

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. AND
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

MANUFACTURING RESOURCES INTERNATIONAL, INC.,
Patent Owner.

IPR2023-00220
Patent 9,173,322 B2

Before JAMESON LEE, JO-ANNE M. KOKOSKI, and MINN CHUNG,
Administrative Patent Judges.

KOKOSKI, *Administrative Patent Judge.*

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (collectively, “Petitioner”) filed a Corrected Petition to institute an *inter partes* review of claims 1–5, 7–13, and 16 (the “challenged claims”) of U.S. Patent No. 9,173,322 B2 (“the ’322 patent,” Ex. 1001). Paper 9 (“Pet.”). Manufacturing Resources International, Inc. (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”).

Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314 (2018); *see also* 37 C.F.R. § 42.4 (2021). For the reasons discussed below, we determine that Petitioner establishes a reasonable likelihood of prevailing with respect to the unpatentability of at least one claim of the ’322 patent. Accordingly, we institute an *inter partes* review of claims 1–5, 7–13, and 16 of the ’322 patent.

A. *Real Parties-in-Interest*

Petitioner identifies Samsung Electronics Co., Ltd., Samsung Electronics America, Inc., Samsung SDS Co., Ltd., Samsung SDA America, Inc., Coates Signco Pty Limited, Coates US Inc., and Industrial Enclosure Corporation d/b/a Palmer Digital Group as the real parties-in-interest. Pet. 2. Patent Owner identifies itself as the real party-in-interest. Paper 5, 2 (Mandatory Notice).

B. *Related Matters*

The parties indicate that the ’322 patent is at issue in *Manufacturing Resources, Inc. v. Samsung Electronics Co., Ltd.*, No. 2:22-cv-00320 (E.D. Tex.) and *In re Certain Outdoor and Semi-Outdoor Electronic*

Displays, Products Containing Same, and Components Thereof,
Investigation No. 337-TA-1331 (ITC). Pet. 2; Paper 5, 2. Patent Owner additionally identifies several other *inter partes* reviews that “may be deemed related” to this proceeding. Paper 5, 2.

C. The '322 Patent

The '322 patent relates “to cooling systems and in particular to cooling systems for electronic displays.” Ex. 1001, 1:46–47. The Specification explains that “cooling devices for electronic displays in the past have generally used convective heat dissipation systems that function to cool an entire interior of the display by one or more fans and fins,” and such systems “functioned satisfactorily with ten or twelve inch screens.” *Id.* at 1:8–11, 1:20–21. The Specification further explains that “[n]ow, many displays are in need of screens having sizes greater than or equal to twenty-four inches” and “some outdoor applications call for seventy inch screens and above.” *Id.* at 1:21–25. “With increased heat production with the larger screens and radiative heat transfer from the sun through the display window,” the cooling systems of the past “are no longer adequate.” *Id.* at 1:25–29.

The '322 patent addresses this issue by providing “a constricted convection cooling system and a method of cooling an electronic display.” Ex. 1001, 2:43–45. In particular, the Specification teaches that the cooling system includes an external housing with an air entrance end and an exhaust end, and a constricted convection plate preferably mounted to the posterior display surface. *Id.* at 2:45–51. “The posterior display surface may be the posterior surface of the backlight assembly or the posterior surface of any other thin panel display (OLED, plasma, etc.).” *Id.* at 2:51–54.

The Specification further teaches that “[t]he constricted convection plate further defines a constricted convection cooling channel immediately behind the posterior display surface” that “may be adapted to receive air entering the entrance aperture and adapted to expel air through the exit aperture.” Ex. 1001, 2:54–59. In addition, “[o]ne or more fans may be used to draw the cooling air through the constricted convection channel” or “to force air through the constricted convection cooling channel.” *Id.* at 2:65–3:2. According to the Specification, “[t]his helps cool the display assembly in a uniform manner” and “is particularly beneficial with an LED backlight, as individual LEDs may fail prematurely if exposed to high levels of heat for an extended period of time.” *Id.* at 3:5–8.

D. Challenged Claims

Petitioner challenges claims 1–5, 7–13, and 16 of the ’322 patent. Pet. 1, 4. Claims 1, 4, and 9 are independent, illustrative of the claimed subject matter, and reproduced below.

1. A system for cooling an electronic display having a posterior display surface and contained within a housing, the system comprising:

- a constricted convection plate placed posterior to the posterior display surface covering the majority of the posterior display surface;
- at least one bracket which connects the posterior display surface with the constricted convection plate; and
- a fan placed to draw ambient air between the constricted convection plate and the rear posterior.

Ex. 1001, 9:60–10:2.

4. A liquid crystal display (LCD) comprising:
- a liquid crystal stack;

- a backlight assembly behind the liquid crystal stack and comprising:
 - a printed circuit board (PCB) having a front and back sides;
 - a plurality of LEDs mounted on the front side of the PCB;
 - a posterior surface on the rear side of the PCB;
- a constricted convection plate placed behind and substantially parallel with the posterior surface of the PCB; and
- a fan positioned to draw air between the constricted convection plate and the posterior surface.

Id. at 10:9–21.

9. A system for cooling an electronic display comprising:
- an electronic display comprising a front display surface and a posterior surface where no electronics are mounted to the posterior surface of the electronic display;
 - a constricted convection plate behind the posterior surface of the display covering a majority of the posterior display surface; and
 - a means for forcing air between the constricted convection plate and the posterior surface of the electronic display.

Id. at 10:40–49.

E. Evidence

Petitioner relies on the evidence listed below (Pet. 4–5, 13–27):

Name	Reference	Date	Exhibit No.
Kim	US 7,800,706 B2	Sept. 21, 2007	1005
Cho	US 2006/0132699 A1	June 22, 2006	1006
Hong	US 2007/0171353 A1	July 26, 2007	1029
Kimura	US 2006/0199514 A1	Sept. 7, 2006	1004
Takahashi	JP H11-683-63	March 9, 1999	1007 1008 (as translated)
Kochiyama	JP P2003-162228A	June 6, 2003	1027 1028 (as translated)
Na	KR 10-2006-0016469	Feb. 22, 2006	1009 1010 (as translated)

Name	Reference	Date	Exhibit No.
Tachikawa	JP P2006-330196A	Dec. 7, 2006	1025 1026 (as translated)

Petitioner also relies on the Declaration of Robert Smith-Gillespie (“Smith-Gillespie Declaration,” Ex. 1002).

F. Asserted Grounds

Petitioner asserts that claims 1–5, 7–13, and 16 would have been unpatentable based on the following grounds:

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
4, 7	103 ¹	Kim, Hong
5	103	Kim, Hong, Tachikawa
8	103	Kim, Hong, Takahashi
1–3	103	Kim, Tachikawa
4, 8–10, 16	103	Na
7, 12, 13	103	Na, Kim
11	103	Na, Tachikawa
9, 12, 13, 16	103	Kimura
1–3, 11	103	Kimura, Kochiyama
4, 7	103	Kimura, Hong
5	103	Kimura, Hong, Kochiyama
4, 5, 9–11	103	Cho

Pet. 4–5.

II. ANALYSIS

A. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art (“POSITA”) “would have possessed a bachelor’s degree in a pertinent

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284 (2011), revised 35 U.S.C. §§ 102 and 103 effective March 16, 2013. Petitioner argues, and Patent Owner does not contest, that the pre-AIA statutory provisions apply to this case. *See* Pet. 13, 16, 17, 19, 21, 23, 24, 26. Accordingly, we apply the pre-AIA versions of §§ 102 and 103.

discipline, such as mechanical engineering, physics, product design, or a related field” and “2–4 years of experience in working with electronic displays and have an understanding of product design issues and failure modes associated with electronic displays.” Pet. 7 (citing Ex. 1002 ¶ 38). In the alternative, Petitioner argues that “a POSITA would have had 5–7 years of experience in the field working with electronic displays and have a similar understanding of product design issues and failure modes associated with electronic displays.” *Id.* (citing Ex. 1002 ¶ 38).

Patent Owner argues that “the level of skill would be low,” and offers the following level of ordinary skill in the art:

A bachelor’s degree in a pertinent discipline, such as mechanical or electrical engineering, physics, applied physics, or a related field. Such a person would also have had 2–4 years of experience in working with electronic displays including thermal management associated with electronic displays. Alternatively, a POSITA would have had 4–6 years of experience in the field and would have developed a similar understanding of thermal management associated with electronic displays.

Prelim. Resp. 10 (citing Ex. 2004, 12–13 (Patent Owner’s Opening Claim Construction Brief in the ITC)). Patent Owner adds that a POSITA “does not necessarily have an understanding of product design issues and failure modes associated with electronic displays.” *Id.* at 10–11.

Neither party argues that the outcome of the case would differ based on our adoption of any particular definition of the level of ordinary skill in the art. For purposes of this Decision, we determine that a POSITA would have had a bachelor’s degree in a pertinent discipline, such as mechanical engineering, physics, applied physics, product design, or a related field, and would also have had 2–4 years of experience working with electronic

displays, including the thermal management, product design issues, and failure modes associated with such displays, or 5–7 years of experience in the field working with electronic displays and would have developed a similar understanding of thermal management, product design issues, and failure modes associated with electronic displays.

B. Claim Construction

We construe each claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 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, 1313 (Fed. Cir. 2005) (en banc). Only those terms in controversy need to be construed, and only to the extent necessary to resolve the controversy. *Realtime Data LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019).

Based on the record before us, we address “means for forcing air between the constricted convection plate and the posterior surface of the electronic display” as recited in claim 9. Petitioner contends that this term should be construed “as a ‘means-plus-function’ limitation.” Pet. 12. At this stage, Patent Owner does not dispute Petitioner’s proposed construction of this limitation.

Construing a means-plus-function limitation includes two steps: (1) identifying the claimed function, and (2) identifying the corresponding structure in the specification of the patent that performs the function. *IPCom GmbH & Co. v. HTC Corp.*, 861 F.3d 1362, 1370 (Fed. Cir. 2017).

