

**IN THE UNITED STATES DISTRICT COURT  
FOR THE DISTRICT OF DELAWARE**

BENCH WALK LIGHTING LLC,

Plaintiff,

v.

OSRAM SYLVANIA INC.; OSRAM  
LICHT AG; OSRAM GMBH; OSRAM  
OPTO SEMICONDUCTORS GMBH  
& CO.; OSRAM OPTO  
SEMICONDUCTORS, INC.; LEDVANCE  
GMBH; LEDVANCE LLC; LED ENGIN,  
INC.

Defendants.

CIVIL ACTION NO. 18-cv-1732 (RGA)

JURY TRIAL DEMANDED

**FIRST AMENDED COMPLAINT**

Plaintiff Bench Walk Lighting LLC (“Plaintiff” or “BWL”), by and through its attorneys, brings the following First Amended Complaint (the “Complaint”) for patent infringement against OSRAM Sylvania, Inc.; OSRAM Licht AG; OSRAM GmbH; OSRAM Opto Semiconductors GmbH & Co.; OSRAM Opto Semiconductors, Inc.; LEDVANCE GmbH; LEDVANCE LLC; LED Engin, Inc. (“OSRAM” or collectively “Defendant” or “Defendants”), and demanding trial by jury, hereby alleges as follows:

**I. NATURE OF THE ACTION**

1. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 271, *et seq.*, to enjoin and obtain damages resulting from Defendants’ unauthorized use, sale, and offer to sell in the United States of products, methods, processes, services and/or systems that infringe Plaintiff’s United States patents, as described herein.

2. Defendants manufacture, provide, use, sell, offer for sale, imports, and/or distribute infringing products and services; and encourage others to use its products and services in an infringing manner, as set forth herein.

3. Plaintiff seeks past and future damages and prejudgment and post-judgment interest for Defendants' infringement of the Asserted Patents, as defined below.

## **II. PARTIES**

4. Plaintiff Bench Walk Lighting LLC is a limited liability company organized and existing under the laws of Delaware. Its principal place of business is 485 Lexington Avenue, 29th Floor, New York, NY 10017.

5. On information and belief, OSRAM Sylvania Inc. is a Delaware corporation, having its principal place of business at 100 Endicott Street, Danvers, Massachusetts 01923. Upon information and belief, OSRAM Sylvania Inc. is a subsidiary of OSRAM GmbH and sells and/or offers for sale in the United States LED products manufactured by it and/or OSRAM GmbH, including in the State of Delaware and in this judicial district. Defendant may be served via its registered agent for service of process: Corporation Creations Networks Inc., 3411 Silverside Road, Tatnall Building Ste. 104, Wilmington, DE 19810.

6. On information and belief, OSRAM Licht AG is a foreign corporation organized and existing under the laws of Germany with a principal place of business located at Marcel-Breuer-Straße 6, 80807 Munich, Germany. Upon information and belief, OSRAM Licht AG manufactures light-emitting diode ("LED") products and, through its subsidiaries, has sales offices in the United States. Defendant OSRAM Licht AG can be served with process in Germany pursuant to The Hague Convention on the Service Abroad of Judicial and Extrajudicial Documents, Article 1, November 15, 1965 T.I.A.S. No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969).

7. On information and belief, OSRAM GmbH (formerly OSRAM AG) is a foreign corporation organized and existing under the laws of Germany with a principal place of business located at Hellabrunner Straße 1, 81543 Munich, Germany, and is a subsidiary OSRAM Licht AG. Upon information and belief, OSRAM GmbH manufactures light-emitting diode (“LED”) products and, through its subsidiaries, Defendants OSRAM Opto Semiconductor GmbH & Co. and OSRAM Sylvania Inc., have sales offices in the United States. Defendant OSRAM GmbH can be served with process in Germany pursuant to The Hague Convention on the Service Abroad of Judicial and Extrajudicial Documents, Article 1, November 15, 1965 T.I.A.S. No. 6638, 20 U.S.T. 361 (U.S. Treaty 1969).

8. On information and belief, OSRAM Opto Semiconductor GmbH & Co. is a foreign corporation organized and existing under the laws of Germany with a principal place of business located at Leibnizstr 4, 93055 Regensburg, Germany. Upon information and belief, OSRAM Opto Semiconductor GmbH & Co. is a subsidiary of OSRAM GmbH and sells and/or offers for sale in the United States LED products manufactured by it and/or OSRAM GmbH, including in the State of Delaware and in this judicial district.

