[redacted]

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

U.S. Patent No. 9,173,322

Filing Date: October 7, 2014
Issue Date: October 27, 2015

Title: Constricted Convection Cooling System for an Electronic Display

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Inter Partes Review No. IPR2023-00220

PATENT OWNER RESPONSE

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EXHIBIT LIST

Exhibit No.	Description
2001	MRI-ITC-1331_0000435123-24 (4/24/2020 Romulus Stoain email to Dunn)
2002	MRI-ITC-1331_0000435125-27, Mutual Non-Disclosure Agreement
2003	MRI-ITC-1331_0000435133-34 (5/4/2020 Romulus Stoain email to Dunn)
2004	MRI's Opening Claim Construction Brief filed in *In the Matter of Certain Outdoor and Semi-Outdoor Electronic Displays*, Inv. No. 337-TA-1331
2005	U.S. Provisional Patent Application 61/039,454
2006	Declaration of Michael Gershowitz
2007	Curriculum Vitae of Michael Gershowitz
2008	U.S. Prov. App. No. 61/039,454
2009	Samsung's Opening Claim Construction Brief, ITC Inv. No. 337-TA-1331 (Feb. 1, 2023)
2010	Order No. 13: Construing Certain Terms of the Asserted Claims of the Patents at Issue, ITC Inv. No. 337-TA-1331 (May 15, 2023)
2011	Excerpt from Samsung's Pre-Hearing Brief, ITC Inv. No. 337-TA-1331 (June 5, 2023)
2012	U.S. Patent No. 5,636,072
2013	Evidentiary Hearing Transcript (Pages 838 through 1135), ITC Inv. No. 337-TA-1331 (June 29, 2023)
2014	Internet Archive Page Showing Review of Samsung XL20 as of December 20, 2007
2015	Declaration of Robert Smith Gillespie, ITC Inv. No. 337-TA-1331 (January 17, 2023)
2016	The New Oxford American Dictionary, Second Edition (2005)

Exhibit No.	Description
2017	Meriam-Webster's Collegiate Dictionary, Eleventh Edition (2008)
2018	Updated Joint Claim Construction Statement, ITC Inv. No. 337-TA-1331 (March 8, 2023)
2019	Evidentiary Hearing Transcript (Open Sessions, Pages 1 through 273), ITC Inv. No. 337-TA-1331 (June 26, 2023)
2020	CX-0280, ITC Inv. No. 337-TA-1331 (Photographs of Samsung OHF product)
2021	User Manual for OH46F | OH55F
2022	Samsung's Post-Hearing Reply Brief (Public Version), ITC Inv. No. 337-TA-1331 (June 5, 2023) (Excerpts)
2023	Driving LEDs versus CCFLs for LCD backlighting, EE Times, by Tom Novitsky and Bill Abbott (2007).
2024	Technical Data Sheet: Reverse Package Chip LED with Inner Lens, Everlight Electronics Co. (Jan. 24, 2008)
2025	Samsung White Paper: Taking the Message Outdoors (Dec. 4, 2015)
2026	Website - Samsung White Paper: Taking the Message Outdoors (Dec. 4, 2015) https://insights.samsung.com/2015/12/04/taking-the-message-outdoors-with-high-brightness-display-tech-white-paper/ (last visited Sept. 26, 2023)
2027	Respondents' Notice of Prior Art, *Certain Outdoor and Semi-Outdoor Electronic Displays*, Inv. No. 337-TA-1331 (Jan. 4, 2023).
2028	Digital Solutions for Convenience Stores, Samsung, dated 2021
2029	Sung Ki Kim deposition transcript excerpts, *Certain Outdoor and Semi-Outdoor Electronic Displays*, Inv. No. 337-TA-1331 (Mar. 31, 2023)
2030	Sungsu Lee deposition transcript excerpts, *Certain Outdoor and Semi-Outdoor Electronic Displays*, Inv. No. 337-TA-1331 (Mar. 20, 2023)
2031	Wunkil Lee deposition transcript exerpts, *Certain Outdoor and Semi-Outdoor Electronic Displays*, Inv. No. 337-TA-1331 (Mar. 21, 2023)

Exhibit No.	Description
2032	John Palmer deposition transcript excerpts, *Certain Outdoor and Semi-Outdoor Electronic Displays*, Inv. No. 337-TA-1331 (Mar. 16, 2023)
2033	U.S. Patent Application Publication No. 2006/0077636 A1 to Kim, dated Apr. 13, 2006
2034	U.S. Patent Application Publication No. 2006/0132699 A1 to Cho et al., dated Jun. 22, 2006
2035	U.S. Patent No. 7,948,575 to Oh et al., dated May 24, 2011
2036	Certified translation of Korean Unexamined Patent Application KR 10-2006-0016469 to Na, dated Feb. 22, 2006 ("Na")
2037	U.S. Patent No. 7,800,706 B2 to Kim et al., dated Sep. 21, 2010)
2038	SEITC0027754 McDonald's Outdoor DMB presentation, dated Mar. 2017
2039	RESERVED
2040	Samsung OH product sales spreadsheet, CX-1728C
2041	SEITC0028579 Samsung Market Requirements Document, Outdoor LCD Signage, dated Apr. 23, 2021, and English translation
2042	SEITC0035224 Samsung teardown of [redacted] Outdoor 86" product, dated Mar. 24, 2016, and English translation
2043	SEITC0035259 Samsung teardown photos of [redacted] 55" product
2044	MRI-ITC-1331_0000046205 MRI Sales Detail
2045	Declaration of Alan Brand, *Certain Outdoor and Semi-Outdoor Electronic Displays*, Inv. No. 337-TA-1331 (Aug. 19, 2022)
2046	MRI-ITC-1331_0000444713 MRI Sales Detail
2047	Article – Sunlight and Solar Clearing, https://lg-mri.com/sunlight-and-solar-clearing/ (last visited Sept. 26, 2023)
2048	Letter from Chris Bolton (Vertigo Group) to Bill Dunn (MRI), dated Apr. 6, 2009

Exhibit No.	Description
2049	Trademark and Technology License Agreement, dated Feb. 18, 2014
2050	Joint Venture and Limited Liability Company Agreement, dated Jan. 8, 2014
2051	License Agreement, dated Aug. 27, 2008
2052	Confidential Agreement, dated Jan. 22, 2020
2053	Samsung Outdoor Installation Guide
2054	RESERVED

I. Introduction

Patent Owner Manufacturing Resources International, Inc ("PO" or "MRI") respectfully submits this Response in accordance with 37 C.F.R. § 42.120, responding to the Board's decision to institute *inter partes* review (Paper No. 11) (the "Institution Decision" or "Decision") and to the Petition for *inter partes* review (Paper No. 3) filed by Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. ("Petitioner" or "Samsung"). The Board instituted review of U.S. Patent No. 9,173,322 ("the '322 patent") on twelve (12) grounds that challenge various combinations of claims 1-5, 7-13, and 16 ("the Challenged Claims"). As discussed in detail below, Samsung has not met its burden of proving unpatentability of any of these claims. *See* 35 U.S.C. § 316(e).

The '322 patent teaches a constricted convection plate configured to form a constricted convection channel between the plate and the posterior surface of an LCD or other thin panel electronic display assembly. This invention bucked the conventional wisdom at the time of the invention, which held that maximizing airflow into and out of a large cooling chamber through as many side walls as possible would minimize heat buildup.

The challenged claims focus in on particular requirements for optimizing constricted convection, such as the requirement that the constricted convection plate

be immediately behind the posterior display surface without any intervening electronics between the posterior surface and the constricted convection plate (i.e., "where no electronics are mounted to the posterior surface of the electronic display").

Whereas Petitioner mischaracterizes prior art such as Kim, Na, Kimura and Cho as disclosing a constricted convection plate and channel, the cross-examination testimony of Samsung's expert, Mr. Smith-Gillespie, and the declaration of MRI's expert (Michael Gershowitz) confirms those references provide no such disclosure.

For Kim, Patent Owner's expert, Mr. Smith-Gillespie, acknowledged on cross-examination that air flows out of Kim in four directions (up, down, left, and right). Thus, the alleged constricted convection plate in Kim is not configured to form a constricted convection channel as in all embodiments of the '322 patent. Moreover, Kim teaches screwing circuit board 133 to the posterior surface of its backlight—thus teaching away from, for example, challenged claim 9.

The grounds based on Na miss the mark entirely. Air flows into the interior of Na's backlight through fifty large holes on its posterior surface, which the Petition mistakenly identifies as a "constricted convection plate." Further, like Kim, Na also teaches mounting its driving circuit to the posterior surface of its backlight—again teaching away from, for example, claim 9.

For Kimura, the Petition misidentifies the display's electronics (driving circuit 19) as a constricted convection plate simply because it is placed within the cooling pathway of Kimura's unique fan. The claimed "electronics" of the '322 patent, however, are meant to be distinct from the claimed "constricted convection plate," behind the plate, and placed outside of the constricted convection channel formed between the constricted convection plate and posterior surface of the electronic display.

Cho is similarly irrelevant as it teaches an assembly for a finned heat sink.

The non-obviousness of the '322 patent is confirmed by the objective, real-world evidence of Petitioner's failure in the outdoor display market for several years after the time of the invention, until it eventually copied MRI's invention and achieved commercial success using the claimed invention of the '322 patent.

Petitioner failed to carry its burden, and the Board should affirm the patentability of the Challenged Claims.

II. Background

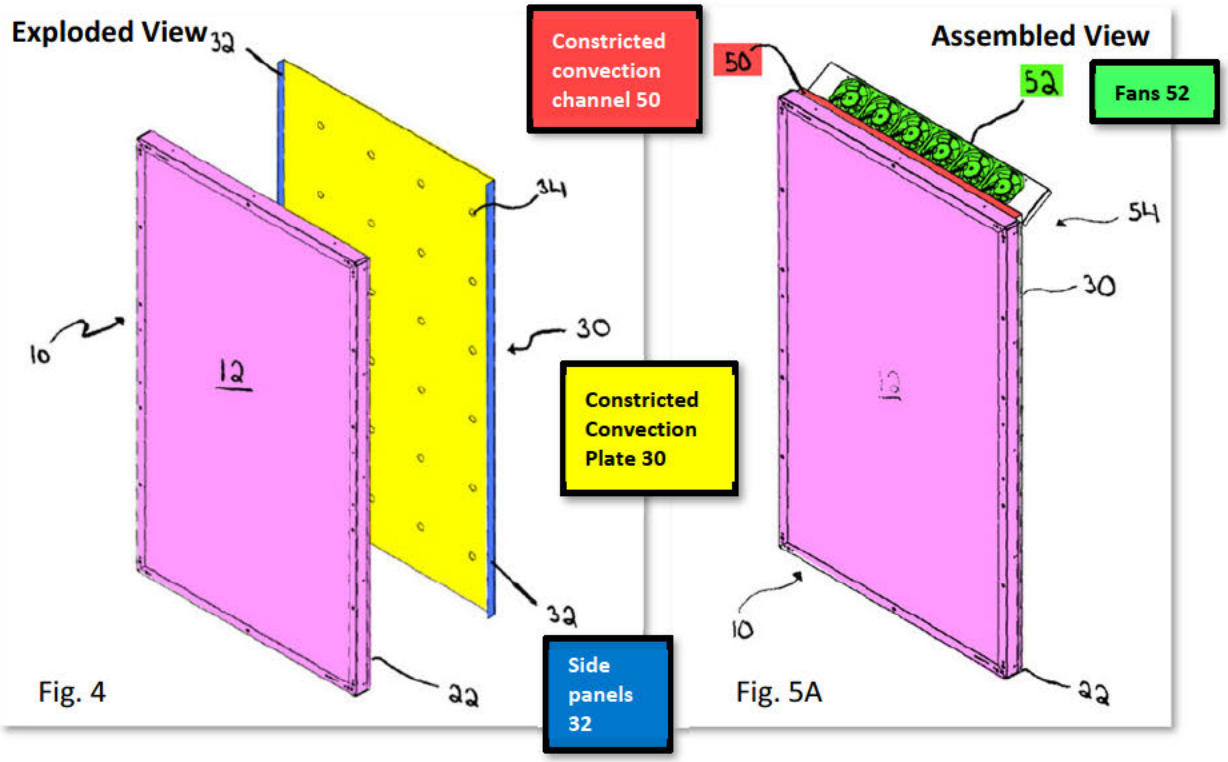
A. The Patent Describes a System for Cooling the Posterior Surface of an Electronic Display Module Using a Constricted Convection Channel

The '322 Patent describes a system for cooling a typical electronic display having a posterior display surface. Ex. 1001, Abstract, 2:43-59, 4:39-41.

At the time of the invention, "the market [wa]s demanding larger screen

sizes for displays" with "some outdoor applications call[ing] for seventy inch screens and above." *See* Ex. 1001, 2:8-29. Further, "[m]odern displays [we]re required to be extremely bright," which caused the backlight assembly, in particular, to "generate a significant amount of heat." *Id.*, 4:1-15. Whereas cooling "systems of the past generally attempt[ed] to remove heat from the electronic components in a display through as many sidewalls of the display as possible," the '322 Patent took a starkly different approach by using fans to direct cooling air through a narrow channel immediately behind the display to remove heat directly and specifically from the electronic display's posterior display surface. Ex. 1001, 1:53-55, 6:17-19, 6:30-37.

This "constricted convection channel" is formed behind the posterior surface of the thin panel display using a constricted convection plate as depicted in the annotated Fig. 5C and 5D from the '322 Patent below:



In some embodiments, the '322 Patent further teaches electronics "hardware located behind the constricted convection plate 30" that is accessible through access apertures on the constricted convection plate that are preferably plugged before use. *Id*., 6:24-29

The operation of the cooling system is further diagrammed in Figs. 5C and 5D of the patent below with Fig. 5D also showing how housing 80 and septum 90 direct the flow of air. Ex. 1001, 6:1-13.

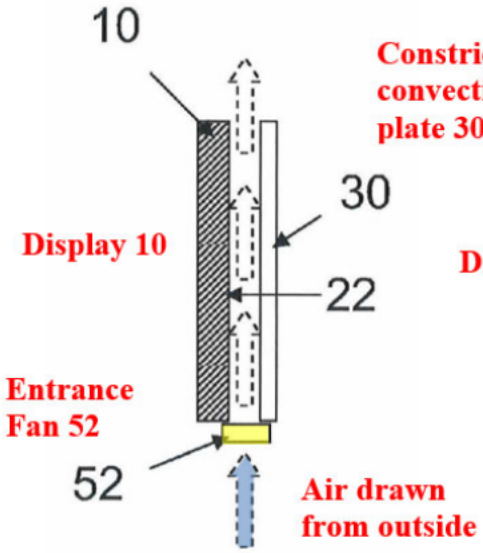


Fig. 5C

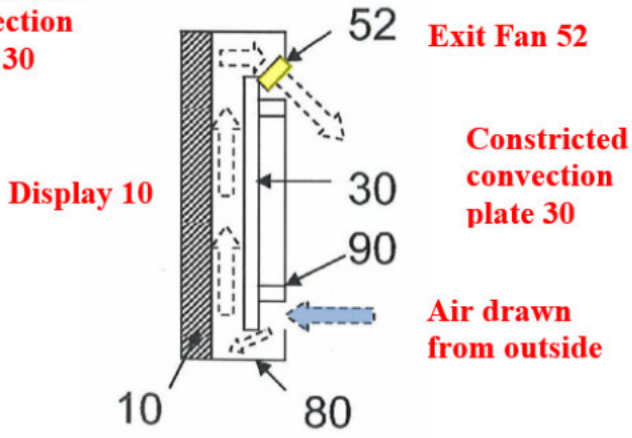


Fig. 5D

Although the small cross-sectional area of the narrow airflow path limits the volume of cooling air flowing through the system, the '322 patent teaches that "the narrowing of the airflow path" by the constricted convection channel unexpectedly "increases the effectiveness of the heat transfer" from the display to the air. Ex. 1001, Ex. 2008[1] (U.S. Prov. App. No. 61/039,434), [0032].