We agree with Petitioner that “means for forcing air between the constricted convection plate and the posterior surface of the electronic display,” as recited in claim 9, is a means-plus-function clause. *See Williamson v. Citrix Online LLC*, 792 F.3d 1339, 1349 (Fed. Cir. 2015) (en banc) (“use of the word ‘means’ creates a presumption that § 112, ¶ 6 applies”). We also agree, on this record, with Petitioner’s identification of the claimed function as “forcing air between the constricted convection plate and the posterior surface of the electronic display.” Pet. 12.

Petitioner identifies the corresponding structure as “one or more fans 52, air conditioning unit 110, and their equivalents.” Pet. 12 (citing Ex. 1001, 6:65–67, 7:38–54; Ex. 1002 ¶¶ 76–77). We agree with Petitioner that the ’322 patent teaches that the corresponding structure is one or more fans or an air conditioning unit. The Specification repeatedly states that one or more fans are used to draw air between the posterior surface and the constricted convection plate. *See* Ex. 1001, 2:67–3:2 (“one or more fans may be used to force air” between the constricted convection plate and the posterior surface), 6:2–7 (“In FIG. 5B, one or more fans 52 are used to draw ambient air between the posterior display surface 22 and the constricted convection plate 30. In FIG. 5C, one or more fans 52 are used to force ambient air between the posterior display surface 22 and the constrict convection plate 30.”), 6:60–67 (identifying “one or more fans” as a means for forcing air within the system and increasing the speed at which the air travels), 7:45–48 (“fan 52 may be associated with the entrance opening 62 and may force air” between the constricted convection plate and the posterior surface). The Specification also teaches that, in Figure 5E, “an air conditioning unit 110 is used to both cool the air and to force the cooled air

between the posterior display 22 and the constricted convection plate 30.”
Id. at 6:9–12.

For purposes of this Decision, based on the current record, we determine that the disclosed structure corresponding to the function of the “means for forcing air between the constricted convection plate and the posterior surface of the electronic display” is one or more fans, or an air conditioning unit.

C. Lack of Particularity

Patent Owner argues that Petitioner “do[es] not—for any ground—explain how the references are purported to be combined or how the proposed combinations allegedly teach each element of the claims” and that such “insufficient analysis does not warrant institution.” Prelim. Resp. 16. Patent Owner argues that Petitioner has “taken a number of improper shortcuts, rendering their arguments unclear and imprecise, and improperly shifting the burden of deciphering them onto Patent Owner and the Board,” and “therefore have failed in their burden of arguing with sufficient particularity.” *Id.* at 17. Patent Owner sets out the reasons why it believes that each of the twelve asserted grounds lack particularity. Prelim. Resp. 18–31.

After considering Patent Owner’s arguments, we disagree that Petitioner’s challenges lack particularity, because, as discussed below, we understand Petitioner’s arguments and asserted combinations. Accordingly, we decline to deny the Petition for lack of sufficient particularity. *See* 35 U.S.C. § 312(a)(3) (“A petition . . . may be considered only if . . . the petition identifies, in writing and with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim.”).

D. Asserted Obviousness over Kim and Hong

Petitioner contends that claims 4 and 7 would have been obvious over the combined teachings of Kim and Hong. Pet. 27–39.

1. Overview of Kim

Kim “provide[s] a cooling fan unit with improved cooling efficiency by efficiently cooling heat generated from a backlight unit, and a display apparatus having the same.” Ex. 1005, 1:46–49. In particular, Kim describes “a display apparatus having a casing in which an opening part is formed” that includes a liquid crystal display, a backlight unit, a shield cover, and a cooling fan unit. *Id.* at 1:57–67.

Figure 5 of Kim is reproduced below.

FIG. 5

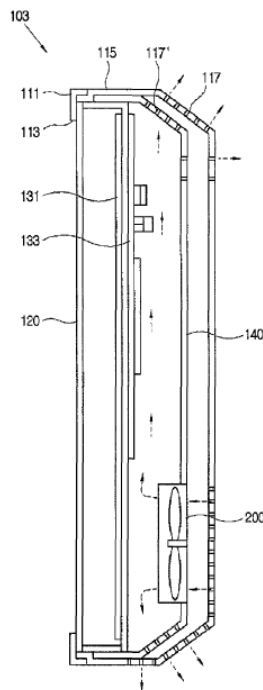


Figure 5 is schematic view of a cooling system described in Kim. Ex. 1005, 3:50. Display body 103 includes liquid crystal display panel 120, backlight unit 130 (not labeled) comprising light source 131, circuit board 133, shield

cover 140, and cooling fan unit 200. *Id.* at 4:4–6, 4:33–35. Front casing 111, with opening part 113, supports liquid crystal display panel 120 and backlight unit 130. *Id.* at 4:9–15. Rear casing 115, on the lateral and rear side of liquid crystal display panel 120, has a plurality of air slits 117 through which air produced by cooling fan 210 (not labeled) comes in and out. *Id.* at 4:22–24.

Shield cover 140, on the rear side of backlight unit 130, is supported by at least one of backlight unit 130 and the casing, and a space is formed between shield cover 140 and backlight unit 130. Ex. 1005, 4:52–55. Shield cover 140 has a plurality of air slits 117' through which flowing air produced by cooling fan 210 comes in and out. *Id.* at 4:59–61. Cooling fan unit 200 is placed in a lower central portion of shield cover 140, and can alternatively be placed in a central or upper portion of shield cover 140 if necessary. *Id.* at 5:38–41.

Kim explains that “cooling fan 210 generates cooling air to cool the heat generating parts such as the light source 131 and the circuit board 133 of the backlight unit 130.” Ex. 1005, 5:24–26. “[C]ooling fan 210 may draw in the cooling air from the outside into the heat generating parts or discharge the cooling air to the outside through the heat generating parts depending on its rotation direction.” *Id.* at 5:42–45. In addition, a plurality of cooling fans 210 “may be provided . . . in consideration of the size of the backlight unit 130, the capacity of the cooling fan 210, etc.” *Id.* at 5:31–33.

2. *Overview of Hong*

Hong “relates to a liquid crystal display device.” Ex. 1029 ¶ 2. Hong’s LCD device includes a backlight assembly and a liquid crystal panel disposed over an inner surface of a bottom case. *Id.* ¶ 25. The backlight assembly includes a plurality of LEDs, which may be arranged on a plurality

of base printed circuit boards (“PCBs”). *Id.* ¶ 29. The base PCBs “are arranged in parallel on the bottom case” and “may contact or couple with the bottom case.” *Id.*

3. *Claim 4*

Petitioner contends that the combined teachings of Kim and Hong account for all of the elements of independent claim 4. Pet. 27–37. In particular, Petitioner contends that Kim teaches “a liquid crystal stack” (contained within LCD display panel 120) (*id.* at 28), “a constricted convection plate placed behind and substantially parallel with the posterior surface” (shield cover 140 provided on the rear side of backlight unit 130) (*id.* at 33–34), and “a fan positioned to draw air between the constricted convection plate and the posterior surface” (cooling fan unit 200 including cooling fan 210) (*id.* at 35–36).

Claim 4 also recites “a backlight assembly behind the liquid crystal stack” that comprises “a printed circuit board (PCB) having front and back sides, a plurality of LEDs mounted on the front side of the PCB, [and] a posterior surface on the rear side of the PCB.” Ex. 1001, 10:11–17. Petitioner contends that Kim teaches that backlight unit 130 (the recited “backlight assembly”) is provided behind the LCD display panel, and comprises a plurality of LEDs as light source 131 that are widely distributed on the plane of backlight unit 130. Pet. 29–30 (citing Ex. 1005, 1:61–63, 2:51–53, 4:33–35, 5:35–36; Ex. 1002 ¶ 121). Petitioner contends that “[a] POSITA would recognize, therefore, that the LEDs must be mounted on a first side of a PCB included as part of the backlight unit 130.” *Id.* at 40 (citing Ex. 1002 ¶ 123). Petitioner points to the rear side of Kim’s backlight unit 130 to satisfy the “a posterior surface on the rear side of the PCB” limitation of claim 4. *Id.* at 30–31 (citing Ex. 1005, Fig. 2; Ex. 1002 ¶ 127).

Petitioner also contends that Hong discloses backlight assembly 120 located behind liquid crystal panel 110 that includes a plurality of LEDs 124 arranged on a plurality of base PCBs 122 placed on an inner surface of the bottom case 150. Pet. 31–32 (citing Ex. 1029 ¶¶ 25, 29, 33, Fig. 4; Ex. 1002 ¶¶ 124–126). Petitioner contends that “a POSITA would have understood that LEDs 124 are mounted on the ‘front side of the PCB’ and that the ‘back side’ of the PCB faces bottom case 150.” *Id.* at 32–33 (citing Ex. 1029 ¶ 33, Fig. 4; Ex. 1002 ¶ 126) (emphases omitted).

Petitioner further contends that a POSITA “would have been motivated to modify Kim’s backlight to include Hong’s PCB with multiple LEDs mounted to its front side.” Pet. 36 (citing Ex. 1002 ¶ 140). Specifically, Petitioner contends that “a POSITA would have known that Kim’s LEDs need to be mounted on a first side of a PCB within backlight unit 130 in order to operate as intended and that Hong’s PCB would have been suitable.” *Id.* (citing Ex. 1002 ¶ 140). Petitioner contends that a POSITA would have “recognized the similarities between Hong’s and Kim’s backlight configurations and ascertained that Kim’s LEDs (e.g., ‘[t]he light source 131 of the backlight unit 130 [which] is widely arranged **on a plane** of the backlight unit 130’ (Ex. 1005, 4:43–45)) could be predictably mounted to Hong’s base PCB 122.” *Id.* at 37 (alterations in original). Petitioner contends that a POSITA also “would have recognized the cost savings using Hong’s LED and PCB arrangement.” *Id.* (citing Ex. 1002 ¶ 141). In support of this contention, Petitioner relies on Mr. Smith-Gillespie’s testimony:

Since the cost of circuit board is directly and positively related to the area of the circuit board, a POSITA, looking to reduce backlight unit costs, would have been motivated to reduce the total PCB area in the Kim design by using the approach

disclosed in Hong, wherein the LEDs are placed on a plurality of narrow circuit boards. This arrangement could reduce the circuit board area to $\frac{1}{4}$ of that in the Kim design and result in significant cost savings.

