

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Hisense USA Corporation

Petitioner,

v.

Brightplus Ventures LLC,

Patent Owner

Case No. IPR2023-01410

U.S. Patent No. 8,294,075

**PATENT OWNER'S REVISED CONTINGENT MOTION TO AMEND
UNDER 37 C.F.R. § 42.121**

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II. INTRODUCTION

Patent Owner Brightplus Ventures LLC (“Brightplus” or “Patent Owner”) respectfully submits this revised contingent request to substitute challenged claims of U.S. Patent No. 8,294,075 (the “’075 Patent”). In the instituted trial, the Petitioner Hisense USA Corporation (“Hisense” or “Petitioner”) has challenged the patentability of claims 1-7 and 9-12 as obvious under 35 U.S.C. § 103. Patent Owner submits that this Motion satisfies the statutory and regulatory requirements for a motion to amend the claims under 35 U.S.C. § 316(d) and 37 C.F.R. § 42.121 because the proposed amendments: (i) do not enlarge the scope of the claims or introduce new subject matter; (ii) are responsive to at least one ground of patentability instituted in this proceeding; (iii) are supported by the disclosure of the originally-filed application; and (iv) are patentable over the closest known prior art.

III. MOTION TO AMEND IS CONTINGENT

Patent Owner submits that this Motion is contingent upon a finding in a final written decision that any of the challenged claims are unpatentable. Specifically, Patent Owner requests the following contingencies:

- if any of claims 1-5 are found unpatentable, the unpatentable claim be substituted with the corresponding one proposed substitute claims 34-38, respectively.

IV. A REASONABLE NUMBER OF CLAIMS ARE AMENDED

Under 37 C.F.R. §42.121(a)(3), a motion to amend may propose a reasonable number of substitute claims for each challenged claim. Generally, it is presumed “that only one substitute claim would be needed to replace each challenged claim,” but that presumption may be rebutted upon a showing of need. 37 C.F.R. § 42.121(a)(3); *Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 4-5 (PTAB Feb. 25, 2019). “An amendment under this subsection may not enlarge the scope of the claims of the patent or introduce new matter.” 35 U.S.C. § 316(d)(3); *Pulse Elecs., Inc. v. U.D. Elec. Corp.*, No. 3:20-cv-01676-BEN-DEB, 2021 U.S. Dist. LEXIS 69938, at *22 (S.D. Cal. 2021). In this Revised Motion to Amend, Patent Owner proposes no more than 1 substitute claim for each challenged claim 1-5. Hence, patent Owner proposes a reasonable number of substitute claims. See Prelim. Guidance at 4.

V. THE PROPOSED AMENDMENTS RESPOND TO A GROUND OF UNPATENTABILITY INVOLVED IN THIS TRIAL

While Patent Owner submits new and additional limitations in Claims 34, as well as additional amendments 35-38, the Board's Preliminary Guidance is still applicable to this Revised Motion to Amend. For example, the Board recognized that "proposed substitute claims 34 and 35 recite new limitations that directly respond to the grounds of unpatentability involved in the trial" (Prelim. Guidance at 4-5). Similarly, Patent Owner has incorporated into this Revised Motion to Amend arguments as to why the art cited in Petitioner's original grounds and the additional art cited in Petitioner Opposition to Patent Owner Contingent Motion to Amend does not teach the limitations in proposed substitute claims 34-38. Additionally, all of the proposed substitute claims are to modify the claims included in Petitioner's original grounds, namely claims 1-5.

VI. THE PROPOSED AMENDMENTS DO NOT SEEK TO ENLARGE THE SCOPE OF THE CHALLENGED CLAIMS

While Claims 34-38 include new limitations not previously presented, Patent Owner submits the commentary provided in the Board's Preliminary Guidance is still applicable to this Revised Motion to Amend. For example, proposed substitute independent claim 34 retains all limitations of corresponding original claim 1 and further includes additional limitations as compared to the original claim. As the Board stated in its Preliminary Guidance, the additional limitations narrow the original claim and do not enlarge the scope of the claims of the challenge patent. (Prelim. Guidance at 5). Consequently, even though proposed dependent claims 35-

38 may have certain limitations removed, proposed dependent claims 35-38 do not enlarge the scope of the challenged patent. (Prelim. Guidance at 5). Also, See *Lectrosonics v. Zaxcom*, IPR2018-01129, Paper 15 at 6–7 (PTAB, Feb. 25, 2019) (“A substitute claim will meet the requirements of § 42.121(a)(2)(i) and (ii) if it narrows the scope of at least one claim of the patent, for example, the challenged claim it replaces, in a way that is responsive to a ground of unpatentability involved in the trial.” (emphasis added)).

