

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

XU PEICHENG (HONG KONG) OPTOELECTRONIC
TECHNOLOGY CO., LIMITED,
Petitioner,

v.

SEMISILICON TECHNOLOGY CORP.,
Patent Owner.

IPR2024-00157
Patent 8,124,988 B2

Before CHARLES J. BOUDREAU, SHEILA F. McSHANE, and
ELIZABETH J. REAGAN, *Administrative Patent Judges*.

BOUDREAU, *Administrative Patent Judge*.

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

I. INTRODUCTION

Xu Peicheng (Hong Kong) Optoelectronic Technology Co., Limited (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–17, 20, and 21 of U.S. Patent No. 8,124,988 B2 (Ex. 1001, “the ’988 patent”). Paper 1 (“Pet.”). Semisilicon Technology Corp. (“Patent Owner”) filed a Preliminary Response. Paper 8 (“Prelim. Resp.”).

We have jurisdiction under 35 U.S.C. § 6 (2018). Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in the Petition and any response thereto shows “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” Considering the Petition, Preliminary Response, and all supporting evidence, we determine that Petitioner has not demonstrated a reasonable likelihood of prevailing with respect to any of the challenged claims. Accordingly, we do not institute *inter partes* review.

A. *Real Parties in Interest*

Xu Peicheng (Hong Kong) Optoelectronic Technology Co., Limited identifies itself and Shenzhen Yuyixin Lighting Technology Co., Ltd. as real parties in interest for Petitioner in this proceeding. Pet. 102; Paper 4, 1 (Petitioner’s Updated Mandatory Notices Pursuant to 37 C.F.R. § 42.8). Semisilicon Technology Group identifies itself as the real party in interest for Patent Owner. Paper 6, 2 (Patent Owner’s Mandatory Notices).

B. *Related Matters*

Petitioner represents that it is unaware of any judicial or administrative matters that would affect, or be affected by, a decision in this proceeding. Pet. 102. Patent Owner identifies Reexamination Control

Nos. 90/015,274 (terminated Oct. 26, 2023) and 90/015,328 (pending; reexamination ordered Feb. 15, 2024) as related matters. Paper 6, 2.

C. The '988 patent

The '988 patent, titled “Light Emitting Diode Lamp Package Structure and Assembly Thereof,” issued February 28, 2012, from an application filed May 28, 2008. Ex. 1001, codes (22), (45), (54). The '988 patent generally discloses a “light emitting diode (LED) lamp package . . . with light emitting diodes, control integrated circuit (IC) and circuit board encapsulated inside a package body.” *Id.* at 1:7–11.

Figure 1 of the '988 patent is reproduced below:

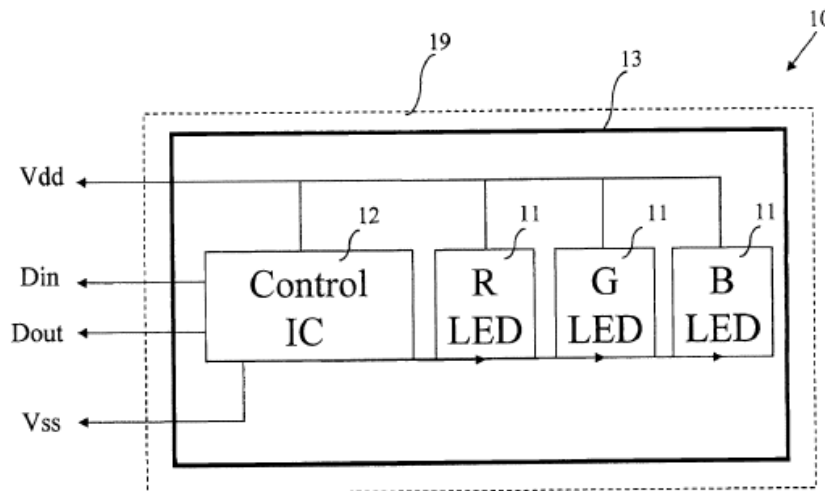


FIG.1

Figure 1, above, is a circuit block diagram of a LED lamp according to the invention. Ex. 1001, 3:24–25, 4:9–10. With reference to Figure 1, LED lamp 10 includes package body 19, which encapsulates circuit board 13 and portions of four electric conductivity supports, labeled as Vdd, Din, Dout, and Vss, that are electrically connected to circuit board 13 inside package body 19. *Id.* at 4:32–41. Circuit board 13 is mounted with red, green, and

blue LEDs 11 (labeled as R LED, G LED, and B LED, respectively) and control IC 12. *Id.* at 4:10–15. In the embodiment shown in Figure 1, red, blue and green LEDs 11 have a common electrode end, the common electrode end being a Vdd pad. *Id.* at 4:17–19. According to the '988 patent, control IC 12 receives external control data via Din, and controls the luminosity or flashing of LED 11 according to such control data, and outputs the control data via Dout. *Id.* at 4:26–30. In addition, LED lamp 10 has power supply pins Vdd and Vss to receive a DC voltage. *Id.* at 4:30–31.

Figure 4B of the '988 patent is reproduced below.

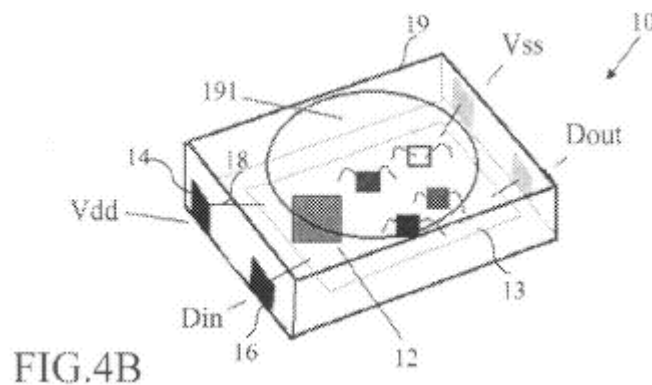


Figure 4B, above, is a structural view of the interior of an LED lamp according to an embodiment of the invention, based on LED lamp 10 of Figure 1. Ex. 1001, 3:34–37, 5:33–38. As depicted in Figure 4B, LEDs 11 inside package body 19 align with light emitting window 191. *Id.* at 5:42–43. Package body 19 has four electrodes 14–17 disposed at opposing sides and electrically connected to circuit board 13 via conductive metal wire 18. *Id.* at 5:44–48. Specifically, Din and Dout electrodes 16, 17 are respectively disposed at two opposing sides of package body 19, and Vdd electrode 14 and Vss electrode 15 are likewise respectively disposed at two opposing sides of package body 19. *Id.* at 5:55–59.

D. Illustrative Claims

Of the challenged claims, claims 1, 16, and 21 are independent. Claims 1 and 16 are reproduced below with bracketed letters provided by Petitioner to refer to claim limitations.

1. [Pre] A LED lamp package structure, comprising:

- [A] a plurality of light emitting diodes, each light emitting diode having two electrode ends and one of the electrode ends being a common electrode end;
- [B] a control integrated circuit, having a data input electrode, a data output electrode, a positive power-in electrode, and a negative power-in electrode, and electrically connected to the light emitting diodes, [C] wherein the control integrated circuit receives external control data via the data input electrode to control the illumination state of each light emitting diode according to the external control data;
- [D] a first conductor, a second conductor, a third conductor, and a fourth conductor, [E] the first conductor being a positive DC voltage pad and connected to the common electrode of each light emitting diode and the positive power-in electrode of the control integrated circuit, [F] the second conductor being connected to the data input electrode, [G] the third conductor being connected to the data output electrode, [H] the fourth conductor being a negative DC voltage pad and connected to the negative power-in electrode of the control integrated circuit; and
- [I] a package body encapsulating the light emitting diodes, the control integrated circuit and the conductors, a portion of the first conductor, the second conductor, the third conductor, and the fourth conductor being exposed outside the package body.

16. [Pre] A light emitting diode lamp assembly, comprising:

- [A] a light emitting diode lamp having a plurality of light emitting diodes and four electric conductivity supports encapsulated in a package body;

- [B] a lampshade covering the package body of the light emitting diode lamp;
- [C] a socket being a body having a perforation and extended with a plug-in member, the perforation accommodating the light emitting diodes and enabling the four electric conductivity supports to expose outside the body; and
- [D] a mount formed with a socket, the socket having four electrode contacts inside such that when the socket is plugged into the socket, the four electrode contacts being in contact with the four electric conductivity supports respectively.

Ex. 1001, 8:27–53, 9:49–63; Pet. 107–08, 110. Independent claim 21 recites a light emitting diode lamp assembly including elements similar to the assembly of claim 16 and additionally including a circuit board electrically connected to the electric conductivity supports and carrying a control integrated circuit. Ex. 1001, 10:15–34.

E. Asserted Grounds of Unpatentability

Petitioner asserts the following grounds of unpatentability:

Claim(s) Challenged	35 U.S.C. §¹	Reference(s)/Basis
1–3, 5–10, 13, 14	103(a)	Lai, ² general knowledge of a person of ordinary skill in the art (“POSITA”)
4, 11, 12	103(a)	Lai, Stoyan, ³ general knowledge of a POSITA

¹ The Leahy-Smith America Invents Act (“AIA”) included revisions to 35 U.S.C. § 103 that became effective on March 16, 2013. Because the ’988 patent issued from an application filed before March 16, 2013, we apply the pre-AIA version of § 103.

² Lai, CN 201017882Y, published February 6, 2008 (Ex. 1004; English Translation, Ex. 1005).

³ Stoyan, US 2008/0087903 A1, published April 17, 2008 (Ex. 1006).

Claim(s) Challenged	35 U.S.C. §¹	Reference(s)/Basis
1–3, 5, 6, 9, 10, 13, 16, 17, 20, 21	103(a)	Morgan, ^{4,5} general knowledge of a POSITA
4, 11, 12	103(a)	Morgan, Stoyan, general knowledge of a POSITA ⁶
16	103(a)	Allsop, ⁷ general knowledge of a POSITA
15	103(a)	Lai, Yan ⁸
15	103(a)	Morgan, Yan

Pet. 2–3. In addition to the references listed above, Petitioner relies on a declaration of E. Fred Schubert, Ph.D. (Ex. 1003).

II. ANALYSIS

A. *Level of Ordinary Skill in the Art*

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, the sophistication of the technology, and the educational level of active workers in the field. *Custom*

⁴ Lys et al., US 2004/0240890 A1, published December 2, 2004 (Ex. 1007).

⁵ We employ the parties’ practice of using “Morgan,” corresponding to the second-named inventor on the publication, Frederick M. Morgan, rather than “Lys,” corresponding to first-named inventor Ihor A. Lys, to refer to Exhibit 1007.

⁶ In its discussion of this ground, Petitioner omits any reference to the “general knowledge” of a person of ordinary skill in the art. *See* Pet. 82–87 (“GROUND 4: CLAIMS 4 AND 11–12 ARE OBVIOUS OVER MORGAN IN VIEW OF STOYAN”).

⁷ Allsop et al., US 2006/0012978 A1, published January 19, 2006 (Ex. 1008).

⁸ Yan, US 7,473,933 B2, issued January 6, 2009 (filed October 26, 2005) (Ex. 1009).

Accessories, Inc. v. Jeffrey-Allan Indus. Inc., 807 F.2d 955, 962 (Fed. Cir. 1986); *Orthopedic Equip. Co. v. U.S.*, 702 F.2d 1005, 1011 (Fed. Cir. 1983).

Petitioner contends that a person of ordinary skill in the art as of the filing date of the application for the '988 patent “would have had a bachelor’s degree in electrical engineering, physics, materials science, or a related discipline, and 6 years of practical experience in designing or fabricating LED lighting systems, including controlling and driving LEDs,” or “[a]lternatively . . . would have had a master’s degree and four years of experience, or a Ph.D. degree and two years of experience.” Pet. 5 (citing Ex. 1003 ¶ 32).

Patent Owner does not contest Petitioner’s contention with regard to the level of skill. *See generally* Prelim. Resp.

To the extent necessary for purposes of this Decision, we adopt the formulation of the level of ordinary skill in the art proposed by Petitioner as it appears consistent with the prior art before us in this proceeding.

B. Claim Construction

We interpret claim terms using “the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. [§] 282(b).” 37 C.F.R. § 42.100(b) (2023). In this context, 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) (citations omitted) (en banc).

Neither party proposes express construction of any claim terms for our consideration. *See* Pet. 5 (“[N]o formal claim constructions are necessary because the challenged claims are invalid under their plain and ordinary meanings, and ‘claim terms need only be construed ‘to the extent necessary

to resolve the controversy.””) (quoting *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011)); *see generally* Prelim. Resp.