Ex. 1002 ¶ 141.

In response, Patent Owner argues that “Kim does not disclose the claimed ‘constricted convection plate’ or ‘constricted convection channel’” because Kim’s shield cover 140 “is related to shielding electromagnetic wave radiation (Ex. 1005 at 4:55–58); it does not create a constricted convection channel.” Prelim. Resp. 31–32. Patent Owner argues that shield cover 140 with a plurality of air slits 117’ through which air produced by cooling fan 210 flows is “contrary to the claimed ‘constricted convection plate’ and ‘side panels’ that form a constricted convection channel having a specific entrance and specific exit for directed and consistent air flow.” *Id.* at 32 (citing Ex. 1005, 4:59–61).

As an initial matter, we note that claim 4 does not recite “side panels” or a “constricted convection channel.” Ex. 1001, 10:9–21. Claim 4 does, however, require a “constricted convection plate” that is “placed behind and substantially parallel with the posterior surface of the PCB” and that “a fan is positioned to draw air between the constricted convection plate and the posterior surface.” *Id.* at 10:15–21. At this stage of the proceeding, neither party proposes an explicit construction of “constricted convection plate.” *See* Pet. 11–12 (addressing claim construction); Prelim. Resp. 11–12 (same).

Kim teaches shield cover 140 is “provided in the rear side of backlight unit 130, is supported by at least one of the backlight unit 130 and the casing 110, with a space formed between the shield cover 140 and the backlight unit 130.” Ex. 1005, 4:52–55. Shield cover 140 also “comprises fan support 141,” “may have a plurality of air slits 117’ through which

flowing air produced by the cooling fan 210 comes in and out,” and “may be formed in diverse shapes such that the flowing air produced by the cooling fan 210 can be efficiently guided.” *Id.* at 4:58–63. Kim also teaches that

cooling air generated by the cooling fan 210 contacts the light source 131 that is widely arranged on the rear side of the backlight unit 130 while the cooling air flows through a space among the backlight unit 130, the circuit board 133 and the shield cover 140. This allows the widely arranged light source 131 to be cooled efficiently.

Id. at 5:9–15.

Taken together, these disclosures in Kim indicate that shield cover 140 is “placed behind and substantially parallel with the posterior surface” of backlight unit 130 (which comprises PCB 133) and that cooling fan 210 is “positioned to draw air between” through air slits 117’ on shield cover 140 and “the posterior surface” of backlight unit 130. That Kim further states that shield cover 140 “may be made of a metal material to shield against an electromagnetic wave generated from the backlight unit 130 and the circuit board 133” does not change that conclusion, on this record. Ex. 1005, 4:56–58.

Patent Owner also argues that a POSITA “would not have been motivated to modify Kim based on Hong . . . due to the fundamental differences among the references.” Prelim. Resp. 32. In particular, Patent Owner argues that “a POSITA would not use Hong’s thermal convection and heat sink in conjunction with Kim’s porous shield, nor would a POSITA arrive at the claimed constricted convection plate based on these two references.” *Id.* at 33. Petitioner, however, does not propose combining Hong’s thermal convection and heat sink with Kim’s display apparatus. Instead, we understand Petitioner to be arguing that a POSITA would have

included Hong's PCB with a plurality of LEDs mounted on its front side in Kim's display apparatus. Pet. 32, 36–37. Patent Owner does not argue, on this record, that a POSITA would not have been motivated to modify Kim with Hong in this manner.

Having reviewed Petitioner's and Patent Owner's arguments, and the evidence of record, we are persuaded that Petitioner sufficiently establishes, for purposes of institution, that the combined teachings of Kim and Hong account for all of the recitations of claim 4, and that a POSITA would have been motivated to combine the teachings as proposed with a reasonable expectation of success. *See* Pet. 27–37; Ex. 1002 ¶¶ 112–141.

4. *Claim 7*

Petitioner contends that the combined teachings of Kim and Hong teach or suggest all of the recitations of claim 7, which directly depends from claim 4. Pet. 37–39. At this stage of the proceeding, Patent Owner does not offer any specific arguments with respect to claim 7. *See* Prelim. Resp. 31–35. Based on the record before us, we are persuaded that Petitioner's discussion of the particular structures in Kim and Hong, and the explanations in the Petition and the Smith-Gillespie Declaration, sufficiently show that the combined teachings of Kim and Hong account for all of the elements of claim 7. Pet. 37–39; Ex. 1002 ¶¶ 142–149.

E. *Asserted Obviousness over Kim, Hong, and Tachikawa*

Petitioner contends that claim 5 would have been obvious over the combined teachings of Kim, Hong, and Tachikawa. Pet. 39–43.

1. *Overview of Tachikawa*

Tachikawa “relates to a plasma television and an image display device having a structure wherein the inside of the housing is cooled.” Ex. 1026 ¶ 1. Figure 1 is reproduced below.

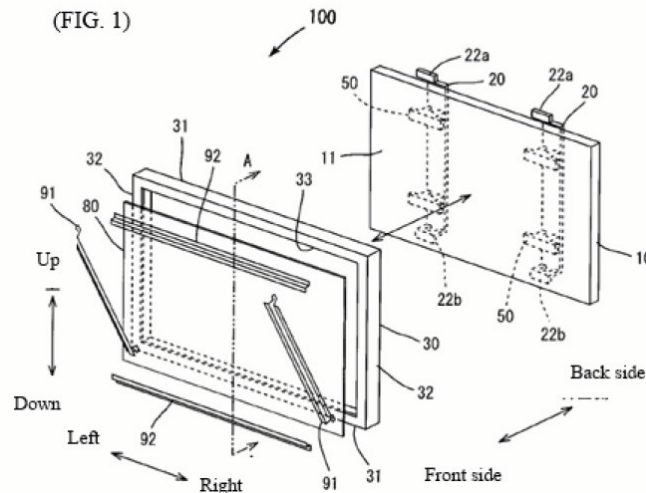


Figure 1 is a perspective view showing the assembly of a plasma television described in Tachikawa. *Id.* ¶ 17. Plasma television 100 includes front cabinet 30, rear cabinet 40, and plasma display panel (“PDP”) 10. *Id.* PDP 10 in front cabinet 30 is “supported by two brackets 20 on the rear side.” *Id.* ¶ 19. Attachments 50 are fixed at four positions on the upper, lower, left, and right sides of PDP 10, divided into two sets of left and right, each attached to one bracket 20. *Id.* “Each of the two brackets 20 is connected to stand member (not shown) which stands substantially perpendicular from an installation surface of the plasma television 100, thereby supporting substantially the entire plasma television 100 at a predetermined height.” *Id.* Front cabinet 30 is also fixed to bracket 20. *Id.* at 20.

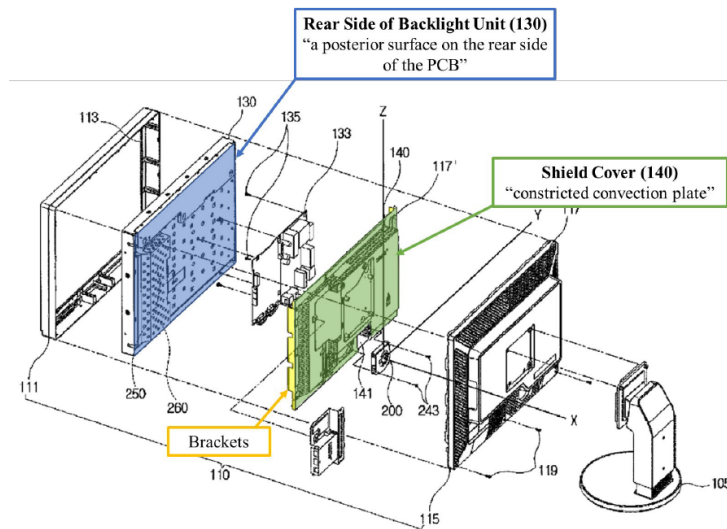
Tachikawa explains that bracket 20 is designed such that when it is connected to PDP 10 by attachments 50, upper and lower ends 22a and 22b “extend outward beyond the width of the PDP 10 in the vertical direction, and the extended upper and lower ends 22a and 22b and the upper and lower sides 31 and 3[2] of the front cabinet 30 are respectively fixed.” Ex. 1026 ¶ 20. Rear cabinet 40 is also fixed to bracket 20. *Id.* According to

Tachikawa, “the front cabinet 30, the PDP 10, and the rear cabinet 40 are all fixed to the bracket 20” and “it is possible to prevent the front cabinet 30, the PDP 10, and the rear cabinet 40 from loading each other.” *Id.*

2. Claim 5

Claim 5 depends from claim 4, and further recites “at least one bracket which connects the posterior surface with the constricted convection plate.” Ex. 1001, 10:23–25. Petitioner contends that the combined teachings of Kim and Hong disclose all of the elements of claim 4, as discussed above. Pet. 39; *see supra* Section II.D.3.

Petitioner provides an annotated version of Kim’s Figure 2,² reproduced below, to illustrate its contentions. Pet. 40.



Kim’s Figure 2 “is an exploded perspective view of a display apparatus” described in Kim, with Petitioner’s annotations, including the addition of labels identifying structures as shield cover 40, the rear side of backlight unit 130, and brackets. Referring to annotated Figure 2, Petitioner contends

² In the Petition, Petitioner refers to this figure as Figure 5, instead of Figure 2. *Compare* Ex. 1005, Fig. 5, *with id.* at Fig. 2. We consider Petitioner’s error to be typographical, and refer to it as Figure 2.

that “a POSITA would have understood that Kim’s shield cover 140 (i.e., ‘constricted convection plate’) [colored green] is connected to the backlight unit 130 using brackets (colored yellow).” Pet. 39–40 (citing Ex. 1005, Fig. 2 (annotated); Ex. 1002 ¶ 151). Petitioner also notes that “Kim teaches that the shield cover 140 ‘is supported by at least one of the backlight 130 and the casing 110.’” *Id.* at 40 (citing Ex. 1005, 4:52–55).