VII. THE PROPOSED AMENDMENTS DO NOT INTRODUCE NEW SUBJECT MATTER

All the substitute claims are supported by the originally filed disclosure of the ‘075 Patent (EX 1002 at 2-52). Additionally, PO submits that the specification in the both the issued Patent and the parent application (U.S. No. 11/408,648¹) are the same as that which was originally filed. PO has identified support in the originally filed disclosure in accordance with the Board’s Preliminary Guidance.

Substitute Claim 34:

- i. a first substrate on a surface of a first tile, the first substrate and the first tile together comprising a first metal core printed circuit board (MCPCB), the

¹ The U.S. App. No. 11/408,648 specification is identical to the specification of U.S. App. No. 12/851,026 as originally filed (i.e., Ex 1002 at 2-52). The only difference between the two is that the ‘648 application does not contain the “Related Application” paragraph found in the originally filed disclosure (see, Ex. 1002 at pg. 2: ¶0001).

first substrate having a first side parallel to a principal plane of the lighting panel

- ii. a second substrate on a surface of a second tile, the second substrate and the second tile together comprising a second MCPCB, the second substrate having a first side parallel to the principal plane of the lighting panel;

These elements find support in EX. 1002, pg. 13 at ¶0061; pg. 16 at ¶0072 and U.S. App. No. 11/408,648 (EX. 2011) pg. 12 at ¶0060; pg. 15 at ¶0071.

- iii. wherein the first plurality of solid state lighting devices are arranged on the first side of the first substrate as a plurality of strings of solid state lighting devices and each one of said plurality of strings comprises ones of the first plurality of lighting devices connected in series with one another by a plurality of metal traces formed on the first side of the first substrate;
- iv. wherein the second plurality of solid state lighting devices are arranged on the first side of the second substrate as a plurality of strings of solid state lighting devices and each one of said plurality of strings comprises ones of the second plurality of lighting devices connected in series with one another by a plurality of metal traces formed on the first side of the second substrate;

These elements find support in EX. 1002, pg. 13 at ¶0061; pgs. 15-16 at ¶¶0069-0070 and Ex. 2011 at pg. 12 at ¶0060; pg. 14 at ¶¶0068-0069.

- v. wherein a first plurality of strings are arranged on the first side of the first substrate;

vi. wherein a second plurality of strings are arranged on the first side of the second substrate;

These elements find support in EX. 1002 pgs. 15-16 at ¶¶0069-0070. And EX. 2011 at pg. 14 at ¶¶0068-0069. Accordingly, the first path 20 may include four serial strings 20A-20D arranged in parallel on the tile 10. The second path 21 on the tile 10 may include four serial strings 21A, 21B, 21C, 21 D arranged in parallel.

vii. wherein the first tile and the second tile are arranged horizontally across the lighting panel;

This element finds support in EX. 1002 pg. 16 at ¶0071; pg. 42 at Figs. 1 and 3 and EX. 2011 at pg. 15 at ¶0070; pg. 42 at Figs. 1 and 3.

viii. a first reflector sheet mounted on the first side of the first substrate and not in contact with the solid state lighting devices;

ix. a second reflector sheet mounted on the first side of the second substrate and not in contact with the solid state lighting devices;

These elements find support in EX. 1002 pg. 18 at ¶0078; pg. 44 at fig. 5A and EX. 2011 at pgs. 16-17 at ¶0077; pg. 44 at Fig. 5A.

