

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

HISENSE USA CORPORATION,
Petitioner,

v.

BRIGHTPLUS VENTURES LLC,
Patent Owner.

IPR2023-01385
Patent 7,690,812 B2

Before STACEY G. WHITE, KEVIN C. TROCK, and JOHN D.
HAMANN, *Administrative Patent Judges*.

TROCK, *Administrative Patent Judge*.

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

I. INTRODUCTION

Hisense USA Corporation (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–7, 10–12, 14–21, and 23 (the “challenged claims”) of U.S. Patent No. 7,690,812 B2 (Ex. 1001, “the ’812 patent”). Brightplus Ventures LLC (“Patent Owner”) filed a Preliminary Response (Paper 6, “Prelim. Resp.”).

The Board has authority to determine whether to institute *inter partes* review. *See* 35 U.S.C. § 314; 37 C.F.R. § 42.4(a). Under 35 U.S.C. § 314(a), we may not authorize an *inter partes* review unless the information in the petition and the preliminary response “shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

For the reasons stated below, we determine that Petitioner has established a reasonable likelihood that it would prevail with respect to at least one claim of the ’812 patent. We therefore institute *inter partes* review as to all of the challenged claims of the ’812 patent and all of the asserted grounds of unpatentability in the Petition.

II. BACKGROUND

A. Related Matters

The parties identify the following district court proceedings involving the ’812 patent: *Hisense USA Corp. v. Brightplus Ventures LLC*, 1:22-cv-02774 (N.D. Ga.) (the “Underlying Litigation”). Pet. 1; Paper 4, 1.

Patent Owner also identifies terminated district court proceedings *Brightplus Ventures LLC v. LG Electronics, Inc. et al.*, 2-22-cv-00170 (E.D. Tex.), and *Brightplus Ventures LLC v. TCL Electronics Holdings Ltd. f/k/a*

TCL Multimedia Technology Holdings, Ltd. et al., 2-22-cv-00194 (E.D. Tex.). Paper 4, 1.

Petitioner also identifies USPTO proceeding IPR2023-01168 involving U.S. 9,605,835 (asserted in the Underlying Litigation), and USPTO proceeding IPR2023-01311 involving U.S. 8,177,382 (also asserted in the Underlying Litigation). Pet. 2.

B. Real Parties-in-Interest

Petitioner identifies Hisense USA Corporation as the real party-in-interest. Pet. 1. Petitioner also notes that “[o]ther privies or real parties in interest” include “companies within the Hisense Group, including Hisense International (Hong Kong) America Investment Co., Ltd.; Hisense Group Holdings Co., Ltd.; Hisense Visual Technology Co., Ltd.; Hisense International (Hong Kong) America Investment Co., Ltd.; Hisense International (HK) Co., Ltd.; Hisense International Co., Ltd.; TVS REGZA Corporation.” *Id.*

Patent Owner identifies Brightplus Ventures LLC, as the real party-in-interest. Paper 4, 1.

Based on the current record, we determine that Petitioner has established compliance with the statutory requirement under 35 U.S.C. § 312(a)(2) to identify all real parties in interest.

C. The '812 Patent

The '812 patent is titled “Apparatus and Methods for Conformable Diffuse Reflectors for Solid State Lighting Devices.” Ex. 1001, code (54). The patent “relates to solid state lighting, and more particularly to tiles and/or panels including solid state lighting components.” *Id.* at 1:7–9. The '812 patent addresses a problem associated with backlighting units that

“commonly rely on an arrangement of cold cathode fluorescent lamps (CCFL’s) within a reflective enclosure.” *Id.* at 1:15–30. These CCFLs are arranged between a reflective surface and an LCD panel, and light from the CCFLs can be reflected from the reflective surface and partially reflected from the inside surface of the LCD panel. *Id.* The CCFLs also require higher signal level voltages. *Id.* The CCFLs thus “generate undesirable amounts of heat, which can be problematic to dissipate.” *Id.*

The invention of the ’812 patent includes a solid state lighting tile having (i) a substrate, (ii) a solid state lighting element mounted on a surface of the substrate, and (iii) a reflector sheet on the surface of the substrate, where the reflector sheet may be a diffuse reflector and/or may be composed of a porous polymer-based material. *Id.* at 1:34–43. The reflector sheet may be configured to conform to a shape of a protruding feature on the tile (e.g., to protrusions on the surface of the tile substrate), such that “recesses may not have to be created or formed in the reflector sheet during manufacturing.” *Id.* at 1:56–62, 8:20–25. The reflector sheet may also include an aperture configured to be positioned proximate to the solid state lighting element, with the reflector sheet not contacting the solid state lighting element. *Id.* at 1:59–62. Figure 2 of the ’812 patent (reproduced below) illustrates, in a top view, a solid state lighting panel including such solid state lighting tiles, and Figure 3 of the ’812 patent (reproduced below) is a side cross-sectional view of a solid state lighting bar. *Id.* at 2:48–52.

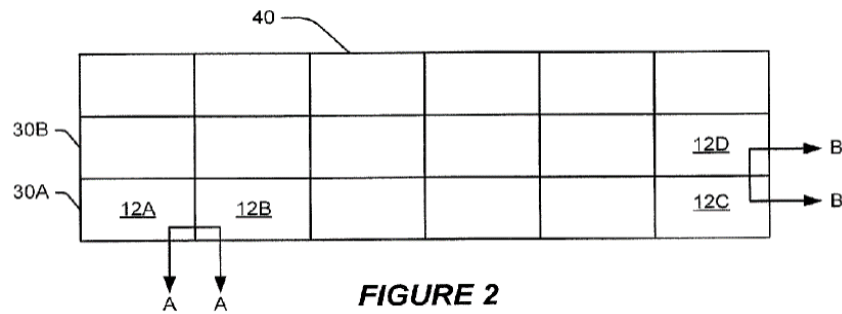


FIGURE 2

Figure 2 illustrates, in a top view, solid state lighting panel 40 including such solid state lighting tiles 12 A–D. *Id.* at 2:48–52, 4:46–51.

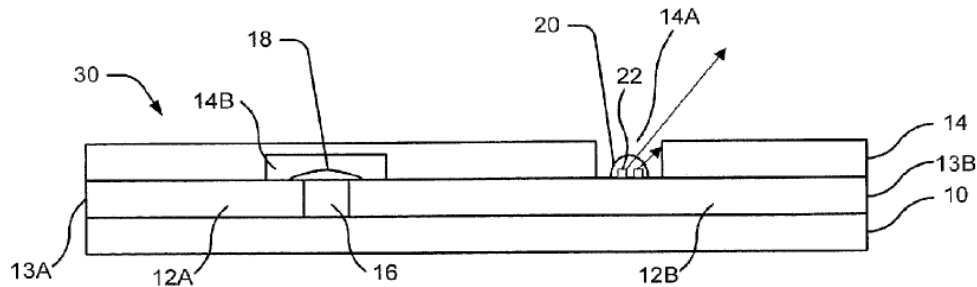


FIGURE 3

Figure 3 is a side cross-sectional view of solid state lighting bar 30. *Id.* at 2:48–52, 4:52–53.