Petitioner then asserts that Tachikawa teaches that its “PDP 10 is housed in the cabinet 30 in a state of being supported by two brackets 20 on the rear side.” Pet. 41 (citing Ex. 1026 ¶ 19). Petitioner contends that Tachikawa teaches that rear cabinet 40 covering the rear side of the plasma television is also fixed to bracket 20. *Id.* (citing Ex. 1026 ¶ 20). Petitioner also points to Tachikawa’s teaching that brackets 20 are “connected to a stand member . . . which stands substantially perpendicular from an installation surface of the plasma television, thereby supporting substantially the entire plasma television at the predetermined height.” *Id.* (citing Ex. 1026 ¶ 20; Ex. 1002 ¶¶ 153–154).

Petitioner contends that “[a] POSITA would have been motivated to modify the display disclosed by the combination of Kim and Hong with the brackets disclosed by Tachikawa to improve Kim’s display serviceability and structural strength.” Pet. 42 (citing Ex. 1002 ¶ 155). In particular, Petitioner asserts that Kim’s shield cover 140 is connected to backlight unit 130 using brackets, which are obscured by casing 11 when assembled in the case, and “additional effort would be required to access and separate the shield cover 140 from the backlight assembly 130 when servicing the backlight assembly or circuit board 133.” *Id.* (citing Ex. 1002 ¶ 156). Accordingly, Petitioner contends, “a POSITA would have been inclined to

look for alternative bracket options to connect Kim’s shield cover 140 to backlight 130.” *Id.* (citing Ex. 1002 ¶ 156).

Petitioner further contends that “[a] POSITA looking to modify the bracket structure in Kim would have been motivated to look to other electronic displays that had addressed similar heat removal, including PDPs,” and that “[a]lternative bracket options would have been well known to the POSITA at the time of the filing of the ’322 patent.” Pet. 42 (citing Ex. 1002 ¶¶ 157–159). Petitioner contends that

Tachikawa’s brackets 20, along with attachments 50, allow removal of rear cabinet 40 with minimal effort, since the rear cabinet 40 is snapped on the PDP 10 through brackets 20. ([Ex. 1002], ¶ 161.) In addition, Tachikawa’s mounting brackets provide for enhanced mounting stability. (*Id.*, ¶ 162.) A POSITA would have envisioned, based on the teachings from Tachikawa, that the rear side surface of Kim’s backlight unit 130 would be fitted with brackets via a set of attachments so that the shield cover 140 can be attached on the extended upper and lower ends (22a and 22b) of the brackets. (*Id.*, ¶ 161.)

Pet. 42–43.

At this stage of the proceeding, Patent Owner does not address Petitioner’s specific contentions with respect to claim 5.

Having reviewed Petitioner’s and Patent Owner’s arguments, and the evidence of record, we are persuaded that Petitioner sufficiently establishes, for purposes of institution, that the combined teachings of Kim, Hong, and Tachikawa account for all of the elements of claim 5, and that a POSITA would have been motivated to combine the teachings as proposed with a reasonable expectation of success. *See* Pet. 39–43; Ex. 1002 ¶¶ 150–163.

F. Asserted Obviousness over Kim and Tachikawa

Petitioner contends that claims 1–3 would have been obvious over the combined teachings of Kim and Tachikawa. Pet. 48–50.

1. Claim 1

Petitioner contends that the combined teachings of Kim and Tachikawa account for all of the elements of independent claim 1. Pet. 48–49. Relying on arguments made with respect to the similar limitation in claim 4, Petitioner contends that Kim’s shield cover 140 is the “constricted convection plate placed posterior to the posterior display surface” recited in claim 1. *Id.* (citing Pet. 33–34). Petitioner also contends that shield cover 140 covers the majority of the posterior display surface. *Id.* at 49 (citing Ex. 1005, Figs. 2, 5 (annotated)).

With respect to the “at least one bracket which connects the posterior display surface with the constricted convection plate” limitation of claim 1, Petitioner points us to the arguments made in reference to claim 5, discussed above. Pet. 49 (citing Ex. 1002 ¶ 182; Pet. 39–41). Petitioner also argues that Kim teaches the claimed “fan placed to draw ambient air between the constricted convection plate and the rear posterior” for the reasons set forth above with respect to the similar limitation in claim 4. *Id.* (citing Ex. 1002 ¶¶ 183–184; Pet. 34–36). Finally, Petitioner contends that “[a] POSITA would have been motivated to combine Kim with Tachikawa for the same reasons as discussed above with respect to the combination of Kim, Hong, and Tachikawa.” *Id.* at 48 (citing Pet. 42–43). At this stage of the proceeding, Patent Owner does not address Petitioner’s specific contentions with respect to claim 1.

Having reviewed Petitioner’s and Patent Owner’s arguments, and the evidence of record, we are persuaded that Petitioner sufficiently establishes,

for purposes of institution, that the combined teachings of Kim, Hong, and Tachikawa account for all of the recitations of claim 1, and that a POSITA would have been motivated to combine the teachings as proposed with a reasonable expectation of success. *See* Pet. 48–50; Ex. 1002 ¶¶ 174–184.

2. *Claims 2 and 3*

Petitioner contends that the combined teachings of Kim and Tachikawa account for all of the elements of claims 2 and 3, which directly depend from claim 1. Pet. 50. At this stage of the proceeding, Patent Owner does not offer any specific arguments with respect to claims 2 and 3. Based on the record before us, we are persuaded that Petitioner’s discussion of the particular structures in Kim and Tachikawa, and the explanations in the Petition and the Smith-Gillespie Declaration, sufficiently show that the combined teachings of Kim and Takahashi account for all of the recitations of claims 2 and 3. Pet. 50; Ex. 1002 ¶¶ 185–187.

G. *Asserted Obviousness over Na*

Petitioner contends that claims 4, 8–10, and 16 would have been obvious over Na. Pet. 50–65.

1. *Overview of Na*

Na relates “to a backlight unit capable of improving a cooling effect and a liquid crystal display device including the same.” Ex. 1010, 2. “[T]he backlight unit includes a light generator that generates light, and a storage container where the light generator is accommodated and an intake unit through which external air is sucked and an exhaust unit through which internal air is discharged are formed.” *Id.*

Na's Figure 1 is reproduced below.

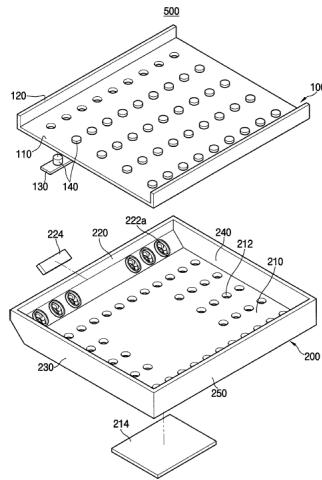


Figure 1 is an exploded perspective view of one embodiment of a backlight unit described in Na. Ex. 1010, 1. Backlight unit 500 includes areal light source device 100 and storage container 200. *Id.* at 4. Areal light source device 100 includes reflective plate 110, sidewall 120, driving substrate 130, and a plurality of LED light sources 140. *Id.* A plurality of coupling holes 112 are formed in reflective plate 110 so that the LED sources 140 can be coupled. *Id.* Sidewall 120 is formed on the edge portion of reflective plate 110 in order to couple areal light source device 100 to storage container 200. *Id.*

Storage container 200 accommodates areal light source device 100 and includes bottom plate 210, first sidewall 220, second sidewall 230, third sidewall 240, and fourth sidewall 250. Ex. 1010, 4. First through fourth sidewalls 220, 230, 240, and 250 “extend from the edge portions of the bottom plate 210, respectively, to form a storage space and an inner space.” *Id.* First driving circuit 214 is disposed on bottom plate 210 and drives areal light source device 100, and through-holes 212 are formed in portions of bottom plate 210 “except where the first driving circuit 214 is disposed.” *Id.* Na explains that through-holes 214 “function as an intake unit through

which external air is sucked.” *Id.* A plurality of fans 222a are formed on first sidewall 220, and are operated to flow air from the inner space to the outside to transfer the heat generated by areal light source 100 from the inner space to the outside. *Id.* Na explains that plurality of ‘fans 222a function as an exhaust unit for discharging internal air.’ *Id.*

Na’s Figure 3 is reproduced below.

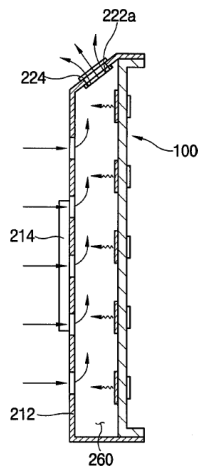


Figure 3 depicts “a side view for explaining a cooling process of the backlight unit of FIG. 1.” Ex. 1010, 1. LED array substrate 110 of areal light source device 100 is driven to generate heat, increasing the temperature of the air in inner space 260 between areal light source device 100 and storage container 200. *Id.* at 5. The heated air is discharged to the outside of backlight unit 500 by a plurality fans 222a. *Id.* Discharging the heated air lowers the pressure in inner space 260, and “low-temperature air cooler than the high-temperature air in the inner space 260 is introduced from the outside of the backlight unit 500 through the through-holes 212.” *Id.* Na explains that “the processes of discharging high-temperature internal air and introducing low-temperature external air are continuously repeated, and as a result, the heat generated in the areal light source device 100 is cooled by the flow of air.” *Id.*

2. *Claim 4*

Petitioner contends that Na teaches all of the elements of independent claim 4. Pet. 50–58. For example, Petitioner contends that Na teaches “a liquid crystal stack” (liquid crystal display panel 840 that includes TFT substrate 842, liquid crystal 844, color filter substrate 846, and driving module 848) (*id.* at 50), “a constricted convection plate placed behind and substantially parallel with the posterior surface” (bottom plate 210) (*id.* at 56–57), and “a fan positioned to draw air between the constricted convection plate and the posterior surface” (plurality of fans 222a) (*id.* at 57–58).