9. On information and belief, OSRAM Opto Semiconductors, Inc. is a Delaware corporation, having its principal place of business at 1150 Kifer Road Suite 100, Sunnyvale, CA 94086. Upon information and belief, Defendant OSRAM Opto Semiconductors, Inc. sells and/or offers for sale in the United States LED products manufactured by it and/or OSRAM GmbH, including in the State of Delaware and in this judicial district. Upon information and belief, Defendant may be served via its registered agent for service of process: Corporation Creations Networks Inc., 3411 Silverside Road, Tatnall Building Ste. 104, Wilmington, DE 19810.

10. On information and belief, LEDVANCE GmbH is a foreign corporation organized and existing under the laws of Germany with a principal place of business located at Leibnizstr 4, 93055 Regensburg, Germany. Upon information and belief, LEDVANCE GmbH is a subsidiary of OSRAM GmbH and sells and/or offers for sale in the United States LED products manufactured by it and/or OSRAM GmbH, including in the State of Delaware and in this judicial district.

11. On information and belief, LEDVANCE LLC is a Delaware limited liability company, having its principal place of business in Wilmington, Massachusetts. Upon information and belief, LEDVANCE LLC is a subsidiary of OSRAM GmbH and sells and/or offers for sale in the United States LED products manufactured by it and/or OSRAM GmbH, including in the State of Delaware and in this judicial district. Defendant may be served via its registered agent for service of process: Corporation Creations Networks Inc., 3411 Silverside Road, Tatnall Building Ste. 104, Wilmington, DE 19810.

12. On information and belief, LED Engin, Inc. is a Delaware Corporation, having its principal place of business at 651 River Oaks, Parkway San Jose, CA 95134. Upon information and belief, LED Engin, Inc. is a subsidiary of Osram Sylvania, Inc. and sells and/or offers for sale in the United States LED products manufactured by it and/or Osram Sylvania, Inc. including in the State of Delaware and in this judicial district. Defendant LED Engin, Inc. may be served via its registered agent for service of process: Incorporating Services, Ltd., 3500 S Dupont Highway, Dover, DE 19901.

13. On information and belief, the Defendant entities are related entities under the OSRAM brand and infringe the Asserted Patents by substantially the same products in the same way.

### **III. JURISDICTION AND VENUE**

14. This is an action for patent infringement which arises under the patent laws of the United States, in particular, 35 U.S.C. §§ 271, 281, 283, 284, and 285.

15. This Court has exclusive jurisdiction over the subject matter of this action under 28 U.S.C. §§ 1331 and 1338(a).

16. On information and belief, venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b), (c), and 1400(b) because, on information and belief, Defendants are foreign entities or have incorporated in this State; Defendants have transacted business in this judicial district and have committed acts within this judicial district giving rise to this action, directly and/or through subsidiaries; and/or Defendants have committed and/or induced acts of patent infringement in this Judicial District directly and/or through subsidiaries.

17. On information and belief, Defendants are subject to this Court's specific and general personal jurisdiction pursuant to due process and/or the Delaware Long Arm Statute, 10 *Del. C.* § 3104, due at least to Defendants' substantial business in this forum, directly or through subsidiaries, including: (i) at least a portion of the infringements alleged herein; and (ii) regularly doing or soliciting business, engaging in other persistent courses of conduct, and/or deriving substantial revenue from goods and services provided to individuals in Delaware and in this Judicial District.

18. Defendants directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others), have committed and continue to commit acts of infringement in this District by, among other things, making, using, importing, offering for sale, and/or selling products and/or services that infringe the patents-in-suit. Thus, Defendants have purposefully availed themselves of the benefits of doing business in the State of Delaware and the exercise of

jurisdiction over Defendants would not offend traditional notions of fair play and substantial justice.

#### **IV. FACTUAL BACKGROUND**

##### **BENCH WALK LIGHTING LLC**

19. BWL is the owner of the entire right, title, and interest of a portfolio of patents covering technologies used in Light-Emitting Diode (“LED”) products, including the patents-in-suit. The patent portfolio consists of 92 issued and pending patents from 70 patent families. The patent portfolio contains both U.S. and international issued and pending patents. Many of the patents in this portfolio were originally assigned to Agilent Technologies, Inc. and/or the successors of its LED business. Some patents of the portfolio were originally assigned to Avago Technologies Limited.

#### **V. COUNTS OF PATENT INFRINGEMENT**

20. Plaintiff alleges that Defendants have infringed and continue to infringe the following United States patents (collectively the “Asserted Patents”):

