

Petition for *Inter Partes* Review
U.S. Patent No. 8,941,331

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Hisense USA Corporation
Petitioner

v.

Brightplus Ventures LLC
Patent Owner

Patent No. 8,941,331
Filing Date: May 17, 2013
Issue Date: January 27, 2015
Title: SOLID-STATE LIGHTING PANELS WITH VARIABLE VOLTAGE
BOOST CURRENT SOURCES

Inter Partes Review No. IPR2023-01401

PETITION FOR *INTER PARTES* REVIEW

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LIST OF EXHIBITS

EXHIBIT	DESCRIPTION
1001	U.S. Patent No. 8,941,331 (“the ’331 Patent”)
1002	Prosecution History of U.S. Patent No. 8,941,331
1003	Declaration of Rafael Betancourt
1004	Curriculum Vitae of Rafael Betancourt
1005	WO 2005/089293 to Lys (“Lys”)
1006	U.S. 2007/0046485 to Grootes (“Grootes”)
1007	CN 1588523 to Xu (“Xu”)
1008	Certified Translation of Xu
1009	U.S. 2005/0047134 A1 to Mueller (“Mueller”)
1010	U.S. 5,663,667 to Blum (“Blum”)
1011	Counterclaim filed by Patent Owner in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774, Dkt. 9 (N.D. Ga. Sep. 16, 2022)
1012	Scheduling Order in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774, Dkt. 35 (N.D. Ga.)
1013	Judicial Caseload Profile for the Northern District of Georgia
1014	Cover Pleading to Patent Owner’s Infringement Contentions in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774 (N.D. Ga.)
1015	Cover Pleading to Patent Owner’s Supplemental Infringement Contentions in <i>Hisense USA Corp. v. Brightplus Ventures LLC</i> , No. 1:22-cv-02774 (N.D. Ga.) served June 21, 2023
1016	Supertex Inc., HV9910 – Universal High Brightness LED Driver
1017	Supertex Inc., Press Release Announcing HV9910 (May 17, 2004)

I. Mandatory Notices (37 C.F.R. § 42.8(b))

A. Real Party-in-Interest (37 C.F.R. § 42.8(b)(1))

The petitioner Hisense USA Corporation, is a Georgia corporation with a principal place of business at 7310 McGinnis Ferry Road, Suwanee, GA, 30024. Petitioner is a subsidiary of Hisense Group, which is organized under the laws of China. Other privies or real parties in interest include companies within the Hisense Group, including Hisense International (Hong Kong) America Investment Co., Ltd.; Hisense Group Holdings Co., Ltd.; Hisense Visual Technology Co., Ltd.; Hisense International (HK) Co., Ltd.; Hisense International Co., Ltd.; TVS REGZA Corporation.

B. Related Matters (37 C.F.R. § 42.8(b)(2))

The '331 Patent is asserted against Petitioner in a Counterclaim in *Hisense USA Corp. v. Brightplus Ventures LLC*, No. 1:22-cv-02774 (N.D. Ga.) (the “Underlying Litigation”). The Underlying Litigation was initially filed by Petitioner on July 14, 2022, and the '331 Patent was first asserted in a Counterclaim filed in the Underlying Litigation on September 16, 2022. *See* Ex. 1011. The current schedule in the Underlying Litigation is attached as Exhibit 1012. In addition to Petitioner, the following entities are Counterclaim defendants in the Underlying Litigation: Hisense Co., Ltd. Hisense International (HK) Co. Ltd., Hisense Visual Technology Co. Ltd., and TVS Regza Corp.

Petitioner has also filed petitions for IPR challenging other patents asserted in the underlying litigation as follows:

- U.S. 9,605,835 filed on July 14, 2023, and assigned IPR2023-01168;
- U.S. 8,177,382 filed on August 11, 2023, and assigned IPR2023-01311; and
- U.S. 7,690,812 filed on September 6, 2023, and assigned IPR2023-01385.

C. Designation of Lead and Backup Counsel (37 C.F.R. § 42.8(b)(3)) and Service Information (37 C.F.R. § 42.8(b)(4)).

<u>Lead Counsel</u>	<u>Backup Counsel</u>
Matias Ferrario Reg. No. 51,082 1001 W. 4 th Street Winston-Salem, NC 27101 Office: 336.607.7475 Fax: 336.734.2651 MFerrario@kilpatricktownsend.com	Michael J. Turton Reg. No. 40,852 1100 Peachtree St. NE, Suite 2800 Atlanta, GA 30309-4528 Office: 404.815.6061 Fax: 404.815.6555 MTurton@kilpatricktownsend.com

Petitioner may be served via email to its lead and backup counsel at the email addresses above.

II. Introduction

The '331 patent is invalid. The independent claims recite little more than first and second strings of solid-state lighting devices, corresponding current supply circuits, and a pulse width modulation (PWM) controller coupled to the current supply circuits. Each of these elements was well-known in the art, and each of these elements had been used in combination for exactly the same purpose—adjustable solid state lighting panels—for years prior to the earliest claimed

priority date. The combination of these known elements would have been obvious to a Person of Ordinary Skill in the Art as of the earliest claimed priority date of the '331 Patent, November 18, 2005. The challenged claims should be cancelled as obvious.

III. IPR Requirements

A. Standing (37 C.F.R. § 42.104(a))

Petitioner certifies that the '331 Patent is available for IPR and that Petitioner is not barred or estopped from requesting IPR. The '331 Patent issued on January 27, 2015, and this Petition is filed within one year of service of the Complaint against Petitioner alleging infringement of the '331 Patent (*see* Ex. 1011) and is not barred under 35 U.S.C. §315(b).

B. Fees (37 C.F.R. § 42.103)

This Petition requests review of eight (8) claims of the '331 Patent and is accompanied by a payment of \$41,500, which includes the \$19,000 IPR request fee, and the \$22,500 post-institution fee. *See* 37 C.F.R. § 42.15(a). Thus, this Petition meets the fee requirements under 35 U.S.C. § 312(a)(1). The Board is hereby authorized to charge any additional fees required by this action to Deposit Account No. 20-1430.

C. Challenge Under 37 C.F.R. § 42.104(b)

This petition requests cancellation of claims 17-18 and 20-25 as rendered obvious under 35 U.S.C. § 103 based on the following prior art references:

- WO 2005/089293 to Lys (“Lys”) (Ex. 1005);
- U.S. 2007/0046485 to Grootes (“Grootes”) (Ex. 1006);
- CN 1588523 to Xu (“Xu”) (Exs. 1007, 1008);
- U.S. 2005/0047134 to Mueller (“Mueller”) (Ex. 1009); and
- U.S. 5,663,667 to Blum (“Blum”) (Ex. 1010).

The statutory grounds for the challenge of each claim are set forth below:

Ground	35 U.S.C.	Claims	References
1	103	17	Combination of Lys and Grootes in view of the Knowledge of a POSITA
2	103	18-20 and 22-25	Combination of Lys, Grootes, and Xu in view of the Knowledge of a POSITA
3	103	21	Combination of Lys, Grootes, Xu, and Blum in view of the Knowledge of a POSITA
4	103	17	Combination of Mueller and Grootes in view of the Knowledge of a POSITA
5	103	18 and 20	Combination of Mueller, Grootes, and Xu in view of the Knowledge of a POSITA
6	103	21	Combination of Mueller, Grootes, Xu, and Blum in view of the Knowledge of a POSITA

The record establishes a reasonable likelihood of prevailing as to each ground of invalidity with respect to the Challenged Claims.

IV. Background

A. The '331 Patent

The '331 Patent was filed on May 17, 2013, and claimed priority as a continuation to a series of applications, to an earliest non-provisional filing date of November 17, 2006, and a priority claim to a provisional application filed November 18, 2005.¹

The '331 Patent describes multiple embodiments, however, the claims of the '331 Patent relate to a lighting system including at least first and second strings of solid-state lighting devices, corresponding current supply circuits, and a pulse width modulation (PWM) controller coupled to the current supply circuits. This embodiment is described with respect to Figure 5 of the '331 Patent as a “lighting system 200,” which includes a lighting panel 40. '331 Patent, col. 9:60-62. The lighting system 200 further includes a current driver 220 that “provides independent current control for” each LED string of the lighting panel 40. *Id.*, col. 10:17-18. The lighting system 200 further includes a controller 230, which is programmed to provide pulse width modulation (PWM) control of, for example, thirty-six separate current supply blocks with the driver 220 for the thirty-six strings included in the lighting panel 40. *Id.*, col. 10:24-29.

¹ All of the prior art relied upon this Petition predates the filing date of this provisional application and thus this Petition does not address whether the claims of the '331 Patent are entitled to that priority date.

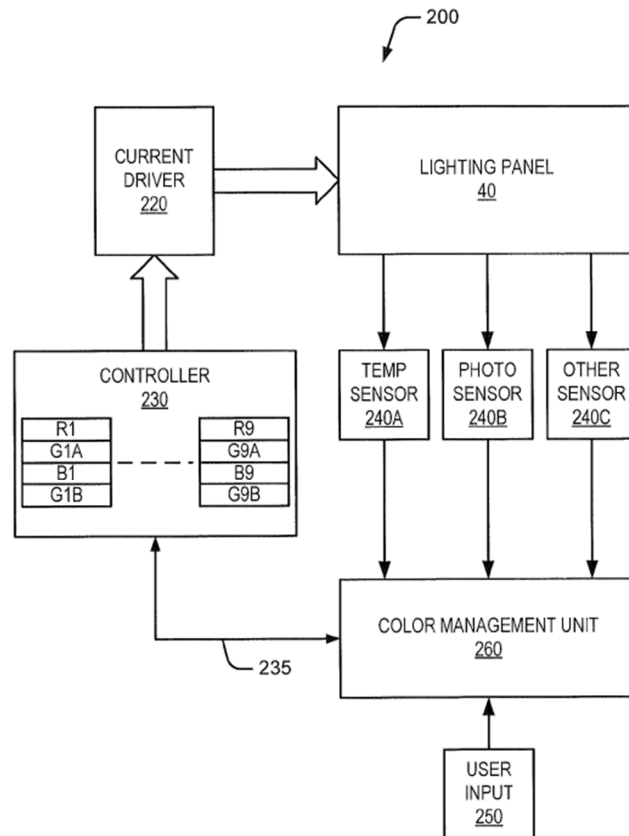


FIGURE 5

Id., Fig. 5.

This embodiment is also described with respect to Figure 9 as a “current supply circuit 400,” which has a “variable voltage boost converter configuration including a PWM controller 410, a charging inductor 420, a diode 430, an output capacitor 440, first and second control transistors 450, 460, and a sense resistor 470.” ’331 Patent, col. 12:45-51. The current supply circuit 400 receives an input voltage V_{IN} , which may be 34 V in some embodiments, and a PWM signal from the controller 230. *Id.*, col. 12:51-54. The current supply circuit 400 is “configured

to provide a substantially constant current to a corresponding LED string 23 via output terminals DIODE+ and DIODE−, which are connected to the anode and cathode of the corresponding LED string, respectively.” *Id.*, col. 12:55-59. The current supply circuit may “act as a voltage boost converter to provide the high voltage (*e.g.*, 170 V or even higher) that may be required to drive an LED string 23.” *Id.*, col. 12:59-63. Additionally, the constant current may be supplied with a variable voltage boost “to account for differences in average forward voltage from string to string.” *Id.*, col. 12:63-65.

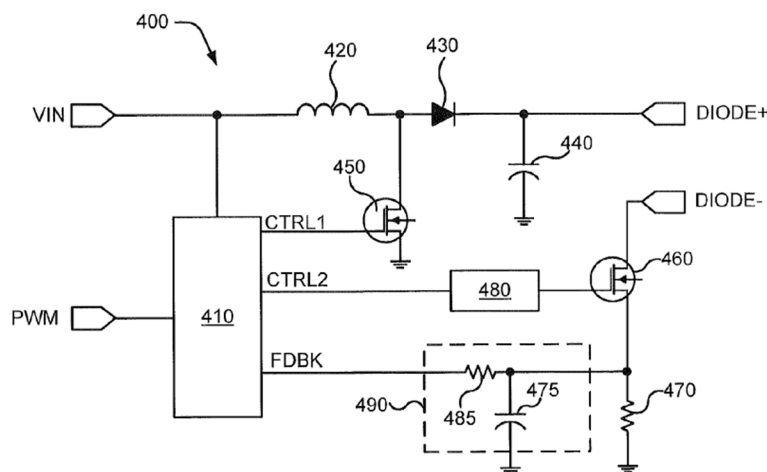


FIGURE 9

Id., Fig. 9.

