

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.

IPR2024-01130
Patent 7,168,842 B2

Before THU A. DANG, BENJAMIN D. M. WOOD, and
KEVIN W. CHERRY, *Administrative Patent Judges*.

WOOD, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining Some Challenged Claims Unpatentable
Dismissing Patent Owner's Motion to Exclude
35 U.S.C. § 314

I. INTRODUCTION

A. *Background*

BOE Technology Group Co., Ltd. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 3–9 of U.S. Patent No. 7,168,842 B2 (Ex. 1001, “the ’842 patent”). Optronic Sciences LLC (“Patent Owner”) filed a preliminary response. Paper 7 (“Prelim. Resp.”). We authorized (Ex. 3001) additional pre-institution briefing. *See* Paper 11, Paper 12. After the Petition was filed, Patent Owner disclaimed claims 3 and 4. Prelim. Resp. 20; Paper 11, 1–2. We instituted *inter partes* review of the remaining challenged claims (claims 5–9) on January 27, 2025. Paper 16 (“Dec.”).

After institution, Patent Owner filed a Response to the Petition (Paper 25, “PO Resp.”), Petitioner filed a Reply to Patent Owner’s Response (Paper 39, “Pet. Reply”), and Patent Owner filed a Sur-Reply thereto (Paper 33, “PO Sur-reply”). Patent Owner subsequently moved to exclude Petitioner’s expert’s declarations, Exhibits 1002 and 1031 (Paper 36), Petitioner responded in opposition to the motion (Paper 38), and Patent Owner replied in support of the motion (Paper 40). We held an oral hearing on October 27, 2025, a transcript of which is in the record. Paper 43 (“Tr.”).

After the hearing, with our authorization,¹ Patent Owner moved to dismiss this proceeding because, according to Patent Owner, the Petition did not identify all real parties-in-interest as required by 35 U.S.C. § 312(a)(2).

¹ IPR2024-01131, Paper 43, 45:1–8.

Paper 42. Petitioner opposed the motion. Paper 44. We denied the motion. Paper 46.

For the reasons set forth below, we determine that Petitioner has shown by a preponderance of the evidence that claims 5 and 6 are unpatentable, but has not shown that claims 7–9 are unpatentable. We dismiss Patent Owner’s motion to exclude.

B. Real Parties-in-Interest

Petitioner identifies itself as real party-in-interest. Pet. 92.

Patent Owner identifies itself as real party-in-interest. Paper 6, 1.

C. Related Proceedings

The Parties identify *Optronic Sciences LLC v. BOE Technology Group Co., LTD*, 2:23-cv-00549 (E.D. Tex.) as a related matter. Pet. 92; Paper 3, 1.

Patent Owner also identifies the following *inter partes* review proceedings as related matters: IPR2024-01131 (Patent No. 7,226,801); IPR2024-01132 (Patent No. 7,586,121); IPR2024-01133 (Patent No. 9,263,509); IPR2024-01134 (Patent No. 9,406,733); and IPR2024-01315 (Patent 8,158,477). Paper 6, 1.

D. The '842 patent

The '842 patent² relates to a light-emitting-device (LED) backlight for liquid crystal displays (LCDs) that “requires minimal space while producing maximum luminosity.” Ex. 1001, 1:7–11. The '842 patent teaches that backlighting an LCD provides “good functionality in low ambient light

² The '842 patent issued on January 30, 2007 from an application filed December 1, 2004.

conditions and also provides enhanced contrast ratios.” *Id.* at 1:21–24. Because LCDs are not highly transmissive to light, the backlight must be as efficient as possible. *Id.* at 1:24–27. In a conventional configuration of an LED backlight package, the LED modules are placed below the two ends of a light guiding plate (LGP) so light must be reflected twice before traveling along the length of the LGP. *Id.* at 1:34–41, Fig. 1. These two reflections result in energy losses due to the imperfect reflectivity of the LGP surfaces. *Id.* at 1:44–48. In another conventional configuration, the LED modules are placed on the ends of an LGP so emitted light travels directly along the length of the LGP with no reflections. *Id.* at 1:51–56, Fig. 2. Although this configuration improves energy efficiency and luminosity along the length of the LGP, the heat-dissipating plates that are conventionally placed underneath the printed-circuit-board (PCB) portion of the LED modules must extend from the ends of the LGP in the longitudinal direction, which results in “awkward and inefficient” use of “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.” *Id.* at 1:57–2:5. The ’842 patent addresses this problem by providing an LED backlight package using an L-shaped fastener to provide a first surface adjacent to the end of the LGP to which an LED module attaches, and a second perpendicularly oriented surface for attachment to a PCB. *Id.* at 2:31–40, 3:10–21.

Figures 4 and 5 of the ’842 patent, reproduced below, show a side view and end view, respectively, of an LED backlight package according to the ’842 patent:

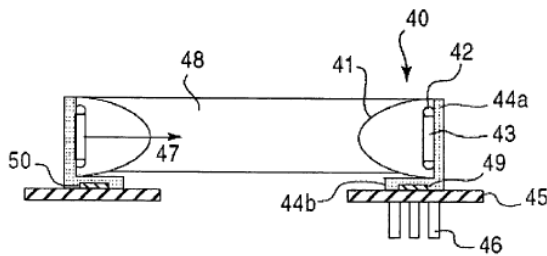


Fig.4

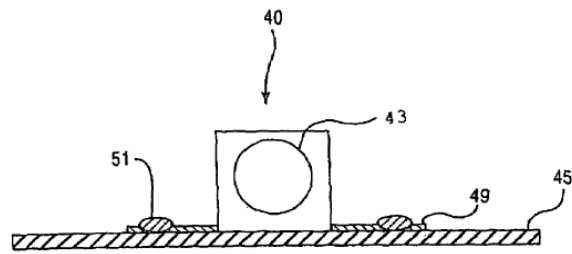


FIG.5

Figures 4 and 5 depict LED module 40 comprising lens 41, conducting wires 42, light-emitting chip 43, an L-shaped fastener formed of first and second portions 44a and 44b “oriented perpendicular to each other,” and PCB 45. *Id.* at 3:6–14. Chip 43 is attached to first portion 44a and second portion 44b is attached to PCB 45. *Id.* at 3:19–22. Conducting wires 42 electrically connect chip 43 to PCB 45. *Id.* at 3:21–24. As shown in Figure 5, anode lead 49 is attached to the PCB 45 with solder 51. *Id.* at 3:59–61. In this configuration, first portion 44a extends along the lateral side of light guiding plate 48 in a direction perpendicular to longitudinal axis 47, and second portion 44b “extends behind” light guiding plate 48 in a direction parallel to longitudinal axis 47. *Id.* at 3:24–39. LED modules 40 may then be placed on the lateral sides of light guiding plate 48 so that the emitted light travels directly through light guiding plate 48 along longitudinal axis 47, and heat-dissipating plates 46 may be “attached to the underside of the horizontally oriented PCB 45” as shown in Figure 4. *Id.* at 3:26–27, 39–43. This configuration “achieves an optimal light travel path and efficient heat dissipation, while conserving valuable space in the longitudinal direction of the light guiding plate 48.” *Id.* at 3:54–57.

E. The Challenged Claims

Petitioner challenges claims 5–9 of the '842 patent, which are the challenged claims that remain after Patent Owner's statutory disclaimer of claims 3 and 4. Pet. 1. Claims 5 and 6 depend from disclaimed independent claim 3. Claim 7 is independent. Claims 8 and 9 depend from independent claim 7. We treat claim 5, which incorporates the limitations of claim 3, as illustrative. Claim 5 is reproduced below (along with its base claim 3):³

3. [3pre] A backlight package comprising:

[3a] a light guiding plate having a first side;

[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; and

[3c] a light emitting device disposed on the first portion of the first fastener for emitting a light toward the light guiding plate.

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.

Ex. 1001, 4:37–48, 51–55.

³ We use Petitioner's bracketed identifiers for each limitation. See Pet. vii, 8–27.

F. Asserted Grounds of Unpatentability

Petitioner contends that claims 5–9 are unpatentable based on the following specific grounds (Pet. 1):⁴

Ground	Claims Challenged	35 U.S.C. §	Reference(s)/Basis
1	5–9	102 ⁵	Uekusa ⁶
2	5–9	103	Uekusa, Isoda ⁷
3	6, 9	103	Uekusa in view of what was admitted to be prior art in the '842 patent (“AAPA”)
4	5–9	102	Kurokawa ⁸
5	7–9	103	Kurokawa
6	5–9	103	Kurokawa, Isoda

Petitioner submits the Declaration of Dr. R. Jacob Baker (Ex. 1002) and the Reply Declaration of Dr. Baker (Ex. 1032) in support its asserted

⁴ Petitioner’s grounds 7 and 8, which were specific to disclaimed claims 3 and 4 (*see* Pet. 1), have been omitted.

⁵ Because the challenged claims of the '842 patent have an apparent effective filing date that precedes the effective date of the amendments to 35 U.S.C. §§ 102 and 103 enacted by the Leahy-Smith America Invents Act (AIA), we apply the pre-AIA version of these sections (although our decision would be the same under either version). *See* AIA, Pub. L. No. 112–29, § 3(n)(1), 125 Stat. 284, 293 (2011).

⁶ U.S. Patent No. 6,927,424 B2 (issued Aug. 9, 2005) (Ex. 1008).

⁷ U.S. Patent No. 7,218,041 B2 (issued May 15, 2007) (Ex. 1005).

⁸ Certified English language translation of JP 2004-279262 A (published Oct. 7, 2004) (Ex. 1004).

grounds. Patent Owner submits the Declaration of Dr. Eric Bretschneider (Ex. 2020) in opposition to the proposed grounds.

II. ANALYSIS

A. *Legal Standards Used in the Merits Analysis*

“In an IPR, the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)); *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

“Because the hallmark of anticipation is prior invention, the prior art reference—in order to anticipate under 35 U.S.C. § 102—must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as in the claim.’” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008) (quoting *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

“A patent may not be obtained though the invention is not identically disclosed or described as set forth in [35 U.S.C. § 102], if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a) (pre-AIA version).

Obviousness is a question of law based on underlying factual considerations, including the scope and content of the prior art, the differences between the prior art and the claimed invention, the level of ordinary skill in the art, and any relevant secondary considerations of non-obviousness, including commercial success of the patented product or method, a long-felt but unmet need for the functionality of the patented invention, and the failure of others who have unsuccessfully attempted to accomplish what the patentee has achieved. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). The obviousness analysis should not be conducted “in a narrow, rigid manner,” but should instead focus on whether a claimed invention is merely “the result[] of ordinary innovation,” which is not entitled to patent protection. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406, 427–28 (2007).

In the two following sections we discuss the scope and content of the prior art and the level of ordinary skill in the art. The differences between the prior art and the claimed invention will be discussed in connection with Petitioner’s proposed grounds of unpatentability. Neither party has submitted evidence of secondary considerations.

B. Scope and Content of the Prior Art

1. Uekusa (Ex. 1008)

Uekusa is titled “Light Emitting Diode and Method for Producing It,” and relates to LED backlights for LCD displays. Ex. 1008, code (54), 1:8–10, 29–31. Figure 1, reproduced below, “is a perspective view showing an outside shape of a completed light emitting diode.” *Id.* at 3:14–15.