We construe only those claim terms that require analysis to determine whether to institute *inter partes* review. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))). At this stage, we do not see the need to construe claim terms to resolve the issues in dispute.

C. Principles of Law

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). Except in limited circumstances not present here, this burden of persuasion never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

A patent claim is invalid as obvious if the differences between the claimed subject matter and the prior art are “such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.” 35 U.S.C. § 103(a).

The ultimate determination of obviousness is a question of law, but that determination is based on underlying factual findings. . . . The underlying factual findings include (1) “the scope and content of the prior art,” (2) “differences between the

prior art and the claims at issue,” (3) “the level of ordinary skill in the pertinent art,” and (4) the presence of secondary considerations of nonobviousness such “as commercial success, long felt but unsolved needs, failure of others,” and unexpected results.

In re NuVasive, Inc., 842 F.3d 1376, 1381 (Fed. Cir. 2016) (citing *inter alia* *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966)). Additionally, the obviousness inquiry typically requires an analysis of “whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007) (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) (requiring “articulated reasoning with some rational underpinning to support the legal conclusion of obviousness”)); see *In re Warsaw Orthopedic, Inc.*, 832 F.3d 1327, 1333 (Fed. Cir. 2016) (citing *DyStar Textilfarben GmbH & Co. Deutschland KG v. C.H. Patrick Co.*, 464 F.3d 1356, 1360 (Fed. Cir. 2006)).

An obviousness analysis “need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.” *KSR*, 550 U.S. at 418; accord *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1259 (Fed. Cir. 2007). Petitioner cannot satisfy its burden of proving obviousness by employing “mere conclusory statements.” *In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1380 (Fed. Cir. 2016). Instead, Petitioner must articulate a reason why a person of ordinary skill in the art would have combined the prior art references. *NuVasive*, 842 F.3d at 1382.

A reason to combine or modify the prior art may be found explicitly or implicitly in market forces; design incentives; the “interrelated teachings of multiple patents”; “any need or problem known in the field of endeavor at

the time of invention and addressed by the patent”; and the background knowledge, creativity, and common sense of the person of ordinary skill. *Perfect Web Techs., Inc. v. InfoUSA, Inc.*, 587 F.3d 1324, 1328–29 (Fed. Cir. 2009) (quoting *KSR*, 550 U.S. at 418–21).

We analyze the asserted grounds of unpatentability in accordance with these principles to determine whether Petitioner has met its burden to establish a reasonable likelihood of success at trial.

D. Obviousness of claims 1–3, 5–10, 13, and 14 over Lai in view of the general knowledge of a person of ordinary skill in the art

Petitioner contends that claims 1–3, 5–10, 13, and 14 are unpatentable over the teachings of Lai in view of the general knowledge of a person of ordinary skill in the art. Pet. 5–28. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 12–16, 18–19, 22, 29–32.

1. Lai

Lai, titled “Programmable Full-Color LED Light,” describes a programmable LED light that includes LED chips and a control IC board encapsulated with a housing, along with a power supply pin, a ground pin, a data input pin, and a data output pin extending out of the housing. Ex. 1005, codes (54), (57), 3. According to Lai, the light is capable of independently achieving display control, including automatic control of display colors and display timing, or may be controlled through an external control device or by loading and updating control programs into its built-in control ID. *Id.* at code (57), 4. By integrating red, blue, and green LED chips into a single unit and employing a built-in control circuit to implement control, Lai explains, the light is capable of achieving full-color display. *Id.* at code (57), 4.

Figures 1 and 2 of Lai are reproduced below:

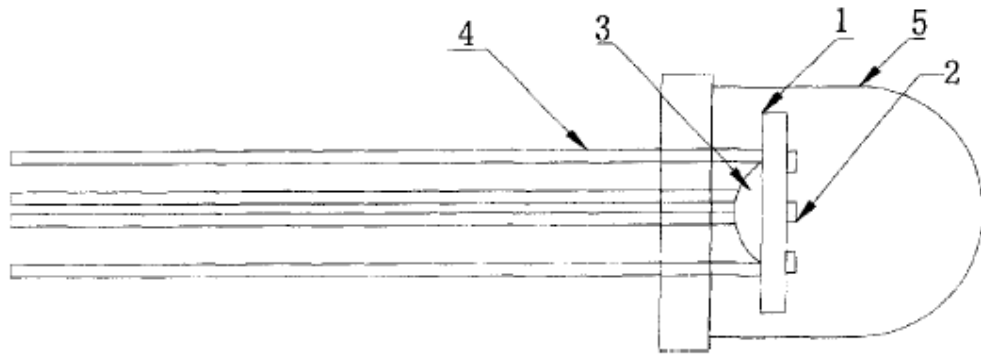


Figure 1

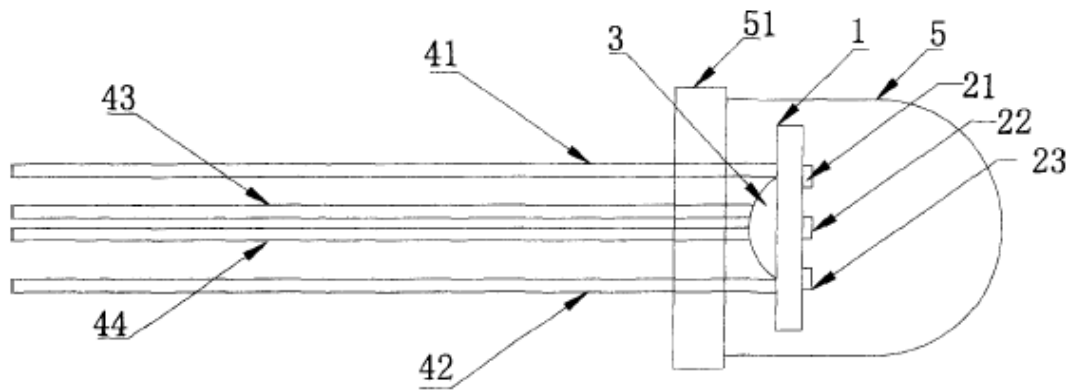


Figure 2

Figures 1 and 2, above, are perspective drawings of an exemplary LED light according to Lai's description. Ex. 1005, 4. As shown in Figure 1, the illustrated light includes substrate 1, LED chips 2, control IC board 3, pins 4, and encapsulating housing 5. *Id.* As shown in Figure 2, LED chips 2 comprise red LED chip 21, green LED chip 22, and blue LED chip 23; and pins 4 comprise power supply pin 41, ground pin 42, data input pin 43, and data output pin 44. *Id.* According to Lai, power supply pin 41, ground pin 42, data input pin 43, and data output pin 44 are electrically connected to

corresponding terminals of control IC 3, namely, a VCC terminal, a GND terminal, a data input pin, and a data output pin, respectively. *Id.*

Figure 3 of Lai is reproduced below:

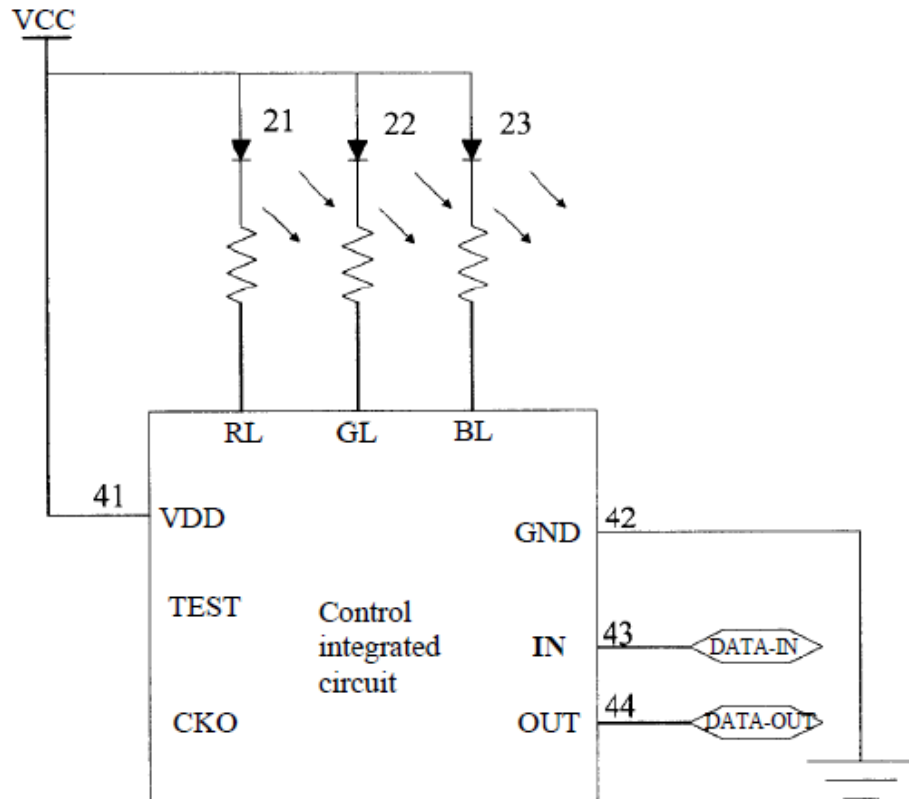


Figure 3

Figure 3, above, is a schematic drawing illustrating the circuit of the exemplary LED light depicted in Figures 1 and 2. Ex. 1005, 4. With reference to Figure 3, Lai explains that, when using the disclosed LED light, “the emission timing of the red, green, and blue LED chips may be controlled through the built-in driver program in the control IC to achieve full-color display” and that “by utilizing the data input pin (43) and data output pin (44), the LED light may be controlled by an external driver program or a new driver program may be written to the control IC (3) by external means, to realize programmable updates.” *Id.* at 5.

2. *Independent Claim 1*

a) *1[Pre]: “A LED lamp package structure, comprising;”*

Petitioner cites Lai’s disclosure of “a programmable full-color LED light, comprising LED chips, a control IC board, pins, and a housing” as teaching the preamble of claim 1. Pet. 5 (quoting Ex. 1005, 3) (citing Ex. 1003 ¶ 35). Patent Owner does not present any arguments directed specifically to the preamble, and at this stage we find that Petitioner has made a sufficient showing.⁹

b) *Limitation 1[A]: “a plurality of light emitting diodes, each light emitting diode having two electrode ends and one of the electrode ends being a common electrode end;”*

For limitation 1[A], Petitioner contends Figure 1 of Lai “illustrates an LED lamp with multiple LED chips to control red, green [sic], and blue LEDs” and “discloses LEDs with two electrode ends, one of which is a common electrode end.” Pet. 6 (citing Ex. 1005, 4, Figs. 1–3; Ex. 1003 ¶¶ 36, 37). Patent Owner does not present any arguments directed specifically to this limitation, and at this stage we find that Petitioner has made a sufficient showing.

c) *Limitation 1[B]: “a control integrated circuit, having a data input electrode, a data output electrode, a positive power-in electrode, and a negative power-in electrode, and electrically connected to the light emitting diodes,”*

Petitioner contends that a person of ordinary skill in the art would have understood Figure 3 of Lai to illustrate a control integrated circuit as

⁹ We make no finding as to whether the preamble is limiting.

recited in limitation 1[B], mapping Lai’s data input pin 43 to the recited data input electrode, Lai’s data output pin 44 to the recited data output electrode, Lai’s power supply pin 41 (labeled VDD in Fig. 3) to the recited positive power-in electrode, and Lai’s ground pin 42 (labeled GND in Fig. 3) to the recited negative power-in electrode. Pet. 7–8 (citing Ex. 1005, 4, Fig. 3). Petitioner argues that a person of ordinary skill in the art “would have understood that a VDD pin represents positive power voltage connected to the IC and the anodes of the LED chips” and “that a GND or ground pin as labeled in FIG. 3 can reasonably be negative supply voltage.” *Id.* According to Petitioner, “[t]he term GND is often used interchangeably with the term VSS, which refers to negative voltage.” *Id.* (citing Ex. 1003 ¶ 38). Quoting Lai, Petitioner further contends that “the IC in Lai is electrically connected to the LEDs: ‘[T]he LED chips are fixedly connected to the control IC board and electrically connected to the control IC.’” *Id.* at 9 (emphasis omitted) (quoting Ex. 1005, 3) (citing Ex. 1003 ¶ 39).