B. Prosecution of the '331 Patent.

The Application that led to the '331 Patent was originally filed with claims 1-19. Applicant canceled claims 1-19 and added new claims 20-46 on May 24, 2013 in a preliminary amendment. The Applicant canceled claims 20-46 and added new claims 47-71 on June 20, 2013 in a supplemental preliminary amendment. The

Examiner rejected claims 47-54 and 58-71 and objected to claims 55-57 in a Non-Final Office Action dated August 8, 2013. The Applicant responded by amending independent claim 63, now claim 17 after renumbering, to recite “a pulse width modulation (PWM) controller that is coupled to the current supply circuits and that is configured to generate, for ones of the first and second current supply circuits, a first PWM control signal and a second PWM control signal that are supplied to the at least first and second strings.” Ex. 1002 at 116.

The Examiner rejected claims 63-71 in a Final Office Action dated January 13, 2014, citing a new prior art reference U.S. Patent No. 6,255,786 to Yen. The Applicant responded by amending claim 63, now claim 17 after renumbering, to recite “a pulse width modulation (PWM) controller that is coupled to the first current supply circuit and the second current supply circuit[[s]] and that is configured to generate, for each ~~ones~~ of the first current supply circuit and the second current supply circuit[[s]], a first PWM control signal and a second PWM control signal that are supplied to the each of the at least first and second strings.” Ex. 1002 at 239. The Examiner issued a notice of allowance.

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

A. Declaration Evidence

This Petition is supported by the declaration of Rafael Betancourt. Ex. 1003. As describe in his declaration, Mr. Betancourt is an expert with decades of experience the relevant industry. Ex. 1003 at ¶6-12.

B. Person of Ordinary Skill in the Art

A person of ordinary skill in the art of the '331 Patent would have had at least a graduate degree in mechanical engineering, physics, materials science, electrical engineering, or a related discipline, coupled with at least four years' experience in designing backlighting systems for displays; the level of ordinary skill in the art is approximate and additional education could make up for a lack of experience or vice-versa.

C. Claim Construction

Nothing in the specification or prosecution history of the '331 Patent expressly defines any term appearing in any challenged claim of the '331 Patent. Further, the Board does not need to construe any claim term for purposes of evaluating the prior art in this Petition, and thus for purposes of this proceeding only, Petitioner believes that no claim term requires construction.

VI. Prior Art

A. Lys

Lys is a publication of an International Application filed on March 15, 2005, and published on September 29, 2005. Lys is thus prior art to the '331 Patent under at least 35 U.S.C. § 102(a).

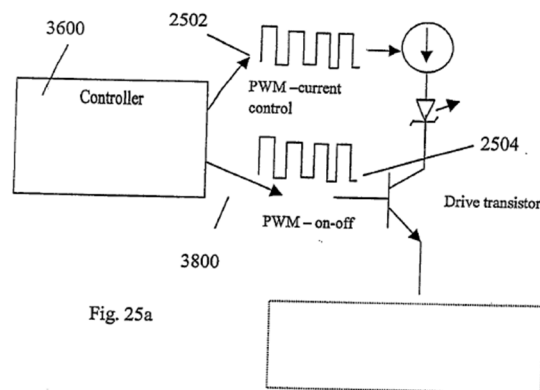
Lys relates to “high output linear lighting systems for various environments,” and the linear lighting systems may include “power systems for driving light sources in high-voltage environments.” Lys, Abstract.

Lys describes “a lighting unit 102 is controlled by a control facility 3500,” which “controls the intensity, color, saturation, color temperature, on-off state, brightness, or other feature of light that is produced by the lighting unit 102.” Lys, p. 32:6-9. The lighting unit 102 can include “a light source 300, which in embodiments is a solid-state light source, such as a semiconductor-based light source, such as light emitting diode, or LED.” *Id.*, p. 32:10-12.

The lighting unit 102 or the light source 300 may “include and/or be coupled to a power facility 1800,” which may be “AC power sources, DC power sources, batteries, solar-based power sources, thermoelectric or mechanical-based power sources and the like” in various embodiments. *Id.*, p. 60:13-17. In one aspect, the power facility 1800 may include or be associated with one or more power

conversion devices that convert power received by an external power source to a form suitable for operation of the lighting unit 102. *Id.*, p. 60:17-19.

Control facilities may include more complex drive facilities 3800, including various forms of drive hardware 3802, such as switches, current sinks, voltage regulators, and complex circuits, as well as various methods of driving 4300, including “modulation techniques such as pulse-width-modulation, pulse-amplitude-modulation, combined modulation techniques, table-based modulation techniques, analog modulation techniques, and constant current techniques.” *Id.*, p. 34:23-35:2. In one embodiment, the control facility 3500 can switch between a current-control mode 2502 (which itself could be controlled by a PWM stream) and a separate PWM mode 2504, and such a system can include simultaneous current control via PWM for wavelength and PWM control balanced to produce desired output intensity and color. *Id.*, p. 85:17-20. As shown in Figure 25a, “two control signals” are created from a controller, such as a microprocessor “to control one or more LEDs in a string.” *Id.*, p. 85:20-22.



C. Xu

Xu is a Chinese application filed on August 12, 2004, and published on March 2, 2005. Xu is thus prior art to the '331 Patent under at least 35 U.S.C. § 102(a).

Xu discloses “a driving device for a light-emitting diode series for a back light module.” Xu, p. 5:5-6. Xu describes that the direct current-direct current converter 208 in three examples may also be replaced by other buck converter, boost converter, boost-buck converter, flyback converter or full-bridge converter. *Id.*, p. 11:17-20. Xu further states that the feed circuit 206 comprises a current-voltage converter 214, and the current-voltage converter 214 is, for example, a resistor R_s . *Id.*, p. 8:8-11.

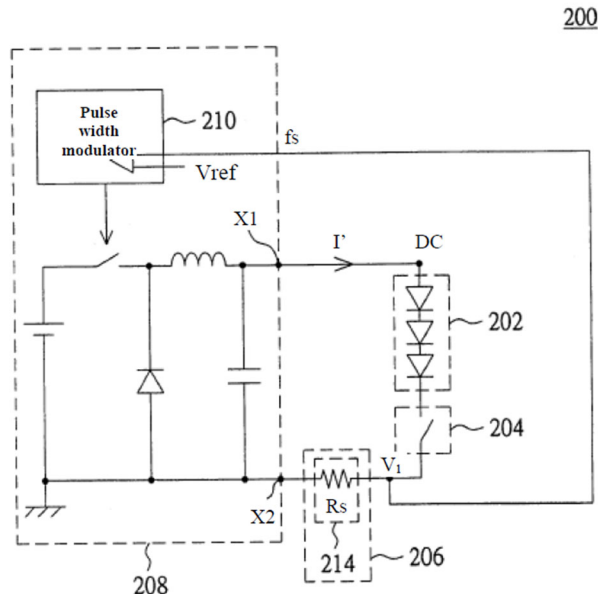


Figure 2

Xu, Fig. 2.

D. Mueller

Mueller is a publication of an application filed on September 3, 2004, and published on March 3, 2005. Mueller is thus prior art to the '331 Patent under at least 35 U.S.C. § 102(a).

Mueller discloses “methods and systems for providing controlled lighting.” Mueller, [0037]. The lighting unit 100 shown in Figure 1 may be used alone or together with other similar lighting units in a system of lighting units, and the lighting unit 100 may be employed in a variety of applications including, among other applications, illumination of displays and/or merchandise. Mueller, [0153].

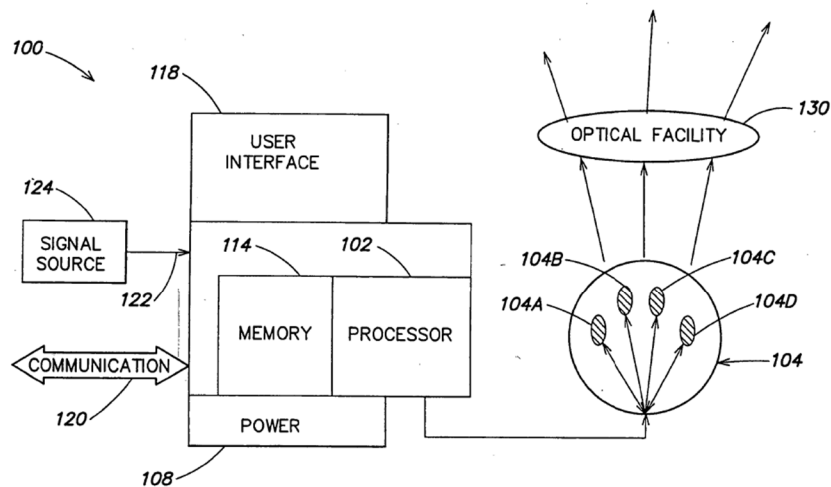


FIG. 1

Id., Fig. 1.

As shown in Figure 2, a number of lighting units 100, similar to those discussed above in connection with Figure 1, are coupled together to form the

networked lighting system. Lighting unit controllers (LUCs) 208A, 208B, 208C, and 208D may be configured to be “intelligent” in that the central controller 202 may be configured to communicate higher level commands to the LUCs that need to be interpreted by the LUCs before lighting control information can be forwarded to the lighting units 100. *Id.*, [0192]. When a given LUC receives such a command, it may then interpret the command so as to generate the appropriate lighting control signals which it then communicates using a DMX protocol via any of a variety of signaling techniques (e.g., PWM) to one or more lighting units that it controls. *Id.* A PWM controller is further shown in Mueller Figure 69.

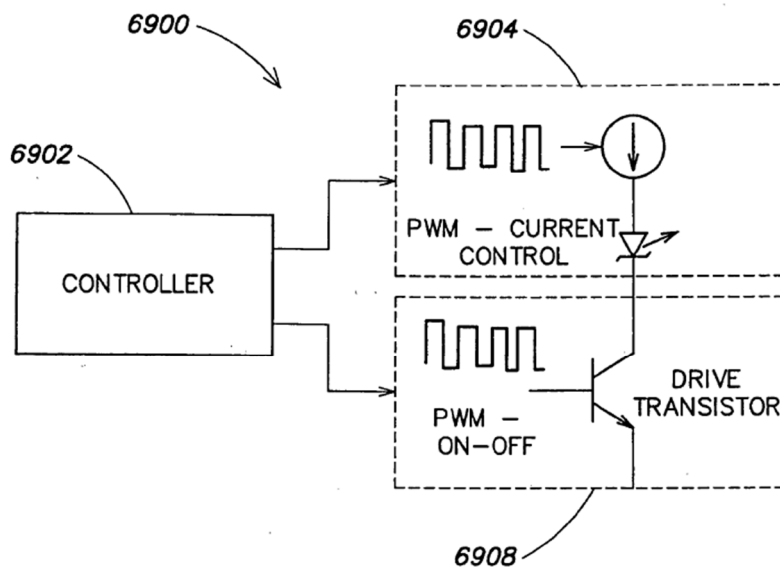


FIG. 69

Id., Fig. 69.

E. Blum

Blum is a publication of a patent filed on August 19, 1996, and published on September 2, 1997. Blum is thus prior art to the '331 Patent under at least 35 U.S.C. § 102(b).

Blum is directed to “a circuit that reduces leading edge current spikes in a current sense signal that may occur during switching.” Blum, col. 1:11-13. Blum discloses monitoring the amount of current flowing in a switching device such as a transistor by adding a current sense element, such as a resistor connected in series with the switching device. Blum, col. 1:14-18. Blum confirms that “plac[ing] a low pass RC filter between the current sense element and the current sense input of the PWM controller” is a well-known method in the art for eliminating the leading-edge current spike. Blum, col. 1:45-48. One example of such a low pass RC filter is a filter formed from passive components that have an attenuation effect over the entire signal that is greater over certain frequency levels than others. Blum, col. 1:48-53.

VII. Full Statement of the Reasons for the Relief Requested

A. Ground 1 – Claim 17 is Obvious Under 35 U.S.C. § 103 Over the Combination of Lys and Grootes in view of the Knowledge of a POSITA.

1. Motivation to Combine Lys and Grootes.

A POSITA would be motivated to combine Lys and Grootes. A combination of familiar elements according to known methods which yields no more than predictable results is likely obvious to one of skill in the art. One rationale to support a conclusion of obviousness is the use of a known technique to improve similar devices (methods, or products) in the same way. MPEP 2143(C). To establish that a combination and/or modification is the use of a known technique to improve similar devices and methods in the same way, it is necessary to establish (1) that the prior art contained a “base” device/method upon which the claimed invention can be seen as an “improvement,” (2) a finding that the prior art contained a “comparable” device/method that is not the same as the base device/method and that has been improved in the same way as the claimed invention, and (3) that the skilled artisan could have applied the known “improvement” in the same way to the base device/method with predictable results. *See* MPEP 2143(C).