III. Expert Testimony, Level of Skill in the Art, and Claim Construction

A. Declaration Evidence

[1] The '322 Patent claims priority to two parent provisional applications, U.S. Prov. App. No. 61/033,064, filed March 3, 2008, and U.S. Prov. App. No. 61/039,454 ("the '454 Provisional"), filed March 26, 2008, both of which are incorporated by reference into the '322 patent. *See* Ex. 1001, 1:7-10, 23-28.

In support of this Response, MRI provides the declaration of Michael Gershowitz. Ex. 2006. Mr. Gershowitz has a Bachelor of Science degree in Electrical Engineering, a Master of Engineering degree, and decades of experience working with electronic displays and LED lighting. As demonstrated by Mr. Gershowitz's testimony, the claimed invention would not have been obvious to a POSITA.

B. Level of Ordinary Skill in the Art

A person of ordinary skill in the art ("POSITA") of the '322 Patent would have had a bachelor's degree in a pertinent discipline, such as mechanical or electrical engineering, physics, applied physics, or a related field. Ex. 2006, ¶ 36. Such a person would also have had 2-4 years of experience in working with electronic displays including thermal management associated with electronic displays. *Id*. 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. *Id*.

C. Claim Construction

The claim terms of the '322 Patent are construed under the *Phillips* standard, considering the plain meaning of the claim terms to a person of ordinary skill in the art, in light of the language of the claims, the specification, and the file history. The Board, however, only construes the claims when necessary to resolve the

underlying controversy. *Toyota Motor Corp. v. Cellport Systems, Inc.*, IPR2015-00633, Paper No. 11, 16 (Aug. 14, 2015) (citing *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

1. Terms Not Requiring Construction

Petitioner proposed a construction for several terms ("between," "substantially parallel," "a fan [placed/positioned] to draw [ambient] air between the constricted convection plate and the [rear posterior/posterior surface]"), which the Institution Decision did not address. Because no material disputed issues in this proceeding turn on the proposed constructions, no construction of these terms is required.

2. "Means for Forcing Air Between the Constricted Convection Plate and the Posterior Surface of the Electronic Display"

The Institution Decision construes the "means for forcing air between the constricted convection plate and the posterior surface of the electronic display" recited in claim 9 as a means-plus-function clause with the function of "forcing air between the constricted convection plate and the posterior surface of the electronic display." Patent Owner agrees with this construction. The Petition proposes "[t]he corresponding structure to perform this function is one or more fans **52**, air conditioning unit **110**, and their equivalents." Paper 3, 15. Like the Institution Decision, Patent Owner agrees. However, as explained below in Section VII.A.1.c,

below, Patent Owner disagrees that Kimura teaches a fan that performs the claimed function or has an equivalent structure to the one or more fans 52 described in the '322 patent.

3. Constricted Convection Plate

The phrase "a constricted convection plate" should be construed as "a plate configured to form part of a constricted convection channel." The International Trade Commission construed the term "constricted convection plate" as "a plate configured to form part of a constricted convection channel." Ex. 2010, 35. The ITC recognized that "the 'constricted convection plate' is used to form a constricted convection channel that removes heat from the posterior display surface/posterior surface" citing the specification's teaching that "[t]he constricted convection plate 30 and the display posterior 22 define a constricted convection cooling channel 50 immediately behind the display posterior." *Id.*, 37 (citing Ex. 1001, 5:37-39). In construing this term, the ITC further acknowledged Petitioner's admission that "the 'constricted convection plate' is described in the shared specification of the '595 and '322 patents as defining a part of the 'constricted convection channel.'" Ex. 2010, 37 (citing Ex. 2009, 17).

Moreover, the claims of the '322 support the ITC's construction. All the claims require air to flow "between the constricted convection plate and the [posterior surface or rear posterior]."

Accordingly, to maintain consistency with the parallel proceedings at the ITC and to give effect to the specification and claims, the phrase "a constricted convection plate" should be construed as "a plate configured to form part of a constricted convection channel."

4. Posterior Surface of the Electronic Display

Petitioner has proposed "the Board should apply the Delaware District Court's constructions" included with Exhibit 1011 to the Petition. *See* Paper 3, 14. Among them is the construction of "posterior display surface" as "rear-facing surface of the display assembly." At the ITC, Petitioner proposed that the term "posterior surface of the electronic display" in Claim 9 of the '322 patent should receive the same construction. *See* Ex. 2009, 25-28.

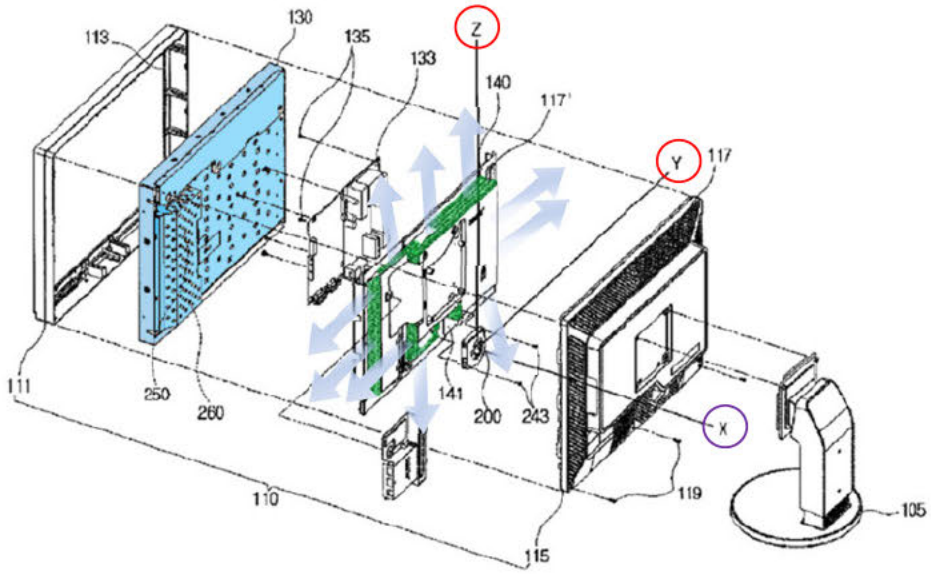
Petitioner prevailed on the same proposal at the International Trade Commission over Patent Owner's objection. However, to maintain consistency with the litigation, MRI acquiesces to the same construction applying in this proceeding as well. As explained below, application of this construction materially impacts Grounds 5-7 because the Petition identifies a surface *inside* of Na's backlight as the recited "posterior surface of the electronic display" and then identifies the actual rear-facing surface of Na's display assembly as an alleged constricted convection plate.

IV. Prior Art

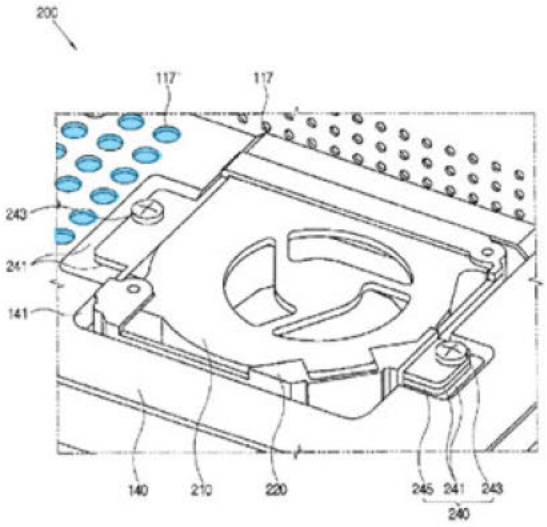
A. Kim

Kim discloses an LCD panel in a casing with a shield cover behind the backlight unit; the shield cover is combined with a fan to supply cooling to the backlight. Kim, Abstract. Kim's purports to provide improved cooling that also has less vibration and noise. Ex. 1005 (Kim), 1:45-52. Kim describes its displays "generally comprise a TV or a computer monitor." Ex. 1005 (Kim), 3:66-68. A cooling fan is combined with the shield cover to provide cooling air to circuit board 133 and LCD backlight 130; *see* Ex. 1005 (Kim), Fig. 2 (annotated) below. A plurality of air slits 117' are added in the periphery of the shield cover 140 to allow air to freely flow from the fan outward on the sides through slits 117 in the rear cover 115 as can be seen in Kim's Fig. 2 (annotated) below where air slits 117' have been highlighted in green and backlight unit 130 highlighted blue. Ex. 2006, ¶¶ 44-46.

FIG. 2



Kim explains "[t]he air which flows through the heat generating parts is discharged to the outside (in a 'Y' or 'Z' direction shown in FIG. 2) through the plurality of air slits 117' of the shield cover 140 and the plurality of air slits 117 of the rear casing 115 so that heat generated from the heat generating parts is emitted." Kim, 7:57-62. The labels for intake direction 'X' and exhaust directions 'Y' and 'Z' directions in Kim have been circled purple and red respectively in the annotated Fig. 2 above. Arrows have been added to show the direction of air flow as described in Kim.

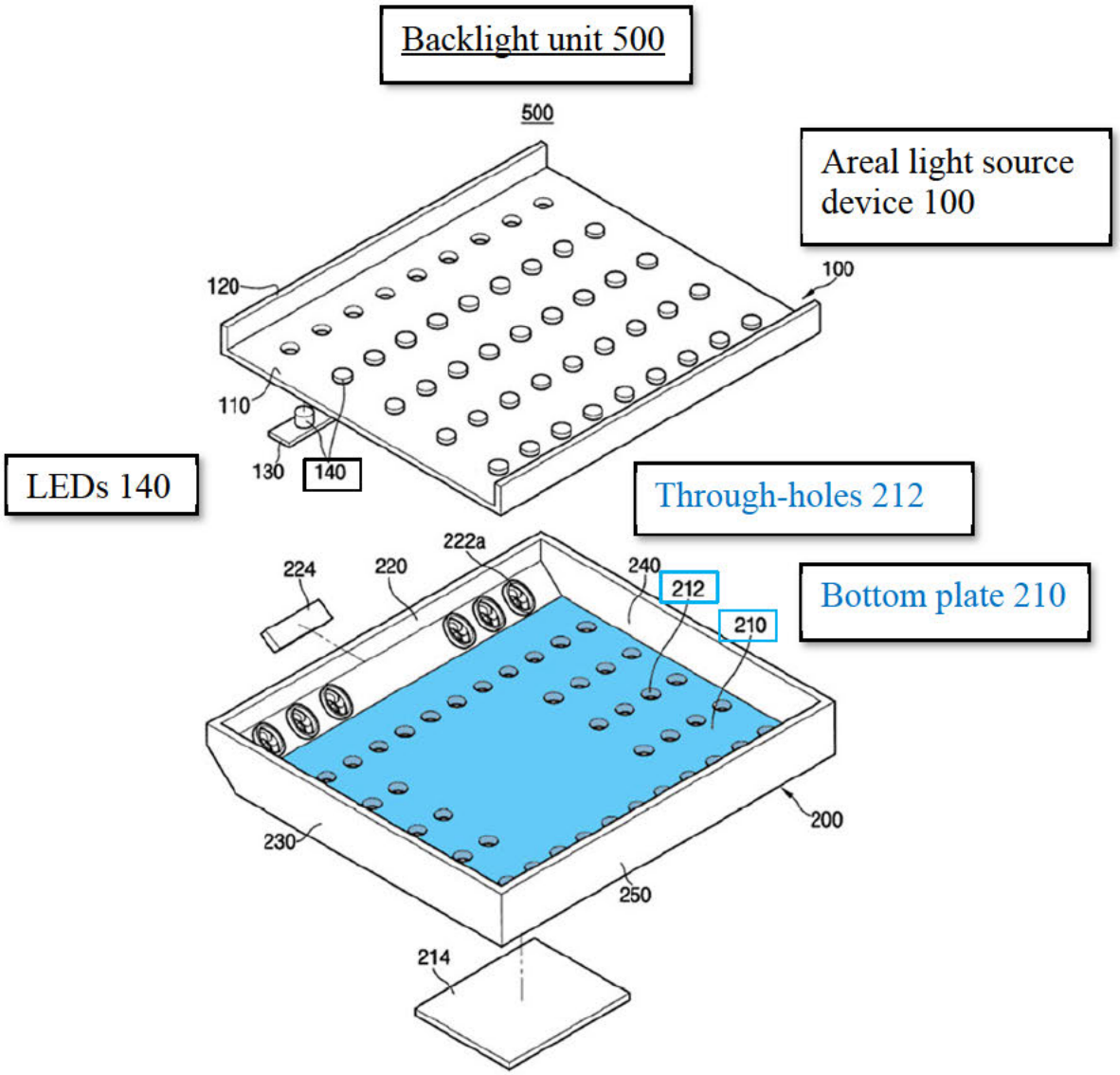


Kim's air slits 117' can be seen in greater detail in Kim's Fig. 4 (reproduced

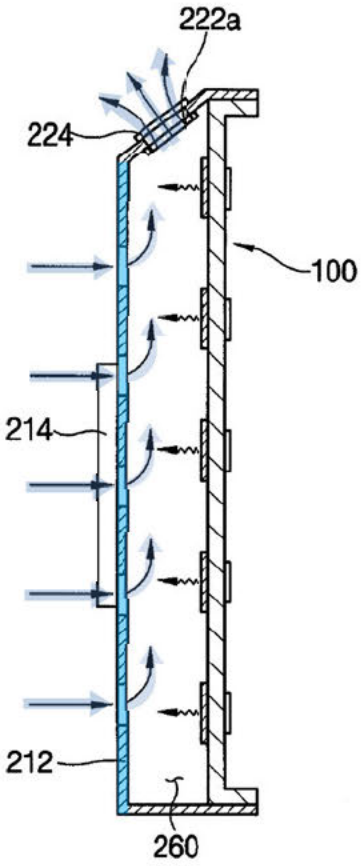
to the right, with air slits 117' on Kim's porous shield cover 140 highlighted blue.

B. Na

Na is entitled, "Backlight Unit and LCD Device Including the Same," and was filed Aug. 18, 2004. Na's Fig. 1, which has been reproduced and annotated below, is an exploded perspective view of backlight unit 500. Ex. 1010, 3. Na teaches "backlight unit 500 includes an areal light source device 100 and a storage container 200." *Id.*, 4. "The areal light source device 100 includes a reflective plate 110, a sidewall 120, a driving substrate 130, and a plurality of light emitting diode light sources 140." *Id*. "The storage container 200 includes a bottom plate 210, a first sidewall 220, a second sidewall 230, a third sidewall 240, and a fourth sidewall 250." *Id*. The bottom plate 210 of backlight unit 500 has been highlighted blue. Bottom plate 210 is permeated by through-holes 212 that "function as an intake unit through which external air is sucked." *Id*.

