

2023-2346

United States Court of Appeals
for the Federal Circuit

LYNK LABS, INC.,
Appellant,

v.

SAMSUNG ELECTRONICS CO., LTD.,
Appellee,

KATHERINE K. VIDAL, Under Secretary of Commerce for
Intellectual Property and Director of the United States
Patent and Trademark Office,
Intervenor.

*Appeal from the United States Patent and Trademark Office,
Patent Trial and Appeal Board in No. IPR2022-00149.*

**BRIEF FOR APPELLEE
SAMSUNG ELECTRONICS CO., LTD.**

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REPRESENTATIVE CLAIM AT ISSUE

U.S. Patent No. 10,687,400

Claim 7:

7. A lighting system comprising:

an LED circuit array comprising an LED circuit comprising a plurality of LEDs connected in series;

a capacitor;

a bridge rectifier configured to receive an input AC voltage from a mains power source;

a driver connected to the bridge rectifier and configured to provide a rectified output AC voltage to the LED circuit array;

wherein a forward voltage of the LEDs of the LED circuit array matches the rectified input AC voltage output of the driver; and

wherein the LED circuit array, the capacitor, the bridge rectifier, and the driver are all mounted on a single substrate.

CERTIFICATE OF INTEREST

Counsel for Appellee Samsung Electronics Co., Ltd. certifies the following:

1. Provide the full names of all entities represented by undersigned counsel in this case.	2. Provide the full names of all real parties in interest for the entities. Do not list the real parties if they are the same as the entities.	3. Provide the full names of all parent corporations for the entities and all publicly held companies that own 10% or more stock in the entities.
Samsung Electronics Co., Ltd.	Samsung Electronics America, Inc.	None

4. The names of all law firms and the partners or associates that appeared for the party now represented by me in the agency or are expected to appear in this Court (and who have not or will not enter an appearance in this case) are:

Paul Hastings: Paul Anderson, Arvind Jairam*

*No longer with the firm

5. Other than the originating case(s) for this case, are there related or prior art cases that meet the criteria under Fed. Cir. R. 47.5(a).

Lynk Labs, Inc. v. Samsung Electronics Co., Ltd., No. 2023-1934 (Fed. Cir.);

Lynk Labs, Inc. v. Samsung Electronics Co., Ltd., No. 2023-1935 (Fed. Cir.);

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. v. Lynk Labs, Inc., No. 1:21-cv-02665 (N.D. Ill.);

Lynk Labs, Inc. v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc., No. 1:21-cv-05126 (N.D. Ill.).

6. Information required by Federal Rule of Appellate Procedure 26.1(b) and (c) that identifies organizational victims in criminal cases and debtors and trustees in bankruptcy cases.

Not Applicable

Date: September 25, 2024

/s/Naveen Modi
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STATEMENT OF RELATED CASES

This is an appeal from the Patent Trial and Appeal Board's ("the Board's") final written decision in an *inter partes* review IPR2022-00149 involving U.S. Patent No. 10,687,400 ("the '400 Patent"). On December 13, 2023, the Court designated this appeal and Appeal Nos. 23-1934 and 23-1935 as companion cases, with all three appeals assigned to the same merits panel. Appeal No. 23-1934 arises from IPR2021-01300 and Appeal No. 23-1935 arises from IPR2021-01347, involving the same parties, Appellant Lynk Labs, Inc. ("Lynk") and Appellee Samsung Electronics Co., Ltd. ("Samsung"), and related patents, U.S. Patent No. 10,966,298 ("the '298 patent") and U.S. Patent No. 11,019,697 ("the '697 patent").

The '400 patent is presently at issue in *Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. v. Lynk Labs, Inc.*, No. 1:21-cv-02665 (N.D. Ill.), and *Lynk Labs, Inc. v. Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc.*, No. 1:21-cv-05126 (N.D. Ill.). Those cases are stayed pending resolution of the *inter partes* review proceeding on appeal here and additional *inter partes* review proceedings involving related patents, including resolution of any appeals from those proceedings to this Court.

In addition to the '400 patent, the following related patents are also at issue in the above-referenced district court cases: U.S. Patent Nos. 10,492,251 ("the '251 patent"); 10,492,252 ("the '252 patent"); 10,499,466 ("the '466 patent"); 10,750,583

(“the ’583 patent”); 10,154,551 (“the ’551 patent”); 10,652,979 (“the ’979 patent”); 10,506,674 (“the ’674 patent”); the ’298 patent, and the ’697 patent. These patents were involved in the following *inter partes* review proceedings: IPR2022-00051, IPR2022-00052, and IPR2021-01369 (the ’251 patent); IPR2021-01345 (the ’252 patent); IPR2021-01347 (the ’298 patent); IPR2021-01346 (the ’466 patent); IPR2021-01299 (the ’674 patent); IPR2021-01300 (the ’697 patent); IPR2022-00100 and IPR2022-00101 (the ’583 patent); IPR2021-01575 and IPR2021-01367 (the ’551 patent); IPR2021-01576 (the ’979 patent). The Board issued final decisions in all of these proceedings. The Board discretionarily denied institution in IPR2022-00150 involving claims of the ’400 patent that were not challenged in IPR2022-00149 or are at issue here on appeal.

The Board’s final decisions involving the ’251, ’252, ’466, ’583, and ’551 patents were not appealed. In addition to this appeal and Appeal Nos. 23-1934 and 23-1935, the Board’s decision in IPR2021-01576 (involving the ’979 patent) was appealed to this Court as Appeal Nos. 23-2088 (lead appeal) and 23-2128 (cross-appeal). These appeals were voluntarily dismissed on September 11, 2023. Further, the Board’s decision involving the ’674 patent was appealed (Appeal No. 23-1897). That appeal was voluntarily dismissed on July 11, 2023.

INTRODUCTION

Appellant Lynk challenges the Board’s unpatentability findings for claims 7-13 and 17 of the ’400 patent, primarily focusing on two limitations of claim 7 and a challenge to the eligibility of one of the asserted references—Martin—as prior art. For claim 7, Lynk wrongly ascribes error to the Board’s conclusion that a plurality of LEDs organized in series-connected groups does not disclose a circuit “comprising a plurality of LEDs connected in series,” when groups are plainly a “plurality of LEDs” and Lynk conceded the groups are connected in series.

Lynk also contends that the Board erred by interpreting claim 7’s limitation that LED forward voltage “matches” the rectified output voltage in a manner consistent with the ’400 patent’s description of such “matched” voltages being an equal to or less than condition. Lynk’s argument primarily hinges on “matched” being used in the specification in alleged “scare quotes,” purportedly indicating disagreement. But the ’400 patent simply copies the definition of “matched” voltages from the prior art—the Allen reference—where “matched” is also in quotes. The use of quotes thus does not plausibly indicate disagreement. Lynk’s remaining arguments as to that limitation are attempts to use example embodiments to limit the claim scope, which is contrary to well-settled precedent. As such, Lynk’s claim construction argument fails, and Lynk does not dispute that the prior art discloses the “matches” limitation under the Board’s interpretation.

Lynk’s challenge to the Board’s consistent practice of treating the filing date of a published patent application—even one that did not ultimately issue as a patent—as an effective prior art date in *inter partes* reviews also fails. This challenge misunderstands the IPR statutory scheme, and ignores the Board’s long-standing application of the timing rule of pre-AIA § 102(e)(1) when determining the filing date of a published patent application that did not ultimately issue as a patent—a practice that Congress did not intend to change when enacting the IPR regime.

This Court should affirm the Board’s well-reasoned decision.

STATEMENT OF THE CASE

I. THE TECHNOLOGY AT ISSUE

The ’400 patent relates broadly to light emitting diodes (“LEDs”). Appx126 (1:45-49). LEDs are intrinsically DC-powered devices. They pass current in one polarity and DC voltage sources can use resistors to limit that current. Appx4765 ¶ [0004]; Appx173-180 ¶¶ 36-41, 45. But LEDs can also be powered by an AC voltage source, as long as a transformer (or rectifier) is used. Appx4765 ¶ [0005]; Appx174-181 ¶¶ 38-40, 46.

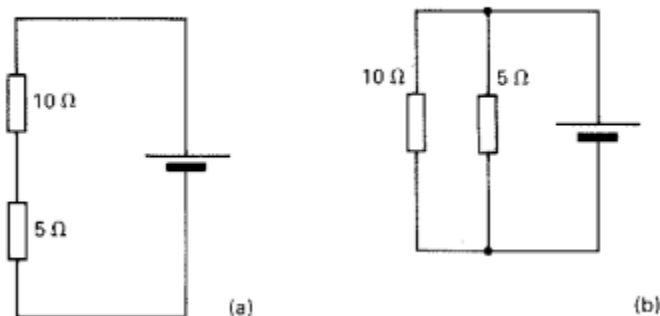
LEDs were commonly used in various devices and applications, including displays, colored lights, optical communication systems, and computer devices. Appx177-178 ¶ 42; Appx2149; Appx126 (1:65-2:62). It was also common to configure LED lighting systems in different ways depending on the application,

including configuring an LED circuit with LEDs connected in a series and/or in parallel. The characteristics of those serial and parallel connections were known to ordinary skilled artisans at the time.

A. Series and Parallel Circuits of LEDs

An electrical circuit that draws power from a source of electricity is known as a *load*. Appx2110. The load consumes electrical power and may contain any number of electrical components, such as resistors and diodes (*e.g.*, LEDs), which may be connected together to jointly consume power from a power source. Appx2110-2113. There are two possible connections—series connection and parallel connection. Appx2110-2113. Two loads are connected *in series* when they are connected end-to-end so that all the current flows through both of them. By contrast, two loads are connected *in parallel* when they connect to the same point (or node) so that current flow is divided between them. Appx2110-2113. These two connection types are illustrated below.

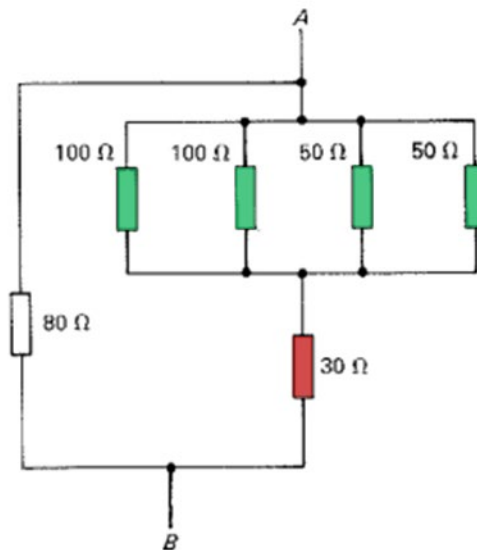
fig 2.7 resistors in series (a) and parallel (b)



Appx5071-5072 ¶ 12 (referencing Appx2111 (Fig. 2.7)). Figure 2.7(a) above shows a $10\ \Omega$ resistor connected in *series* with a $5\ \Omega$ resistor, and Figure 2.7(b) shows a $10\ \Omega$ resistor connected in *parallel* with a $5\ \Omega$ resistor. Appx2110-2111. These are sometimes referred to as a *simple series circuit* or *simple parallel circuit*, respectively. Appx5071-5072 ¶ 12.

In practice, however, quite complex combinations of series and parallel connections may exist in a single circuit. Figure 2.8 below illustrates such an instance.

fig 2.8 a complex series-parallel network

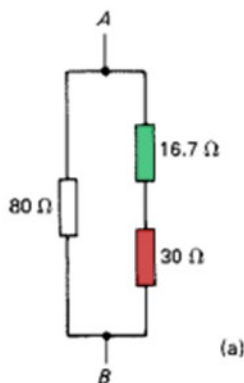


Appx5072-5075 ¶ 13 (referencing Appx2112 (Fig. 2.8)) (color annotation added).

The overall circuit above includes a parallel-connected circuit, consisting of the two $100\ \Omega$ and two $50\ \Omega$ resistors (green), which is further connected in series with a $30\ \Omega$ resistor (red). It was understood that “[t]his can be shown even more clearly

where the equivalent resistance of the four parallel resistors (*i.e.*, two 100 Ω and two 50 Ω) is determined.” Appx5072-5075 ¶ 13. Indeed, the prior art disclosed the basic formula for determining the combined parallel resistance. *See* Appx2111. In the above example, it would be equivalent to a 16.7 Ω resistor, as shown below.

fig 2.9 progressive simplifications of figure 2.8



Appx5072-5075 ¶ 13 (referencing Appx2112 (Fig. 2.9(a))) (color annotation added). A POSITA would have understood the 16.7 Ω resistor (which is the equivalent circuit for the four parallel-connected 100 Ω and 50 Ω resistors in Figure 2.8) to be connected *in series* with the 30 Ω resistor. Appx5072-5075 ¶ 13. A POSITA would also have understood the parallel-connected resistors corresponding to that equivalent 16.7 Ω resistor to be connected in series to the 30 Ω resistor. While Figure 2.8 uses resistors as a load, this understanding would apply equally to other loads, including LEDs. Thus, a first LED connected in series with a second LED

would describe a plurality of LEDs connected in series, even where the first LED is also connected in parallel to a third LED. Appx5072-5075 ¶ 13.

The same is true where multiple parallel-connected LEDs are series connected to each other. Contemporaneous state-of-art disclosures, such as Yang (Appx5101-5115), corroborate this understanding. See Appx5111 (2:31-34) (describing Figure 7 embodiment (below) as “a plurality of light emitting diodes connection in series and parallel”); Appx5081-5082 ¶ 17.

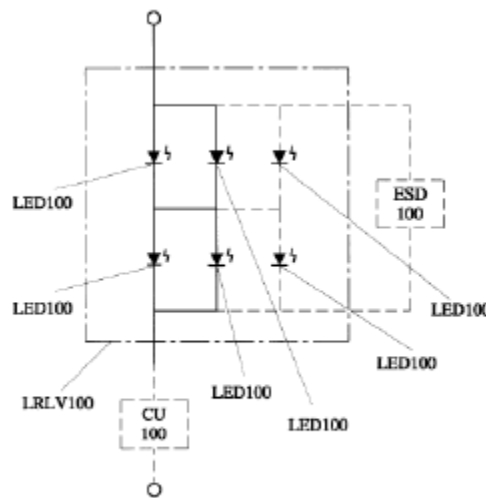
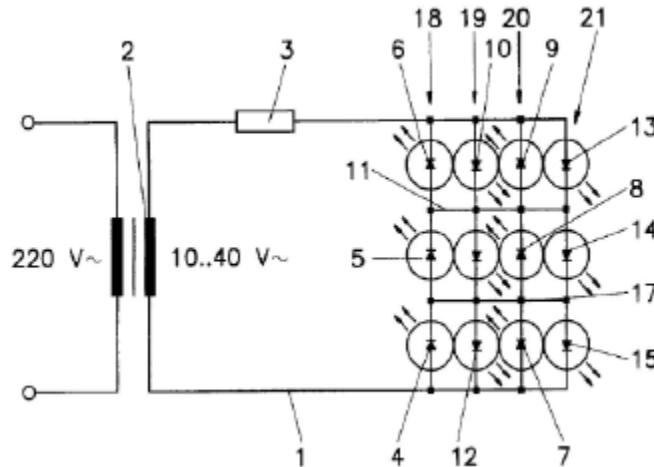


FIG. 7

Appx5105 (Fig. 7). Rössner (Appx5116-5130) likewise describes an LED matrix having groups of LED sections “connected in parallel and each having a plurality of series-connected LEDs.” Appx5123; *see also* Appx5082-5083 ¶ 18. In particular, Rössner describes the LED matrix of Figure 1 (shown below) as including groups of LEDs, where “[e]ach group comprises a plurality of parallel-connected sections 18,

19, 20, 21 of LEDs which are connected in series” (e.g., LEDs 4, 5, 6; LEDs 7, 8, 9). Appx5125.



