

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BOE TECHNOLOGY GROUP CO., LTD.,

Petitioner,

v.

OPTRONIC SCIENCES LLC,

Patent Owner.

Case No.: IPR2024-01130

Patent 7,168,842

PATENT OWNER'S SUR-REPLY

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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 https://patents.google.com/patent/JP2004279262A/en?q=JP2004-279262 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 https://web.archive.org/web/20131109010416/http://www.cirque.com/solutions/posSolutions.aspx (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, https://www.merriam-webster.com/dictionary/connect (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> .
2025	<i>Qualcomm Inc. v. Apple Inc.</i> , Nos. 2023-1208, 2023-1209 (Fed. Cir. 2025).
2026	Non-confidential excerpts of the Opening Expert Report of Dr. Baker Regarding Invalidity of U.S. Pat. No. 7,168,842 from <i>Optronic Sciences LLC, v. BOE Tech. Group Co., Ltd.</i> , No. 2:23-cv-00549 (W.D. Tex.)

I. INTRODUCTION

Petitioner's Reply is full of inconsistent and contradictory positions, highlighting Petitioner's attempts to salvage untenable arguments. For example, Petitioner's Reply disparages the very construction of "heat dissipating means" proposed in the Petition. *Compare* Reply at 18 ("heat dissipating means' should not be limited to heat dissipating plates like PO suggests"), 11–13 *with* Petition at 6–7 (arguing the proper construction of "heat dissipating means" is "heat dissipating plates 46").

Further, Petitioner's attempts to conceal its hindsight are unavailing. For example, Petitioner incorrectly states that Patent Owner's identification of hindsight is confusing because Kurokawa "anticipates the claims." Reply at 2 (citing POR at 2) (emphasis in original). Petitioner ignores that it brought Kurokawa as a separate obviousness ground, further demonstrating its own lack of confidence that a POSITA would have considered Kurokawa's bent circuit board to be a fastener. POR at 2 (referring to Ground 5, Kurokawa obviousness).

II. PERSON OF ORDINARY SKILL

Patent Owner's definition of a POSITA is appropriate, as explained at length in Patent Owner's Response. Paper 24 at 4–8. Indeed, Petitioner admits the "backlight package described by the '842 patent is much broader than LED package

design and thermal management systems,” meaning that thermal management experience is necessary to understand the broader technology. *See* Reply at 2.

Petitioner’s waiver argument is baseless. Paper 30 at 3 n.1. Dr. Baker’s qualifications are explicitly challenged in Patent Owner’s Reply, and whether or not Patent Owner challenges his qualifications for claim construction in district court does not waive this argument at the PTAB. Daubert motions are not even due yet.

1. Type of Problems Encountered in the Art;

Petitioner misstates the ’842 Patent’s field of invention. Petitioner’s statement that “[t]he ’842 patent *specifically* discloses that the *use* of LED packages is a subpart of the electronic backlight system that is being designed” is inaccurate—the patent instead discloses that it relates to the *packaging* of light-emitting device backlights, not the use. Reply at 4 (citing Ex. 1001 at 1:7–27) (emphasis original); Ex. 1001 at 1:7–11 (“The present invention generally relates to the *packaging* of light-emitting device backlights. In particular, the present invention relates to a light-emitting device backlight package which requires minimal space while producing maximum luminosity.”) (emphasis added).

Petitioner’s attempts to downplay the requirement for “experience in design of thermal management systems for LEDs” also fails. Reply at 4. For instance, the ’842 Patent discloses achieving “an optimal light travel path and efficient heat dissipation, while conserving valuable space in the longitudinal direction of the light

guiding plate 48.” Ex. 1001 at 3:54–58. Claims 6 and 9 are directed at heat dissipating means. It remains undisputed that Dr. Baker has no thermal management training or work experience. His involvement in other cases about the use of LEDs has does not change this.

Petitioner’s statement “Dr. Bretschneider admitted that the ’842 patent is not directed towards **maximizing** heat transfer” is a strawman attempt to downplay Dr. Baker’s lack of experience with heat transfer principles. Reply at 5 (emphasis added). The ’842 Patent is trying to “conserve valuable space” while *simultaneously* providing “an optimal light travel path and *efficient heat dissipation.*” Ex. 1001 at 3:54–58 (emphasis added). The relevant problem informing a POSITA’s skill thus includes the design of efficient heat dissipation in a limited space—even if not focused on “maximizing” heat transfer. *See id.* at Ex. 1001, 1:7–11.

2. Prior Art Solutions

The Reply acknowledges that LED package and backlight package design were prior art solutions. Reply at 6; *see* POR at 7 (citing Ex. 1008, Ex. 1004, Ex. 2020, ¶ 81). This supports Patent Owner’s definition of a POSITA.

3. Rapidity with which Innovations are Made

The Parties agree that Backlight technology was slow changing. Reply at 6, POR at 7.

4. Technology Sophistication

Petitioner’s conclusion that “the relevant level of skill and sophistication is not particularly high” is simply inaccurate.¹ Reply at 7. Dr. Bretschneider worked in industry on the types of applications that the ’842 Patent is directed to. He states, “LED package design, particularly in the context of backlights for displays, is a sophisticated technology that requires significant experience with complex subjects” including thermal management, power requirements, and form factor constraints in displays. Ex. 2020, ¶ 83, ¶¶ 37–48.