Solid state lighting panel 40 illustrated in Figure 2 includes multiple solid state lighting bars (e.g., 30A and 30B), which can further include multiple solid state lighting tiles (12A, 12B, 12C, and 12D). *Id.* at 4:46–51, Fig. 2. A solid state lighting bar (e.g., 30, illustrated in Figure 3) includes support member 10, on which is provided solid state lighting tile substrate 13B (which corresponds to solid state lighting tile 12B). *Id.* at 4:52–5:4. Tile 12B also may include solid state emitter 20 mounted on a surface of substrate 13B. *Id.* Emitter 20 includes one or more LED emitter chips 22 configured to emit light of one or more wavelengths. *Id.* Tile 12B also includes reflector sheet 14 configured to reflect and diffuse light transmitted

from emitter 20. *Id.* Reflector sheet 14 may be configured to cover multiple tiles 12A, 12B of solid state lighting panel 40. *Id.* Substrates 13A, 13B also may include surface protrusions, such as, for example, large wire interconnect (LWI) 18. *Id.* LWI 18 may be used to provide electrical interconnections for tiles 12A and 12B. *Id.* Adjacent to LWI 18 is optional insulating plug 16, which can mechanically join and electrically insulate adjacent tiles 12A and 12B. *Id.* LWI 18 may be electrically insulated and/or protected from environmental exposure with a passivation or encapsulation material. *Id.*

After bars 30 of tiles 12 are assembled into a two-dimensional structure, reflector sheet 14 may be mounted on the multiple bars. *Id.* at 5:5–29. Reflector sheet 14 may include recesses 14B configured to provide relief for surface protrusions, such as LWI 18. *Id.* Recesses 14B may be molded into reflector sheet 14 and/or created by removing material from the reflector sheet as a step in a manufacturing process. *Id.* Without recesses 14B, reflector sheet 14 can press against the LWI, potentially causing the LWI to break or pull away from substrate 13. *Id.* Reflector sheet 14 also may include apertures 14A configured to be aligned with emitters 20. *Id.*

Figure 4 of the '812 patent (reproduced below) is a partial, side cross-sectional view of a solid state lighting bar 30, taken along lines A-A of Figure 2. *Id.* at 2:52–56, 5:30–33.

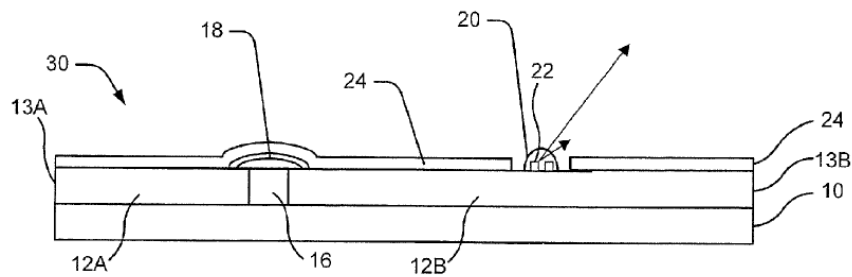


FIGURE 4

Figure 4 is a partial, side cross-sectional view of solid state lighting bar 30, taken along lines A-A of Figure 2. *Id.* at 2:52–56, 5:30–33.

Solid state lighting bar 30 illustrated in Figure 4 includes first substrate 13A corresponding to first tile 12A, and second substrate 13B corresponding to second tile 12B. *Id.* at 5:30–45. Each of the first and second substrates 13A and 13B are mounted on support member 10. *Id.* Support member 10 provides support for tiles 12. *Id.* Tile 12 may include a printed circuit board (PCB) on which one or more circuit elements are mounted. *Id.* First and second substrates 13A and 13B may be separated by an insulating plug 16 configured to mechanically join and electrically insulate tiles 12A and 12B. *Id.*

Solid state lighting bar 30 may also include one or more large wire interconnects 18 (LWIs) positioned, for example, proximate to insulating plug 16. *Id.* at 5:45–56. LWI 18 is one example of a surface protrusion located on a surface of the tile substrate. *Id.* Solid state emitter 20 is mounted on a surface of the substrate 13B. *Id.* Solid state emitter 20 may include multiple LED emitter chips 22. *Id.*

Reflector sheet 24 is positioned on substrate 13 of one or more tiles 12. *Id.* at 5:56–6:8. Reflector sheet 24 may be configured to cover a single tile 12 and/or a solid state lighting bar 30. *Id.* Reflector sheet 24 may be

held in place on tile 12 and/or bar 30 using mechanical and/or chemical bonding techniques. *Id.* at 6:9–17. Reflector sheet 24 may be a diffuse reflector formed using a microporous structure of a polymer material, such as micro-cellular polyethylene terephthalate (MCPET). *Id.* at 6:18–40. Reflector sheet 24 may be a sheet and/or film that is polymeric, elastomeric, thermoplastic and/or thermoset, among others. *Id.* Reflector sheet 24 includes a deformation characteristic that can provide conformance to surface protrusions (such as LWI 18). *Id.*

D. Illustrative Claim

Among the challenged claims of the '812 patent, claims 1, 15, and 20 are independent. Claims 2–7, 10–12, and 14 depend from claim 1, and claims 16–19, 21, and 23 depend from claim 15. Claim 1 is illustrative of the claimed subject matter and is reproduced below:

1. [Preamble] A solid state lighting tile, comprising:
 - [1A] a substrate;
 - [1B] a solid state lighting element mounted on a surface of the substrate; and
 - [1C] a reflector sheet on the surface of the substrate, the reflector sheet configured to conform to a shape of a protruding feature on the tile.

Ex. 1001, 8:39–45.¹

E. Prior Art References and Other Evidence

Petitioner relies on the following references:

1. Chou, U.S. Patent No. 7,497,592 B2 (March 3, 2009), (Ex. 1005, “Chou”).
2. Starry, et al., U.S. Patent Application Publication

¹ Paragraph references in brackets proposed by Patent Owner. *See* Prelim. Resp. 9.

No. 2006/0262310 A1 (November 23, 2006) (Ex. 1006, “Starry”).

3. Tabito, et al., U.S. Patent Application Publication No. 2007/0103908 A1 (May 10, 2007) (Ex. 1007, “Tabito”).

In addition to these references, Petitioner relies on a Declaration of P. Morgan Pattison, Ph.D. Ex. 1003 (“Pattison Decl.”).

Patent Owner relies on a Declaration of William K. Bohannon. Ex. 2001 (“Bohannon Decl.”).

F. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability. Pet. 4.

Claim(s) Challenged	35 U.S.C. §	Reference(s)
1, 12, 15, 18	103(a) ²	Chou
2–6, 21	103(a)	Chou, Starry
7, 10, 11, 14, 16, 17, 19, 20, 23	103(a)	Chou, Tabito

III. ANALYSIS

A. Applicable Legal Standards

A claim is unpatentable as obvious under 35 U.S.C. § 103 “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103 (2011). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any

² Because the application from which the ’812 patent issued has an effective filing date before March 16, 2013 (Ex. 1001, code (22)), citations to 35 U.S.C. § 103 are to the pre-AIA version. Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29.

differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) so-called “secondary considerations,” including commercial success, long-felt but unsolved needs, failure of others, and unexpected results. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). At this stage, neither party has presented any evidence on the fourth *Graham* factor.

B. Level of Ordinary Skill in the Art

According to Petitioner, a person of ordinary skill in the pertinent art would have had at least a graduate degree in mechanical engineering, physics, materials science, electrical engineering, or a related discipline, coupled with at least four years’ experience in designing backlighting systems for displays; the level of ordinary skill in the art is approximate and additional education could make up for a lack of experience or vice-versa.

Pet. 9 (citing Pattison Decl. ¶ 28).

Patent Owner, in turn, contends that a person of ordinary skill in the pertinent art

would have (a) a Bachelor’s of Science degree in a technical field and at least four years of experience in the field of design and/or manufacture of display systems; (b) a Master’s of Science degree in a technical field and at least two years of experience in the field of design and/or manufacture of display systems; or (c) a PhD in a technical field relating to the design and/or manufacture of display systems. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.

Prelim. Resp. 4 (citing Bohannon Decl. ¶¶ 31–34).

We regard Petitioner’s definition as consistent with the complexity of the technology described in the ’812 patent and the asserted prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001) (prior art itself

may reflect an appropriate level of skill). Patent Owner's use of the term "technical field" is unduly vague. Therefore, for the purpose of this Decision, we adopt Petitioner's proposed formulation.