The citations above demonstrate written support for claim 26, specifically that 1) the lighting panel can comprise multiple lighting tiles that have surfaces with a substrate thereon, 2) each tile and substrate together comprise a metal core printed circuit board, 3) a plurality solid state lighting devices are arranged on a first side of

a substrate of each tile, 4) the plurality of solid state lighting devices are arranged in as a plurality of strings of solid state lighting devices and each one of said strings comprise ones of the plurality of lighting devices connected in series with one another by a plurality of metal traces formed on the first side of the substrate, 5) each tile is arranged horizontally across the lighting panel, 6) each substrate has a reflector mounted thereon, wherein the reflector is not in contact with the solid state lighting devices and the reflector is arranged between the substrate and a brightness enhancement film (BEF), 7) the BEF is on the reflector sheets and is configured to preferentially emit light having a first orientation from the lighting panel and to reflect light having a second orientation, different from the first orientation back into the lighting panel, and 8) a diffuser sheet is between the reflector and BEF, wherein the BEF, reflector sheets, and diffuser sheet extend and are arranged parallel to the principal plane of the lighting panel. The disclosures in the parent priority application and the application that matured into the subject patent, as originally filed, demonstrate possession of the subject matter recited in the proposed substitute claim 34, as a whole, because (a) each of the limitations are described in connection with the same embodiment of the invention, (b) the description indicates the features of one embodiment may be included in other embodiments, and/or (c) the drawings illustrate the features being used in combination with one another. The originally filed disclosure further demonstrates elements (a), (b), and (c) above, “[t]his invention may, however, be embodied in many different forms and should not be

construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.” (Ex. 1002 pg. 10 at ¶0052 and U.S. App. No. pg. 9 at ¶0051).

Substitute Claims 35 and 36:

- i. Claim 35: further comprising an optical reflective cavity formed around the solid state lighting elements, the optical reflective cavity having planar angled sidewalls, wherein the optical reflective cavity is not in contact with solid state lighting elements.

These elements find support in EX. 1002 pg. 18 at ¶¶0079-0081; pgs. 44-45 at Figs. 5A and 7 and EX. 2011 at pg. 17 at ¶¶0078-0080; pgs. 44-45 at Figs. 5A and 7.

- ii. Claim 36: wherein the diffuser sheet is in direct contact with the uppermost surface of the optical reflective cavity.

This element finds support in EX. 1002 pgs. 18-19 at ¶¶0079-0082; pgs. 44-45 at Figs. 5A and 7 and EX. 2011 at pg. 17 at ¶¶0078-0081; pgs. 44-45 at Figs. 5A and 7.

The citations above demonstrate written support for claims 35 and 36, specifically that 1) the light panel comprises an optical reflective cavity formed around the solid state lighting element, 2) the optical reflective cavity has planar

angled sidewalls and is not in contact with the solid state lighting element, and 3) the diffuser sheet is in direct contact with the uppermost surface of the optical reflective cavity. The disclosures in the parent priority application and the application that matured into the subject patent, as originally filed, demonstrate possession of the subject matter recited in the proposed substitute claims 35 and 36, as a whole, because (a) each of the limitations are described in connection with the same embodiment of the invention, (b) the description indicates the features of one embodiment may be included in other embodiments, and/or (c) the drawings illustrate the features being used in combination with one another. The originally filed disclosure further demonstrates elements (a), (b), and (c) above. See, Ex. 1002 pg. 10 at ¶0052 and U.S. App. No. pg. 9 at ¶0051.

Substitute Claims 37 and 38:

- i. Claim 37: further comprising a plurality of current supply circuits that are operable to control a pulse width of a current supplied to each one of the plurality of strings of solid state lighting devices.
- ii. Claim 38: wherein the first and second plurality of strings arranged on each of the first and second substrate, respectively, are controlled by at least two current supply circuits.

These elements find support in EX. 1002 pg. 22 at ¶0095; pg. 23 at ¶0098; pgs. 26-27 at ¶0111 and EX. 2011 at pg. 21 at ¶0094; pg. 22 at ¶0097; pg. 25-26 at ¶0110.

The citations above demonstrate written support for claims 37 and 38,

specifically that 1) the light panel comprises a plurality of current supply circuits that are operable to control a pulse width of a current supplied to each one of the plurality of strings of solid, and 2) the first and second plurality of strings arranged on each of the first and second substrate, respectively, are controlled by at least two current supply circuits. The disclosures in the parent priority application and the application that matured into the subject patent, as originally filed, demonstrate possession of the subject matter recited in the proposed substitute claims 37 and 38, as a whole, because (a) each of the limitations are described in connection with the same embodiment of the invention, (b) the description indicates the features of one embodiment may be included in other embodiments, and/or (c) the drawings illustrate the features being used in combination with one another. The originally filed disclosure further demonstrates elements (a), (b), and (c) above. See, Ex. 1002 pg. 10 at ¶0052 and U.S. App. No. pg. 9 at ¶0051.