5. Education Level

Petitioner attacks Patent Owner’s proposal that a POSITA have a degree in “in mechanical engineering, chemical engineering, or related field.” Reply at 8. Petitioner’s argument has no merit because mechanical engineers and chemical engineers work on the packaging and thermal management of LEDs—and more than electrical engineers do when it comes to thermal management. Petitioner’s attack on biomedical engineers and environmental engineers is a straw man; Patent Owner never proposed these degrees. *Id.*; Paper 30 at 7.

¹ Indeed, Dr. Baker’s lower sophistication in thermal management led him to offer unsophisticated opinions that include distant heat plates or heat plates that covering ventilation holes. *See* Ex. 1002 at 72, 103–04.

A. Petitioner’s Expert Lacks the Requisite Experience to be Considered a POSITA in LED Packaging or in Thermal Management

Dr. Baker does not have the relevant experience to be considered a POSITA for the ’842 Patent. POR at 8–10, Ex. 2020 at ¶¶ 88–90. The only thing Petitioner addresses is Petitioner’s expert’s time at Cirque, arguing that he fit “components into a backlight display package.” Reply at 8. Petitioner does not deny that Dr. Baker worked on *capacitive touch* technology and did nothing with the design of LED packages or thermal management. Reply at 8; Ex. 2024 at 24:17–23 (With respect to his experience working at Cirque, Dr. Baker “didn’t work on the actual mechanical design of the LED package.”) At best, Dr. Baker argues that “I have substantial experience with heat **generation** from LED,” because any use of LEDs inherently generates heat. Ex. 1031 ¶ 38 (emphasis added). But Dr. Baker stops short of saying he worked on thermal management, so he remains unqualified in that area.

III. PETITIONER RELIES ON HINDSIGHT

Patent Owner identified numerous instances of hindsight. For example, with respect to Kurokawa, Petitioner points to a piece of the metal wiring board 7 and alleges it is a fastener, or renders obvious using a fastener. Petition at 49–50. The only way Petitioner could have reached such a conclusion is by working backwards from the claims because Kurokawa discloses bending a metal wiring board, not

using an L-shaped fastener. Ex. 2020 at ¶¶ 187–199, ¶ 215. Further, Isoda explicitly teaches that the use of a metal core circuit board solves the heat radiation problem. POR at 57. Yet, Petitioner ignored the teaching by forcibly combining Isoda with Kurokawa’s metal circuit board to solve the already-solved heat radiation problem by covering Kurokawa’s ventilation holes, clearly motivated by a desire to invalidate the claims. POR at 56–57.

Patent Owner did not argue that a POSITA cannot look at the claims at all. Indeed, an expert should ask whether a POSITA, given the prior art, would have found the claims obvious. The problem is that Dr. Baker was caught on camera crafting the allegedly obvious design based on what the claims said, *not* based on the POSITA’s understanding of the prior art. POR at 11.

IV. CLAIM CONSTRUCTION

A. “fastener” (all claims)

In the District Court, the parties agreed to a construction for “fastener” that is “[a] feature that attaches or holds something in place.” Ex. 1027 at 1. Such a construction is consistent with Patent Owner’s proposed construction in the instant proceeding, which is that a “fastener” is “one feature whose primary purpose is to attach something.” POR at 13. Patent Owner’s arguments remain valid under both constructions. Uekusa cannot meet either construction.

B. “heat dissipating means attached onto the surface of the circuit board for conducting a heat generated thereon” (claims 6 and 9)

Petitioner disparages Patent Owner’s proposed construction—the same construction Patent Owner proposed in the Petition. *Compare* Reply at 18 (“‘heat dissipating means’ should not be limited to heat dissipating plates like PO suggests”) *with* Petition at 6–7 (arguing “the only structure disclosed and linked ... is the heat dissipating plates 46”).

Petitioner also improperly presents a new claim construction argument that “a fastener structure could act as both a heat dissipating means and a fastener”—directly contrary to the construction in the Petition. Reply at 12; Petition at 6–7. Further, Petitioner’s new proposed construction would render the additional limitation meaningless (*i.e.* by arguing that the claimed heat dissipating means and the claimed fastener are the same) and should be rejected. *See* Reply at 12–13.

This term uses the words “heat dissipating means” and recites the function of either “for conducting a heat generated thereon” and “heat dissipating.” A POSITA would have understood from the specification that the structure performing that function is heat dissipating plates 46. *See* EX1001, Fig. 4, 2:9–11, 3:25–32, 3:51–58; Ex. 2005, ¶ 118.