Appx5130 (Fig. 1). The cross connections between the “junction points of the individual LEDs of one section 18, 19, 20, 21” interconnect the LEDs to “form an array or a matrix.” Appx5124-5125; *see also* Appx5083-5084 ¶ 19.

B. Voltage Matching in LEDs

An LED is a type of diode that converts a forward current into light. Appx176 ¶ 40; Appx2530-2532, Appx2607. The light emitted by an LED is proportional to the forward current in the diode when a forward bias (a positive bias) is applied to the diode. Appx177 ¶ 41; Appx2532; Appx2607; Appx4724 ¶ 0241. An LED exhibits a forward voltage drop that depends on the type and color of the LED. Appx178 ¶43; Appx2140-2142; Appx2152. When LEDs are arranged in series, the total forward voltage drop is the sum of the individual voltage drops of the LEDs. Appx178 ¶ 43; Appx5090-5091 ¶ 26. Because the voltage drop across a given LED

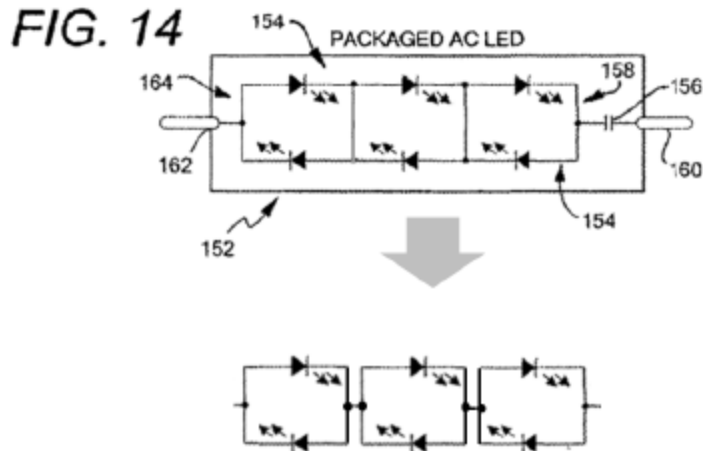
is roughly constant, the number of LEDs in a given series circuit is inversely proportional to the current. Appx179 ¶ 44. Thus, as was understood in LED circuit design, choosing too small a number of LEDs in a circuit will draw a large and potential harmful current, while choosing too great a number will draw a current too small to power the LEDs. Appx179 ¶ 44.

Consequently, LED circuit designs at the time contemplated LED implementations to avoid overdriving, which may damage the LEDs, without underdriving them, which may lead to less LED output brightness than desired. Appx253-254 ¶ 129; Appx4915 (6:6-9). This application of voltage matching principles in the context of an LED circuit was known to those of ordinary skill in the art. *See, e.g.*, Appx1847 (20:26-31); Appx1849 (22:9-30); Appx126 (2:24-35); Appx1761-1775 (Figs. 1A, 1B, 2A, 2B) ¶¶ 0031, 0035; Appx1760 (Abstract). A POSITA knew both that “[i]n order to directly drive a network of diodes without current-limiting circuitry, the voltage of each series block of diodes must be matched to the input source voltage,” and that “[t]his *voltage matching requirement* for direct AC drive places fundamental restrictions on the number of diodes on each diode series block, depending on the types of diodes used.” Appx1777 ¶ 0056 (emphasis added); *see also* Appx253-254 ¶ 129.

II. THE '400 PATENT

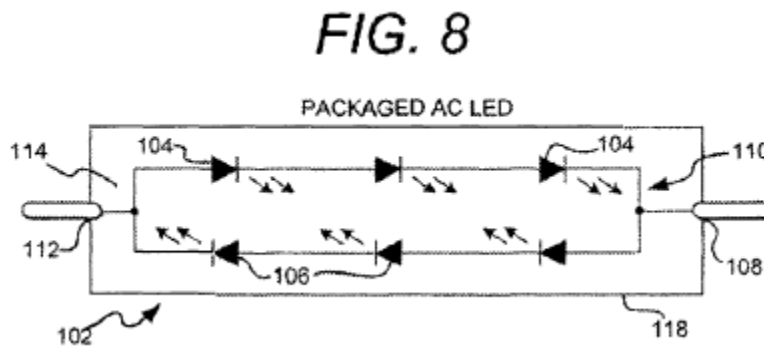
The '400 patent specification purports to relate to LEDs and LED drivers, and specifically to AC driven LEDs, LED circuits and drive circuits (*e.g.*, Appx126 (1:59-62); Appx132 (13:34-57); Appx191 ¶ 55). The claims are broadly directed to a combination of known components and features. For example, independent claim 7 recites a lighting system comprising, *inter alia*, (i) an LED circuit array consisting of an LED circuit with a plurality of LEDs connected in series, (ii) a capacitor, (iii) a bridge rectifier configured to receive input AC voltage from a mains power source, and (iv) a driver connected to the rectifier and configured to provide a rectified output AC voltage to the LED circuit array, such that a forward voltage of the LEDs matches the rectified input AC voltage output of the driver. Appx139 (27:48-62); Appx191-193 ¶¶ 56-57.

The '400 patent describes LED circuit arrays consistent with the basic understanding that, in practice, a single circuit can include complex combinations of both series and parallel connections. *Supra* § I.A; Appx5072-5077 ¶¶ 13-14. For example, Figure 14 discloses an LED matrix 154 (which is an array) that includes both series-connected LEDs and parallel-connected LEDs. Appx82 (Fig. 14); Appx133 (15:57-16:4); Appx5075-5077 ¶ 14. The circuit matrix/array of Figure 14 (shown below on top) is functionally equivalent to the circuit below.



Appx5075-5077 ¶ 14; *see also* Appx133 (15:56-64) (referring to “a *series* opposing parallel LED matrix 154”) (emphasis added). The ’400 patent also explains that the LED array 154 of Figure 14 includes a capacitor in series with the LED array (which, as Figure 14 shows, includes parallel connected LEDs). Appx133 (15:56-64) (“a series opposing parallel LED matrix 154 and a capacitor 156 connected in series”); *see also* Appx5077-5078 ¶ 15.

As another example, the ’400 patent describes the LED circuit of Figure 8 as a “parallel series string of LEDs.” Appx133 (15:13-21) (15:64-16:4).



Appx80 (Fig. 8); *see also* Appx5078-5081 ¶ 16.

The '400 patent also describes voltage matching principles consistent with those known in the art. *See supra* § I.B. For example, the '400 patent discusses the “matched” forward voltage aspects in context of state-of-art teachings from Allen (Appx1760-1782):

Allen describes ... a *voltage matching* requirement ... placing fundamental restrictions on the number of diodes (LEDs) ... [where] to be “*matched*”... *the peak input voltage must be less than or equal to the sum of the maximum forward voltages ... in order to prevent over-driving.*

Appx126 (2:26-35) (emphasis added); *see also* Appx1774-1778 (¶¶ 0029-0030, 0041-0043, 0056, 0068) (disclosing DC driven LED circuit arrangements); Appx1762 (Figs. 3A-3B, 4); Appx5092-5097 ¶¶ 27, 30.

III. THE PRIOR ART

A. Nerone

U.S. Patent No. 6,411,045 (“Nerone”; Appx2253-2261) “relates to an electrical circuit and, in particular, to a power supply circuit for operating a light source, particularly, an array of light emitting diodes (LEDs).” Appx2258 (1:5-9). Nerone discloses several examples of power supply circuits that provide power to LED arrays. Appx2258 (2:47-59) (describing Figures 1-4). For example, Figure 4 describes a power supply circuit 400 that uses AC power (AC source 110 shown at left), and various circuitry, to power an LED array (shown at right).

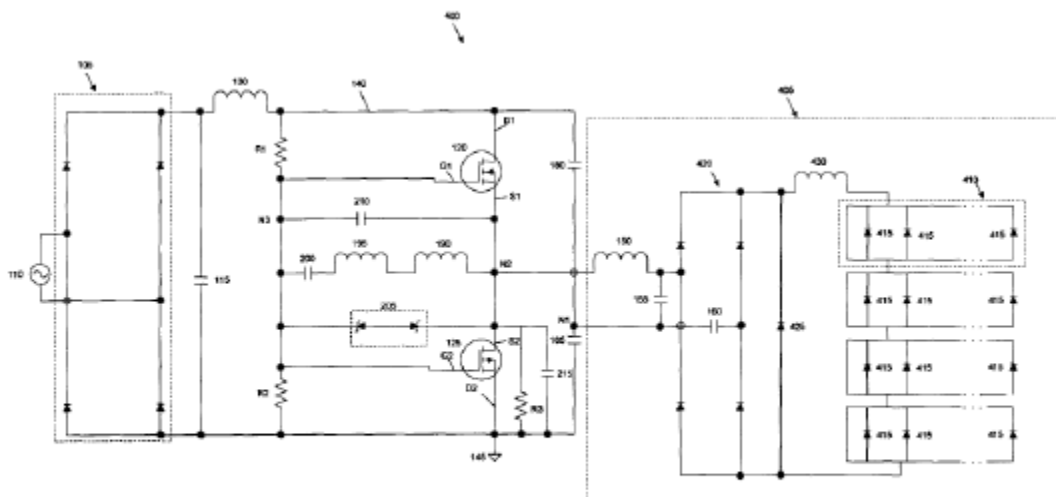


FIG. 4

Appx2257 (Fig. 4); *see also* Appx2258 (2:57-59). Bridge rectifier 420 converts AC current to DC current that is provided to “at least one group 410 of LEDs 415 connected in parallel,” where “groups 410 of the LEDs 415 are connected in series.” Appx2260 (5:51-6:6).

B. Martin

U.S. Patent Application Publication No. 2004/0206970 (“Martin”; Appx1867-1879) relates to monolithic arrays of semiconductor light emitting devices powered by alternating current sources using filtering and rectifying circuitry. Appx1876 ¶ 0002; Appx1877 ¶ 0024; Appx1871 (Fig. 5). Figure 5 describes a series of LEDs that operate with a direct voltage.

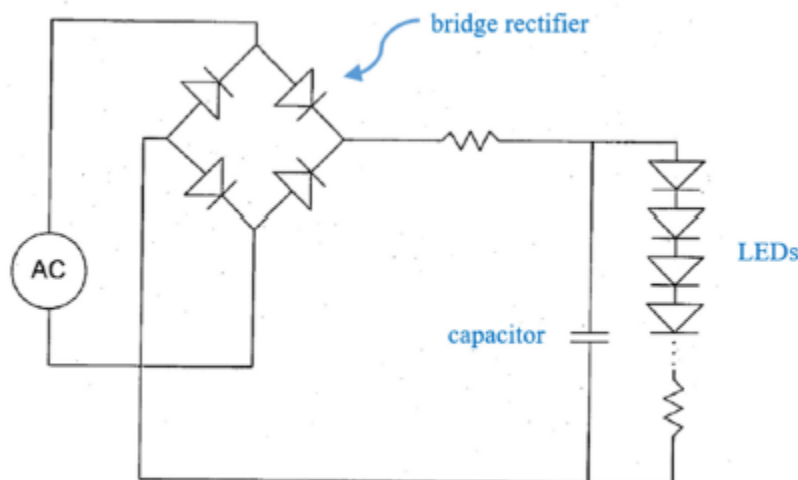


Fig. 5

Appx199-200 ¶ 64 (annotating Appx1871 (Fig. 5)).

Martin discloses that “[e]xcessive forward voltage can damage the LEDs irreversibly.” Appx1877 ¶ 0021. “Series interconnection reduces the voltage drop across each LED to a level that does not exceed the maximum forward voltage of each LED.” *Id.* Hence, “[t]he number of LEDs in the monolithic array may be selected to achieve a particular voltage drop across each device ... such that the maximum voltage across each individual LED during the peak in the alternating current cycle is low enough so as to not damage the LEDs.” Appx1877 ¶ 0022.

IV. PROCEDURAL HISTORY

A. The Proceeding Below

Samsung requested *inter partes* review of claims 7-20 of the '400 patent. Appx6044; Appx6047-6048. The Board instituted review. Appx6234; Appx6272. Neither Samsung nor Lynk proposed any special construction for the claim terms,

Appx6051; Appx6200, and the Board concluded that “no claim terms require express construction.” Appx6241.

Following institution, Lynk disclaimed claims 14 and 18-20. Appx5575; Appx6365.

B. The Board’s Final Written Decision

The Board’s final written decision found all remaining challenged claims—claims 7-13 and 15-17 of the ’400 patent—unpatentable over the asserted prior art. Appx68. The Board reiterated that “no claim terms require express construction.” Appx10 (citations omitted).

The Board found claims 7-13, 15 and 16 obvious over the Nerone-Martin combination (with additional references for some claims). Appx12; Appx42. Lynk only contested that the combination failed to teach two limitations of claim 7: “an LED circuit array comprising an LED circuit comprising *a plurality of LEDs connected in series*” (limitation 7(b)) and “a forward voltage of the LEDs of the LED circuit array *matches* the rectified input AC voltage output of the driver” (limitation 7(f)). Appx12 (citing Appx6321) (emphasis added).

As to limitation 7(b), the Board found that Nerone discloses a plurality of LEDs connected in series. Appx24. Noting Lynk’s “admi[ssion] that ‘Nerone confirms that each of the four groups [of LEDs] 410 is in series,’” the Board observed that the only question “is whether Nerone’s groups 410 [of LEDs 415]

meet the requirement of ‘a plurality of LEDs connected in series.’” Appx22 (quoting Appx6326) (additional citation omitted). The Board then rejected Lynk’s contention that, from a POSITA’s viewpoint, the “‘plurality of LEDs connected in series’ in limitation 7(b) refers to individual LEDs connected in series, not individual groups or circuits of LEDs being in series.” Appx17 (quoting Appx6326). As the Board explained, Lynk “applies its narrow construction within individual groups 410,” but “[t]he fact that individual LEDs in any group [410¹] are not connected in series is not dispositive. ... [A]ny two adjacent groups 410, which are part of the same LED circuit in Nerone, correspond[] to ‘a plurality of LEDs connected in series.’” Appx23-24 (citation omitted).

