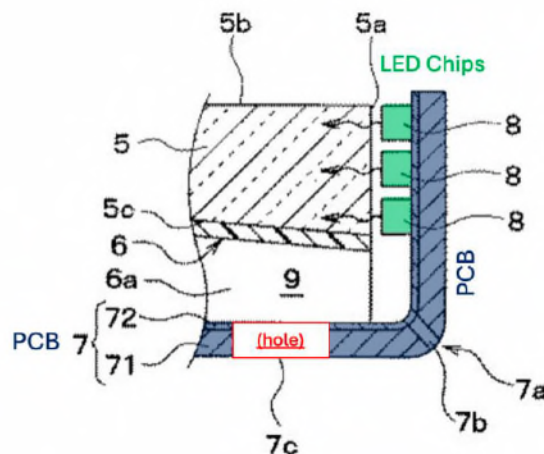
Under Petitioner's alternate, hindsight-based theory, the Cover (1) of Kurokawa cannot be the "first portion" of the claimed L-shaped fastener.



Petition at 55 (presenting this alternative theory). The very word “cover” means that the thing that Petitioner points to is not an L-shaped fastener that the LED is disposed on; rather the “cover” is part of a box that covers or surrounds the assembly. Petitioner’s expanded figure shows that the LED is not “disposed on” the cover, which is separated out. No POSITA would agree that the LED is not disposed on the cover. Ex. 2020 ¶ 199.

- B. Dependent Claim [5]: “The backlight package as claimed in claim 3, further comprising a circuit board and a conducting wire, the circuit board connecting the second portion, and the conducting wire electrically coupling the light emitting device to the circuit board.”**

In addition to the above, the Petition relies on bifurcating two portions of the metal PCB (Kurokawa’s wiring board 7). *See* Petition at 59. This construction is improper, as Kurokawa describes this as an alternate construction of a metal PCB, not as an L-shaped fastener, and bends the PCB itself. Ex. 1004, ¶ [0021], Fig. 2 (annotated below).



- C. All claims 5–9: Not anticipated for reasons discussed above.**

Claims 5 and 6 depend from claim 3. Thus, claims 5 and 6 are not invalid for at least the same reasons discussed above for claim 3.

Independent claim 7[b]–7[c] recites elements similar to those discussed above for claims 3 and 5, and the Petitioner’s analysis of claim 7 merely cites back to its

argument for claims 3 and 5. Petition at 66–67. For at least the reasons discussed for claims 3 and 5 above, claim 7 is also not anticipated by Kurokawa.

Claims 8 and 9 depend from claim 7. Kurokawa fails to anticipate claims 6–9 for at least the reasons discussed for claim 7.

**D. Claims 6 and 9: Kurokawa Lacks a “Heat Dissipating Means”**

A POSITA would not have considered Kurokawa’s internal “ribs 6a” to be the claimed “heat dissipating means” of claims 6 and 9. Ex. 2020 ¶¶ 204–07.

The Petition argues that these ribs dissipate heat into the airspace inside Kurokawa’s device. Petition at 66. Contrary to the Petitioner’s assertions, a POSITA would have understood that heat cannot be sunk to an air space within a device because “dissipation” of heat refers to the transfer of heat into the ambient environment. Ex. 2020, ¶ 207. Inside an environment, heat would aggregate or accumulate, not dissipate, until the device eventually overheats and stops working. *See id.* The LEDs of Kurokawa are adjacent to an exterior wall and that heat only need travel a small distance to reach the exterior environment where it can be dissipated via both convection and radiation. Ex. 2020, ¶ 204. However, Petitioner’s suggestion that ribs 6a would act not only to provide structural support but may also act as a heat dissipating means is without merit. *See* Petition at 65; Ex. 2020, ¶¶ 203–07. Specifically, such an arrangement would have the opposite of the desired effects—it would transfer heat *towards the center of the device and from the bottom*

*circuit board toward the LEDs* where it would be more difficult to dissipate to the ambient area surrounding the device. Ex. 2020, ¶ 207.

For the foregoing reasons, Kurokawa's ribs cannot anticipate the structure claimed in the '842 Patent.

**X. GROUND 5 (KUROKAWA § 103, CLAIMS 4, 7–9)**

**A. Still No L-Shaped Fastener**

As discussed above in Section IX, Kurokawa discloses bending wiring board 7 and does not teach or suggest using an L-shaped fastener recited in the independent claims. Ex. 2020, ¶ 215. Further, the Petition does not introduce any additional reasoning for claims 3 or 7–9 and merely cites to the anticipation ground. *See* Petition at 67–69. Accordingly, Kurokawa does not render claims 4 or 7–9 of the '842 Patent obvious for the reasons discussed in Section IX above.