A POSITA would have been motivated to modify the linear lighting systems described in Lys to connect each string of lights to its own current source described in Grootes.

First, both Lys and Grootes are in the same field of endeavor, i.e., setting the voltages and currents for LED strings. Ex. 1003, ¶81. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting system having a mechanism for setting the voltages and currents for LED strings. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to incorporate the improvements to the lighting systems described in Grootes into the lighting systems disclosed by Lys. *Id.*

Second, a primary motivation of one of ordinary skill in the art would have been to provide a pulse current with a constant level to achieve color and brightness uniformity. Ex. 1003, ¶82. Modifying Lys to include a current source for each string of LEDs, as disclosed by Grootes would meet this goal. *Id.* For example, Grootes states that the current sources 40, 41, and 42, which are connected to red LEDs 32, green LEDs 33, and blue LEDs 34, respectively, are independently “controllable to control the brightness of its associated LEDs to achieve the desired white point.” Grootes, [0041]. In other words, including a

separate current source for each string of LEDs can achieve a better “balance (white point) between the three colors.” *Id.*; Ex. 1003, ¶82.

Third, Lys recognizes certain major challenges with lighting systems. For example, Lys states: “A need exists for improved components for such lighting systems and for improved methods and systems for powering, making, addressing, cooling, and controlling such lighting systems. A need also exists for improved systems that take advantage of LED lighting systems.” Lys, p. 3:5-8; Ex. 1003, ¶83. Those same challenges are recognized in Grootes as well. Grootes, [0008] and [0009]; Ex. 1003, ¶83. Grootes stresses that the techniques disclosed therein “can store optimal current settings for strings of LEDs, such that color and brightness uniformity in the backlight application is ensured.” Grootes, [0010]. Grootes further states: “Storing the optimal current settings for a particular light source board on the board results in all light source boards having uniform light output characteristics.” *Id.*; Ex. 1003, ¶83.

A POSITA would recognize that each of Lys and Grootes describe known methods for improving the color and brightness uniformity of the lighting system. Ex. 1003, ¶84. A POSITA would have been motivated to use the improvements described within Grootes to improve the color and brightness uniformity of the lighting system described in Lys. *Id.* A POSITA would recognize that the combination would have provided better color and brightness uniformity, and this

would have provided motivation to combine known elements from the prior art in a similar field. *Id.*

Thus, combining these two references—Lys and Grootes—that both use the same components to achieve the same goal would have been obvious to a POSITA.

2. Independent Claim 17.

[’331 Claim 17 Preamble] A lighting system, comprising:

Lys discloses “a lighting system.” Lys, p. 32:6-12; Ex. 1003, ¶49.

[’331 Claim 17A] a lighting panel including at least first and second strings of solid state lighting devices that are respectively configured to emit at least a first light and a second light, respectively;

Lys describes that “the sources 300 can be point sources or can be arranged in many different configurations 302, such as ... a circular configuration 308, an oval configuration 304 ... or any other geometric configuration, including two-dimensional and three-dimensional configurations.” Lys, 36:30-37:2. With respect to panels, one example Lys gives is that “ housings 800 may include panels 804 that consist of a support platform on which light sources 300 are disposed in an array.” *Id.*, 51:15-16. Lys further describes, “[r]eferring to FIG. 3, the lighting unit 102 may be any kind of lighting unit 102 that is capable of responding to control, but in embodiments the lighting unit 102 includes a light source 300 that is a solid-state light source, such as a semiconductor-based light source, such as a light emitting diode, or LED. Lighting units 102 can include LEDs that produce a single color or

wavelength of light, or LEDs that produce different colors or wavelengths, including red, green, blue, white, orange, amber, ultraviolet, infrared, purple or any other wavelength of light.” Lys, p. 36:16-23; Ex. 1003, ¶51. Lys further describes, “controlling one or more LEDs in a string” and that “[m]ultiple such strings can be used to create a light fixture that can vary in color (HSB) and spectrum based on the current and on-off control.” Lys, p. 85:17-30. Each of these strings of LEDs would be controlled to emit light, i.e., a first light and a second light. *See, e.g.*, Lys, p. 37:3-8 (“The sources 300 can also be mixed, including sources 300 of varying wavelength, intensity, power, quality, light output, efficiency, efficacy or other characteristics. In embodiments sources 300 for different lighting units 102 are consistently mixed to provide consistent light output for different lighting units 102. In embodiments the sources are mixed 300 to allow light of different colors or color temperatures, including color temperatures of white.”); Ex. 1003, ¶51; ¶92, Claim 17A.

[’331 Claim 17B] at least first and second current supply circuits coupled to the at least first and second strings of solid state lighting devices, respectively, and configured to supply an on-state drive current to a respective one of the first and second strings of solid state lighting devices; and

Lys expressly discloses, “controlling one or more LEDs in a string” and that “[m]ultiple such strings can be used to create a light fixture that can vary in color (HSB) and spectrum based on the current and on-off control.” Lys, p. 85:23-24.

Lys describes power supply circuits that provide current to the strings of LEDs. *See, e.g.*, Lys, p. 60:14-19 (“In various aspects, examples of power facilities 1800 include, but are not limited to, AC power sources, DC power sources Additionally, in one aspect, the power facility 1800 may include or be associated with one or more power conversion devices that convert power received by an external power source to a form suitable for operation of the lighting unit 102.”); Ex. 1003, ¶54-55.

Lys further describes that “[p]ower supplies may be separate from lighting units 102 or may be incorporated on-board the lighting units 102 in power-on-board configurations. Power supplies may power multiple lighting units 102 or a single lighting unit 102. In embodiments power supplies may provide low-voltage output or high-voltage output.” *Id.*, p. 60:22-27; Ex. 1003, ¶56.

Lys further describes, with respect to Figure 17, that the power factor correction facility 1804 and DC to DC converter 1812 are integrated into a single stage power factor correction/DC to DC converter facility 1908. This converter “is integrated with the lighting unit 102, rather than being contained in a separate power supply.” *Id.*, p. 62:18-21. In other words, each of the LED lights 102 has its own single stage power factor correction/DC to DC converter facility 1908. A POSITA would recognize that a DC to DC converter is a current supply circuit,

and as shown below, there is a current supply circuit 1908 for each string of microprocessor controlled LED lights 102.

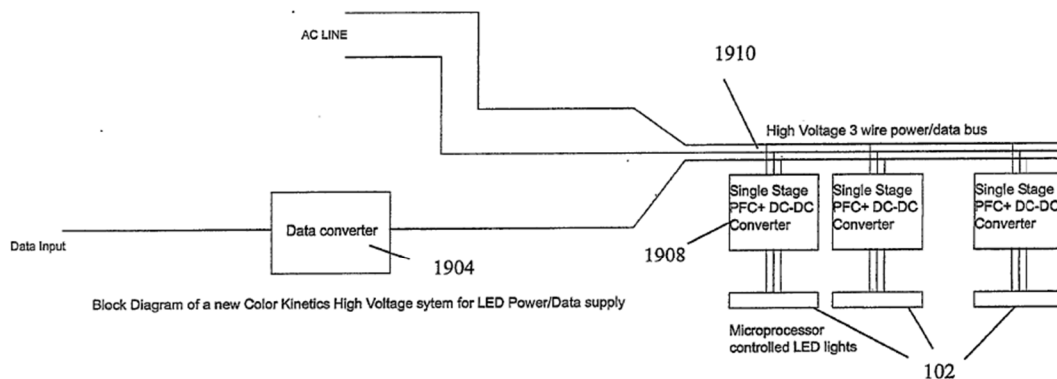


Fig. 17

Id., Fig. 17; Ex. 1003, ¶56.

Accordingly, Lys discloses or at least implies the use of a single power supply circuit for each string of LEDs. Ex. 1003, ¶57. To the extent Lys fails to disclose the use of a single supply circuit for each string of LEDs, Grootes expressly describes that “[s]eries strings of red LEDs 32, green LEDs 33, and blue LEDs 34” and current sources 40, 41, and 42 are mounted on a single printed circuit board (PCB) 30, and the cathode of each string is “connected to its own current source 40, 41, 42.” Grootes, [0035]-[0037]; Ex. 1003, ¶60. Each current source 40-42 is controllable to control the brightness of its associated LEDs to achieve the desired white point. Grootes, [0041].

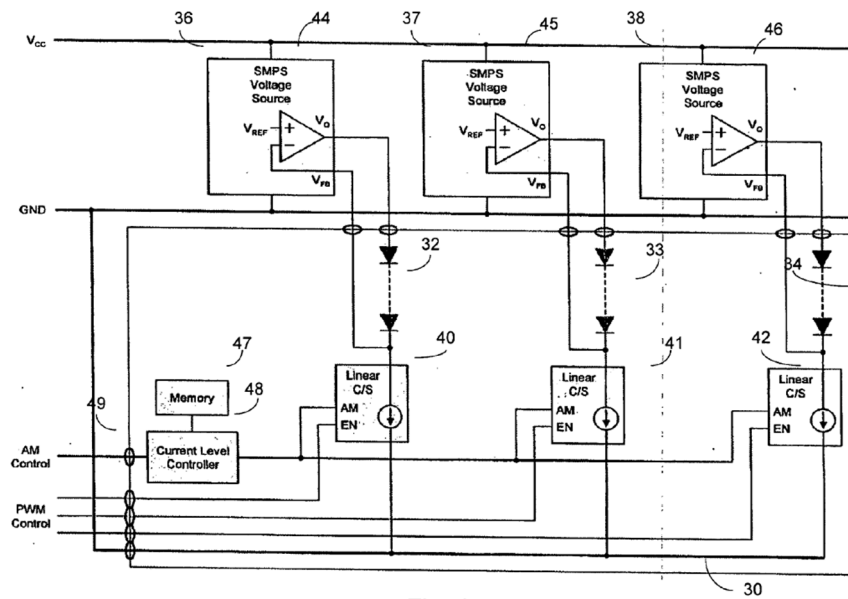


Fig. 4

Grootes, Fig. 4.

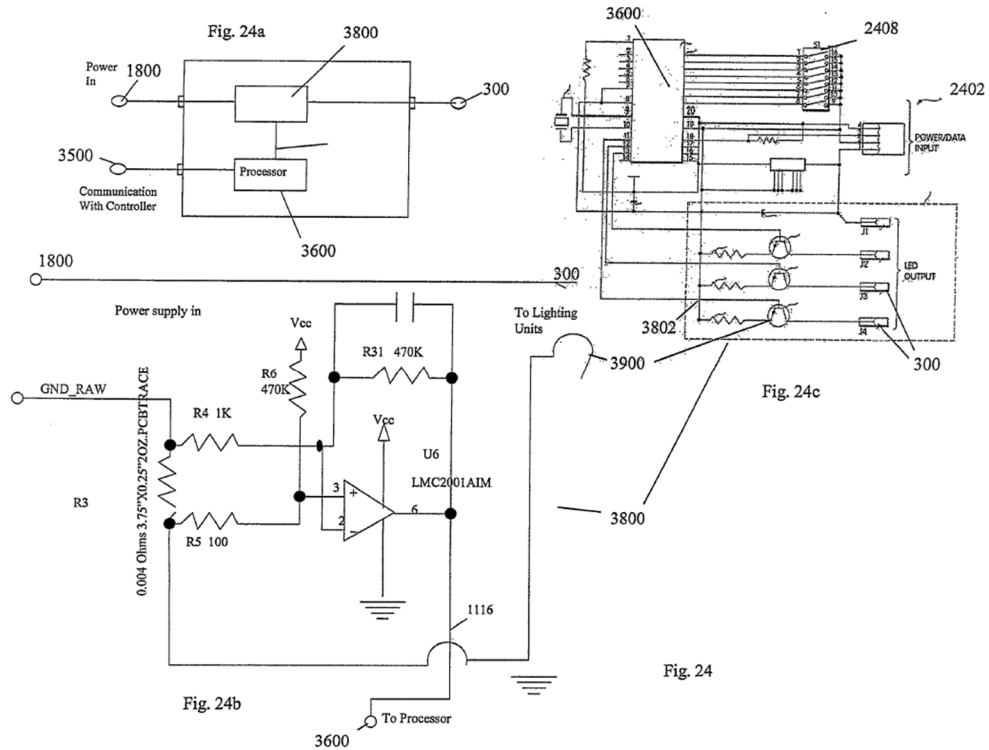
As discussed above, a POSITA would be motivated to combine Lys and Grootes to modify the current supply circuit(s) described in Lys with the individually controllable current sources for each LED string described in Grootes to achieve the desired white point and it would have been trivial to do so as, according to Grootes, it would allow for the individual control of current sources. Ex. 1003, ¶61. The combination of Lys in view of Grootes discloses this claim element. Ex. 1003, ¶92, Claim 17B.