VIII. THE PROPOSED SUBSTITUTE CLAIMS ARE PATENTABLE

A. Claim 34

In its preliminary guidance, the Board considered the Mok, Holman and Lamb references separately and in combination with respect to Patent Owner's original proposed substitute claim 34. Patent Owner will address these references in the same order below.

Mok

The Board, in its Preliminary Guidance, stated that it did not find “reflector cups 32 (and attached reflective coatings 58) embedded in each of Mok’s light emitting devices 14 to be teaching “a reflector sheet on the first side of the at least one substrate, wherein the reflector is extended and angled with respect to the surface of the substrate” (as recited in claim 34).” (Prelim Guidance at 15) The Board also found that it would not have been obvious to a person of ordinary skill in the art to deposit a reflective surface on the surface of the reflective cups of Mok (Id. at 16) Similarly, newly proposed claims 34 and 35 require reflector sheets that are mounted on the first side of a first substrate and second substrate, respectively, and not in contact with the solid state lighting devices, a reflective optical cavity having planar angled sidewalls in contact with the substrate and formed around, and not in contact with, the solid state lighting elements.

Mok does not disclose multiple tiles with multiple substrates each with its own reflective sheet thereon as per claim 34. Mok discloses a singular base panel on which its light emitting elements 14 and reflective surface 50 are disposed. (“The base panel 12 may comprise a generally rectangular shaped, plate-like member having a length 38 and a width 40 that are commensurate with the intended size of the panel 10” Mok at 0019). Thus, the base panel is of roughly the same size as the lighting panel itself. Claim 34 requires multiple lighting tiles, each necessarily smaller than the lighting panel. Mok’s reflective surface 50 is not disclosed to be in the form of multiple reflective sheets as per claims 34. Mok also does not disclose a

diffuser in contact with the reflective surface. In all depictions and descriptions of the reflective surface, the lighting devices are taller than the reflective surface, thus, the diffuser could not be in contact with the reflective surface or the uppermost surface of an optical reflective cavity.

Mok also does not disclose multiple current supply circuits that control the pulse width of current supplied to its lighting devices as per claims 37 and 38.

Holman

While the Board noted that Holman discloses “cavities defined by sloped sidewalls 230 and additional vertical portions of height J, 246, with sidewalls 230 and cavity height J made of a reflecting material”, Holman does not disclose a substrate on which both light emitting devices and a reflector sheet can be mounted. (Prelim Guidance at 19). Holman does not disclose a location where a reflector sheet could presumably be mounted such that it is mounted to the substrate on which the lighting devices are mounted as per claim 34. Where Holman does describe a back reflector in Figures 1 and 2, the light source(s) 1 are depicted as floating above the “back reflector”. These arrangements are described as “One-Dimensional Emitting Array(s)” (Holman at 0023). Holman states that preferably “one-dimensional emitting arrays are sets of parallel fluorescent tubes or channels, parallel fluorescent tube lamps, a lengthy single fluorescent tube lamp bent (or molded) into a serpentine pattern whose major sections run parallel to each other, or a planar device within which a gaseous plasma has been forced into concentrated stripe-like or zone-like

regions.” (Holman at 0082). On the other hand, where Holman discloses LEDs as the preferred light source, it depicts a compartmentalized spacer layer 84 arranged in such a way that light emitted by LED chip 70 could not interact with the surface on which those LEDs are mounted as sidewalls of the spacers are arranged in such a way that their leading edge is incident on the edge of the chip disposed beneath them. In other words, the spacers block any light from reaching the surface on which the LEDs are mounted.

Holman also does not disclose multiple tiles with separate reflector sheets mounted thereon per claim 34. Holman generally depicts a single mounting substrate for its LEDs and also refers to a “monolithic light source panel”. (See Holman e.g. at 0156). Finally, Holman does not disclose multiple current supply circuits that control the pulse width of current supplied to its lighting devices per claims 37 and 38.