Patent Owner argues that “Na does not teach the claimed constricted convection plate or constricted convection channel.” Prelim. Resp. 35. According to Patent Owner, because Na “provides a cooling mechanism whereby air enters and exits through the same through-holes in a bottom plate, not a channel having an entrance and an exit,” Na “teaches away from the claimed constricted convection channel.” *Id.* at 35–36. Claim 4 requires “a constricted convection plate placed behind and substantially parallel with the posterior surface of the PCB,” but says nothing about a “constricted convection channel.” Ex. 1001, 10:9–21. Thus, Patent Owner has not explained why whether or not Na teaches away from a “constricted convection channel” is pertinent for purposes of this Decision.

Moreover, we are persuaded, on this record, that Petitioner sufficiently establishes that Na teaches the claimed “constricted convection plate.” In particular, Petitioner explains that “Na specifically teaches that ‘the cooling effect is increased by a free convection phenomenon or a forced convection phenomenon resulting from the operation of the components,’” and argues that “a POSITA would have understood that bottom plate 210

constricts airflow in order to achieve the desired convective cooling effect and is therefore the claimed ‘constricted convection plate.’” *Id.* at 56 (citing Ex. 1010, 5; Ex. 1002 ¶ 205). In particular, Na teaches that “low temperature air cooler than the high-temperature air in the inner space 260 is introduced” via through-holes 212 in bottom plate 210, and the “air whose temperature is increased is discharged” by a plurality of fans 222a on the first sidewall 220. Ex. 1010, 5; *see also id.* at Fig. 3 (using arrows to indicate the direction of the flow of air in through through-holes 212 and out through fans 222a). Petitioner further argues that Na teaches that bottom plate 210 faces the rear-facing side of driving substrate 130 (the claimed “printed circuit board”), and is thus “behind and substantially parallel with the posterior surface of the PCB.” *Id.* at 53–54, 56–57; Ex. 1002 ¶ 205.

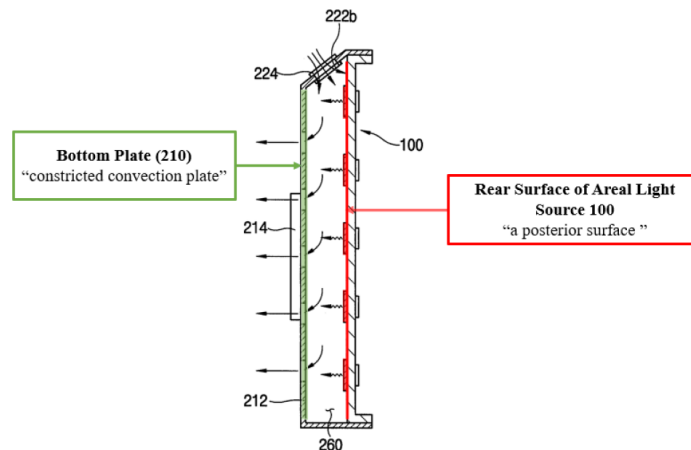
Having reviewed Petitioner’s and Patent Owner’s arguments, and the evidence of record, we are persuaded that Petitioner sufficiently establishes, for purposes of institution, that the combined teachings of Na account for all of the recitations of claim 4. *See* Pet. 50–58; Ex. 1002 ¶¶ 188–209.

3. *Claim 9*

Petitioner contends that Na teaches all of the elements of independent claim 9. Pet. 60–64. With respect to the “electronic display comprising a front display surface and a posterior surface where no electronics are mounted to the posterior surface of the electronic display” limitation of claim 9, Petitioner argues that “Na’s liquid display panel 840 and areal light source device 100 is ‘an electronic display’” and “the upper most panel of the liquid display 840,” namely, “the top surface of color filter substrate 846,” is the “front display surface.” *Id.* at 61. Petitioner further argues that “the bottom most surface of the areal light source device 100 corresponds to the claimed ‘posterior surface of the electronic display.’” *Id.* Petitioner also

asserts that “no electronics are mounted to the posterior surface of the areal light source 100.” *Id.* at 62.

Petitioner provides an annotated version of Na’s Figure 9, reproduced below, to illustrate that Na teaches a “constricted convection plate behind the posterior surface of the display covering a majority of the posterior display surface.”



Annotated Figure 9 is “a side view for explaining a cooling process” of one embodiment of a backlight unit described in Na, with Petitioner’s addition of green highlighting of bottom plate 210 and a red line along what Petitioner identifies as the rear surface of areal light source 100. Pet. 63 (citing Ex. 1010, Fig. 9; Ex. 1002 ¶ 226); Ex. 1010, 2. Petitioner argues that, “[a]s shown [in] Figure 9, Na’s bottom plate 210 (‘constricted convection plate’; colored green) is ‘covering a majority of’ the rear-facing side of areal light source 100 (‘the posterior display surface’).” Pet. 63 (footnote omitted).

Claim 9 also recites “a means for forcing air between the constricted convection plate and the posterior surface of the electronic display.” Ex. 1001, 10:40–49. As set forth above, this is a means-plus-function limitation, where “forcing air between the constricted convection plate and the posterior surface of the electronic display” is the function, and one or

more fans, or an air conditioning unit, is the corresponding structure. *See supra* Section II.B. Referring to Na’s Figure 9, Petitioner argues that “the operation of fans 222b force air between (in the space that separates) the bottom plate 210 (‘constricted convection plate’) and the rear-facing side of areal light source 100 (‘posterior surface’).” Pet. 63–64 (citing Ex. 1010, Fig. 9; Ex. 1002 ¶ 231). At this stage of the proceeding, Patent Owner does not address Petitioner’s specific contentions with respect to claim 9.

Having reviewed Petitioner’s and Patent Owner’s arguments, and the evidence of record, we are persuaded that Petitioner sufficiently establishes, for purposes of institution, that the teachings of Na account for all of the recitations of independent claim 9. *See* Pet. 60–64; Ex. 1002 ¶¶ 215–233.

4. *Claims 8, 10, and 16*

Petitioner contends that Na account for all of the elements of claim 8, which directly depends from claim 4, and claims 10 and 16, which directly depend from claim 9. Pet. 58–60, 64–65. At this stage of the proceeding, Patent Owner does not offer any specific arguments with respect to dependent claims 8, 10, and 16. Based on the record before us, we are persuaded that Petitioner’s discussion of the particular structures in Na, and the explanations in the Petition and Smith-Gillespie Declaration, sufficiently show that the teachings of Na account for all of the elements of claims 8, 10, and 16. Pet. 58–60, 64–65; Ex. 1002 ¶¶ 210–214, 234–238.

H. *Asserted Obviousness Over Na and Tachikawa*

Petitioner contends that claim 11 would have been obvious over the combined teachings of Na and Tachikawa. Pet. 69–71.

1. *Claim 11*

Claim 11 directly depends from claim 9, and further recites “at least one bracket which connects the posterior surface with the constricted

convection plate.” Ex. 1001, 10:53–55. Petitioner contends that Na teaches all of the elements of claim 9 as discussed above. Pet. 69. Petitioner then points to Tachikawa’s brackets 20 that support PDP 10 in front cabinet 30, and contends that “Tachikawa’s brackets 20, along with attachments 50, provide for enhanced mounting stability.” *Id.* at 70 (citing Ex. 1026 ¶ 19; Ex. 1002 ¶ 256).

Petitioner contends that “[a] POSITA would have been motivated to combine Na with the brackets disclosed by Tachikawa to improve Na’s display stability.” Pet. 70 (citing Ex. 1002 ¶ 257). Petitioner contends that, although Na teaches that “areal light source device 100 is easily coupled to the storage container 200,” Na does not teach how its LCD is mounted for use. *Id.* (citing Ex. 1010, 4). Petitioner contends that because “Na teaches that it ‘has the advantage of being very small in volume and in weight’ so as to be ‘widely used for portable computers, communication devices, liquid crystal TVs, etc.’ . . . a POSITA would have been motivated to add a stand to Na’s device to support it for its intended use.” *Id.* (citing Ex. 1010, 2). According to Petitioner, “[a] POSITA looking to modify Na in this manner would have been motivated to look to other electronic displays that had addressed similar heat removal, including plasma display panels” and “Tachikawa provides an example of such a stand and bracket structure.” *Id.* at 70–71 (citing Ex. 1002 ¶ 259). Petitioner further contends:

This adaptation would amount to the use of a known technique to improve similar devices in the same way and would produce predictable results. ([Ex. 1002], ¶ 260.) The addition of Tachikawa’s stand and bracket arrangement would provide support to Na’s display without compromising its cooling ability. (*Id.*) Indeed, a POSITA would have envisioned, based on the teachings from Tachikawa, that the rear surface of area light source 100 would be fitted with brackets via a set of attachments to bottom surface 210 and an installation surface. (*Id.*, ¶ 259.)

Pet. 71.

Patent Owner argues that

Na teaches away from the claimed bracket which connects the posterior surface with the constricted convection plate as Na teaches an empty chamber behind the posterior surface with inner space 260 between the posterior surface and rear porous housing for airflow, meaning Na has no structure corresponding to a constricted convection plate.

Prelim. Resp. 36. We disagree because, as discussed above, we are persuaded, on this record, that Petitioner sufficiently establishes that Na teaches the claimed constricted convection plate.

Having reviewed Petitioner's and Patent Owner's arguments, and the evidence of record, we are persuaded that Petitioner sufficiently establishes, for purposes of institution, that the combined teachings of Na and Tachikawa account for all of the elements of claim 11, and that a POSITA would have been motivated to combine the teachings as proposed with a reasonable expectation of success. *See* Pet. 69–71; Ex. 1002 ¶¶ 255–256.

I. Asserted Obviousness over Kimura

Petitioner contends that claims 9, 12, 13, and 16 would have been obvious over the teachings of Kimura. Pet. 71–80.

1. Overview of Kimura

Kimura is directed “to a cooling fan for cooling a backlight unit that is a high-temperature region in a flat panel display apparatus, the cooling fan being especially capable of uniformly cooling the backlight unit of a large flat panel display apparatus with high efficiency and operating more quietly than conventional fans.” Ex. 1004 ¶ 3.