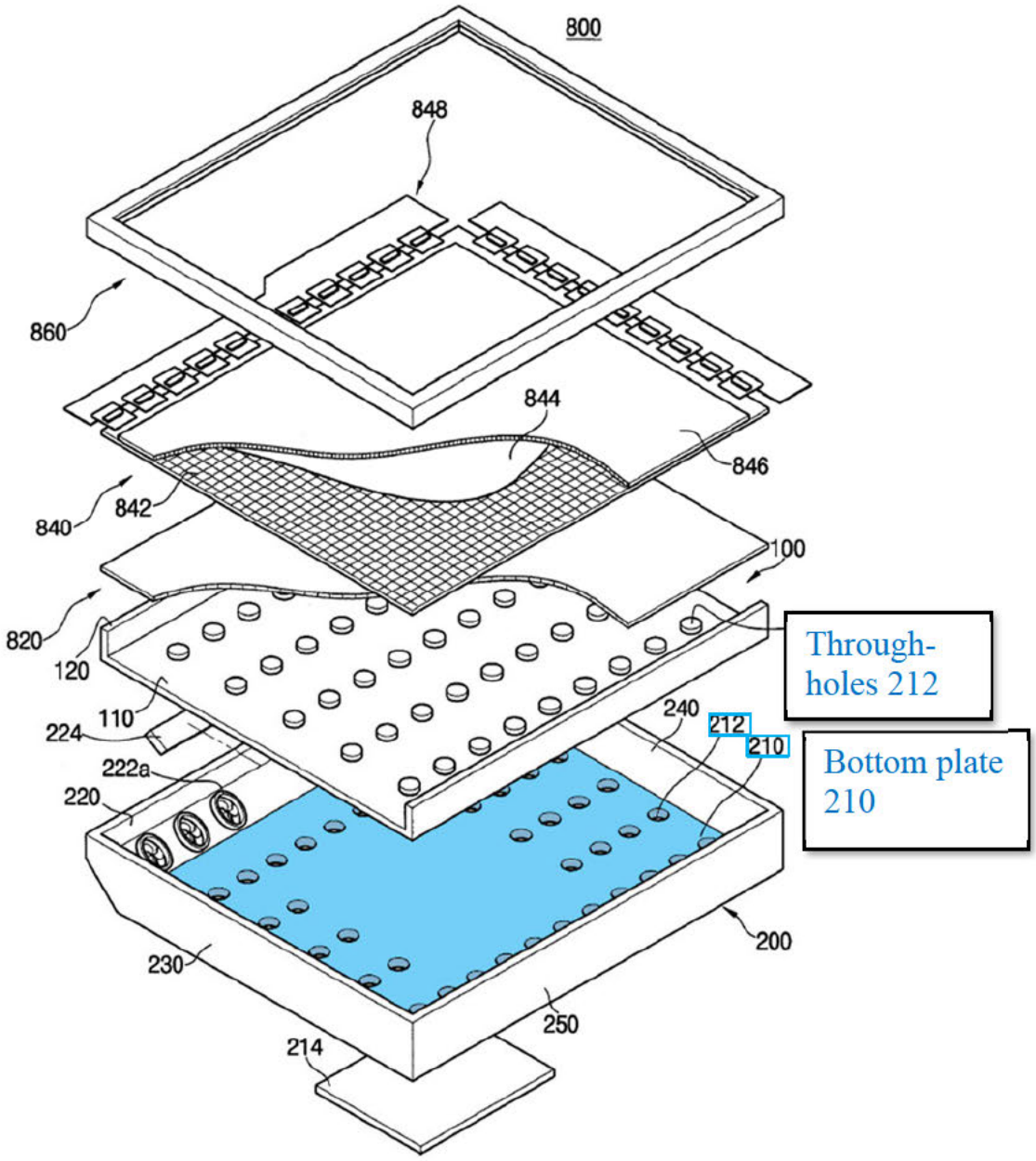

Backlight unit 500
500
Areal light source device 100
120
100
110
130
140
LEDs 140
Through-holes 212
222a
224
220
240
212
210
Bottom plate 210
200
230
250
214

Na's Fig. 3 (reproduced and annotated to the right) "is a side view for explaining a cooling process of the backlight unit of FIG. 1." Ex. 1010, 5. "[L]ow-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" to cool the inside of backlight unit 500. *Id*.



Na's Fig. 13 "is an exploded perspective view illustrating a liquid crystal display device having the backlight unit of FIG. 1" wherein "liquid crystal display device 800 includes a backlight unit 500" that "has the same structure and function as the backlight unit shown in FIG. 1." Ex. 1010, 8. An annotated version of Fig. 13 has been reproduced below with bottom plate 210 of backlight unit 500 highlighted blue consistent with Fig. 1 above to illustrate that the bottom plate 210 is both the rear-facing surface of the backlight assembly as well as the display assembly.

FIG. 13

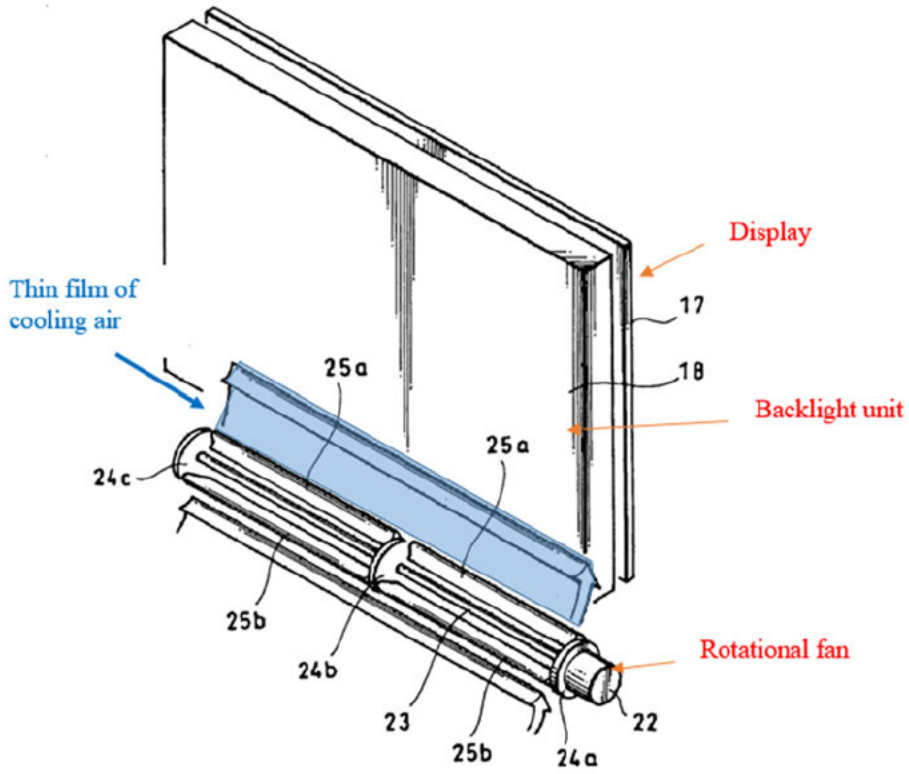


C. Kimura

Kimura, filed on November 11, 2005, discloses a unique cooling fan design for cooling a backlight unit that has high efficiency and less noise during

operation. Ex. 1004 (Kimura), Abstract. The single fan uses a rotational shaft with at least two vanes that have parallel shafts rotating together that generate air flow perpendicular to the shaft. *Id.*, [0012], [0045]. The stated goal of the invention is to create quieter operation for use in home television applications. *Id*. [0003].

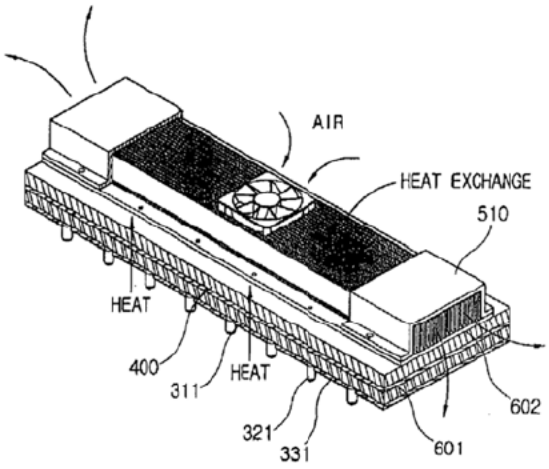
Kimura's design is shown below. Kimura, Fig. 10 (annotated). Kimura teaches that—unlike other fans that "generate airflows in all directions of the rotating surfaces" (*id.*, [0010])—the action of its fan "can generate an air flow in one direction perpendicular to a rotational shaft 1." *Id.*, [0045]. Kimura describes the generated airflow of its invention as a "fine wind in the form of a film." *Id.*, [0024]. Kimura's Fig. 10 illustrates "how the backlight of a liquid crystal display panel is cooled" using this thin film of air. *Id.*, [0077]. Kimura further teaches that the "mechanism that controls the angles of the veins" is the "means for realizing the concept." *Id.,* [0056].



D. 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*.

Figure 5 is a partially-cut-away perspective view of a cooling apparatus described in Cho placed behind a liquid crystal display device 1. Ex. 1006, ¶ 24.



Heat generated during operation of the LCD is conducted to heat sink 530, which includes fins 532. Ex. 2006, ¶ 53. The operation of cooling fan 520 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. Ex. 1006, ¶ 56. Fins 532 are disposed within (and parallel to) the air flow path. Ex. 2006, ¶ 53.

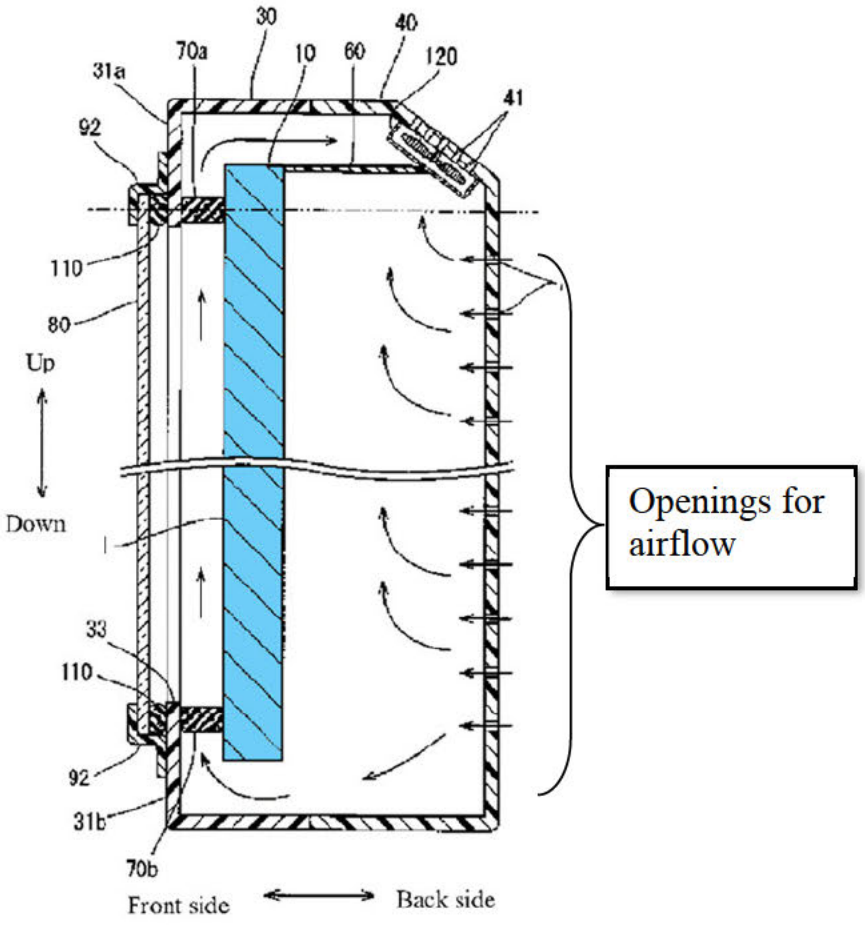
E. Hong

Hong is entitled, "Liquid Crystal Display Device," and was filed Dec. 13, 2006. Hong discloses an LCD including a backlight assembly with a heat sink disposed on the bottom case to irradiate heat out of the LCD. Ex. 1029 (Hong), Abstract. The Hong backlight and cooling system rely on conductivity to move heat from the backlight to a heat sink, which is cooled by passive convection (i.e., without fans). Ex. 1029, [0037]. Hong teaches that to increase heat conduction to the rear case, a metal core PCB ("MCPCB") may be used. Ex. 1029, [0038].

F. Tachikawa

Tachikawa is entitled, "Plasma Television and Image Display Device." Tachikawa teaches a cooling system for Plasma TVs that incorporates an optical filter in front of the panel, which creates an air space for cooling the front of the display. Consistent with conventional display cooling systems at the time of the invention, Tachikawa teaches the display should be placed within a large cabinet with a multitude of openings for air flow as shown in Tachikawa's Fig. 2 (annotated) below where the display 10 has been highlighted blue.

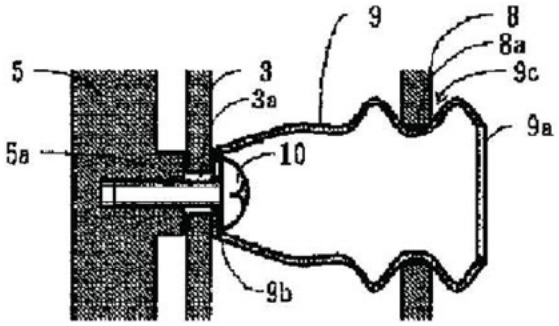
(FIG. 2)



G. Takahashi

Takahashi is entitled, "Heat dissipation structure for electronics," and was filed Aug. 20, 1997. Takahashi teaches a heat dissipation structure for electronic equipment such as a plasma panel that can prevent air leakage in a through hole. Takahashi, Abstract. The air leak prevention part 9 consists of a hollow body having an open end 9a and an insertion hole 9b as shown in Fig. 2 (right). Takahashi, Abstract.

【Figure 2】



H. Kochiyama

Kochiyama teaches "video display device using a plasma display panel" or PDP. Ex. 1028 at ¶ (0001). Kochiyama address that the "critical problem" of "temperature differences of the PDP … which are the cause of …deformation of the PDP." *Id.*, ¶ (0003). Kochiyama teaches the "method of fixing the circuit board 3 to the chassis 2 is to fix the circuit board with screws 6 through a chassis support 5, for example, so that there is a gap 4 between the chassis 2 and the board body 3a." *Id.*, ¶ (0019).

V. None of the Kim Grounds Renders the Challenged Claims Unpatentable

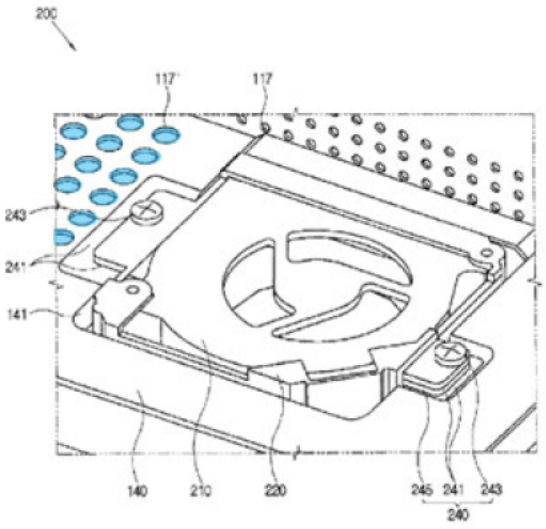
A. Claims 1-5, 7, 8:

1. Ground 1: Kim in Combination with Hong Does Not Render Obvious Claims 4 or 7

The proposed combination of Kim and Hong fails to teach or suggest a "constricted convection plate." Further, even were all the elements disclosed, the Petition fails to show a motivation to combine Kim and Hong to achieve the claimed invention.

a. Kim's Porous Shield Cover 140 Is Not a Constricted Convection Plate

Petitioner contends that Kim's "shield cover 140" is a constricted convection plate. However, a plurality of slits 117' are included throughout the periphery of the shield cover 140 to allow air to freely flow from the fan outward on all sides through slits 117 in the rear cover 115. Ex. 1005 (Kim), 4:58-61. These air slits 117' can be seen in FIG. 4 (reproduced to the right, with air slits 117' highlighted blue). Fig. 2 (below) confirms the distribution of air slits 117' (highlighted green) throughout shield cover 140.