Lamb

The Board noted that it was unpersuaded by Petitioner’s reliance on Lamb. The Board noted that the “reflecting elements appearing in Lamb’s Figure 2 (i.e., lightguide 140 that reflects propagating light by total internal reflection, lamp cavity reflectors 176a and 176b, and reflector sheet 127) do not appear to be “extended and angled with respect to the surface of [a] substrate”” (Prelim Guidance at 21). Similarly, newly amended claim 34 includes reflector sheets mounted on each of its substrates and not in contact with its solid state lighting devices; claim 35 requires

an optical reflective cavity in contact with the substrate and formed around the solid state lighting elements, the optical reflective cavity having planar angled sidewalls, wherein the optical reflective cavity is not in contact with the solid state lighting elements. Finally, Lamb does not disclose a reflector mounted to the same surface on which the light emitting devices are disposed as per claim 34. Figures 2 - 6 of Lamb depict the light emitting devices disposed on the side of rectangular light guides and reflective elements disposed on a separate surface (e.g. reflector sheet 127).

Combination of Mok, Holman and Lamb

As noted by the Board Mok and Lamb do not teach a reflector as recited in the originally amended claims. (Prelim Guidance at 21, 22) The combination of Mok, Holman and Lamb also does not teach or render obvious a lighting panel comprising multiple substrates with separate reflector sheets on each substrate as per claim 34. None of the references indicate that multiple substrates could be employed. Mok, Holman and Lamb also do not teach or render obvious a lighting tile with a reflective cavity in contact with the substrate and having planar angled sidewalls as per claim 35. Mok and Lamb do not disclose a reflective cavity. Holman discloses angled off sets which may have reflective sidewalls but these sidewalls are not in contact with substrate. Mok, Holman and Lamb also do not teach or render obvious a diffuser in direct contact with the uppermost surface of the optical reflective cavity as per claim 36. Again, Holman is the only reference relevant to

this claim and it discloses a diffuser positioned between its angled off sets and its light sources. (see e.g. element 68 of Figure 3 of Holman) Thus, the combination of these references does not teach or render obvious the limitations of claims 34 through 36.

Epstein

With respect to Epstein, the Board stated, “Epstein’s reflecting sheet or surface (1822 or 1824) appears to form a reflector that is extended and angled with respect to the surface of a substrate (e.g., substrate 1808)... Moreover, reflecting sheet 1822 (or reflecting surface 1824 if deposited thereon) appears to form a reflective optical cavity around a solid state lighting device (e.g., LED 1820)” (Prelim. Guidance at 24)

PO submits that Claim 34 addresses these deficiencies. Claim 34 requires a first substrate on the surface of a first tile and a second substrate on the surface of a second tile, wherein a first and second reflector sheet are mounted on the surface of the respective substrate. Epstein, however, only demonstrates a single substrate 408 to which intermediate layer 422 is mounted on (Ex. 1008 at Fig. 4a). Epstein does not disclose an embodiment in which there are multiple reflectors or multiple substrates to which those reflectors are mounted or multiple substrates that each have a plurality of strings mounted thereon. Therefore, Epstein does not disclose all the limitations on claim 34.

Combination of Epstein, Holman and Lamb

None of Epstein, Holman and Lamb teach or render obvious a lighting panel comprising multiple substrates with separate reflector sheets on each substrate as per claim 34. None of the references indicate that multiple substrates could be employed. Similar to Holman and Lamb, every figure of Epstein which depicts a substrate shows it as a single element (see e.g. Epstein figures 4A through 14A, 15A, 15B, and 17A through 20D). Epstein, like Holman and Lamb describes a single reflector sheet. (see e.g. “An array of reflectors is disposed with the LEDs. The reflectors define individual portions of **a reflector sheet.**” Epstein at 0008, emphasis added). Thus, there is no description in the references that would render obvious a lighting panel with multiple substrates and multiple reflector sheets.

Epstein Holman and Lamb do not teach or render obvious an optical reflective cavity with planar angled sidewalls and in contact with the substrate as per claim 35. Epstein’s intermediate layer, in every figure wherein the contours of the layer are discernable, is either curved or parallel to the surface of the substrate. (see e.g. Epstein figures 17C through 20D). Epstein Figure 20B is the only figure wherein the intermediate layer 622 is not in contact with the LED 620. The description of that figure recites: “the light emitting element includes **a gap 2052 between the lower surface 612 of the guiding layer 610 and the intermediate layer 622.** In this case, the intermediate layer 622 is reflective, so that light 2006 that is diffusely reflected through the lower surface 612 is reflected back up through the guiding layer.” (Epstein at 0095, emphasis added). On the other hand, claim 36 requires that

the diffuser sheet be in direct contact with the uppermost surface of the optical reflective cavity. Neither Holman or Lamb disclose an optical cavity with planar angled sidewalls which is in contact with the substrate and a diffuser. Thus, the combination of these references does not teach or render obvious the limitations of claims 34 through 36.