Patent Owner does not present any arguments directed specifically to this limitation. Nonetheless, we find a close question as to whether Petitioner has made a sufficient showing with respect to this limitation, as the only evidence Petitioner cites in support of its argument that “[t]he term GND is often used interchangeably with the term VSS, which refers to negative voltage” (Pet. 8) is an identical, unsupported assertion in Dr. Schubert’s Declaration (Ex. 1003 ¶ 38) to which we accord little or no weight. *See* 37 C.F.R. § 42.65 (“(a) Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.”). Because we determine below that Petitioner has not made a sufficient showing with regard to limitations 1[E] and 1[H] (*see infra*

Section II.D.2.f), we need not determine whether Petitioner has made a sufficient showing with respect to this limitation.

d) Limitation 1[C]: “wherein the control integrated circuit receives external control data via the data input electrode to control the illumination state of each light emitting diode according to the external control data;”

Petitioner contends Lai discloses limitation 1[C], citing disclosure in Lai that the emission timing of LED chips may be controlled through a built-in driver program in the control IC and that, by utilizing data input pin 43 and data output pin 44, the LED light may be controlled by an external driver program or a new driver program may be written to the control IC. Pet. 9.

Patent Owner does not present any arguments directed specifically to this limitation, and at this stage we find that Petitioner has made a sufficient showing.

e) Limitation 1[D] “a first conductor, a second conductor, a third conductor, and a fourth conductor,”

Referring to Lai’s power supply pin 41, ground pin 42, data input pin 43, and data output pin 44, Petitioner contends “Lai discloses four separate conductors.” Pet. 9–10 (citing Ex. 1005, 4, Figs. 2, 3). Citing a dictionary definition of “pin,” Petitioner asserts that a person of ordinary skill in the art “would have understood the references to ‘pins’ to be metallic conductors.” *Id.* at 10–11 (citing Ex. 1013,¹⁰ 7 (defining “pin” as, *inter alia*, “[a] slender straight, stiff prong used as a terminal”); Ex. 1003 ¶41).

¹⁰ Excerpts from Stan Gibilisco, *The Illustrated Dictionary of Electronics* (8th ed. 2001).

Patent Owner does not present any arguments directed specifically to this limitation, and at this stage we find that Petitioner has made a sufficient showing.

f) Limitations 1[E] and 1[H] “the first conductor being a positive DC voltage pad and connected to the common electrode of each light emitting diode and the positive power-in electrode of the control integrated circuit, . . . the fourth conductor being a negative DC voltage pad and connected to the negative power-in electrode of the control integrated circuit,”

Referring to Figure 3 of Lai and corresponding description, Petitioner contends with respect to limitation 1[E] that “[t]he VDD power supply pin (‘first conductor’) is connected to both the control IC and the common electrode end of each LED” and that a person of ordinary skill in the art “would have understood the VDD power supply pin to act as a positive DC voltage pad because ‘VDD’ represents positive DC voltage.” Pet. 11.

According to Petitioner, “[i]n electronic circuits having bipolar transistors, VCC stands for the ‘common collector voltage’” and “typically is a positive voltage.” *Id.* Additionally, Petitioner contends, “in Lai, VCC and GND are connected to the LED anodes and cathodes (see Figure 3 of Lai) and accordingly are a positive and negative voltage, respectively.” *Id.* at 12.

Moreover, Petitioner asserts, a person of ordinary skill in the art “would have understood the terms ‘pad’ and ‘pin’ to both refer to a terminal which connects a device to a mounting substrate.” Pet. 12. That is, Petitioner argues, “‘pad’ and ‘pin’ are implementations of a terminal, with both serving the same function.” *Id.* Further, according to Petitioner, a person of ordinary skill in the art “would also have understood that a ‘pad’ is a terminal having a flat shape, whereas a ‘pin’ is a terminal having a pointed shape.” *Id.* (citing

Ex. 1012,¹¹ 7 (defining “pad” as, *inter alia*, “[a] metallized area on the surface of an active substrate as an integral portion of the conductive interconnection pattern to which bonds or test probes may be applied”); Ex. 1013, 7 (defining “pin” as, *inter alia*, “[a] slender straight, stiff prong used as a terminal”); Ex. 1003 ¶ 44).

With respect to limitation 1[H], Petitioner similarly contends that a person of ordinary skill in the art would have understood Lai’s “ground GND pin (‘fourth conductor’) to act as a negative DC voltage pad because the GND pin is where the current exits the control IC.” Pet. 15.

Patent Owner responds that “[t]he Petition has not established that the claimed voltages [sic] pads would have been obvious based on Lai.” Prelim. Resp. 30. More particularly, Patent Owner argues, “Lai does not disclose voltage pads, it discloses ‘pins.’” *Id.* (citing Ex. 1005, Fig. 1; Pet. 11, 14). Indeed, Patent Owner argues, “[i]n addressing [limitation] 1[E], Petitioner describes a pin as ‘a terminal having a pointed shape,’ and cites a dictionary defining a pin as a ‘slender, straight, stiff prong[,]’ . . . consistent with Lai’s pins 4.” *Id.* (citing Pet. 11, 13; Ex. 1013; Ex. 1005, Fig. 1). In contrast, Patent Owner points out, Petitioner “describes a pad as ‘a terminal having a flat shape,’ and cites a dictionary defining a pad as a ‘metalized area on the surface of an active substrate,” which descriptions “resemble the examples illustrated in the ’988 patent, such as Fig. 4A showing electrodes 14, 15, and 16.” *Id.* at 30–31 (citing Pet. 11, 12, Ex. 1012; Ex. 1001, 6:57–59, Fig. 4A).

Patent Owner argues, “[t]he Petition effectively concedes there exists a structural difference between Lai’s pin and the claimed pad, but never

¹¹ Excerpts from Rudolf F. Graf, *Modern Dictionary of Electronics* (7th ed. 1999).

reconciles this difference.” Prelim. Resp. 31. “Even if the Board were to adopt Petitioner’s definitions,” Patent Owner argues, “the Petition never explains how Lai’s pins – which the Petition alleges are defined as a ‘pointed’ or ‘slender, straight, stiff prong,’ meets the claimed pad – which the Petition alleges are defined as a ‘metalized area on the surface.’” *Id.* Patent Owner contends, “[t]he Petition does not propose to modify Lai’s pins, and provides no explanation as to why a POSITA would have been motivated to modify Lai’s pins to become pads.” *Id.* Instead, according to Patent Owner, “Petitioner and its expert appear to assume that Lai’s pins are pads merely because they can have similar functions of making electrical connections, but these unsupported assumptions alone cannot support institution.” *Id.* at 32.

Having considered the parties’ respective arguments and the evidence of record, we agree with Patent Owner that Petitioner has failed to make a sufficient showing with respect to limitations 1[E] and 1[H]. As Patent Owner points out, the Petition effectively concedes that there is a structural difference between pins, as disclosed by Lai, and pads, as recited in claim 1, and Petitioner does not reconcile this difference or explain why a person of ordinary skill in the art would have been motivated to modify Lai’s disclosure and use pads rather than the pins Lai discloses. Prelim. Resp. 31. Even if pins and pads may both be types of terminals, claim 1 specifically recites pads, not terminals, and Petitioner has not persuasively shown that a person of ordinary skill in the art would regard pins and pads as interchangeable or that pads would otherwise be suggested by Lai’s disclosure of pins.

Further, as Patent Owner also points out, Petitioner’s inclusion of “general knowledge of a POSITA” in the asserted ground is unavailing

because the Petition does not explain specifically how or why such “general knowledge” is to be brought to bear on the combination and has instead “left it to Patent Owner and the Board to speculate on which of the features of the asserted art differs from the claims and how the asserted art or its teaching would have been modified.” Prelim. Resp. 13–14. Although general knowledge of a person of ordinary skill in the art may, under certain circumstances, be relied upon to supply a missing claim limitation (*see, e.g., Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1337–38 (Fed. Cir. 2020)), such reliance is improper where, as here, it is based merely upon “conclusory statements and unspecific expert testimony” (*id.* (quoting *Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1366 (Fed. Cir. 2016))).

Still further, we agree with Patent Owner that Dr. Schubert’s Declaration—the only purported evidence of the knowledge of a person of ordinary skill in the art proffered in this proceeding—is entitled to little weight, particularly with respect to these limitations. *See* Prelim. Resp. 25–28. As illustrated in the table reproduced below from the Preliminary Response, the paragraph of Dr. Schubert’s Declaration that the Petition cites in support of its arguments concerning the recited “pads” merely repeats nearly identically the text of the Petition, the only differences being the addition of the phrase “for example” in one instance and replacement of the word “means” with “to mean” in two instances:

Petition at 12	Declaration ¶ 44 (Ex. 1003)
Moreover, a POSITA would have understood the terms “pad” and “pin” to both refer to a terminal which connects a device to a mounting substrate. That is, “pad” and	Moreover, a POSITA would have understood the terms “pad” and “pin” to both refer to a terminal which connects a device to, for example, a mounting substrate. That is, “pad” and

“pin” are implementations of a terminal, with both serving the same function. A POSITA would also have understood that a “pad” is a terminal having a flat shape, whereas a “pin” is a terminal having a pointed shape. EX1012 at 535 (“pad” means “[a] metallized area on the surface of an active substrate as an integral portion of the conductive interconnection pattern to which bonds or test probes may be applied.”); EX.1013 (“pin” means “[a] slender, straight, stiff prong used as a terminal ...”). EX1003, ¶ 44.	“pin” are implementations of a terminal, with both serving the same function. A POSITA would also have understood that a “pad” is a terminal having a flat shape, whereas a “pin” is a terminal having a pointed shape. EX1012 at 535 (definition of “pad” to mean “[a] metallized area on the surface of an active substrate as an integral portion of the conductive interconnection pattern to which bonds or test probes may be applied.”) (emphasis added); EX.1013 (definition of “pin” to mean “[a] slender, straight, stiff prong used as a terminal ...”).
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Id. at 26–27 (quoting Pet. 12; Ex. 1003 ¶ 44). Dr. Schubert’s Declaration provides no disclosure of the basis for his testimony that a person of ordinary skill in the art “would have understood the terms ‘pad’ and ‘pin’ to both refer to a terminal which connects a device to, for example, a mounting substrate” or that “‘pad’ and ‘pin’ are implementations of a terminal, with both serving the same function.” *See* 37 C.F.R. § 42.65(a); *see also In re Ethicon, Inc.*, 844 F.3d 1344, 1348, 1352 (Fed. Cir. 2017) (concluding that the Board properly gave “little weight” to conclusory expert testimony). Although Dr. Schubert *does* provide support for his testimony that a person of ordinary skill “would also have understood that a ‘pad’ is a terminal having a flat shape, whereas a ‘pin’ is a terminal having a pointed shape,” namely, the same dictionaries that Petitioner cites in support of the same

statement, that testimony and the cited definitions do not support Petitioner's obviousness contention but instead underscore the structural difference between Lai's pin and the claimed pad, as discussed above.

g) Limitations 1[F], 1[G], and 1[I]

Petitioner contends that Lai teaches each of the remaining limitations of claim 1. Pet. 12–15. Patent Owner does not present any arguments directed specifically to these limitations. Nonetheless, because we conclude for the reasons set forth above that Petitioner has not made a sufficient showing with respect to at least limitations 1[E] and 1[H] (*see supra* Section II.D.2.f), we need not determine whether Petitioner has made a sufficient showing with respect to these additional limitations.

3. Dependent Claims 2, 3, 5–10, 13, and 14

Claims 2, 3, 5–10, 13, and 14 depend directly or indirectly from independent claim 1. Having failed to demonstrate a reasonable likelihood of prevailing with respect to claim 1, Petitioner also fails to demonstrate a reasonable likelihood of prevailing in its challenge to these dependent claims as unpatentable over Lai and the general knowledge of a person of ordinary skill in the art.

E. Obviousness of claims 4, 11, and 12 over Lai, Stoyan, and the general knowledge of a person of ordinary skill in the art

Claim 4 depends from claim 3, which in turn depends from claim 1, and further recites that “the light emitting diodes and the control integrated circuit are mounted on the same surface of the substrate.” Ex. 1001, 8:60–63. Claim 11 depends from claim 1 and recites that the LED lamp package structure of claim 1 further comprises “a fifth conductor and a sixth conductor, the fifth conductor being a positive DC voltage pad and the sixth conductor being a negative DC voltage pad.” *Id.* at 9:24–28. Claim 12

depends from claim 11 and further recites that “the first conductor and the fifth conductor are connected to two opposing sides of the package body,” “the second conductor and the third conductor are connected to two opposing sides of the package body,” and “the fourth conductor and the sixth conductor are connected to two opposing sides of the package body.” *Id.* at 9:29–35.