C. Claim Construction

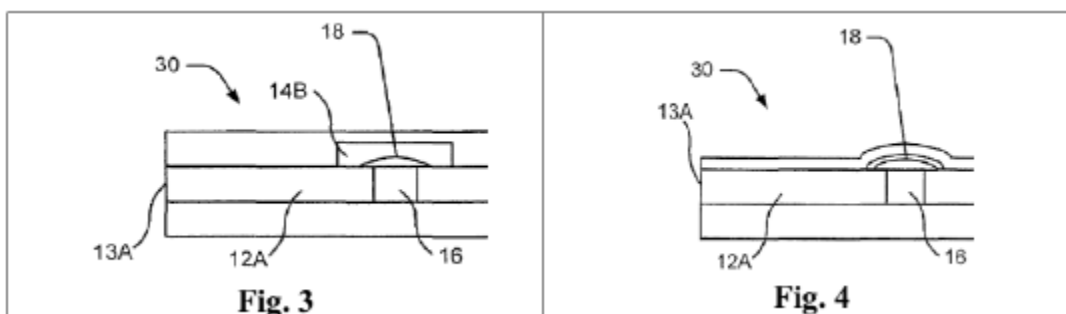
For this *inter partes* review, the Board applies the same claim construction standard as that applied in federal courts. *See* 37 C.F.R. § 42.100(b) (2023). Under this standard, claim terms "are generally given their ordinary and customary meaning" as understood by a person of ordinary skill in the art in question at the time of the invention. *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–13 (Fed. Cir. 2005) (en banc) (citations omitted). "In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–1317). Extrinsic evidence is "less significant than the intrinsic record in determining 'the legally operative meaning of claim language.'" *Phillips*, 415 F.3d at 1317 (citation omitted).

Petitioner contends that "the Board does not need to construe any claim term for purposes of evaluating the prior art in this Petition." Pet. 10.

Patent Owner, however, points out that in the Underlying Litigation Petitioner has proposed a construction for the phrase "reflector sheet configured to conform to a shape of a protruding feature on the tile," as recited in claim 1. Prelim. Resp. 4–6. Patent Owner contrasts its proposed construction with Petitioner's proposed construction in the Underlying Litigation as shown in the chart below. *Id.* at 5.

Patent Owner Brightplus' Proposed Construction 1:22-cv-02774	Petitioner Hisense's Construction 1:22-cv-02774
Plain and ordinary meaning. In the alternative, “reflector sheet that provides cover and relief for a shape of a protruding feature on the [solid state lighting] tile”	the reflector sheet overlays (e.g., by deformation), and has the same shape, outline, or contour of a protruding feature

Patent Owner contends that “the specification makes clear that there are several ways of achieving ‘conformance’—including by *not* taking on the exact shape of the protruding feature.” *Id.* Patent Owner argues that the ’812 patent “provides several examples of protruding features, such as ‘long wire interconnect’ or ‘LWI’ 18 in the following excerpts from Figs. 3 and 4.” *Id.*



The ’812 patent’s Figure 3 (above left) and Figure 4 (above right), are cross-sectional views of solid-state lighting bar 30, including solid-state lighting tile 12A, substrate 13A, insulating plug 16, large wire interconnect (LWI) 18, and recess 14B in reflector sheet 14 (not numbered). Ex. 1001, 4:52–5:18. Patent Owner explains that “Figure 3 shows a ‘recess’ 14B formed in the reflector ‘to provide relief for surface protrusions, such as LWI 18.’” *Id.* at 6. Patent Owner asserts that “to the extent the Board construes this term, Patent Owner’s construction should be adopted.” *Id.*

On this record, we preliminarily agree with Patent Owner that the '812 patent shows alternative ways for a reflector sheet “to conform to a shape of a protruding feature” on a lighting tile that does not demand the reflector sheet have “the same shape, outline, or contour of a protruding feature” as Petitioner’s proposed construction in the Underlying Litigation would require. To illustrate this, Figures 3 and 4 from the '812 patent are shown in their entirety below.

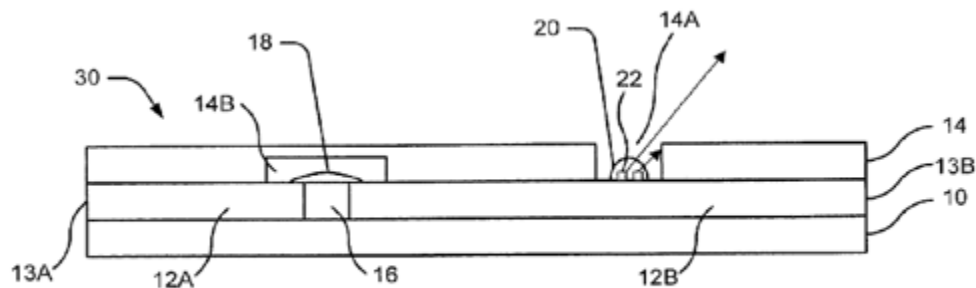


FIGURE 3

With respect to Figure 3 above, the '812 patent explains that “reflector sheet 14 may include recesses 14B configured to provide relief for surface protrusions, such as an LWI 18. . . . The reflector sheet 14 may also include apertures 14A that are configured to be aligned with the emitters 20.” Ex. 1001, 5:9–18. Figure 4 is shown in its entirety below.

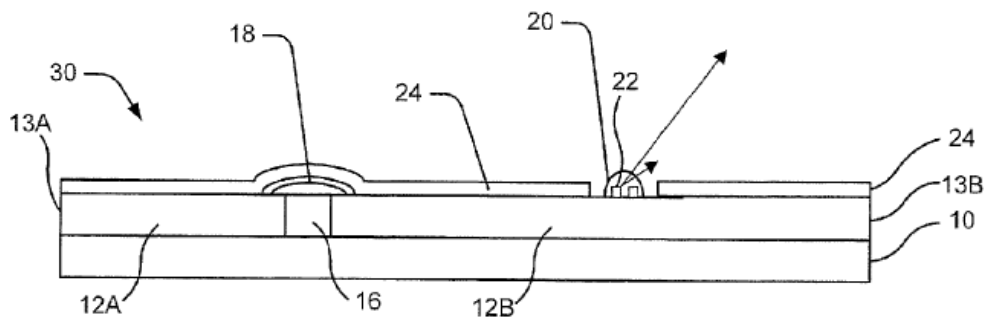


FIGURE 4

With respect to Figure 4 above, the '812 patent explains that

[a]lthough illustrated as a protrusion, in some embodiments the LWI 18 may be flush with the surface of the tiles 12, in which case the relief are[a] 14B may be unnecessary. . . . [t]he small thickness of the reflector sheet 24 relative to the emitter 20 can result in a reduction of low-angle light blocking, which may provide for better color uniformity of the solid state lighting panel 40. Additionally, the reflector sheet 24 includes a deformation characteristic that can provide conformance to surface protrusions such as an LWI 18.

Id. at 5:50–53, 6:30–36. Although not numbered or expressly discussed in the Specification, Figure 4 does appear to show an aperture configured to be aligned with emitter 20, as similarly illustrated in Figure 3.

In addition, we again note that the Specification with respect to Figure 4 states that “the reflector sheet 24 includes a deformation characteristic that can provide *conformance* to surface protrusions,” and with respect to Figure 3 states that “the reflector sheet 14 may include recesses . . . configured to *provide relief* for surface protrusions.” *Compare id.* at 6:33–36, with *id.* at 5:9–11 (emphases added). At this stage, we preliminarily agree with Patent Owner that these are alternative ways for a reflector sheet “to conform to a shape of a protruding feature.” The parties, however, should consider during trial whether these different descriptions concerning reflector sheet 14 instead disclose distinct embodiments that may not both be covered by a different construction of “to conform to a shape of a protruding feature.”