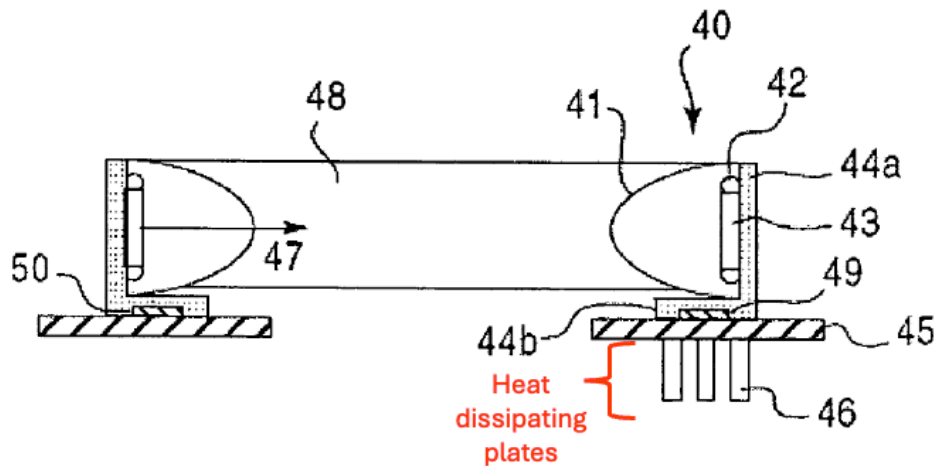


Fig.4

Thus, the term “heat dissipating means” refers to heat dissipating plates. Ex. 2005, ¶ 118.

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

In the District Court, the parties agreed that “the circuit board connecting the second portion” should be construed as “the circuit board connecting to the second portion.” Ex. 1030 at 2. Patent Owner further proposes that the plain and ordinary meaning of the term “connecting” requires something more than touching, such as, for example, attaching or completing an electrical connection. *See* POR at 17 (citing Ex. 2019).

Petitioner attempts to obfuscate the plain and ordinary meaning of “connecting,” arguing that “‘something more than touching’ is not required under [the] plain and ordinary meaning of the term.” Reply at 13. Petitioner’s argument

should be rejected. Common sense confirms that Petitioner lacks support for this assertion. For example, two Lego bricks placed side-by-side are “touching,” but only by stacking one on top of the other and interlocking a Lego bump into a receiving hole can the Lego bricks be said to be physically “connected.”

Further, Petitioner’s suggestion that “[t]o the extent some sort of attachment is required between the PCB and fastener, that would include holding components in place” is simply incorrect. *See* Reply at 14. Take, for example, a broom that is leaned against a wall—the wall may hold the broom in place, but the wall is not “connecting” to the broom under the plain and ordinary meaning of “connecting.”

Petitioner’s proposed constructions of the term “connecting” are nothing more than hindsight-based attempts to get around the plain and ordinary meaning and should be rejected. The plain and ordinary meaning of “connecting” requires something more than touching, like attaching or completing an electrical connection.

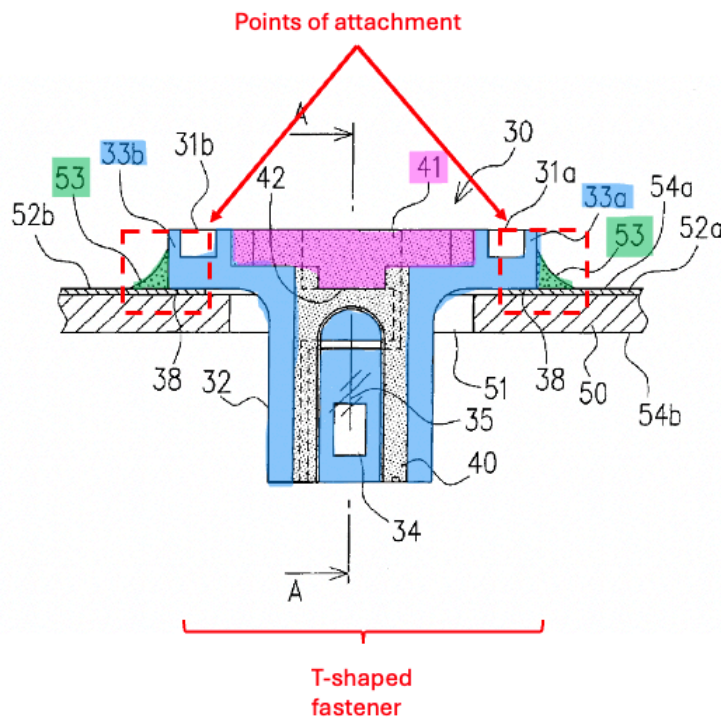
V. GROUND 1: Claims 5 to 9 Are Not Anticipated by Uekusa

Petitioner is unable to rebut that Uekusa does not teach every element of claims 5 to 9, as discussed below. As explained in detail Patent Owner’s response, Uekusa is directed to preventing a T-shaped LED from tipping forward. POR at 17–23. It is unsurprising that this arrangement does not disclose every element of the ’842 Patent, which claims an L-shaped fastener.