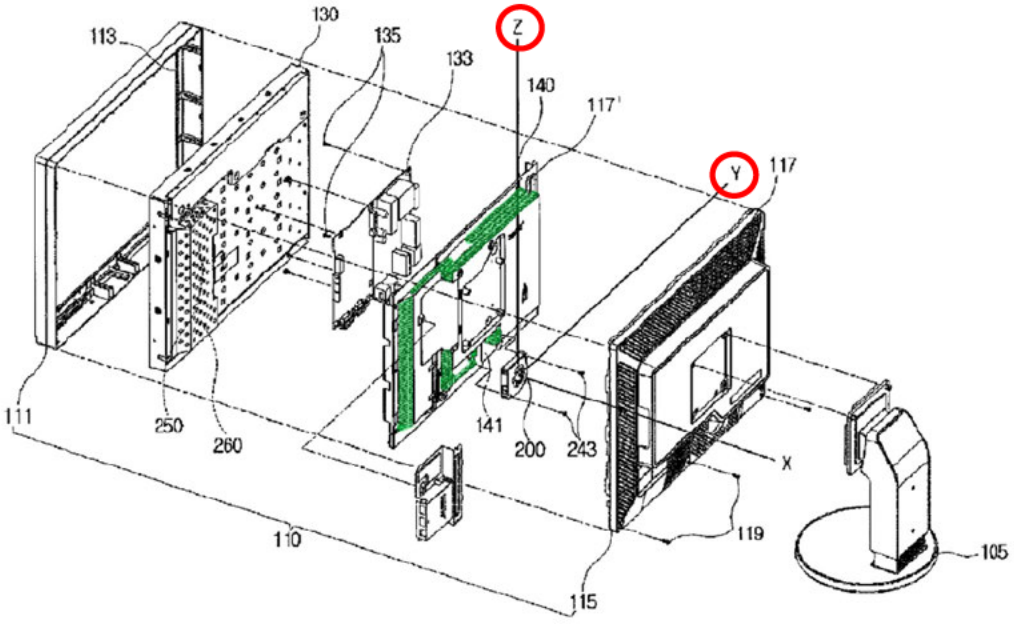


As explained in Section III.C.3 supra, the '322 patent teaches the constricted convection plate is used to form a constricted convection channel that removes heat from the posterior display surface/posterior surface. *See e.g.*, Ex. 1001, 5:37-39 ("[t]he constricted convection plate 30 and the display posterior 22 define a

constricted convection cooling channel 50 immediately behind the display posterior.")

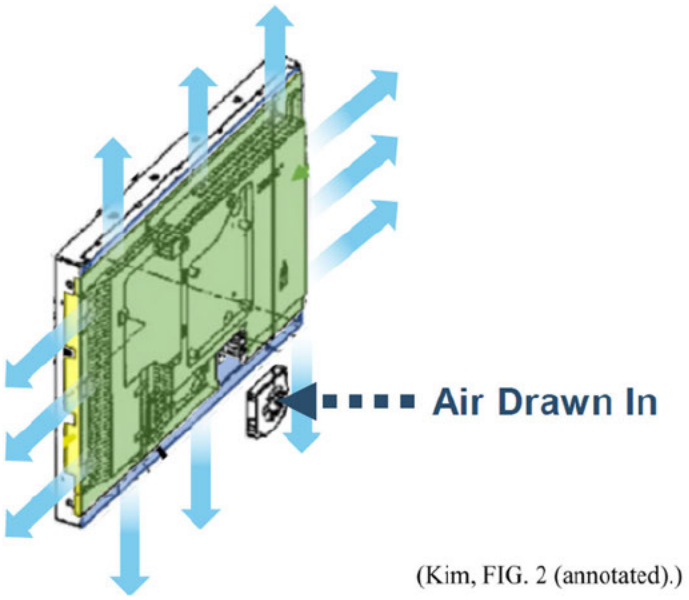
Kim's shield cover 140 does not form a constricted convection channel as required by claim 4 when properly construed. Ex. 2006, ¶¶ 60-65.

FIG. 2



Kim explains "[t]he air which flows through the heat generating parts is discharged to the outside (in a 'Y' or 'Z' direction shown in FIG. 2) through the plurality of air slits 117' of the shield cover 140 and the plurality of air slits 117 of the rear casing 115 so that heat generated from the heat generating parts is emitted." Kim, 7:57-62.

As illustrated by the modified Fig. 2 below where the exploded view diagram components have been placed together, the airflow is not directional through a channel. Rather, the cooling air flows through the air slits 117' throughout the shield cover 140 and through the corresponding air slits 117 on the top and sides of the rear casing.



(Kim, FIG. 2 (annotated).)

Mr. Smith-Gillespie admitted on cross-examination that in Kim the air will flow out of Kim's back plate in the directions shown above ("top," "bottom," "left," and "right"). Ex. 2013 (ITC Public Transcript), 1066:13-15, 1067:13-1068:9 (disputing only the scale of the arrows but not the directions).

A POSITA would understand "channel"—in the context of the '322 patent—indicates a narrow path for the directional flow of a fluid. Ex. 2006, ¶ 61.

This is consistent with the dictionary definition of "channel" as "a narrow gap or passage" or "a tubular passage or duct for liquid." Ex. 2016. While a POSITA would not understand the claimed "channel" to be "tubular," the word tubular's implication of barriers enclosing the cross-section of the fluid path in all 360 degrees is apt. Ex. 2016. A POSITA would understand that the constricted convection channel of the '322 patent would enclose the cross-section of the fluid path on all four consistent with the embodiments disclosed in the '322 patent and unlike what is disclosed in Kim. Ex. 2006, ¶ 61.

Because air exits Kim's shield covers in all four directions (top, bottom, left, and right), Kim's shield cover 140 is not "a plate configured to form part of a constricted convection channel." Ex. 2006, ¶¶ 65-66.

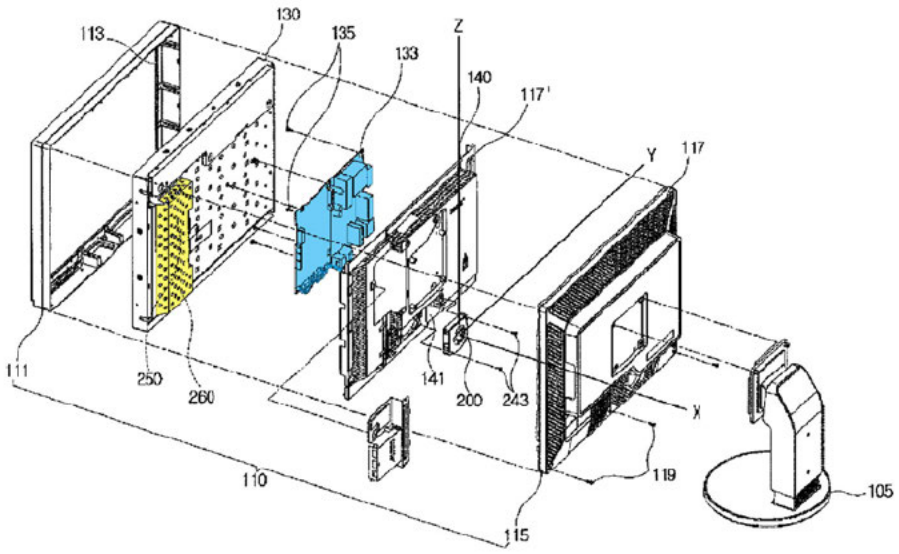
b. Kim Does Not Teach a "the Constricted Convection Plate is Substantially Parallel to the Posterior Display Surface"

Petitioner fails to establish that Kim teach or disclose claim 4's requirement that "the constricted convection plate is substantially parallel to the posterior display surface." The cross-section view in Kim's Fig. 5 appears to show shield cover 140 substantially parallel to the posterior display surface in one particular cross-section. However, this figure is not to scale and thus not representative of the proportions and relative dimensions of Kim's design. While it is well-established that patent figures can provide written description support for claim elements based

solely on, for example, their "relative dimensions," (*see e.g.*, Koito Mfg. Co., Ltd. v. Turn-Key-Tech, LLC, 381, F.3d 1142 (Fed. Cir. 2004), the law is just as clear that—in the context of invalidity—"arguments based on drawings not explicitly made to scale in issued patents are unavailing" where "the specification is completely silent on the issue" (*see Nystrom v. TREX Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 2005).

Here, the specification is silent as to whether shield cover 140 should be substantially parallel to the posterior surface of the backlight 130. Ex. 2006, ¶¶ 67-69. Moreover, Kim's more-detailed Fig. 2 shows shield cover 140 of Kim has substantial topology. *Id*. As also illustrated in Fig. 2 the posterior surface of Kim's backlight assembly 130 is not a flat surface but includes a portion (highlighted in yellow below) that juts out and further includes circuit board 133 (highlighted in blue below) with its own topology. Ex. 2006, ¶¶ 68-69.

FIG. 2



Accordingly, a POSITA would not understand Kim to teach or suggest the requirement that its shield cover 140 be substantially parallel to the posterior display surface of its backlight. Ex. 2006, ¶ 70.

c. There Is No Motivation to Combine Kim and Hong

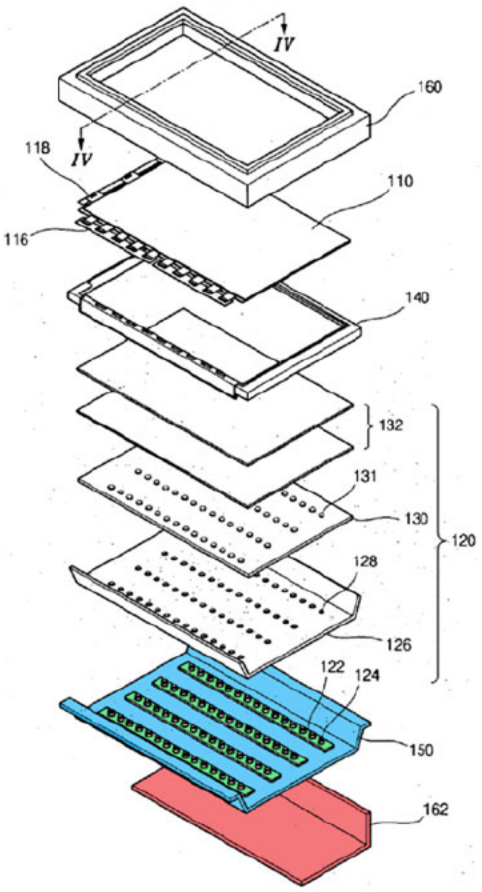
Petitioner asserts that "a POSITA as of March 3, 2008 would have been motivated to modify Kim's backlight unit to include Hong's PCB with multiple LEDs mounted to its front side." Paper 3, 39. The Petition asserts that the two references have "similarities" in their "backlight configurations" and "the POSITA would have recognized cost savings using Hong's LED and PCB arrangement." *Id*.

Hong, however, discloses a fan-less cooling system comprising heat sinks and other high-conductivity materials such as metal core PCBs to conduct heat away from the LEDs so that passive (i.e., no fans) convective cooling can be

effective. Hong, [0012].

Hong's design can be seen in more detail by examining Fig. 3, reproduced and annotated below. The LEDs 124 are mounted to base PCB strips 122, (colored green) which are in contact with the rear case 150 (blue) from which heat is removed by heat sink 162. Hong, [0029], [0031]. Because the heat transfer is strictly through conduction, the metal core PCB can "effectively absorb and transfer heat produced at the LED 124". *Id.*

FIG. 3



A POSITA would understand that Kim's computer monitor was designed for indoor applications and thus would not have required the kind of high-power LEDs for which Hong's metal core PCB would be desirable. Ex. 2006, ¶¶ 71-73. A POSITA would have known that metal core PCBs were more expensive than typical PCBs due to the additional metal layer. Ex. 2006, ¶ 71. While Hong shows that such metal core PCBs would be desirable to obtain a silent, passively cooled display with no fans, the claimed invention specifically requires fans, as does Kim. Ex. 2006, ¶ 73. Accordingly, a POSITA would not have been motivated to "modify Kim's backlight unit to include Hong's

PCB" as contended by the Petition because Hong's PCB would have been an unnecessary cost for Kim's monitor with no expected benefit.

Moreover, Petitioner ignores the simple incompatibility of Kim's cooling system design with metal core PCBs. Hong teaches heat sink 162 should be placed adjacent to PCB strips 122 and LEDs 124 to conduct heat away from the LEDs so that it can irradiated outside of the system, but that the "driving circuit is disposed on the liquid crystal display device at a position different from where the heat is accumulated and the heat sink is disposed." *See* Ex. 1006, [0015], [0038]-[0039]. In contrast, Kim teaches driving circuit 133 is one of the systems "heat generating parts" and should be screwed into the rear of the backlight 130 as shown in Figs. 2 and 5. *See* Ex. 1005, 4:39-45, 7:53-62. Because Kim's design places circuit board 133 flush against the rear surface of the backlight, a POSITA would understand that introducing a metal core PCB into Kim's design to *increase* conductive heat transfer between its light source 131 and circuit board 133 would cause the system to overheat. Ex. 2006, ¶ 109; *see also* Ex. 1005, 4:46-51. Because of this incompatibility, a POSITA would not have had a reasonable expectation of success in incorporating metal core PCBs into Kim's design. Ex. 2006, ¶ 74.

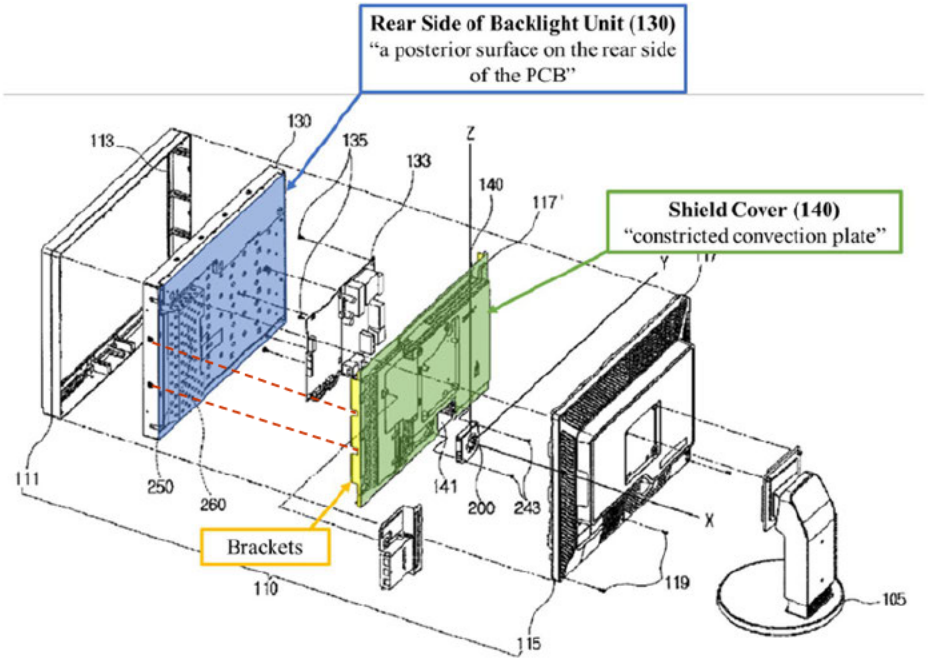
While PCBs like the one taught in Hong were indeed known at the time of the invention such that a POSITA *could* have modified Kim's backlight unit to include Hong's PCB, the Petition does not show a POSITA *would* have made this

modification. *Belden Inc. v. Berk-Tek LLC*, 805 F.3d 1064, 1073 (Fed. Cir. 2015) ("obviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.") (emphasis in original).

Petitioner thus fails to satisfy its burden of proving unpatentability by a preponderance of the evidence.

2. Ground 2: Kim in Combination with Hong and Tachikawa Does Not Render Obvious Claim 5

The Petition asserts Kim's shield cover 130 "is connected to the backlight unit 130 using brackets (colored yellow)" in the annotated figure from the Petition (at 44).



However, the alleged brackets in Kim's Fig. 5 connect to the *sides* of Kim's backlight 130 and *not* to its posterior surface as required by Claim 5. Ex. 2006, ¶ 76. Mr. Smith-Gillespie admitted on cross-examination that the two circles on the sides of backlight unit 130 line up with the two notches on the alleged brackets so that each can be "mated up with th[e] side of the backlight unit." Ex. 2013, 1058:12-24, 1059:14-20. This mating is indicated with the additional dashed red lines in the annotated Figure 5 above. Ex. 2006, ¶ 77. Mating these alleged brackets with the side of the backlight unit, ensures they do not impede airflow behind Kim's backlight unit 130. Ex. 2006, ¶ 77.