Kimura's Figure 9 is reproduced below.

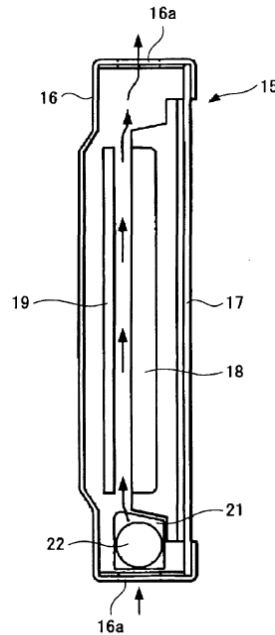


Figure 9 “is a side elevation of an internal construction showing the arrangement of the cooling fan with respect to flat panel display.” Ex. 1004 ¶ 39. Flat panel display 15 has liquid crystal panel 17 on a front surface of display housing 16. *Id.* ¶ 78. Backlight unit 18 is composed of LEDs or the like and is disposed behind liquid crystal panel 17. *Id.* Driving circuit 19 is disposed behind backlight unit 18. *Id.* Cooling fan 20 “is installed inside a gap 21 that is around 20 mm square and 700 mm long that is produced at a lower part of the panel due to the construction of the flat panel display.” *Id.*

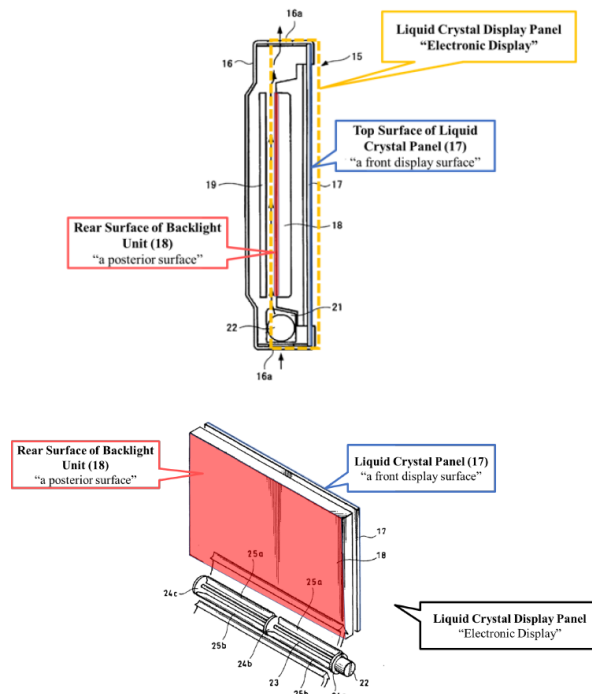
Kimura explains that “air is sucked into the cooling fan 20 from an air intake hole 16a formed in a base surface of the display housing 16 and air supplied to cool the backlight unit 18 is expelled from an expulsion hole 16b formed in an upper surface of the display housing 16.” Ex. 1004 ¶ 78.

Kimura further explains that, “[b]y circulating a wind generated by rotationally driving the cooling fan 20 in the form of a ‘film’ to the rear

surface of the backlight unit 18, the entire backlight unit 18 is cooled uniformly.” *Id.*

2. Claim 9

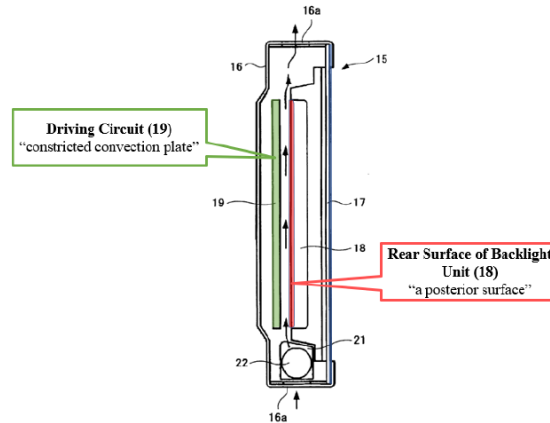
Petitioner contends that Kimura teaches all of the elements of independent claim 9. Pet. 71–77. Petitioner provides the following annotated versions of Kimura’s Figures 9 and 10 to illustrate its contentions. *Id.* at 71–72.



backlight unit.” Pet. 72. Petitioner’s annotations to Figure 10 include coloring in red an area labeled “rear surface of backlight unit.” *Id.*

With respect to the “an electronic display comprising a front display surface and a posterior surface where no electronics are mounted to the posterior surface of the electronic display” limitation of claim 9, Petitioner refers to annotated Figures 9 and 10 and contends that “Kimura’s LCD panel (‘electronic display’) includes ‘a front display surface’ (colored blue) and a ‘a posterior surface’ of the backlight unit 18 (colored light-red).” Pet. 72. Petitioner further contends that, “[a]s further shown in the [annotated] cross-sectional view of Figure 9, ‘no electronics are mounted to the posterior surface of the electronic display’—e.g., on the posterior surface of backlight unit 18.” *Id.* at 73.

Claim 9 also recites “a constricted convection plate behind the posterior surface of the display covering a majority of the posterior display surface.” Petitioner identifies Kimura’s driving circuit 19 at the “constricted convection plate.” Pet. 74. Petitioner asserts that “Kimura explains that the ‘entire backlight is cooled uniformly’ because of a ‘film’ of air formed over ‘the rear surface of the backlight unit 18’ by fan 20.” *Id.* (citing Ex. 1002 ¶¶ 271–275) (emphasis omitted). Petitioner also provides the following annotated version of Figure 9 in support of its contentions. *Id.*



Petitioner annotates the side elevation of an internal construction showing the arrangement of a cooling fan with respect to a flat panel display in Figure 9 by adding a red line labeled “rear surface of backlight unit (18)” and shading in green and labeling “driving circuit (19).” *Id.* Petitioner contends that “[a] POSITA would have understood that Kimura’s driving circuit 19 is a plate that confines the convective air-flow between the driving circuit 19 and the rear surface of the backlight unit 18,” as “reflected in the arrows shown in (original) Figure 9. In other words, the driving circuit 19 allows the ‘film’ of air to be formed on the posterior surface.” *Id.* (citing Ex. 1004, Fig. 9 (annotated); Ex. 1002 ¶ 273). Petitioner also contends that “Kimura discloses that ‘driving circuit 19 of the flat panel display is disposed behind the backlight unit 18’ (i.e., ‘behind the posterior surface of the display’).” *Id.* at 75 (citing Ex. 1004 ¶ 78).

Petitioner further contends:

The air flow design of Kimura allows simultaneous cooling of the backlight unit 18 and the driving circuit 19, which are the two primary heat generating elements in an LCD. (Ex. 1002, ¶ 274.) The length of cooling fan 20, which runs across the entire width of the LCD panel, is indicative of the size of both the driving circuitry 19 and the backlight unit 18. (*Id.*) Thus, a POSITA would have understood that Kimura’s airflow design facilitates a driving a circuit that covers “a

majority of the posterior display surface” without generating overheating issues for the display. (*Id.*)

Pet. 75 (emphasis omitted).

With respect to the “a means for forcing air between the constricted convection plate and the posterior surface of the electronic display” limitation of claim 9, Petitioner identifies Kimura’s cooling fan 20, which “forces air in the space that separates the ‘constricted convection plate’ and the ‘posterior surface of the electronic display’ as indicated by arrows in Figure 9 of Kimura.” Pet. 76–77 (citing Ex. 1002 ¶ 279).

Patent Owner responds that “Petitioners are incorrect in asserting ‘no electronics are mounted to the posterior surface of the electronic display’ in Kimura” because “element 19 of Kimura is a driving circuit.” Prelim. Resp. 37. Kimura teaches, however, that driving circuit 19 “is *disposed behind* the backlight unit 18.” Ex. 1004 ¶ 78 (emphasis added). Moreover, Kimura’s Figure 9 indicates that air flows between driving circuit 19 and the posterior of backlight unit 18, which tends to indicate that driving circuit 19 is separated from, not mounted to, backlight unit 18. *Id.* at Fig. 9; *see also* Ex. 1002 ¶ 273 (Mr. Smith-Gillespie testifying that “Kimura achieves the formation of a uniform airflow film by appropriately positioning the driving circuit 19 relative to the rear surface of the backlight unit 18 (‘the posterior surface’) so that the air-flow generated by fan 20 is channeled therebetween.”). Patent Owner does not direct us to, nor do we discern, anything in Kimura that indicates that driving circuit 19 is mounted to the posterior surface of the electronic display as Patent Owner contends.

Patent Owner also argues that “Kimura does not disclose the dimensions of the driving circuit or its positioning such that it would create ‘a constricted convection channel’ as required by” the “constricted

convection plate behind the posterior surface of the display covering a majority of the posterior display surface” limitation of claim 9. Prelim. Resp. 37. On this record, however, Patent Owner does not explain why a limitation that does not recite a “constricted convection channel” nonetheless requires the presence of one.

In any event, based on the record now before us, we are persuaded that Petitioner sufficiently establishes that Kimura teaches the claimed convection plate covering a majority of the posterior display surface. In particular, we are persuaded that because Kimura teaches that “the entire backlight unit 18 is cooled uniformly” by a wind generated by fan 20, and Kimura’s Figure 9 illustrates that air flowing between driving circuit 19 and the posterior surface of backlight unit 18, a POSITA would have understood that driving circuit 19 covers “a majority of the posterior display surface” as required by claim 9. Pet. 75; Ex. 1002 ¶¶ 273–274; Ex. 1004 ¶ 78.

Having reviewed Petitioner’s and Patent Owner’s arguments, and the evidence of record, we are persuaded that Petitioner sufficiently establishes, for purposes of institution, that the teachings of Kimura account for all of the recitations of claim 9. *See* Pet. 71–77; Ex. 1002 ¶¶ 261–280.