Fig. 1

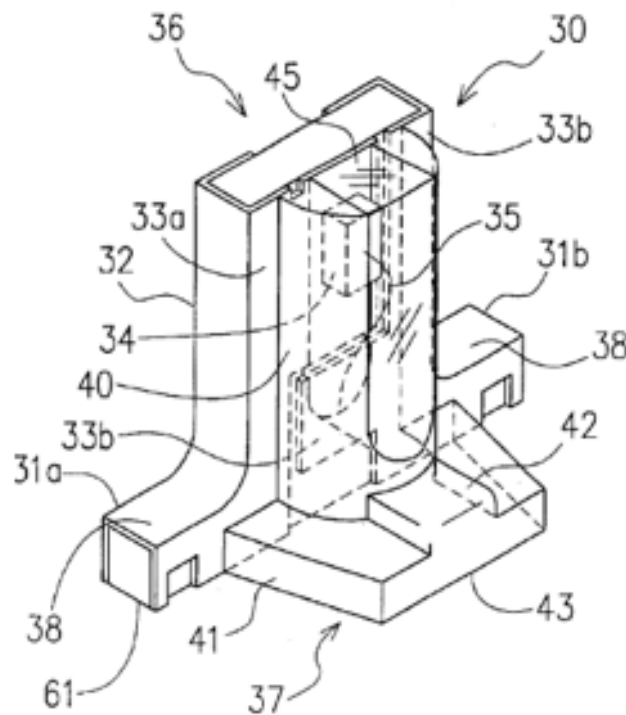
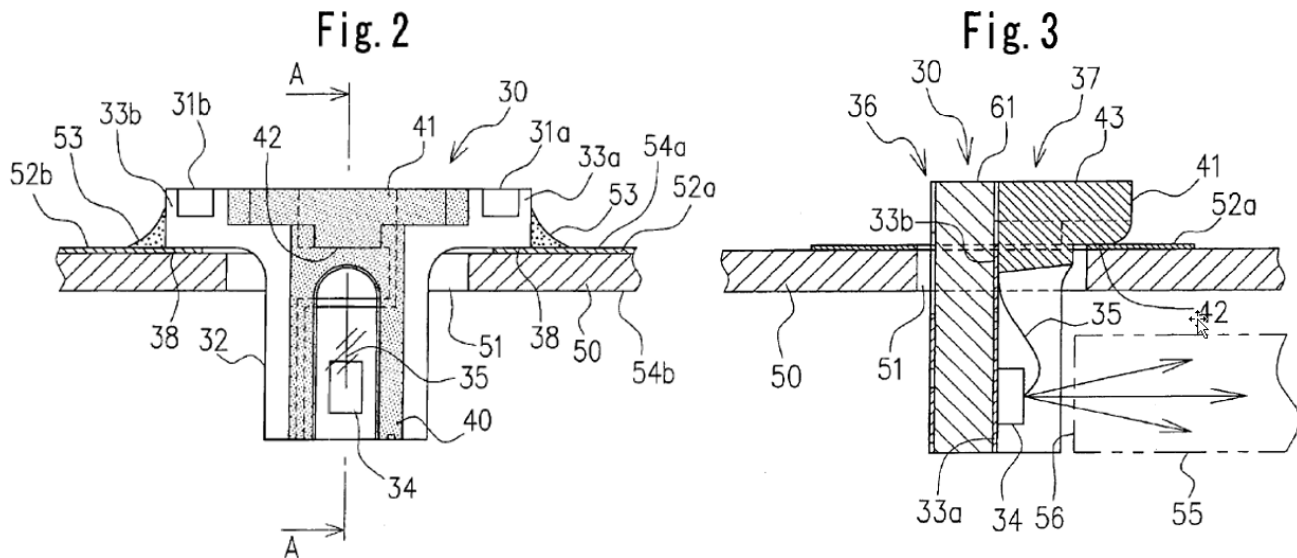


Figure 1 depicts LED 30 having body section 36 “formed into a generally T-character shape from a glass epoxy resin material,” and resin forming section 37 “extending integrally from . . . a front surface of the body section [36].” Ex. 1008, 3:47–53. Base portions 31a and 31b of body section 36 have mounted surfaces for mounting on a motherboard. *Id.* at 3:60–63. LED element 34 is fixed on a front surface of left substrate electrode 33a and upright section 32 of body section 36. *Id.* at 3:63–65. Bonding wire 35 connects LED element 34 to right substrate electrode 33b. *Id.* at 3:67–4:3. Resin forming section 37 “is composed of a generally U-shaped frame 40 formed on the front surface” of upright section 32 of body section 36; plate-shaped extension part 41 is formed integrally with U-shaped frame 40 at a lower end thereof. *Id.* at 4:4–10. Plate-shaped extension part 41 includes

rectangular mounted portion 42 for mounting on the motherboard. *Id.* at 4:11–14, 4:61–63.

Figures 2 and 3, reproduced below, respectively depict a front and side view of Uekusa's LED mounted on a motherboard. *Id.* at 3:18–19, 3:24–25, 5:23–32.



Figures 2 and 3 depict, respectively, front and side views of LED 30 inverted and mounted in circular hole 51 of motherboard 50. Ex. 1008, 3:18–21, 4:61–62, 5:12–14. Base portions 31a and 31b of LED 30 are mounted to motherboard 50 on the peripheral edge of circular hole 51 and secured by solder 53. *Id.* at 4:63–5:10. LED element 34 emits light toward guiding end surface 56 of optical waveguide 55. *Id.* at 5:23–33. Because both side and lower surfaces of LED element 34 are shielded by the U-shaped frame 40, the “diffusion of light to . . . both sideward and downward directions of the light emitting diode is blocked.” *Id.*

2. *Kurokawa (Ex. 1004)*

Kurokawa relates to a “lighting device for a vehicle display unit.”
Ex. 1004 ¶ 1. The lighting device comprises LEDs “arranged opposite a

side edge of a light guide plate, and light incident from the [LEDs] onto the side edge of the light guide plate is outputted from the surface of the light guide plate as illuminating light.” *Id.* ¶ 2. Figures 1 and 2 of Kurokawa are reproduced below:

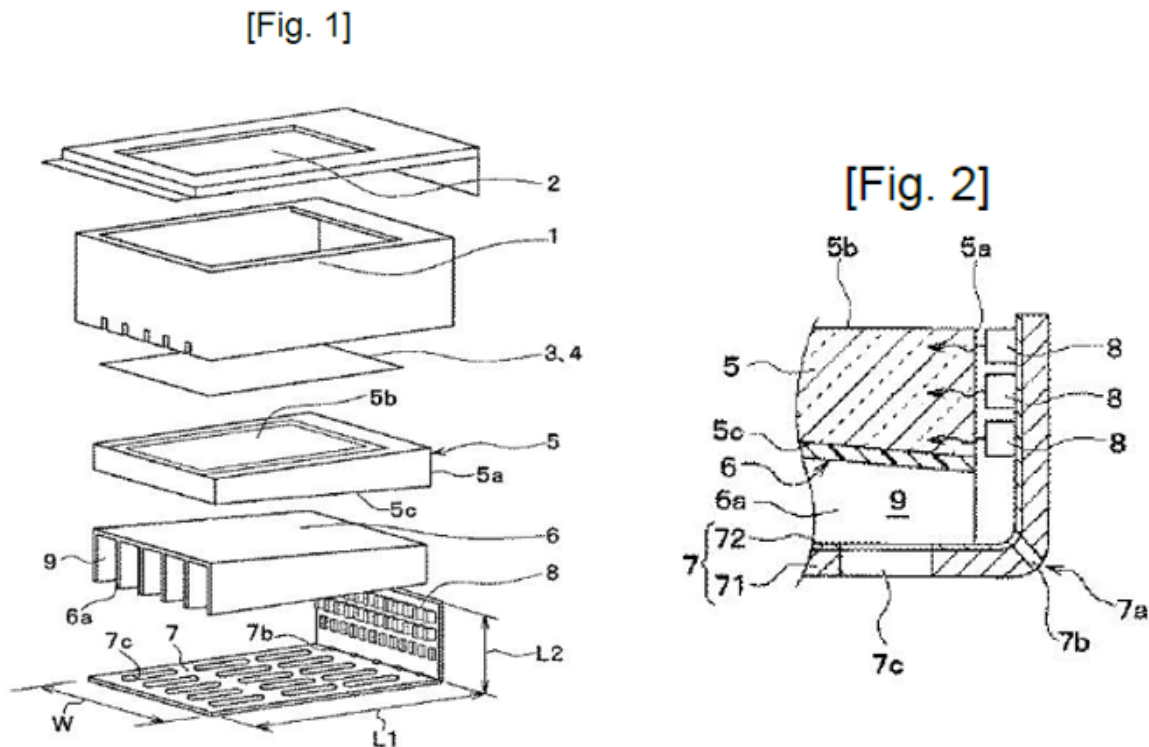


Figure 1 shows Kurokawa’s display unit including, *inter alia*, cover 1, liquid crystal panel 2, light guide plate 5, reflector 6, printed wiring board 7, and light emitting diodes 8. Ex. 1004 ¶¶ 31–32. Figure 2 is a partial cross-sectional view of the display of Figure 1 and depicts printed wiring board 7 composed of metal plate 71 bonded to flexible printed wiring board 72. *Id.* ¶¶ 37–38.

3. Isoda

Isoda teaches “a light emitting device having an effective means for heat release.” Ex. 1005, 2:14–15. Isoda’s device uses, e.g., a “cooling member” that is “secured to the underside” of a “print substrate” on which

an LED is mounted. *Id.* at 2:48–49, Fig. 4. Figure 4 of Isoda is reproduced below:

FIG. 4

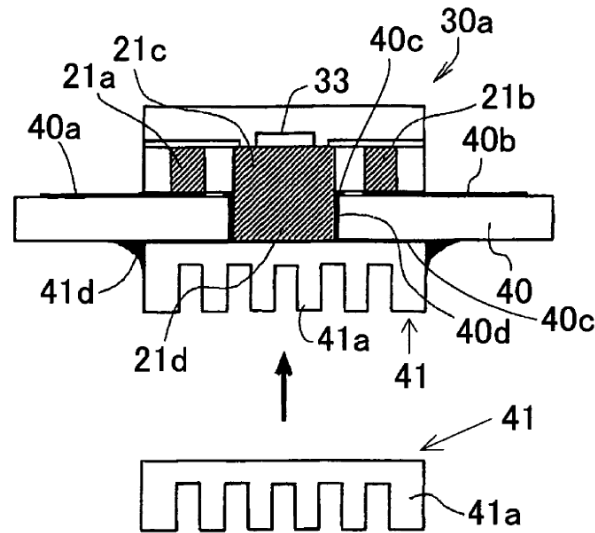


Figure 4 depicts light-emitting device 30a comprising LED 33 mounted on print substrate 40. *Id.* at 4:3–42. Cooling member 41, which is made of heat transmissive metal and has a plurality of cooling fins 41a, is attached to heat radiation pattern 40c on the underside of the print substrate and secured by solder 41d. *Id.* at 4:51–56. When a voltage is applied to LED 33, it “is driven to emit light and heats up,” the heat “transmitted to the cooling member 41 through the conductive member 21c as a heat sink and the heat radiation pattern 40c.” *Id.* at 4:61–5:1. Thus, “the transmitted heat is cooled by the cooling fins 41a.” *Id.* at 5:1–2.

C. Level of Ordinary Skill in the Art

Petitioner contends that, for the ’842 patent, one of ordinary skill in the art “would have had a Bachelors’ degree in electrical engineering or a comparable field of study, plus approximately one or more years of professional experience with electronic and optoelectronic system design,”

but “[a]dditional graduate education could substitute for professional experience, and significant experience in the field could substitute for formal education.” Pet. 3 (citing Ex. 1002 ¶¶ 45–46).