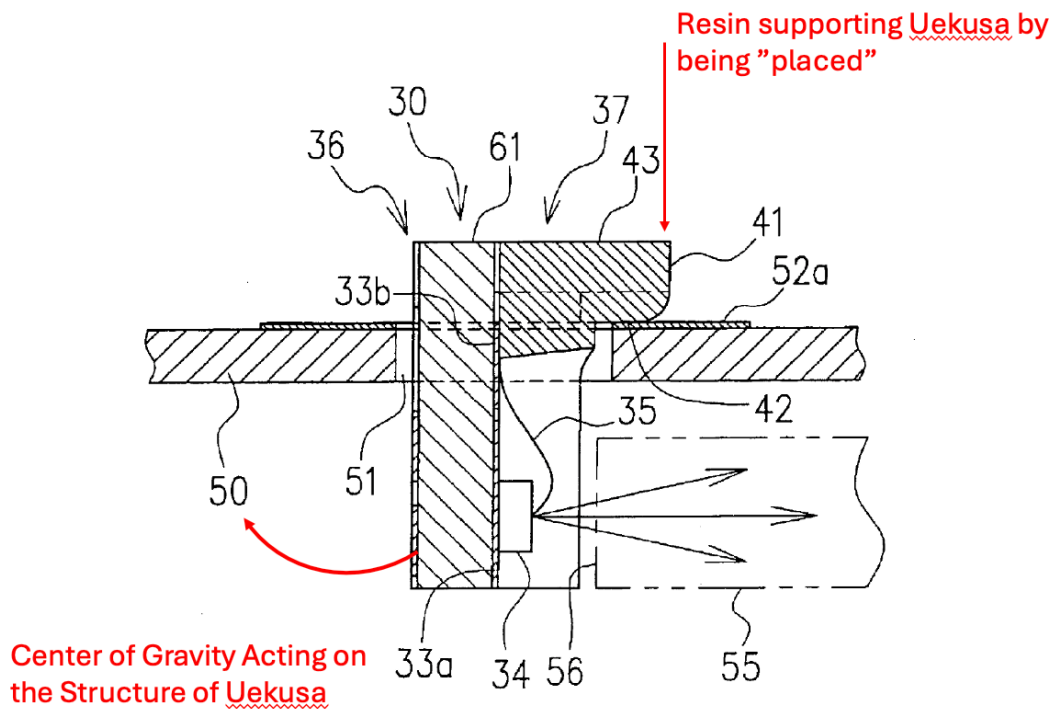
A. [3b] Uekusa Does Not Disclose a Substantially L-Shaped Fastener

Uekusa does not disclose a substantially L-shaped fastener under the agreed upon construction, which is “[a] feature that attaches or holds something in place.”

As discussed at length in the POR, Uekusa discloses a “T” shaped fastener, which “attaches or holds something in place” via solder on the portions of the T:



POR at 27–31. This T-shaped fastener holds the LED 34 in place. By contrast, the resin forming section 37 does not *itself* attach or hold something in place—it simply prevents the T-shaped structure from rotating or tipping in only one direction:

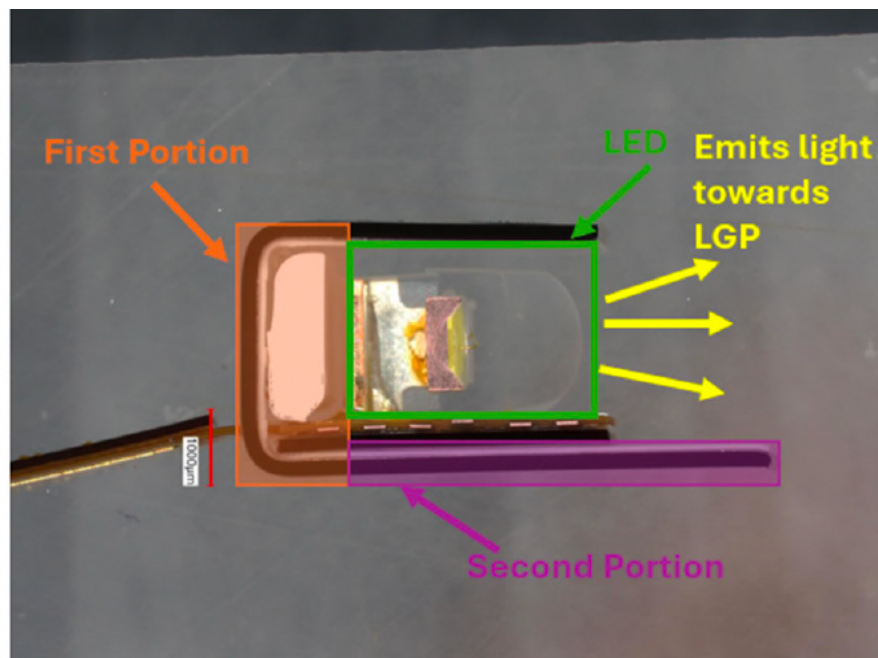


POR at 30. This does not meet the agreed definition of a fastener that “attaches or holds something in place.” See Section IV(A), above. Here, the parties appear to agree that the thing to be held in place is Uekusa’s LED 34. Reply at 16.

Thus, the only parts of Uekusa that are fastened are parts 32 and 33a/b, which are fastened by solder 53 to the motherboard 50, and they hold the LED 34 in place. Parts 41/42 are not soldered to the motherboard and do not hold the LED in place—they don’t even touch the LED. Without parts 41/42, the LED 34 would still be fastened by parts 32 and 33a/b. Uekusa’s fastener made of 32 and 33 look like a “T” from the front and an “I” from the side, not an L-shape as claimed. Indeed, even Uekusa itself characterizes its body section 36 as “formed into a *generally T-*