3. Claims 12, 13, and 16

Petitioner contends that Kimura teaches all of the elements of claims 12, 13, and 16, which directly depend from claim 9. Pet. 77–80. At this stage of the proceeding, Patent Owner does not offer any specific arguments with respect to dependent claims 12, 13, and 16. Based on the record before us, we are persuaded that Petitioner’s discussion of the particular structures in Kimura, and the explanations in the Petition and Smith-Gillespie Declaration, sufficiently show that the teachings of Kimura

account for all of the recitations of claims 12, 13, and 16. Pet. 77–80; Ex. 1002 ¶¶ 248–297.

J. Asserted Obviousness over Cho

Petitioner contends that claims 4, 5, and 9–11 would have been obvious over the teachings in Cho. Pet. 90–104.

1. Overview of Cho

Cho relates to “a cooling apparatus having a good cooling efficiency” and “a liquid crystal display device having an effectively cooled backlight unit.” Ex. 1006 ¶ 11. The cooling apparatus comprises “a casing, a heat sink, and a cooling fan.” *Id.* ¶ 13. “The casing comprises a first opening and a second opening to provide an air path.” *Id.* “The heat sink is received in the casing and includes a recession part,” and “[t]he cooling fan is disposed in the recession part.” *Id.*

Cho also describes “a display device comprising a liquid crystal panel, a backlight unit, a chassis and a cooling apparatus.” Ex. 1006 ¶ 14. The backlight unit, which supplies light to the liquid crystal panel, “is disposed at a back surface of the liquid crystal panel.” *Id.* “The chassis receives the liquid crystal panel and the backlight unit,” and “[t]he cooling apparatus is disposed in contact with the chassis.” *Id.*

Cho describes the operation of its LCD device with reference to Figure 5, reproduced below.

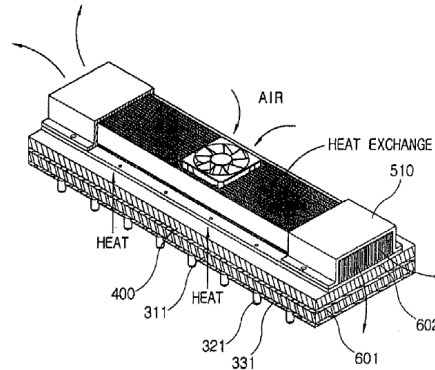


Figure 5 is partially cut away perspective view of a cooling apparatus described in Cho. Ex. 1006 ¶ 24. Cho explains that during operation of liquid crystal display device 1, heat is generated by LED 321. *Id.* ¶ 54. The generated heat is transmitted to heat sink 530 (not pictured) through LED circuit substrate 321, upper gap pad 601, chassis 400, and lower gap pad 602, which are closely attached to each other to effectively transmit the heat to transmission plate 531 (not pictured) of heat sink 530. *Id.* ¶ 55. The heat transmitted to transmission plate 531 is transmitted to fins 532 (not pictured), which have a wide surface area. *Id.*

Cho further explains that the operation of cooling fan 520 (not labeled) introduces air into heat sink 530 through first opening 511, and the air flow travels along an air path formed by casing 510 and heat sink 530 then discharges through second opening 512. *Id.* ¶ 56. Fins 532 are disposed parallel to the air path, and, while air flows without being disturbed, the air absorbs the heat from fins 532. *Id.* According to Cho, the cooling apparatus removes the heat generated by LED 321 by operating cooling fan 520 and heat sink 530.

2. Claim 4

Petitioner contends that Cho teaches all of the elements of independent claim 4. Pet. 90–97. For example, Petitioner contends that a

POSITA would have understood Cho's LED circuit substrate 311 to be the claimed "printed circuit board" because "(i) both phrases use the term 'circuit' to described the electrical circuits formed on the board"; "(ii) the word 'board' is a colloquial short-hand for 'substrate,' where a 'circuit board' and 'circuit substrate' each support multiple layers of conductor pathways and dielectric layers," and "(iii) the 'printed' descriptor is a term of art that describes a method of fabricating the circuit traces." Pet. 92 (citing Ex. 1002 ¶ 362). Petitioner contends that "LED circuit substrate 311 has a 'front side' on which 'a plurality of LEDs [321] are mounted' and a 'back side' opposite to the front side." *Id.* at 93 (citing Ex. 1006, Fig. 2 (annotated); Ex. 1002 ¶ 363) (alterations in original, emphasis omitted). Petitioner further contends that "Cho discloses chassis 400, including upper chassis 401 and lower chassis 402 on the rear/back side of LED circuit substrate 311" and "[b]ecause lower chassis 402 is disposed on the back side of the LED circuit substrate 311, it is disposed on 'the rear side' of the LED circuit substrate 311, and is thus 'a posterior surface on the rear side of the PCB.'" *Id.* (citing Ex. 1002 ¶¶ 371–372) (emphasis omitted).

With respect to the claimed "constricted convection plate placed behind and substantially parallel with the posterior surface of the PCB," Petitioner provides annotated versions of Cho's Figures 4 and 5, reproduced below. Pet. 95.

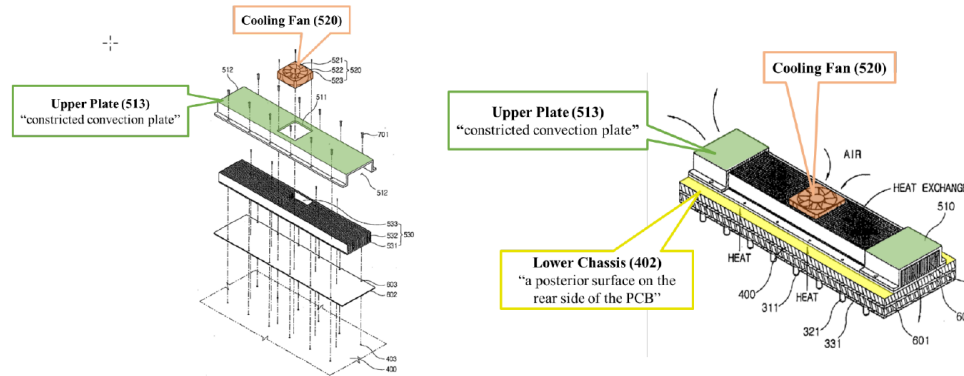


Figure 4, on the left, is an exploded assembly view of a cooling apparatus described in Cho; Figure 5, on the right, is a partially cut away perspective view of a cooling apparatus described in Cho. Ex. 1006 ¶¶ 23–24.

Referring to annotated Figures 4 and 5, Petitioner contends that “[c]ooling apparatus 500 features an upper plate 513 [colored green] ‘placed behind and substantially parallel with’ the lower chassis 402 (‘the posterior surface of the PCB’; colored yellow).” Pet. 94–95 (citing Ex. 1006, Figs. 4, 5 (annotated); Ex. 1002 ¶ 376). Petitioner contends that upper plate 513, with side surface parts 514, “form an enclosure in which air can flow, such that upper plate 513 of cooling apparatus 500 also is ‘the constricted convection plate placed behind and substantially parallel with the posterior surface of the PCB.’” *Id.* at 95 (citing Ex. 1002 ¶ 377).

Petitioner also relies on its annotated version of Cho’s Figures 4 and 5 to illustrate the claimed “fan positioned to draw air between the constricted convection plate and the posterior surface.” Pet. 95–97. Referring to annotated Figure 4, Petitioner asserts that air introduced by cooling fan 520 (colored orange) through first opening 511 is discharged through second opening 512, and annotated “Figure 5 shows the air flow during operation of cooling fan 520.” *Id.* at 96 (citing Ex. 1006 ¶ 50). According to Petitioner,

“a POSITA would have understood that Cho discloses a cooling fan 520 positioned to pull air through and out of the space that separates upper plate 513 (‘constricted convection plate’) and the external surface of lower chassis 402 (‘posterior surface’).” *Id.* at 97 (citing Ex. 1002 ¶¶ 382–383).

Patent Owner responds that “Cho does not disclose the claimed constricted convection plate,” and instead “describes bolt-on cooling units affixed to the rear exterior of the device chassis, which is nowhere near a posterior surface of the display and is also exterior to the display housing.” Prelim. Resp. 38. Patent Owner also argues that Cho does not disclose the claimed “fan positioned to draw air between the constricted convection plate and the posterior surface.” *Id.*

We agree with Patent Owner. Cho teaches that upper plate 513, which Petitioner identifies as the claimed “constricted convection plate,” is “parallel to the external surface of the lower chassis 402,” and that “heat sink 530 is interposed between the upper plate 513 and the external surface of the lower chassis 402.” Ex. 1006 ¶ 48. Cho also teaches that “cooling fan 520 exhausts air introduced from outside the cooling apparatus 500 to a side direction through the heat sink 530.” *Id.* ¶ 50. “[H]eat sink 530 comprises a heat transmission plate 531 disposed parallel to the upper plate 513, fins 532 connected to the heat transmission plate 531, and is provided with a combination hole” to allow “combining the heat sink 530 with the chassis 400.” *Id.* ¶ 51. Cho also teaches that “lower gap pad 602 is disposed between cooling apparatus 500 and lower chassis 402.” *Id.* ¶ 43. Cho further teaches that the air from cooling fan 520 “flows along a path formed by the casing 510 and the heat sink 530,” and that “fins 532 are disposed parallel to the air path, which is the direction from the first opening 511 and the second opening 512.” *Id.* ¶ 56. According to Cho, the

flowing air absorbs the heat from fins 532 and discharges the air through second opening 512. *Id.*

These disclosures in Cho indicate that cooling fan 520 is positioned to draw air along a path between the casing and heat sink 530, not between the casing and the posterior surface (external surface of chassis 402) as Petitioner contends. *See* Ex. 1006 ¶ 56. In light of these disclosures, Petitioner does not sufficiently explain why upper plate 513 is the claimed “constricted convection plate,” or why cooling fan 520, which is positioned to draw air between the casing and heat sink 530, is “a fan positioned to draw air between the constricted convection plate and the posterior surface” as claim 4 requires.

Accordingly, we are not persuaded that Petitioner sufficiently establishes, on this record, that Cho teaches all of the elements of independent claim 4.