[’331 Claim 17C] a pulse width modulation (PWM) controller that is coupled to the first current supply circuit and the second current supply circuit and that is configured to generate, for each of the first current supply circuit and the second current supply circuit, a first PWM control signal and a second PWM control signal that are supplied to the each of the at least first and second strings.

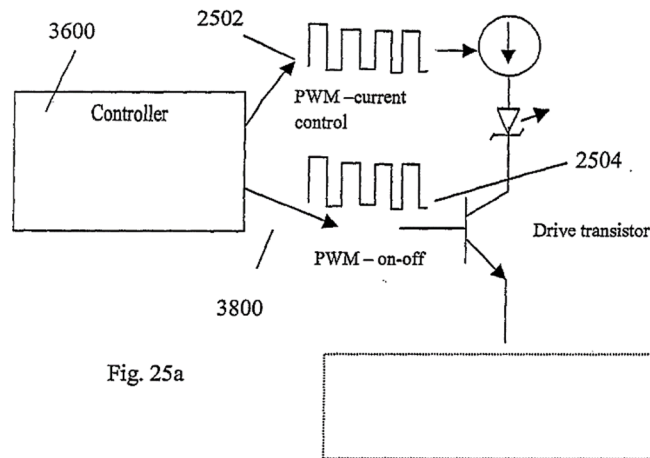
Lys expressly describes that its “[c]ontrol facilities may include more complex drive facilities 3800, including various forms of drive hardware 3802” and that these control facilities may include “various methods of driving 4300, including modulation techniques such as *pulse-width-modulation....*” Lys, p. 34:23-29; Ex. 1003, ¶62. Lys further states: “In particular, the color (or color temperature) of the mixed colored light may be varied by varying one or more of the respective intensities of the light sources or the apparent intensities, such as using a duty cycle in *a pulse width modulation* technique.” Lys, p. 37:20-24; *see also id.*, 79:14-16 (“The PWM technique is considered one of the preferred techniques for driving LEDs, although the present invention is not limited to such control techniques.”); Ex. 1003, ¶62.

Thus, Lys describes that “control signals [*e.g.*, PWM control signals] from a control facility 3500 ... are used by a processor 3600 that controls the drive hardware 3800, causing current to be delivered to the light sources 300 in the desired intensities and durations, often in very rapid pulses of current, such as in pulse width modulation” *Id.*, p. 73:9-12. *See also id.*, p. 76:11-15 (“In

embodiments the switch turns on and off in rapid pulses, such as in pulse width modulation of the current to the LEDs, which results in changes in the apparent intensity of the LED, based on the percentage of the duty cycle of the pulse width modulation technique during which the switch is turned 15 on.”); *Id.*, p 85:8-11 (“a single fixture can have narrow bandwidth light sources for multicolor light applications and then can change to a current and PWM control mode to get broad spectra to make good white light or non-white light with broader spectrum color characteristics”); *Id.*, 85:17-20 (“The control facility 3500 can switch between a current-control mode 2502 (which itself could be controlled by a PWM stream) and a separate PWM mode 2504. Such a system can include simultaneous current control via PWM for wavelength and PWM control balanced to produce desired output intensity and color.”); Ex. 1003, ¶¶63-64. Therefore, this expressly discloses controlling multiple LED strings, with each LED string receiving two PWM control signals (one for current control to adjust the wavelength, and the other for on-off control to adjust output intensity). *Id.*



Id., Fig. 24. A PWM-current control is also explicitly shown in Figure 25a.



Id., Fig. 25a.

As discussed above with respect to claim 17B, Lys describes with respect to Figure 17 that each of the LED lights 102 has its own single stage power factor

correction/DC to DC converter facility 1908. To the extent that this does not expressly disclose the use of a single supply circuit for each string of LEDs, Grootes expressly describes that “[s]eries strings of red LEDs 32, green LEDs 33, and blue LEDs 34” and current sources 40, 41, and 42 are mounted on a single printed circuit board (PCB) 30, and the cathode of each string is “connected to its own current source 40, 41, 42.” Grootes, [0035]-[0037]; Ex. 1003, ¶¶63-64.

A POSITA would recognize that Lys’s PWM control signals could be used to drive each of the current sources 40, 41, and 42 to control individual strings of light. This modification would achieve independent “control [of] the brightness of its associated LEDs to achieve the desired white point.” Grootes, [0041]; Ex. 1003, ¶¶65. In other words, including a separate current source for each string of LEDs controlled by an individual PWM signals as taught by Lys would achieve a better “balance (white point) between the three colors.” *Id.* Thus, this element is obvious in view of the combination of Lys and Grootes. Ex. 1003, ¶¶92, Claim 17C.

B. Ground 2 – Claims 18-20 and 22-25 are Obvious Under 35 U.S.C. § 103 Over the Combination of Lys, Grootes, and Xu in view of the Knowledge of a POSITA.

1. Motivation to Combine Lys, Grootes, and Xu

A POSITA would be motivated to combine Xu to the Lys-Grootes combination such that (1) each of the first and second current supply circuits comprises a variable voltage boost, constant current power supply circuit

configured to operate in continuous current mode described in Xu; and (2) to couple a sense resistor to an output terminal of the current supply circuits to provide a feedback signal to allow for the closed loop control described in Xu. Ex. 1003, ¶86.

First, Xu is in the same field of endeavor as each of Lys and Grootes, i.e., setting the voltages and currents for LED strings. Ex. 1003, ¶87. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting system having a mechanism for setting the voltages and currents for LED strings. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to incorporate Xu's improvements to an LED driving circuit into the lighting systems disclosed by Lys and Grootes as all of the references employ or use well known electrical techniques in electronic circuitry. *Id.*

Second, a primary motivation of one of ordinary skill in the art would have been to provide a turn-on current with a constant level and achieve a constant color temperature. Ex. 1003, ¶88. Modifying the Lys-Grootes combination to include the constant on current and the current-voltage converter (e.g., a sense resistor), as disclosed by Xu would meet this goal. *Id.* For example, Xu states that “[w]hen [a control] switch 204 is turned on, a fixed turn-on current flows through the light-emitting diode series 202, and the light-emitting diode series is rapidly lit to a

predetermined brightness; and when the switch 204 is turned off, the current flowing through the light-emitting diode series 202 stops immediately, and the light-emitting diode series 202 is quickly extinguished.” Xu, p. 7:27-29. Xu further states that the current-voltage converter 214, which is a sense resistor, generates a feedback signal, based on which “the constant color temperature” of the lighting system can be realized. Xu, p. 8:7-15; Ex. 1003, ¶88.

Third, Lys recognizes certain major challenges with lighting systems. Ex. 1003, ¶89. For example, Lys states: “A need exists for improved components for such lighting systems and for improved methods and systems for powering ... cooling, and controlling such lighting systems. A need also exists for improved systems that take advantage of LED lighting systems.” Lys, p. 3:5-8. Those same challenges are recognized in Xu as well. Ex. 1003, ¶89. For example, Xu admits that there is a phenomenon of slow capacitor charging and discharging, and thus the LED series cannot be quickly turned on or off. Xu, p. 5:22-26. A primary motivation of one of ordinary skill in the art would have been to provide a pulse current with a constant level to achieve color and brightness uniformity. Ex. 1003, ¶89. The modifications described in Xu would achieve this improved color and brightness uniformity in the Lys-Grootes combination. *Id.*

A POSITA would recognize that each of Lys, Grootes, and Xu describe known methods for improving the color and brightness uniformity of the lighting

system. Ex. 1003, ¶90. A POSITA would have been motivated to use the improvements described in Xu to improve the color and brightness uniformity of the lighting system described in Lys, and that this combination would have provided better color and brightness uniformity. *Id.* This would have provided motivation to make the combination, which is nothing more than the combination of known elements from the prior art. *Id.*

Thus, combining these three references—Lys, Grootes, and Xu—that all use the same components to achieve the same goal would have been obvious to a POSITA.

2. Dependent Claim 18.

[’331 Claim 18] The lighting system according to claim 17, wherein each of the first and second current supply circuits comprises a variable voltage boost, constant current power supply circuit configured to operate in continuous current mode.

As discussed above, Lys describes using PWM control signals. *See supra* claim 17C. Lys further describes that “three colors of LEDs [may be] presented (e.g., red, green and blue) and each of the colors is driven with PWM to vary its apparent intensity.” Lys, p. 79:19-22. Thus, Lys describes driving strings with PWM to vary the intensity of each string. Lys further describes that “Pulse width modulation (PWM) involves supplying a substantially constant current to the LEDs for particular periods of time.” *Id.*, 79:9-10. Thus, Lys describes multiple color LEDs driven by PWM and that the power supply may supply “a substantially

constant current.” In a similar field, Xu further describes a constant current supply circuit configured to operate in continuous current mode. Ex. 1003, ¶68. For example, Xu describes that, “[w]hen [a control] switch 204 is turned on, a fixed turn-on current flows through the light-emitting diode series 202, and the light-emitting diode series is rapidly lit to a predetermined brightness; and when the switch 204 is turned off, the current flowing through the light-emitting diode series 202 stops immediately, and the light-emitting diode series 202 is quickly extinguished.” Xu, p. 7:27-29; Ex. 1003, ¶68. Xu further describes a pulse width modulator 210, which is shown in Figure 2:

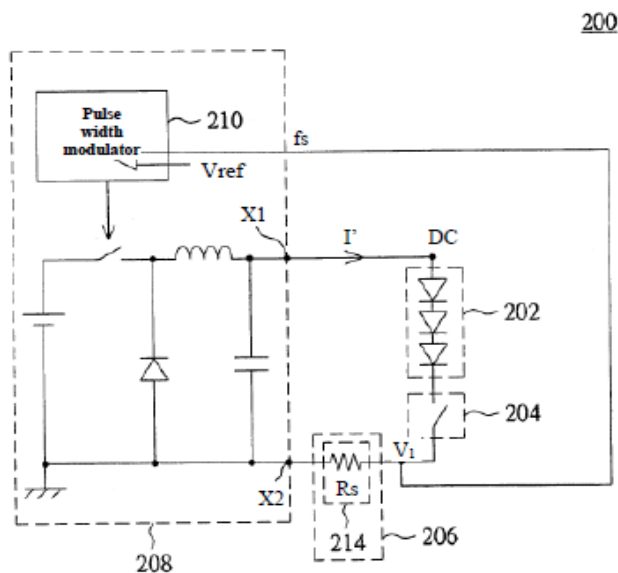


Figure 2

Xu, Fig. 2.

Xu further describes various conversion circuits that can be used to provide power to the string of LEDs. Ex. 1003, ¶69. In particular, that “the direct current-direct current converter 208 in these three examples may also be replaced by other buck converter, boost converter, boost-buck converter, flyback converter or full-bridge converter, similarly allowing the light-emitting diode series 202 to be quickly extinguished and lit.” Xu, p. 11:16-19; Ex. 1003, ¶69. Thus, a POSITA would recognize that Xu describes a variable voltage boost, constant current power supply circuit configured to operate in continuous current mode, as required by claim 18. Ex. 1003, ¶69.

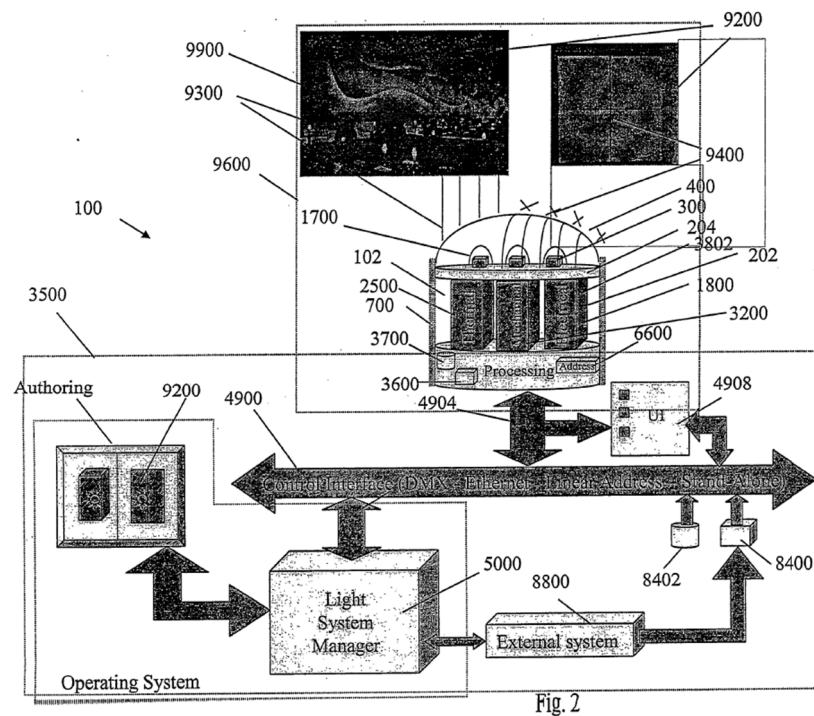
As described above, a POSITA would be motivated to combine Xu to the Lys-Grootes combination in order to provide greater control of the overall light output, especially the constant color temperature. Thus, the combination of Lys, Grootes, and Xu renders claim 18 obvious. Ex. 1003, ¶98, Claim 18.