According to Patent Owner, however, one of ordinary skill in the art 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.” PO Resp. 4 (citing Ex. 1001, Title, 1:6–7, 2:21–24; Ex. 2020 ¶¶ 72, 77–80). Patent Owner submits that “Petitioner’s definition requiring one year or more of ‘electronic and optoelectronic system design’ is inadequate because it is too broad.” *Id.* (citing Ex. 2020 ¶¶ 77–80). Patent Owner contends that “the field of ‘optoelectronics’ broadly encompasses solar cells, optical fiber, LED detectors, LED signal devices, and any application of LEDs,” whereas “[d]esigning LED packages for displays presents unique challenges that are not present in other subfields of optoelectronics.” *Id.* at 4–5 (citing Ex. 2020 ¶¶ 78–79). Patent Owner asserts, for example, that “[t]he 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.* at 6 (citing Ex. 2020 ¶¶ 72, 80). According to Patent Owner, “[p]oor thermal management noticeably impacted the resulting visible light and radically affected the lifespan of the LEDs, which was crucial for displays.” *Id.* at 6 (citing Ex. 2020 ¶¶ 72, 80). Patent Owner further notes that “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.* at 6–7 (citing Ex. 2020 ¶ 80). Thus, submits Patent

Owner, “a POSITA would have had knowledge of the problems associated with designing ‘the packaging of light emitting device backlights,’ including understanding thermal management.” *Id.* at 7 (quoting Ex. 1001, 1:6–11; citing Ex. 2020 ¶ 80). Patent Owner therefore defines one of ordinary skill in the art as someone having “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,” but “a formal education could substitute for practical experience and vice versa.” *Id.* at 5 (citing Ex. 2020 ¶ 86).

In its Reply, Petitioner acknowledges that “the ’842 patent is concerned with the dimensions of the backlight package and heat removal from the already packaged LEDs (‘light-emitting chip’) . . . the thermal concerns related to mounting packaged light-emitting chips on a circuit board, and the orientation of the light-emitting chips in the light emitting display.” Pet. Reply 3–4 (citing Ex. 1031 ¶¶ 12–14). According to Petitioner, however, “[t]hermal concerns related to components of circuit designs, such as LED chips or power transistors, implemented on a printed circuit board used in light emitting devices are routine concerns that would fall within the scope of a POSITA under either definition of POSITA.” *Id.* at 4 (citing Ex. 1031 ¶ 15). Petitioner further contends that “[s]pecific design considerations for a backlight package would vary substantially depending on the end application, and therefore broader experience in electronic and optoelectronic design would be advantageous to a POSITA practicing the invention to ensure a small form factor backlight that produces maximal luminosity.” *Id.* (citing Ex. 1031 ¶¶ 16–17).

The level of skill in the art is “a prism or lens” through which we view the prior art and the *claimed invention*. *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). “This reference point prevents . . . fact finders from using their own insight or, worse yet, hindsight, to gauge obviousness.” *Id.* “The person of ordinary skill in the art is a hypothetical person who is presumed to know the relevant prior art.” *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). In determining the level of ordinary skill, we may “consider various factors including type of problems encountered in the art; prior art solutions to those problems; rapidity with which innovations are made; sophistication of the technology; and educational level of active workers in the field.” *Id.* (quoting *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986)). “In a given case, every factor may not be present, and one or more factors may predominate.” *Id.*

“[T]he level of skill in the art might be gleaned from the prior art itself.” *Litton Indust. Prods. V. Solid State Sys. Corp.*, 755 F.2d 158, 163–164 (Fed. Cir. 1985)); *see GPAC*, 57 F.3d at 1579 (approving the Board’s appeal to the references of record, particularly the primary reference, to determine the level of ordinary skill, because the primary reference “offers valuable insight in considering the *Customs Accessories* factors”).

The prior art of record in this case, particularly Uekusa and Kurokawa, indicates that one of ordinary skill in the art would be familiar with designing LED backlights for LCD displays. For example, Uekusa “relates to LEDs “suitable for side luminescence,” i.e., “as light sources of a backlight for illuminating a screen of a liquid crystal display” for, e.g., a portable phone. Ex. 1008, 1:8–10, 1:30–32. Kurokawa relates to a “lighting device for a vehicle display unit,” and teaches that the lighting device

comprises LEDs illuminating the side edges of a light guide plate to illuminate an LCD panel. Ex. 1004 ¶¶1–2, 31–32, Fig. 1. In other words, Kurokawa’s lighting device is an LED backlight for an LCD display.

The prior art of record also provides insight into the types of problems encountered in the art and prior art solutions to those problems. Uekusa notes the possibility of “a loss of light” from the backlight’s “optical wave guide”⁹ if the LEDs are mounted on the back of the optical wave guide instead of to its side. Ex. 1008, 1:33–2:15. Kurokawa seeks to “suppress thermal degradation” of LEDs by “improving the heat dissipating properties of the printed wiring board,” and to enable the use of “inexpensive vertical” LEDs without increasing the size of the lighting device. Ex. 1004, Abstr., ¶ 8. One having ordinary skill would therefore have known how to design LCD-display backlights having adequate thermal dissipation and light production while keeping the size of the display appropriate for its intended purpose.

In determining the level of ordinary skill, we also have recourse to “general knowledge,” such as applicant admitted prior art (AAPA). *See* Stewart, “Enforcement and Non-Waiver of 37 C.F.R. § 42.104(b)(4) and Permissible Uses of General Knowledge in Inter Parties Reviews” (July 31, 2025) (“AAPA Memo”), 1 (stating that general knowledge, including AAPA, may be used in an IPR to, e.g., “demonstrate the knowledge of a person having ordinary skill in the art”); *Unification Techs. LLC v. Micron Tech. Inc.*, 2024 WL 3738401, at *7 (Fed. Cir. Aug. 9, 2024) (affirming use

⁹ Petitioner’s declarant contends, and Patent Owner does not dispute, that “optical wave guide” is another term for “light guiding plate.” Ex. 1002 ¶ 82.

in an IPR of general knowledge, including AAPA, to demonstrate how a skilled artisan would have understood a prior-art reference's disclosure).

We have reviewed the "Background of the Invention" section of the '842 patent, which we find constitutes AAPA, and determine that it is consistent with our understanding of the level of ordinary skill gleaned from the prior art. The '842 patent AAPA describes the field of the invention as "the packaging of light-emitting device backlights," and in particular a light-emitting device backlight package that "requires minimal space while producing maximum luminosity." Ex. 1001, 1:7–11. The '842 patent AAPA teaches that because conventional LCD displays for which a backlight would be used "do not have high transmissivities . . . it is important that the backlight be as efficient as possible." *Id.* at 1:13–27. The '842 patent AAPA further notes that "[f]or conventional LED backlights, heat-dissipating plates . . . are typically placed underneath" the PCB "to dissipate the heat generated by the electronics away from the delicate circuitry." *Id.* at 1:63–66. The '842 patent AAPA thus reiterates that one having ordinary skill would have had experience designing LED backlights for LCD displays, including experience balancing the concerns of efficient light production, adequate heat dissipation, and backlight size.

In light of the above, and having carefully considered Petitioner's arguments and evidence in support of its proposed definition of the level of ordinary skill in the art at the time of the invention, we determine that Petitioner's definition is too broad. Petitioner asserts that one of ordinary skill in the art would have "approximately one or more years of professional experience with electronic and optoelectronic system design." Pet. 3. But Petitioner does not appear to dispute the testimony of Patent Owner's

declarant, Dr. Bretschneider, that “the field of optoelectronics” is “broad and expansive and encompasses solar cells, optical fiber, and any application of LEDs, not just the design of LED packages.” Ex. 2020 ¶ 78. Therefore, one having experience with optoelectronic system design would not necessarily have experience designing LED backlights for LCD displays.

We have also carefully considered Patent Owner’s arguments and evidence in support of its proposed definition of the level of ordinary skill in the art at the time of the invention. In light of our analysis of the prior art and the AAPA, we determine that Patent Owner’s requirement of “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” is not sufficiently precise. Patent Owner does not specify that the required experience is in the context of designing LED backlights for LCD displays. One having this experience would necessarily have experience addressing thermal-management concerns associated with such backlights.

Petitioner disagrees with Patent Owner’s definition of the level of ordinary skill, in part, because Patent Owner’s “definition of a bachelor’s degree in (unspecified) engineering incorrectly encompasses engineering fields clearly having nothing to do with light emitting displays,” such as biomechanical, environmental, and chemical engineering. Pet. Reply 7. Petitioner contends that “knowing about the chemical properties used in the materials used to fabricate the LEDs, printed circuit boards, fasteners, etc. would not be particularly relevant to understanding the electrical, mechanical, and thermal considerations associated with designing and implementing a light emitting display.” *Id.* But, according to Petitioner, “[a]n engineer educated in electrical engineering[] would know how to

mount electrical components on a PCB and, if necessary, remove the heat from the component.” *Id.* at 7–8 (citing Ex. 1031 ¶ 25).

Patent Owner responds that “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.” PO Sur-reply 4. Patent Owner further responds that “Petitioner’s attack on biomedical engineers and environmental engineers is a straw man; Patent Owner never proposed these degrees.” *Id.*

We tend to agree with Petitioner that one of ordinary skill in the art would more likely have a degree in electrical engineering. But we are not persuaded that other engineering fields, such as mechanical engineering and chemical engineering, would not have provided a helpful background to the ordinarily skilled artisan. As Petitioner acknowledges, there are “mechanical and thermal considerations,” not just electrical, “associated with designing and implementing a light emitting display.” Pet. Reply 7. Further, both parties recognize that relevant practical experience could substitute for formal education (and relevant practical experience is necessary regardless of the undergraduate degree). Pet. 3; PO Resp. 5. Thus, it is not unreasonable to expect that a skilled artisan would have had a degree in mechanical or chemical engineering, perhaps with additional experience designing LED backlights for LCD displays.

In view of the above, we find that one of ordinary skill in the art would have an undergraduate degree in electrical engineering or a related

field and one year¹⁰ of practical experience designing LED backlights for LCD displays. Additional experience designing LED backlights for LCD displays may substitute for formal education, and additional graduate education may reduce, but not eliminate, relevant experience.

D. Whether Dr. Baker is a Person of Ordinary Skill

Patent Owner disputes that Petitioner’s declarant, Dr. Baker, possesses the requisite experience to testify as a person of ordinary skill in the art at the time of the invention. Patent Owner contends that Dr. Baker “has no experience designing systems for thermal management” and “does not have experience designing LEDs for the backlights of displays.” PO Resp. 8–9 (citing Ex. 2020 ¶¶ 88–90).

Petitioner responds that “Dr. Baker has been qualified, opined, and been deposed in many legal proceedings regarding the use of packaged LEDs, systems designed using packaged LEDs, and thermal management systems for LEDs/electrical systems.” Pet. Reply 8 (citing Ex. 1031 ¶¶ 26–35). Petitioner further asserts that “Dr. Baker’s experience at Cirque is directly relevant because he worked on fitting components into a backlight display package that included LED packages and involved display design constraints using LED packages.” *Id.* According to Petitioner, “Dr. Baker is a highly qualified POSITA who has relevant experience with heat transfer, industry, and designing electronic and optoelectronic systems.” *Id.* (citing Ex. 1031 ¶¶ 36–38).

¹⁰ We adopt Patent Owner’s proposal that one year of experience would suffice but omit “at least” from Patent Owner’s proposal because it is unduly open-ended.

Patent Owner replies that at Cirque “Dr. Baker’s worked on *capacitive touch* technology and did nothing with the design of LED packages or thermal management.” PO Sur-reply 5 (citing Ex. 2024, 24:17–23).

Dr. Baker has a Ph.D. in electrical engineering and, as evidenced by the long list of cases in which he has testified as an expert witness at the Board and in district courts (Ex. 1031 ¶¶ 28–35), is qualified to testify on many different topics. But that does not mean that Dr. Baker is qualified to testify as a POSITA in every electronics-related field. As discussed above, a POSITA would have one year experience designing LED backlights for LCD displays. Neither Petitioner nor Dr. Baker has identified any such experience.