Petitioner contends that claims 4, 11, and 12 are unpatentable over the teachings of Lai in view of Stoyan and in further view of the general knowledge of a person of ordinary skill in the art. Pet. 29–34. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 12, 16–19, 22–24, 45.

Petitioner relies on Stoyan as disclosing LEDs and a control integrated circuit being mounted on the same surface of a substrate, in connection with claim 4, and as disclosing fifth and sixth conductors, relative to the four conductors allegedly disclosed by Lai, in connection with claim 11. Pet. 29 (“Stoyan discloses LEDs 1000 and control integrated circuit 1400A that are mounted on one surface of carrier body or substrate 1300” (citing Ex. 1006, Fig. 1A; Ex. 1003 ¶¶ 75–77)), 31–32 (“Stoyan FIG. 1A also discloses six separate ‘electrical terminals 1111, 1120, 1130, 1210, 1220, and 1230[,]’ where ‘the terminal pairs 1130/1230 and 1110/1210 facilitate power distribution to the carrier substrate 1300.’” (citing Ex. 1006, Fig. 1A, ¶¶ 65, 66; Ex. 1003 ¶ 84)). Nonetheless, Petitioner does not cite Stoyan as teaching or suggesting the subject matter of independent claim 1 lacking from Lai and the general knowledge of a person of ordinary skill in the art, as discussed in Section II.D.2.f above, namely, “the first conductor being a positive DC voltage pad” and “the fourth conductor being a negative DC voltage pad.” Therefore, we determine that Petitioner has not demonstrated a reasonable likelihood it would succeed in its challenge to claims 4, 11,

and 12 as unpatentable over Lai, Stoyan, and the general knowledge of a person of ordinary skill in the art.

F. Obviousness of claim 15 over Lai and Yan

Claim 15 depends from claim 1 and further recites that “the package body is in rectangular shape, said rectangle having a light emitting window, the light emitting diodes aligning with the light emitting window inside the rectangle.” Ex. 1001, 9:44–48.

Petitioner contends that claim 15 is unpatentable over the combination of Lai and Yan. Pet. 95–97.¹² Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 12, 16–18, 22–24, 45.

Petitioner relies on Yan as disclosing an LED package that has a “square footprint enabling multiple light emitting devices to be densely arranged in a square array,” and in one embodiment, a glass or plastic lens that “can be useful ‘for focusing the light emitted from the LED package [or] as a protective capping layer.’” Pet. 95–97 (alteration in original) (quoting Ex. 1009, 6:14–16, 11:37–41) (citing Ex. 1003 ¶¶ 182–183; Ex. 1009, 6:13–16, 12:48–53, Figs. 1, 6B). Petitioner contends that a person of ordinary skill in the art “would be motivated to combine the teachings of Lai with Yan to modify Lai’s package housing 5 to have a rectangular shape with a lens such as that in Yan,” that “[t]he lens in Yan satisfies the claim limitation ‘a light emitting window, the light emitting diodes aligning with the light emitting window inside the rectangle’ because [Yan’s] lens . . . is centered over the

¹² Notably, notwithstanding the fact that claim 15 depends from claim 1, against which Petitioner asserts Lai only “in view of the general knowledge of a POSITA” (*see supra* Sections I.E., II.D.), Petitioner does not include the general knowledge of a person of ordinary skill in the art as part of the combination asserted against claim 15.

LEDs,” and that “[t]his modification to Lai would enhance and focus light emitted from the LED chips in a direction perpendicular to Lai’s package housing 5.” *Id.* at 97 (citing Ex. 1003 ¶ 184). Nonetheless, Petitioner does not cite Yan as teaching or suggesting the subject matter of independent claim 1 lacking from Lai in combination with the general knowledge of a person of ordinary skill in the art, as discussed in Section II.D.2.f above, namely, “the first conductor being a positive DC voltage pad” and “the fourth conductor being a negative DC voltage pad.” Therefore, we determine that Petitioner has not demonstrated a reasonable likelihood it would succeed in its challenge to claim 15 as unpatentable over Lai and Yan.

G. Obviousness of claims 1–3, 5, 6, 9, 10, 13, 16, 17, 20, and 21 over Morgan in view of the general knowledge of a person of ordinary skill in the art

Petitioner contends that claims 1–3, 5, 6, 9, 10, 13, 16, 17, 20, and 21 are unpatentable over the teachings of Morgan in view of the general knowledge of a person of ordinary skill in the art. Pet. 34–82. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 12–16, 19–20, 22, 33–39.

1. Morgan

Morgan, titled “Methods and Apparatus for Controlling Devices in a Networked Lighting System,” describes methods and apparatus for computer-based control of light sources in a networked lighting system such as a “light string.” Ex. 1007, codes (54), (57). According to Morgan, “[a]pplications contemplated for such light strings include, but are not limited to, decorative and entertainment-oriented lighting applications (e.g., Christmas tree lights, display lights, theme park lighting, or video and other game arcade lighting, etc.).” *Id.* at code (57).

Figure 2 of Morgan is reproduced below:

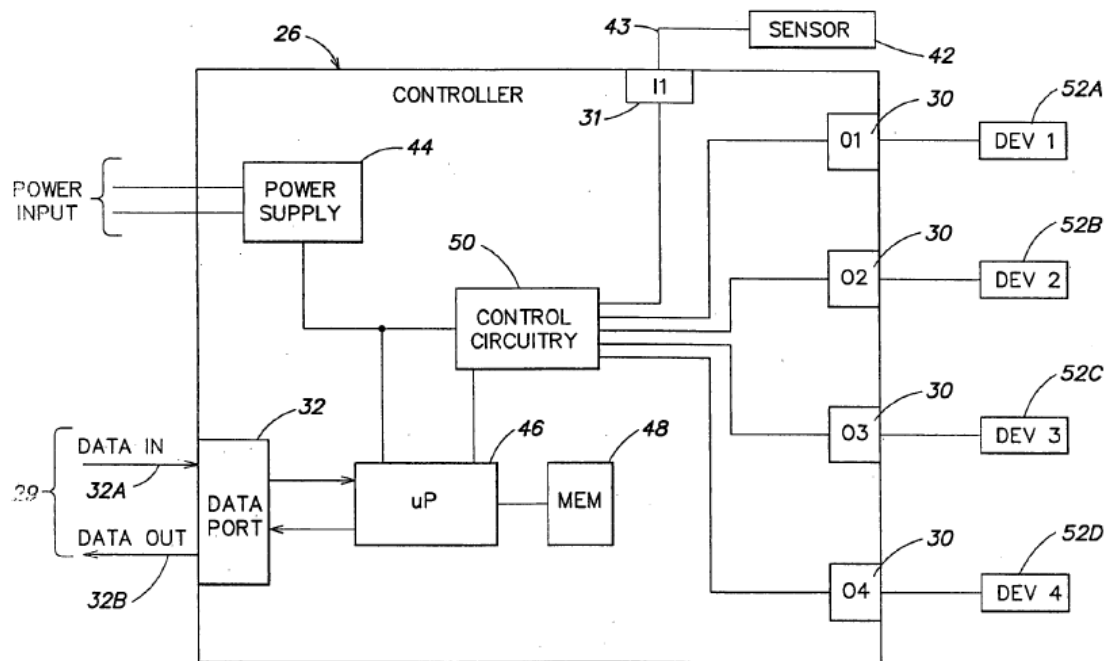


FIG. 2

Figure 2, above, is a diagram showing an example of a controller for a lighting system in one embodiment of Morgan's invention. Ex. 1007 ¶ 45. In Figure 2, controller 26 includes data port 32 having input terminal 32A and output terminal 32B, through which data 29 is transported. *Id.* ¶ 88.

Controller 26 also includes control circuitry 50, coupled to power supply 44 and microprocessor 46. *Id.* ¶ 89. Power supply 44 is shown in Figure 2 as being connected to a pair of "power input" lines extending from outside of controller 26. According to Morgan, control circuitry 50 and microprocessor 46 operate to transmit control signals from one or more independently controllable output ports 30 (indicated as O1, O2, O3, and O4 in Figure 2), based on data received by microprocessor 46. *Id.* Morgan further explains that in one embodiment, microprocessor 46 is programmed to decode or extract particular portions of the data it receives via data

port 32, corresponding to desired parameters for one or more devices 52A–52D (indicated as DEV1, DEV2, DEV3, and DEV4 in Figure 2) coupled to one or more output ports 30 of the controller 26, where “devices 52A–52D may be individual light sources, groups of lights sources, or one or more other controllable devices (e.g., various actuators).” *Id.* ¶ 90.

Figure 5 of Morgan is reproduced below:

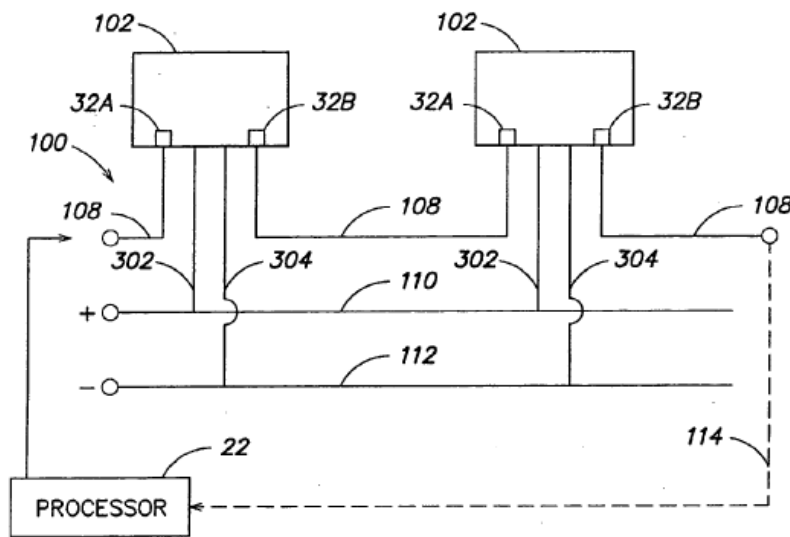


FIG. 5

Figure 5, above, illustrates a lighting network in the form of a light string, according to one embodiment of Morgan’s invention. Ex. 1007 ¶ 48. With reference to Figure 5, string 100 includes processor 22 that communicates with a plurality of lighting systems 102. *Id.* ¶ 117. Each lighting system 102 includes first and second data ports 32A and 32B, respectively, and power and ground connections 110 and 112, respectively. *Id.* ¶¶ 117, 119. As depicted in Figure 5, lighting systems 102 are connected in a serial fashion, such that second data port 32B of one lighting system 102 is connected to first data port 32A of the next lighting system 102. *Id.* ¶ 117. Thus, “[w]hen the data stream is communicated to the first lighting system 102 in the serial

connection, the first lighting system may strip the first data segment from the data stream and then communicate the remaining data stream to the next lighting system 102 in the serial connection.” *Id.* ¶ 118. Further, according to Morgan, although Figure 5 illustrates a parallel connection of power, a serial power distribution may instead be employed, and still further, “[a]lthough line 110 is referred to generally as ground, it should be understood that this may refer to a common reference potential and may not be earth ground.” *Id.* ¶ 119.