Adopting Petitioner’s proposed construction in the Underlying Litigation may effectively exclude embodiments using apertures 14A and recesses 14B, as illustrated in Figure 3, because they do not necessarily have “the same shape, outline, or contour of a protruding feature” and we are mindful that claims should not be limited to preferred embodiments unless the specification clearly indicates otherwise. *See WesternGeco LLC v. ION*

Geophysical Corp., 889 F.3d 1308, 1323–24 (Fed. Cir. 2018) (“It is well established that claims are not limited to preferred embodiments, unless the specification clearly indicates otherwise.” (citing *Comaper Corp. v. Antec, Inc.*, 596 F.3d 1343, 1348 (Fed. Cir. 2010) (“[T]his court has repeatedly cautioned against limiting claims to a preferred embodiment.”))).

Thus, for purposes of this Decision, and based on the current record, we preliminarily adopt Patent Owner’s proposed construction that the phrase “reflector sheet configured to conform to a shape of a protruding feature on the tile” recited in claim 1 means a “reflector sheet that provides cover and relief for a shape of a protruding feature on the tile.” As noted above, this preliminary construction does not preclude the parties from proposing, presenting evidence, or arguing a different construction of the claims during trial. To the extent the parties disagree with this preliminary construction, the parties are encouraged to present their claim construction arguments and evidence as permitted by our rules.³ A final claim construction will be determined after the close of all the evidence and after any oral hearing in this matter.

D. Prior Art References

1. Chou (Ex. 1005)

Chou is a patent titled “Light source assembly.” Ex. 1005, code (54). Chou “relates to a light source assembly, and in particular relates to a light

³ “If a trial is instituted, the parties also will have opportunities to cross-examine any opposing declarants, and to submit additional arguments and evidence, addressing the Board’s initial claim construction determination and the opposing party’s arguments and evidence before oral hearing.” CPTG 49 (*Available at* <https://www.uspto.gov/TrialPracticeGuideConsolidated>).

source assembly using light emitting diodes (LEDs) as the light source.” *Id.* at 1:5–8. Chou’s light source assembly includes a circuit board, a plurality of spot light sources disposed on the circuit board, and a reflector sheet disposed on the circuit board. *Id.* at 2:1-7. Figure 2 of Chou, reproduced below, illustrates a reflector sheet of a light source assembly. *Id.* at 2:41–42.

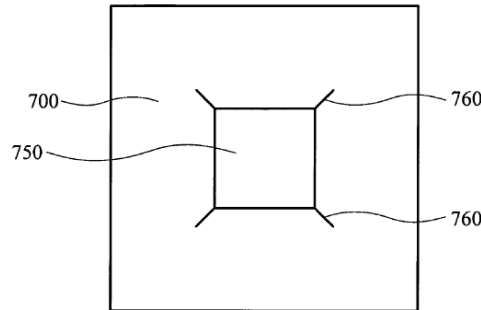


FIG. 2

Figure 2 illustrates a reflector sheet 700 of a light source assembly. *Id.* at 2:41–42, 3:4–5.

Reflector sheet 700 illustrated in Figure 2 has a plurality of holes 750, with one hole 750 having at least one slit 760 extended from the periphery of hole 750. *Id.* at 3:5–27. As shown in Figure 2, hole 750 may have four slits 760 extended from the periphery of the hole. *Id.* Slit 760 may be a line extended from the line passing through the center of hole 750, or a line extended from the periphery of hole 750 without a special orientation. *Id.* For example, hole 750 may have a rectangular shape with four slits 760 symmetrically extending from the four corners of rectangle hole 750. *Id.* Or hole 750 may be a circle, with a plurality of slits 760 symmetrically extending from the center of the circle. *Id.* The shape of hole 750 depends on the light source used. *Id.* Figures 3A and 3B of Chou, reproduced below, illustrate a schematic view of the light source assembly. *Id.* at 2:43–46, 3:27–28. In figures 3A and 3B, only one circuit board 500, one spot light

source (such as LED 600) welded to circuit board 500, and one reflector sheet 700 are shown for simplification. *Id.* at 3:27–31.

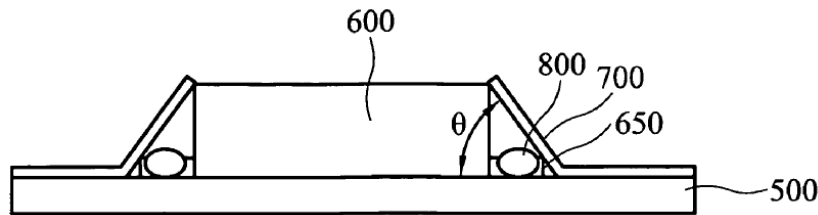


FIG. 3A

Figure 3A is a front schematic view of a light source assembly. *Id.* at 2:43–44, 3:27–31.

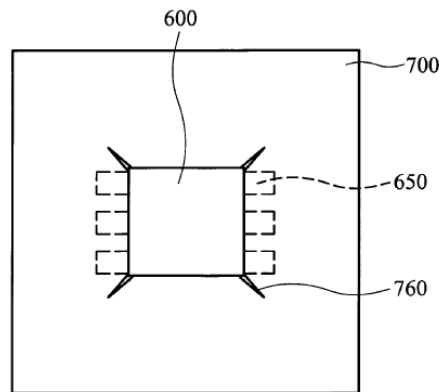


FIG. 3B

Figure 3B is a top schematic view of the light source assembly. *Id.* at 2:45–46, 3:27–31.

As shown in Figures 3A and 3B, reflector sheet 700 has hole 750 corresponding to the spot light source (LED 600), and the periphery of hole 750 has at least one slit 760 extended from the hole. *Id.* at 3:30–41. The aperture of hole 750 is slightly smaller than the size of the spot light source (LED 600). *Id.* Reflector sheet 700 disposed on circuit board 500 doesn't shield the emission surface of the spot light source (LED 600). *Id.* The spot

light source (LED 600) may have a top-emission surface, and reflector sheet 700 doesn't shield the emission surface of the spot light source. *Id.*

Reflector sheet 700 is disposed on circuit board 500, and reflector sheet 700 adjacent to hole 750 forms an angle θ between about 0 degrees to about 90 degrees with circuit board 500. *Id.* at 3:41–51. Angle θ will change with the height of the spot light source (LED 600), the length of lead 650 of the spot light source, and the amount of solder 800. *Id.* As shown in Figures 3A and 3B, only the emission surface of the spot light source (LED 600) is exposed. *Id.*

Figure 8 of Chou, reproduced below, is a schematic view of a light source assembly having a plurality of spot light sources. *Id.* at 2:55–56.

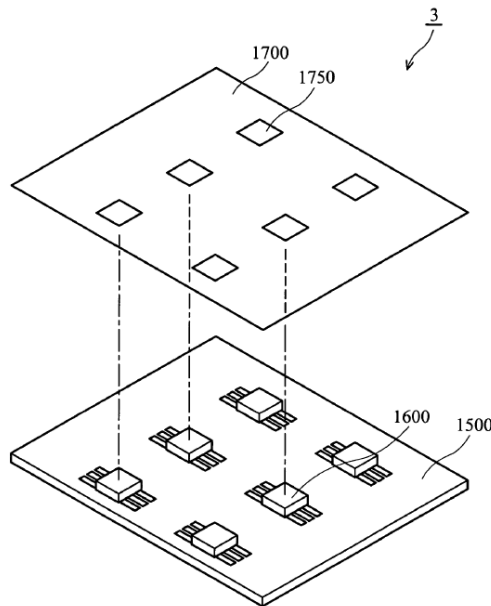


FIG. 8

Figure 8 is a schematic view of a light source assembly 3 having a plurality of spot light sources 1600. *Id.* at 2:55–56, 4:18–27.