3. Dependent Claim 19.

[’331 Claim 19A] The lighting system according to claim 18, wherein each of the first and second current supply circuits comprises: a temperature sensor that is configured to generate a sensor output signal that the PWM controller uses to generate the first PWM signal or the second PWM signal, and

Lys describes that its current supply circuit uses a temperatures sensor configured to generate a sensor output signal that the PWM controller uses to generate PWM signals. Ex. 1003, ¶80. In particular, Lys describes the use of one or

more temperature sensors, as one example of a signal source 8400, “in connection with the lighting unit 102.” Lys, p. 135:4-12. The one or more temperature sensors “generate one or more signals in response to some stimulus.” *Id.* The one or more output signals generated by the one or more temperature sensors “may be received and processed by the processor 3600.” Lys, p. 134:24-28; Ex. 1003, ¶80. The processor 3600 may use the one or more output signals, “either alone or in combination with other control signals ... to control one or more of the light sources 300....” Lys, p. 134:16-22.



Lys, Fig. 2.

Lys further discusses the necessity to “compensate for the temperature change.” Lys, p. 136:24-27. A temperature sensor, “which gives a good indication

of the temperature at which the LEDs are running,” enables precise prediction (“within a few percent”) of the running temperature of the LED, while taking lifetime variation or degradation into account. Lys, p. 136:24-137:3; Ex. 1003, ¶81. Thus, Lys discloses a temperature sensor that is configured to generate a sensor output signal that the PWM controller (the processor 3600, as discussed *supra* in relation to claim 17C) uses to generate PWM signals. Ex. 1003, ¶81; ¶98, Claim 19A.

[’331 Claim 19B] a sense resistor that is coupled to an output terminal of the current supply circuit and that is configured to provide a feedback signal to the PWM controller.

Lys describes the use of feedback control circuits, describing that “[c]urrent control can be provided with various embodiments, including feedback loops, such as using a light sensor as a signal source 8400....” Lys, p. 85:1-4; Ex. 1003, ¶72. In a similar field, Xu describes a feedback circuit that uses a resistor as a current-voltage converter. Ex. 1003, ¶75. In Xu, “the feedback circuit 206 comprises a current-voltage converter 214.... for example, a resistor R_s . When the switch 204 is turned on, the direct-current current I' flows into the current-voltage converter 214, causing the current-voltage converter 214 to generate a first reference voltage V_I as the feedback signal f_s according to the direct-current current I' . Therefore, the direct current-direct current converter 208 controls the magnitude of the direct-

current current I' according to the feedback signal f_s , so as to achieve a constant color temperature of the backlight module.” Xu, p. 8:7-15; Ex. 1003, ¶75.

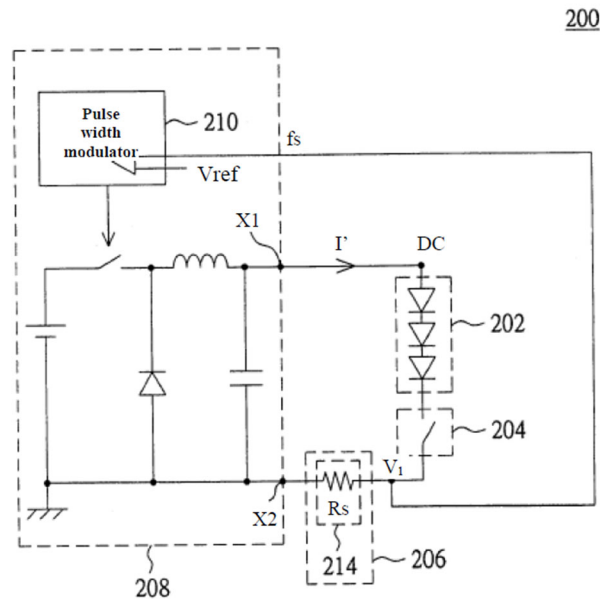


Figure 2

Xu, Fig. 2; Ex. 1003, ¶75.

As discussed above, a POSITA would be motivated to include Xu’s sense resistor in the Lys-Grootes combination, thus this claim element is obvious.

4. Dependent Claim 20.

[’331 Claim 20] The lighting system according to claim 17, wherein each of the first and second current supply circuits comprises a sense resistor that is coupled to an output terminal of the respective one of the first and second current supply circuits and that is coupled to a feedback input to provide the feedback signal to provide closed loop control.

Lys describes the use of feedback control circuits, describing that “[c]urrent control can be provided with various embodiments, including feedback loops, such

as using a light sensor as a signal source 8400....” Lys, p. 85:1-4; Ex. 1003, ¶72. Xu further describes a feedback circuit that uses a resistor as a current-voltage converter. *See* Claim 19B above. As discussed above, a POSITA would be motivated to combine Xu to the Lys-Grootes combination in order to provide greater control of the overall light output, especially the constant color temperature. Thus, the combination of Lys, Grootes, and Xu renders claim 20 obvious. Ex. 1003, ¶98, Claim 20.

5. Dependent Claim 22.

[’331 Claim 22] The lighting system according to claim 17, wherein the first string of solid state lighting devices are coated with a wavelength conversion phosphor and are configured to emit the first light that includes a combined light including a dominant wavelength corresponding to a blue color and a dominant wavelength corresponding to a yellow color, and wherein the second string of solid state lighting devices are configured to emit the second light that includes a dominant wavelength corresponding to a red color.

As discussed *supra* in relation to claim 17A, Lys discloses, for example, controlling multiple LED strings “to create a light fixture that can vary in color (HSB) and spectrum based on the current and on-off control.” Lys, p. 85:23-28. Sources of varying wavelengths, intensity, etc. can be mixed. Lys, p. 41:5-14; Ex. 1003, ¶82.

Lys expressly discloses the use of “a wavelength conversion phosphor” because it describes “a phosphor for shifting a wavelength of light emitted from

one or more of the plurality of LEDs.” Lys, p. 5:15-16; 40:8-9 (“an LED may be associated with a phosphor that is considered as an integral part of the LED (e.g., some types of white LEDs).”); Ex. 1003, ¶83. Lys discloses the wavelength-conversion nature of a phosphor, stating that the phosphor material “converts luminescence having a first spectrum to a different second spectrum.” Lys, p. 39:28-30.

With respect to “the first light that includes a combined light including a dominant wavelength corresponding to a blue color and a dominant wavelength corresponding to a yellow color,” and “that LEDs may be configured to generate radiation having various bandwidths for a given spectrum....” (Lys, p. 39:21-23), and explicitly discloses dominant wavelengths corresponding to both a blue and a yellow color, describing that “examples of LEDs include ... red LEDs, blue LEDs ... yellow LEDs.” Lys, p. 39:18-21; Lys, 8:16-17 (“[t]he plurality of LED light sources may include one or more *blue LEDs that include a phosphor*.”); Ex. 1003, ¶82.

With respect to “the second string of solid state lighting devices are configured to emit the second light that includes a dominant wavelength corresponding to a red color” Lys further expressly describes that “white source[s] can be mixed with, for example, an amber or *red source* to provide a warm white

light or with *a blue source* to produce a cool white light.” Lys, 37:12-14; Ex. 1003, ¶82.

Lys goes on to describe that “red LEDs produce light in a red region 2618 and blue LEDs produce light in a blue region 2620. Mixing these colors produces mixed light output, such as in the overlapping areas between the regions, including those for orange, purple and other mixed light colors.” Lys, p. 86:30-87:3; Ex. 1003, ¶84-85. Lys also expressly teaches that “a given spectrum may be the result of a mixing of two or more other spectrums (e.g., mixing radiation respectively emitted from multiple light sources).” Lys, p. 41:12-14. Thus, it would be obvious to a POSITA reviewing Lys to utilize the combination of blue LEDs and a wavelength conversion phosphor to emit a first light that includes blue, red, and yellow components in order to produce specific type of lighting. Ex. 1003, ¶84-86; ¶98, Claim 22.

6. Dependent Claim 23.

[’331 Claim 23] The lighting system according to claim 22, wherein the first current supply circuit provides current control of the first string of solid state lighting devices that is independent of current control of the second string of solid state lighting devices provided by the second current supply circuit.

As discussed *supra* in relation to claim 17B, Lys discusses a current supply circuit 1908 for each string of microprocessor controlled LED lights 102. Lys, p. 62:18-21. Additionally, Grootes expressly describes that each current source 40-42

is controllable to control the brightness of its associated LEDs to achieve the desired white point. Grootes, [0041]. It would be obvious to a POSITA, in view of the Lys-Grootes combination, the current control of the strings of LEDs operate independently. Ex. 1003, ¶85; ¶98, Claim 23.

7. Dependent Claim 24.

[’331 Claim 24] The lighting system according to claim 22, further comprising a third string of solid state lighting devices that are configured to emit a third light that includes a dominant wavelength corresponding to a red color.

As discussed *supra* in relation to claim 22, Lys expressly describes that the LEDs may be light sources, “which [may be] configured to produce substantially white light and may include without limitation red, green, blue, and white LEDs.” Lys, p. 20:7-9. In other words, using red, green, blue, and white LEDs to generate mixed lighting. Further Lys expressly states: “[t]he plurality of LEDs may include *at least one* red LED, at least one green LED, at least one blue LED, and at least one white LED.” Lys, p. 21:11-14. A POSITA would appreciate various variations and modifications described in Lys of mixing light colors, and it would thus be obvious to a POSITA to further include a third string of LEDs that emit red light as recited in claim 24. Ex. 1003, ¶84-86; ¶98, Claim 24.

8. Dependent Claim 25.

[’331 Claim 25] The lighting system according to claim 24, further comprising a third current supply circuit that is configured to supply an on-state drive current to the third string of solid state

lighting devices, and wherein the first current supply circuit provides current control of the first string of solid state lighting devices that is independent of current control of the second string of solid state lighting devices provided by the second current supply circuit and that is independent of current control of the third string of solid state lighting devices provided by the third current supply circuit.

As discussed *supra* in relation to claim 17B, Lys discusses a current supply circuit 1908 for each string of microprocessor controlled LED lights 102. Lys, p. 62:18-21. Lys further describes that “three colors of LEDs [may be] presented (e.g., red, green and blue) and each of the colors is driven with PWM to vary its apparent intensity.” Lys, p. 79:18-22. Thus, Lys describes driving strings with PWM to vary the intensity of each string. Additionally, Grootes expressly describes that each current source 40-42 is controllable to control the brightness of its associated LEDs to achieve the desired white point. Grootes, [0041].

Similar to the reasoning *supra* in relation to claim 23, it would be obvious to a POSITA, in view of the Lys-Grootes combination, that (i) a third current supply circuit is provided to supply an on-state drive current to the third string of solid state lighting devices; and (ii) the current control of the *third* string of solid state lighting devices is independent of the current control of the *first* string of solid state lighting devices and the current control of the *second* string of solid state lighting devices. A third LED string is obvious in view of the teachings of the Lys-Grootes combination. Ex. 1003, ¶84-86; ¶98, Claim 25.

C. Ground 3 – Claim 21 is Obvious Under 35 U.S.C. § 103 Over the Combination of Lys, Grootes, Xu, and Blum in view of the Knowledge of a POSITA.

1. Motivation to Combine Lys, Grootes, Xu, and Blum

A POSITA would be motivated to combine Blum to the Lys-Grootes-Xu combination to include features such as a low pass RC filter between the sense resistor and the current sense input of the PWM controller described in Blum.

First, Blum is in the same field of endeavor as each of Lys, Grootes, and Xu, i.e., setting the voltages and currents for LED strings. Ex. 1003, ¶93. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting system having a mechanism for setting the voltages and currents for LED strings. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to incorporate the improvements to the filtering circuit that reduces current spikes in a feedback signal described in Blum into the lighting systems disclosed by Lys, Grootes, and Xu. *Id.*

Second, a primary motivation of one of ordinary skill in the art would have been to eliminate current spike in the feedback signal to provide enhanced light quality and longer circuit life. Ex. 1003, ¶94. Modifying the Lys-Grootes-Xu combination to include the low pass RC filter between the sense resistor and the current sense input of the PWM controller, as disclosed by Blum would meet this

goal. *Id.* For example, Blum discloses monitoring the amount of current flowing in a switching device such as a transistor by adding a current sense element, such as a resistor connected in series with the switching device. Blum, col. 1:14-18; Ex. 1003, ¶94. Blum describes that “plac[ing] a low pass RC filter between the current sense element and the current sense input of the PWM controller” is a well-known method in the art for eliminating the leading-edge current spike. Blum, col. 1:45-48; Ex. 1003, ¶94.