The most relevant experience, according to Petitioner, is Dr. Baker’s work for Cirque. Pet. 8. According to Dr. Baker, he “worked on fitting components into a backlight display package which included LED packages and had to contend with display design constraints involved with using LED packages.” Ex. 1031 ¶ 38. At his deposition Dr. Baker clarified that at Cirque “I worked on the interface that was a capacitive touch display,” but “I didn’t work on the actual mechanical design of the LED packages. It was more making sure that my solutions didn’t interfere with the package, that it could be fit in the package.” Ex. 2024, 24:4–5, 19–23. In fact, the capacitive touch panel on which Dr. Baker worked “can be placed over,” and therefore was external to, an LCD display rather than being a part of the LCD display. Ex. 2010, 1. This indicates that Dr. Baker’s work did not involve the design of the LCD display itself, much less the LCD-display

backlight, but rather involved a product meant to work with a pre-existing LCD display.

Because Dr. Baker does not have the requisite experience designing LED backlights for LCD displays, he is not qualified to offer expert testimony from the vantage point of a person of ordinary skill in the art of designing LED backlights for LCD displays. *Kyocera Senco Indus. Tools Inc. v. Int’l Trade Comm’n*, 22 F.4th 1369, 1377–78 (Fed. Cir. 2022).

E. Claim Construction

We construe claim terms “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b). Under this standard, claim terms are generally given their plain and ordinary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc). Any special definitions for claim terms must be set forth in the Specification “with reasonable clarity, deliberateness, and precision.” *See In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). Extrinsic evidence is “less significant than the intrinsic record in determining ‘the legally operative meaning of claim language.’” *Phillips*, 415 F.3d at 1317 (citations omitted).

1. “fastener” (claims 5–9)

The parties agreed in the parallel district-court proceeding that “fastener” means “[a] feature that attaches or holds something in place.” Ex. 1026, 42:12–43:2; Ex. 1027, 1; Pet. Reply 10; PO Sur-reply 6. In light of the parties’ agreement, and for consistency, we apply that construction here.

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

The parties agree that “heat dissipating means . . . for conducting a heat generated thereon” should be construed as a means-plus-function claim limitation under 35 U.S.C. § 112(f). Pet. 6; PO Resp. 15. We do as well. When construing a means-plus-function claim, we first “identify the claimed function,” and then “determine what structure, if any, disclosed in the specification corresponds to the claimed function.” *Qualcomm Inc. v. Intel Corp.*, 6 F.4th 1256, 1266 (Fed. Cir. 2021). “[S]tructure disclosed in the specification is corresponding structure only if the specification or prosecution history clearly links or associates that structure to the function recited in the claim.” *B. Braun Med. Inc. v. Abbott Labs.*, 124 F.3d 1419, 1424 (Fed.Cir.1997).

The parties agree that the recited function of the heat dissipating means is conducting heat generated on the circuit board. Pet. 6; PO Resp. 15. As for the corresponding structure, Petitioner contends that “[t]he only structure disclosed and linked by the specification to perform [the claimed] function is heat dissipating plates 46 (plural).” Pet. 6 (citing Ex. 1001, 2:9–11, 3:25–32, 3:51–58, Fig. 4). Patent Owner responds that “the corresponding structure . . . includes at least one of the heat dissipating plates 46 . . . that dissipate heat into the surrounding air.” PO Resp. 15 (citing Ex. 1001, 2:9–11, 3:25–32, 3:51–58, Fig. 4; Ex. 2020 ¶ 118). According to Patent Owner, we “need not resolve whether 1, 2, or 3 plates is needed or which direction they face or their precise orientation and location.” *Id.* at 16.

The Specification of the '842 patent clearly links heat dissipating plates 46 depicted in Figure 4 (and the apparently identical heat dissipating plates 23 depicted in Figure 2 and heat dissipating plates 36 depicted in Figure 3) to the function of conducting heat generated on the circuit board. *See, e.g.*, Ex. 1001, 3:25–32 (“heat dissipating plates 46 are attached to the underside of the horizontally oriented PCB 45” and “conduct, or dissipate, heat produced by electronic components disposed on the PCB 45”). The Specification does not disclose a heat-dissipating structure having only one plate, and therefore we determine that the corresponding structure includes multiple plates.

3. *“circuit board connecting the second portion”
(claims 5 and 7–9)*

Claim 5 recites “a circuit board . . . connecting the second portion [of the fastener].” Ex. 1001, claim 5. In the parallel district-court litigation the parties agreed to construe “the circuit board connecting the second portion” as “circuit board connecting *to* the second portion.” Pet. Reply 13 (emphasis added); *see* PO Sur-reply 8; Ex. 1030, 2. The parties dispute, however, the construction of “connecting.” Patent Owner contends that “the plain and ordinary meaning of the term ‘connecting’ requires something more than just touching, such as attachment.” PO Resp. 17.

Petitioner responds that Patent Owner’s proposed construction “impermissibly narrows the plain and ordinary meaning” of the term, which does not require “something more than touching.” Pet. Reply. 13. According to Petitioner, “[t]o the extent [Patent Owner] suggests ‘connecting’ requires solder or some other medium, that should be rejected as not required by the claims or the specification.” *Id.* at 14. Petitioner

further contends that to the extent “connecting” requires “attachment,” that would include “holding components in place (as [Patent Owner] agreed to for purposes of the fastener limitation).” *Id.*

Neither party asserts that “connecting” is a term of art requiring expert testimony to construe.

We agree with Petitioner that “connecting” should be construed consistently with the “fastener” term, because it is the “fastener” (or the second portion thereof) to which the circuit board is “connecting.” Because the parties agree that “fastener” is “[a] feature that attaches or holds something in place, “connecting” means “attaching or holding.”

4. *“the second portion extending above the light guiding plate”*

Independent claim 7 recites that the “second portion [of the fastener] extend[s] above the light guiding plate.” Ex. 1001, claim 7. In the parallel district-court case, the court agreed with Petitioner that this term is indefinite. Ex. 2027, 17–20. The court noted that the Specification’s use of “top” and “bottom” in describing the conventional embodiment depicted in Figure 1 indicated that “at least for Figure 1, ‘above’ is at the top of the page.” *Id.* at 18. But “[w]ith respect to Figure 4 . . . that would mean the second portion of the fastener is ‘below’ the LGP—not ‘above’ it,” as this term requires. *Id.* The court further observed that even Patent Owner’s expert—applying his “conclusory” opinion that “above” is determined from the structure’s spatial relationship with a display in which the structure is used and the direction of light—could not tell from Figure 4 “which way is up without the rest of the display, which isn’t a claim limitation.” *Id.* at 19. The court therefore determined that “[i]f [Patent Owner’s] expert cannot

apply his own opinion about the direction of light to tell which way is ‘above’ from Figure 4, neither can a skilled artisan.” *Id.* at 19–20.

Although we do not render any determination as to the indefiniteness of this term or of claims 7–9 in which it is found, we agree with the court’s analysis to the extent that our unpatentability analysis would require “considerable speculation as to the meaning and assumptions as to the scope” of the claims (*In re Steele*, 305 F.2d 859, 862 (CCPA 1962)), such that the differences between these claims and the prior art cannot be ascertained. *See id.*; *see also BlackBerry Corp. v. MobileMedia Ideas, LLC*, Case IPR2013-00036, at 19–20 (PTAB Mar. 7, 2014) (Paper 65) (citing *Steele*, 305 F.2d at 862–63 for the proposition that “the prior art grounds of unpatentability must fall, pro forma, because they are based on speculative assumption[s] as to the meaning of the claims” and reasoning that “an obviousness determination based on less than all of the claimed elements is speculative as to the meaning or scope of the claims”). In other words, “[w]ithout ascertaining the proper claim scope, we cannot conduct a necessary factual inquiry for determining obviousness—ascertaining differences between the claimed subject matter and the prior art.” *Id.* at 20 (citing *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966)).

F. Ground 1: Anticipation of Claims 5–9 by Uekusa

Petitioner contends that Uekusa anticipates claims 5–9. Pet. 8–27. Patent Owner opposes. PO Resp. 17–39.

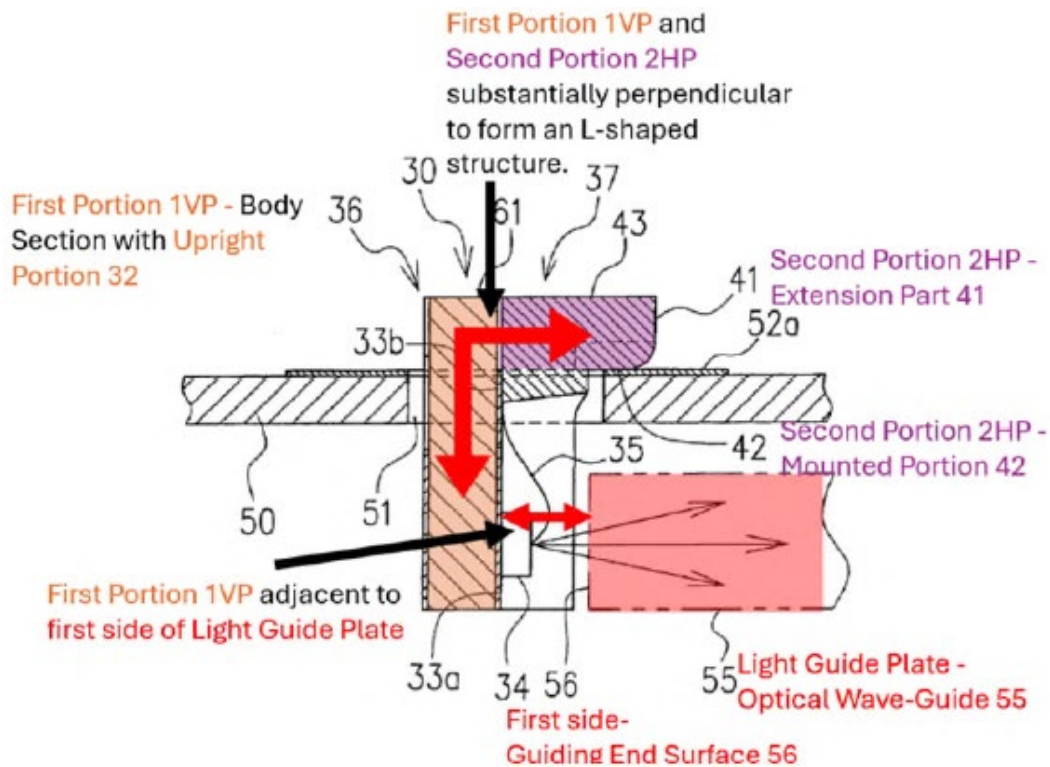
1. Claim 3/5

Petitioner contends that Uekusa discloses all of the limitations of claim 3 and the additional limitation of claim 5. Pet. 8–15, 17–23 (citing Ex. 1008, 1:29–56, 2:9–15, 3:25–31, 3:47–6:6, Figs. 1–8, 10, 11; Ex. 1002

¶¶ 79–89, 99–105). Petitioner specifically contends that Uekusa’s optical wave-guide 55 corresponds to the claimed light guiding plate; upright portion 32 of body section 36 corresponds to the claimed first portion of the fastener;¹¹ extension part 41/mounted portion 42 of resin forming section 37 corresponds to the claimed second portion of the fastener; LED 34 corresponds to the claimed light emitting device disposed on the first portion; and motherboard 50 corresponds to the circuit board connecting the second portion recited in claim 5. *Id.* Petitioner supports these contentions with citations to the record. *Id.*

Petitioner provides an annotated version of Figure 3 of Uekusa, reproduced below, to illustrate where it contends the first and second fastener portions are located:

¹¹ Claim 3 recites a “first fastener.” However, neither claim 3 nor any other of the challenged claims recites a “second” or additional fastener. For simplicity, here and elsewhere in this Decision we use the term “fastener” to refer to the “first fastener.”