Light source assembly 3 illustrated in Figure 8 includes circuit board 1500, a plurality of spot light sources 1600 disposed on circuit board 1500,

and reflector sheet 1700 having a plurality of holes 1750. *Id.* at 4:18–36. Reflector sheet 700 disposed on circuit board 1500 has a plurality of holes 1750 corresponding to one spot light source 1600. *Id.* Reflector sheet 1700 adjacent to each hole 1750 forms an angle between about 0 degrees to about 90 degrees with circuit board 1500. *Id.* Reflector sheet 1700 may be made of a deformable material, such as a resin film having a reflecting function, and the slits can be omitted. *Id.* Reflector sheet 1700 is disposed on circuit board 1500, and reflector sheet 1700 adjacent to hole 1750 is deformed to form an angle θ between about 0 degrees to about 90 degrees with circuit board 1500. *Id.*

2. *Starry (Ex. 1006)*

Starry is titled “Diffuse Reflective Article” and “relates to a diffuse reflective article having a nonwoven sheet diffuse reflector containing pores of high light scattering efficiency and having a high photopic reflectance of visible light.” Ex. 1006, code (54), ¶ 2. Starry’s diffuse reflective article includes a diffuse reflector of light positioned within a structure defining an optical cavity. *Id.* at code (57). The pores of high light scattering efficiency are inter-fiber and intra-fiber pores of optimal light scattering dimension. *Id.* Starry also describes an optical display, including: (i) a structure defining an optical cavity; (ii) a light source positioned within the optical cavity; (iii) a display panel through which light from the light source passes; and (iv) a diffuse reflector positioned within the optical cavity for reflecting light from the light source toward the display panel. *Id.* Figures 1, 2, and 3 of Starry, reproduced below, illustrate cross sectional views of optical displays utilizing diffuse reflectors. *Id.* ¶¶ 17–19.

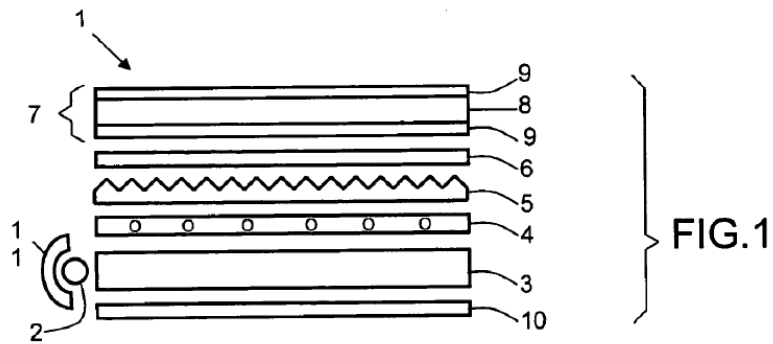


Figure 1 illustrates a cross sectional view of a side-lit liquid crystal optical display utilizing a diffuse reflector. *Id.* ¶¶ 17, 33.

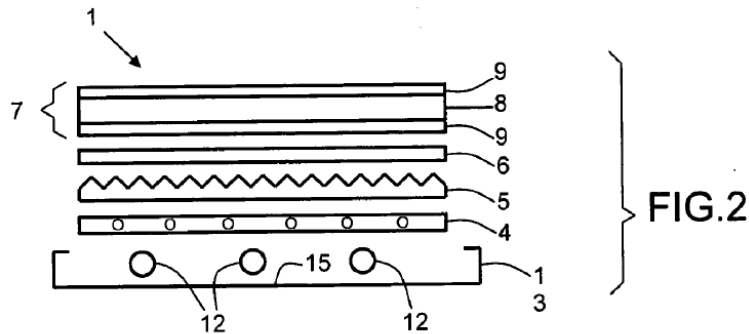


Figure 2 illustrates a cross sectional view of a backlit liquid crystal optical display with a cold cathode fluorescent lamp light source utilizing a diffuse reflector. *Id.* ¶ 18.

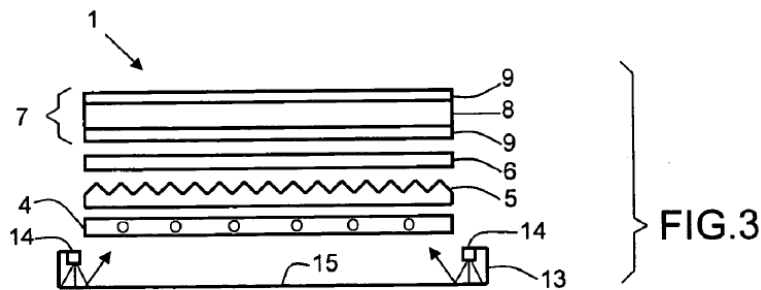


Figure 3 illustrates a cross sectional view of a backlit liquid crystal optical display with a light emitting diode light source utilizing a diffuse reflector. *Id.* ¶ 19.

Optical display 1 illustrated in Figure 1 includes (i) a fluorescent light source 2 coupled to an optical cavity containing a plastic light guide 3 that directs light towards a display panel 7 and ultimately a viewer, with some

light reflected from the back surface of the light guide, (ii) a diffuser 4, (iii) an optional brightness enhancing film 5 and an optional reflective polarizer film 6 acting to redirect and reflectively polarize the light emitted from guide 3 toward liquid crystal display panel 7 and a viewer, (iv) liquid crystal display panel 7 placed on top of reflective polarizing film 6 and constructed of a liquid crystal 8 contained between two polarizers 9, and (v) diffuse reflector 10 placed behind light guide 3 and reflecting light towards liquid crystal display panel 7. *Id.* ¶¶ 33–34. Diffuse reflector 10 also reflects and randomizes the polarization of the light reflected from reflective polarizing film 6 and brightness enhancing film 5 layers. *Id.* ¶ 34. Diffuse reflector 10 is a highly reflective, high diffusivity surface that enhances the optical efficiency of the optical cavity. *Id.* Diffuse reflector 10 scatters and reflects light diffusely, depolarizes the light, and has high reflectance over the visible wavelength range. *Id.* Diffuse reflector 10 is an element of a light recycling system, and it reflects light rejected from reflective polarizing film 6 and/or from brightness enhancement film 5, and also gives that light another opportunity to reach liquid crystal display panel 7 and ultimately a viewer. *Id.* ¶ 35. This rejecting and recycling of light may occur numerous times, increasing the luminance of the optical display (i.e., the amount of light directed towards the viewer). *Id.*

This increased optical efficiency of diffuse reflector 10 may be used to reflect incident light between layer 5 and diffuse reflector 10, to thereby increase display luminance by controlling the angles over which light is emitted. *Id.* ¶ 36. More particularly, brightness enhancing film 5 transmits light within a specific, narrow angular range, and reflects light over another, specific and wider angular range. *Id.* The reflected light is scattered by

diffuse reflector 10 into all angles. *Id.* The light within the transmission angles of brightness enhancing layer 5 is transmitted towards the viewer. *Id.* Light in the second angular range is reflected by layer 5 for additional scattering by diffuse reflector 10. *Id.*

The increased optical efficiency of diffuse reflector 10 may also be used to reflect incident light between reflective polarizer film 6 and diffuse reflector 10, to thereby increase display luminance by controlling the polarization state of the light transmitted through reflective polarizer film 6. *Id.* ¶ 37. In particular, most displays have an absorbing polarizer 9 applied to the back of display panel 8, and at least half of the available light is absorbed when the display is illuminated by unpolarized light, such that display luminance is decreased and display polarizer 9 is heated. *Id.* These adverse situations are overcome with the use of reflective polarizer film 6, because reflective polarizer film 6 transmits light of one linear polarization state and reflects the other linear polarization state, and if the transmission axis of reflective polarizer film 6 is aligned with the absorbing polarizer transmission axis, the transmitted light is only weakly absorbed by the absorbing polarizer. *Id.* Moreover, the light in the reflected polarization state is not absorbed by the absorbing polarizer; instead, it is reflected towards diffuse reflector 10. *Id.* Diffuse reflector 10 depolarizes the light, creating a polarization state that has equal polarization components in the reflective polarizer film transmission and reflection states. *Id.* One half of the light transmits through reflective polarizer layer 6 towards the viewer, while light in the reflected polarization state (or “undesirable” state) is again scattered by diffuse reflector 10, providing yet another chance for additional polarization conversion. *Id.*