Nevertheless, Petitioner asserts a POSITA would have been motivated to modify Kim's design "with the brackets disclosed by Tachikawa to improve Kim's display serviceability and structural strength." Paper 3, 46. Petitioner asserts "a POSITA would have been inclined to look for alternative bracket options" due to the "effort required to access and separate the shield cover 140 from the backlight assembly 130 when servicing the backlight assembly or circuit board 133." Kim, however, does not disclose any serviceability or structural strength concerns relating to its design. Ex. 2006, ¶ 79. Indeed, a POSITA would understand that its Kim's design to be much more convenient and serviceable than that of Tachikawa. Ex. 2006, ¶¶ 78-79. Kim's rear casing 115 is combined with its front casing 111 by screws, snaps or hooks and is easily removed to expose the shield cover 140 and

display. Ex. 1005, 4:18-22. The shield cover 140 is then easily separated from backlight unit 130 with the removal of just four screws. Ex. 2006, ¶¶ 78-79. Tachikawa provides no teachings regarding improved serviceability. A POSITA would not have been motivated to modify Kim with Tachikawa's brackets. Ex. 2006, ¶ 79. The proposed modification is driven purely by hindsight.

3. Ground 3: Kim in Combination with Hong and Takahashi Does Not Render Obvious Claim 8

In Ground 3, Petitioner alleges claim 8 is obvious in view of Kim in combination with Hong and Takahashi, but the proposed combination fails to teach or suggest the claimed access apertures. Further, the Petition fails to show a motivation to combine Kim and Hong with Takahashi to achieve the claimed invention.

Petitioner proposes modifying "Kim's shield cover 140 … with through-holes like those disclosed by Takahashi to permit servicing of the LED driver circuit board and backlight." Paper 3, 51.

The petition does not explain how Kim, which already has numerous through-holes (i.e., air slits 117' in shield cover 140), would be modified to include "holes like those disclosed by Takahashi." Mr. Smith-Gillespie has testified that because "Kim already has a number of very small holes" a POSITA would have been motivated to "create a larger one and then seal it." Ex. 2013 (ITC Public

Transcript), 955:18-21. But the flow of air through Kim's "small holes" (air slits 117') are crucial to its cooling system design. *See* Kim, 7:57-62. Plugging Kim's air slits 117' would have destroyed the basic objective of Kim's air slits 117', so this is not a modification a POSITA would have made. Ex. 2006, ¶¶ 82-84.

In *Trivascular, Inc. v. Samuels*, 812 F. 3d 1056, 1068 (Fed. Cir. 2016) both the PTAB and Federal Circuit rejected the argument that it would have been obvious to substitute the "barbs" of one reference with the "protuberances" of another reference since the "proposed substitution would destroy the basic objective of the barbs, which is to *penetrate* surrounding tissue." *Id.*, 1068. Likewise, here, Petitioner proposes destroying the basic objective of Kim's air slits 117' (airflow) by replacing them with a plugged hole, per Takahashi, that prevents airflow. The only explanation for this is hindsight.

Moreover, access to the circuit board in Kim is accomplished conveniently by removing Kim's small shield cover (which attaches to the sides of the display module) thus rendering access apertures unnecessary. Ex. 2006, ¶ 79.

The Petition fails to show any motivation to combine to Kim and Hong with Takahashi.

4. Ground 4: Kim in Combination with Tachikawa Does Not Render Obvious Claims 1-3

In Ground 4, Petitioner asserts claim 1-3 is obvious in view of Kim in combination with Tachikawa, but as explained in Section V.A.1.a above, Kim does not disclose a "constricted convection plate" as required by each of claims 1-3. Further, as explained in Section V.A.1.b above, Kim does not disclose a constricted convection plate that is substantially parallel to the posterior display surface as required by claim 3. Furthermore, the Petition asserts Kim and Tachikawa would be combined "for the same reasons as discussed above with respect to the combination of Kim, Hong, and Tachikawa," but as explained in Section V.A.2 above, a POSITA would not have been motivated to modify Kim to use Tachikawa's brackets.

VI. None of the Na Grounds Renders the Challenged Claims Unpatentable

A. Claims 4, 7-13, 16:

1. Ground 5: Na Does Not Render Obvious Claims 4, 8, 9, 10, and 16

In Ground 5, Petitioner asserts claims 4, 8, 9, 10 and 16 are obvious in view of Na. Na, however, fails to teach or suggest a "constricted convection plate" as required by each of those claims.

a. Na does not teach or suggest a "constricted convection plate behind the posterior surface of the display"

Independent claim 9 requires "an electronic display" comprising "a posterior

surface" and "a constricted convection plate behind the posterior surface of the display."

The petition asserts that within Na "[t]he combination of the liquid display panel 840 and areal light source device 100 is an 'electronic display.'" Paper 3, 66 (citing Ex. 1002, ¶221). However, a POSITA would know that the "electronic display" of Na includes the backlight unit 500. This is expressly stated in Na: "FIG. 13 is an exploded perspective view illustrating a liquid crystal display device having the backlight unit of FIG. 1. Referring to FIG. 13, a liquid crystal display device 800 includes a backlight unit 500, a liquid crystal display panel 840, and a chassis 860." Ex. 1010, 8.

Na's FIGS. 1 (left) and 13 (right) are shown below for context with bottom plate 210 highlighted blue:

FIG. 1

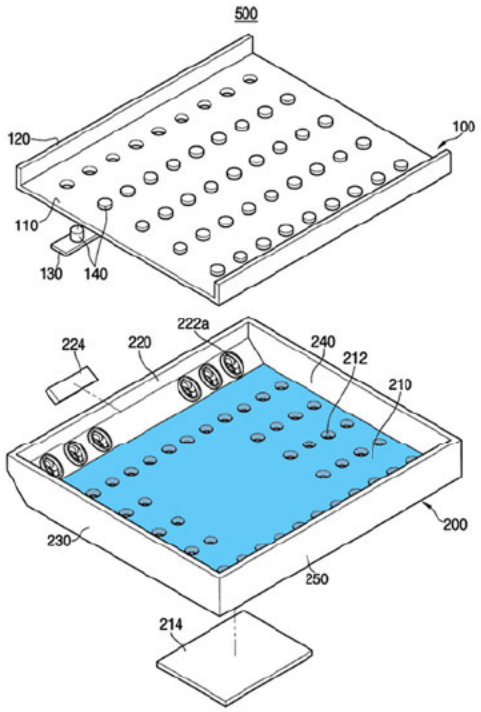
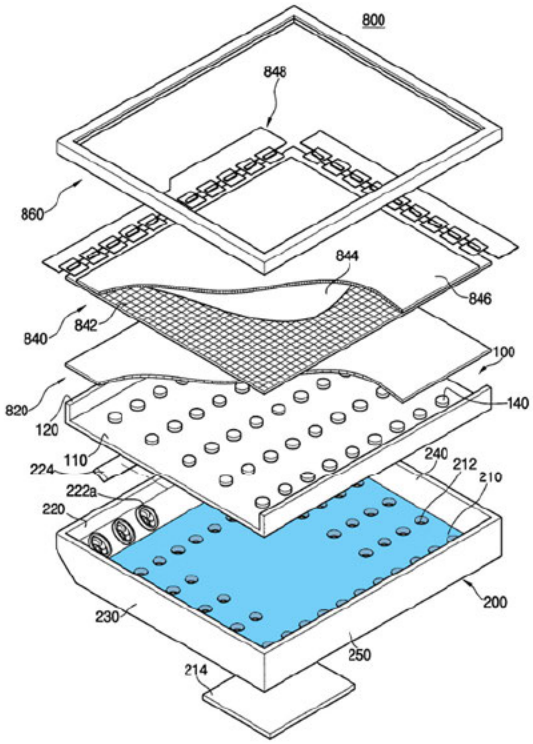
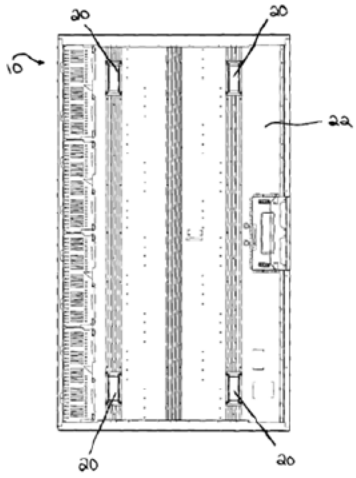
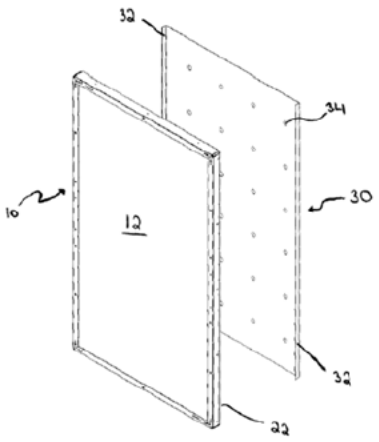


FIG. 13



The Petition asserts that "the bottom most surface of the areal light source device 100 corresponds to the claimed 'posterior surface of the electronic display.'" However, at the ITC, Petitioner explained that in Figures 2 and 4 of the '322 Patent, "the posterior display surface 22 is the rear-facing surface of the display 10" as shown below. Ex. 2009 (Samsung's ITC Markman Brief), 26.





In fact, Petitioner argued that based on the specification, prosecution history and claims "the 'posterior display surface' could not be anything other than ***the*** rear-facing surface of the display assembly." Ex. 2009, 27 (emphasis added). Despite Patent Owner's opposition, the ITC agreed with and adopted Patent Owner's proposed construction of this term.

The ITC Markman Order explained that "the ordinary meaning of the claim term is not readily apparent" and that "the specification refers to the claimed posterior surface in a specific way, which does not appear to be a mere application of commonly understood words." Ex. 2010, 41. Accordingly, the ITC adopted the construction of "posterior surface of the electronic display" as "rear-facing surface of the display assembly" in order to "reflect the examples given in the specification while recognizing that they are not definitional." *Id.*, 42. Every example of a

posterior surface of the electronic display in the specification is the most posterior portion on the outside of a display module. Ex. 2006, ¶ 89.

On this point, both parties' experts are in agreement. Both Petitioner and Patent Owner have agreed that the terms "posterior display surface" from related U.S. Patent No. 8,854,595 and "posterior surface of the electronic display" should "be construed identically." *See* Ex. 2009, 22, n. 3. Petitioner's expert, Mr. Smith-Gillespie, has testified that the "posterior display surface" comprises "the most posterior portion" of the display assembly. Tr. (Smith-Gillespie) 930:23-25. This is consistent with the specification which also describes the posterior display surface 22 (or "display posterior 22") as being on the outside of the display 10 and never inside of it. Ex. 2006, ¶ 89. A POSITA would not understand that the claimed "posterior surface of the electronic display" could be a surface within the interior of the backlight assembly under its plain meaning or the construction used in the Petition and the ITC. Ex. 2006, ¶ 89. Rather, a POSITA would understand that the "posterior surface of the electronic display" of Na is the bottom plate 210 of the storage container 200 of Na's backlight assembly 500 of Na's liquid crystal display device 800. Ex. 2006, ¶¶ 90-91.

Na explains that "components directly performing a cooling function are formed in the storage container of the backlight unit. Thus, the thickness and weight of the backlight unit are reduced." Na, p. 8. This teaches away from the

claimed cooling system of the '322 patent where the fans and other components performing a cooling function are formed outside of the backlight unit.

Because the Petition misidentifies "areal light source device 100" rather than bottom plate 210 as the claimed "posterior surface of the electronic display," it then goes on to misidentify bottom plate 210 as a "constricted convection plate" behind Na's internal reflective plate 110. Ex. 2006, ¶¶ 90-92. There is, however, no teaching or suggestion in Na of any "constricted convection plate" placed posterior to the actual posterior display surface: bottom plate 210.

b. Petitioner's Misidentification of Na's Posterior Surface is Particularly Egregious for Claim 16

Claim 16 expressly requires "the electronic display comprises an LED backlight LCD display where the posterior surface is the rear surface of a backlight assembly." Petitioner, however, does not identify the rear surface of Na's backlight assembly 500 (i.e., bottom plate 210) but disingenuously maintain that "the 'posterior surface' of the 'electronic display' is the backside surface of areal light source 100, which is the rear surface of the backlight assembly'" based solely on the testimony of Mr. Smith-Gillespie. *See* Petition, 71. The Board "must disregard the testimony of an expert that is plainly inconsistent with the record." *Homeland Housewares, LLC v. Whirlpool Corp.*, 865 F. 3d 1372, 1378 (Fed. Cir. 2017). As explained above, Na is clear that bottom plate 210 is the rear surface of backlight

assembly 500. Ex. 1010, 4, Figs. 1-3, 13; Ex. 2006, ¶ 91. A POSITA would understand that the "backside surface of areal light source 100" is an internal structure within backlight assembly 500. Ex. 2006, ¶¶ 90-91. Petitioner's attempt to misconstrue Na and the '322 patent should be rejected.

c. Na does not disclose "a posterior surface on the rear side of the PCB" or "a constricted convection plate placed behind … the posterior surface of the PCB"

Independent Claim 4 includes a similar but distinct recitation of a "posterior surface on the rear side of the PCB" and "a constricted convection plate placed behind the posterior surface of the PCB." Even though claim 4 requires a printed circuit board (PCB) "having front and back sides" and a "posterior surface on the rear side of the PCB," Mr. Smith-Gillespie fails to identify a distinct "posterior surface" on the rear side of the PCB distinct from the rear side of the PCB itself. Ex. 2006, ¶¶ 95-97.

"It is highly disfavored to construe terms in a way that renders them void, meaningless, or superfluous" as Petitioner proposes. *Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1288 (Fed. Cir. 2017). A POSITA would understand from the plain language of the claims that the "posterior surface" of claim 4 is distinct from "the rear side of the PCB" (which is another surface) and that the claimed "posterior surface" must be placed "on the rear side of the PCB" (i.e., behind the PCB and placed against it). Ex. 2006, ¶¶ 95-96.

The specification teaches "[t]he backlight assembly may comprise a printed circuit board (PCB) with a plurality of LEDs mounted to the anterior surface." Ex. 1001, 4:53-55. The specification further explains that "heat which is generated by the LEDs may be transferred to the posterior surface of the [] backlight assembly, and subsequently removed by air within the constricted convection channel." Ex. 1001, 4:57-60. In Na, however, heat is convectively removed directly from the driving substrates 130, which are directly exposed to convective air flow provided by fan 224 with no conduction to a separate posterior surface. *See* Ex. 1010 (Na), Fig. 3. Accordingly, Petitioner's identification of the "posterior surface on the rear side of the PCB" in Na as the "rear side of the PCB" itself is incorrect.

In essence, independent claim 4 includes independent claim 9's requirement of a "constricted convection plate placed behind … the posterior surface" of the electronic display along with the additional requirement that this "posterior surface" be placed against the rear side of an LED PCB. Ex. 2006, ¶¶ 95-96.

Mr. Smith-Gillespie recognizes the proper construction of this term in his discussion of Ground 1 when he identifies the posterior surface of backlight unit 130 of Kim as purportedly satisfying this limitation. Ex. 1002, ¶ 127.

Na's design differs, however, in that it includes an internal airflow within its backlight such that the limitations of claim 4 are not met.

d. Na Does Not Disclose A "Constricted Convection Plate"

Even assuming, arguendo, that the "posterior display surface" could be the internal surface of areal light source 100, Na still does not disclose "a constricted convection plate" when that term is properly construed because Na's bottom plate 210 is not "a plate configured to form part of a constricted convection channel." Thus, Na does not render obvious any of the challenged claims.

Na's bottom plate 210 of LED backlight 500 is covered with through-holes 212. *See* Fig. 1 (below, left). Rather than a channel, Na teaches a cooling chamber behind the backlight wherein air flows into the chamber via through holes 212 of the hole-covered bottom plate 210 of its housing, which "function as an intake unit through which external air is sucked." *See e.g.*, Na, Figs. 1-3, p. 4.

Because external air is sucked into Na's rear cooling chamber *through* bottom plate 210, bottom plate 210 is not a constricted convection plate that forms part of a constricted convection channel. Ex. 2006, ¶¶ 98-101. A POSITA would not understand airflow to be "constricted" by a porous plate with fifty large through-holes dispersed throughout it. Ex. 2006, ¶ 99-100. Na does not teach a "constricted convection plate;" it teaches away from one. Ex. 2006, ¶ 100.

e. Na Teaches Mounting Electronics to the Posterior Surface of Its Electronic Display

As explained above, the posterior surface of Na's electronic display is its

bottom plate 210. Na's driving circuit 214 is mounted to bottom plate 210. Ex. 1010, Figs. 1-3, 13; *see also id*., 4 ("The first driving circuit unit 214 is disposed on the bottom plate 210"). Accordingly, Na does not teach or suggest "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" as required by independent claim 9 and all of its dependent claims. Ex. 2006, ¶ 102.