Figure 9 of Morgan is reproduced below:

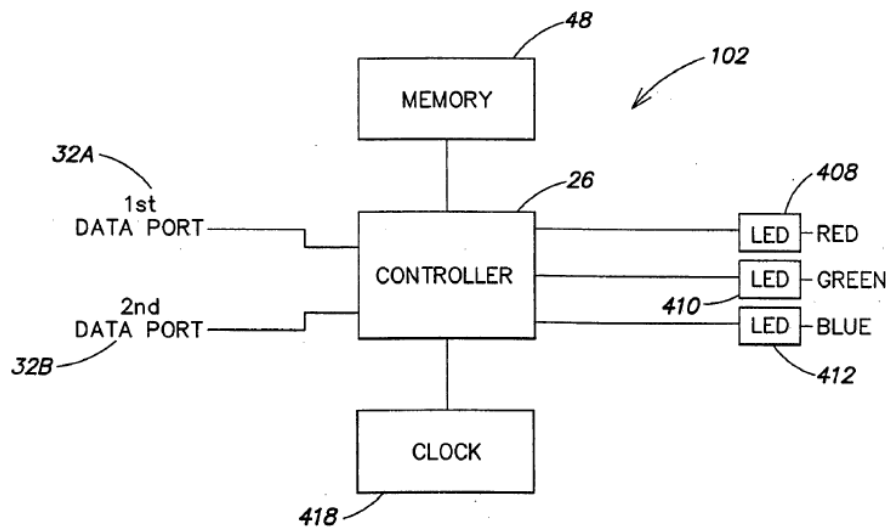


FIG. 9

Figure 9, above, illustrates an example of a lighting system of the light string of Figure 5. Ex. 1007 ¶ 52. With reference to Figure 9, lighting system 102 may include controller 26, which may have light sources 408, 410, and 412 each having one or more LEDs; first and second data ports 32A and 32B; memory 48; and clock 418 connected thereto. *Id.* ¶ 132. According to Morgan, controller 26 can also be connected to a voltage regulator (not

shown), and the LEDs may be associated with current limiting resistors (not shown) that may also be connected to the voltage regulator. *Id.*

Figure 13 of Morgan is reproduced below:

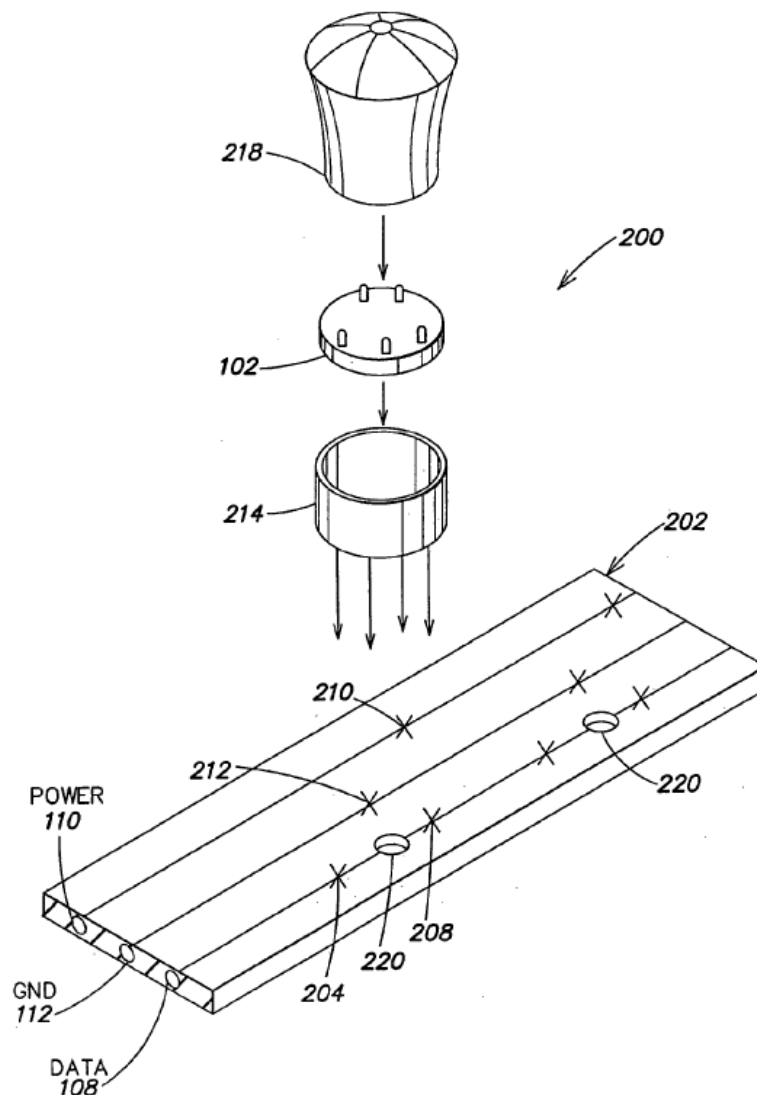


FIG. 13

Figure 13, above, illustrates a conduit arrangement for a lighting network according to another embodiment of Morgan's invention. Ex. 1007 ¶ 56. With reference to Figure 13, lighting string 200 includes conduit 202, light socket 214, and lighting system 102 having LEDs mounted to its top side and electrical connectors on its bottom side, where the connectors may be

physically arranged to match a pattern of connectors in socket 214 that may in turn be arranged to be electrically connected with conductors in conduit 202. *Id.* ¶¶ 139–140. According to Morgan,

In one aspect of this embodiment, the socket 214 may be positioned on the conduit 202, and screws or other electrically conductive fasteners may be used to electrically and physically connect the socket 214 to the conduit 202. Each of the connectors 312, 314, 320 and 318 of socket 214 may include holes, and the holes in the connectors may be aligned with holes 204, 208, 210 and 212 in the conduit 202, as shown in FIG. 13 in the socket 214 such that when a screw or other electrically conductive fastener is passed through the hole and into the conduit, an electrical connection is formed between the electrical connector of the socket and the electrical conductor of the conduit 202. In another aspect of this embodiment, the arrangement would electrically connect first data port 32A to one side of the broken data line 108 and second data port to the other side of the broken data line 108, such that the data line 108 circuit is completed through the lighting system 102. This arrangement would also electrically connect ground connector 304 to conductor 112 in the conduit 202 and power connector 302 to conductor 110 in the conduit 202.

Id. ¶ 141. With further reference to Figure 13, Morgan states that, in another embodiment, lighting system 200 may include optic 218, removably or sealably connected to socket 214. *Id.* ¶ 142. Socket 214 may also be sealed at the electrical connectors or at conduit 202. *Id.*

Figures 16A and 16B of Morgan are reproduced below:

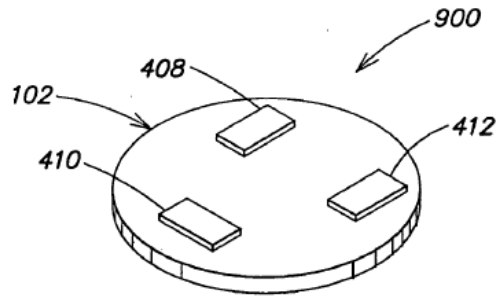


FIG. 16A

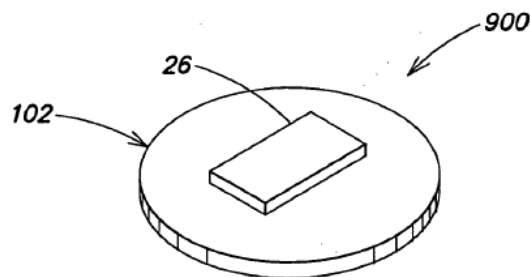


FIG. 16B

Figures 16A and 16B, above, illustrate a lighting system according to another embodiment of Morgan's invention, in which lighting system 102 is included in a lighting module. Ex. 1007 ¶¶ 60, 144. In Figure 16A, red, green, and blue LEDs 408, 410, and 412 are shown on the top side of lighting module 900, while Figure 16B shows controller 26 located on the bottom or opposite side of lighting module 900. *Id.* ¶ 144. According to Morgan, "[o]ne of the reasons for this construction is that the lighting module 900 may be so small that the three LEDs and the controller cannot fit on the same side." *Id.*

2. *Independent Claim 1*

As discussed above in connection with Petitioner's Lai-based ground, claim 1 recites, in part:

1. [Pre] A LED lamp package structure, comprising:

[A] a plurality of light emitting diodes, each light emitting diode having two electrode ends and one of the electrode ends being a common electrode end;

[B] a control integrated circuit, having a data input electrode, a data output electrode, a positive power-in electrode, and a negative power-in electrode, and electrically connected to the light emitting diodes, . . .

[D] a first conductor, a second conductor, a third conductor, and a fourth conductor, [E] the first conductor being a positive DC voltage pad and connected to the common electrode of each light emitting diode and the positive power-in electrode of the control integrated circuit, [F] the second conductor being connected to the data input electrode, [G] the third conductor being connected to the data output electrode, [H] the fourth conductor being a negative DC voltage pad and connected to the negative power-in electrode of the control integrated circuit

Ex. 1001, 8:27–48.

a) *1[Pre]*

Referring to Figure 13 of Morgan, Petitioner identifies optic 218, lighting system 102, and socket 214 as the LED lamp package structure recited in the preamble of claim 1. Pet. 34–35 (citing Ex. 1007 ¶ 140, Fig. 13; Ex. 1003 ¶ 89). Patent Owner does not present any arguments directed specifically to the preamble, and at this stage we find that Petitioner has made a sufficient showing.

b) *Limitation 1[A]*

With respect to limitation 1[A], Petitioner identifies devices 52A–52D (DEV 1 – DEV 4) in Figure 2 of Morgan as “a plurality of light emitting

diodes.” Pet. 35–36 (citing Ex. 1007 ¶¶ 90, 152, 153, Figs. 2; Ex. 1003 ¶ 90). Petitioner further contends that “Morgan also discloses LEDs with two electrode ends, one of which is a common electrode end,” that a person of ordinary skill in the art “would have understood FIG. 5 to disclose these two electrode ends as claimed,” and that “lighting system 102 as illustrated in FIG. 5 includes the LEDs.” *Id.* at 36 (citing Ex. 1007 ¶ 140, Fig. 5; Ex. 1003 ¶ 91). Patent Owner does not present any arguments directed specifically to limitation 1[A], and at this stage we find that Petitioner has made a sufficient showing.

c) Limitation 1[B]

With respect to limitation 1[B], Petitioner identifies Morgan’s controller 26, including control circuitry 50 coupled to power supply 44 and microprocessor 46, as the recited “control integrated circuit.” Pet. 37. Petitioner contends that a person of ordinary skill in the art “would have understood the labeled ‘POWER INPUT’ lead pair to include both a positive power-in electrode and a negative power-in electrode as claimed.” *Id.* Petitioner argues, with reference to Figure 2 of Morgan, that “controller 26 . . . ‘includes a data port 32 having an **input terminal 32A** and an **output terminal 32B**, through which data 29 is transported to and from the controller 26,’” and that “[d]ata is outputted to the LEDs via ‘one or more output ports 30 of the controller 26.’” *Id.* at 38 (quoting Ex. 1007 ¶¶ 88, 90) (citing Ex. 1003 ¶¶ 94–95). Petitioner further contends, “[t]he data output functionality to the LEDs is also shown in FIG. 9, which illustrates a controller 26 (‘control integrated circuit’) that transmits ‘data processing and lighting control functions’ to red, green, and blue LEDs.” *Id.* (citing Ex. 1007 ¶ 132; Ex. 1003 ¶ 96). Patent Owner does not present any

arguments directed specifically to limitation 1[B], and at this stage we find that Petitioner has made a sufficient showing.

d) Limitations 1[D]–1[H]

Petitioner contends that “Morgan discloses four separate conductors,” as recited in limitation 1[D]. Pet. 39 (citing Ex. 1007, Fig. 2; Ex. 1003 ¶ 98). In particular, with reference to Figure 2 of Morgan, Petitioner identifies the power input lines connected to Morgan’s power supply 44 as the first and fourth conductors recited in limitations 1[E] and 1[H], respectively; Morgan’s input terminal 32A as the second conductor of limitation 1[F]; and Morgan’s output terminal 32B as the third conductor of limitation 1[G]. *Id.* at 39–44.

With specific reference to limitation 1[E], Petitioner quotes Morgan’s disclosure that “[t]he controller 26 of FIG. 2 also includes control circuitry 50, coupled to a power supply 44 and the microprocessor 46,” and contends that a person of ordinary skill in the art “would have understood the labeled ‘POWER INPUT’ lead pair to include both a positive power-in electrode and a negative power-in electrode as claimed.” Pet. 40 (quoting Ex. 1007 ¶ 89) (citing Ex. 1003 ¶ 99). According to Petitioner, a person of ordinary skill in the art “would further understand the first conductor to act as a positive DC voltage pad which is connected to the common electrode of each LED” and “the fourth conductor to act as a negative DC voltage pad.” *Id.* at 40, 43. Petitioner continues,

As illustrated in FIG. 5, each “lighting system 102” is connected to a common positive power terminal, which a POSITA would have understood to be a positive DC voltage pad because the LEDs need to be in series with a current-regulating device, such as a transistor, with all LED anodes connected to the positive power voltage and each LED cathode connected to the current-regulating device (such as a BJT (bipolar junction transistor) or

FET (field-effect transistor)) which in turn is connected to GND (negative power voltage) and a control input. . . . At the periphery of the IC or lighting device, the pad is connected to a wire (which in turn may be called a conductor). . . . Moreover, item 110 is referred to as a “conductor.”

Id. at 40–41 (citing Ex. 1007 ¶¶ 119, 143, Fig. 5; Ex. 1003 ¶ 100). Petitioner makes similar arguments regarding limitation 1[H]. *Id.* at 43–44.