The increased optical efficiency of the diffuse reflector can be used to increase the reflective efficiency of an optical cavity and/or to mix discrete wavelengths of light to make a uniform colored or white light source. *Id.*

¶ 39. For example, in optical display 1 shown in Figure 2 three fluorescent lamps 12 are located in optical cavity 13, while in optical display 1 shown in Figure 3 two light emitting diodes (LEDs) 14 provide light to optical cavity 13, with optical cavities 13 in these figures being lined with diffuse reflectors 15. *Id.* Diffuse reflector 15 increases reflectance and also mixes the discrete light colors (from the fluorescent lamps or LEDs) to form a white light source with good spatial light emitting uniformity, for illumination of liquid crystal display panel 7. *Id.*

3. *Tabito (Ex. 1007)*

Tabito is titled “Backlight Device and Liquid Crystal Display Apparatus” and “relates to a liquid crystal display apparatus, having a light transmitting liquid crystal display (LCD) device, and to a backlight device used for this liquid crystal display apparatus.” Ex. 1007, code (54), ¶ 1.

With reference to Tabito’s light transmitting liquid crystal display apparatus illustrated in Figures 2 and 4 (reproduced below), a backlight section 3 is formed by a plural number of rows made up of many light emitting units 15 arranged on the back surface of liquid crystal display panel 8. *Id.* at code (57). Each light emitting unit includes many LED units 18 mounted on an interconnection substrate 17. *Id.* A reflecting section 6 for reflecting light radiated from each LED is formed by a large number of reflective sheet pieces 27, and a reflective plate 26 secured to reflecting plate supports 40 formed on a heat dissipating plate. *Id.* Reflecting plate 26 is overlaid on each reflective sheet piece 27 and secured in this state to each

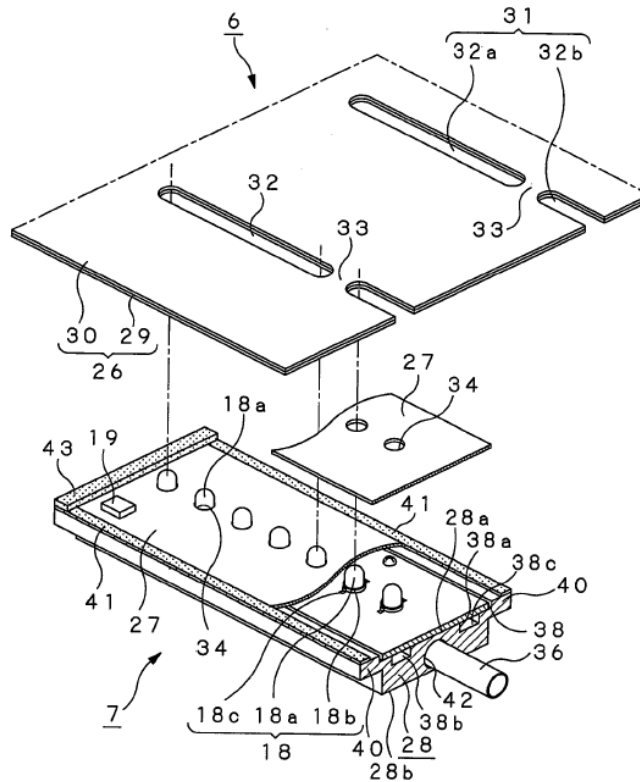


FIG. 4

Figure 4 is an exploded perspective view illustrating parts of a light emitting unit of backlight section 3, and reflecting plate 26 and reflecting sheet piece 27 of reflecting section 6. *Id.* ¶ 42.

E. Ground 1 - Obviousness Based on Chou

Petitioner contends that claims 1, 12, 15, and 18 would have been rendered obvious by Chou. Pet. 4, 14–23. We discuss in detail the evidence and the arguments provided by the parties with respect to independent claim 1. Petitioner provides a detailed analysis of claim 1, supported by the testimony of Dr. Pattison. *See id.* at 14–19; Ex. 1003 ¶¶ 38–63. For claim 1, Patent Owner only contests Petitioner’s evidence and arguments concerning limitation [1C]. Patent Owner’s position is supported by the testimony of Mr. Bohannon. *See Prelim. Resp.* 9–14; Ex. 2001 ¶¶ 53–60.

Claim 1 recites the following:

1. [Preamble] A solid state lighting tile, comprising:
[1A] a substrate;
[1B] a solid state lighting element mounted on a surface of the substrate; and
[1C] a reflector sheet on the surface of the substrate, the reflector sheet configured to conform to a shape of a protruding feature on the tile.
Ex. 1001, 8:39–45.

With respect to limitation [1C], Petitioner relies on Chou’s Figure 3A, shown below.

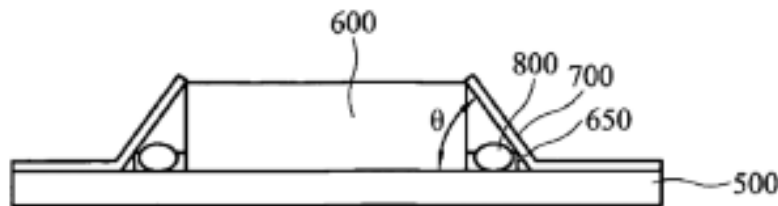


FIG. 3A

According to Petitioner, Chou’s Figure 3A “discloses a reflector sheet 700 positioned to conform to the protruding features [of] LED 600, including the lead 650 and solder 800.” Pet. 17 (citing Ex. 1005, 3:42–51 (“The reflector sheet 700 is disposed on the circuit board 500 and the reflector sheet 700 adjacent to the hole 750 forms an angle θ between about 0 degree to about 90 degree with the circuit board 500. The angle θ will change with the height of the spotlight source (LED 600), the length of lead 650 of the spot light source (LED 600), and the amount of the solder 800.”); Ex. 1003 ¶ 41).

Petitioner asserts that “Chou further discloses that the reflector sheet conforms to the protruding features.” Pet. 17 (citing Ex. 1003 ¶ 42). “In

particular,” Petitioner explains, “Chou describes that the angle of the reflector sheet ‘will change with the height of the spotlight source (LED 600), the length of lead 650 of the spot light source (LED 600), and the amount of the solder 800.’” Pet. 17 (citing Ex. 1005, 3:45–47).

“Accordingly,” Petitioner concludes, “the reflector sheet 700 provides cover and relief for a shape of protruding feature, such as the LED 600, lead 650, and solder 800, on the tile.” Pet. 17.