Turning to limitation 7(f), the Board found that the combined teachings of Nerone and Martin indicate that a forward voltage of the LEDs of the LED circuit array *matches* the rectified input AC voltage output of the driver. Appx29; Appx35-39. As the Board observed, Martin’s disclosure of using “‘voltage matching’ to determine the number of LEDs so as not to damage the individual LEDs” supported that finding. Appx38 (citing Appx1877 ¶ 22; Appx243-248 ¶¶ 120-124). Martin’s disclosure aligned with the reason for “matching” described in the ’400 patent. Appx38 (citing Appx126 (2:24-35)). And the Board agreed with Samsung’s expert,

¹ As Lynk acknowledges, the Board’s decision in that instance inadvertently referred to “group 415” instead of “group 410.” See Lynk Br. 19 n.3.

Dr. R. Jacob Baker, that a POSITA would have considered several factors to satisfy the “matching” requirement (a point “[n]either [Lynk] nor [Lynk’s expert] dispute[d],” Appx37), and so matching the forward voltage to the rectified AC voltage output was a matter of routine optimization. Appx36-37.

The Board similarly rejected Lynk’s argument that Martin’s input voltage is less than the forward LED voltage and therefore not matched. The Board explained that “[t]he ’400 patent describes [that] ‘for the forward voltage to be “matched,” ... the peak input voltage must be *less than or equal to* the sum of the maximum forward voltages ...’” and thus “the ’400 patent’s description of ‘matches’ is broader than ‘equivalence,’” also encompassing the “less than” condition described. Appx36 (quoting Appx126 (2:32-35)).

Finally, the Board rejected Lynk’s contention that Martin (a published patent application) is not available as prior art under 35 U.S.C. § 311(b). Appx10-12. The Board acknowledged that, under section 311, an IPR proceeding may be instituted only on the basis of “prior art consisting of patents or printed publications.” Appx11. But, the Board reasoned, that does not mean that pre-AIA § 102(e)(1)—which provides that one may not receive a patent if the claimed invention was described in “an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent,” 35 U.S.C. § 102(e)(1)

(2006)—cannot be used to determine the effective priority date of a patent application asserted as a “printed publication” in an IPR. Appx11-12.

The Board pointed out that this Court “applied § 102(e) patent application publication prior art in an appeal from an IPR,” Appx11 (citing *Purdue Pharma L.P. v. Iancu*, 767 F. Appx. 918, 920-21 (Fed. Cir. 2019)), and that the Board itself has previously “determined claims to be unpatentable based on patent application publications under § 102(e),” Appx12 (citing cases). The Board found this prior practice “persuasive.” Appx12. The Board also noted that when Congress intended to limit proceedings solely to prior art challenges under § 102(a), it did so explicitly. Appx11.

The Board also found claim 17 unpatentable over the combination of Zhang and Martin. Appx68.

Lynk appealed the Board’s decision. Appx6566-6571.

SUMMARY OF ARGUMENT

1. Lynk contends that the Board erred by finding Nerone discloses claim limitation 7’s “LED circuit comprising a plurality of LEDs connected in series” because—according to Lynk—Nerone lacks “individual LEDs” connected to one-another in series. Lynk Br. 19. The Board properly rejected Lynk’s arguments as “largely based on rewriting this limitation” to refer to “*individual LEDs* connected in series.” Appx22-23. Applying the plain language of the claim, the Board

determined that Nerone discloses “groups 410 of the LEDs 415 *are connected in series*” and therefore “any two adjacent groups 410, which are part of the LED circuit in Nerone, correspond[] to ‘a plurality of LEDs connected in series.’” Appx24.

Lynk points to embodiments in the '400 patent that it contends include individual LEDs connected in series, to support limiting the claim scope in that way. Lynk Br. 24-34. But it is well settled that embodiments do not typically limit the claims beyond their plain meaning, and Lynk does not identify any clear and unmistakable intent by the applicant to limit a “plurality of LEDs connected in series” to individual LEDs. As such, the Board applied the correct interpretation of this claim limitation when determining that Nerone discloses a plurality of LEDs connected in series, and substantial evidence supports its findings.

2. Lynk disagrees with Board’s determination that the term wherein “a forward voltage of the LEDs of the LED circuit array *matches* the *rectified* input AC voltage output of the driver” in claim 7 encompasses forward voltages equal to or less than the rectified input AC voltage. Lynk Br. 38-39. The Board correctly interpreted this term by relying on the '400 patent’s description of such matched voltages in the Allen reference as encompassing both the equal to and less than condition. Appx36. Nothing in the '400 patent evidences a clear intent to depart from Allen’s description of matched voltages or the Board’s interpretation of “matches” consistent with Allen.

Lynk also contends that the Board read the term “rectified” out of the same clause of claim 7. Lynk Br. 48. But the Board agreed with Samsung that Martin’s teaching of voltage matching applies equally to LEDs powered directly from an alternating current as well as those powered by rectified AC current. Appx38. The Board also acknowledged Samsung’s position that Martin discloses ““driving with a rectified AC voltage,”” and credited Samsung’s arguments and evidence when concluding that it would have been obvious to match the rectified AC voltage output in Nerone to the forward voltage. Appx34; Appx37-39. Thus, the Board did not read “rectified” out of claim 7.

3. Lynk’s challenge to the Board’s reliance on pre-AIA § 102(e)(1) in determining the priority date of a patent application asserted as a printed publication prior art misunderstands the statutory scheme and contradicts long-standing PTO practice of which Congress was aware when it set up the IPR regime. Longstanding precedent instructs that the filing date—not the date of the eventual patent grant—determines the priority date for purposes of ascertaining patentability. Logic mandates the same rule when applying pre-AIA § 102(e)(1) to determine the relevant priority date of a patent application asserted as a prior art. Nothing in the IPR statute requires a different result. Section 311(b)’s reference to “printed publication” merely sets up a category of prior art documents that can be used in an IPR; it does not in itself determine the relevant priority date. The PTO’s long-term

practice, reflected in its official guidance to patent examiners and in *inter partes* reexamination decisions, was to apply § 102(e)(1) when determining the relevant priority date for printed-publication patent applications asserted as prior art. Congress—which “is presumed to be aware of an administrative ... interpretation of a statute,” *Lorillard v. Pons*, 434 U.S. 575, 580 (1978)—demonstrated no indication in the AIA to change that settled practice.

ARGUMENT

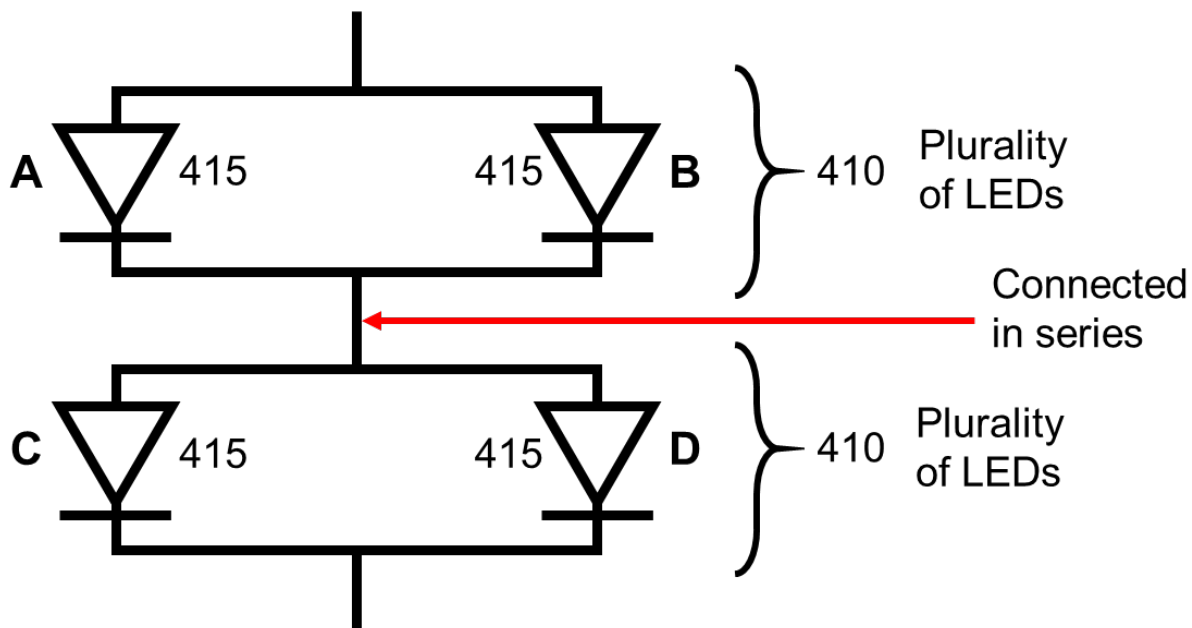
I. STANDARD OF REVIEW

Obviousness is a question of law based on underlying findings of facts. *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1047 (Fed. Cir. 2016) (*en banc*). “What a prior art reference teaches ... [is a] question[] of fact.” *Id.* at 1051. This Court reviews the Board’s claim construction *de novo* and any underlying factual findings for substantial evidence. *Immunex Corp. v. Sanofi-Aventis U.S. LLC*, 977 F.3d 1212, 1217–18 (Fed. Cir. 2020). Statutory interpretation is an issue of law reviewed *de novo*. *Facebook, Inc. v. Windy City Innovations, LLC*, 973 F.3d 1321, 1330 (Fed. Cir. 2020).

II. THE BOARD PROPERLY INTERPRETED AND APPLIED THE CLAIMED “LED CIRCUIT COMPRISING A PLURALITY OF LEDS CONNECTED IN SERIES” LIMITATION

The issue in this appeal is whether a circuit with groups of parallel-connected LEDs, where those LED groups are connected in series with adjacent LED groups,

discloses the “LED circuit comprising a plurality of LEDs connected in series” of claim 7(b). A simplified version of Nerone’s Figure 4 illustrates this question:



See Appx6054 (citing Appx2257 (Fig. 4)) (a circuit consisting of LED groups 410 that are connected in series, with each group 410 having parallel-connected LEDs 415).

The Board considered whether Nerone’s groups 410 (which are connected in series) “meet the requirement of ‘a plurality of LEDs connected in series’ as recited in limitation 7(b).” Appx22. The Board rejected Lynk’s contention that Nerone does not disclose that limitation because it purportedly lacks “individual LEDs” connected in series. Appx22-24. Instead, the Board found that “Nerone discloses that resonant load circuit 405 ‘includes at least one group 410 of LEDs 415 connected in parallel and polarized in the same direction’ and ‘groups 410 of the

LEDs 415 *are connected in series.*” Appx24 (citing Appx2260 (5:58-60)). Thus, the Board explained, “any two adjacent groups 410, which are part of the LED circuit in Nerone, correspond[] to ‘a plurality of LEDs connected in series.’” Appx24. Lynk’s challenge to the Board’s interpretation and application of the “plurality of LEDs connected in series” limitation of claim 7 is unavailing.

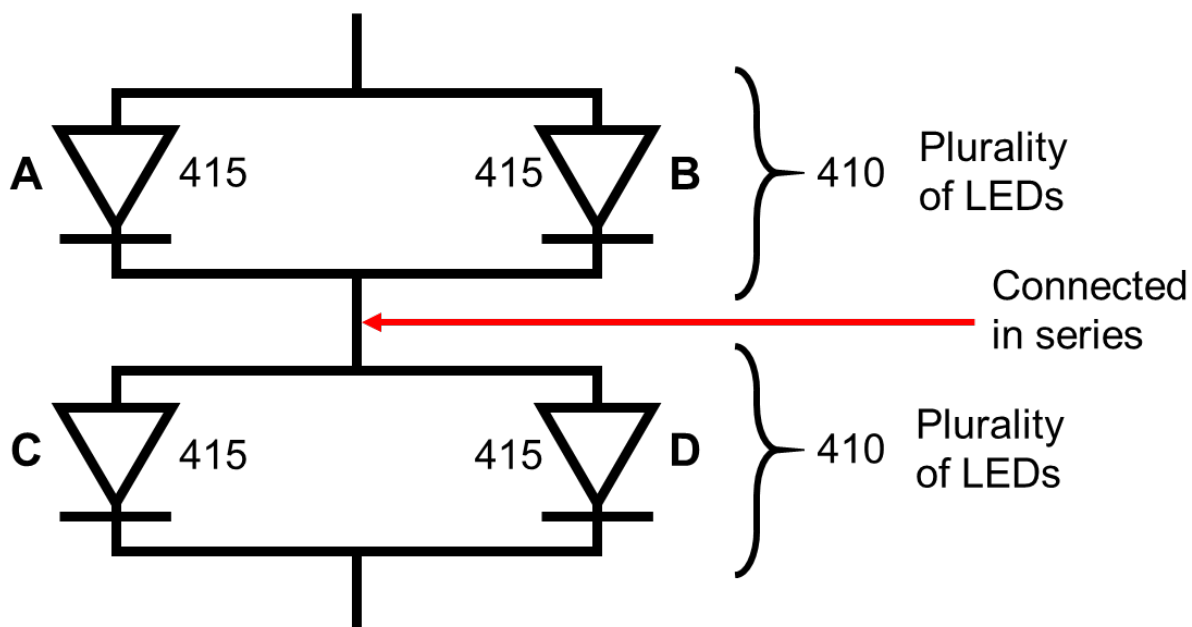
A. Lynk’s Construction Improperly Limits the Claim Scope

The Board correctly interpreted limitation 7(b), finding that it does not exclude groups of parallel-connected LEDs that are connected in series, as disclosed in the prior art. Appx23-24. Lynk contends that “a plurality of LEDs connected in series” should be construed as requiring that “‘at least two LEDs are connected in series.’” Lynk Br. 14 (quoting Appx6443). Lynk then further narrows that construction, requiring “‘*individual* LEDs connected in series, *not individual groups* or circuits of LEDs [connected] in series,’” where “*the LEDs are connected end-to-end* to form a single path for current such that the LEDs will always carry the same current.” Lynk Br. 14 (quoting Appx6324 and citing Appx6327; Appx6443) (second emphasis added). In essence, Lynk contends that “a plurality of LEDs connected in series” must be construed to require that: (i) at least two individual LEDs be connected in end-to-end in series; (ii) no groups or circuits of LEDs be connected in series; and (iii) there be a single current path such that all of the at least

two individual LEDs always carry the same current. But limitation 7(b) should not be construed in this convoluted way.