2. Ground 6: Na in Combination with Kim Does Not Render Obvious Claims 7, 12, and 13

In Ground 6, Petitioner asserts claims 7, 12, and 13 are obvious in view of Na and Kim. The Petition relies on Na's teachings alone for satisfaction of the independent claims (4 and 9), and relies on Kim solely for the claimed housing. Paper 3, 71-72. Because Na fails to render obvious independent claims 4 and 9 as described above for Ground 5, Ground 6 likewise fails as to Claim 7, 12 and 13.

Further, Petitioner failed to show a motivation to combine Na and Kim.

The Petition asserts Na would require "an external housing using the teachings of Kim" because "[b]oth Na and Kim are concerned with efficient cooling of the posterior display surface of an LCD, and both references use cooling mechanisms employing fans, entrances and exits to a cooling channel." Paper 3, 72. But Petitioner fails to explain a relationship between Kim's external housing and the concern with "efficient cooling of the posterior surface of an LCD."

Moreover, Kim teaches air flow against the posterior surface of an LCD whereas Na teaches air flow *within* an LCD and thus Petitioner is mistaken about their similarities. Ex. 2006, ¶ 105.

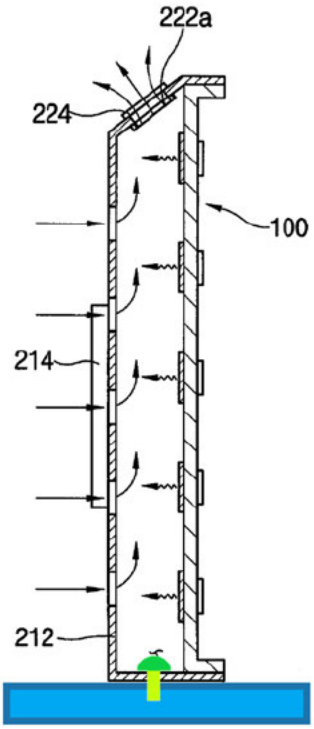
The Petition also asserts that "since Na's first and second driving circuits **214** and **224** are exposed to ambient air, it would have been obvious to add an external housing to protect them." Paper 3, 72. However, even if Kim's external housing were placed around Na, Na's first and second driving circuits 214 and 224 would still be exposed to ambient air. Ex. 2006, ¶ 104. Accordingly, the Petition failed to identify any *rational* underpinning for the proposed combination. Ex. 2006, ¶ 106.

3. Ground 7: Na in Combination with Tachikawa Does Not Render Obvious Claim 11

The Petition asserts a "POSITA would have been motivated to combine Na with the brackets disclosed by Tachikawa to improve Na's display stability." Paper 3, 77. The Petition explains "[w]hile Na discloses that 'the areal light source device **100** is easily coupled to the storage container **200**,' (Ex. 1010, p.4), Na does not disclose how its LCD is mounted for use." *Id*. Mr. Smith-Gillespie opines that "a POSITA would have been motivated to add a stand to Na's device to support it for its intended use." Ex. 1003, ¶ 258.

The modified version of Na's Fig. 13 (right) depicts a blue stand coupled to Na's backlight using a green attachment means. Notably, no "bracket" which "connects the posterior surface with the constricted convection plate" is required. Thus, the POSITA's alleged motivation does not result in the claimed invention.

FIG. 3



Nevertheless, the Petition and Mr. Smith-Gillespie summarily posit that "a POSITA would have envisioned, based on the teachings from Tachikawa, that the rear side surface of area light source **100** would be fitted with brackets via a set of attachments to bottom surface **210** and an installation surface." Paper 3, 78; Ex. 1002, ¶ 259. Tachikawa, however, provides no disclosure for placing brackets *within* a backlight as the Petition proposes for Na's backlight 500. Ex. 2006, ¶¶ 107-109. Nor does this proposal make any sense as placing Tachikawa's brackets within Na's backlight 500 to connect the rear side surface of areal light source 100 to bottom plate would cause the brackets to connect to Na's exposed driving substrates 130 without improving Na's stability. Ex. 2006, ¶ 108. Moreover, light sources within a backlight are not designed to be structural components that can support the weight of the entire display.

Once again, Petitioner's proposed modification is not one a POSITA would have made. Ex. 2006, ¶¶ 107-109. Rather, the proposal is driven entirely by a hindsight effort to reconstruct the claim limitations from inapposite prior art references.

VII. None of the Kimura Grounds Renders the Challenged Claims Unpatentable

A. Claims 1-5, 7-9, 12-13, 16:

1. Ground 8: Kimura Does Not Render Obvious Claims 9, 12, 13, and 16

In Ground 8, Petitioner asserts claims 9, 12, 13 and 16 are obvious in view of Kimura. Kimura, however, fails to teach or suggest a "constricted convection plate," "a constricted convection plate … covering a majority of the posterior display surface," or the claimed "means for forcing air between the constricted convection plate and the posterior surface of the electronic display."

a. Kimura does not teach a constricted convection plate

Claims 9, 12 and 13 of the '322 patent require a "constricted convection plate" which is not taught or suggested by Kimura. Petitioner contends *driving circuit* 19 of Kimura is a constricted convection plate. However, the single mention of driving circuit 19 in Kimura states, in whole, "[a] driving circuit 19 for the flat panel display is disposed behind the backlight unit 18." Kimura, [0078]. Kimura is otherwise silent as to driving circuit 19; there is no other disclosure of this circuit's

composition or configuration. Ex. 2006, ¶ 110. Nevertheless, Petitioner's expert, Mr. Smith-Gillespie, interprets Kimura's Fig. 9 (a side view of a cross section of the display) as teaching that driving circuit 19 is a constricted convection plate because the arrows go between the driving circuit 19 and the back of the backlight unit (i.e., so that the driving circuit 19 is exposed to the flow of cooling air). Mr. Smith-Gillespie is grossly misinterpreting Fig. 9 in an effort to find the elements of claim 9 within the prior art.

A POSITA would understand from Kimura's full description, claims, and Fig. 10 that driving circuit 19 is irrelevant to the thin, unidirectional film of air blown onto the flat panel display by Kimura's fan. Ex. 2006, ¶¶ 111-112. Indeed, Kimura's claimed invention focuses entirely on the fan's ability to create "a wind in a single direction perpendicular to the rotational shaft is generated by rotation of the fan rotator" (id., claim 1), and blow "a film of air onto the flat panel display" (*id*., claim 7) by utilizing "vane angle control means" without mention of the driving circuit 19 playing any role in this result whatsoever. Ex. 1004, claim 1 and 7; Ex. 2006, ¶¶ 111-112, 114. Fig. 10 illustrates the same without showing any involvement of driving circuit 19. Ex. 1004, Fig. 10. A POSITA would thus not believe Mr. Smith-Gillespie's contention that Kimura teaches "Kimura's driving circuit 19 doubles as a 'constricted convection plate' that confines the air-flow within the space formed between the driving circuit 19 and the rear surface of the

backlight unit 18." Ex. 1002, ¶ 273.

The plain and ordinary meaning of "plate" implies a sheet of metal or other sturdy material used to strengthen a device. *See* Ex. 2016 (defining "plate" as "a thin, flat sheet or strip of metal or other material, typically one used to join or strengthen things or forming part of a machine.") A POSITA would never understand Kimura's driving circuit 19 (or a PCB, generally) to be a "plate." Ex. 2006, ¶ 110.

The Petition fails to show Kimura discloses the claimed constricted convection plate.

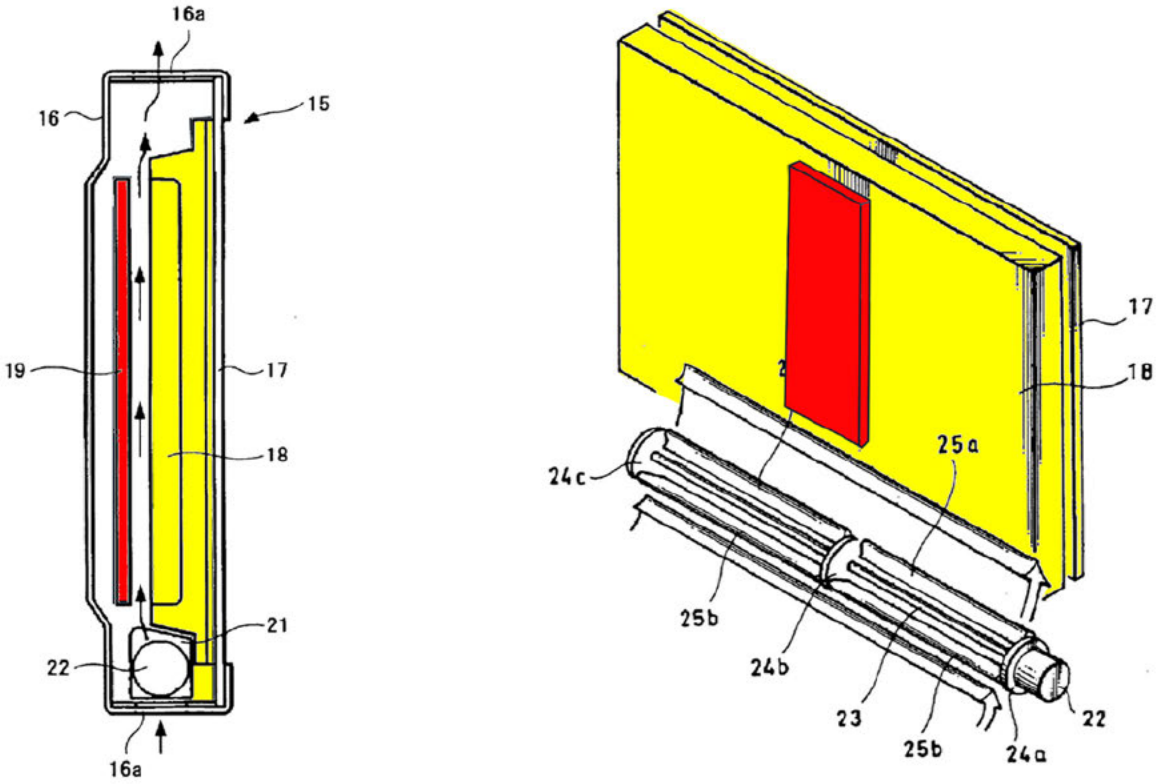
b. Kimura does not teach a constricted convection plate "covering a majority of the posterior display surface"

Claim 9 further requires "a constricted convection plate … covering a majority of the posterior display surface." This element is also not taught or suggested by Kimura. Once again, Mr. Smith-Gillespie attempts to extrapolate, solely from the cross-sectional diagram of Fig. 9, that the driving circuit 19 of Kimura *must* cover a majority of the posterior display surface because of its apparent height in the cross-section diagram and based on "[t]he length of cooling fan 20, which runs across the entire width of the LCD panel." Ex. 1002, ¶ 274.

Mr. Smith-Gillespie's conclusion is illogical and unsupported by any evidence. A POSITA would not understand there to be a connection between the

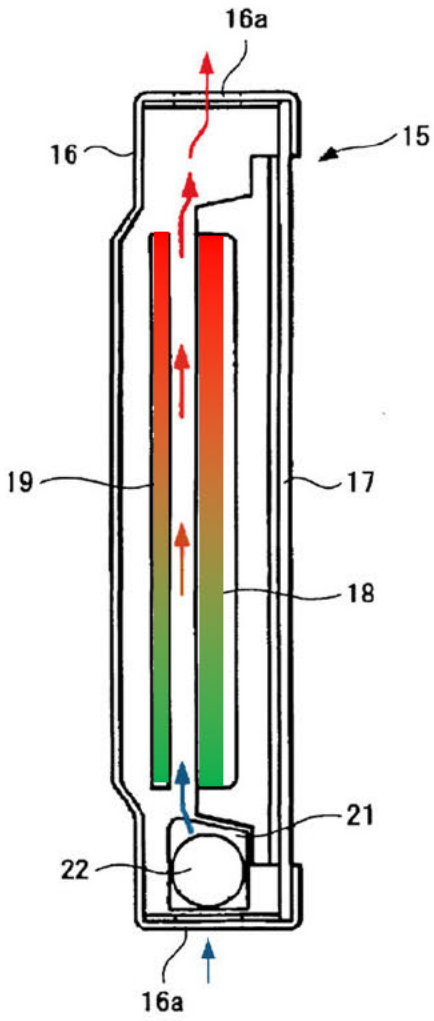
length of a display's fan and the size of its driving circuit. Ex. 2006, ¶¶ 114-115. Kimura discloses that air flows from its fan into the housing through a large opening (20mm x 700mm) and thus Mr. Smith-Gillespie's conclusion would require the PCB of Kim to be 700mm long (2.3 feet). Kimura, [0078]. As the field of invention of Kimura is "thin screen television," *Id*. [0003], [0005], a POSITA would know that the "driver circuit for the flat panel display" in flat panel televisions is much smaller in area than the area of the display. Ex. 2006, ¶ 115. Even Kim and Na, the two display monitor references Mr. Smith-Gillespie relies upon show their driving circuits cover far less than a majority of the rear-facing surface of the display. *See* Ex. 1010 (Na), Figs. 1-3 (elements 214, 224) and Ex. 1005 (Kim), Fig. 2 (element 133); Ex. 2006, ¶ 115.

Mr. Smith-Gillespie admitted on cross-examination that "Kimura doesn't tell us the size of the driving circuit." Ex. 2013 (ITC transcript), 1083:15-17. He also admitted that driving circuits much smaller than an LCD display were known to skilled artisans and that Kimura's driving circuit could be smaller than the backlight. Ex. 2013 (ITC transcript), 1086:17-20, 1087:1-4. This is shown in the annotated version of Kimura's Figs. 9 and 10 below, where a driving circuit 19 (red) consistent with Fig. 9 (left) has been added to Fig. 10 (right).



Recognizing the deficiency of Kimura, Mr. Smith-Gillespie posits that a POSITA would *increase* the size of the driving circuit to cover the entire backlight assembly in order to "optimize the display cooling capability." Smith-Gillespie Report, ¶274. A POSITA would not have understood that enlarging driving circuit 19 (which generates heat, and serves no purpose in the cooling system) would "optimize the display cooling capability" as Mr. Smith-Gillespie baldly contends. Ex. 2006, ¶ 114.

Kimura teaches 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." Kimura, [0078]. A POSITA would understand that enlarging the driving circuit and placing it close to the posterior display surface would have caused ***non***-uniform cooling of the backlight. Ex. 2006, ¶ 114. This is because the air between the driving circuit and posterior display surface would remove heat from *both* the posterior display surface and the driving circuit as it travels upwards. Ex. 2006, ¶ 114. The additional heat generated by driving circuit would significantly increase the temperature of the air behind the posterior display surface by the time it reaches the top of the backlight. Because air near the top of the backlight is hot, it will remove less heat from the top of the posterior display surface. Ex. 2006, ¶ 114. As a result, the top of the posterior display surface would be significantly hotter than the bottom due to the accumulation of heat from the over-sized driving circuit proposed by Mr. Smith-Gillespie. Ex. 2006, ¶ 114. Because Kimura teaches "backlight unit 18 is cooled



uniformly," Kimura, in fact, teaches away from use of a driving circuit that large. Thus, this is not a modification a POSITA would have made. Ex. 2006, ¶ 114.