Patent Owner responds that neither the paragraphs of Morgan cited by Petitioner nor the figures referenced in those paragraphs disclose or illustrate positive or negative DC voltage pads as recited in limitations 1[E] and 1[H]. Prelim. Resp. 33–35 (citing Ex. 1007 ¶¶ 89, 119, 143, Figs. 2, 5, 15). Patent Owner contends, “[t]he three cited paragraphs are silent as to the structure of the electrical connections in Morgan”; Figures 2 and 5 show block or circuit diagrams, respectively, and do not illustrate the device or any structure components; and Figure 15 “purports to show a ‘conduit arrangement for a lighting network,’ but does not illustrate the structure of any electrical connections, let alone illustrate the claimed DC voltage pads.” *Id.* at 33–34 (citation omitted) (citing Ex. 1007 ¶¶ 89, 119, 143, Figs. 2, 5, 15).

In response to Petitioner’s argument that “[a] POSITA would further understand the first conductor to act as a positive DC voltage pad” as recited in limitation 1[E] and the similar assertion with respect to limitation 1[H], Patent Owner contends “Petitioner does not bridge the gap between Morgan’s disclosure and the claim language.” Prelim. Resp. 35 (citing Pet. 40–43). According to Patent Owner, this deficiency “is accentuated by the Petition’s reliance on arguing that Morgan is somehow functionally equivalent to the claim language, and the Petition’s inability to assert that Morgan discloses the structure that claim 1 recites.” *Id.* Moreover, Patent Owner argues, “Petitioner also does not propose to modify Morgan’s

electrical connections to be pads, or explain why a POSITA would have been motivated to make such a modification.” *Id.* Instead, Patent Owner contends, “the Petition includes several unsupported statements about what a POSITA would have understood,” “cit[ing] only Dr. Schubert’s declaration (Ex. 1003), which repeats the same conclusory statements as the Petition verbatim and should be given no weight.” *Id.* (citing Pet. 40–41, 43–44).

Having considered the parties’ respective arguments and the evidence of record, we agree with Patent Owner that Petitioner has failed to make a sufficient showing with respect to limitations 1[E] and 1[H]. As an initial matter, we agree with Patent Owner that the cited portions of Morgan do not include any express disclosure of “pads,” and we find no persuasive evidentiary support for Petitioner’s assertions that a person of ordinary skill in the art “would understand the first conductor to act as a positive DC voltage pad which is connected to the common electrode of each LED,” “would have understood” the “common positive power terminal” to which Petitioner alleges each lighting system 102 is connected “to be a positive DC voltage pad,” and “would further understand the fourth conductor to act as a negative DC voltage pad.” Pet. 40, 43; *see* Prelim. Resp. 33–35. As Patent Owner points out, Dr. Schubert’s Declaration merely “repeats the same conclusory statements as the Petition” with respect to limitations 1[E] and 1[H] and are accordingly entitled to little, if any weight. Prelim. Resp. 35; *see* 37 C.F.R. § 42.65(a).

In addition to the issues raised by Patent Owner’s arguments concerning the term “pad,” we determine that Petitioner’s allegations with respect to limitation 1[E] vis-à-vis Morgan are deficient in an additional critical respect. In particular, limitation 1[E] recites “the first conductor being a positive DC voltage pad and *connected to the common electrode of*

each light emitting diode and the positive power-in electrode of the control integrated circuit.” Ex. 1001, 8:40–43 (emphasis added). We find in the Petition, however, no identification of any conductor in Morgan that is connected to *both* “the common electrode of each light emitting diode” *and* “the positive power-in electrode of the control integrated circuit,” as recited in limitation 16[E].

As set forth above, the Petition first points to one of the “POWER INPUT” lines connected to power supply 44 of controller 26 in Figure 2 (i.e., the “control integrated circuit,” in Petitioner’s mapping) as allegedly meeting the “positive DC voltage pad” limitation. Pet. 39–40. However, neither Figure 2 nor the corresponding text in Morgan’s specification suggests that either of the POWER INPUT lines, both of which are located on the left side of the figure, are “connected to the common electrode of each light emitting diode.” Ex. 1007 ¶¶ 88–94, Fig. 2. Indeed, the only discernible connections to LEDs shown in Figure 2 are the connections between output ports 30 and devices (e.g., LEDs) 52A–52D (labeled as DEV 1 – DEV 4) on the far-right side of the figure for, e.g., transmission of control signals. *Id.* ¶ 90, Fig. 2.

The Petition then shifts and points instead to conductor 110 in Figure 5 as being the alleged “positive DC voltage pad” to show “connect[ion] to the common electrode of each light emitting diode.” Pet. 40. We find this mapping, too, to be unavailing, however. Although Figure 5 shows power connectors 302 connecting conductor 110 to each lighting system 102, Figure 5 does not show any connection between conductor 110 and any “control integrated circuit” identified by Petitioner. *See* Ex. 1007 ¶¶ 117–119, 140, Fig. 5.

Accordingly, for these additional reasons, we find Petitioner has failed to show that Morgan teaches or suggests a “first conductor being a positive DC voltage pad and connected to the common electrode of each light emitting diode and the positive power-in electrode of the control integrated circuit,” as recited in limitation 1[E].

e) Limitations 1[C] and 1[I]

Petitioner contends that Morgan teaches limitations 1[C] and 1[I]. Pet. 38–39, 45–48. Patent Owner does not present any arguments directed specifically to these limitations. Nonetheless, because we conclude for the reasons set forth above that Petitioner has not made a sufficient showing with respect to at least limitations 1[E] and 1[H] (*see supra* Section II.G.2.d), we need not determine whether Petitioner has made a sufficient showing with respect to these additional limitations.

3. Independent Claim 16

a) 16[Pre]: “A light emitting diode lamp assembly, comprising:”

Referring to Figure 13 of Morgan, Petitioner identifies optic 218, lighting system 102, and socket 214 as the “light emitting diode lamp assembly” recited in the preamble of claim 16. Pet. 57 (citing Ex. 1007 ¶ 140, Fig. 13; Ex. 1003 ¶ 126). Patent Owner does not present any arguments directed specifically to the preamble, and at this stage we find that Petitioner has made a sufficient showing.¹³

¹³ We make no finding as to whether the preamble is limiting.

b) Limitation 16[A]: “a light emitting diode lamp having a plurality of light emitting diodes and four electric conductivity supports encapsulated in a package body;”

With reference again to Figure 13 of Morgan, Petitioner argues that optic 218 and socket 214 together form a “package body” that encapsulates LEDs (i.e., lighting system 102) and four conductors, with a portion of each conductor being exposed outside optic 218 and socket 214. Pet. 59–60 (citing Ex. 1007, Fig. 13). Petitioner contends that “‘lighting system 102’ includes several ‘electrical connectors’ for the four conductors,” and “socket 214 has conductivity supports to enable connectivity to four conductors partially exposed outside the package body.” *Id.* at 61 (citing Ex. 1007, Figs. 14A, 14B; Ex. 1003 ¶ 130). Patent Owner does not present any arguments directed specifically to this limitation, and at this stage we find that Petitioner has made a sufficient showing.

c) Limitation 16[B]: “a lampshade covering the package body of the light emitting diode lamp;”

With respect to limitation 16[B], Petitioner presents two alternative arguments. Pet. 63–64. First, Petitioner contends that a person of ordinary skill in the art “would recognize that a separate ‘lampshade’ would be an obvious addition to the LED lamp assembly disclosed in Morgan.” *Id.* at 63. According to Petitioner, “[a] lampshade diffuses the light originating from point sources such as LEDs thereby creating a more pleasant lighting environment,” and “[f]urthermore, lampshades reduce glare which is a common undesirable phenomenon associated with bright point-like sources.” *Id.* at 63–64 (citing Ex. 1003 ¶ 133). Alternatively, Petitioner contends, “the claimed ‘package body’ can consist only of the socket 214 (within which the lighting system 102 sits and is electrically connected to

the socket connectors 312, 314, 320 and 318), and the coupled optic 218 can be considered the ‘lampshade’ that covers the package body.” *Id.* at 64 (citing Ex. 1007, Fig. 13; Ex. 1003 ¶ 134).

Patent Owner responds that both of Petitioner’s theories fail to establish unpatentability. Prelim. Resp. 36–38. Regarding Petitioner’s first theory, Patent Owner argues that there is no basis for the assertion that a person of ordinary skill would have found it obvious to add a lampshade over optic 218. *Id.* at 36. According to Patent Owner, even if it is true that a lampshade “diffuses the light” originating from LEDs to “creat[e] a more pleasant lighting environment,” and that lampshades “reduce glare,” as Petitioner alleges, the Petition nonetheless “does not establish that Morgan’s device lacks such capabilities and would have benefited from the addition of a lampshade.” *Id.* at 36–37 (quoting Pet. 63–64). In fact, Patent Owner asserts, “Morgan teaches that optic 218 ‘may be able to diffuse the light, redirect the light, generate a prismatic effect or otherwise affect the generated light,’” and “[t]herefore, Morgan establishes that optic 218 already provides the advantages underlying the modification in the Petition, and refutes the Petition’s assertion that it would have been obvious to a POSITA to add a lampshade *over* optic 218 that already provides the same benefits.” *Id.* at 37 (citing Ex. 1007 ¶ 150).

Regarding Petitioner’s second theory, Patent Owner argues that Petitioner’s alternative identification of socket 214 alone as the “package body” and optic 218 as the “lampshade” conflicts with Petitioner’s analysis of limitation 16[A], “because the Petition does not set forth any basis for alleging that socket 214 alone is a package body that encapsulates ‘a plurality of light emitting diodes and four electric conductivity supports,’ as required by [limitation] 16[A].” Prelim. Resp. 37–38. Further, Patent Owner

contends, Petitioner’s “alternative mapping also fails because the Petition does not establish, or even allege, that optic 218 is a lampshade covering socket 214, because [limitation] 16[B] requires ‘a lampshade covering the package body.’” *Id.* at 38.

Having considered the parties’ respective arguments and the evidence of record, we determine, for substantially the reasons argued by Patent Owner, that Petitioner has failed to make a sufficient showing with respect to limitation 16[B]. In support of Petitioner’s reasoning as to why a person of ordinary skill in the art “would recognize that a separate ‘lampshade’ would be an obvious addition to the LED lamp assembly disclosed in Morgan,” the Petition cites only Dr. Schubert’s testimony that repeats the same assertions without any further elaboration and without taking into account Morgan’s disclosure, as identified by Patent Owner, suggesting that Morgan’s optic 218 already provides the benefits that Petitioner alleges addition of a lampshade would provide. *Compare* Pet. 63–64, *with* Ex. 1003 ¶ 133; *see* Prelim. Resp. 37 (citing Ex. 1007 ¶ 150). We additionally agree with Patent Owner that Petitioner’s second theory also fails, both because Petitioner does not show how socket 214 alone would encapsulate “a plurality of light emitting diodes and four electric conductivity supports,” as required by limitation 16[A], and because Petitioner does not establish that optic 218, as the recited “lampshade,” would “cover[]” socket 214, as the recited “package body.” *See id.* at 37–38. Indeed, as Petitioner itself recognizes, Morgan describes optic 218 as being removably or sealably *connected* to socket 214, rather than as covering it. *See* Pet. 60 (“Morgan makes clear that the optic 218 is connected to the socket 214 (either removably connected or sealably connected).” (citing Ex. 1007 ¶ 142)).

d) *Limitations 16[C] and 16[D]*

Petitioner contends that Morgan teaches each of the remaining limitations of claim 16. Pet. 65–68. Patent Owner does not present any arguments directed specifically to these limitations. Nonetheless, because we conclude for the reasons set forth above that Petitioner has not made a sufficient showing with respect to at least limitation 16[B] (*see supra* Section II.G.3.c), we need not determine whether Petitioner has made a sufficient showing with respect to these additional limitations.

4. *Independent Claim 21*

Claim 21 recites, in part:

21. A light emitting diode lamp assembly, comprising:

- a light emitting diode lamp having a package body and a circuit board, the package body encapsulating a plurality of light emitting diodes and four electric conductivity supports, . . . [and]
- a lampshade covering the package body of the light emitting diode lamp;

Ex. 1001, 10:15–26. Petitioner relies for the “package body” and “lampshade” limitations on substantially the same arguments and evidence as for the corresponding limitations of claim 16. *Compare* Pet. 71–77, 78–79, *with* Pet. 58–64. For the reasons set forth in the above discussion of claim 16, we determine that Petitioner also has not demonstrated a reasonable likelihood of prevailing in its challenge to claim 21 as unpatentable over Morgan and the general knowledge of a person of ordinary skill in the art. *See supra* Section II.G.3.