Lynk contends that the Board erred by construing limitation 7(b) as encompassing a plurality of LEDs connected in series “even if no *individual LEDs* are connected in series with other LEDs.” Lynk Br. 11 (emphasis added). But the Board correctly observed that “limitation 7(b) does not recite ‘individual LEDs connected in series,’” and that Lynk was essentially “rewriting this limitation.” Appx22-23. Lynk seemingly acknowledges limitation 7(b) does not contain a requirement that *individual LEDs* be connected in series, arguing that it “refers to ‘individual’ simply to illustrate the point that the claim recites that ‘LEDs’—not ‘LED circuits’ or ‘groups of LEDs’—are ‘connected in series.’” Lynk Br. 23 n.5. But the emphasis on a series connection between individual LEDs is central to Lynk’s argument here. *See, e.g.*, Lynk Br. 7 (“no *individual LEDs* connected in series”); Lynk Br. 17 (“no *individual LEDs* are connected in series”); Lynk Br. 18 (“the *individual LEDs* 1-4 are not connected in series”); Lynk Br. 19 (“no *individual LED* is connected in series to another LED”); Lynk Br. 19 (“the Board explicitly conceded that no *individual LEDs* in Nerone are connected in series”) (all emphasis added). The fact that limitation 7(b) does not contain that requirement—a fact Lynk does not seriously contest—is fatal to its proposed construction.

There is no reasonable dispute that a “plurality” means “more than one” or “at least two.” See Appx22-23; see also *Aug. Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1286 (Fed. Cir. 2011) (“A plurality of wafers means more than one physically distinct wafer.”); *ResQNet.com, Inc. v. Lansa, Inc.*, 346 F.3d 1374, 1382 (Fed. Cir. 2003). Lynk tries to distinguish Nerone’s “groups” of LEDs connected in series from the claimed “plurality”—effectively a plurality of pluralities distinction—on the basis that in Nerone “no single LED is connected in series with another LED.” Lynk Br. 34-45. But Lynk does not explain—nor can it—why the scope of “a plurality of LEDs connected in series” cannot include “more than one” LED connected in series with “more than one” LED (i.e., two groups of LEDs connected in series).



In the exemplary figure above, a plurality of LEDs 415 (e.g., A and B) are connected in series with a plurality of LEDs 415 (e.g., C and D), and thus, a plurality of LEDs are connected in series. Nerone discloses this same configuration, Appx2257 (Fig. 4), and the Board found that Nerone's groups 410 of LEDs 415 are connected in series with the other groups 410 of LEDs 415, Appx24—a fact Lynk did not contest, Appx6326. The effect of Lynk's argument on appeal is that the claim would be narrowly construed to exclude a plurality of LEDs connected in series if those LEDs are also connected in parallel to other circuit components, such as additional LEDs. This unwarrantedly narrow interpretation is not supported by the claim language or the intrinsic record. *See infra* at §§ II.B, D.

Lynk's construction improperly restricts the claim's broad language ("plurality of LEDs connected in series") to include only *individual* LEDs connected in series. But a "comprising" claim does not otherwise exclude additional components or circuitry, such as the plurality of LEDs that are connected in series are arranged in circuits or groups. *See Amgen Inc. v. Amneal Pharm. LLC*, 945 F.3d 1368, 1378-79 (Fed. Cir. 2020) ("The term 'comprising' is the standard transition term used to make clear that the claim does not preclude the presence of components or steps that are in addition to, though not inconsistent with, those recited in the limitations that follow."); *ArcelorMittal France v. AK Steel Corp.*, 700 F.3d 1314, 1320-21 (Fed. Cir. 2012) (a claim to cold-rolling steel "[b]y its use of the term

‘comprising’” “expressly contemplates” additional steps such that the steel may be both hot-rolled and cold-rolled). Similarly here, the claim language of limitation 7(b) does not preclude LEDs from being connected in parallel or organized in groups in addition to being connected in series, provided the LED circuit comprises a plurality of LEDs connected in series—just as the Board found Nerone discloses, Appx24.

To support its construction, Lynk contends that there is no dispute as to the ordinary meaning of components being “connected in series.” Lynk Br. 15. But that misses the point. Samsung disputed Lynk’s unwarrantedly restrictive interpretation (which requires a series connection between individual LEDs) as applied to series-connected groups of LEDs. Appx6393-6394; Appx6397-6399. And Samsung’s expert, Dr. Baker, explained that Lynk’s definition does not work as applied to more complex circuits that contain more than just two loads. Appx5071-5077 ¶¶ 12-14; *see also* Appx5430-5431 (84:15-85:25).² The Board plainly disagreed with Lynk’s interpretation as applied to the art. Appx22-25.

Lynk attempts to shore up its construction by invoking the *McGraw-Hill Dictionary of Electronics and Computer Technology*, presenting newly annotated figures from Nerone, and arguing that those figures support what it contends to be

² Lynk’s assertion that Dr. Baker agreed with its purported “common understanding of LEDs being connected in series,” Lynk Br. 15 (quoting Appx5430 (84:16-18)), is based on a selective quotation that mischaracterizes Dr. Baker’s overall testimony.

the “ordinary meaning [of ‘series’] set forth in *Mcgraw-Hill*.” Lynk Br. 16-17. As an initial matter, those figures were not presented to the Board as shown. *Compare* Lynk Br. 16–17, *with* Appx6325. For example, none of the colored arrows or annotations were included. Moreover, the figures were used to discuss Nerone, not illustrate anything regarding the teachings of *McGraw-Hill*. Appx6325. In any event, Lynk admits that groups of LEDs in Nerone may be connected in series with other groups of LEDs. Lynk Br. 18. That is all that limitation 7(b) requires.

Lynk also argues that “[t]he Board erroneously construed limitation 7(b) as not requiring any LEDs to be connected in series.” Lynk Br. 19 (citing Appx22-24). The Board did no such thing. The Board simply agreed with Samsung that a *group* of LEDs connected in series with another *group* of LEDs meets the limitation “a plurality of LEDs connected in series.” Appx24. Lynk’s argument misapprehends the Board’s decision, which compared the claim to the Nerone prior art reference, and concluded that Nerone’s *groups* of LEDs connected in series disclosed limitation 7(b).

B. Limitation 7(b)’s Plain Language Supports the Board’s Decision

There is no dispute that “connected in series” in limitation 7(b) modifies a “plurality of LEDs.” *See* Lynk Br. 20. Claim 7 recites “*an* LED circuit array comprising *an* LED circuit comprising *a plurality* of LEDs” where the only element that is not singular is the plurality of LEDs. Appx139 (27:49-50) (emphasis added).

This is consistent with Samsung’s mapping of Nerone and the Board’s analysis. Nerone discloses in Figure 4 an “LED circuit array” comprising an “LED circuit” (all of the series-connected groups 410), comprising a “plurality of LEDs” 415 (the LEDs in each group 410) that are connected in series. *See* Appx6054-6055 (“Nerone discloses that its LED circuit array (red [below]) comprises an LED circuit (*i.e.*, groups 410) comprising a plurality of LEDs connected in series.”); Appx24 (“any two adjacent groups 410, which are part of the LED circuit in Nerone, correspond, to ‘a plurality of LEDs connected in series’”).

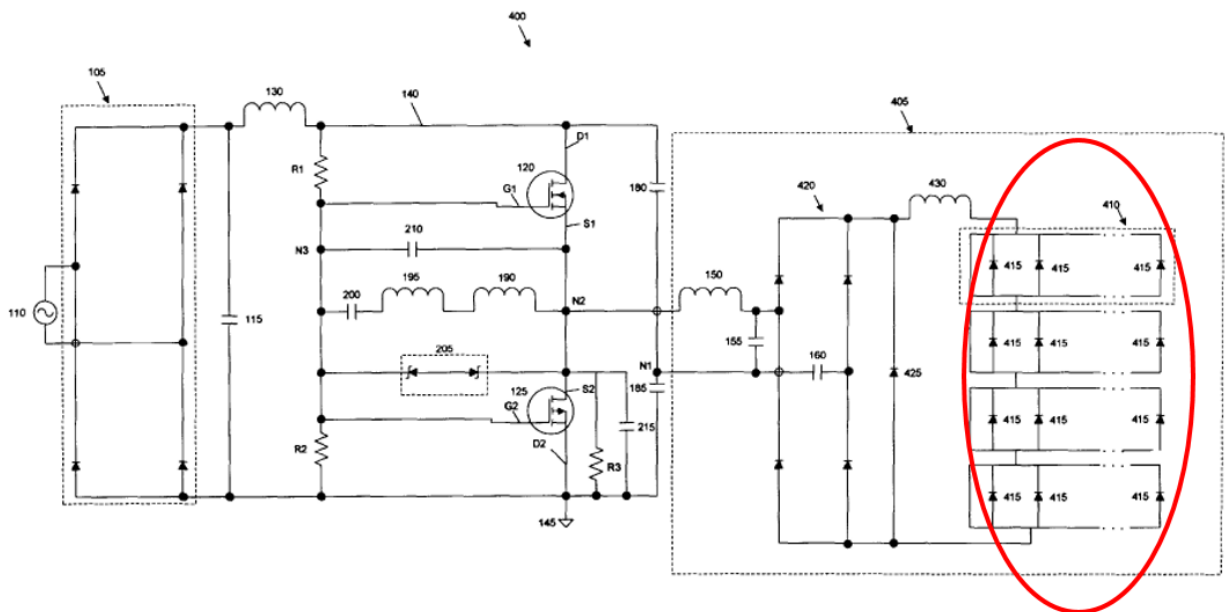


FIG. 4

Appx6054 (excerpting Appx2257 (Fig. 4) (annotated)).

Lynk did not dispute that all of Nerone’s groups 410 collectively disclose an “LED circuit.” *See* Appx22 (citing Appx6054; Appx6321-6330). Lynk even agreed

that the groups 410 are connected in series. Appx6326 (“each of the four groups 410 is in series”); Appx22 (“there is no dispute that groups 410 are in series”). Instead Lynk’s entire argument hinges on excluding those *groups* of series-connected LEDs from the scope of “comprising a plurality of LEDs connected in series,” even where each *group* of LEDs is indisputably in series with other *groups* of LEDs. But the claim language is plainly broad enough to encompass a plurality of LEDs connected in series, regardless of whether the plurality of LEDs are in groups with a series connection or individually connected in this manner. Appx23-24.

The Board considered and rejected Lynk’s arguments that that Nerone does not disclose an LED connected in series to another LED within the same group or in a different group. Appx15-25. In doing so, the Board did not rewrite the claim to recite “‘an LED circuit comprising a plurality of LED circuits connected in series’ or ‘an LED circuit comprising a plurality of groups of LEDs connected in series,’” as Lynk contends. Lynk Br. 21. Rather, the Board compared the plain language of the claim to Nerone, explaining that Nerone discloses limitation 7(b) as written, and that Lynk’s arguments to the contrary “are largely based on rewriting this limitation” to refer to “*individual LEDs* connected in series.” Appx22-23 (quoting Appx6324, and citing Appx6443).

Lynk has not identified any disclaimer or disavowal in the intrinsic record that would warrant limiting the plain language of the claim to individual LEDs connected in series, or to exclude groups of LEDs connected in series. Its argument also disregards that the claim includes the “comprising” transition which permits additional unclaimed components, and therefore does not exclude series-connected LEDs simply because they also have parallel connections. *Supra* § II.A. As such, the Board correctly found that limitation 7(b) does not preclude the LEDs from being organized in groups or connected in parallel to other circuit components. Appx23-24. And there is no error in the Board’s finding that Nerone’s LED circuit, which has LEDs in a group that are connected in series with LEDs in another group, discloses a plurality of LEDs connected in series. Appx24.

C. A Single LED Group in Nerone Is Not the Claimed “LED Circuit”

Lynk’s argument attempts to conflate Nerone’s “groups” of LEDs with the claimed “LED circuit.” *See* Lynk Br. 21. But Lynk did not dispute the mapping of Nerone’s multiple LED groups to the “LED circuit” before the Board. Appx22. Where Lynk tried to conflate Nerone’s series-connected LED groups with LED circuits, the Board properly rejected Lynk’s arguments as “ignor[ing] [Samsung]’s contention that Nerone’s LED circuit comprises ‘groups 410’” And “appl[ying] its narrow construction within individual groups 410.” Appx24 (citing Appx6054). Finding that Lynk’s arguments “are largely based on rewriting this limitation,”

Appx22, the Board credited Dr. Baker's analysis over that of Lynk's expert as more faithful to the claim language, Appx23.

The Board explained that the claim language does not preclude parallel-connected LEDs and LEDs connected in series within the LED circuit. Appx23. For example, “[a]lthough two or more individual LEDs connected in series could satisfy this limitation, the scope is broader than [Lynk] contends because the plurality of LEDs connected in series are part of an LED circuit that is part of an LED circuit array.” Appx23. This is also consistent with the '400 patent's description of Figure 14 as having parallel-connected LEDs connected in series with other components. *See infra* § II.D. Nor could Lynk explain why two groups of LEDs connected in series, like that taught by Nerone, is not a “plurality of LEDs,” consistent with the plain language of claim 7 (without rewriting it to require individual LEDs connected in series). *Supra* § II.A.

It is irrelevant that the applicant could have drafted the claim to recite that the LED circuits are connected in series, or that the LEDs are in groups connected in series. *See* Lynk Br. 21. Samsung did not contend, and the Board's decision is not based on, finding LED circuits connected in series. The uncontested “LED circuit” of Nerone comprises a plurality of LEDs arranged in series-connected groups. Even if the applicant could have drafted its claim more narrowly, specifying how the plurality of LEDs are arranged (e.g., in groups), the issued claim is broader than

individual LEDs connected in series, as the Board correctly found. Appx23-24. Similarly, it is irrelevant that Claim 14 recites “LED *circuits* connected in parallel,” defining a relationship between LED circuits, because the Board’s decision is based on the connection between a plurality of LEDs, not LED circuits. *See* Appx24. That is why the Board noted that claim 14 “sheds little, if any, light” on the meaning of claim 7 and properly disagreed with Lynk. Appx23.

D. The Specification Does Not Support Lynk’s Construction

Lynk next argues the Board did not ground its construction of limitation 7(b) in the specification. Lynk Br. 24-34. But the Board considered Samsung’s arguments related to the specification, and agreed with Samsung. Appx20-21.

The record amply supports that conclusion. As Dr. Baker explained:

[T]he ’400 patent specification describes LED circuit array embodiments including LED series strings (LEDs connected in series), while connected in parallel to *other* LEDs. (*See, e.g.*, Ex. 1001, 8:48-53, 8:63-66 (“Yet another form of the invention is a LED circuit comprising a single LEDs or a *series* strings of diodes **and/or** LEDs connected in *parallel*”), 14:52-15:23, 15:57-16:4, 16:48-51, 16:64-17:1, FIG. 6 (having LED series string 66 connected in opposing parallel to series string 68), FIG. 7 (having series string 84 connected in opposing parallel to series string 86), FIG. 8 (having series string 104 connected in opposing parallel to series string 106), FIG. 14 (having two series strings connected in opposing parallel), FIG. 21 (including device 180 having series string connected in opposing parallel), FIG. 24 (including a package 324 having series string connected in opposing parallel).)