Moreover, a POSITA would understand that Kimura's Fig. 9 is not drawn to scale. The Federal Circuit has explained that obviousness "arguments based on drawings not explicitly made to scale in issued patents are unavailing." *Nystrom v. TREX Co.*, 424 F.3d 1136, 1149 (Fed. Cir. 2005)(citing *Hockerson-Halberstadt, Inc. v. Avia Group Int'l, Inc.,* 222 F.3d 951, 956 (Fed. Cir. 2000) ("it is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.")). Thus, because Kimura is admittedly silent regarding the size of its driving circuit, Fig. 9 cannot be used to establish the dimensions of the driving circuit, let alone be combined with illogical expert conjecture to establish the existence of a driving circuit of ridiculous area.

c. Kimura does not teach the claimed "means for forcing air between the constricted convection plate and the posterior surface of the electronic display"

Claim 9 further requires "a means for forcing air between the constricted convection plate and the posterior surface of the electronic display." Mr. Smith-Gillespie has opined that "cooling fan 20 is equivalent to fan 52 of the '322 patent" because both fans are "positioned in identical locations with respect to the recited 'constricted convection plate' and the 'posterior surface of the electronic display'"

and because both fans "force air" between the . . . and (ii) both cooling fan 20 and fan 52 force air "between" … the "constricted convection plate" and "posterior surface of the electronic display" as indicated in Fig. 9 of Kimura and Fig. 5C of the '322 patent. Ex. 1002, ¶ 279. A POSITA would not understand this to be true. Ex. 2006, ¶¶ 117-118. Fig. 5C of the '322 patent shows the means for forcing air is placed so that air exiting the fan can *only* go between the constricted convection plate and posterior surface of the electronic display. Fig. 9 of Kimura, in contrast, shows there is a gap between fan 22 (which is itself unlike any fan structure disclosed in the '322 Patent) and driving circuit 19 such that air could flow around it on both sides if a traditional fan, like fan 52, were placed there. Indeed, Kimura disparages traditional fans like the ones used in the '322 patent, none of which include a "mechanism that controls the angles of the vanes" to achieve Kimura's unidirectional airflow. Kimura, [0004]-[0005], [0056].

Accordingly, if a POSITA believed—as Mr. Smith-Gillespie contends—that Kimura's driving circuit directs airflow in the manner needed to qualify it as the claimed constricted convection plate, then a POSITA would also understand from the bottom of Fig. 9 of Kimura, that air from fan 22 would be directed evenly into the spaces on either side of the driving circuit 19 and is not "forced" into the alleged constricted convection channel.

Thus, Kimura does not teach or suggest the function of the "forcing air

between the constricted convection plate and the posterior surface of the electronic display" or a structure for performing that function that is equivalent to any structure disclosed by the '322 patent.

d. Kimura does not teach "the means for forcing air . . . comprises a plurality of fans placed near the entrance aperture"

Claim 13 is dependent from claim 9 and further requires the "the means for forcing air . . . comprises a plurality of fans placed near the entrance aperture." Petitioner and its expert, Mr. Smith-Gillespie, claim that a POSITA would have misread Kimura's ¶ [0088] and Fig. 11 as disclosing *multiple* fans even though ¶ [0088] ("in the case of the cooling fan shown in FIG. 11, the vanes that have been divided into two are further divided into two by the support frames 35.") and Fig. 11 of Kimura expressly disclose a single fan with multiple vane sections as does ¶ [0090] ("the cooling fan" (singular)). Ex. 2006, ¶ 119. This is not a mistake a POSITA would have made. Ex. 2006, ¶ 119.

Kimura expressly teaches that its single fan overcomes problems in the art with using multiple fans like the means for forcing air described in the '322 patent. *Id*., ¶¶ [0003]-[0012]. In other words, Kimura teaches away from multiple fans. Ex. 2006, ¶ 119-120. Mr. Smith-Gillespie incorrectly identifies vane sections as "fans"; whereas a POSITA would understand the proper definition of a fan, which is consistent with Kimura, is a device with a series of vanes and a single motor. Ex.

2006, ¶ 119-120; Ex. 2017 at 3 (defining "fan" as "a device that consists of a series of vanes radiating from a hub rotated on its axle by a motor"). A POSITA would realize that adding a second fan, which includes its own motor, would create a gap in the air flow and ruin the "film" of air flowing towards the display and thus render Kimura inoperable for its intended purpose. Ex. 2006, ¶ 120. Accordingly, a POSITA would not have sought to modify Kimura to use multiple fans. Ex. 2006, ¶¶ 120-122.

2. Ground 9: Kimura in Combination with Kochiyama Does Not Render Obvious Claims 1-3 and 11

In Ground 9, Petitioner asserts claims 1-3 and 11 are obvious in view of Kimura in combination with Kochiyama. As explained for Ground 8, however, Kimura, however, fails to teach or suggest a "constricted convection plate" as required by claims 1-3 and 11. Ground 9 also does not render obvious dependent claim 11 for the same reasons described for Ground 8 as to independent claim 9. Additionally, Petitioner's arguments as to how Ground 9 renders obvious claim 11 contradicts its assertions at the ITC regarding the meaning of the claim limitation "no electronics are mounted to the posterior surface of the electronic display."

Finally, there is no motivation to combine Kimura and Kochiyama.

a. Kimura does not teach a "constricted convection plate"

Ground 9 relies on the same arguments as Ground 8 regarding Kimura's alleged teaching of a constricted convection plate. *See* Paper 3, 90. Thus, because Kimura does not teach a constricted convection plate—as explained above for Ground 8—the combination of Kimura and Kochiyama also does not teach one.

b. The Combination of Kimura and Kochiyama Does Not Teach "At Least One Bracket Which Connects The Posterior Surface With The Constricted Convection Plate"

The Petition relies on Kochiyama as teaching "at least one bracket which connects the posterior display surface with the constricted convection plate." Paper 3, 90. However, neither Kimura nor Kochiyama teach the use of a bracket to connect the posterior surface with a constricted convection plate. *See* Ex. 2006, ¶¶ 127-130. Rather, both Kimura and Kochiyama describe a driving circuit—with Kochiyama further explaining how the driving circuit is connected to the back of the display. It is undisputed that brackets were well-known in the art. But Ground 9 provides no relevant teachings regarding connecting a *constricted convection plate* and posterior surface with a bracket.

Moreover, a POSITA would not understand Kochiyama's screws to be a bracket. Ex. 2006, ¶ 124.

c. Petitioner's Arguments Regarding Claim 11 Are Inconsistent with Its Positions at the ITC

The Petition asserts that Kimura does not expressly disclose *how* the "'posterior display surface' is connected to the 'driving circuit **19**'", so "a POSITA would connect the two by 'adding the brackets disclosed by Kochiyama to improve Kimura's device without impacting airflow.'" Paper 3, 93.

At the ITC, Petitioner asserted "the '322 patent specification acknowledges that two components are mounted to each other even if mounting is accomplished with a bracket." Ex. 2022, 16. Petitioner further asserted "the plain meaning of the phrase 'mounted to' includes components that are indirectly mounted to the display surface using components like a bracket." *Id.*, 18.

Nevertheless, the Petition contends that in the combination of Kimura and Kochiyama—where driving circuit 19 (i.e., electronics) is connected to the posterior surface of the display by a bracket—"no electronics are mounted to the posterior surface of the electronic display." *See* Paper 3, 80-81, 90-91, 96.

Petitioner's befuddled positions appear to be the fruit of its expert's misidentification of Kimura's driving circuit as a constricted convection plate rather than the piece of heat generating electronics it is. Regardless, Petitioner cannot meet its burden to show claim 11 is unpatentable over Ground 9 in this proceeding due to its confused and inconsistent arguments.

d. The Petition Fails to Show a Reason for Combining Kimura and Kochiyama

The Petition asserts a POSITA "would have been motivated to improve Kimura's display by adding the brackets disclosed by Kochiyama to improve Kimura's device without impacting airflow." Paper 3, 93. A POSITA would not have been motivated to combine the teachings of Kochiyama with those of Kimura. Ex. 2006, ¶¶ 127-129. A POSITA would have understood that using brackets to connect Kimura's display circuit 19 to the posterior surface of the backlight would have interfered with the flow of Kimura's thin film of air over the backlight and would have attached Kimura's circuit to the rear housing from behind. Ex. 2006, ¶¶ 127-129.

A POSITA also would not have looked to Kochiyama for potential modifications to Kimura because Kochiyama addresses design issues with plasma display panels, and Kimura expressly teaches away from the known cooling solutions for plasma display panels. *See* Kimura, [0006]-[0009].

3. Ground 10: Kimura in Combination with Hong Does Not Render Obvious Claims 4 and 7

In Ground 10, Petitioner asserts claims 4 and 7 are obvious in view of Kimura and Hong, but the proposed combination fails to teach or suggest a "constricted convection plate" as described above for Grounds 8 and 9. Further, the

Petition fails to show a motivation to combine Kimura and Hong to achieve the claimed invention.

The Petition asserts "a POSITA would have been motivated to incorporate Hong's PCB into Kimura's LED backlight for the same reasons as discussed above with respect to the combination of Kim and Hong in Ground 1." Paper 3, 99. Patent Owner disagrees for the same reasons discussed above in Ground 1. Additionally, Petitioner asserts "Kimura's LEDs *need* to be mounted on a first side of a PCB within backlight unit **18**." *Id*. But Kimura is silent about the nature of its substrate and LED configuration and a POSITA would have been aware of other LED substrates than PCBs and other configurations than the one in Hong. Ex. 2006, ¶ 133. The Petition provides no reasoning for why a POSITA would have found Hong's backlight configuration suitable for Kimura. Ex. 2006, ¶ 131-134.

4. Ground 11: Kimura in Combination with Hong and Kochiyama Does Not Render Obvious Claim 5

In Ground 11, Petitioner asserts claim 5 is obvious in view of Kimura, Hong, and Kochiyama based on its arguments for Ground 9. Ground 11 fails for the same reasons described above for Grounds 9 and 10. Paper 3, 100.

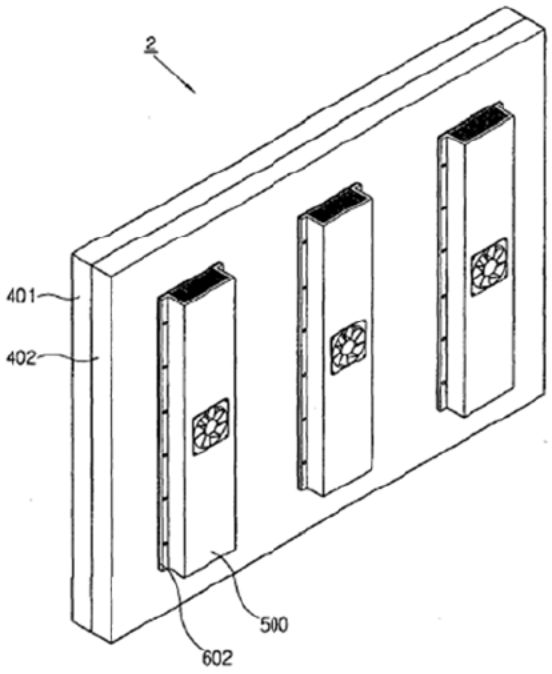
VIII. Cho Does Not Render the Challenged Claims Unpatentable

A. Ground 12: Cho Does Not Render Obvious Claims 4, 5, 9, 10, and 11:

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 the "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 (emphasis added). "[H]eat sink 530 comprises a heat transmission plate 531 disposed parallel to the upper plate 513" and "fins 532 connected to the heat transmission plate 531." *Id*., ¶ 51. Cho also teaches that "lower gap pad 602 is disposed between cooling apparatus 500 and lower chassis 402." *Id*., ¶ 43.

Therefore, Cho teaches away from the claimed constricted convection plate required by all challenged claims. Rather than teaching "a plate configured to form part of a constricted convection channel," Cho teaches a shell for a finned heat sink where the purported constricted convection plate is above a cavity that is filled *entirely* with the finned heat sink, thus substantially reducing the speed of the air flowing under the purported constricted convection plate and relying instead on the increased surface area of the fins for heat removal. Ex. 2006, ¶ 136. This conventional approach to cooling was described and rejected by the '322 Patent. *See* Ex. 1001, 2:8-11.

Additionally, Cho does not teach a constricted convection plate "covering a majority of the posterior display surface" as required by claim 9. As shown in Cho's Fig. 7A below, for additional cooling, Cho teaches multiplying the *quantity* of cooling systems rather than increasing their size. Ex. 1006 (Cho), [0043]; Ex. 2006, ¶ 139.



Additionally, Cho does not teach a constricted convection plate "at least one bracket which connects the posterior surface with the constricted convection plate" as required by claims 5 and 11. The Petition identifies the sides of cooling

apparatus 500 as "brackets" but they are merely portions of the formed metal casing of the cooling apparatus rather than separate brackets. Ex. 2006, ¶ 140.

IX. Mr. Smith-Gillespie's Testimony Deserves Little Weight

Mr. Smith-Gillespie's declaration largely parrots the Petition without any elaboration or supporting evidence. *See generally* Paper 3 and Ex. 1002. As such, Mr. Smith-Gillespie's testimony is due little weight. *Xerox Corp. v. Bytemark, Inc.,* IPR2022-00624, Paper 9, at 18 (PTAB Aug. 24, 2022) (precedential) (an expert declaration is entitled to little weight when it contains an exact restatement of the petition's arguments without any additional supporting evidence or reasoning).

X. Objective Evidence of Non-Obviousness

"The objective indicia analysis is . . . a fundamental part of the overall § 103 inquiry." *Liqwd, Inc*., 941 F.3d at 1137 (Fed. Cir. 2019) (citation omitted). It is an essential safeguard that protects against hindsight bias. *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Pat. Litig*., 676 F.3d at 1079.

Samsung asserts that the challenged claims would have been obvious in 2008, but the real-world evidence shows that, despite its expertise and enormous resources, Samsung was not able to develop a successful outdoor LCD display for over ***ten years*** and then achieved remarkable commercial success immediately after adopting MRI's innovative approach.

1. Samsung's Long Felt Need, Failure, and Copying

Around the early 2000s, larger LCDs of 32-inches and above began to appear in the market. Those larger display screens faced new thermal challenges, particularly when used in an outdoor environment. *See, e.g.*, Exs. 2025-2026, 2038, 2047. Samsung itself explains that companies had "wanted their messages outdoors" but "were challenged by a variety of issues during the early years." Ex. 2025, at 3, 6 (touting the benefits of digital outdoor displays); *see* Ex. 2026 (publication of white paper in 2015). "The biggest obstacle was heat—from inside and from the sun. Direct sunlight and its amplified heat could alter the properties of LCD crystals—the display layer of screens—and discolor or cause black blotches." Ex. 2025, at 3. Samsung admits that the harsh outdoor environment posed "***enormous engineering challenges***." Ex. 2025, at 2 (emphasis added).

Years of research efforts were undertaken by Samsung and others in the electronic display industry to address the enormous thermal challenge. Despite these efforts, Samsung failed to identify an effective solution. Samsung holds itself out as a "Leader in Innovation," with "$15.6B Invested in R&D" and as the "#2 Patent Holder in US." Ex. 2028, at 4 (Samsung marketing touting its "History of Success" manufacturing "top-of-the-line" displays and expertise in advancing the field of digital signage). Samsung is undoubtedly an industry leader, yet failed repeatedly in its effort to develop outdoor LCD displays. *See In re*

Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig., 676 F.3d 1063, 1081 (Fed. Cir. 2012).

Samsung began its outdoor LCD display development starting at least by 2005—three years before MRI's priority date—and filed numerous patent applications on thermal management systems between 2004 and 2008. Ex. 2029 (Sung Ki Kim Dep. Tr.), 45:22-46:11; Ex. 2033; Ex. 2034; Ex. 2035; Ex. 2036; Ex. 2037; *see* Ex. 2027 (Samsung's ITC listing of 13 pages of prior art). Despite its extensive R&D efforts at the time of MRI's invention, Samsung was not able to introduce an actual display product to the market. Ex. 2029 (Sung Ki Kim Dep. Tr.), 46:7-15.

Former Samsung engineer Sung Ki Kim testified that Samsung's first outdoor display was not launched until the 2010 to 2012 timeframe, and even then, Samsung resorted to using air-conditioning to provide cooling. Ex. 2029 (Sung Ki Kim Dep. Tr.), 46:16-47:22. Samsung continued to try to develop effective convective cooling systems and finally introduced its OHD product in 2013-2015. Ex. 2029 (Sung Ki Kim Dep. Tr.), 49:9-17. The OHD product also proved to be a failure because the "generated heat, was not being taken out well" resulting in a rise in temperature and [redacted] Ex. 2029 (Sung Ki Kim Dep. Tr.), 51:1-9. It was not until after a ***decade of failures*** between 2005 and 2015 that Samsung finally launched its OHF product line that MRI accused of

infringement in the co-pending ITC investigation. Ex. 2029 (Sung Ki Kim Dep. Tr.), 53:1-4.