5. *Dependent Claims 2, 3, 5, 6, 9, 10, 13, 17, and 20*

Claims 2, 3, 5, 6, 9, 10, and 13 depend directly or indirectly from independent claim 1. Claims 17 and 20 depend from independent claim 16.

Having failed to demonstrate a reasonable likelihood of prevailing with respect to the independent claims, Petitioner also fails to demonstrate a reasonable likelihood of prevailing in its challenge to these dependent claims as unpatentable over Morgan and the general knowledge of a person of ordinary skill in the art.

H. Obviousness of claims 4, 11, and 12 over Morgan and Stoyan

Petitioner contends that claims 4, 11, and 12 are unpatentable over the teachings of Morgan in view of Stoyan. Pet. 82–87. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 12, 16–20, 22–24, 45.

As with respect to its ground based on Lai, Stoyan, and the general knowledge of a person of ordinary skill in the art discussed in Section II.E. above, Petitioner relies for this ground on Stoyan as disclosing LEDs and a control integrated circuit being mounted on the same surface of a substrate, in connection with claim 4, and as disclosing fifth and sixth conductors, relative to the four conductors allegedly disclosed by Lai, in connection with claim 11. Pet. 83 (“Stoyan discloses LEDs 1000 and control integrated circuit 1400A that are mounted on one surface of carrier body or substrate 1300” (citing Ex. 1006, Fig. 1A; Ex. 1003 ¶ 159)), 85 (“Stoyan FIG. 1A also discloses six separate ‘electrical terminals 1111, 1120, 1130, 1210, 1220, and 1230[,]’ where ‘the terminal pairs 1130/1230 and 1110/1210 facilitate power distribution to the carrier substrate 1300.’” (citing Ex. 1006, Fig. 1A, ¶¶ 65, 66; Ex. 1003 ¶ 166)). Nonetheless, Petitioner does not cite Stoyan as teaching or suggesting the subject matter of independent claim 1 lacking from Morgan and the general knowledge of a person of ordinary skill in the art, as discussed in Section II.G.2.d above, namely, “the first conductor being a positive DC voltage pad and connected to the common electrode of each light emitting diode” and “the fourth

conductor being a negative DC voltage pad and connected to the negative power-in electrode of the control integrated circuit.” Therefore, we determine that Petitioner has not demonstrated a reasonable likelihood it would succeed in its challenge to claims 4, 11, and 12 as unpatentable over Morgan, Stoyan, and the general knowledge of a person of ordinary skill in the art.

I. Obviousness of claim 15 over Morgan and Yan

Petitioner contends that claim 15 is unpatentable over the combination of Morgan and Yan. Pet. 98–100.¹⁴ Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 12, 16–18, 22–24, 45.

Petitioner in this ground relies on Yan for the same disclosures as in its ground based on Lai and Yan, discussed in Section II.F. above. Pet. 99 (citing Pet. 95–97; Ex. 1003 ¶¶ 186–187). Petitioner contends that “[t]he only material difference between Morgan and Yan with respect to . . . claim [15] is that the socket 214 in Morgan (‘package housing’) is cylindrical instead of rectangular.” *Id.* at 100 (citing Ex. 1003 ¶ 188). According to Petitioner, a person of ordinary skill in the art “would be motivated to combine the teachings of Morgan with Yan to modify Morgan’s socket 214 (i.e., the claimed ‘package housing’) to have a rectangular shape,” such that “more LEDs can be connected to the surface of lighting system 102, and more densely packed LED structures can be connected,” and because “Yan’s LED manufacturing method is efficient.”

¹⁴ Notably, notwithstanding the fact that claim 15 depends from claim 1, against which Petitioner asserts Morgan only “in view of the general knowledge of a POSITA” (*see supra* Sections I.E., II.G.), Petitioner does not include the general knowledge of a person of ordinary skill in the art as part of the combination asserted against claim 15.

Id. (citing Ex. 1003 ¶ 189; Ex. 1009, 6:14–16, 14:51–53). Nonetheless, Petitioner does not cite Yan as teaching or suggesting the subject matter of independent claim 1 lacking from Morgan in combination with the general knowledge of a person of ordinary skill in the art, as discussed in Section II.G.2.d above, namely, “the first conductor being a positive DC voltage pad and connected to the common electrode of each light emitting diode” and “the fourth conductor being a negative DC voltage pad and connected to the negative power-in electrode of the control integrated circuit.” Therefore, we determine that Petitioner has not demonstrated a reasonable likelihood it would succeed in its challenge to claim 15 as unpatentable over Morgan and Yan.

J. Obviousness of claim 16 over Allsop in view of the general knowledge of a person of ordinary skill in the art

Petitioner contends that claim 16 is unpatentable over the teachings of Allsop in view of the general knowledge of a person of ordinary skill in the art. Pet. 88–95. Patent Owner disputes Petitioner’s contentions. Prelim. Resp. 12–16, 20–22, 39–45.

1. Allsop

Allsop, titled “Offset Solar-Powered Outdoor Lighting Apparatus,” describes a system for providing outdoor lighting, including a support, a lighting element assembly, and a collector unit. Ex. 1008, codes (54), (57), ¶ 6. The support is typically a vertical rod having the lower end thereof inserted in a soil substrate, and the lighting element assembly is typically ornamental and contains a lighting element, such as an LED. *Id.* ¶ 6. The lighting element assembly “secures to the support near the upper end thereof” and “has a diffuser positioned over the lighting element to diffuse the light therefrom,” while the collector unit “contains a solar cell and a

battery” and “secures to the support offset a substantial distance from the lighting element assembly.” *Id.* ¶¶ 6–8. A light sensitive switch connects the lighting element to the battery and is operable to turn the lighting element on and off depending on lighting conditions. *Id.* at code (57), ¶ 7.

Figure 6 of Allsop is reproduced below:

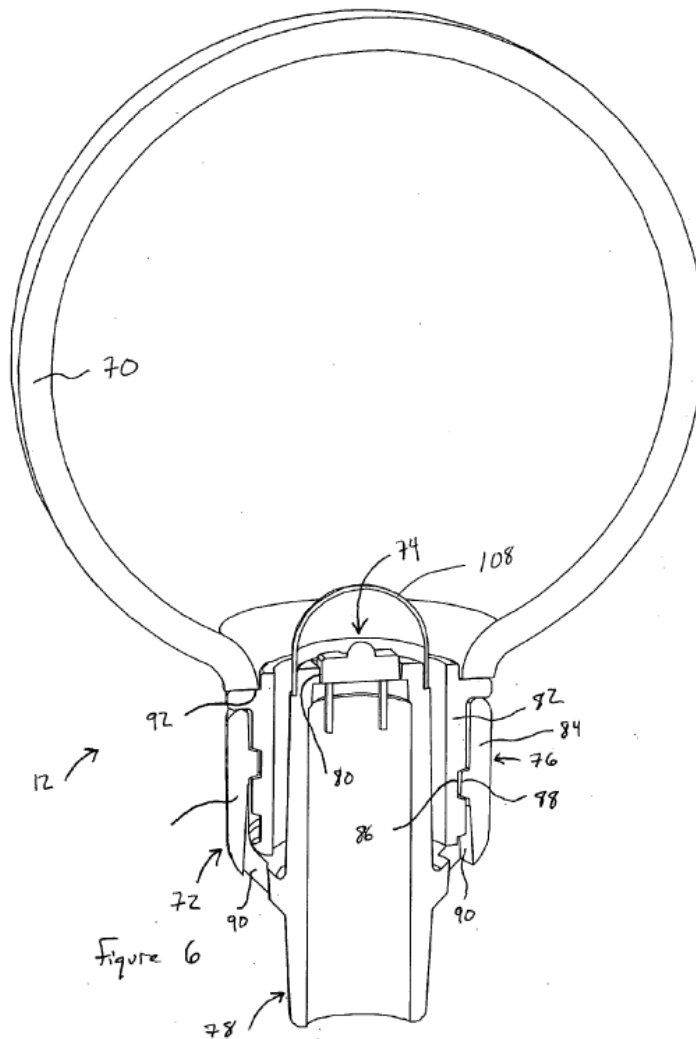


Figure 6, above, is a cutaway perspective view of a lighting element assembly in accordance with Allsop’s invention. Ex. 1008 ¶ 17. Referring to Figure 6, lighting element assembly 12 may include support adapter 72, as well as diffuser 70 and lighting element 74. *Id.* ¶ 34. Diffuser 70 “may be embodied as a globe, or other three-dimensional shape positionable over the

lighting element 74,” and “[o]ne or both of the interior and exterior surfaces may be colored, textured, or treated to enhance the diffusing properties of the diffuser 70.” *Id.* According to Allsop, “support adapter 72 typically includes a diffuser receptacle 76, a support receiver sleeve 78, and a lighting element seat 80,” where “diffuser receptacle 76 mates with a portion of the diffuser 70 or an attachment 82 secured to the diffuser 70.” *Id.* ¶ 35. In the illustrated embodiment, “receptacle 76 is an annular pocket formed by an outer wall 84 circumscribing the lighting element seat 80.” *Id.* “[R]eceptacle 76 mates with a tubular attachment 82, or a tubular structure monolithically formed with the diffuser 70, having threads 86 matable with corresponding threads 88 formed on the interior surface of the outer wall 84.” *Id.*

Figure 7 of Allsop is reproduced below:

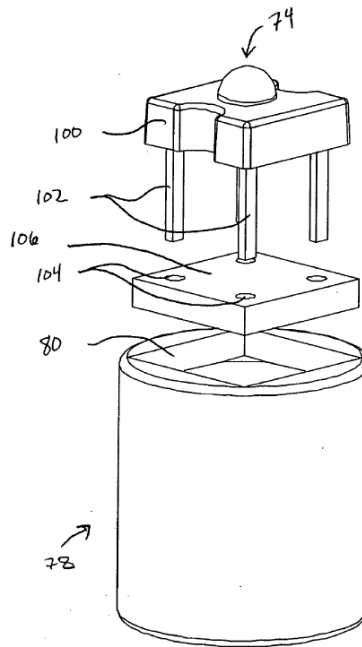


Figure 7

Figure 7, above, is an exploded view of a LED mounting system in accordance with Allsop’s invention. Ex. 1008 ¶ 18. In the embodiment

illustrated in Figure 7, “lighting element seat 80 receives a lighting element 74 embodied as an LED circuit board 100 having an LED mounted thereon.” *Id.* ¶ 40. Allsop provides that “[t]he LED may be amber, or any other color output by LED’s,” and in some embodiments, phosphorescent coating over the LED results in light having wavelengths other than those output[sic] by the LED.” *Id.* Circuit board 100 “typically has leads 102 extending therefrom . . . through apertures 104 formed in an LED mount plate 106,” where “mount plate 106 secures within the lighting element seat 80 by means of adhesive or a like securement means.” *Id.* Allsop explains that in typical applications, a wire 50 will be connected to leads 102 prior to securing mount plate 106 to lighting element seat 80, which typically opens into support receiver sleeve 78, providing a channel through support adapter 72 to receive the wire. *Id.* Further, Allsop discloses, “[a] lighting element shield 108, such as a transparent dome, may then be placed over the lighting element 74 to protect against weathering.” *Id.* “In the illustrated embodiment, the shield 108 fits around the lighting element 74 and lighting element seat 80 and is secured by either adhesive or press-fit,” whereas “[i]n some embodiments, the shield 108 extends downwardly to near the point of attachment of the outer wall 84 to the support adapter 72 to provide additional protection.” *Id.*

2. *Independent Claim 16*

As discussed above in connection with Petitioner’s Morgan-based ground, claim 16 recites, in part, “16. [Pre] A light emitting diode lamp assembly, comprising: [A] a light emitting diode lamp having a plurality of light emitting diodes and four electric conductivity supports encapsulated in a package body.” Ex. 1001, 9:49–52.

With respect to the preamble of claim 16, Petitioner contends that “Allsop discloses a ‘light emitting diode lamp assembly’ as illustrated, for example, in FIG. 6.” Pet. 88 (citing Ex. 1008 ¶ 34, Fig. 6; Ex. 1003 ¶ 171). Patent Owner does not present any arguments directed specifically to the preamble, and at this stage we find that Petitioner has made a sufficient showing.

With respect to limitation 16[A], Petitioner argues, first, that “Allsop discloses ‘a lighting element 74 embodied as an LED circuit board 100 having an LED mounted thereon’” and that “[t]he LED may be amber, *or any other color output by LED’s*.” Pet. 88–89 (quoting Ex. 1008 ¶ 40 (emphasis added)). Petitioner then asserts, “[t]he LED circuit board 100 is comprised of multiple LEDs (e.g., red, green, and Blue LEDs) in order to output ‘any other color’ as described.” *Id.* (quoting Ex. 1003 ¶ 172).