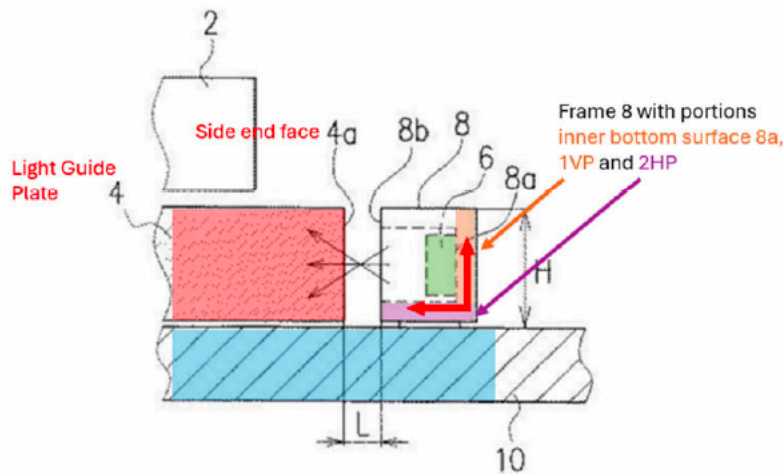
character shape from a glass epoxy resin material,” with a protrusion (resin forming section 37). Ex. 1008, 3:48–51 (emphasis added).

Further, in the parallel District Court litigation, Dr. Baker opined on various asserted prior art that “[u]nder BOE’s proposed construction of substantially L-shaped structure of ‘Plain and ordinary meaning, i.e., shaped substantially like an L. Comprising does not operate to literally encompass other shapes’ this limitation *is not met because [the fastener structure/frame 8] as a whole is shaped like a sideways U or backwards C. It is not L-shaped.*” Ex. 2026, ¶¶ 172, 190 (emphasis added); *see id.*, ¶¶ 170, 188 (the referenced illustrations):



Id., ¶ 170.

[FIG. 17]



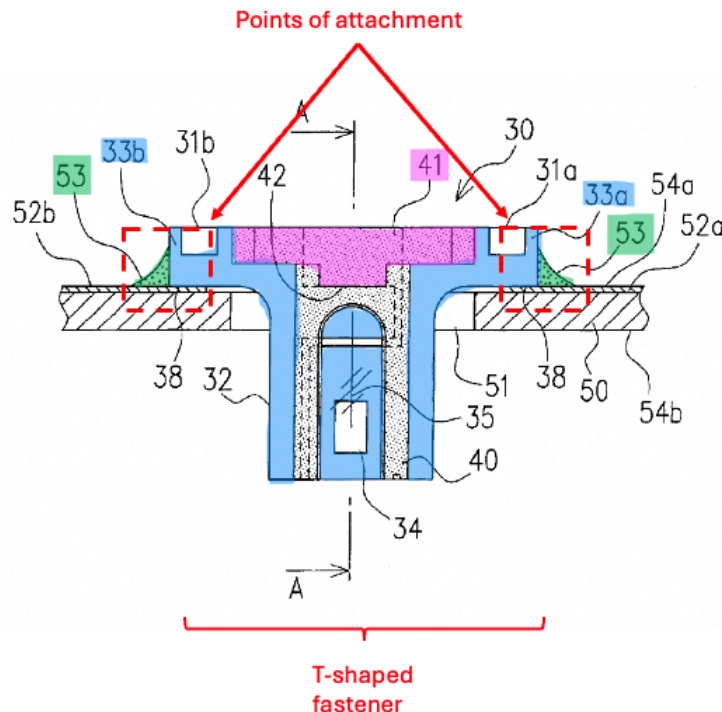
Id., ¶ 188. Like the references above, which were cited by Dr. Baker in his expert report, Uekusa does not meet this limitation because the fastener structure **as a whole** is shaped like a “T”. It is not L-shaped .

Accordingly, Uekusa does not disclose or render obvious an L-shaped fastener, as required by claim 3.

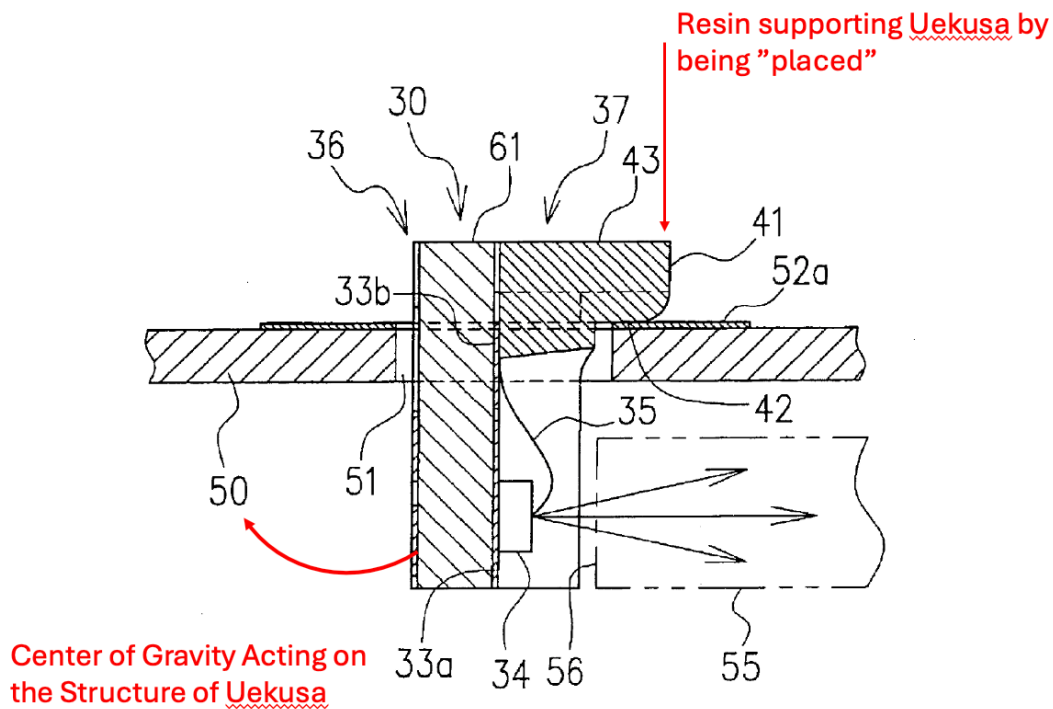
B. [5] Uekusa’s Circuit Board is Not “Connecting to the Second Portion”