Third, Lys recognizes certain major challenges with lighting systems. Ex. 1003, ¶95. For example, Lys states: “A need exists for improved components for such lighting systems and for improved methods and systems for powering, making, addressing, cooling, and controlling such lighting systems. A need also exists for improved systems that take advantage of LED lighting systems.” Lys, p. 3:5-8; Ex. 1003, ¶95. Those same challenges are recognized in Blum as well. Ex. 1003, ¶95. For example, Blum admits that avoiding “the problems of a leading-edge spike in a current sense signal” is desired. Blum, col. 1:40-63; Ex. 1003, ¶95. A primary motivation of one of ordinary skill in the art would have been to provide a low pass RC filter to avoid the leading-edge spike in the feedback signal and thereby improve the overall quality of light output and increase longevity of the lighting circuit. Ex. 1003, ¶95.

A POSITA would recognize that each of Lys, Grootes, Xu, and Blum describe known methods for improving the color and brightness uniformity of the lighting system. Ex. 1003, ¶96. A POSITA would have been motivated to use the improvements described within Blum to improve the color and brightness uniformity of the lighting system described in Lys, with mitigated leading-edge spike in the feedback signal. Ex. 1003, ¶96. A POSITA would recognize that the combination would have provided better color and brightness uniformity, and this would have provided motivation to make the combination. This combination is nothing more than the combination of known elements from the prior art. *Id.*

Thus, combining these four references—Lys, Grootes, Xu, and Blum—that all use the same components to achieve the same goal would have been obvious to a POSITA.

2. Dependent Claim 21.

[’331 Claim 21] The lighting system according to claim 20, further comprising a filter coupled to the sense resistor, the filter configured to filter the feedback input.

As discussed above, Lys discloses a lighting control circuit and Xu describes using a sensing resistor for closed loop control. In a similar field, Blum discloses monitoring the amount of current flowing in a switching device such as a transistor by adding a current sense element, such as a resistor connected in series with the switching device. Blum, col. 1:14-18; Ex. 1003, ¶78. Blum confirms that

“plac[ing] a low pass RC filter between the current sense element and the current sense input of the PWM controller” is a well-known method in the art for eliminating the leading-edge current spike. Blum, col. 1:45-48. One example of such a low pass RC filter is a filter formed from passive components that have an attenuation effect over the entire signal that is greater over certain frequency levels than other. Blum, col. 1:48-53; Ex. 1003, ¶78.

As discussed above, a POSITA would be motivated to combine Blum to the Lys-Grootes-Xu combination in order to provide greater control of the overall light output by way of, for example, avoiding the leading-edge current spike in the feedback signal. Thus, the combination of Blum and the Lys-Grootes-Xu combination renders claim 21 obvious. Ex. 1003, ¶104, Claim 20.

D. Ground 4 – Claim 17 is Obvious Under 35 U.S.C. § 103 Over the Combination of Mueller and Grootes in view of the Knowledge of a POSITA.

1. Motivation to Combine Mueller and Grootes

A POSITA would have been motivated to modify the systems for providing controlled lighting described in Mueller such that each string is connected to its own current source as described in Grootes.

First, each of Mueller and Grootes are in the same field of endeavor, namely setting the voltages and currents for LED strings. Ex. 1003, ¶99. Consequently, a POSITA would have had a reasonable expectation of success in combining their

various disclosures to produce a lighting system having a mechanism for setting the voltages and currents for LED strings. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to incorporate the improvements to the lighting systems described in Grootes into the systems for providing controlled lighting disclosed by Mueller. *Id.*

Second, a primary motivation of one of ordinary skill in the art would have been to provide a pulse current with a constant level to achieve color and brightness uniformity. Ex. 1003, ¶100. Modifying Mueller to include a current source for each string of LEDs, as disclosed by Grootes would meet this goal. For example, Grootes states that the current sources 40, 41, and 42, which are connected to red LEDs 32, green LEDs 33, and blue LEDs 34, respectively, are independently “controllable to control the brightness of its associated LEDs to achieve the desired white point.” Grootes, [0041]. In other words, including a separate current source for each string of LEDs can achieve a better “balance (white point) between the three colors.” *Id.*; Ex. 1003, ¶100.

Third, Mueller recognizes certain major challenges with lighting systems. Ex. 1003, ¶101. For example, Mueller states: “In conventional LED-based light systems, constant current control is often preferred because of lifetime issues. Too much current can destroy an LED or curtail useful life. Too little current produces little light and is an inefficient or ineffective use of the LED.” Mueller, [0297]; Ex.

1003, ¶101. The lighting systems disclosed by Mueller can “operate LEDs in an efficient manner.” Mueller, [0157]. Those same challenges are recognized in Grootes as well. Grootes, [0008] and [0009]. Grootes stresses that the techniques disclosed therein “can store optimal current settings for strings of LEDs, such that color and brightness uniformity in the backlight application is ensured.” Grootes, [0010]. Grootes further states: “Storing the optimal current settings for a particular light source board on the board results in all light source boards having uniform light output characteristics.” *Id.*; Ex. 1003, ¶101.

A POSITA would recognize that each of Mueller and Grootes describe known methods for improving the color and brightness uniformity of the lighting system. Ex. 1003, ¶102. A POSITA would have been motivated to use the improvements described within Grootes to improve the color and brightness uniformity of the lighting system described in Mueller. *Id.* A POSITA would recognize that the combination would have provided better color and brightness uniformity, and this would have provided motivation to make the combination. *Id.* This combination is nothing more than the combination of known elements from the prior art. *Id.*

Thus, combining two references—Mueller and Grootes—that both use the same components to achieve the same goal would have been obvious to a POSITA.

2. Independent Claim 17.

[’331 Claim 17 Preamble] A lighting system, comprising:

Mueller describes “the lighting unit 100 shown in FIG. 1 may be used alone or together with other similar lighting units in a system of lighting units (e.g., as discussed further below in connection with FIG. 2).” Mueller, [0153]; Ex. 1003, ¶50.

[’331 Claim 17A] a lighting panel including at least first and second strings of solid state lighting devices that are respectively configured to emit at least a first light and a second light, respectively;

Mueller describes that its lighting unit 100 may include one or more light sources including multiple LEDs. Mueller, [0155] (“the lighting unit 100 shown in FIG. 1 may include one or more light sources 104A, 104B, 104C, and 104D (collectively 104) wherein one or more of the light sources may be an LED-based light source that includes one or more light emitting diodes (LEDs).”).

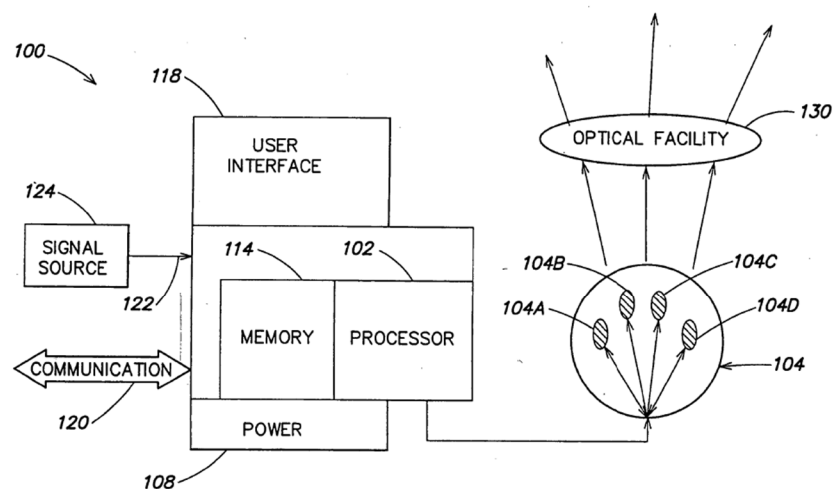
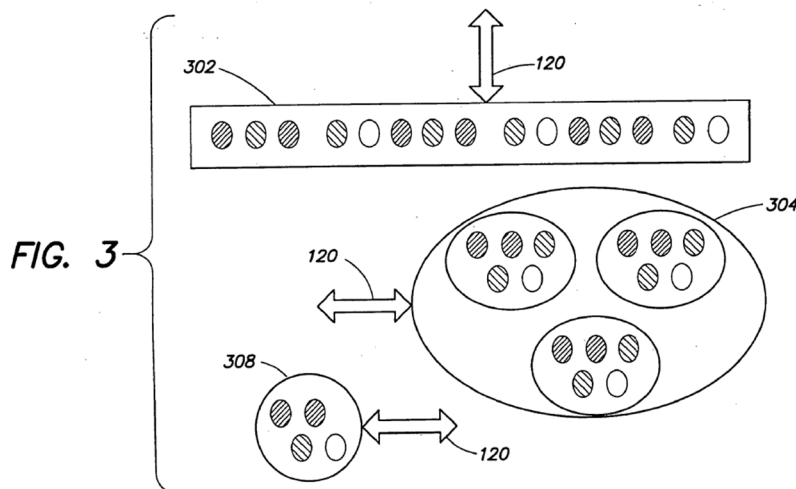


FIG. 1

Id., Fig. 1; Ex. 1003, ¶52. Mueller further describes that these LEDs may be included in serial connections of LEDs, which demonstrates that the LEDs are in strings of multiple LEDs. *See, e.g.*, Mueller, [0160] (“the lighting unit 100, one or more of the light sources 104A, 104B, 104C and 104D shown in FIG. 1 may include a group of multiple LEDs or other types of light sources (e.g., various parallel and/or **serial connections of LEDs** or other types of light sources) that are controlled together by the processor 102.”); Ex. 1003, ¶53.



Id., Fig. 3; Ex. 1003, ¶110, Claim 17A.

With respect to “a lighting panel,” Mueller describes multiple configuration that disclose a lighting panel. Mueller describes that “various configurations can be provided for lighting units 100.... Configurations include a linear configuration 302 (which may be curvilinear in embodiments), a circular configuration 308, an oval configuration 304, or a collection of various configurations 302, 304, 308.” Mueller, [0194]. As one example of such a configuration, Mueller describes that

“lighting units can be used on the interior ceiling 2714 or along the floor 2712, such as being used as directional lights 2704. The lights can be used to light the seating environment 2710.... The lighting units 100 can thus be used to provide aesthetic lighting, alarm lighting, safety lighting, lighting entertainment, indication of conditions or data, or many other purposes.” *Id.*, [0248]; [0249] (“Lighting units 100 can be disposed along the ceiling 2802, above seats 2808, or along the aisle 2804, to provide a variety of illumination effects,”); [0255] (“Referring to FIG. 33, a medical environment is depicted in which a health care provider 3300 provides health care services to a patient 3302 under a lighting system 3308 that includes a plurality of lighting units 100.”)

[’331 Claim 17B] at least first and second current supply circuits coupled to the at least first and second strings of solid state lighting devices, respectively, and configured to supply an on-state drive current to a respective one of the first and second strings of solid state lighting devices; and

Mueller describes using power sources 108 to supply power to the strings of LEDs. Mueller, [0184]. As shown in FIG. 2, the lighting system 200 may include one or more lighting unit controllers (hereinafter “LUCs”) 208A, 208B, 208C and 208D. Ex. 1003, ¶58.