Holman Combination of Primary References: Mok, Holman, Lamb, and Epstein With Secondary References: Ayabe, Roth, Saccomano, Chang, Hiroki, Lee, and Hiratsuka

As discussed *supra*, the primary combinations of the primary prior references, i.e., Mok, Holman, Lamb, and Epstein does not render claim 34 obvious. Petitioner has submitted a variety of secondary references to combine with the primary references. The secondary references are discussed in turn below.

Ayabe

The Board expressed that, “Ayabe’s Figures 9, 32, 34, and 35 appear to show a reflector (collection of reflecting members 57 in Ayabe) that is ‘extended an angled’ with respect to the surface of a substrate (wiring board 55)... the reflector (each reflecting member 57) forming a ‘reflective optical cavity’ (cavity bounded by annular reflecting areas 64b-64d)” (Prelim. Guidance at 27).

PO’s RMTA addresses the deficiencies above. Claim 34 requires a first substrate on the surface of a first tile and a second substrate on the surface of a second tile, wherein a first and second reflector sheet are mounted on the surface of the respective substrate. Ayabe teaches a single board 26 that includes lighting

emitting sources 27 (Ex. 1017 at ¶0014 and Fig. 6) and a single wiring board 55 to which multiple LEDs are mounted (Ex. 1017 at ¶0014 and Figs 32, 34, and 35). Ayabe also does not teach the wiring board 55 to be a metal core printed circuit board. Lastly, Ayabe does not disclose a reflective cavity in contact with the substrate and having a planar angled sidewall or that a diffuser is in direct contact with the uppermost surface of the optical reflective cavity. Therefore, Ayabe does not make up for the deficiencies in the combinations of the primary references.

Roth

The Board described that, “Roth’s Figure 2 illustrates reflector 31 which is extended with respect to the surface of a substrate 1, reflector 31 also having angled side walls with respect to the surface of substrate 1” (Prelim. Guidance 28-29).

Claim 34 contains limitations that are non-obvious in view of Roth. Roth describes an LED package which comprises a light emitting diode 6, electrodes 5, and substrate 1 (Ex. 1018 at ¶0021). Roth does not teach that substrate 1 is on the surface of a first or second substrate or that the substrate comprises a metal core printed circuit board. Roth does not disclose a plurality of solid state lighting devices arranged on the substrate 1 or that a plurality of strings of solid state lighting devices are connected in series by a plurality of patterned metal traces formed on the first side of the substrate. Lastly, Roth demonstrates that reflector 31 is mounted on electrode 5 and not on substrate 1. Therefore, Roth does not disclose a first or second reflector sheet mounted on the first side of a first or second substrate, respectively.

Lastly, Roth does not disclose a reflective cavity in contact with the substrate and having a planar angled sidewall or that a diffuser is in direct contact with the uppermost surface of the optical reflective cavity. Therefore, Roth does not make up for the deficiencies in the combinations of the primary references.

Saccomanno

The Board noted in its Preliminary Guidance that “Saccomanno’s Figure 4 shows a flat reflective surface 405 located at an end of a light guide 400, which does not teach an “extended and angled” reflector... or a reflector forming “a reflective optical cavity” around lighting device(s)” (Prelim Guidance at 30). Similarly, newly proposed claims 34 and 35 disclose reflector sheets that are mounted on the first side of the substrate and not contact with the solid state lighting devices as well as an optical reflective cavity in contact with the substrate and formed around, and not in contact with the solid state lighting devices, wherein the optical cavity comprises planar angled sidewalls. The Board also noted that Saccomanno’s structure was likely not proper to be combined with Mok (“reflective surface 505 (having only vertical walls located next to a substrate in Saccomanno’s Figure 5) appears to be significantly different from the arrangement of layers (including the reflector) in Mok that Petitioner relied upon with respect to a substantial number of limitations recited in original claim 1”. (Prelim Guidance at 31). Finally, Saccomanno does not disclose a reflector mounted to the same surface on which the light emitting devices are disposed as per claim 34. Figures 4 and 5 of Saccomanno depict the light emitting

devices disposed on a substrate but depict reflective surfaces 405 and 505 respectively disposed on sidewalls. Therefore, Saccomano does not make up for the deficiencies in the combinations of the primary references.