Petitioner’s argument is based on a construction of “connecting” that is contrary to its plain and ordinary meaning. *See* Reply at 17–18 (arguing that “connecting” does not require anything more than touching). Indeed, Petitioner’s own expert confirmed that the circuit board is not connected to Uekusa’s resin forming section, 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.”). As explained in detail in the POR, Uekusa’s T-shaped structure is the only part of its structure that is connected or attached to the circuit board—the resin forming section is “placed” on the circuit board to prevent tipping:



POR at 27–31.



POR at 30.

Indeed, Petitioner has not provided any rebuttal to the fact that that Uekusa “only provides a surface that *touches* the motherboard to prevent further tilting.” POR at 30; Ex. 2020 at ¶ 131 (“The resin forming section 37 is merely resting against, but not fastened to, the motherboard 50.”).

Rather, Petitioner argues that the resin forming section “hold[s] LED 34 in place as well as provide[s] support for the structure.” See Reply at 14 (applying the construction of fastener as a “feature that . . . *holds something in place.*”). Petitioner’s only argument is an attorney argument that cannot overcome the technical opinions of Dr. Bretschneider and Petitioner’s own expert, which confirm

that the resin forming section 2HP is “placed” on the circuit board—not connected to it. Ex. 2024 at 53:23–24. Petitioner’s argument that Uekusa’s use of the word “mounted” shows that it is “connecting” the second portion and the circuit board is conclusory and insufficient to overcome the unrebutted technical evidence that the resin forming section does not (and cannot) connect the second portion to the circuit board—it simply rests against the circuit board. *Compare* Reply at 17–18 with POR at 27–31, 33–34; Ex. 2020 at ¶ 127–133; Ex. 2024 at 53:23–24. Thus, Uekusa’s resin forming section does nothing more than “touch” the circuit board and is not “connecting to” it as required by the claims.

Accordingly, Petitioner has failed to establish by a preponderance of the evidence that Uekusa discloses a circuit board connecting to the second portion.

C. [6] and [9]: Uekusa Lacks a Heat Dissipating Means

Petitioner’s only argument is that Uekusa’s fastener inherently dissipates heat. Reply at 18. As explained above in Section IV.B, this argument is based on an improper claim construction and is directly contrary to the construction previously proposed by Petitioner. Accordingly, Petitioner’s new argument that Uekusa anticipates claims 6 and 9 should be rejected.

VI. GROUND 2: Claims 5 to 9 Are Not Rendered Obvious by Uekusa and Isoda

Uekusa alone does not render claims 5–9 obvious for the reasons explained above in Ground 1 and in Patent Owner’s Response, and Petitioner provides no additional reasoning asserting that it does so. *See* Reply at 18.

A. No Motivation to Combine

Petitioner’s Reply does not address that 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, 1:57–64 (“As described above, the epoxy resin has low heat conductivity”); POR at 39–40. Yet Petitioner, using hindsight and a desire to invalidate the claims, maintains that a POSITA would have been motivated to place heatsinks on Uekusa’s epoxy resin PCB. Indeed, Petitioner admits the understatement that Isoda’s Figure 8 design “does not have optimal heat transfer.” Reply at 19. But Petitioner is unable to articulate any motivating benefit that offsets the scarce heat transfer through the PCB that causes high temperatures and LED junction degradation. Reply at 19.

Dr. Bretschneider’s opinion (based on actual heat transfer experience) that the proposed modification “will have a negligible effect” due to the lack of a thermally conductive pathway remains unrebutted. Ex. 2020 ¶ 162. Dr. Baker offered no

simulations or testing in rebuttal. *See* Ex. 1031. This is dispositive: the proposed modification yields no non-negligible benefit.

Petitioner’s proposed combination is an attempt to reach the language of the claims against the teachings of the references, and a POSITA would not have combined Uekusa and Isoda as proposed by Petitioner. *See* POR at 39–42.

VII. GROUND 3: Claims 6 and 9 Are Not Rendered Obvious by Uekusa and AAPA

Petitioner apparently concedes Ground 3, which it does not address in the Reply briefing. But Petitioner’s original arguments in Ground 3 serve as further evidence of hindsight.