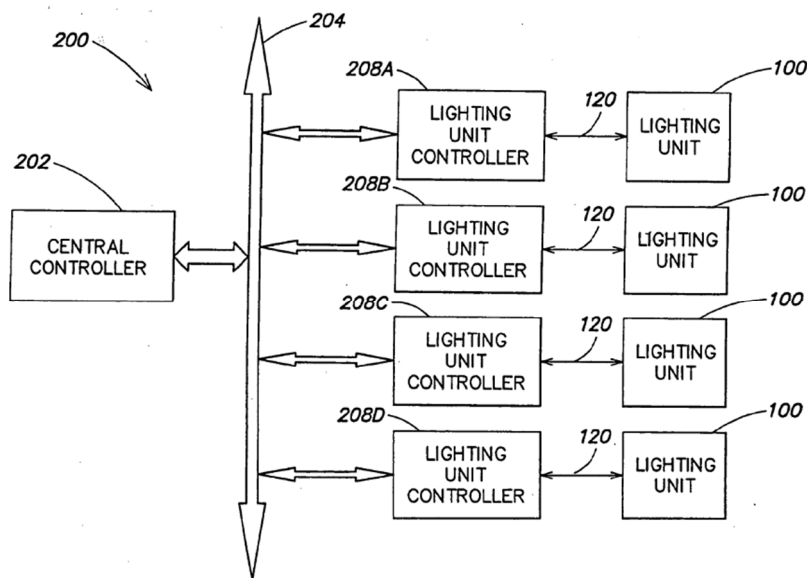


FIG. 2

Id., Fig. 1. “Each LUC is responsible for communicating with and generally controlling one or more lighting units 100 coupled to it.” *Id.* [0189]. These “LUCs 208A, 208B, 208C and 208D shown in FIG. 2 may be configured to be ‘intelligent’ in that the central controller 202 may be configured to communicate higher level commands to the LUCs that need to be interpreted by the LUCs before lighting control information can be forwarded to the lighting units 100.” *Id.* [0192]; Ex. 1003, ¶58.

Thus, as described by Mueller, each lighting unit 100 shown in Figure 2 has its own light unit controller. Ex. 1003, ¶59. A POSITA would recognize that this discloses or at least suggests that each lighting unit includes its own power supply. *Id.*

Further, as discussed above, a POSITA would motivated to modify Mueller based on Grootes, which expressly discloses the cathode of each string is “connected to its own current source 40, 41, 42.” Grootes, [0035]-[0037]. Each current source 40-42 is controllable to control the brightness of its associated LEDs to achieve the desired white point. Grootes, [0041]; Ex. 1003, ¶60.

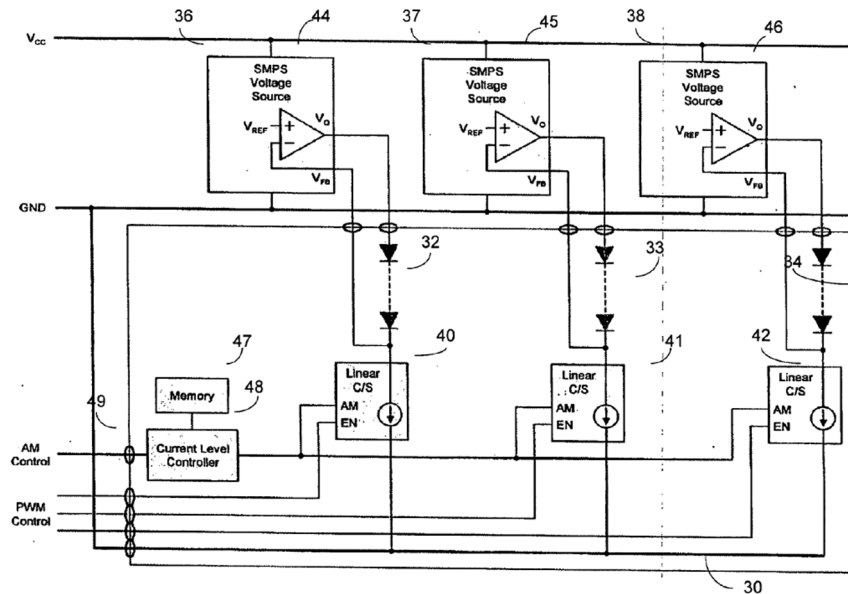


Fig. 4

Grootes, Fig. 4. As discussed above, it would have been obvious to modify Mueller to include Grootes’s individual current source control for each string to achieve the desired benefit better color and brightness uniformity, which are characteristics both Grootes and Mueller identify. Thus, this element is obvious in view of the combination of Mueller and Grootes. Ex. 1003, ¶110, Claim 17B.

[’331 Claim 17C] a pulse width modulation (PWM) controller that is coupled to the first current supply circuit and the second current supply circuit and that is configured to generate, for each of the first current supply circuit and the second current supply

circuit, a first PWM control signal and a second PWM control signal that are supplied to the each of the at least first and second strings.

As discussed above, Mueller discloses lighting unit controllers that are configured to be “intelligent.” Mueller, [0192]; Ex. 1003, ¶65. Mueller further describes controlling the lighting units with PWM signals, describing that “examples of control signals that may be generated by the processor to control the light sources include ... pulse width modulated signals (PWM)” Mueller, [0156]; Ex. 1003, ¶65. Mueller further states: “Pulse width modulation (PWM) involves supplying a substantially constant current to the LEDs for particular periods of time. The shorter the time, or pulse-width, the less brightness an observer will observe in the resulting light. The human eye integrates the light it receives over a period of time and, even though the current through the LED may generate the same light level regardless of pulse duration, the eye will perceive short pulses as “dimmer” than longer pulses. The PWM technique is considered one of the preferred techniques for driving LEDs” *Id.*, [0158]. A PWM controller is further shown in Mueller Figure 69.

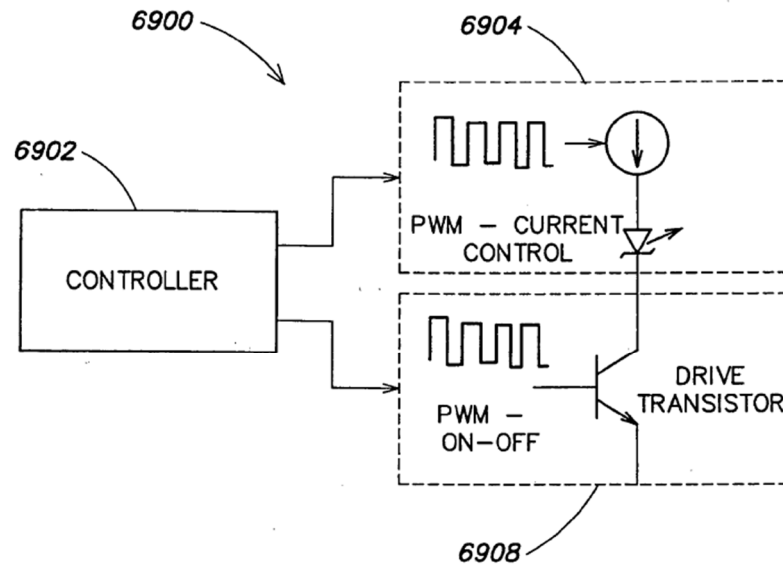


FIG. 69

Id., Fig. 69; Ex. 1003, ¶65. Mueller describes with respect “to FIG. 69, a control system 6900 embodiment can use a variety of well-known methods. Thus, the control facility 6902 can switch between a current control mode 6904 (which itself could be controlled by a PWM stream) and a separate PWM mode 6908. Such a system can include simultaneous current control via PWM for wavelength and PWM control balanced to produce desired output intensity and color. FIG. 69 shows a schematic diagram 6900 with one possible embodiment for creating the two control signals from a controller, such as a microprocessor to control one or more LEDs in a string. Multiple such strings can be used to create a light fixture that can vary in color (HSB) and spectrum based on the current and on-off control.” Mueller, [0315]. This expressly discloses controlling multiple LED

strings, with each LED string receiving two PWM control signals (one for current control to adjust the wavelength, and the other for on-off control to adjust output intensity). *Id.*

As discussed above with respect to claim 17B, Mueller describes using power sources 108 to supply power to strings of LEDs and because each lighting unit 100 shown in Figure 2 has its own light unit controller. Ex. 1003, ¶66. Further, Grootes expressly describes that “[s]eries strings of red LEDs 32, green LEDs 33, and blue LEDs 34” and current sources 40, 41, and 42 are mounted on a single printed circuit board (PCB) 30, and the cathode of each string is “connected to its own current source 40, 41, 42.” Grootes, [0035]-[0037]; Ex. 1003, ¶66.

A POSITA would recognize that Mueller’s PWM control signals could be used to drive each of the current sources 40, 41, and 42 to control individual strings of light. This modification would achieve independent “control [of] the brightness of its associated LEDs to achieve the desired white point.” Grootes, [0041]. In other words, including a separate current source for each string of LEDs controlled by an individual PWM signals as taught by Mueller would achieve a better “balance (white point) between the three colors.” *Id.* Indeed, as Mueller explains “The PWM technique is considered one of the preferred techniques for driving LEDs” Mueller, [0158]. Thus, this element is obvious in view of the combination of Mueller and Grootes; Ex. 1003, ¶110, Claim 17C.

E. Ground 5 – Claims 18 and 20 are Obvious Under 35 U.S.C. § 103 Over the Combination of Mueller, Grootes, and Xu in view of the Knowledge of a POSITA.

1. Motivation to Combine Mueller, Grootes, and Xu

A POSITA would be motivated to combine Xu to the Mueller-Grootes combination to include such that (1) each of the first and second current supply circuits comprises a variable voltage boost, constant current power supply circuit configured to operate in continuous current mode described in Xu; and (2) to couple a sense resistor to an output terminal of the current supply circuits to provide a feedback signal to allow for the closed loop control described in Xu. Ex. 1003, ¶104.

First, Xu is in the same field of endeavor as each of Mueller and Grootes, namely setting the voltages and currents for LED strings. Ex. 1003, ¶105. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting system having a mechanism for setting the voltages and currents for LED strings. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to incorporate the improvements to the driving device for a LED string described in Xu into the lighting systems disclosed by Mueller and Grootes. *Id.*

Second, a primary motivation of one of ordinary skill in the art would have been to provide a turn-on current with a constant level and achieve a constant color

temperature. Ex. 1003, ¶106. Modifying the Mueller-Grootes combination to include the constant on current and the current-voltage converter (e.g., a sense resistor), as disclosed by Xu would meet this goal. For example, Xu states that “[w]hen [a control] switch 204 is turned on, a fixed turn-on current flows through the light-emitting diode series 202, and the light-emitting diode series is rapidly lit to a predetermined brightness; and when the switch 204 is turned off, the current flowing through the light-emitting diode series 202 stops immediately, and the light-emitting diode series 202 is quickly extinguished.” Xu, p. 7:27-29; Ex. 1003, ¶106. Xu further states that the current-voltage converter 214, which is a sense resistor, generates a feedback signal, based on which “the constant color temperature” of the lighting system can be realized. Xu, p. 8:7-15; Ex. 1003, ¶106.

Third, Mueller recognizes certain major challenges with lighting systems. Ex. 1003, ¶107. For example, Mueller states: “In conventional LED-based light systems, constant current control is often preferred because of lifetime issues. Too much current can destroy an LED or curtail useful life. Too little current produces little light and is an inefficient or ineffective use of the LED.” Mueller, [0297]. The lighting systems disclosed by Mueller can “operate LEDs in an efficient manner.” *Id.*, [0157]. Those same challenges are recognized in Xu as well. Ex. 1003, ¶107. For example, Xu admits that there is a phenomenon of slow capacitor charging and discharging, and thus the LED series cannot be quickly turned on or off. Xu, p.

1:22-26. A primary motivation of one of ordinary skill in the art would have been to provide a pulse current with a constant level to achieve operation efficiency. The modifications described in Xu would achieve this improved color and brightness uniformity in the Mueller-Grootes combination. Ex. 1003, ¶107.

A POSITA would recognize that each of Mueller, Grootes, and Xu describe known methods for improving the color and brightness uniformity of the lighting system. Ex. 1003, ¶108. A POSITA would have been motivated to use the improvements described within Xu to improve the color and brightness uniformity of the lighting system described in Mueller. *Id.* A POSITA would recognize that the combination would have provided better color and brightness uniformity, and this would have provided motivation to make the combination. *Id.* This combination is nothing more than the combination of known elements from the prior art. *Id.*

Thus, combining these three references—Mueller, Grootes, and Xu—that all use the same components to achieve the same goal would have been obvious to a POSITA.

2. Dependent Claim 18.

[’331 Claim 18] The lighting system according to claim 17, wherein each of the first and second current supply circuits comprises a variable voltage boost, constant current power supply circuit configured to operate in continuous current mode.

As discussed above, Mueller discloses using PWM controllers. *See supra*, Claim 17C. And the Mueller-Grootes combination discloses using multiple current supply circuits and Mueller expressly discloses using PWM to supply “substantially constant current to the LEDs.” Mueller, [0158] (“Pulse width modulation (PWM) involves supplying a substantially constant current to the LEDs for particular periods of time.”). *See supra*, Claim 17B. In a similar field, Xu further describes a constant current supply circuit configured to operate in continuous current mode and various conversion circuits that can be used to provide power to the string of LEDs. *See* Ground 2, Claim 18 (with respect to Xu).

As discussed above, a POSITA would be motivated to combine Xu and the Mueller-Grootes combination in order to provide greater control of the overall light output, especially the constant color temperature. Thus, the combination of Mueller, Grootes, and Xu renders claim 18 obvious. Ex. 1003, ¶116, Claim 18.