In Petitioner’s annotated version of Uekusa Figure 3, Petitioner labels, *inter alia*, upright portion 32 as the claimed first portion of the fastener, and extension part 41/mounted portion 42 as the claimed second portion of the fastener. Pet. 11.

a. Limitations [3pre], [3a], and [3c]

Patent Owner does not dispute that Uekusa teaches a backlight package (limitation [3pre]; a light guiding plate (limitation [3a]); and a light emitting device for emitting a light toward the light guiding plate “disposed on” upright portion 32 of body section 36, which is the structure that Petitioner contends corresponds to the first portion of a fastener (Pet. 13) (limitation [3c]). Having reviewed the record and the parties’ contentions, we determine that Petitioner has shown by a preponderance of the evidence that Uekusa teaches limitations [3pre], [3a], and [3c].

b. Limitation [3b]

Limitation [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.” As an initial matter, neither party asserts that this limitation contains any term of art that requires expert testimony to interpret. *See Sinorgchem Co., Shandong v. Int'l Trade Comm'n*, 511 F.3d 1132, 1137 n.3 (Fed.Cir.2007) (holding that because the term “controlled amount” was not shown to have an accepted meaning in the field of chemistry, testimony as to how one skilled in the art would interpret the term “is entitled to no weight”). Nor has either party established that expert testimony is required to determine whether or not any term within this limitation, particularly “fastener” or “L-shaped,” is taught by a prior-art reference. *See Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1365 (Fed.Cir.2008) (affirming obviousness where “[t]he technology is simple and neither party claims that expert testimony is required”).

We agree with Petitioner’s mapping of Uekusa to limitation [3b]. Thus, we find that the combination of upright portion 32 (with left and right base portions 31a and 31b), extension part 41, and mounted part 42 corresponds to the claimed L-shaped fastener.

This structure is a “fastener” under the parties’ agreed-upon construction of “fastener”—a feature that “attaches or holds something in place”—because it is the structure by which LED 30 is “mounted” to motherboard 50. Ex. 1008, 4:61–63, Figs. 2, 3. According to Uekusa, upright section 32 of body section 36 is inserted in hole 51 of the

motherboard, and base portions 31a and 31b are “mounted on a peripheral edge of the hole 51 and at the same time, the mounted portion 42 is mounted on the peripheral edge of the hole to support the light emitting diode with three points of the mounted surfaces [of base portions 31a and 31b] and mounted portion 42.” *Id.* at 4:63–5:4, Figs. 2, 3. As a result, “the light emitting diode 30 can be mounted correctly and firmly on the motherboard 50.” *Id.* at 5:5–6. This structure thus “holds” light emitting diode 30 because it provides it “support” and ensures that it is mounted “firmly” to the motherboard.

Second, upright portion 32, plate shaped extension 41, and mounted portion 42 combine to form an “L-shaped” structure, as depicted in Figure 3 of Uekusa. The Specification does not provide an express construction of “L-shaped,” but does describe the combination of first portion 44A and second portion 44B depicted in Figure 4 as “an L-shaped fastener.” Ex. 1001, 3:6–11. The Specification teaches that “[i]n this exemplary embodiment, the first portion 44A and the second portion 44B of the L-shaped fastener are oriented perpendicular to each other,” but “the present invention is not limited to the configuration shown in FIG.4, and different configurations may be used without departing from the scope of the present invention.” *Id.* at 3:12–15. This indicates that structure need not be identical to that depicted in Figure 4 to be considered L-shaped. Further, the ’842 patent’s L-shaped fastener is not always depicted as “L-shaped”; in Figure 5, it is depicted as square shaped. *See id.* at Figs. 4, 5. This suggests that structure need only be L-shaped in one cross-sectional view to satisfy the “L-shaped” limitation.

In the absence of a generally accepted meaning of “L-shaped” in the art, or of an express definition of the term in the ’842 patent, we accord “L-shaped” its plain, ordinary meaning, which is “shaped like the letter ‘L.’” Further, as discussed above, the structure need not be identical to that depicted in Figure 4 of Uekusa, or be L-shaped in more than one cross-sectional view, to be “L-shaped.” We find that upright portion 32, plate shaped extension 41, and mounted portion 42 combine to form an “L-shaped” structure, as depicted in Figure 3 of Uekusa.

We have considered Patent Owner’s arguments that Uekusa does not teach the claimed L-shaped fastener, but find them unpersuasive. First, Patent Owner argues that extension part 41/mounted part 42 cannot correspond to the second portion of the claimed fastener because “[t]he resin extension . . . does not and cannot provide any type of attachment or fastening.” PO Resp. 26. Patent Owner submits the testimony of its declarant, Dr. Bretschneider, that the resin forming section “is not suitable for soldering to the motherboard because the resin will burn and become damaged.” *Id.* at 26–27 (citing Ex. 2020 ¶¶ 127–132). Patent Owner further contends that Uekusa does not “describe any other means by which the resin attaches anything to the T-shaped fastener.” *Id.* at 28. According to Patent Owner, “[a]lthough resin forming section 37^[12] may be ‘placed’ on the PCB, resin forming section 37 does not and cannot attach anything.” *Id.* at 29

¹² As discussed above, Petitioner contends that only plate shaped extension 41/mounted portion 42—not the entire resin forming section 37—corresponds to the claimed second portion of the fastener Pet. 11.

(citing Ex. 2020 ¶ 132).¹³ Instead, Patent Owner submits, “[i]t only provides a surface that touches the motherboard to prevent further tilting.” *Id.* at 30.

Petitioner replies that, as the parties agreed in the district-court litigation, a “fastener” is a “feature that attaches or holds something in place,” and the combination of upright section 32 and plate shaped extension 41/mounted portion 42 “hold[s] LED 34 in place as well as provide[s] support for the structure.” Pet. Reply 15–16.

In its Sur-reply, Patent Owner responds that “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.” PO Sur-reply 10. According to Patent Owner, “[t]his does not meet the agreed definition of a fastener that ‘attaches or holds something in place’” because “the parties appear to agree that the thing to be held in place is Uekusa’s LED 34.” *Id.* at 11.

We are not persuaded that the combination of plate shaped extension 41/mounted portion 42 cannot be considered the “second portion” of the claimed fastener because it is made of resin and cannot be soldered. Uekusa makes clear that this structure, along with body portion 32, “holds” light emitting diode 30 in place on the motherboard because it “support[s]” it “firmly” on the motherboard. Ex. 1008 5:1–6. Further, although we disagree with Patent Owner that “the thing to be held in place is Uekusa’s LED 34,” the combination of body section 36/upright portion 32 and plate shape extension 41/mounted portion 42 does hold LED 34 in place with respect to the motherboard and optical wave guide 55, because LED 34 is

¹³ Here and throughout this opinion we omit the parties’ use of colored text.

“fixed on one substrate electrode 33a . . . in a front surface of the upright section 32.” Ex. 1008, 3:63–65, Figs. 1, 3.

Patent Owner also argues that the structure that Petitioner contends corresponds to the claimed fastener is not “L-shaped.” PO Resp. 32. Patent Owner contends that “Uekusa explicitly describes its body as T-shaped and frame as U-shaped or plate-shaped, not L-shaped.” *Id.* (citing Ex. 1008, 2:35–37, 4:4–10). According to Patent Owner, “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 called them a ‘fastener.’” *Id.* at 32–33.

That Uekusa refers to body section 36 as T-shaped is not relevant because Petitioner is not relying on body section 36 alone as corresponding to the L-shaped fastener. Further, the structure that Petitioner contends corresponds to the L-shaped fastener does not include U-shaped frame 40. Finally, we are not persuaded that body section 36, plate shape extension 41 and mounted portion 42 “perform different roles,” because, as discussed above, they combine to provide the three points of contact that firmly supports light emitting diode 30 to the motherboard.

In summary, we find that Uekusa discloses limitation [3(b)].

c. Additional Limitation of Claim 5

Claim 5 depends from claim 3 and additionally recites “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.” Ex. 1001, claim 5. Petitioner contends that Uekusa’s motherboard 50 corresponds to the claimed circuit board “connecting the

second portion” (mounted portion⁴²/extension part 41), and front wire 35, substrate electrodes 33a and 33b, and circuit electrodes 52a and 52b collectively correspond to the claimed conducting wire “electrically coupling the light emitting device to the circuit board.” Pet. 17.

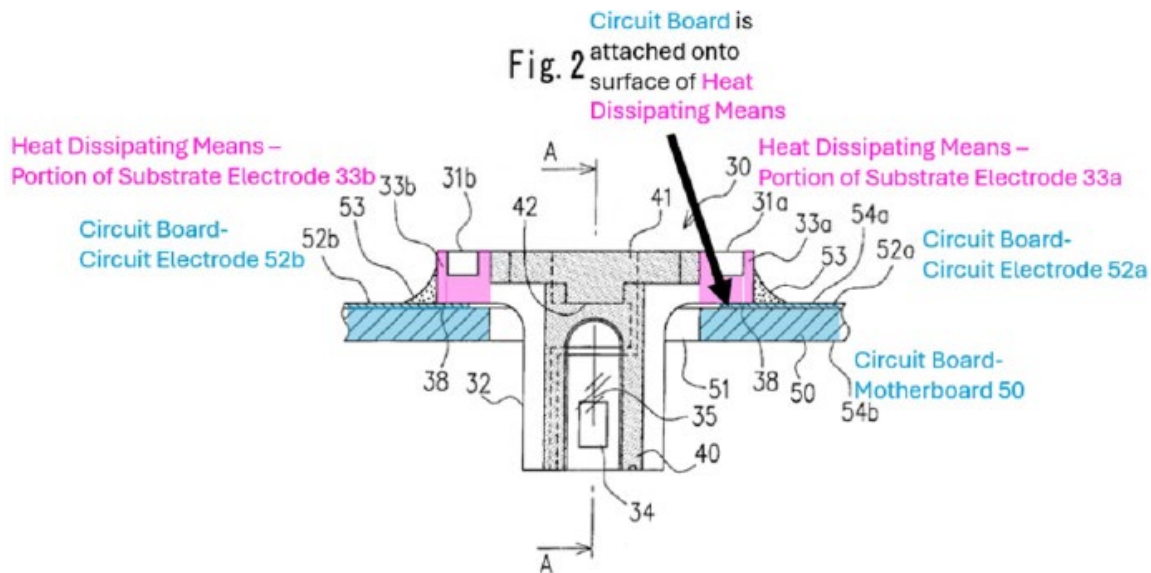
Patent Owner responds that “Uekusa’s resin forming section 37 is not connected to the circuit board” because it “cannot be soldered to and is not otherwise attached or connected to the circuit board.” PO Resp. 34. According to Patent Owner, “resin forming section [37] touches but does not ‘connect’ to the circuit board.”

We find that Uekusa teaches the additional limitations of claim 5. First, Patent Owner does not dispute that Uekusa discloses “a conducting wire electrically coupling the light emitting device to the circuit board.” Second, we construe “connecting” to mean “attaching or holding” and, as discussed above, the circuit board and the second portion are held “firmly” together. Patent Owner’s argument is based on an incorrect construction of “connecting,” and is therefore unpersuasive.

2. *Claim 6*

Claim 6 depends from claim 3 and additionally recites “a circuit board and a heat dissipating means, the circuit board connecting the second portion, and the heat dissipating means attached onto the surface of the circuit board for conducting a heat generated thereon.” Ex. 1001, claim 5. Petitioner asserts that “[a] POSITA would have understood that the portions of [Uekusa’s] substrate electrodes 33a and 33b would inherently perform the function of ‘conducting heat generated on the circuit board’” because they “would be made of metal” and “would inherently have conducted heat from any component they touched.” Pet. 25–26 (citing Ex. 1002 ¶ 108).