VIII. GROUND 4: Claims 5 to 9 Are Not Anticipated by Kurokawa

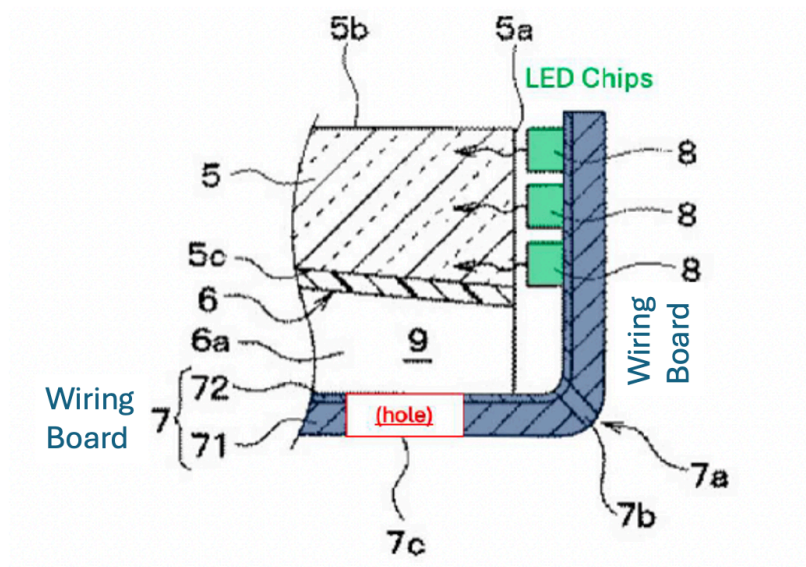
Petitioner abandoned two of its three theories regarding Kurokawa for being “irrelevant.” Reply at 23. The remaining theory fares no better and, contrary to Petitioner’s assertion, is addressed in Patent Owner’s response. *See* POR at 54.

Kurokawa teaches bending a metal wiring board, not using a separate fastener. The Institution Decision sympathetically acknowledged this. Paper 16 at 26. As explained by Dr. Bretschneider, Kurokawa uses “an entirely different approach and would have separate use cases from the scope of the ‘842 Patent—for example, the bend in Kurokawa’s PCB limits the ability of the PCB to continue extending in a

horizontal direction and would be an endpoint for the circuit board.” Ex. 2020 at ¶186; *see also id.* at 193–97.

Petitioner’s only remaining argument for Kurokawa relies on a hindsight attempt bifurcate Kurokawa’s circuit board (i.e., wiring board 7, which is a “metal-based wiring board”). Ex, 1004 at [0037] (“printed wiring board 7 is a metal-based wiring board in which the metal plate 71 occupies more than half the thickness of the wiring board 7”). Kurokawa itself disproves Petitioner’s theory, which Petitioner acknowledges. Petition at 54 (“Kurokawa discloses that the combination of board 72 and 71 can be considered a single structure, board 7”).

Petitioner’s new argument that the metal plate portion of Kurokawa’s metal wiring board is actually a distinct fastener should be rejected. This is plainly seen in Kurokawa, which discloses that **wiring board 7** (*e.g.*, the circuit board) itself is bent. Ex. 1004 at [0040] (“The printed wiring board 7 configured in the manner described above is bent”). A more accurate annotation shows Kurokawa bending a **wiring board 7**:



Ex. 1004, Fig. 2 (annotated), [0037].

Indeed, Petitioner’s attempt to point to a portion of the printed wiring board 7 as the claimed fastener is based entirely on hindsight. Ex. 1004 at [0037] (“printed wiring board 7 is a metal-based wiring board in which the metal plate 71 occupies more than half the thickness of the wiring board 7”); Ex. 2020 at ¶193 (“Kurokawa details that this is simply an alternate [and exemplary] manufacture of a ‘metallic circuit board,’ and is directed towards a metal PCB, not a fastener having a first portion and a second portion as claimed by the ‘842 Patent.”); Ex. 1004 at [0038] (“The metallic wiring board 7 in the present embodiment consists of a flexible printed wiring board 72 bonded to a metallic plate 71. The flexible printed wiring board 72 and the metal plate 71 may be made to adhere to each other by bonding them with an adhesive, or by thermocompressing the insulating layer of the flexible

printed wiring board 72 to the metal plate 71.”). A POSITA would not have considered a portion of the wiring board 7 to be a distinct fastener—it is the circuit board itself. *See* Ex. 1001 at claims 3 and 6 (reciting “circuit board” and “fastener” as separate components).

Further, Patent Owner disagrees with Petitioner’s unilateral construction of “disposed on,” which Petitioner did not include claim construction argument for. *See* Petition at 3–4. First, as explained above, Kurokawa does not teach using a fastener at all, but instead teaches bending the circuit board (wiring board 7) itself—so the claimed fastener is not present. Second, even under Petitioner’s erroneous interpretation that wiring board 7 is a fastener, the LED is disposed on what Petitioner points to as the PCB—not what it points to as the fastener.

Accordingly, Kurokawa does not disclose an L-shaped fastener.

IX. GROUND 5: Claims 4 and 7 to 9 Are Not Rendered Obvious by Kurokawa

Kurokawa does not render claims 4 or 7 to 9 obvious for the reasons described above and in Patent Owner’s Response. Indeed, Dr. Bretschneider explained that Kurokawa “is an entirely different approach and would have separate use cases from the scope of the ‘842 Patent—for example, the bend in Kurokawa’s PCB limits the ability of the PCB to continue extending in a horizontal direction and would be an endpoint for the circuit board.” Ex. 2020 at ¶186.