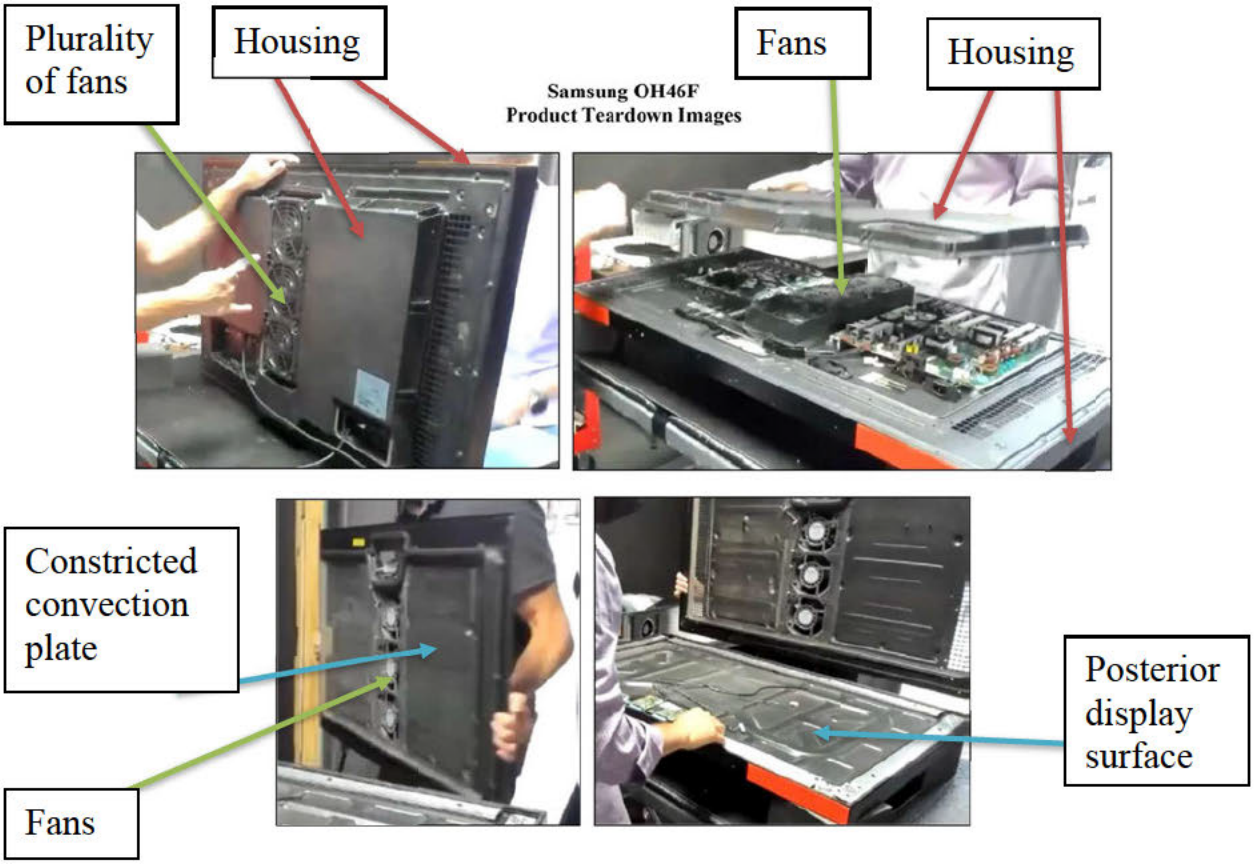
In a March 2017 presentation pitching its OHF product to its customer [redacted], Samsung explained the thermal design for an outdoor display was a [redacted] that required an [redacted] and that [redacted] Ex. 2038, at 11-12. Samsung detailed for [redacted]s the "[c]onventional" approach, which used fans and air filters to blow as much ambient air as possible through a display housing. Ex. 2038, at 13. Then Samsung provided schematic diagrams showing the infringing thermal management system of its new OHF products, including two constricted convection channels ("[redacted]") [redacted] for dissipating heat effectively. Ex. 2038, at 18-22.



The thermal management system Samsung pitched to [redacted] and implemented in its OHF product practices claims 9, 12, 13 and 16 of the '322 patent. Samsung's OHF product is sold in two sizes: 46-inch and 55-inch. Ex. 2021 (User Manual for OH46F | OH55F). The user manual confirms the OHF product includes an LCD panel (i.e., an electronic display) with a backlight. *See id.*, 120 (describing "LCD panel"), 67 (describing "[b]acklight").

Prior to filing its ITC Complaint, MRI tore down a Samsung OHF product to examine its cooling system and documented the teardown with photographs. *See* Ex. 2019, 265:13-24 (MRI's Michael Brown explaining that ITC exhibit CX-0280 includes those photographs); Ex. 2020 (ITC exhibit CX-0280).

As shown in the teardown photos below, the cooling system for the LCD panel in the Samsung OHF product utilizes a constricted convection plate covering a majority of the posterior display surface and meets all elements of claims 9, 12, 13, and 16 of the '322 patent. *Id*. at 2.



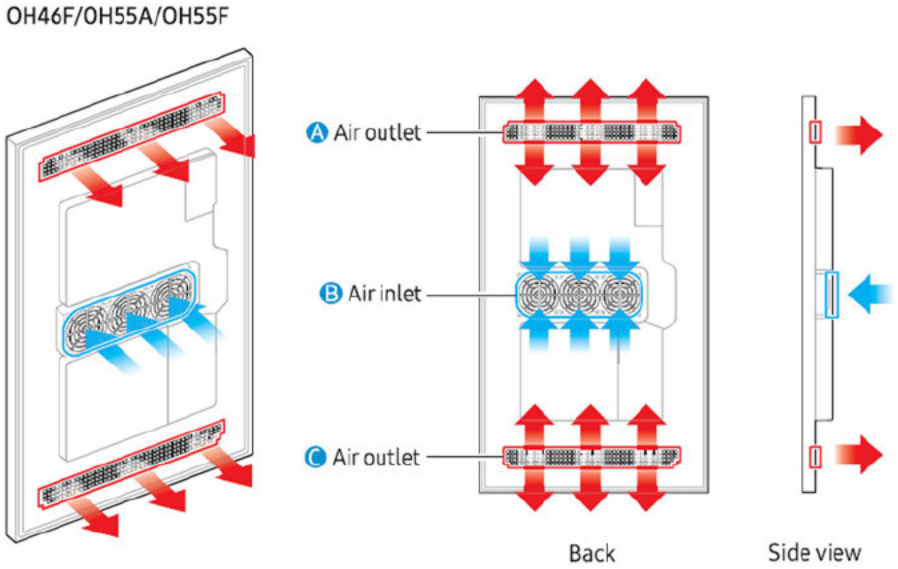
An outer housing—in the form of four side walls (top, bottom, left, and right) and a rear cover on the back—contains the LCD panel (electronic display) (9[pre]),[2] constricted convection plate (9[b]) and the plurality of fans (means for

[2] For convenience, Patent Owner adopts the short-hand for claim elements utilized in the Petition at pages 6-7.

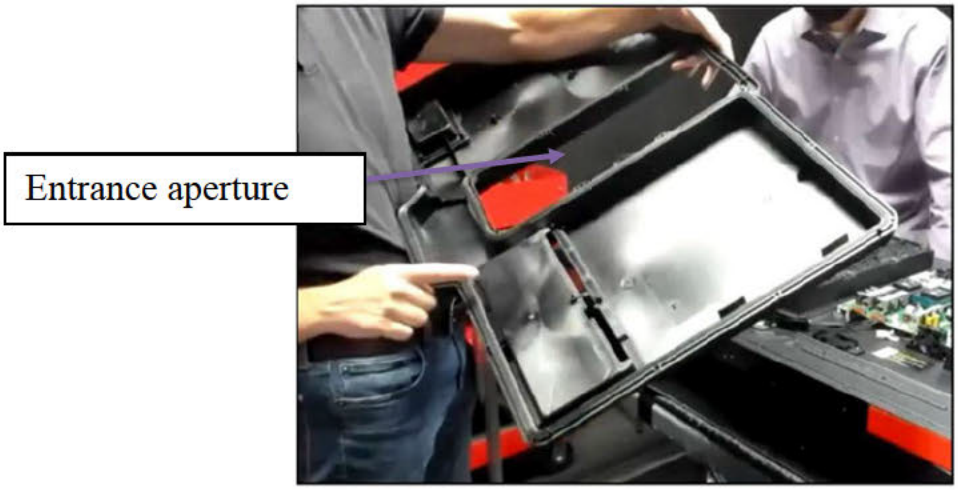
forcing air) (9[c]). The housing required by claim 12, and the plurality of fans required by claim 13 can be seen in the top two photos.

Per the annotations above, in the bottom two photos, removal of the large metal plate holding the plurality of fans reveals —on the other side of the fans—a narrow passage for ambient air within the product travelling between a constricted convection plate and the rear-facing surface of the LCD's backlight assembly (9[b], 9[c]).

Samsung's manuals confirm the three fans force air into the display through the constricted convection channel between the constricted convection plate and posterior surface (9[b], 9[c]) shown in the photos above. Ex. 2245 (Samsung Outdoor Installation Guide) ("The outdoor unit uses cooling fans to take in outside air to lower the internal temperature and discharge the hot air").



An additional teardown photo (below) shows that the rear cover portion of the housing includes an entrance aperture within it which permits external ambient air to enter the housing and flow between the constricted convection plate and the posterior surface (12[b]). *See* Ex. 2020, 2.



Another teardown photo (below) shows the electronic display has a front surface on which images can be displayed (9[a]). *See* Ex. 2020, 2.



Finally, the teardown photo below shows no electronics mounted to the posterior display surface. Although a T-CON board can be seen in the photo, it is

mounted to a bracket (like Kimura's driving circuit 19) rather than the posterior display surface (9[a]). *Id*.



Moreover, when assembled a series of side panels covered with a gasket to form a sealed area for the cooling air to flow against the backlight separates *the* posterior surface of the entire display assembly from a distinct posterior surface of the electronic display that forms part of the cooling channel. *See* Ex. 2020. No electronics are included in the constricted convection channel at all (mounted on a bracket or otherwise)—exactly as taught by the '322 patent.

Accordingly, Samsung's 46-inch and 55-inch OHF products practice claims 9, 12, 13, and 16 of the '322 patent, are coextensive with those claims, and there is a nexus between the secondary considerations evidence and MRI's claimed invention.

Revealingly, during its development of these copycat OHF products, Samsung performed extraordinarily detailed teardowns and analyses of [redacted] products. "[C]opying the claimed invention … is indicative of non-obviousness." *Windsurfing Int'l Inc. v. AMF, Inc.*, 782 F.2d 995, 1000 (Fed. Cir. 1986). A team of Samsung engineers obtained and tore down two of [redacted] products: a large format product and a mid-sized product. Exs. 2042, 2043; *see* Ex. 2030 (Sungsu Lee transcript), at 184:15-191:8; Ex. 2031 (Wunkil Lee transcript), 77:13-81:16 (discussing how Samsung disassembled [redacted] products and studied them in early [redacted]); Ex. 2029, 139:7-16; Ex. 2042 (analyzing, specifically, the [redacted] and [redacted] of the Samsung and [redacted] outdoor displays). Thereafter, Samsung released its new OHF products which infringe the challenged claims and can function outside and in full sunlight because of their cooling system. *See* Ex. 2038, at 13-22 (comparing the Samsung OH series thermal management system having a constricted [redacted] with conventional systems).





2. Post-Copying Commercial Success

Samsung's infringing OHF products (and subsequent OHA and OHB products) achieved the commercial success its earlier efforts could not. From 2015-2017, the years the predecessor OHD display was on the market, those OHD products generated [redacted] in U.S. sales in 2015; [redacted] in U.S. sales

in 2016, [redacted] in U.S. sales in 2017; and [redacted] in [redacted] in 2018. Ex. 2040.

By contrast, sales of Samsung's commercial embodiments of the '322 patent resulted in immediate commercial success thus further demonstrating the nexus between the claimed invention practiced by the 46-inch and 55-inch OHF products and their commercial success. In contrast to the OHD products' [redacted] in U.S. sales over several years, the 55-inch OHF product achieved over [redacted] in U.S. sales in a single year. Ex. 2040. Federal Circuit precedent holds sales of this magnitude alone show commercial success. *See e.g.*, *J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1563, 1566, 1572, (Fed. Cir. 1997) (affirming a finding that "sales evidence…shows [strong commercial] success," where the "sales evidence" consisted solely of the patentee's "$17 million of sales from 1979 through 1984, and its $4 million of annual sales from 1985 through 1989.")

Upon adoption of the effective cooling system first developed by MRI—which was available to Samsung through a tear down of [redacted] technology and disclosures in patents named on the [redacted] label on the product Samsung tore down—Samsung's market share grew from [redacted] (before entering the outdoor display market) to [redacted] (in 2017 after launch of the Accused Products) to [redacted] (by 2020). Ex. 2041, at 29-30.

The fact that Samsung only developed its commercially successful designs after experiencing failures with other designs—despite extensive research efforts—and only after MRI's own successful product was in the market, is compelling real-world evidence that MRI's design was not obvious at the time.

3. Industry Praise and Willingness of Others to License the '322 Patent

But for the effective thermal management system invented by MRI, there would be no outdoor LCD market. Indeed, Samsung itself praised Bill Dunn for his "impressive and unique" innovations in outdoor display design and recognized that it was MRI that pioneered the outdoor display industry, which Samsung termed "a virgin space." Ex. 2001.

Other third parties have also recognized MRI's innovations by licensing the '322 Patent and paying royalties for use of the claimed inventions. Indeed, Samsung's primary competitor LG has acknowledged MRI's innovations by not only licensing MRI's patents but also has entering a joint venture with MRI for marketing MRI's products. Ex. 2049 (LG license); Ex. 2050 (LG-MRI joint venture agreement). Others in addition to LG have taken licenses. Ex. 2051 (Megatech); 2052 ( ). The willingness of others to license the patent is additional evidence that others in the industry appreciated the validity and value of MRI's '322 patent, thereby supporting the non-obviousness of the invention.

MRI's patented cooling technology is also a critical feature of Samsung's products that Samsung uses as a key selling point of its products in its marketing to its customers and without which the products would not work. Ex. 2038, at 99-102 (focusing on the thermal management system). John Palmer, who is a Samsung customer and integrator of Samsung OHF displays for end users, testified that Samsung's products were requested by customers (and believed by Palmer to be superior) because of their built-in cooling systems. Ex. 2032 (Palmer transcript), 118:6-119:8.

The foregoing real-world facts demonstrate the claimed inventions would not have been obvious in 2008. Despite the demand for outdoor displays, no one (including Samsung, despite having attempted to develop outdoor displays at least by 2005) was successful until Mr. Dunn conceived of his invention. Only after MRI's pioneering design and Samsung's failures with other designs, was Samsung ultimately able to achieve success (including [redacted] in sales and over [redacted] market share) by infringing.

XI. Conclusion

For at least the reasons set forth above, Petitioner fails to establish that any of claims 1-5, 7-13, or 16 are unpatentable.

Respectfully submitted,

Dated: September 26, 2023

By: */John C. Alemanni/*
John C. Alemanni
Reg. No. 47,384
Lead Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **PATENT OWNER'S RESPONSE** has been served electronically via email upon the following:

Sanjeet Dutta – sdutta@goodwinlaw.com
Douglas J. Kline – dkline@goodwinlaw.com
Srikanth Reedy – sreddy@goodwinlaw.com
Naomi L. Birbach – nbirbach@goodwinlaw.com

Dated: September 26, 2023

By: */s/ John C. Alemanni*
John C. Alemanni
Reg. No. 47,384
Lead Counsel for Patent Owner