**XI. GROUND 6 (KUROKAWA, ISODA § 103, CLAIMS 5–9)**

**A. Isoda Does Not Cure the Deficiencies of Kurokawa**

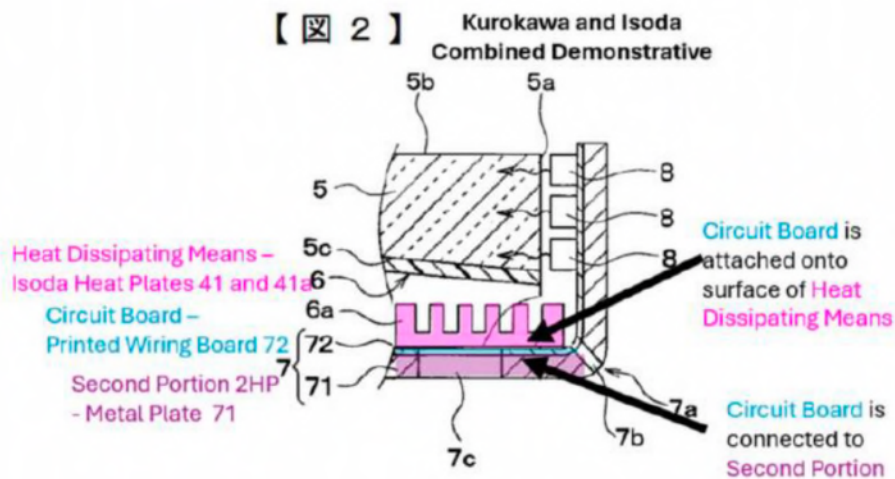
Isoda does not cure the deficiencies of Kurokawa, as stated above in §§ IX and X, and the Petition makes no assertion that it does so. Therefore, this ground fails to render claims 3 and 5–9 of the '842 Patent obvious.

**B. Hindsight: A POSITA Would Not Be Motivated to Combine Kurokawa and Isoda**

A POSITA would not be motivated to combine Kurokawa and Isoda in the way Dr. Baker proposed. Kurokawa teaches mounting LEDs on a metal core circuit board, which is incompatible with any embodiment of Isoda due to the explicit teachings of Isoda. *See* Ex. 1005, 2:1–3 (“Here, if the print substrate is made with a metal having high heat conductivity, the heat radiation problem is resolved.”); Ex. 2020, ¶ 220. The proposed combination by Petitioner is based entirely on hindsight and there is no motivation to combine or reasonable expectation of success, and this ground must fail.

**C. Kurokawa and Isoda Would Not Yield the Structure Proposed by Petitioner**

As discussed above, Petitioner improperly bifurcates Kurokawa’s printed wiring board 7, which is simply an alternate way to manufacture a metal PCB. *See* Ex. 1004, ¶ [0021]. Further, and in addition to the lack of motivation to combine, the proposed combination illustrated in the Petition would remove heat from the circuit board *and into Kurokawa’s package, closer to the LEDs*, and then expect the system to fail. Ex. 2020, ¶¶ 220–30; *see* Petition at 72 (annotated figure reproduced below).



This structure conducts heat toward the inside of the device and retains it there, and this would increase the internal operating temperature of all components, including the LEDs. Ex. 2020, ¶ 228. Indeed, the fins protrude into the system, away from both the ambient environment and *ventilation hole 7c, which is depicted as being covered in the proposed combination.* See Petition at 72. A POSITA would not make this combination. See Ex. 2020, ¶ 225–29.

Thus, a POSITA would have had no motivation to combine Kurokawa and Isoda and no reasonable expectation of success. Petitioner relies solely on hindsight to create the proposed combination of Kurokawa and Isoda and there is no motivation to combine or reasonable expectation of success.

## XII. CONCLUSION

For the reasons set forth above, Patent Owner respectfully requests that the Board find all challenged claims not unpatentable.



Date: April 23, 2025

Respectfully submitted,

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**CERTIFICATION REGARDING WORD COUNT**

Pursuant to 37 C.F.R. §42.24(d), Patent Owner hereby certifies, in accordance with and reliance on the word count provided by the word-processing system used to prepare this **PATENT OWNER'S RESPONSE**, that the amount of words in this paper is 9,170. Pursuant to 37 C.F.R. § 42.24, this word count is in compliance with the word limit set forth in 37 C.F.R. § 42.24(b)(2) excluding the portions exempted under 37 C.F.R. § 42.24(a)(1).

Date: April 23, 2025

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**CERTIFICATE OF SERVICE (37 C.F.R. § 42.6(e)(1))**

The undersigned hereby certifies that the above document was served on April 23, 2025, by filing this document through the Patent Trial and Appeal Board End to End system as well as delivering a copy via electronic mail upon the following attorneys of record for the Petitioner:

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