X. GROUND 6: Claims 5 to 9 Are Not Rendered Obvious by Kurokawa and Isoda

As explained above and in Patent Owner’s Response, Kurokawa’s bending of the PCB itself “is an entirely different approach” to the ’842 Patent’s L-shaped fastener. Isoda does not cure Kurokawa’s deficiencies with respect to the L-shaped fastener, and Petitioner makes no assertion that it does so. Accordingly, Ground 6 fails.

A. No Motivation to Combine

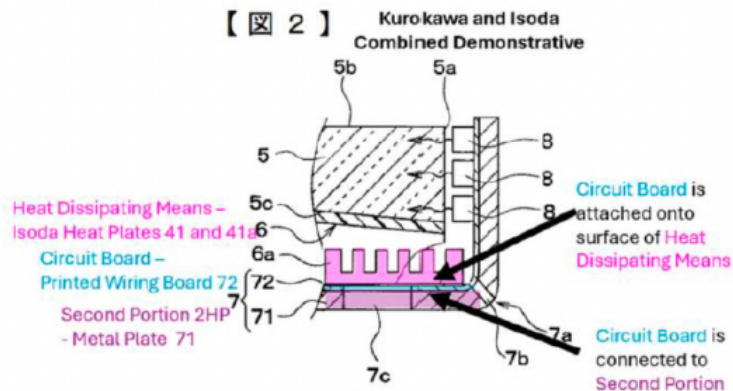
Petitioner is not able to overcome most glaring flaw of its proposed combination—Kurokawa teaches using a metal circuit board due to its thermal properties, and Isoda specifies that its teachings are not necessary in devices with metal circuit boards. *See* POR at 56–57. Isoda taught that “the heat radiation problem is resolved” when metal circuit boards were used, so a POSITA would not have thought to apply Isoda’s techniques to Kurokawa’s system with a metal circuit board. Ex. 1005, 2:1–3.

Petitioner’s rebuttal is: “it is not clear that the print substrate ‘made with metal having high heat conductivity’ is the structure pointed to in Kurokawa.” Reply at 28. However, Kurokawa specifically states it uses a metal wiring board for its thermal qualities. Ex. 1004 at [0010] (“Because a metallic wiring board is used as the printed wiring board (7), the thermal conductivity of the printed wiring board (7)

can be improved compared to that of a glass epoxy-based wiring board.”). Accordingly, a POSITA facially would not have combined Kurokawa and Isoda and Ground 7 fails.

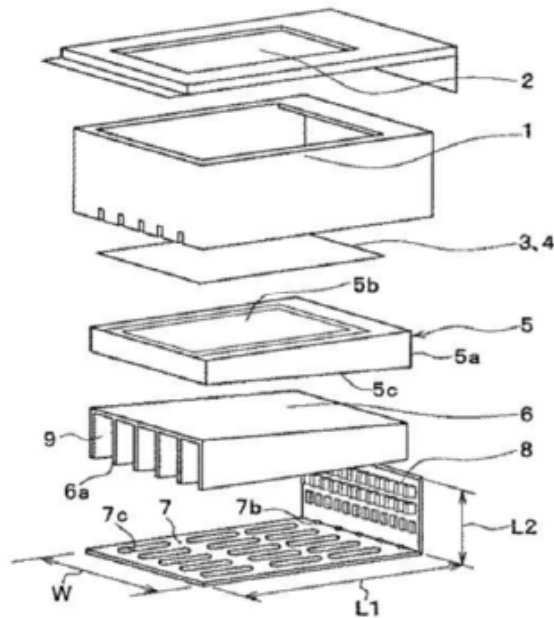
B. No Possibility of Combination

Further, Patent Owner has shown that Petitioner’s proposed combination *covers Kurokawa’s ventilation holes*, which a POSITA would not do:



POR at 58. The Petition did not show or state that the heatsink was offset from the ventilation holes. Petitioner’s rebuttal is simply that Kurokawa’s Figure 1 “shows that the ventilation holes 7c have ample space between them, which would allow for heat sinks or fins to be placed without covering the ventilation holes.” Reply at 29. Figure 1, in fact, shows *lack* of available space between ventilation holes 7c for the modification Petitioner proposes:

[Fig. 1]



Ex. 1004 at Fig. 1 (showing that, when assembled, the ribs 6a of reflector 6 contact metal circuit board 7 at the very locations Petitioner insinuate have “ample room”), [0041]. Moreover, the Petition does not include any drawing based on Figure 1 showing the placement of heatsinks between the ventilation holes, instead of over them. Petitioner has come up with this new argument using the hindsight colored by Patent Owner’s Response.

Petitioner has failed to show any reason a POSITA would be motivated to combine Kurokawa with Isoda as it proposes, and Ground 7 fails to render claims 5 to 9 obvious.

XI. CONCLUSION

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

Date: September 17, 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 SUR-REPLY**, that the amount of words in this paper is 4,269. Pursuant to 37 C.F.R. § 42.24, this word count is in compliance with the 5,600 word limit set forth in 37 C.F.R. § 42.24(c)(2) excluding the portions exempted under 37 C.F.R. § 42.24(a)(1).

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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 September 17, 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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