Appx5064 ¶ 5 (citing Appx129 (8:48-53, 8:63-66); Appx132-134 (14:52-15:23, 15:57-16:4, 16:48-51, 16:64-17:1); Appx79 (Fig. 6, 7); Appx82 (Fig. 14)).

Further, while Lynk now seeks to rely on Figures 16, 18, 22, and 65, *see* Lynk Br. 25-27, 30-33, it never presented that argument to the Board. Lynk's Patent Owner's Response did not rely on the specification for the scope of limitation 7(b). *See* Appx6321-6330. Only in its Sur-Reply did Lynk mention Figures 16 and 18, and only in passing. Appx6444. In contrast to the Board, *see* Appx20-21, Lynk ignored Samsung's arguments as to Figure 14, Appx6444-6448. And while Lynk discussed Figure 8, Appx6446-6447, its arguments about Figure 8 are new and do not identify any evidence indicating that the applicant intended to limit claim 7 to *individual* LEDs connected in series, and exclude *groups* of LEDs connected in series. Lynk Br. 27-30.

Lynk argues that figures 8, 16, 18, 22, and 65 show examples of individual LEDs connected in series, where the series-connected LEDs are in groups or circuits. Lynk Br. 25-33. But it is well settled that embodiments do not limit the claims beyond their plain meaning. *Unwired Planet, LLC v. Apple Inc.*, 829 F.3d 1353, 1359 (Fed. Cir. 2016). Lynk cites nothing to evidence the requisite clear and unmistakable intent to limit "plurality of LEDs connected in series" to individual LEDs.

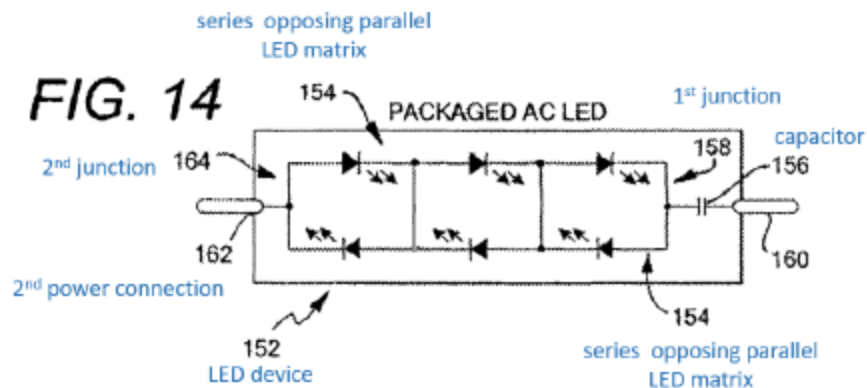
Lynk is also incorrect that its representation that two parallel-connected strings of series-connected LEDs in Figure 8 are within the scope of its construction “puts to rest [Samsung’s] incorrect assertion that [Lynk’s] construction improperly excludes parallel connections involving LEDs.” Lynk Br. 29-30 (citing Appx20; Appx6389). Lynk is simply pointing to two different groups of individual series-connected LEDs in Figure 8, which is no different from its “individual LEDs” argument. *Id.*

Nonetheless, Lynk admits that Figure 14 supports limitation 7(b) “because it discloses a plurality of LEDs connected in series.” Lynk Br. 30 n.9. This is an important admission because Samsung demonstrated that Figure 14 of the ’400 patent shows a plurality of parallel-connected LEDs, with each group of LEDs connected in series (not “individual LEDs” connected in series), just like Nerone.

Dr. Baker explained:

For instance, FIG. 14 depicts “a light emitting device 152 [including] a *series* opposing *parallel* LED matrix 154 and a capacitor 156 *connected in series*.” (Ex. 1001, 15:56-64.) Notably, the ’400 patent specification describes the matrix 154 of Figure 14 (below) as including a “**series string of LEDs**” (*id.*, 15:64-16:1) while each LED in the series string is also connected in parallel *to other* LEDs (*id.*).

Appx5064-5065 (¶ 6) (citing Appx133 (15:57-16:4)).



Appx5064-5065 (¶ 6) (referencing Appx82 (Fig. 14 (annotated above))); Appx133 (15:57-16:4).

Lynk’s attempt (made for the first time on appeal) to distance Figure 14 from Nerone, *see* Lynk Br. 30 n.9, is unavailing. As Samsung noted, the ’400 patent refers to the Figure 14 arrangement as LEDs connected in series in the same way as it refers to the LED connections for Figure 8. Appx6392-6394. In other words, the ’400 patent makes no textual distinctions between what Lynk refers to as “individual LEDs” connected in series and groups of parallel-connected LEDs that are connected in series like Figure 14. Both describe what Lynk admits is a “plurality of LEDs connected in series” just like limitation 7(b). Lynk Br. 30 n.9.

Regardless, Lynk’s parade of exemplary series-connected LEDs from in the ’400 patent does not support narrowing the plain claim language to include only those embodiments. *Unwired Planet*, 829 F.3d at 1359. And Lynk identifies nothing in the specification that would require a departure from the plain meaning. “A disclaimer or disavowal of claim scope must be clear and unmistakable, requiring

‘words or expressions of manifest exclusion or restriction’ in the intrinsic record.” *Id.* at 1358 (quoting *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1327 (Fed. Cir. 2002)).

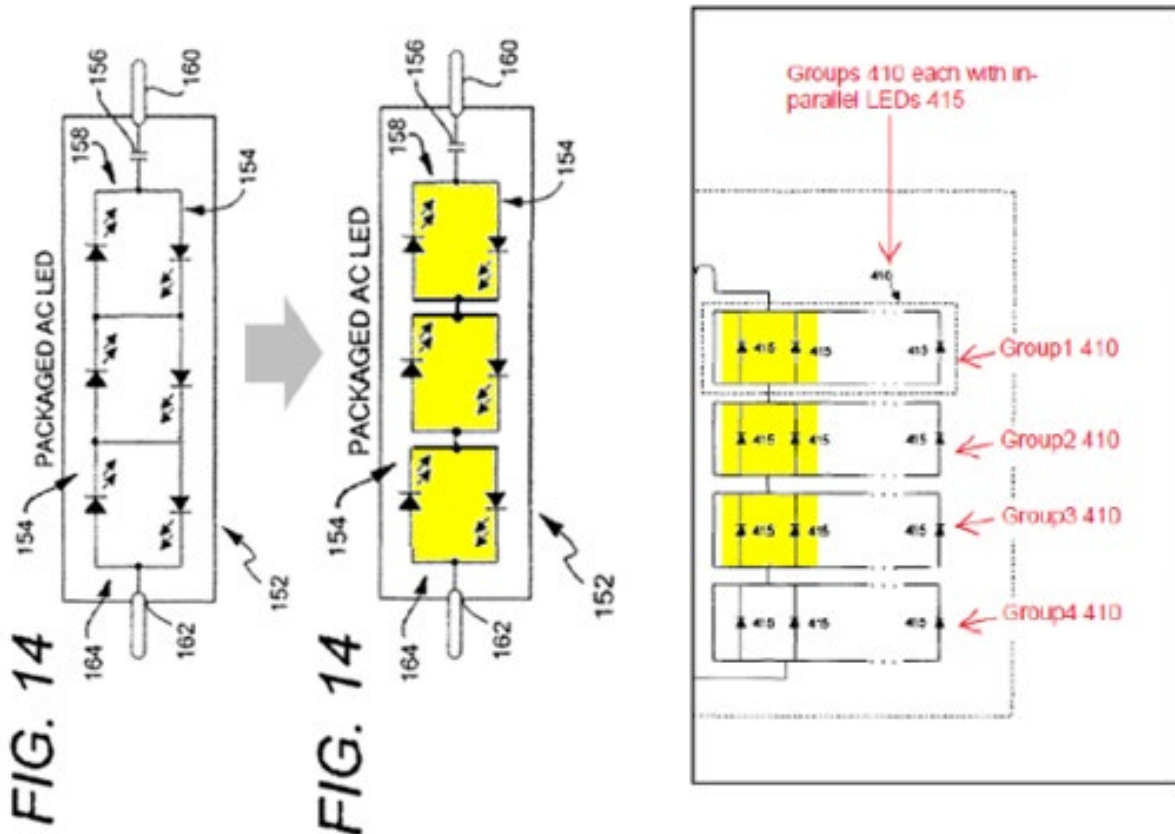
Lynk’s argument continues to conflate groups of LEDs with the claimed LED circuits. Lynk Br. 27-28, 31. This is textual gamesmanship. Lynk never contested Samsung’s mapping of Nerone’s multiple groups of LEDs 410 to the claimed LED circuits or its mapping of Nerone’s LEDs 415 to the plurality of LEDs. *Supra* § II.C. Even now, Lynk points to nothing in the ’400 patent that requires each “group” of LEDs to be solely attributed to the claimed “LED circuit” instead of a “plurality of LEDs.” Of course, a group or set of LEDs could be an LED circuit, but it is also a plurality of LEDs. As such, the fact that Nerone discloses series-connected groups of LEDs in its Figure 4 is insufficient to distinguish limitation 7(b). Appx6054-6055; Appx232-233 ¶¶ 108-109; Appx23-24.

Indeed, Dr. Baker explained:

[T]he LED groups 1-4 [in Nerone] are in series with the other LED groups. And although I agree that each group might be considered a circuit, it is important to note that my analysis of claim 7 did not identify a “group” *individually* as the “LED circuit” of limitation 7(b). Rather, I identified *multiple* groups 410 *in series* as satisfying the “LED circuit” of limitation 7(b), consistent with how a person of ordinary skill in the art would have understood.

Appx5066-5067 ¶ 8 (citing Appx232-233 ¶¶ 108-109).

Nerone’s labeling of its LEDs as “groups” is functionally indistinguishable from the parallel connected LEDs in the LED arrangement shown in Figure 14 of the ’400 patent. That arrangement also shows “groups” of parallel LEDs connected in series in an LED circuit similar to that shown in Nerone.³



Appx6391 (showing Appx82 (Fig. 14) (rotated on left); *id.* (redrawn/highlighted in middle with common nodes); Appx6323 (annotated figure on right)); Appx5075-5078 ¶¶ 14-15; Appx6390-6391.

³ Lynk takes issue with this argument based on the groups of LEDs in Figure 14 being connected in opposing polarity, Lynk Br. 30 n.9, but it cannot reasonably dispute that Figure 14 has its LEDs organized in groups of two parallel-connected LEDs with each LED group connected in series.

In sum, Lynk is incorrect that the specification distinguishes between individual LEDs connected in series and groups of LEDs connected in series. Lynk Br. 33. Limitation 7(b) does not say “individual” LEDs or LED “groups;” in only refers to a “plurality of LEDs,” which would include both individual LEDs and groups of LEDs, as each comprises two or more LEDs. Lynk’s argument merely highlights its attempt to rewrite limitation 7(b) to include the word “individual.” But, as the Board observed, nothing in the intrinsic record supports narrowing the claim to exclude groups of parallel-connected LEDs, which would also improperly exclude the Figure 14 embodiment.

E. Nerone Discloses a Plurality of LEDs Connected In Series

Lynk argues that its claims are patentable under its unwarrantedly narrow claim construction requiring “a single ... connected in series with another LED.” Lynk Br. 34-35. This argument is based entirely on its construction and fails for the above reasons.

F. The Board Was Not Required to Find an Individual LED Connected in Series with One Other Individual LED

Lynk contends that the Board was required to find an individual LED connected in series with another LED. Lynk Br. 35-38. These arguments are based on its erroneous construction and so also fail.

Lynk also contends that Samsung provided no evidence that any single LED 415 is connected in series with another LED in Nerone. Lynk Br. 37-38. Not true.

The Board recognized Samsung's arguments showing how each group of LEDs includes individual LEDs connected in parallel with other LED(s) in a respective group, but those plurality of LEDs are in turn connected in series with another plurality of LEDs. Appx15 (citing Appx6054); *see also* Appx6054 (“*Nerone*’s circuit 400 (‘lighting system’) comprises an LED circuit array comprising a plurality of LEDs connected in series”); *id.* (“*Nerone* discloses that its LED circuit array (red above) comprises an LED circuit (i.e., groups 410) comprising a plurality of LEDs connected in series.”); Appx20-21 (citing Appx6388-6390). This meets the claimed “plurality of LEDs connected in series” of limitation 7(b). Moreover, a “group” of LEDs contains individual LEDs.

Lynk is also wrong that Dr. Baker “explicitly admitted *Nerone* does not disclose two LEDs (‘diodes’) in series.” Lynk Br. 38 (citing Appx5430 (84:14-19)). Lynk takes out of context two sentences of Dr. Baker’s response during an extensive discussion of hypotheticals introduced by Lynk’s counsel. The full context shows there was no such admission. *See* Appx5421 (75:4-7) (“I want to go back to what you characterize as, you know, an impractical approach, and that’s where there are three different diodes used in each of these groups [from *Nerone*].”), Appx5424 (78:4-16) (explaining that counsel’s hypotheticals is “not what’s taught in *Nerone*”), Appx5431 (85:8-25) (“this hypothetical” is “not what *Nerone* teaches” and saying “the individual components are not in series” is “not what is taught in *Nerone*, nor

is that a correct interpretation of what’s happening in the circuits”). Lynk presents no basis to disturb the Board’s finding that Nerone’s groups 410 of LEDs 415 discloses a plurality of connected in series as recited in Claim 7, and that Claim 7, and dependent Claims 8-13, are unpatentable.

III. THE BOARD PROPERLY INTERPRETED AND APPLIED THE CLAIMED “MATCHES” LIMITATION

A. The Board Properly Interpreted “Matches”

Claim limitation 7(f) requires “wherein a forward voltage of the LEDs of the LED circuit array *matches* the rectified input AC voltage output of the driver.” Appx139 (27:57-59) (emphasis added). As the Board explained:

While matching based on “an equivalence within a manufacturing tolerance” falls within the scope of limitation 7(b), *the ’400 patent’s description of “matches” is broader than “equivalence.” It also encompasses “the rectified input AC voltage output of the driver” that is less than “a forward voltage of the LEDs of the LED circuit.”*

Appx36 (quoting Appx126 (2:32-35)) (emphasis added).

Lynk takes issue with the Board’s reliance on the ’400 Patent’s discussion of the Allen reference (Appx1760-1782) to understand the plain meaning of “matches.” Lynk Br. 40-42. But the Board was correct to do so. “[P]rior art cited in a patent ... constitutes intrinsic evidence.” *V-Formation, Inc. v. Benetton Grp. SpA*, 401 F.3d 1307, 1311 (Fed. Cir. 2005) (citations omitted). Intrinsic evidence receives “priority” over inconsistent extrinsic evidence, such as Lynk’s expert who opined that “matches” is limited to “exactly equal” voltage. Appx34; *see also Immunex*,

977 F.3d at 1222 (“extrinsic evidence, including expert testimony,” cannot “trump the persuasive intrinsic evidence”) (internal quotation marks and citation omitted). The ’440 patent’s discussion of Allen is the best evidence in the record as to the ordinary meaning of matched voltages in the art. Because “the Board credited this evidence, and therefore necessarily rejected [Lynk’s] conflicting evidence, [this Court] owe[s] it deference.” *Immunex*, 977 F.3d at 1222 (citation omitted).