Lee

The Board noted that Lee discloses “a light collection panel 200 is installed on the front surface of the LED substrate 10,” wherein the light collection panel 200 has insertion holes 210, each of which is “formed in such a shape that it becomes gradually narrower toward a lower side, and ha[ving] an inclined surface 211.” (Prelim Guidance at 36). However, Lee does not disclose multiple tiles with multiple substrates each with its own reflective sheet thereon as per claim 34. Lee refers to a single LED substrate 10 that is depicted in Figure 1 as being approximately the same size as screen 100. Thus, the LED substrate could not represent multiple separate tiles as per claim 34. Condensing panel 200 is depicted as being approximately the same size as both substrate 10 and screen 100 and thus could not represent multiple separate reflector sheets as per claims 34 and 35. Therefore, Lee does not make up for the deficiencies in the combinations of the primary references.

Chang

The Board offered the following commentary, “Chang’s reflector 32 appeared to be extended and angled with the respect to base plate 31, such that Chang appears to teach a reflector that is ‘extended and angled’ with respect to the surface of a substrate (base 31)” (Prelim. Guidance at 32).

Claim 34 does not suffer from the same deficiencies. Chang discloses a singular reflector 32 and a single substrate 31. (Ex. 1021 Figs. 5A and 6). Chang does not present any disclosure of multiple tiles or multiple reflector sheets. Chang also lacks disclosure of solid state lighting devices that are arranged on a first side of the substrate. Fig. 6 of Chang demonstrates that the light-emitting components 33 are above, and not arranged on, the base plate 31. Chang does not present any disclosure that base 31 comprises a metal core printed circuit board. For the reasons above, Chang lacks disclosure of multiple limitations present in claim 34. Therefore, Chang does not make up for the deficiencies in the combinations of the primary references.

Hiroki

The board explained that “Hiroki’s Figure 4 appears to teach a reflector sheet (reflector 6) on the first side of a substrate (substrate 2), wherein a reflector (slant surface 6X of the reflector 6) is extended and angled with respect to the surface of the substrate (substrate 2)” (Prelim. Guidance 34).

Hiroki discloses an LED package (Ex. 1025 4:10-17), similar to Roth. Fig. 12 of Hiroki is identical to Fig 2 of Roth. PO submits that Hiroki suffers from the same issues as presented above with respect to Roth. Hiroki even addresses the fact that an LED package is not a PCB but needs to be mounted to a PCB (Ex. 1025 1:47-54). Hiroki, therefore, does not disclose a reflector sheet mounted on the substrate since the reflector 6 is on substrate 2 and not on a substrate comprising an MCPCB. Hiroki also does not disclose multiple substrates or reflector sheets. The LED packages of

Hiroki and Roth do not disclose the limitations present in claim 34. Additionally, Hiroki does not make up for the deficiencies in the combinations of the primary references.

Hiratsuka

The board explained that “Hiratsuka’s Figures 1-4 appear to teach a reflector sheet (housing 5) on the first side of a substrate (circuit board 1), wherein a reflector (reflective surface 7 of the light radiating hole 6 of the housing 5) is extended and angled with respect to the surface of the substrate (circuit board 1)” (Prelim. Guidance at 38).

Hiratsuka pertains to a LED package similar to Roth and Hiroki and suffers from similar deficiencies. Specifically, Hiratsuka does not disclose a metal core printed circuit board or a printed circuit board in general. Additionally, Hiratsuka does not disclose multiple substrates to which multiple reflectors are mounted. Therefore, Hiratsuka does not disclose all the limitations present in claim 34. Additionally, Hiratsuka does not make up for the deficiencies in the combinations of the primary references.

B. Claims 35

Similar to the reasons given above, the references do not disclose an optical reflective cavity in contact with the substrate formed around, and not in contact with, the solid state lighting elements, the optical reflective cavity having planar angled sidewalls. Further since claim 35 is dependent on claim 34, Petitioner’s prior art

references do render this claim obvious.

C. Claim 36

None of the references disclose a diffuser sheet in direct contact with the uppermost surface of the optical reflective cavity. Most notably, neither Epstein nor Holman teaches a diffuser that is in direct contact with the uppermost surface of the optical cavity. Further since claim 36 is dependent on claims 34 and 35, Petitioner's prior art references do render this claim obvious.