Petitioner provides an annotated version of Uekusa's Figure 2 illustrating the portions of substrate electrodes 33a and 33a Petitioner contends corresponds to the claimed heat dissipating means:



Id. at 25. Petitioner contends that “[a] POSITA would have understood that the portions of substrate electrodes 33a and 33b are the claimed heat-dissipating plates (plural)” because they are “metal plates around a resin core” and have “indentations 31a and 31b that result in the formation of multiple small metal plates or ‘fins’ at both ends of 33a and 33b.” *Id.* at 26 (citing Ex. 1002 ¶ 109).

Patent Owner responds that “Uekusa’s substrate electrodes are wholly inadequate to act as a heat dissipating means as claimed.” PO Resp. 36 (citing Ex. 2020 ¶¶ 138–46). Patent Owner contends, for example, that upright section 36 to which the electrodes are attached “comprises a thermal insulator and cannot perform the function of effective heat dissipation.” *Id.* at 37 (citing Ex. 1008, 3:49–50; Ex. 2020 ¶ 145; Ex. 1005, 1:30–31). Patent Owner further asserts that “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.” *Id.* (citing Ex. 2020 ¶¶ 142, 146).

As discussed above, “heat-dissipating means” is a means-plus-function term under 35 U.S.C. § 112(f). The claimed function is “conducting a heat generated” on the surface of the circuit board. The ’842 discloses as the structure corresponding to this function heat dissipating plates 46. Petitioner must therefore show that Uekusa discloses heat dissipating plates or equivalent structure. *Regents of Univ. of Minnesota v. AGA Med. Corp.*, 717 F.3d 929, 940 (Fed. Cir. 2013). Petitioner does not contend that Uekusa discloses the equivalent of the claimed structure, but rather the structure itself. *See* Pet. 36 (“A POSITA would have understood that the portions of substrate electrodes 33a and 33b are the claimed heat-dissipating plates (plural).”).

Petitioner has not shown by a preponderance of the evidence that this is the case, however. First, Uekusa does not provide any support for considering a portion of the substrate electrodes to be considered a stand-alone structure, much less heat-dissipating plates. Second, any resemblance between these portions and the heat-dissipating plates shown in Uekusa is meager at best. Third, Petitioner does not rebut the testimony of Patent Owner’s expert that these electrode portions would provide “small to negligible” heat transfer. Ex. 2020 ¶ 146. Thus, Petitioner does not show that this structure performs the claimed function of dissipating heat generated on the circuit board. Finally, Petitioner’s only support for its contention that one of ordinary skill in the art would have considered these electrode portions to be the claimed heat-dissipating means is the unsupported testimony of its declarant, Dr. Baker. Ex. 1002 ¶¶ 108–109.

We give no weight to this testimony because it is unsupported and because Dr. Baker is not qualified to testify from the perspective of a person of ordinary skill in the art of designing LED backlights for LCD displays.

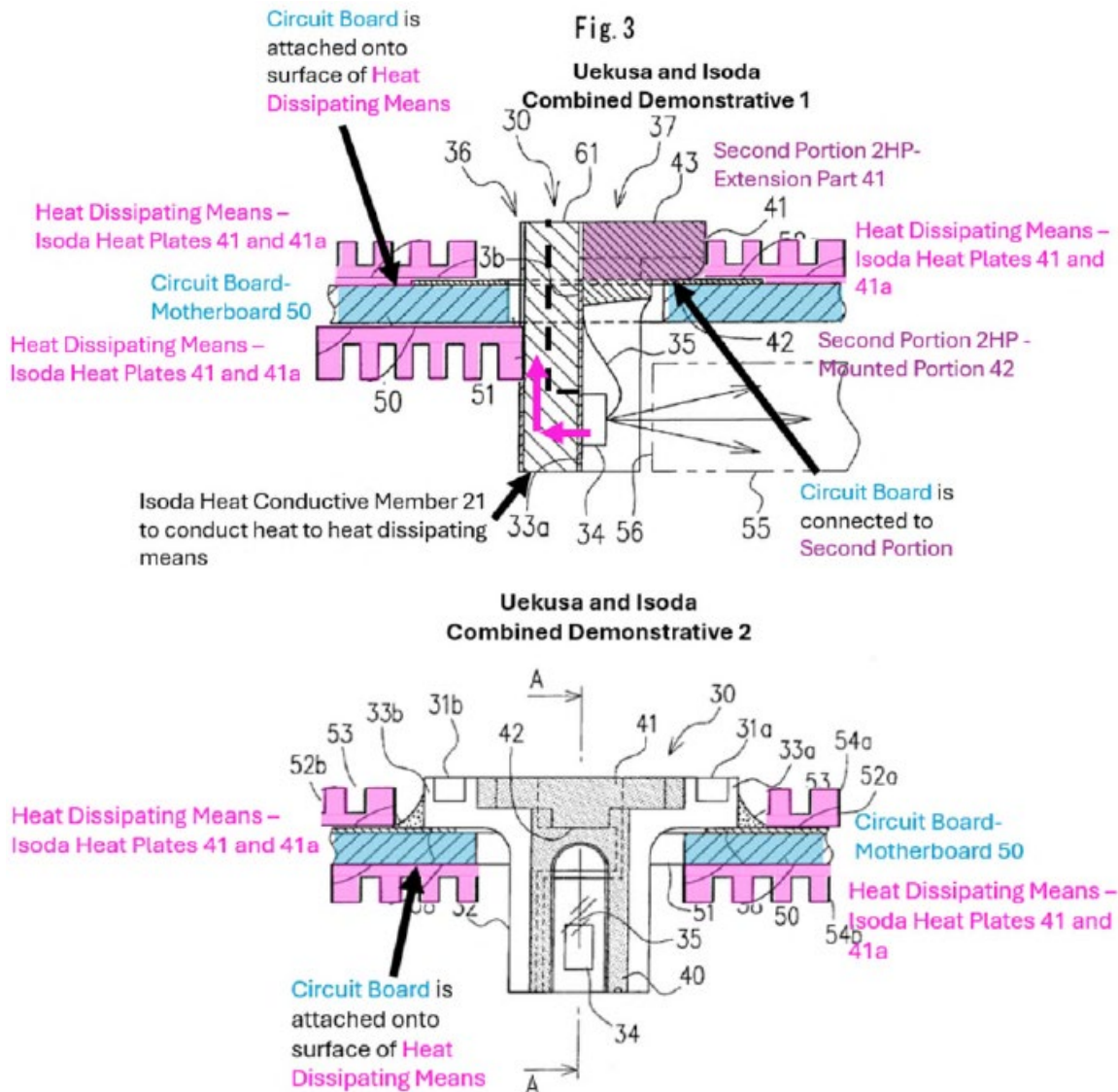
Because Petitioner has not shown that Uekusa discloses the claimed heat dissipating plates of claim 6, Petitioner has not shown by a preponderance of the evidence that Uekusa anticipates claim 6.

3. *Claims 7–9*

Independent claim 7 recites the “second portion [of the fastener] extend[s] above the light guiding plate.” As discussed above, we are unable to ascertain the differences between these claims and the prior art. As a result, Petitioner has not met its burden of showing, by a preponderance of the evidence that claims 7–9 are unpatentable.

G. *Ground 2 (Uekusa and Isoda)*

For Ground 2, Petitioner relies on Isoda to teach the heat-dissipating-means limitation of claim 6. Pet. 40. Petitioner specifically contends that Isoda’s “heat plates 41 and 41a” correspond to the claimed heat dissipating means (*id.*), and that it would have been obvious to one of ordinary skill in the art “to add a plurality of heat dissipating plates to further increase the heat-dissipation of Uekusa’s electronic components.” *Id.* at 27 (citing Ex. 1002 ¶ 118). Petitioner provides versions of Figures 2 and 3 of Uekusa annotated to include “obvious configurations of [Isoda’s] fin locations on Uekusa,” which we reproduce below:



Id. at 28–29 (citing Ex. 1002 ¶ 120). According to Petitioner:

It would have been obvious for a POSITA to combine Uekusa's teachings related to LCD backlight devices utilizing LEDs with Isoda's teachings of enhanced heat dissipation methods by placing heat dissipating fins disclosed in Isoda to the left, right, and back sides of extension part 2HP on Uekusa's motherboard 50 and on the opposite side of motherboard to the left, right, and back sides of Uekusa's 1VP portion to enhance heat dissipation. A POSITA would have selected the precise location (or locations) of the heat dissipating fins in the combination based on the critical dimensions of the overall

system design, but each location and combination of locations would have been obvious to a POSITA.

Id. at 29 (citing Ex. ¶ 121).

Petitioner also contends that “[f]urther support that a POSITA would have been motivated to combine Uekusa’s [sic] with Isoda is found in the applicant admitted prior art (AAPA) in the 842’s specification.” Pet. 30–31 (citing Ex. 1001, 1:51–2:11, Figs. 2, 3). According to Petitioner, “[t]he purported invention is rotating the LED ninety degrees using an L-shape fastener while keeping a circuit board in the prior art orientation . . . such that when the heat plate fins are placed in their ‘typical’ prior art location underneath the circuit board, they continue to point down as shown in Figure 4.” *Id.* at 31 (citing Ex. 1001 2:29–40, 3:51–58, 4:1–9, Fig. 4). Petitioner submits that “[t]he combination would have been obvious because it merely applies known techniques to solve known problems with predictable results.” *Id.*

Patent Owner responds that “Petitioner’s proposed heatsink locations rely on the transmission of heat through the insulating PCB,” even though “Isoda explicitly teaches that heat is ‘scarcely transmitted to the [PCB],’ which results in ‘high temperature, which causes junctions in the LED to degrade.” PO Resp. 39–40 (citing Ex. 1005, 1:30–36). According to Patent Owner, “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,” a teaching that Petitioner “rejects.” *Id.* at 40. Patent Owner asserts that “[t]he 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,” which “is

insufficient to carry Petitioner’s burden of proof.” *Id.* at 43. Patent Owner does not dispute that Isoda discloses the same structure disclosed in the ’842 for performing the claimed function of “conducting a heat generated” on a circuit board; i.e., that Isoda’s “cooling member 41,” which is “made of heat transmissive metal and [has] a plurality of cooling fins 41a,” corresponds to the ’842 patent’s heat dissipating plates. Patent Owner also does not address Petitioner’s argument that AAPA would have motivated a person of ordinary skill in the art to combine Uekusa and Isoda.

As discussed above, we agree with Patent Owner that Dr. Baker is not a person of ordinary skill in the art because he lacks the requisite experience designing LED backlights for LCD displays. Therefore, he cannot testify from the perspective of one of ordinary skill in the art, and we give no weight to his testimony that one of ordinary skill in the art would have combined Uekusa and Isoda. Nonetheless, we agree with Petitioner that one of ordinary skill in the art would have been motivated to add Isoda’s cooling member to Uekusa’s device, as evidenced by AAPA’s teaching that “[f]or conventional LED backlights, heat dissipating plates . . . are typically placed underneath of PCB . . . to dissipate the heat generated by the electronics away from the delicate circuitry.” Ex. 1001, 1:63–66. Thus, one of ordinary skill in the art would have placed Isoda’s heat dissipating plates on Uekusa’s circuit board “to dissipate heat generated by the electronics away from the delicate circuitry” on the circuit board. As a result of the skilled artisan’s experience designing LED backlights for LCD displays, the skilled artisan would have known the appropriate place or places to locate the heat dissipating plates depending on the particular display for which the backlight was designed, and therefore would have had a reasonable expectation of

success in making the combination. A precise explanation of exactly where Isoda's heat dissipating plates would be placed is not required to demonstrate obviousness. *See NuVasive, Inc. v. Iancu*, 752 Fed. Appx. 985, 998 (2018) (explaining that case law does not require explaining exactly how elements of two references could be physically combined). Indeed, “[c]laims may be obvious in view of a combination of references, even if the features of one reference cannot be substituted physically into the structure of the other reference.” *Orthopedic Equip. Co. v. United States*, 702 F.2d 1005, 1013 (Fed. Cir. 1983); *see In re Keller*, 642 F.2d 413, 425 (CCPA 1981) (“The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.”).