It would have been legal error for the Board *not* to give weight to the Allen reference’s discussion of “matched” voltages that the applicant copied into the ’400 patent. In *Arthur A. Collins, Inc. v. Northern Telecom Ltd.*, this Court rejected a district court’s claim construction which “declined to consider the teachings of [prior art referenced in the patent] to ascertain the meaning” of a disputed claim term, and then interpreted the claim term based on its usage in that prior art. 216 F.3d 1042, 1044-45 (Fed. Cir. 2000); *see also Immunex*, 977 F.3d at 1222 & n.9 (the “district court properly used” a prior art reference listed on the face of the patent in its claim construction).

Lynk contends that by using quotes on “matched” in the specification, the applicant was indicating disagreement with Allen’s use of “matched” to refer to equal to or “less than” (i.e., the quotes are “scare quotes”). Lynk Br. 41 & n.11. Lynk never presented this “scare quotes” argument to the Board, and so waived it. In any event, comparing Allen with the ’400 patent refutes that argument. The ’400

patent simply copies the definition of “matched” voltages from Allen’s abstract, *including the original quotes Allen places around “matched.” Compare Appx126 (2:24-35), with Appx1760 (Abstract) (highlighted below); see also Appx1777 ¶ [0056] (“For the voltage to be ‘matched,’... the peak input voltage, V_{peak} , must be less than or equal ...”).*

'440 Patent at 2:24-35

Pat. Pending Application No. 0015968A1 entitled PREFERRED EMBODIMENT TO LED LIGHT STRING to Allen (hereinafter “Allen”) discloses AC powered LED-based light strings. Allen describes LED light strings employing series parallel blocks with a voltage matching requirement for direct AC drive placing fundamental restrictions on the number of diodes (LEDs) on each diode series block, depending on the types of diodes used. Allen discloses that **for the forward voltage to be “matched,” in each series block, the peak input voltage must be less than or equal to the sum of the maximum forward voltages for each series block in order to prevent over-driving.**

Allen at Abstract

from end to end. In order to directly drive a network of diodes without current-limiting circuitry, the voltage of each series block of diodes must be matched to the input source voltage. This voltage matching requirement for direct AC drive places fundamental restrictions on the number of diodes on each diode series block, depending on the types of diodes used. **For the voltage to be “matched,” in each series block, the peak input voltage must be less than or equal to the sum of the maximum diode voltages for each series block.**

The specification states no disagreement with Allen.⁴

Lynk also concedes that the specification *does not define* (or “redefine”) “matches.” Lynk Br. 41-44. Therefore, Lynk has disclaimed any argument that the specification defines “matches,” and at issue is only its ordinary meaning, which the Board found was evidenced by the specification’s discussion of Allen. Appx36.

B. Lynk’s Shifting Construction Is Erroneous

Before the Board Lynk avoided defining “matches,” and instead focused on assertions that it did not encompass “less than.” Appx6330-6343; Appx6453-6459.

⁴ The very next paragraph of the ’400 patent uses quotes around “opposing parallel” in reference to that feature in a different prior art publication, again indicating no express disagreement with the terminology. Appx126 (2:36-38).

Lynk’s expert, however, took the position that the plain meaning of the claimed “matches” means “equal,” Appx4978-4980 (23:25-25:9)—a position inconsistent with the ’400 patent’s description of “matched” as a “less than or equal to” condition, Appx126 (2:24-35); Appx6401-6402; Appx5092-5095 ¶¶ 27-28. When the Board sought clarification at oral argument, Lynk stated that “means an *equivalence within a manufacturing tolerance*.” Appx6530 (32:18-21) (emphasis added); *see also* Appx6531 (33:8-13). Lynk referred the Board to the ’400 patent specification’s discussion of a LED voltage drop “within 95 percent of the AC voltage input” as “support for an LED voltage drop that matches the voltage input,” which Lynk agreed was “just an example provided in the spec[ification].” Appx6530-6531 (32:22-33:16). Lynk also acknowledged the discussion in column 9, lines 48-52 of the specification provides “support for the voltage drop being equal to” while also describing it “as equal to *or less than*.” Appx6531-6532 (33:17-34:23); *see also* Appx130 (9:48-52).

Now on appeal, Lynk asserts the “ordinary meaning of ‘matches’ ... is ‘equivalence,’” and relies on that meaning to distinguish the Nerone-Martin combination because Martin—not the modified Nerone system Samsung presented—discloses a driver output voltage to be less than the forward voltage drop of the LEDs in that reference. Lynk Br. 39-40. Lynk further contends that it treated the ordinary meaning of limitation 7(f) such that the “*value* of the total forward

voltage of the LEDs is *equivalent* to the *value* of the rectified voltage output of the driver.” Lynk Br. 39 (citing Appx6531). But Lynk does not explain whether its understanding that there is some unspecified manufacturer’s tolerance is synonymous with its “equivalence” definition of “matching” or with its additional requirement that limitation 7(f) must include a “value” of voltages—none of which is found in the claim language or supported by the specification.

C. The Intrinsic Evidence Supports the Board’s Findings Regarding a POSITA’s Understanding of Voltage Matching

Lynk identifies no support in the intrinsic record to depart from the Board’s interpretation of “matches.” *See* Lynk Br. 40-44. Indeed, the intrinsic record confirms the Board was correct. *Supra* § III.A.

Lynk argues that “matches” means “equivalence” because limitation 7(f) recites that the LED voltage “matches” the driver’s voltage output. Lynk Br. 40. But this is circular. Moreover, the Board never “explicitly acknowledged” that the ordinary meaning of “matches” in context of LED lighting circuit design is “equivalence” as represented by Lynk. Lynk Br. 40 (citing Appx36). Rather, the Board stated that limitation 7(f) is broader than “equivalence” and also encompasses a “rectified input AC voltage output of the driver that is less than a ‘forward voltage of the LEDs of the LED circuit.’” Appx36 (citing Appx126 (2:32-35)). Contrary to Lynk’s argument, “equivalence” cannot be limited to exactly equal; any tolerance

would necessarily encompass voltages that can be lower (or higher) than a forward voltage of the LEDs.

Lynk's specification-based arguments are also unavailing. Lynk first quotes a passage from the '440 patent referencing "*mixing and matching* of LED circuits requiring different forward voltages and drive currents." Lynk Br. 42 (quoting Appx130 (10:26-36)). Lynk did not cite this passage to the Board, but in any event, it overlooks that "mixing and matching" refers to putting different things together in different ways. This recitation of "matching" is irrelevant to matching the forward voltage to the input voltage.

Lynk also cites an exemplary embodiment where the specification refers to "match[ing] a desired voltage and light output." Lynk Br. 42-43 (quoting Appx133-134 (16:64-17:7)). But nothing in the passage limits "matches" to only equivalents. *Apple Inc. v. Wi-LAN Inc.*, 25 F.4th 960, 967 (Fed. Cir. 2022) ("Embodiments in the specification—even if there is only one embodiment—cannot limit the scope of the claims absent the patentee's 'words or expressions of manifest exclusion or restriction.'") (quoting *Hill-Rom Servs., Inc. v. Stryker Corp.*, 755 F.3d 1367, 1372 (Fed. Cir. 2014)). And Lynk agrees there is no definition of "matches" in the specification. Lynk Br. 42.

Finally, Lynk criticizes the Board's citation of a passage referring to driving LEDs "with a high frequency AC voltage equal to or less than the total series voltage

drop of the ... LEDs,” arguing that those “equal to or less than” voltages are not included in “matches” simply because that particular passage does not use the word “matches.” Lynk Br. 44 (citing Appx36; Appx130 (9:49-51)). But Lynk identifies no words or expressions of manifest exclusion in the intrinsic record to limit the scope of “matches” to exclude input voltages “equal to or less than” the forward voltage, which Dr. Baker confirmed is consistent with a POSITA’s understanding of “matches.” Appx5092-5095 ¶¶ 27-28; *see also Oatey Co. v. IPS Corp.*, 514 F.3d 1271, 1276-77 (Fed. Cir. 2008) (“At leas[t] where claims can reasonably be interpreted to include a specific embodiment, it is incorrect to construe the claims to exclude that embodiment, absent probative evidence on the contrary.”).

D. The Extrinsic Evidence Supports the Board’s Findings

Lynk argues the Board’s reliance on state of art teachings “cannot form an alternative basis for affirmance or remand.” Lynk Br. 47. Lynk does not identify any error in the Board’s decision requiring an alternative basis to affirm on appeal. Samsung’s reliance on those references to demonstrate a POSITA’s understanding of “matches” (e.g., Appx6065-6067) supports a motivation to combine and reasonable expectation of success (e.g., Appx6067-6069), and to demonstrate it was a known exercise in routine optimization to match voltages as claimed (e.g., Appx6067). To the extent Lynk argues the Board somehow erred in relying on such evidence, Lynk is wrong. Lynk itself recognizes that the Board’s consideration and

reliance on the state of art evidence was “to establish the POSITA’s common knowledge for purposes of motivation to combine and reasonable expectation of success, not to fill gaps in the Nerone/Martin combination.” Lynk Br. 45-46 (citing Appx31, Appx34-35). The Board could properly rely on this undisputed evidence demonstrating the knowledge and understanding of a POSITA at the relevant time.

E. The Board Did Not Construe Limitation 7(f) to Read “Rectified” Out of the Claim, and Lynk’s Corresponding New Arguments Are Untimely and Misplaced

Lynk contends the Board “effectively constru[ed] limitation 7(f) as encompassing matching the forward voltage of LEDs to an unrectified AC voltage output,” instead of the claimed rectified output. Lynk Br. 48-49. Lynk’s arguments are premised on its assertion that the Board held that “Martin’s teaching of an unrectified AC voltage output that is less than the forward voltage of the LEDs meets limitation 7(f).” Lynk Br. 48. It is unclear where exactly Lynk thinks the Board made this holding as Lynk simply cites a four-page range of the final decision. Lynk Br. 48 (citing Appx35-38). To the extent Lynk is relying on the Board’s citation of Martin, Appx38 (citing Appx1877 ¶ 22), it ignores that in the very next sentence the Board approvingly cited Dr. Baker’s testimony, which explains that Martin’s disclosure of matching “applies equally to LEDs powered directly from an alternating current ... as well as those powered by rectified AC current,” Appx247-248 ¶ 124, *cited in* Appx38.

Samsung also demonstrated that Martin’s teaching of voltage matching “applies equally to LEDs powered directly from an alternating current ... as well as those powered by rectified AC current.” Appx6063-6064 (citing Appx1877 ¶¶ [0021]-[0024]; Appx1871 (Fig. 5) (disclosing a rectifier providing rectified AC voltage to LEDs); Appx245-248 ¶¶ 122-124). The Board acknowledged Samsung’s position and supporting evidence that Martin discloses “driving with a rectified AC voltage.” Appx34 (quoting Appx6402, and citing Appx6063-6064; Appx1877 ¶¶ 23-25, Fig. 5; Appx1775 ¶¶ 41-43; Appx4172 ¶ 30; Appx5096-5097 ¶¶ 29-30). The Board also credited Samsung’s arguments and Dr. Baker’s testimony when concluding that it would have been obvious to match the rectified AC voltage output in Nerone to the forward voltage (not to an unrectified AC voltage). Appx37-39. The Board understood Samsung’s position did not include bodily incorporation of Martin into Nerone, as Lynk appears to suggest. Instead, the Board recognized, and agreed with Samsung, that a POSITA would have “appl[ied] the teachings of Martin to configure Nerone’s circuitry so that ‘the forward voltage of the series-connected LEDs [] approximately match[es] the *rectified* AC voltage output of the above-described LED driver circuit [of Nerone].” Appx37 (quoting Appx6064 (emphasis added)); *see also* Appx30 (describing Samsung’s arguments); Appx38 (citing Appx245-248 ¶¶ 120-124); *In re Mouttet*, 686 F.3d 1322, 1332-33 (Fed. Cir. 2012) (The “test for obviousness is what the combined teachings of the references would

have suggested to” skilled artisans and “does not require an actual, physical substitution of elements.”) (citations omitted).

Lynk acknowledges that the Board considered its arguments concerning Martin’s teachings of “an unrectified AC voltage output.” Lynk Br. 48. But the Board did not agree with that characterization of Martin. On the contrary, the Board pointed out that Lynk “concedes that Figure 5 of Martin discloses LEDs driven by a *rectified* AC voltage.” Appx32 (emphasis added).

Lynk also ignores that the Board considered Samsung’s unrebutted evidence demonstrating that the primary reference Nerone discloses configurations where a rectified AC voltage is provided to LEDs. See Appx6056-6060; Appx26-29 (noting that Lynk “does not address [Samsung]’s contentions” as to the claimed bridge rectifier and driver limitations).

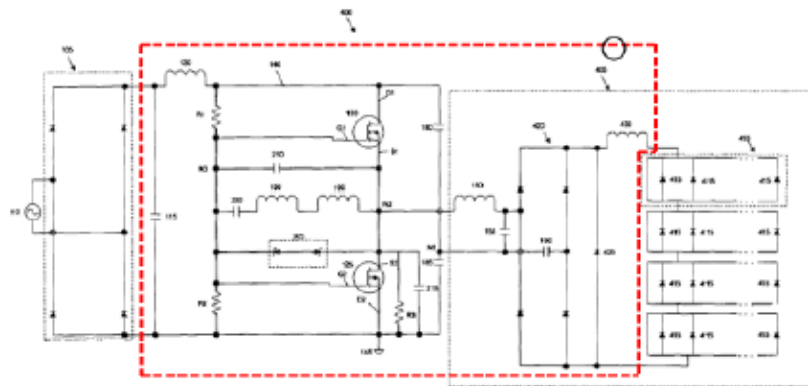
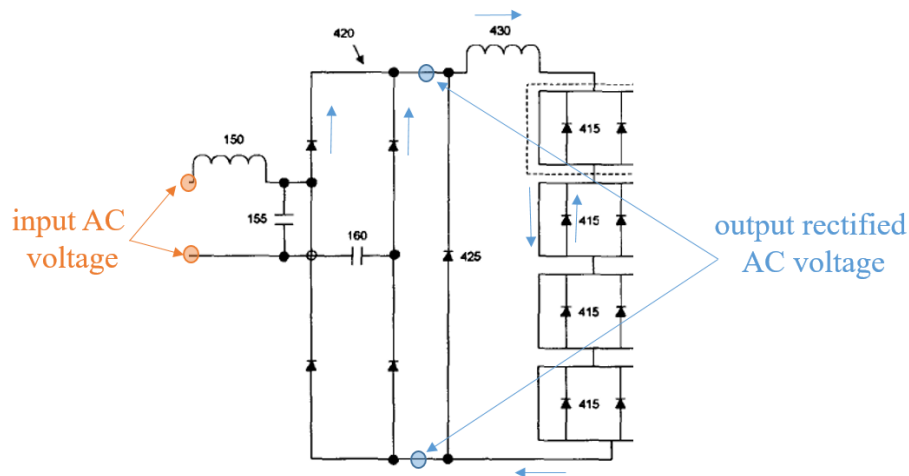


FIG. 4

Appx28 (referring to the Petition’s annotated version of Nerone’s Figure 4 showing a driver (red)); *see also* Appx6061 (showing another annotated version of Nerone’s Figure 4 (below)).