Petitioner also points out that “Chou further discloses that ‘the reflector sheet 1700 can be a *deformable material*, such as a resin film having reflecting function.’” Pet. 18 (citing Ex. 1005, 4:30–32 (emphasis added); Ex. 1003 ¶ 42). According to Petitioner, a person of ordinary skill in the art “would recognize that such a ‘deformable material’ used as the reflector sheet 700 would conform to the shape of the protruding features, e.g., the LED 600, lead 650, and solder 800.” Pet. 18 (citing Ex. 1003 ¶ 43). “Thus,” Petitioner concludes, a person of ordinary skill in the art “would recognize that the reflector sheet 700 overlays (e.g., by deformation), and has the same shape, outline, or contour of the LED 600, lead 650, and solder 800.” Pet. 18. Petitioner explains that “[t]his is particularly evident as another embodiment in Chou teaches the use of slits to create relief areas for the reflector sheet relative to a protruding feature.” *Id.* (citing Ex. 1005 3:7–8 (“The hole 750 has at least one slit 760 extended from the periphery of the hole 750.”); Ex. 1003 ¶ 43). Petitioner asserts that “[a]s an alternative to using slits, Chou teaches the use of a deformable material such that the reflector sheet can have the same shape, outline, or contour of the underlying protruding feature.” Pet. 18 (citing Ex. 1005, 4:29–32 (“In this embodiment, the reflector sheet 1700 can be a *deformable material*. Such as a resin film

having reflecting function, and *the slits can be omitted.*”) (emphasis added)); Ex. 1003 ¶ 43).

“For example,” Petitioner asserts, “as shown in Figure 3A above, the reflector sheet 700 conforms to at least the shape of the lead 650 and solder 800 by providing cover and relief. Further, as explained by Chou, the angle θ between the reflector sheet 600 and the circuit board 500 can vary ‘between about 0 degree and about 90 degree,’” because “angle θ will change with the height of the spotlight source (LED 600), the length of lead 650 of the spot light source (LED 600), and the amount of the solder 800.” Pet. 17–18 (citing Ex. 1005, 3:45–48).

Petitioner argues that a person of ordinary skill in the art “would recognize that this variance in the angle θ indicates that the reflector sheet is conforming to the protrusions that the reflector sheet overlays, e.g., the LED 600, ‘the length of the lead 650,’ and ‘the amount of solder 800.’” Pet. 19 (citing Ex. 1003 ¶¶ 45, 63). “Alternatively,” Petitioner argues, “when a slit is not used and a deformable material is used, the reflector sheet will have the same shape, outline, or contour as the protruding feature.” Pet. 19.

Patent Owner argues that “the fact that the angle θ of the reflector sheet 700 changes with the ‘height of the spotlight source (LED 600), the length of the lead 650 of the spotlight source (LED 600), and the amount of solder 800’ means that Chou is not the same as a ‘reflector sheet configured to conform to a shape of a protruding feature on the tile’ as claimed in the ’812 Patent.” Prelim. Resp. 10–11. Patent Owner contends that “[t]hese elements for which the angle θ of the reflector sheet changes are not the same as *a protruding feature* on the tile as claimed in the ’812 Patent.” *Id.* at 11 (citing Ex. 2001 ¶¶ 54–55).

Patent Owner argues that “the specification shows that surface protrusions 18 of the ’812 patent, are distinguished from the solid state emitters 20 in the ’812 Patent,” and that “the reflector 14 is configured to conform to the protrusion 18.” Prelim. Resp. 11 (citing Ex. 1001, 4:52–63, Fig. 3; Ex. 2001 ¶¶ 54–55). Patent Owner refers to Figure 3 from the ’812 patent, shown below.

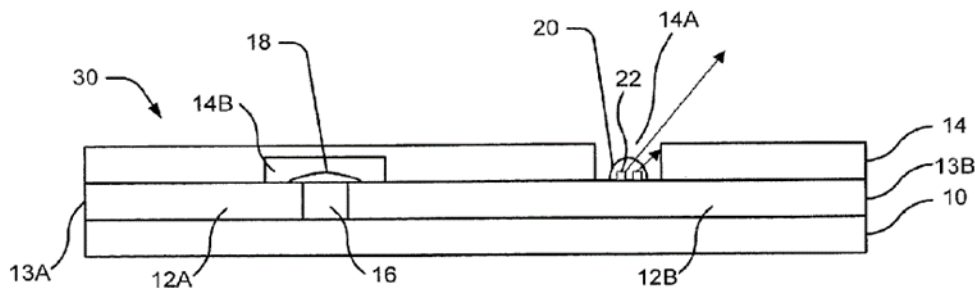


FIGURE 3

Figure 3 is a cross-sectional view of solid state lighting bar 30 comprising support member 10, solid state lighting substrate 13A/13B corresponding to solid state lighting tiles 12A/12B, with solid state emitter 20 associated with aperture 14A and large wire interconnect 18 associated with recesses 14B, overlaid by reflector sheet 14. Ex. 1001, Fig. 3, 4:52–5:18.

Patent Owner argues that although “[t]he ’812 patent describes protruding features over which the reflector may be configured to conform . . . ‘such as, for example, a large wire interconnect (LWI)’” and that “[t]he LWI 18 is but one example of a surface protrusion that can occur on a surface of the tile substrate,” nonetheless “the ’812 Patent distinguishes the surface protrusion or protruding feature from the solid state emitter.” Prelim. Resp. 12 (citing Ex. 1001, 4:62–64, 5:48–50; Ex. 2001 ¶ 55). Patent Owner contends that “there was no intent to include the solid state emitters

within the definition of “protrusions,” because “[h]ad the inventors intended to do so, they would have drafted claims that distinctly name the solid state emitters as protrusions.” Prelim. Resp. 12.

Patent Owner also argues that “Chou does not disclose a reflector configured to conform to the *shape* of a protruding feature, rather Chou only discloses a reflector configured to conform to the *height and width* of the solid state light emitter.” Prelim. Resp. 12 (citing Ex. 2001 ¶ 56). Patent Owner contends that “[t]his arrangement is counter to the teaching of the ’812 patent,” because “[b]y angling the reflector . . . Chou would cause light to propagate at angles that are not optimal for backlighting an LCD display,” whereas in the ’812 patent the “reflector conforms to protruding features but, in general, conforms to the plane of the substrate,” as “[t]his is intended to ensure that light reflected off of the reflector propagates in a direction perpendicular to the surface of the reflector.” Prelim. Resp. 12–13 (citing Ex. 2001 ¶¶ 56–57).

Patent Owner also contends that Chou was intended for a completely different purpose than the ’812 patent. Prelim. Resp. 14. Patent Owner argues that “[t]he reflector of Chou is intended to cover features of the solid state emitters (e.g., hide from view the leads 650) so that only the light emitting surface of solid state emitter is visible from a planar view.” *Id.* (citing Ex. 2001 ¶¶ 59–60). “On the other hand,” Patent Owner argues, “the reflector of the ’812 patent is intended to cover protrusions on the surface of the substrate without reducing the overall reflective quality of the reflector (by, for example, creating recess in the reflector to accommodate the protrusions). Prelim. Resp. 14 (citing Ex. 2001 ¶ 60).

We disagree with Patent Owner. First, Patent Owner argues that “the ’812 Patent distinguishes the surface protrusion or protruding feature from the solid state emitter.” Prelim. Resp. 12 (citing Ex. 1001, 4:62–64, 5:48–50; Ex. 2001 ¶ 55). The ’812 patent, however, merely identifies a large wire interconnect (LWI) 18 as “one example of a surface protrusion that can occur on the surface of the tile substrate,” implying that there can be other examples of surface protrusions. While we acknowledge the ’812 patent does not expressly identify solid state emitters (LEDs) as examples of surface protrusions, the ’812 patent does not expressly exclude emitters either.

In contrast, the ’812 patent explains how

[t]he reflector sheet 14 may include recesses 14B configured to provide relief for surface protrusions, such as an LWI 18. The recesses 14B may be molded into the reflector sheet 14 and/or created by removing material from the reflector sheet as a step in a manufacturing process. Without the recesses 14B, the reflector sheet 14 can press against the LWI, potentially causing the LWI to break or pull away from the substrate 13. The reflector sheet 14 may also include apertures 14A that are configured to be aligned with the emitters 20.

Ex. 1001, 5:9–18. This discussion in the ’812 patent of modifying or manipulating a reflector sheet to adjust for an LWI or an emitter suggests that both an LWI and an emitter are features of a solid state lighting tile that need to be accommodated by a reflector sheet.