D. Claims 37 and 38

Petitioner's prior art references are generally silent regarding current supply circuits or PWM signals. Therefore, the references do not disclose claims 37 or 38. Further since claims 37 and 38 are dependent on claim 34, Petitioner's prior art references do render these claims obvious.

IX. CONCLUSION

For the reasons set forth herein, Patent Owner submits that proposed substitute claims 34-38 satisfy all of the statutory requirements for a motion to amend set forth in paragraphs (1) and (3) of 35 U.S.C. § 316(d) and paragraphs (a)(1), (a)(2), (a)(3), (b)(1) and (b)(2) of 37 C.F.R. § 42.121 and respectfully requests the Motion be granted contingent upon a finding that the challenged claims are unpatentable.

Respectfully Submitted,

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that the above-captioned Mandatory Notice was served on counsel of record for the Petitioner by filing this document through the Patent Review Processing System as well as by delivering a copy via electronic mail to:

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Dated November 5, 2024

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APPENDIX A

(Proposed Amendments)

34. (proposed substitute for claim 1) A lighting panel, comprising:

at least one first substrate on a surface of a first tile, the first substrate and the first tile together comprising a first metal core printed circuit board (MCPCB), the first substrate having a first side parallel to a principal plane of the lighting panel;
a first plurality of solid state lighting devices arranged on the first side of the first
at least one substrate and configured to emit light;

wherein the first plurality of solid state lighting devices are arranged on the
first side of the first substrate as a plurality of strings of solid state lighting
devices and each one of said plurality of strings comprises ones of the first
plurality of lighting devices connected in series with one another by a
plurality of metal traces formed on the first side of the first substrate;
a second substrate on a surface of a second tile, the second substrate and the
second tile together comprising a second MCPCB, the second substrate having a
first side parallel to the principal plane of the lighting panel;
a second plurality of solid state lighting devices arranged on the first side of the
second substrate and configured to emit light;

wherein the second plurality of solid state lighting devices are arranged on
the first side of the second substrate as a plurality of strings of solid state

lighting devices and each one of said plurality of strings comprises ones of
the second plurality of lighting devices connected in series with one another
by a plurality of metal traces formed on the first side of the second substrate;
wherein the first tile and the second tile are arranged horizontally across the
lighting panel;

a first reflector sheet mounted on the first side of the ~~at least one~~ first substrate and
not in contact with the first plurality of solid state lighting devices;

a second reflector sheet mounted on the first side of the second substrate and not in
contact with the second plurality of solid state lighting devices;

a brightness enhancement film on the reflector sheets, wherein the first and second
reflector sheets ~~is~~ are arranged between the first and second ~~at least one~~ substrates,
respectively, and the brightness enhancement film and the brightness enhancement
film is configured to preferentially emit light having a first orientation from the
lighting panel and to preferentially reflect light having a second orientation,
different from the first orientation, back into the lighting panel; and

a diffuser sheet between the first and second reflector sheets and the brightness
enhancement film, wherein the first and second reflector sheets, the diffuser sheet
and brightness enhancement film extend and are arranged parallel to the principal
plane of the lighting panel.

35. (proposed substitute for claim 2) The lighting panel of claim 1 ~~34, wherein the~~
~~reflector sheet is configured to reflect and disperse light incident thereon. further~~
comprising an optical reflective cavity in contact with the substrate and formed

around the solid state lighting elements, the optical reflective cavity having planar angled sidewalls;

wherein the optical reflective cavity is not in contact with solid state lighting elements.

36. (proposed substitute for claim 3) The lighting panel of claim 1 35, ~~wherein the reflector sheet includes a plurality of apertures therethrough, wherein respective ones of the plurality of apertures aligned with corresponding ones of the plurality of solid state lighting devices~~ wherein the diffuser sheet is in direct contact with the uppermost surface of the optical reflective cavity.

37. (proposed substitute for claim 4) The lighting panel of claim 1 34, ~~wherein the reflector sheet comprises a plastic foam~~ further comprising a plurality of current supply circuits that are operable to control a pulse width of a current supplied to each one of the plurality of strings of solid state lighting devices.

38. (proposed substitute for claim 5) The lighting panel of claim 1 34 ~~wherein the brightness enhancement film comprises a plurality of three dimensional light extraction features configured to bend at least some light rays passing through the brightness enhancement film toward the direction normal to the principal plane of the lighting panel~~ wherein the first and second plurality of strings arranged on each of the first and second substrate, respectively, are controlled by at least two current supply circuits.