3. Dependent Claim 20.

[’331 Claim 20] The lighting system according to claim 17, wherein each of the first and second current supply circuits comprises a sense resistor that is coupled to an output terminal of the respective one of the first and second current supply circuits

and that is coupled to a feedback input to provide the feedback signal to provide closed loop control.

Mueller describes a feedback sensor, “the sensor can be a light sensor, and the sensor can provide control of a lighting signal based on a feedback loop, in which an algorithm at the step 6008 modifies the lighting control signal based on the lighting conditions measured by the sensor. In embodiments, a closed-loop feedback system can read spectral properties and adjust color rendering index, color temperature, color, intensity, or other lighting characteristics based on user inputs or feedback based on additional ambient light sources to correct or change light output.” Mueller, [0291]; Ex. 1003, ¶73.

Mueller further states: “A feedback system, whether closed loop or open loop, can be of particular use in rendering white light. Some LEDs, such as those containing amber, can have significant variation in wavelength and intensity over operating regimes. Ex. 1003, ¶74. Some LEDs also deteriorate quickly over time. To compensate for the temperature change, a feedback system can use a sensor to measure the forward voltage of the LEDs, which gives a good indication of the temperature at which the LEDs are running. *Id.* In embodiments the system could measure forward voltage over a string of LEDs rather than the whole fixture and assume an average value. This could be used to predict running temperature of the LED to within a few percent. Lifetime variation would be taken care of through a

predictive curve based on experimental data on performance of the lights.” *Id.*, [0292]; Ex. 1003, ¶73.

Xu further describes a feedback circuit that uses a resistor as a current-voltage converter. Ex. 1003, ¶75. In Xu, “the feedback circuit 206 comprises a current-voltage converter 214.... The current-voltage converter 214 is, for example, a resistor R_s . When the switch 204 is turned on, the direct-current current I' flows into the current-voltage converter 214, causing the current-voltage converter 214 to generate a first reference voltage V_I as the feedback signal f_s according to the direct-current current I' . Therefore, the direct current-direct current converter 208 controls the magnitude of the direct-current current I' according to the feedback signal f_s , so as to achieve a constant color temperature of the backlight module.” Xu, p. 8:7-15; Ex. 1003, ¶75.

As discussed above, a POSITA would be motivated to combine Xu to the Mueller-Grootes combination in order to provide greater control of the overall light output, especially the constant color temperature. Thus, the combination of Mueller, Grootes, and Xu renders claim 20 obvious. Ex. 1003, ¶116, Claim 20.

F. Ground 6 – Claim 21 is Obvious Under 35 U.S.C. § 103 Over the Combination of Mueller, Grootes, Xu, and Blum in view of the Knowledge of a POSITA.

1. Motivation to Combine Mueller, Grootes, Xu, and Blum

A POSITA would have been motivated to modify the Mueller-Grootes-Xu combination to include features such as a low pass RC filter between the sense resistor and the current sense input of the PWM controller described in Blum.

First, Blum is in the same field of endeavor as each of Mueller, Grootes, and Xu, i.e., setting the voltages and currents for LED strings. Ex. 1003, ¶111. Consequently, a POSITA would have had a reasonable expectation of success in combining their various disclosures to produce a lighting system having a mechanism for setting the voltages and currents for LED strings. *Id.* Furthermore, it was well within the technical ability of a POSITA at the time to incorporate the improvements to the circuit that reduces current spikes in a feedback signal described in Blum into the lighting systems disclosed by Mueller, Grootes, and Xu. *Id.*

Second, a primary motivation of one of ordinary skill in the art would have been to eliminate current spike in the feedback signal to provide enhanced light quality and longer circuit life. Ex. 1003, ¶112. Modifying the Mueller-Grootes-Xu combination to include the low pass RC filter between the sense resistor and the current sense input of the PWM controller, as disclosed by Blum would meet this

goal. *Id.* For example, Blum discloses monitoring the amount of current flowing in a switching device such as a transistor by adding a current sense element, such as a resistor connected in series with the switching device. Blum, col. 1:14-18; Ex. 1003, ¶112. Blum admits that “plac[ing] a low pass RC filter between the current sense element and the current sense input of the PWM controller” is a well-known method in the art for eliminating the leading-edge current spike. Blum, col. 1:45-48; Ex. 1003, ¶112.

Third, Mueller recognizes certain major challenges with lighting systems. Ex. 1003, ¶113. For example, Mueller states: “In conventional LED-based light systems, constant current control is often preferred because of lifetime issues. Too much current can destroy an LED or curtail useful life. Too little current produces little light and is an inefficient or ineffective use of the LED.” Mueller, [0297]; Ex. 1003, ¶113. The lighting systems disclosed by Mueller can “operate LEDs in an efficient manner.” *Id.*, [0157]. Those same challenges are recognized in Blum as well. For example, Blum admits that avoiding “the problems of a leading-edge spike in a current sense signal” is desired. Blum, col. 1:40-63. A primary motivation of one of ordinary skill in the art would have been to provide a low pass RC filter to avoid the leading-edge spike in the feedback signal and thereby improve the overall quality of light output and increase longevity of the lighting circuit. Ex. 1003, ¶113.

A POSITA would recognize that each of Mueller, Grootes, Xu, and Blum describe known methods for improving the color and brightness uniformity of the lighting system. Ex. 1003, ¶114. A POSITA would have been motivated to use the improvements described within Blum to improve the color and brightness uniformity of the lighting system described in Mueller, with mitigated leading-edge spike in the feedback signal. *Id.* A POSITA would recognize that the combination would have provided better color and brightness uniformity, and this would have provided motivation to make the combination. *Id.* This combination is nothing more than the combination of known elements from the prior art. *Id.*

Thus, combining these four references—Mueller, Grootes, Xu, and Blum—that all use the same components to achieve the same goal would have been obvious to a POSITA.

2. Dependent Claim 21

[’331 Claim 21] The lighting system according to claim 20, further comprising a filter coupled to the sense resistor, the filter configured to filter the feedback input.

As discussed above, Mueller discloses a lighting control circuit and Xu describes using a sensing resistor for closed loop control. In a similar field, Blum discloses monitoring the amount of current flowing in a switching device such as a transistor by adding a current sense element, such as a resistor connected in series with the switching device. Blum, col. 1:14-18; Ex. 1003, ¶78. Blum admits that

“plac[ing] a low pass RC filter between the current sense element and the current sense input of the PWM controller” is a well-known method in the art for eliminating the leading-edge current spike. Blum, col. 1:45-48; Ex. 1003, ¶78. One example of such a low pass RC filter is a filter formed from passive components that have an attenuation effect over the entire signal that is greater over certain frequency levels than other. Blum, col. 1:48-53; Ex. 1003, ¶78.

As discussed above, a POSITA would be motivated to combine Blum to the Mueller-Grootes-Xu combination in order to provide greater control of the overall light output by way of, for example, avoiding the leading-edge current spike in the feedback signal. Thus, the combination of Blum and the Mueller-Grootes-Xu combination renders claim 21 obvious. Ex. 1003, ¶122, Claim 21.

VIII. Any Secondary Considerations Cannot Overcome the Clear Evidence of Obviousness.

The Board—at the institution phase—has repeatedly held that evidence of secondary considerations presented by the Patent Owner should be addressed in a trial where the parties may develop, and the Board may consider, a full record. *See, e.g., Tristar Products, Inc. v. Choon’s Design, LLC*, IPR2015-01883, Paper No. 6 at 26 (PTAB Mar. 9, 2016). That is the appropriate course here.

IX. Discretionary Denial is Inappropriate.

The Underlying Litigation does not warrant discretionary denial under 35 U.S.C. § 314(a). The *Fintiv* framework favors institution of this proceeding. *See*

Apple Inc. v. Fintiv, Inc., IPR2020-00019, Paper 11 at 6 (PTAB Mar. 20, 2020). As explained below, each of the *Fintiv* factors weighs against discretionary denial or is, at worst, neutral. The Board should institute IPR.

Factor 1 - Whether the Court Granted a Stay or Evidence Exists that One May be Granted if a Proceeding is Instituted. This factor favors institution or is, at worst, neutral. As discussed below, there has been little investment by the parties. The early stage of the litigation and potential simplification (resulting from the Board invalidating all asserted claims of the '331 Patent) weighs against the exercise of discretion.

Factor 2 - Proximity of the Court's Trial Date to the Board's Projected Statutory Deadline for a Final Written Decision. This factor weighs against discretionary denial. This case is at its early stages, the counterclaim asserting the '331 Patent was filed in September 2022. *See* Ex. 1011. Further, Patent Owner only identified asserted claims and served infringement contentions on January 30, 2023, and Patent Owner supplemented these contentions on June 21, 2023. Ex. 1015. The schedule in the Underlying Litigation does not yet include a trial date. *See* Ex. 1012. Further, the current case schedule does not include a date for the close of fact discovery, the beginning of expert discovery, or dispositive motions. Put simply, much more of the Underlying Litigation lies ahead than behind.

Further, according to the latest court management statistics, the average time from complaint to trial in the Northern District of Georgia—where the Underlying Litigation is Pending—is approximately 36 months. *See* Ex. 1013. Thus, conservatively, a jury trial would not occur in the underlying litigation until late 2025. Thus, a Final Written Decision is likely to be issued well before the date of any scheduled trial.

Factor 3 - Investment in the Parallel Proceeding by the Court and the Parties. This factor weighs against discretionary denial. The parties have made only minimal investment in this litigation to date. Plaintiff’s infringement contentions identifying the asserted claims were served on January 30, 2023. *See* Ex. 1014. These contentions first identified the asserted claims, and Patent Owner supplemented these contentions on June 21, 2023. Ex. 1015. This fact weighs against the exercise of discretion, as the Board explained in *Fintiv*, where “the petitioner filed the petition expeditiously, such as promptly after becoming aware of the claims being asserted, this fact has weighed against exercising the authority to deny institution under *NHK*.” *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 1 (PTAB Mar. 20, 2020) (precedential). Further, no substantive orders have been entered. Under these facts discretionary denial is improper. *See, e.g., Nokia of America Corp and Ericsson Inc. v. IPCOM, GMBH & Co. KG*, IPR2021-00533, Paper 10 at (PTAB Aug. 12, 2021).

Factor 4 - Overlap Between Issues Raised in the Petition and in the Parallel Proceeding. Petitioner challenges several claims of the '331 Patent that are not currently asserted in the Underlying Litigation. Exs. 1014-1015. Thus, at a minimum there is no overlap with respect to those claims.

Factor 5 - Whether the Petitioner and the Defendant in the Parallel Proceeding are the Same Party. This factor is neutral. The parties are the same, but this is common in nearly every Petition filed where there is a co-pending litigation.

Factor 6 - Other Circumstances that Impact the Board's Exercise of Discretion, Including the Merits. As discussed in detail above, every element of the claims of the '331 patent is either expressly shown in the prior art or is obvious in view of well-known art. The strong merits of the grounds presented in this Petition further support institution. *Fintiv*, Paper 11 at 14-15.

X. Denial Under Section 325(d) is Inappropriate.

This Petition does not present “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. §325(d). None of the prior art references used herein were cited during prosecution of U.S. Application No. 13/896,977, which issued as the '331 patent.

XI. Conclusion

In view of the foregoing, there is a reasonable likelihood that Petitioner will prevail with respect to claims 17-18 and 20-25 of the '331 Patent. Petitioner requests that the Board institute IPR.

Respectfully submitted,

By: /s/ Matias Ferrario
Matias Ferrario
Registration No. 51,082

CERTIFICATE OF WORD COUNT

The undersigned certifies pursuant to 37 C.F.R. § 42.24(d) that the foregoing **Petition for Inter Partes Review** excluding any table of contents, mandatory notices, certificates of service or word count, or appendix of exhibits or claim listing, contains 13767 words according to the word-processing program used to prepare this paper (Microsoft Word). Petitioner certifies that this **Petition for Inter Partes Review** does not exceed the applicable type-volume limit of 37 C.F.R. § 42.24(a).

Dated: September 14, 2023

By: /s/ Matias Ferrario
Matias Ferrario
Registration No. 51,082

CERTIFICATE OF SERVICE

The undersigned hereby certifies that on the date below a copy of this **Petition for *Inter Partes* Review** has been served by Priority Mail Express® upon the following:

MYERS BIGEL, P.A.
P.O. BOX 37428
Raleigh, NC 27627

With a courtesy copy sent via email to litigation counsel in *Hisense USA Corporation v. Brightplus Ventures LLC*, No. 1:22-cv-02774 (N.D. Ga.).

Dated: September 14, 2023

By: /s/ Matias Ferrario
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