Patent Owner's arguments assume one of ordinary skill in the art would have used Isoda's cooling member solely to dissipate heat generated by the LED, for the purpose of protecting the LED, in accordance with Isoda's teachings. AAPA, however, teaches another known problem that would have motivated the combination: heat generated by other electronics that could harm “delicate circuitry” on the PCB. Ex. 1001, 1:65–66. Protecting this “delicate circuitry” (not necessarily the LED), from heat generated by “the electronics” (again, not necessarily the LED) would have motivated one of ordinary skill in the art to place Isoda's cooling member 41 on Uekusa's PCB. *See KSR Intern. Co. v. Teleflex Inc.*, 550 U.S. 298, 420 (2007) (“[A]ny need or problem known in the field of endeavor at the time

of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.”).

In summary, we determine that Isoda teaches the claimed heat dissipating means, that one of ordinary skill in the art would have been motivated to combine this teaching with Uekusa, and that one of ordinary skill in the art would have had a reasonable expectation of success in making the combination. Accordingly, we determine that claim 6 would have been obvious over Uekusa and Isoda.

H. Ground 3 (Uekusa and AAPA)

In Ground 3 Petitioner relies on AAPA to teach the heat-dissipating-means limitation of claims 6 and 9. Pet. 47–48. However, AAPA “may not be used to supply a missing claim limitation.” AAPA Memo, 1. Therefore, Petitioner fails to establish unpatentability under Ground 3.

I. Ground 4 (Kurokawa, § 102)

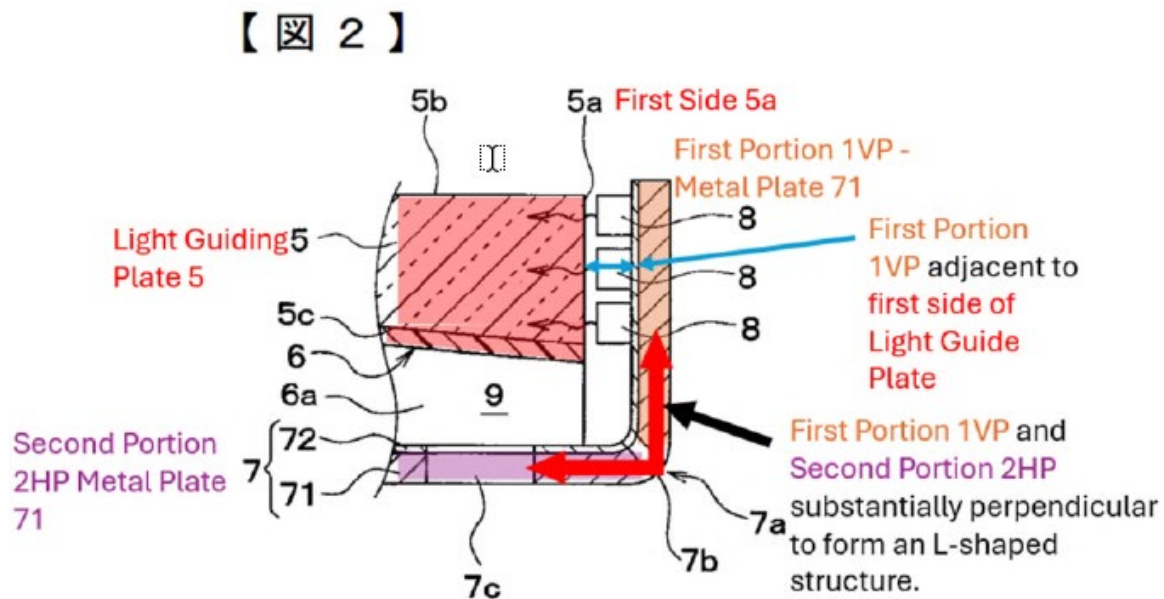
Petitioner contends that Kurokawa anticipates claims 5–9. Pet. 48–67. Patent Owner opposes. PO Resp. 50–56. Because we determined above that we are unable to ascertain the differences between claims 7–9 and the prior art, we only discuss claims 5 and 6.

1. Claim 5

Petitioner relies on Kurokawa to teach all of the limitations of independent claim 3 and the additional limitations of claim 5. Pet. 48–56, 58–60. Petitioner specifically contends that metal plate 71 corresponds to the claimed L-shaped fastener. *Id.* at 49 (citing Ex. 1002 ¶ 166).¹⁴

¹⁴ The Petition presented two alternative theories explaining why Kurokawa discloses the fastener limitation (Pet. 51–52), but Petitioner now considers

Petitioner identifies what it contends are the first portion and second portion of the L-shaped fastener in an annotated version of Figure 2 of Kurokawa, reproduced below:



In Petitioner’s annotated version of Kurokawa Figure 2, Petitioner highlights “First Portion 1VP” in orange, and “Second Portion 2HP” in purple. *Id.* at 50. Petitioner contends that the first portion “is disposed adjacent to the first side (5a) of the light guiding plate (5),” and the first and second portions “are arranged in a substantially perpendicular relationship to form a substantially L-shaped structure.” *Id.* at 49-50 (citing Ex. 1004 ¶¶ 9, 20–21, 37–39, 47, 56, 58, 60, Abstr., Figs. 1–7; Ex. 1002 ¶ 166). According to Petitioner:

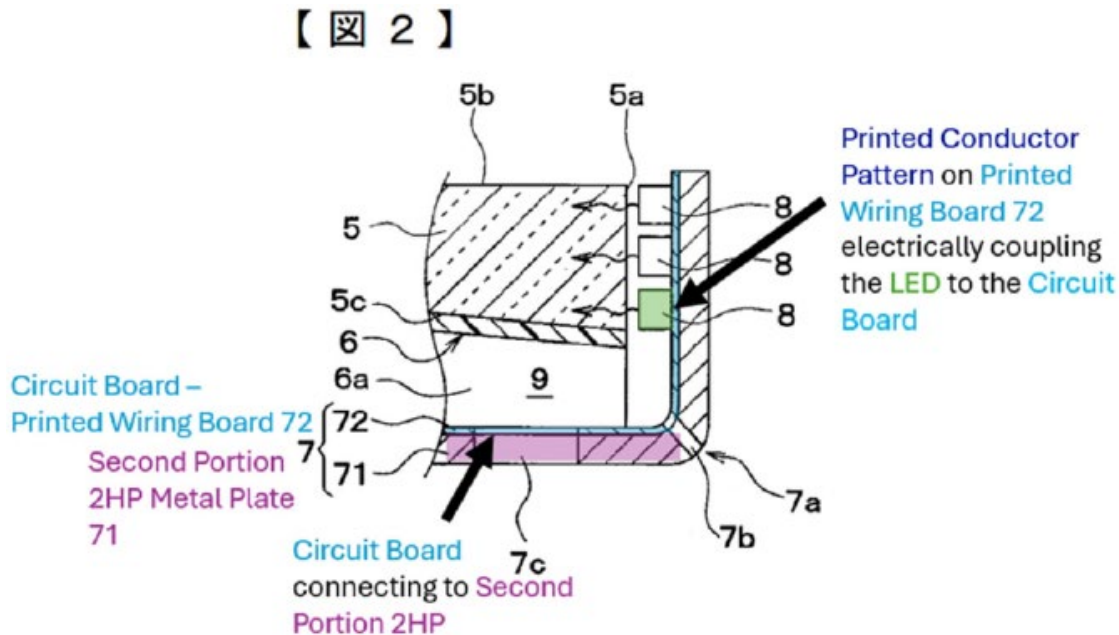
Kurokawa teaches using this L-shaped arrangement allows for placement of additional LEDs to easily increase the brightness and luminance of the device . . . , allows for the use of less

the alternative theories “irrelevant . . . given that [Patent Owner] disclaimed claims 3 and 4.” Pet. Reply 22–23. Therefore, we do not address Petitioner’s alternative theories.

expensive surface mount LEDs . . . , improves thermal dissipation by utilizing a metallic printed wiring board . . . , reduces risk of damage from thermal expansion . . . , enhances thermal dissipation, and efficiently uses space.

Id. at 50–51 (citing Ex. 1004 ¶¶ 11, 12, 14, 27, 48, 50; Ex. 1002 ¶ 167).

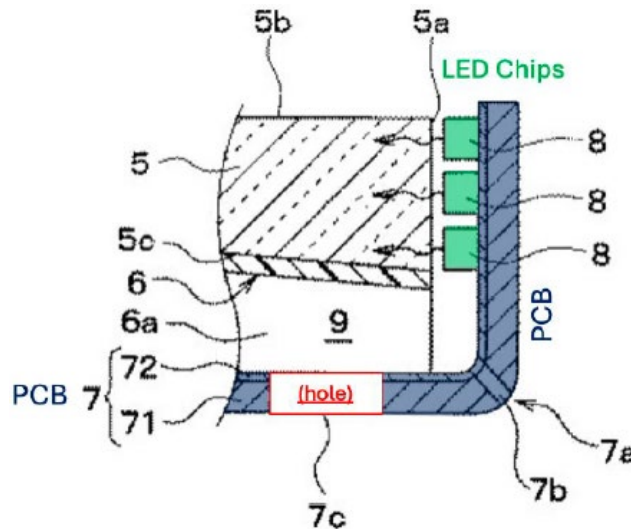
Petitioner further contends that Kurokawa’s flexible printed wiring board 72 corresponds to the circuit board recited in claim 5. Pet. 58 (citing Ex. 1004 ¶¶ 21, 38, 43, 47, Figs. 1–7; Ex. 1002 ¶ 181). Petitioner provides another annotated version of Figure 2 illustrating the location of flexible printed wiring board 71, reproduced below:



In Petitioner’s annotated version of Kurokawa Figure 2, Petitioner highlights flexible printed wiring board 72 in light blue, and asserts that it is “connecting the second horizontal portion . . . of metal plate 71. *Id.* at 59.

Patent Owner argues that Kurokawa does not teach the claimed L-shaped fastener because “Kurokawa teaches to bend a flexible printed circuit board instead of using an intermediate fastener between the PCB and the chip.” PO Resp. 52. Patent Owner submits that “[n]o reasonable

construction allows for the fastener to be the entire PCB itself,” because the ’842 patent “shows that the ‘fastener’ and the ‘circuit board’ are different parts” with “different roles,” and the claims “separately recite the fastener and the circuit board.” *Id.* Patent Owner provides its own annotated version of Figure 2 of Kurokawa, reproduced below, illustrating its point:



Patent Owner contends that its annotations to Kurokawa’s Figure 2 demonstrate that Kurokawa teaches “bending the PCB itself.” *Id.* at 51.

Petitioner responds that “printed wiring board 72 is a separate component from metal plate 71,” and therefore “[i]t is appropriate for a POSITA to point to metal plate 71 as the claimed ‘fastener.’” Pet. Reply 23. Petitioner notes that “Kurokawa discloses that flexible printed wiring board 72 is bonded to a metal plate 71, indicating that 71 and 72 are separate components.” *Id.* (citing Ex. 1004 ¶¶ 21, 37–40). Further, according to Petitioner, “[a] POSITA would understand that printed wiring board 72 is itself a PCB, because an insulator with a printed conductor pattern on it is a PCB,” and “would also understand that a metal plate 71 is not a PCB, because it is solid metal.” *Id.* (citing Ex. 1031 ¶ 85).

In its Sur-reply Patent Owner characterizes Petitioner's argument as "a hindsight attempt [to] bifurcate Kurokawa's circuit board (i.e., wiring board 7, which is a 'metal-based wiring board')." PO Sur-reply 19 (citing Ex. 1004 ¶ 37).