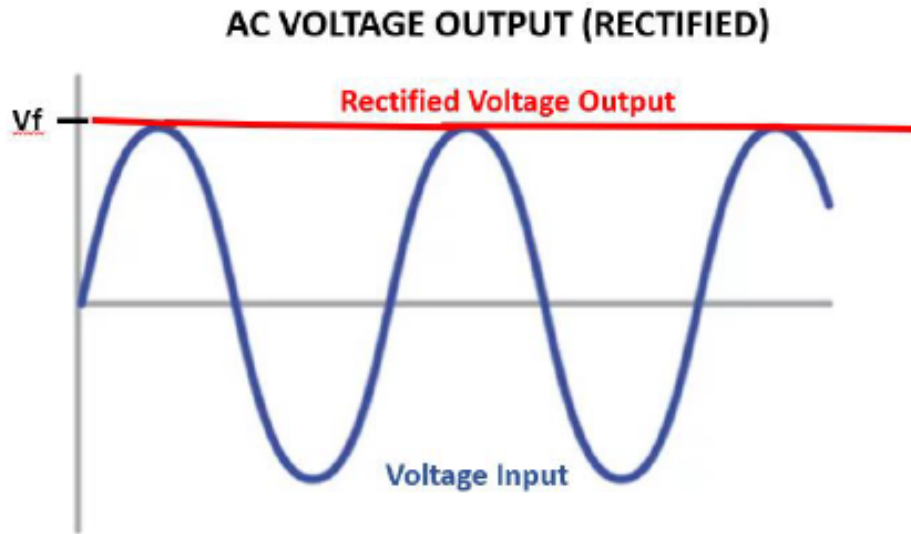


Having “reviewed [Samsung’s] contentions and evidence” and “all of [Lynk’s] contentions,” the Board found the “combined teachings of Nerone and Martin teach or suggest limitation 1(f).” Appx38; *see also* Appx35 (Samsung “persuades us that the combined teachings of Nerone and Martin suggest this limitation”). Thus, contrary to Lynk’s representation, the Board did not “hold that Martin’s teaching of an unrectified AC voltage output ... meets limitation 7(f)” or construe the limitation to encompass voltage matching with an “unrectified AC voltage output.” Lynk. Br. at 48-49. The Board found instead that the teachings of Martin (which includes rectified AC voltage), coupled with a POSITA’s state of art knowledge (demonstrated by state of art evidence such as Cross), motivated the

modification to Nerone's system that resulted in the claimed matching features of limitation 7(f). Appx35-38.

Lynk's remaining arguments (Lynk Br. 51-53) are inapposite and untimely. Lynk never presented to the Board its newly created figures and corresponding arguments, as evidenced by the fact that Lynk does not cite any record below in support of its position. Lynk Br. 51-53. Since Lynk never presented these "more particularized arguments" to distinguish prior art from the same claim limitation to the Board, they are waived. *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1048 (Fed. Cir. 2019).

Lynk's new arguments are also irrelevant because they focus on unrectified and rectified voltage comparisons that are inapplicable to the Board's and Samsung's bases for the Nerone-Martin combination that meets limitation 7(f). Moreover, Lynk's suggestion that claim 7 requires a "rectified voltage output" that appears only as a smooth signal is unsupported and incorrect. Lynk Br. 51 ("On the other hand, limitation 7(f) of the claim recites that the *rectified* AC voltage output **(red below)**").

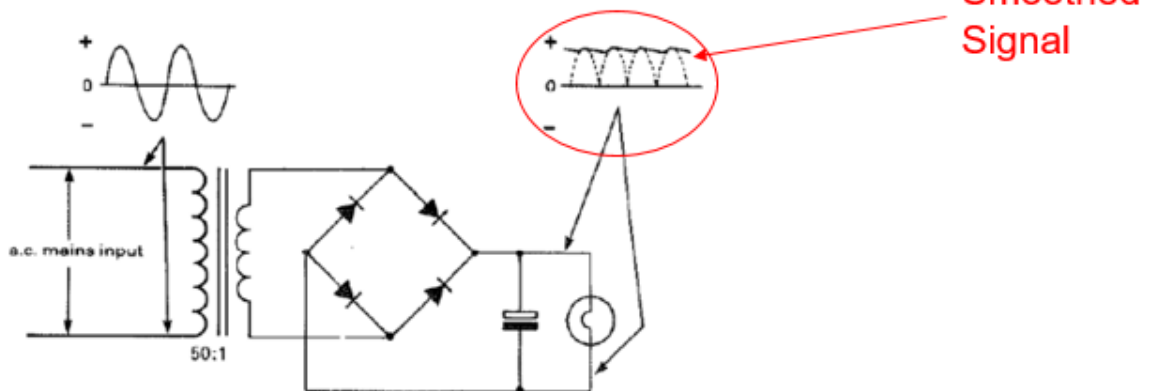


Vf = Forward voltage of LEDs

See Appx0175-0176 [Ex. 1002 (Baker Decl.), ¶ 39] (rectified AC voltage on right of Fig. 3.21 from Appx2137 [Ex. 1030 (*Mastering Electronics* by Watson), 39]).

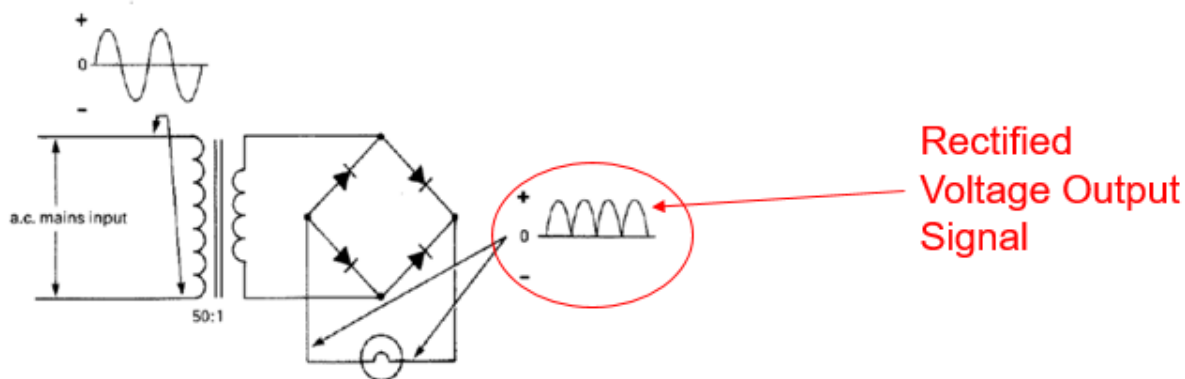
The “voltage on right of Fig. 3.21” from Watson (referenced by Lynk in the label above) shows a rectified voltage output that is also smoothed with a capacitor. Appx174-176 ¶¶ 38-39 (discussing Appx2136-2137). Dr. Baker explained how Watson teaches that a bridge rectifier was known to output a rectified AC signal.

fig 3.21 the bridge rectifier with smoothing capacitor; a large capacitor is used to provide power during the 'gaps' in the rectified waveform



Appx2137 (Fig. 3.21) (annotated); Appx175-176 ¶ 39 (“A [POSITA] would have known that the rectified voltage signal shown at the right side of Figure 3.20 can be smoothed to a relatively constant DC voltage, using a smooth capacitor ... as shown [] in Figure 3.21 of *Watson*.”). Lynk overlooks Watson’s explanation that the AC signal is output from the rectifier as the time-varying signal shown below:

fig 3.20 the diode ‘bridge rectifier’ configuration, used to provide full-wave rectification of an a.c. supply (although both halves of the a.c. input waveform pass through the lamp, the current flow through the lamp is not smooth—and this would upset the operation of many circuits)



Appx2136 (Fig. 3.20 (annotated)); Appx174-175 ¶ 38 (“Figure 3.20 shows a full-wave rectifier using a bridge rectifier”).

While claim 7 recites a “capacitor” (*see e.g.*, Appx139 (27:51); Appx6055-6056), the claim does not *require* that the capacitor be used for smoothing, or be connected in any particular location in the circuit, including at the output of the bridge rectifier. Appx139 (27:48-62).⁵ Lynk’s arguments, which are incorrectly

⁵ Lynk does not (and did not below) dispute Samsung’s mapping showing how “*Nerone* discloses that circuit 400 (‘lighting system’) includes capacitors 115, 155,

premised on the rectified AC signal voltage output in claim limitation 7(f) necessarily being a smoothed signal like that shown in Lynk’s newly created figure above (Lynk Br. 53), fail to demonstrate any error in the Board’s analysis and findings.

F. Substantial Evidence Supports the Board’s Findings that the Nerone-Martin Combination Discloses the Claimed Voltage Matching

Lynk incorrectly frames the Board’s decision as based solely on Martin disclosing “less than” the forward voltage of the LEDs, and incorrectly suggests that is the only result of the combination with Nerone. Lynk Br at 45-46. Although the Board rejected Lynk’s argument attempting to limit “matches” to “equivalence,” it never found that the Nerone-Martin combination only discloses the “matches” limitation if “matches” includes “less than.” Appx36. In fact, the Board credited Samsung’s argument and evidence that a POSITA would have applied “the teachings of Martin to configure Nerone’s circuitry so that ‘the forward voltage of the series-connected LEDs [] approximately match[es] the rectified AC voltage output.’” Appx37 (citing Appx6063-6064; Appx5096 ¶ 29; Appx4172 ¶¶ 30-31; Appx4164 (Fig. 2)); *see also* Appx30-31 (citing Appx6063-6064; Appx246-248

160, 185, 200, 210, and 215 (red below), any of which is ‘a capacitor’ as claimed in limitation 7(c).” Appx6055-6056; *see also* Appx25-26 (noting that Lynk “does not address [Samsung]’s contentions”).

¶¶ 123-124; Appx1877 ¶¶ 22-24; Appx1871 (Fig. 5)). The Board made no finding that “approximately match” is limited to “less than.”

The Nerone-Martin combination is not based on a bodily incorporation of Martin into Nerone either in the Petition or the Board’s decision. *Supra* § III.E. Further, while Martin discloses “less than,” it also supports a forward voltage equal to, especially in context of the state of art evidence presented by Samsung, which includes Allen (discussed in the ’400 patent specification). The resulting modified Nerone system is based on the teachings and suggestions from Martin in context of a POSITA’s state of art knowledge (corroborated with state of art evidence (Allen, Appx1760-1782; Cross, Appx4162-4174; Bockle, Appx4175-4184) and Dr. Baker’s largely unrebutted expert testimony (Appx243-253 ¶¶ 120-128). *See* Appx36-39.

The Board also credited Samsung’s evidence and corresponding arguments, which took into account the undisputed understanding that a POSITA would have been motivated to configure the Nerone system to include an appropriate number of LEDs so as not to overdrive or underdrive the LEDs. The resulting configuration of the Nerone-Martin combination thus encompasses arrangements where the forward voltage drop of the LEDs is equal to or less than the voltage output of the driver to ensure the lighting system operates as designed (e.g., provides sufficient illumination without being damaged by overdriven current) depending on the

application of the modified system. Appx6068; Appx253-254 ¶ 129; Appx4915 (6:6-9); Appx33-34; Appx37 (citing Appx6063-6064; Appx5096 ¶ 29).

As Dr. Baker explained, a POSITA “would have taken into consideration the number of LEDs and the total voltage drop of the LED circuit when designing and implementing *Nerone’s* circuit 400” and that “matching the input voltage to the forward voltage of the LEDs had become a matter of routine optimization.” Appx243-245 ¶¶ 120-121; *see also* Appx4172 ¶ 30. The Board credited this testimony. Appx29; Appx36-37. The Board also observed that neither Lynk nor its expert disputed Dr. Baker’s evidence that “a person of ordinary skill in the art would have known to consider these factors when designing *Nerone’s* circuit.” Appx36-37.

Thus, the Board never found that the resulting *Nerone-Martin* combination only included a forward voltage drop of the LEDs to be less than (or not equal to) the voltage output of the rectifier. Instead, the Board found that “the optimization of LED strings by matching LEDs to input voltage was within the knowledge of one of ordinary skill in the art as evidenced by Martin and corroborated by Cross.” Appx39. Nonetheless, even if the *Nerone-Martin* system encompassed arrangements where the LEDs’ forward voltage was less than the output voltage of the driver, such an arrangement would have been configured consistent with the POSITA’s knowledge and understanding, as explained by Dr. Baker—for example,

to prevent overdriving and underdriving consistent with the '400 patent's reason for "matching," Appx38 (citing Appx126 (2:24-35))—and the meaning of the term in claim 7, which "encompasses 'the rectified input AC voltage output of the driver' that is less than 'a forward voltage of the LEDs of the LED circuit,'" Appx36 (quoting Appx126 (2:32-35)). Thus, even if this Court agrees with Lynk's claim construction arguments, there is still substantial evidence supporting obviousness.

G. The Board Is Not Required to Determine Numerical Values of Exemplary Forward Voltages to Support Obviousness

Lynk contends the Board erred in rejecting Lynk's argument that Samsung was required to "make a numerical showing that [the] Nerone/Martin combination meets the requirement that the value of the rectified AC voltage output of the driver 'matches' the value of the forward voltage of the LED." Lynk Br. 53. Lynk's arguments are misplaced.

Lynk attempts to frame this issue as one of claim construction, arguing that Samsung needed to provide a "numerical showing" to prove obviousness (i.e., a "value" of the forward LED voltage and a "value" of the "AC voltage output of the driver"). Lynk Br. 53-54. And Lynk contends for the first time on appeal that the claim should be read to require specific values because the specification discloses specific example values. *Id.* at 54.

But nowhere below did Lynk argue that limitation 7(f) required a construction adding the term "value" to the claims as Lynk now argues on appeal. *Compare* Lynk

Br. 53-55, with Appx6293-6371, and Appx6436-6470. Instead, Lynk's arguments before the Board were about requiring a specific number of LEDs. Appx6331-6332; Appx6453-6455. And Lynk's newly minted argument is also contrary to its argument on appeal that the claim is limited to matching the rectifier output. *See* Lynk Br. 48; *supra* § III.E.