Second, in a related argument Patent Owner contends that “there was no intent to include the solid state emitters within the definition of ‘protrusions,’” because “[h]ad the inventors intended to do so, they would have drafted claims that distinctly name the solid state emitters as protrusions.” Prelim. Resp. 12. We note that this argument by Petitioner

appears to be unsupported attorney speculation, which is entitled to little probative weight. *See Icon Health & Fitness, Inc. v. Strava Inc.*, 849 F.3d 1034, 1046 (Fed. Cir. 2017) (“Attorney argument is not evidence or explanation in support of a conclusion.”); *In re Payne*, 606 F.2d 303, 315 (CCPA 1979) (“Arguments of counsel unsupported by competent factual evidence of record are entitled to little weight.”).

Third, Patent Owner argues that “Chou does not disclose a reflector configured to conform to the *shape* of a protruding feature, rather Chou only discloses a reflector configured to conform to the *height and width* of the solid state light emitter.” Prelim. Resp. 12 (citing Ex. 2001 ¶ 56). We disagree. Petitioner relies upon, and Chou expressly explains that the angle of the reflector sheet “will change with the height of the spotlight source (LED 600), the length of lead 650 of the spot light source (LED 600), and the amount of the solder 800.” Pet. 17 (citing Ex. 1005, 3:45–47) (emphasis added). Even if we assume for the sake of argument that solid state emitters (such as Chou’s LEDs) should not be considered as a “protruding feature on the [solid state lighting] tile” as recited in claim 1 of the ’812 patent, Chou still teaches that the angle of the reflector sheet “will change with the height of the . . . length of lead 650 of the spot light source (LED 600), and the amount of the solder 800.” Ex. 1005, 3:45–47 (emphasis added). Accordingly, Patent Owner’s argument that “Chou only discloses a reflector configured to conform to the *height and width* of the solid state light emitter,” is simply wrong. *See* Prelim. Resp. 12.

Moreover, Patent Owner does not directly address Petitioner’s argument and evidence that “Chou further discloses that ‘the reflector sheet 1700 can be *a deformable material*, such as a resin film having reflecting

function.” Pet. 18 (citing Ex. 1005, 4:30–32 (emphasis added); Ex. 1003 ¶ 42). According to Petitioner, a person of ordinary skill in the art “would recognize that such a ‘deformable material’ used as the reflector sheet 700 would conform to the shape of the protruding features, e.g., the LED 600, lead 650, and solder 800.” Pet. 18 (citing Ex. 1003 ¶ 43). On this preliminary record, we agree with Petitioner that a person of ordinary skill in the art would recognize that reflector sheet 700 overlays (e.g., by deformation), and would likely conform to the shape, outline, or contour of LED 600, lead 650, and solder 800. See Pet. 18. Indeed, Chou teaches that a reflector sheet “can be a deformable material, such as a resin film having reflecting function, and the slits can be omitted.” Ex. 1005, 4:29–32.

Finally, Patent Owner’s arguments that Chou’s arrangement “is counter to the teaching of the ’812 patent,” because it “would cause light to propagate at angles that are not optimal for backlighting an LCD display,” whereas the ’812 patent “is intended to ensure that light reflected off of the reflector propagates in a direction perpendicular to the surface of the reflector,” are unavailing. Prelim. Resp. 12–13 (citing Ex. 2001 ¶¶ 56–57). “If a reference disclosure has the same purpose as the claimed invention, the reference relates to the same problem, and that fact supports use of that reference in an obviousness rejection.” *In re Clay*, 966 F.2d 656, 658 (Fed. Cir. 1992). Here, Chou explains that there is a need for “a method of improving the covering area of the reflector sheet 300 *so as to improve the lighting efficiency of the backlight module.*” Ex. 1005, 1:58–60 (emphasis added). This stated need appears to be substantially similar to Patent Owner’s professed purpose for the ’812 patent, namely to provide a reflector

“intended to cover protrusions on the surface of the substrate *without reducing the overall reflective quality of the reflector.*” Prelim. Resp. 14.

We have considered Petitioner’s evidence and arguments that the limitations of claim 1 are met by the teachings of Chou, as well as Patent Owner’s evidence and arguments to the contrary. Based on this preliminary record, we are persuaded that Petitioner has demonstrated sufficiently for purposes of institution that the teachings of Chou render obvious the limitations of independent claim 1.

F. Ground 2 - Obviousness Based on Chou and Starry

Petitioner contends that dependent claims 2–6 and 21 would have been obvious over the combined teachings of Chou and Starry. Pet. 4, 24–29. Petitioner provides a claim analysis, supported by the testimony of Dr. Pattison. *Id.*; Ex. 1003 ¶¶ 38–62, 64–71. Petitioner also provides an explanation of a rationale to combine the teachings of Chou and Starry in the manner described in the Petition. Pet. 24–27; Ex. 1003 ¶¶ 64–70.

Patent Owner contests Petitioner’s arguments and evidence, and provides the testimony of Mr. Bohannon in support of its position. Prelim. Resp. 20–26; Ex. 2001 ¶¶ 63–71.

We have considered the evidence and arguments of record with respect to dependent claims 2–6 and 21. Because we determine that Petitioner demonstrates a reasonable likelihood of prevailing in its challenge to independent claim 1 under 35 U.S.C. § 103(a) as obvious over Chou, we are instituting an *inter partes* review on that challenge and we also institute *inter partes* review as to all challenges in the Petition, including Petitioner’s challenges to claims 2–6 and 21. *See PGS Geophysical AS v. Iancu*, 891 F.3d 1354, 1360 (Fed. Cir. 2018).

G. Ground 3 - Obviousness Based on Chou and Tabito

Petitioner contends that independent claim 20 and dependent claims 7, 10, 11, 14, 16, 17, 19, and 23 would have been obvious over the combined teachings of Chou and Tabito. Pet. 4, 29–41. Petitioner provides a claim analysis supported by the testimony of Dr. Pattison. *Id.*; Ex. 1003 ¶¶ 38–62, 72–77. Petitioner also provides an explanation of a rationale to combine the teachings of Chou and Tabito in the manner described in the Petition. Pet. 29–32; Ex. 1003 ¶¶ 72–76.

Patent Owner contests Petitioner’s arguments and evidence, and provides the testimony of Mr. Bohannon in support of its position. Prelim. Resp. 26–29; Ex. 2001 ¶¶ 72–74.

We have considered the evidence and arguments of record with respect to claims 7, 10, 11, 14, 16, 17, 19, 20, and 23. Because we determine that Petitioner demonstrates a reasonable likelihood of prevailing in its challenge to independent claim 1 under 35 U.S.C. § 103(a) as obvious over Chou, we are instituting an *inter partes* review on that challenge and we also institute *inter partes* review as to all challenges in the Petition, including Petitioner’s challenges to claims 7, 10, 11, 14, 16, 17, 19, 20, and 23. *See PGS Geophysical*, 891 F.3d at 1360 (Fed. Cir. 2018).

IV. CONCLUSION

For the foregoing reasons, we have determined that there is a reasonable likelihood that Petitioner would prevail with respect to at least one of the claims challenged in the Petition. We therefore institute trial as to all challenged claims on all grounds asserted in the Petition.

At this preliminary stage of the proceeding, we have not made a final determination as to the patentability of any challenged claim or any factual

or legal issue underlying the patentability inquiry. Any final determination will be based on the complete record developed during trial. We place Patent Owner on express notice that any argument not asserted in a timely-filed Response to the Petition, or in another manner permitted during trial, shall be deemed waived, even if that argument was presented in the Preliminary Response.

V. ORDER

Upon consideration of the record before us, it is

ORDERED that *inter partes* review of claims 1–7, 10–12, 14–21, and 23 of the '812 patent is instituted on all grounds in the Petition;

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

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