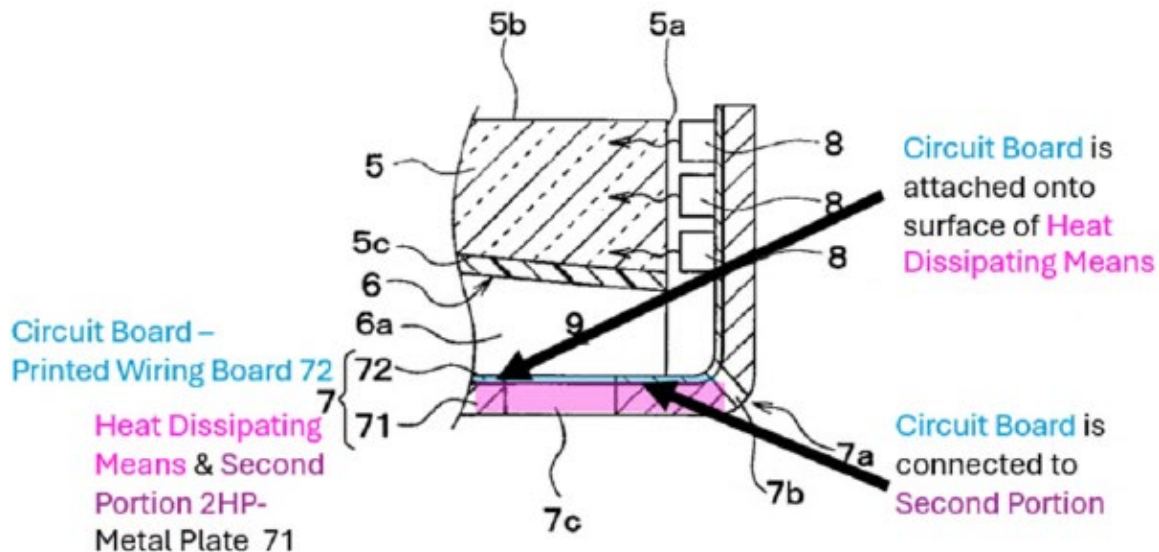
We find that Kurokawa discloses the limitations of claim 5, including the claimed L-shaped fastener. We disagree with Patent Owner that Petitioner uses hindsight to "bifurcate Kurokawa's circuit board," because Kurokawa expressly teaches that metallic wiring board 7 is comprised of two separate components: flexible printed wiring board 72 and metallic plate 71. Ex. 1004 ¶ 38. That Kurokawa give their combination a separate name and reference number does not take away from this fact.

We further find that Kurokawa teaches the other limitations of claim 5 (which Patent Owner does not dispute), and also teaches the limitations arranged as in claim 5. Accordingly, we find that Kurokawa anticipates claim 5.

2. *Claim 6*

Petitioner contends that Kurokawa's metal plate 71 is "the equivalent of a plurality of heat dissipating plates," i.e., the corresponding disclosed in the '842 patent. Pet. 61. Petitioner provides an annotated version of Kurokawa Figure 2, reproduced below, illustrating its contention:

【圖 2】



Petitioner asserts that its annotated version shows, e.g., “printed wiring board (72) connecting metal plate 71, including, specifically, portion 2HP.”

Id. According to Petitioner:

Even though metal plate 71 is a single plate, because it is bent, portions 2HP and 1VP are equivalent to two metal plates (a plurality) from a heat dissipation perspective. An entirely flat plate would require an increased length to have the same area for heat dissipation. Thus, a bent plate allows for the same heat dissipation using two perpendicular surfaces in a different form factor, which is one of the functions of using multiple plates.

Id. at 61 (citing Ex. 1002 ¶ 187). Petitioner further contends that “under certain reads, metal plate 71 (or at least portions thereof) satisfied certain limitations related to the fastener and heat dissipating means.” *Id.* at 64. According to Petitioner, “[n]ot all structures would necessarily satisfy both limitations, but Kurokawa’s metal plate 71 does, as shown in” the annotated version of Kurokawa Figure 2, reproduced above. *Id.*

Petitioner alternatively contends that “Kurokawa discloses multiple ribs 6a which are attached to the surface of printed wiring board 7 and

provide structural support to the reflector 6 and printed wiring board 7, but also may act as heat dissipating means.” Pet. 65 (citing Ex. 1004 ¶¶ 41–42; Ex. 1002 ¶ 192). Petitioner acknowledges that “Kurokawa does not disclose what material is used for reflector 6 (and consequently ribs 6a),” but asserts that one of ordinary skill in the art “would be motivated to use metals with good heat conducting properties . . . because many metals are reflective and the extra metal surface area provided by the ribs would improve heat dissipation in the heat dissipation space 9.” *Id.* at 65–66.

Patent Owner disputes that one of ordinary skill in the art would have considered ribs 6a to be the claimed heat dissipating means of claim 6. PO Resp. 55. Patent Owner primarily disputes that they would, even if made of metal, improve the device’s heat dissipation. *Id.* at 55–56. Patent Owner does not appear to dispute that Kurokawa’s metal plate 71 is equivalent to the corresponding structure disclosed in the ’842 patent.

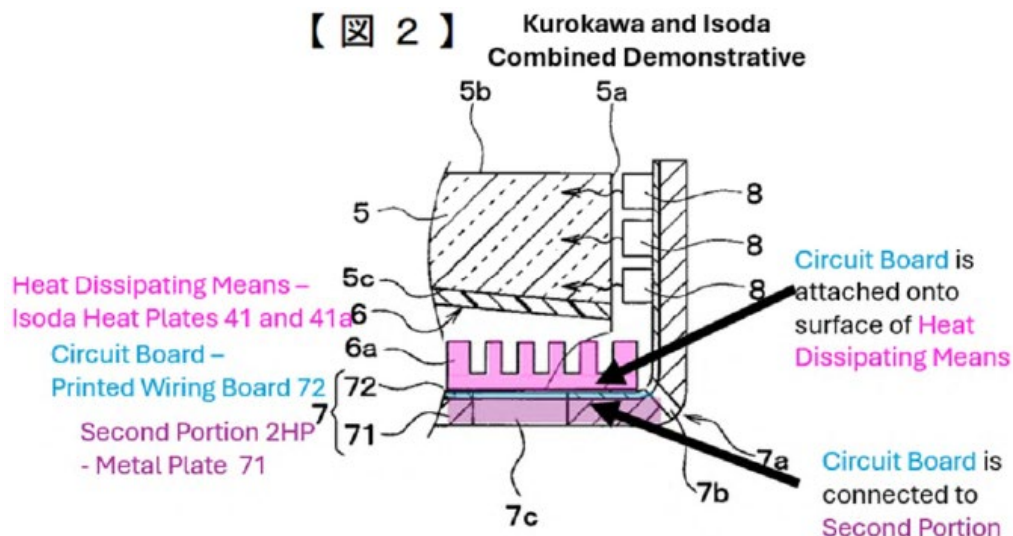
Based on Petitioner’s undisputed analysis discussed above, we find that Kurokawa teaches the heat-dissipating means limitation of claim 6. Accordingly, we find that Kurokawa anticipates claim 6.

J. Ground 5 (Kurokawa, § 103)

Ground 5 is specifically directed to claims 7–9. Because the scope and meaning of claims 7–9 cannot be determined, we cannot ascertain the differences between the claimed invention and the prior art for purposes of an obviousness analysis and, as a result, Petitioner has not met its burden of showing, by a preponderance of the evidence that claims 7–9 are unpatentable.

K. Ground 6 (Kurokawa and Isoda)

For this Ground Petitioner relies on Isoda to teach the heat-dissipating-means limitation of claims 6 and 9. Pet. 79–84. Petitioner contends that it would have been obvious “to add a plurality of heat dissipating plates as taught by Isoda to further increase the heat-dissipation of Kurokawa’s electronic components, including LEDs 8.” *Id.* at 70 (citing Ex. 1002 ¶ 213). Petitioner provides an annotated version of Kurokawa’s Figure 2, reproduced below, illustrating where it contends one of ordinary skill in the art would have placed Isoda’s heat plates:



Id. at 79. Petitioner contends that a “POSITA would have understood that it was common to attach heat sinks to the circuit board around active circuits and would have placed a heat sink so that it did not interfere with active circuits and leave space for holes 7c that may be integrated in board 7 of Kurokawa.” *Id.* at 80 (citing Ex. 1002 ¶ 237). For this Ground, Petitioner does not contend that AAPA would have provided a motivation to combine Kurokawa and Isoda.

Patent Owner disputes that one of ordinary skill in the art would have been motivated to combine Kurokawa and Isoda in the way Petitioner and Dr. Baker propose. Patent Owner contends that the proposed combination “would remove heat from the circuit board *and into Kurokawa’s package, closer to the LEDs*,” thereby “increase[ing] the internal temperature of all components, including the LEDs.” PO Resp. 57–58 (citing Ex. 2020 ¶¶ 220–30).

Petitioner relies on the testimony of Dr. Baker to support its contention that one of ordinary skill in the art would have been motivated to combine Kurokawa and Isoda, as well as to show how one of ordinary skill in the art would have combined the references. Pet. 70–74 (citing Ex. 1002 ¶¶ 213–224). We determined above, however, that Dr. Baker does not have the requisite experience to offer testimony from the perspective of one of ordinary skill in the art. Accordingly, we give no weight to the testimony supporting these contentions and determine that Petitioner has not shown by a preponderance of the evidence that one of ordinary skill in the art would have combined these references in the proposed manner.

III. PATENT OWNER’S MOTION TO EXCLUDE DR. BAKER’S TESTIMONY

Patent Owner moves to exclude the testimony of Petitioner’s expert Dr. Baker, Exhibits 1002 and 1031. Paper 36. According to Patent Owner, Dr. Baker is not a POSITA and therefore his testimony is inadmissible under Fed. R. Evid. 702. *Id.* at 1. Because we did not rely on Dr. Baker’s testimony in our decision, however, we dismiss Patent Owner’s motion as moot.

IV. CONCLUSION¹⁵

For the foregoing reasons, we determine that Petitioner has established by a preponderance of the evidence that claims 5 and 6 are unpatentable. Because we cannot ascertain the differences between the invention recited in claims 7–9 and the prior art, Petitioner has not met its burden of showing by a preponderance of the evidence that claims 7–9 are unpatentable.

Claim(s)	35 U.S.C. §	Reference(s)/Basis	Claim(s) Shown Unpatentable	Claim(s) Not shown Unpatentable
5–9	102	Uekusa	5	6–9
5–9	103	Uekusa, Isoda	5, 6	7–9
6, 9	103	Uekusa, AAPA		6, 9
5–9	102	Kurokawa	5, 6	7–9
7–9	103	Kurokawa		7–9
5–9	103	Kurokawa, Isoda	5	6–9
Overall Outcome			5, 6	7–9

¹⁵ Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

ORDER

For the reasons given, it is

ORDERED that Petitioner has proven by a preponderance of the evidence that claims 5 and 6 of the '842 patent are unpatentable;

FURTHER ORDERED that Petitioner has not proven by a preponderance of the evidence that claims 7–9 are unpatentable;

FURTHER ORDERED that Petitioner's Motion to Exclude is *dismissed*; and

FURTHER ORDERED that, because this is a Final Written Decision, parties to the proceeding seeking judicial review of the decision must comply with the notice and service requirement of 37 C.F.R. § 90.2.

IPR2024-01130
Patent 7,168,842 B2

PETITIONER:

Brian Erickson
Michael Saulnier
Alan Limbach
DLA PIPER LLP (US)
brian.erickson@us.dlapiper.com
michael.saulnier@us.dlapiper.com
alan.limbach@dlapiper.com

PATENT OWNER:

Qi (Peter) Tong
Benjamin T. Wang
RUSS AUGUST & KABAT
ptong@raklaw.com
bwang@raklaw.com