Lynk does not appear to be arguing that the specific "value[s]" disclosed in any of the '400 patent's embodiments are required by the claim, so there is no apparent basis for requiring them to show obviousness. To the extent Lynk's argument is that proving obviousness requires a demonstrated successful example embodiment, obviousness requires only a "reasonable" expectation of success. *Pfizer, Inc. v. Apotex, Inc.*, 480 F.3d 1348, 1364 (Fed. Cir. 2007); *Transtex Inc. v. Vidal*, No. 2020-1140, 2023 WL 1487425, at *5 (Fed. Cir. Feb. 3, 2023). Nor does Lynk cite any support for its novel argument that because the specification discloses an embodiment with specific example numerical values (where those values are not claimed), an obviousness analysis must also include specific values. Lynk Br. 54.

Lynk suggests the Board did not provide "articulated reasoning" and relied on "impermissible hindsight." Lynk Br. 56. That has no merit. The Board explained in detail how the Nerone-Martin combination renders obvious limitation 7(f). Appx29-31; Appx37-38. That is unlike *In re Stepan Company*, 868 F.3d 1342, 1346 (Fed. Cir. 2017), where the Board failed to address "why" it would have been routine

optimization to arrive at the claimed invention. Similarly, Lynk’s request for a “showing that the values of the voltages would match in the *modified* Nerone system” requires that Nerone is *already modified*, and Lynk does not contest the Board’s rationale for modifying Nerone, making concept of “hindsight” and Lynk’s invocation of *TQ Delta* and *Kinetic Concepts* irrelevant. See Lynk Br. 56.

Lynk does not argue that it would be difficult to match voltages. Indeed, Lynk and Dr. Ducharme both admit this is something that “could have *easily* [been] provided.” Appx5291 ¶ 90; Appx6332. And the Board credited Samsung’s evidence showing that a POSITA would have been capable of determining the appropriate number of LEDs to match the forward voltage drop to the rectified AC voltage output. Appx37. Instead of a “hand-waving exercise,” Lynk Br. 55, it is a routine application of basic math and circuit design well within a POSITA’s ability. Thus, substantial evidence supports finding a reasonable expectation of success that a POSITA could match the LED forward voltage drop to the rectified AC voltage output, which is all that is required.

IV. MARTIN IS PRIOR ART UNDER 35 U.S.C. § 311(b)

Lynk challenges the Board’s reliance on pre-AIA § 102(e)(1) in determining the priority date of a patent application asserted as a printed publication prior art. Lynk argues that, since section 311 refers only to patents and printed publications—and not to an “application for patent”—the effective date of a patent application

asserted as a printed publication prior art is the date of its publication by the PTO, and not its filing date. Lynk Br. 57-66.

Lynk's challenge misunderstands the statutory scheme and contradicts long-standing PTO practice predating the AIA's enactment—a practice Congress did not disavow when it set up the IPR regime. As an initial matter, the Supreme Court and this Court have long held that, for patent applications, the relevant priority date is not the date on which an application was made public, but the date of the application's filing. See *Hazeltine Res., Inc. v. Brenner*, 382 U.S. 252, 254-55 (1965); *Becton, Dickinson & Co. v. Baxter Corp. Englewood*, 998 F.3d 1337, 1345 & n.7 (Fed. Cir. 2021). A contrary rule, the Supreme Court explained, “would create an area where patents are awarded for unpatentable advances in the art.” *Hazeltine*, 382 U.S. at 256. Because “[t]he delays of the patent office ought not to cut down the effect of what has been done,” the Supreme Court saw “no reason” to adopt “a restricted definition of ‘prior art’ which would lower standards of patentability,” leading to results contrary to what Congress intended in the Patent Act. *Id.* (quoting *Alexander Milburn Co. v. Davis-Bournonville Co.*, 270 U.S. 390, 401 (1926)).

Indeed, in *Becton*, this Court rejected the patent owner's argument that a patent that was subsequently revoked could not be “considered ... to be prior art” in an *inter partes* review under pre-AIA § 102(e)(2) as of “the filing date of the application,” even though the patent “was not made public until issuance,” which

occurred later. 998 F.3d at 1345 & n.7. As the Court noted, “[t]he Supreme Court’s decision in *Hazeltine* ... forecloses this argument.” *Id.*⁶ Even though no patent yet existed at the time the application for a patent was filed (and the application itself was still kept confidential), *Hazeltine* and *Becton* instruct to look to that filing date—not the date of the eventual patent grant—when determining the priority date for purposes of ascertaining patentability.

Logic mandates the same rule when applying pre-AIA § 102(e)(1) to determine the relevant priority date of a patent application asserted as a prior art. Section 311(b)’s reference to “printed publication” merely sets up a category of prior art documents that can be used in an IPR; it does not in itself determine the relevant priority date thereof. While petitioner must show that the patent application qualifies as a “printed publication,” the effective date of such a publication can be the date the application was filed with the PTO; it is not limited to the subsequent date on which the PTO made it public.

To be sure, there is no dispute that, “[t]o qualify as a printed publication, a reference ‘must have been sufficiently accessible to the public interested in the art.’”

Blue Calypso, LLC v. Groupon, Inc., 815 F.3d 1331, 1348 (Fed. Cir. 2016) (quoting

⁶ The patent challenger in *Becton* did not argue that the patent application constituted prior art under pre-AIA § 102(e)(1) because the applicant “expressly requested that the application ... not be published under 35 U.S.C. § 122(b) and was, therefore, never published under that section.” 998 F.3d at 1345 n.6 (internal quotation marks and citation omitted).

In re Cronyn, 890 F.2d 1158, 1160 (Fed. Cir. 1989)); *see also M & K Holdings, Inc. v. Samsung Elecs. Co.*, 985 F.3d 1376, 1379 (Fed. Cir. 2021) (“[T]he key inquiry is whether or not a reference has been made ‘publicly accessible.’”) (internal quotation marks and citation omitted). There is also no dispute that Martin satisfies that test. As required by statute, Martin was “published ... promptly after the expiration of [the statutory post-filing] period of 18 months,” 35 U.S.C. § 122(b)(1), and the PTO makes “[t]he specification, drawings, and all papers relating to the file of [a] published application ... open to inspection by the public,” 37 C.F.R. § 1.11(a).

The question of a printed publication’s effective date is a different inquiry. Neither section 102(a), which prevents issuance of a patent if “the claimed invention was ... described in a printed publication,” 35 U.S.C. § 102(a), nor section 311(b), which authorizes IPR challenges “on the basis of prior art consisting of patents and printed publications,” 35 U.S.C. § 311(b), sets forth rules for determining the printed publication’s effective date. This Court’s decisions that Lynk invokes, *see Lynk Br. 63*, conducted the inquiry into the date of the asserted printed publication’s disclosure or accessibility in order to ensure that the publication was sufficiently accessible to the public for “‘more than one year prior to the date of the application for patent.’” *In re Cronyn*, 890 F.2d at 1159 (quoting 35 U.S.C. § 102(b)). But where the reference asserted as a printed publication is a patent or an application for

patent, pre-AIA section 102(e)'s rules for determining the effective date supply the answer—and those are the rules the Board followed here.

Lynk (and its *amicus* VLSI) attempt to distinguish *Becton* as a case where the reference at issue was a “patent,” and not a patent application. *See* Lynk Br. 65; VLSI *Amicus* Br. 22-23. But that distinction does not hold up to scrutiny. As VLSI admits, *Becton* “supports the proposition that, when *patents* are asserted in IPRs, they may be treated as prior art as of their filing dates.” VLSI Br. 22. But on that date, a future patent is not yet a patent; it is only an application for a patent. Nevertheless, long-standing precedent holds that the effective date of a patent is the date when an application for that patent is filed with the PTO. *Supra* at 60-61. When a patent application is asserted as a printed application, its effective date should similarly be the date when it was filed with the PTO, as pre-AIA § 102(e)(1) prescribes. Section 311(b) does not distinguish between patents and printed publications in this regard, and there is no reason to believe Congress intended to depart from long-standing precedent on determining the effective date of patents and published patent applications. There is no support in the statute for determining the effective priority date differently depending on whether an application for a patent later resulted in a “patent[]” or a “printed publication[.]” 35 U.S.C. § 311(b). As the Board previously explained, in the context of an appeal from a patent examination:

Section 102(e)(1) gives prior art effect to U.S. patent application publications, such as the published second Lively application, as of the earliest U.S. effective filing date. Congress in making a published application prior art as of its filing date adopted for published applications the same prior art status that it previously adopted for patents which are prior art. ... There is no cogent basis for treating issued patents and published applications differently when it comes to the effective filing date of either.

Ex parte Michael J. May, Appeal No. 2006-1776, 2007 WL 7751834 *5 (B.P.A.I. Apr. 30, 2007) (informative).

Lynk's proposed rule would also be illogical and cause significant administrative confusion. For example, it would lead to an absurd result where effective date of a published application that is still undergoing examination by the PTO could change while an IPR proceeding is pending if the PTO approves it as a patent. Moreover, it would not make sense to have a rule where the same patent application would have a different priority date depending on whether it is asserted in an IPR or in a district court litigation, thereby affecting whether it could be asserted as prior art. That would lead to plainly illogical results under the IPR statutory estoppel provisions, which preclude an IPR petitioner from asserting in litigation "any ground that the petition ... reasonably could have raised during that inter partes review." 35 U.S.C. § 315(e)(2). There is no indication in the statute that Congress intended such an illogical result, particularly since Congress intended the IPR regime as an efficient alternative to district court litigation.

The history of the IPR statutory scheme confirms that Congress did not intend to disallow reliance on § 102(e)(1) when determining the relevant priority date of a patent application asserted as a printed publication in IPRs. The IPR regime replaced *inter partes* reexaminations, which similarly limited patentability challenges to “prior art consisting of patents or printed publications.” *See* 35 U.S.C. § 301 (2006); *see also* 35 U.S.C. § 311(a) (2006) (providing that “a request for *inter partes* reexamination” may be made “on the basis of any prior art cited under the provisions of section 301”). Under the same statutory provision (pre-AIA § 102(e)(1)), the relevant priority date for printed-publication patent applications asserted in reexaminations was the date on which the patent application was filed. That has been the PTO’s long-term practice, reflected in its official guidance to patent examiners. *See* U.S.P.T.O., *35 USC §§ 102(e) and 374: as amended by HR 2215 (Technical Correction Act)* (Nov. 2, 2002), <https://www.uspto.gov/patents/laws/examination-policy/35-usc-102e-and-374-amended-hr-2215-technical> (“§ 102(e) provisions must be used in examining any application, *or patent under reexamination*”) (emphasis added).

Consistent with this practice, the Board repeatedly applied pre-AIA § 102(e)(1) to determine the priority date of patent applications in its *inter partes* reexamination decisions. *See, e.g., Superior Commc’ns, Inc. v. Volstar Techs., Inc.*, Appeal No. 2014-007294, 2014 Pat. App. LEXIS 6964, *7, 10 (P.T.A.B. Oct. 28,

2014); *Brocade Commc'ns Sys., Inc. v. A10 Networks, Inc.*, Appeal No. 2014-002797, 2014 Pat. App. LEXIS 2716, *5-9 (P.T.A.B. Apr. 30, 2014); *Signature Sys., LLC v. AD. Ken Corp.*, Appeal No. 2010-002205, 2010 Pat. App. LEXIS 13215, *5, 31 (B.P.A.I. Sept. 29, 2010). In fact, that was the PTO's practice with respect to *ex parte* reexaminations as well, which pre-dated *inter partes* reexaminations but contained the same "patent or printed publication" requirement. See U.S.P.T.O., *Manual of Patent Examining Procedure* § 2217. When it enacted the *inter partes* reexamination regime, Congress indicated that it wished to maintain the then-"current law," under which "grounds for reexamination are limited to earlier patents and printed publications." H.R. Rep. No. 106-287, pt. 1, at 58 (1999). Congress demonstrated no indication in the AIA to change that settled practice. See *Lorillard*, 434 U.S. at 580 (1978) ("Congress is presumed to be aware of an administrative ... interpretation of a statute."); *Mudge v. United States*, 308 F.3d 1220, 1232 (Fed. Cir. 2002) ("In interpreting [the statute], we presume that Congress was aware of any administrative ... interpretations of the statute."). Congress' implicit approval of the PTO's settled practice demonstrates that, when it listed patent applications in the pre-AIA § 102(e)(1), Congress did not intend to preclude reliance on that provision when determining the effective filing date of a patent application asserted as a printed-publication prior art in an *inter partes* reexamination.

Indeed, the Board has continued to apply pre-AIA § 102(e) in IPRs, ruling in numerous decisions that patent applications can be used as prior art under pre-AIA § 102(e), with priority based on the date of filing—not publication. *See, e.g., Aquestive Therapeutics, Inc. v. Neurelis, Inc.*, No. IPR2019-00451, 2019 WL 3806127, at *3-4 (P.T.A.B. Aug. 13, 2019); *Cardiovascular Sys., Inc. v. Shockwave Med., Inc.*, No. IPR2019-00405, 2019 WL 3001061, at *4 (P.T.A.B. July 9, 2019); *Yamaha Golf Car Co. v. Club Car, LLC*, No. IPR2017-02144, 2019 WL 1486729, at *3 (P.T.A.B. Apr. 2, 2019); *Hutchinson Tech., Inc. v. Nitto Denko Corp.*, No. IPR2017-01421, 2017 WL 4574653, at *3 (P.T.A.B. Oct. 12, 2017); *Butamax Adv. Biofuels LLC v. Gevo, Inc.*, No. IPR2013-00539, 2014 WL 2527800, at *13 & n.3 (P.T.A.B. Mar. 4, 2014). The Board’s consistent practice has not elicited any congressional protest—a further indication that Congress did not view such practice as inconsistent with the legislative design of the IPR regime.

Lynk’s argument would lead to negative results that contravene the IPR regime’s statutory purpose. It would foreclose the Board’s reliance on pre-AIA § 102(e)(1) when determining the priority date of a patent application asserted as a prior art in an IPR. That would mean that such applications could only be treated as a prior art in IPRs upon their “publication” by the PTO, which takes place 18 months after filing. Such a rule would curtail considerably the utility of prior art patent applications in IPRs, contrary to the AIA’s purpose of weeding out dubious patents.

Nothing in the text of section 311(b), nor in congressional design of the IPR regime, mandates this illogical result.

CONCLUSION

The Board's final written decision should be affirmed.

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Respectfully submitted,

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CERTIFICATE OF SERVICE

I certify that I filed the foregoing corrected response brief with the Clerk of the United States Court of Appeals for the Federal Circuit via the CM/ECF system this 25th day of September, 2024 and also served a copy on counsel of record via the CM/ECF system.

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