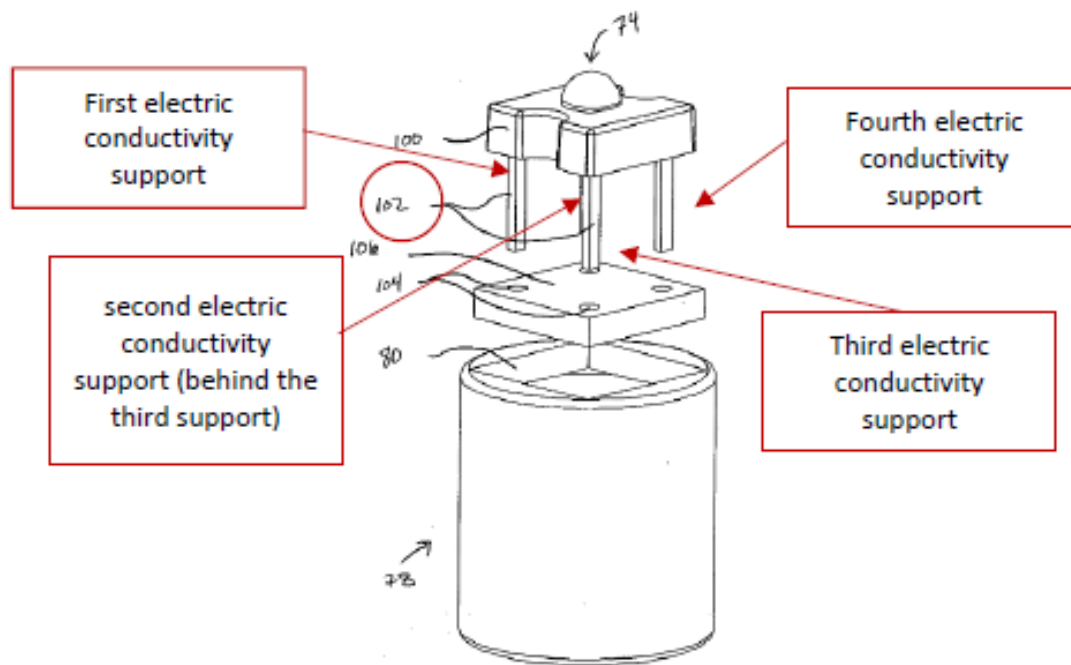
Petitioner further contends:

In addition, it would be an obvious and simple modification to explicitly include two separate LEDs in Allsop’s lighting element assembly. A POSITA would find it obvious and desirable to create any color of light, including magenta. A POSITA would understand that magenta is created by combining the light from a blue LED and a red LED. Since Allsop contemplates the creation of “any other color” of light, including magenta, a POSITA would understand that this can be accomplished by using two LEDs, a red one and a blue one.

Id. at 89 (citing Ex. 1003 ¶ 173).

With respect to the further recitation in limitation 16[A] of the “light emitting diode lamp having . . . four electric conductivity supports encapsulated in a package body,” Petitioner contends that “[f]our electric conductivity supports are illustrated in FIG. 7.” Pet. 89. In support of that

contention, Petitioner provides an annotated version of Allsop's Figure 7, reproduced below:



In the annotated version of Figure 7, above, Petitioner has circled the reference numeral “102”; added call-out boxes to the drawing elements identified by Allsop as leads 102, labeling them as “First electric conductivity support” and “Third electric conductivity support”; and added call-out boxes to two other elements not labeled by Allsop, labeling them as “second electric conductivity support (behind the third support)” and “Fourth electric conductivity support.” *Id.* Citing Allsop’s disclosure that circuit board 100 in Figure 7 “has leads 102 extending therefrom,” that “leads 102 extend through apertures 104 formed in an LED mount plate 106,” that “mount plate 106 secures within the lighting element seat 80 by means of adhesive or a like securement means,” and that “wire 50 will be connected to the leads 102 prior to securing the mount plate 106 to the

lighting element seat 80,” Petitioner argues that a person of ordinary skill in the art “would have understood that these four leads 102 are conductors to facilitate an electrical connection with wire 50.” *Id.* at 90 (quoting Ex. 1008 ¶ 40) (citing Ex. 1003 ¶ 174). Petitioner further contends, with reference to Figure 6 of Allsop, that “Allsop also discloses a lighting element shield 108 as the claimed ‘package body’ that encapsulates the LEDs and four conductors.” *Id.* at 90–91 (citing Ex. 1008 ¶ 40; Ex. 1003 ¶ 175).

Patent Owner responds, first, that “[t]he Petition incorrectly alleges that Allsop discloses ‘a plurality of light emitting diodes.’” Prelim. Resp. 39 (quoting Pet. 88–89). Patent Owner argues, “[t]he Petition cites only paragraph [0040] of Allsop, which discloses a *single* lighting element 74 having a *single* LED under a light shield 108.” *Id.* (citing Ex. 1008 ¶ 40). Patent Owner contends that Figures 6 and 7 of Allsop likewise illustrate a single lighting element 74, and as described in paragraph 40, “a single lighting element 74 with a single LED,” and that “Petitioner is wrong to allege otherwise.” *Id.* at 39–40. Patent Owner further argues, “Petitioner assumes that Allsop’s circuit board 100 must include multiple LEDs in order to output ‘amber, or any other color,’” but “[t]he very same paragraph Petitioner cites to refutes this assumption.” *Id.* at 40 (citing Pet. 88; Ex. 1008 ¶ 40). Therefore, according to Patent Owner, “not only does Allsop lack a plurality of light emitting diodes, but Allsop also teaches a POSITA how to output ‘any other color’ without needing more than a single LED.” *Id.* at 40–41 (citing Ex. 1008 ¶ 40).

Still further, Patent Owner contends, while “the Petitioner also argues that it would have been an ‘obvious and simple modification to explicitly include two separate LEDs in Allsop’s lighting assembly,’” this argument, too, “is wrong.” Prelim. Resp. 41 (quoting Pet. 89). First, Patent Owner

argues, Petitioner’s identification of a desire “to create any color” as a basis for modifying Allsop to include multiple LEDs is a “strawman argument” because Allsop already “teaches how to output ‘amber or any other color’ using a single LED and a phosphorescent coating, as explained above.” *Id.* (citing Pet. 89; Ex. 1008 ¶ 40). Furthermore, Patent Owner argues, “the Petition does not explain how – or even allege that – a POSITA would have expected success in adding LEDs to Allsop’s device,” and indeed, “Fig. 6 of Allsop suggests that a POSITA would not have been able to add a plurality of LEDs without extensive modification.” *Id.* As shown in Figure 6, Patent Owner contends, “lighting element shield 108 fits around lighting element 74 and is in close proximity” thereto, and “there is no room within shield 108 to add any more lighting elements.” *Id.* at 42 (emphasis omitted) (citing Ex. 1008, Fig. 6). According to Patent Owner, “Petitioner and Dr. Schubert do not address the engineering challenges in modifying Allsop’s device given these space constraints.” *Id.*

Patent Owner further argues that the Petition fails to show that Allsop discloses the “four electric conductivity supports” recited in limitation 16[A]. Prelim. Resp. 43–45. In particular, Patent Owner argues, “Fig. 7 labels only two leads 102,” and Petitioner’s “alleg[ation] that ‘[f]our conductivity supports are illustrated in FIG. 7’ of Allsop . . . is incorrect.” *Id.* at 43–44 (second alteration in original) (emphasis omitted) (quoting Pet. 89) (citing Ex. 1008 ¶ 40, Fig. 7). According to Patent Owner:

Once again, Petitioner and its expert assume that the claim limitation is met, without the factual support necessary for institution. Dr. Schubert provides no additional explanation as to why Allsop must disclose four electric conductivity supports, when Fig. 7 only labels two leads 102, and paragraph [0040] of Allsop is silent as to the number of leads 102. For example, the Petition and Dr. Schubert fail to explain why Allsop necessarily

discloses four electric conductivity supports, as opposed to two electrical leads 102, and two non-electric and non-conductive posts used only for mounting the circuit board 100 to the LED mount plate 106. Indeed, there is nothing in the Petition establishing that Allsop's circuit board 100 requires any more than two leads 102 – one for positive power and one for negative power or ground.

At bottom, Allsop does not expressly disclose “four electric conductivity supports encapsulated in a package body” as claimed, and the Petition fails to establish that Allsop must have four leads 102.

Id. at 44–45 (citing *Upjohn Co. v. Mova Pharm. Corp.*, 225 F.3d 1306, 1311 (Fed. Cir. 2000); *Samsung Elecs. Co. v. Mojo Mobility, Inc.*, IPR2023-01102, Paper 11, 13 (PTAB Jan. 10, 2024) (denying institution and affording little weight to expert testimony that is based upon assumptions)).

Having considered the parties' respective arguments and the evidence of record, we agree with Patent Owner that Petitioner has failed to make a sufficient showing with respect to limitation 16[A].

As an initial matter, notwithstanding Petitioner's contention that Allsop's “circuit board 100 is comprised of multiple LEDs (e.g., red, green, and blue LEDs) in order to output ‘any other color’ as described” (Pet. 89), we agree with Patent Owner that the cited portions of Allsop disclose only a single lighting element having a single LED (*see* Prelim. Resp. 39 (citing Ex. 1008 ¶ 40, Figs. 6, 7)). In particular, paragraph 40 of Allsop describes “**a lighting element** 74 embodied as an LED circuit board 100 having **an LED** mounted thereon” and thereafter refers only to “the LED” in the singular: “**The LED** may be amber, or any other color output by LEDs.”; “In some embodiments, phosphorescent coating over **the LED** results in light having wavelengths other than those output[sic] by **the LED**.” Ex. 1008 ¶ 40 (emphases added). Neither Figures 6 and 7 nor the corresponding description

in Allsop’s specification provide otherwise. *See, e.g., id.* ¶ 34 (describing Figure 6 and stating that “lighting element 74 [is] embodied as ***an LED***” (emphasis added)); *see also id.* ¶ 6 (“The lighting element assembly is typically ornamental and contains a lighting element, such as ***an LED***.” (emphasis added)), ¶ 22 (“The lighting element assembly 12 typically includes a light producing means such as ***an*** incandescent lamp or ***LED***.” (emphasis added)).

Moreover, Petitioner does not provide persuasive evidence that a person of ordinary skill in the art would have been motivated to modify Allsop to include “a plurality of light emitting diodes,” as recited in claim 16. As Patent Owner points out, Petitioner’s alleged basis for modifying Allsop to include multiple LEDs—i.e., a desire “to create any color”—is undermined by Allsop’s express disclosure that a phosphorescent coating can be used over the LED to result in light having wavelengths other than that output by the LED. *See* Prelim. Resp. 41 (citing Ex. 1008 ¶ 40).

Lastly, we agree with Patent Owner that neither the Petition nor Dr. Schubert’s Declaration sufficiently shows how Allsop teaches or suggests inclusion of *four* electric conductivity supports encapsulated in a package body in an LED lamp, as recited in claim 16. *See* Prelim. Resp. 44 (citing Pet. 89–90; Ex. 1003 ¶ 174). As Patent Owner points out, notwithstanding Petitioner’s annotations to Figure 7 at page 89 of the Petition, Allsop’s own Figure 7 labels only *two* leads 102; the cited portion of Allsop’s specification is silent as to the number of leads 102; and the Petition does not establish that Allsop’s circuit board 100 would require any more than two leads 102. *Id.* at 44–45. As with the grounds based on Lai and Morgan above, Petitioner’s inclusion of the “general knowledge of a POSITA” in the asserted ground is unavailing because the Petition does not

recognize the deficiencies in Allsop, let alone explain how or why the “general knowledge” of a person of ordinary skill in the art would be brought to bear to overcome the same.

For the foregoing reasons, we conclude that Petitioner has not demonstrated a reasonable likelihood that it would prevail in its challenge to claim 16 as obvious over Allsop in view of the general knowledge of a person of ordinary skill in the art.

III. CONCLUSION

After considering the evidence and arguments presented in the Petition and the Preliminary Response, we determine that Petitioner does not demonstrate a reasonable likelihood of prevailing with respect to any of the challenged claims, and thus, we do not institute an *inter partes* review.

IV. ORDER

In consideration of the foregoing, it is hereby

ORDERED that the Petition is *denied* as to all challenged claims, and no trial is instituted.

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Patent 8,124,988 B2

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