3. *Claim 9*

Petitioner contends that Cho discloses all of the elements of independent claim 9. Pet. 98–103. Claim 9 recites, *inter alia*, “a means for forcing air between the constricted convection plate and the posterior of the electronic display.” Ex. 1001, 10:48–49. As it did with the similar limitation in claim 4, Petitioner contends that “Cho’s cooling fan 520 is a ‘means for forcing air’ in the space that separates upper plate 513 (‘constricted convection plate’) and lower chassis 402 (‘posterior surface’).” Pet. 103 (citing Ex. 1002 ¶ 407). For the same reasons discussed above with respect to claim 4, we are not persuaded that Petitioner sufficiently establishes that Cho teaches “a constricted convection plate” or “means for forcing air between the constricted convection plate and the posterior surface of the electronic display.” *See supra* Section II.J.2.

4. *Claims 5, 10, and 11*

Petitioner asserts that Cho teaches all of the recitations of claim 5, which directly depends from claim 4, and claims 10 and 11 that directly depend from claim 9. Petitioner's arguments with respect to dependent claims 5, 10, and 11 do not remedy the deficiencies set forth above with respect to independent claims 4 and 9. Pet. 97–98, 103–104. Accordingly, we are not persuaded that Petitioner sufficiently establishes that Cho teaches all of the elements of claims 5, 10, and 11.

K. *Objective Indicia of Nonobviousness*

As part of our obviousness analysis, we also consider whether objective indicia of nonobviousness (i.e., secondary considerations) may lead to a conclusion that the challenged claims would not have been obvious. *See, e.g., Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1538–39 (Fed. Cir. 1983) (instructing that evidence of secondary considerations, when present, must always be considered in determining obviousness).

Objective evidence of nonobviousness “is only relevant to the obviousness inquiry ‘if there is a nexus between the claimed invention and the [objective indicia of nonobviousness].’” *In re Affinity Labs of Tex., LLC*, 856 F.3d 883, 901 (Fed. Cir. 2017) (quoting *Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (2006)). A “nexus” is a legally and factually sufficient connection between the objective evidence and the claimed invention such that the objective evidence should be considered in the determination of obviousness. *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019); *see In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994). A presumption of nexus arises where “the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’”

Fox Factory, Inc. v. SRAM, LLC, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1072 (Fed. Cir. 2018) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000))); *see also* *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 723 F.3d 1363, 1372 (Fed. Cir. 2013) (explaining that a “presumption of a nexus” exists where a product is “coextensive” with a patent claim). If, however, the patented invention is only a component of the commercial embodiment, the patentee is not entitled to a presumption of nexus. *Fox Factory*, 944 F.3d at 1374. In addition, “[a] patent claim is not coextensive with a product that includes a ‘critical’ unclaimed feature that is claimed by a different patent and that materially impacts the product’s functionality.” *Id.* at 1375. But, “[a] finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations”; rather, “the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is ‘the direct result of the unique characteristics of the claimed invention.’” *Id.* at 1374 (quoting *In re Huang*, 100 F.3d 125, 140 (Fed. Cir. 1996)). Patent Owner bears the burden of establishing that a nexus exists between the evidence of secondary considerations and the patented invention. *Id.* at 1373.

Patent Owner argues that “[t]here are multiple indicia of non-obviousness of the ’322 Patent with a nexus to [Patent Owner’s] outdoor and semi-outdoor electronic display products, which practice the ’322 Patent, including industry praise, commercial success, long-felt need, unsuccessful attempts by others, and copying.” Prelim. Resp. 7. Specifically, Patent Owner points to an email in which a representative of “[r]eal-party-in-interest Samsung SDS America praised [Patent Owner’s] technical achievements and commercially successful entry into the outdoor display

market.” *Id.* at 7–8 (citing Ex. 2001). Patent Owner also asserts that “Samsung SDS America even attempted to enter into a ‘Mutual Non-Disclosure Agreement’ with [Patent Owner].” *Id.* at 8 (citing Ex. 2002).

Patent Owner argues that such praise “directly discusses Samsung’s belief that Patent Owner would be a ‘key partner in outdoor enclosures,’ and that Patent Owner’s innovations are both ‘impressive and unique’ and ‘rais[e] the bar for high quality standards.’” Prelim. Resp. 8 (citing Ex. 2001). Patent Owner also asserts that “Samsung saw ‘loads of opportunities for collaboration in the outdoor space (smart city, transit, rail, etc.) where we can embrace [Patent Owner’s] technology and blended in with Samsung displays.’” *Id.* (citing Ex. 2001). Patent Owner argues that “[t]his praise is all tied directly to the claimed invention, i.e., systems and products for effectively cooling outdoor and semi-outdoor electronic displays using an open loop airflow pathway and closed loop airflow pathway in combination with heat exchangers, polarizers, and anti-reflective films.” *Id.*

To the extent that there is any praise in the cited evidence, Patent Owner does not tie it to any specific product that embodies, and is coextensive with, the features claimed in the ’322 patent. *See Fox Factory*, 944 F.3d at 1373. Nor does Patent Owner show that the cited evidence is the direct result of the unique characteristics of the invention claimed in the ’322 patent. *See id.* at 1374. On the contrary, the “claimed invention” that Patent Owner contends this “praise is directly tied to” includes elements (e.g., an open loop airflow pathway and closed loop airflow pathway) that are not claimed, or even discussed, in the ’322 patent. Thus, even if the cited evidence were tied to cooling outdoor and semi-outdoor electronic displays using an open loop airflow pathway and closed loop airflow pathway in

combination with heat exchangers, polarizers, and anti-reflective films as Patent Owner contends, Patent Owner still fails to tie the cited evidence to any specific product that embodies, or is coextensive with, features claimed in the '322 patent. Accordingly, we are not persuaded, on this record, that Patent Owner has shown sufficient nexus between the asserted evidence and any challenged claim.

Patent Owner also asserts that, Petitioner “at least knew of the evidence of industry praise directly tied to the claimed invention and had evidence in their possession before filing” the Petition. Prelim. Resp. 12 (citing *id.* at 7–9). For the same reasons discussed above with respect to nexus, the cited evidence (Exs. 2001–2003) is not sufficiently detailed to impose on Petitioner an obligation to address them in the Petition as objective evidence of nonobviousness. Thus, on this record, we decline to impose such an obligation on Petitioner.

L. Conclusion

Based on our consideration of the record before us, and for the reasons shown above, we determine that Petitioner establishes a reasonable likelihood of showing that (1) the combined teachings of Kim and Hong account for all of the recitations of claims 4 and 7; (2) the combined teachings of Kim, Hong, and Tachikawa account for all of the recitations of claim 5; (3) the combined teachings of Kim and Tachikawa account for all of the recitations of claims 1–3; (4) Na teaches all of the recitations of claims 4, 8–10, and 16; (5) the combined teachings of Na and Tachikawa account for all of the recitations of claim 11; and (6) Kimura teaches all of the recitations of claims 9, 12, 13, and 16. We also determine that Patent Owner has not shown sufficient nexus between the asserted secondary considerations evidence and any challenged claim, and, at this stage of the

proceeding, has not established that objective indicia of nonobviousness outweigh Petitioner's evidence of unpatentability. Accordingly, we determine that Petitioner establishes a reasonable likelihood of prevailing in showing that (1) claims 4 and 7 would have been obvious over the combined teachings of Kim and Hong; (2) claim 5 would have been obvious over the combined teachings of Kim, Hong, and Tachikawa; (3) claims 1–3 would have been obvious over the combined teachings of Kim and Tachikawa; (4) claims 4, 8–10, and 16 would have been obvious over the teachings of Na; (5) claim 11 would have been obvious over the combined teachings of Na and Tachikawa; and (6) claims 9, 12, 13, and 16 would have been obvious over the teachings of Kimura.

Petitioner also contends that (1) claim 8 would have been obvious over the combined teachings of Kim, Hong, and Takahashi; (2) claims 7, 12, and 13 would have been obvious over the combined teachings of Na and Kim; (3) claims 1–3 and 11 would have been obvious over the combined teachings of Kimura and Kochiyama; (4) claims 4 and 7 would have been obvious over the combined teachings of Kimura and Hong; and (5) claims 4, 5, and 9–11 would have been obvious over the combined teachings of Kimura, Hong, and Kochiyama. Pet. 43–48, 65–69, 81–90. At this stage of the proceeding, Patent Owner does not address Petitioner's specific contentions with respect to these grounds. Having determined that Petitioner establishes a reasonable likelihood of showing that at least one of the challenged claims is unpatentable as set forth above, we institute an *inter partes* review based on these grounds as well.³ See 37 C.F.R. § 42.108(a)

³ Trial is also instituted with respect to Petitioner's challenge that claims 4, 5, and 9–11 would have been obvious over the teachings of Cho. Pet. 90–104; see *Guidance of the Impact of SAS on AIA Trial Proceedings* (April 26,

(“When instituting inter partes review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”).

III. CONCLUSION

Based on the arguments in the Petition and the Preliminary Response, and the evidence of record, we determine that Petitioner establishes a reasonable likelihood that it will prevail on its challenge to at least one claim of the ’322 patent. Accordingly, we institute an *inter partes* review of all the challenged claims on all the grounds presented in the Petition.

The factual findings set forth in this Decision are preliminary and provided for the sole purpose of deciding whether to institute a review. Any final findings will be based on the full trial record, including any information presented in a timely filed response to the Petition. *See Trivascular, Inc. v. Samuels*, 812 F.3d 1056, 1068 (Fed. Cir. 2016) (noting that “there is a significant difference between a petitioner’s burden to establish a ‘reasonable likelihood of success’ at institution, and actually proving invalidity by a preponderance of the evidence at trial”) (quoting 35 U.S.C. § 314(a); comparing *id.*, with § 316(e)).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that an *inter partes* review is instituted with respect to all of the grounds asserted in the Petition; and

2018) (explaining that “the PTAB will institute as to all claims or none” and “if the PTAB institutes a trial, the PTAB will institute on all challenges raised in the petition”).

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, which shall commence on the entry date of this Decision.

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