- U.S. patent 6,325,524 (the ’524 patent) (Exhibit A)
- U.S. patent 6,806,658 (the ’658 patent) (Exhibit B)
- U.S. patent 7,115,428 (the ’428 patent) (Exhibit C)
- U.S. patent 7,145,182 (the ’182 patent) (Exhibit D)
- U.S. patent 7,239,080 (the ’080 patent) (Exhibit E)
- U.S. patent 7,470,936 (the ’936 patent) (Exhibit F)
- U.S. patent 7,488,990 (the ’990 patent) (Exhibit G)
- U.S. patent 7,519,287 (the ’287 patent) (Exhibit H)
- U.S. patent 7,847,300 (the ’300 patent) (Exhibit I)
- U.S. patent 8,034,644 (the ’644 patent) (Exhibit J)
- U.S. patent 8,405,181 (the ’181 patent) (Exhibit K)
- U.S. patent 9,209,373 (the ’373 patent) (Exhibit L)
- U.S. patent 9,882,094 (the ’094 patent) (Exhibit M)
- U.S. patent 9,887,338 (the ’338 patent) (Exhibit N)

**COUNT ONE**  
**INFRINGEMENT OF U.S. PATENT 6,325,524**

21. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

22. The '524 Patent, entitled "SOLID STATE BASED ILLUMINATION SOURCE FOR A PROJECTION DISPLAY", was filed on January 29, 1999 and issued on December 4, 2001.

23. Plaintiff is the assignee and owner of all right, title and interest to the '524 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

24. The '524 Patent addresses technical problems in the prior art of LED devices. Specifically, the '524 Patent addresses the prior art problem that a "significant fraction of the light generated in an LED array is lost." (col. 1, ll. 33-34).

25. The '524 Patent addresses the prior art problem that "conventional LEDs emit light through the top, the bottom and the side facets." (col. 1, ll. 34-35). "If the LEDs are placed on a planar heat sink, the substrate and top surface of the LED act as an optical waveguide, guiding the light between neighboring LEDs. This waveguide effect transports a significant fraction of the light emitted through the side facets of the LEDs to the outer edge of the array. The light is attenuated during this transportation process and emitted at a place where it is only partially captured by the collimating optics." As shown in the exemplary prior art system in Fig. 1, "the light that finally reaches the edge of the LED array is typically traveling in a direction that is outside the acceptance angle of the optical system that collimates the light, and hence, even this light is effectively lost." (col. 2, ll. 39-42).

26. The '524 Patent provides several technical solutions to these problems to “provide an improved solid-state light source” and “to provide an improved solid-state light source that more efficiently captures the light leaving the side facets of the LEDs than prior art light sources.”

27. Specifically, the '524 Patent teaches multiple technical improvement, including using reflectors such that “light leaving the side surfaces of the LEDs is reflected into the acceptance angle of the optical system by a plurality of reflectors.” (col. 1, l. 67 – col. 2, l. 2). “The reflectors include a plurality of reflecting facets for reflecting light leaving the side surfaces of the LEDs. The facets may be part of the reflective base or separate objects located between the LEDs. In another embodiment of the invention, the reflectors include scattering centers located between the LEDs.” (col. 2, ll. 3-8).

28. The '524 Patent teaches that this problem can be overcome “by utilizing a non-planar reflecting heat sink.” (col. 2, ll. 43-45).

29. The '524 Patent further teaches that this problem can be overcome by utilizing a “transparent medium 55 that includes scattering particles as shown at 36. The scattering particles reflect the light traveling parallel to the surface of the heat sink. A significant fraction of the scattered light is reflected either directly into the acceptance aperture of the optical system or off the heat sink and then into the acceptance aperture of the optical system.” (col. 3, ll. 4-10).

30. The '524 Patent further teaches that this problem can be overcome by a device wherein “the area between the LEDs contains reflectors 46 that reflect the light leaving the sides of the LEDs into the acceptance aperture of the optical system.” (col. 3, ll. 19-22).

#### Direct Infringement

31. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the '524 Patent, either literally or



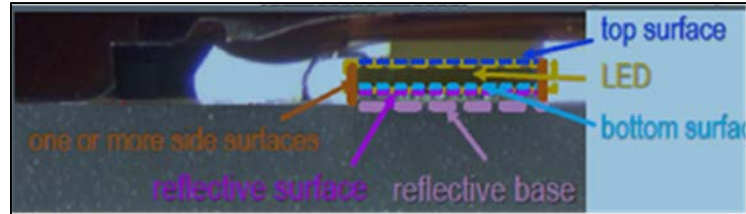
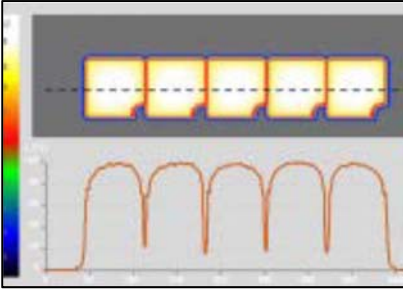
equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '524 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the OSTAR Headlamp Pro series and other substantially similar products (collectively the “'524 Accused Products”).

32. On information and belief, Defendants' OSTAR Headlamp Pro is a non-limiting example of a light source that meets all limitations of claim 1 of the '524 Patent either literally or equivalently.

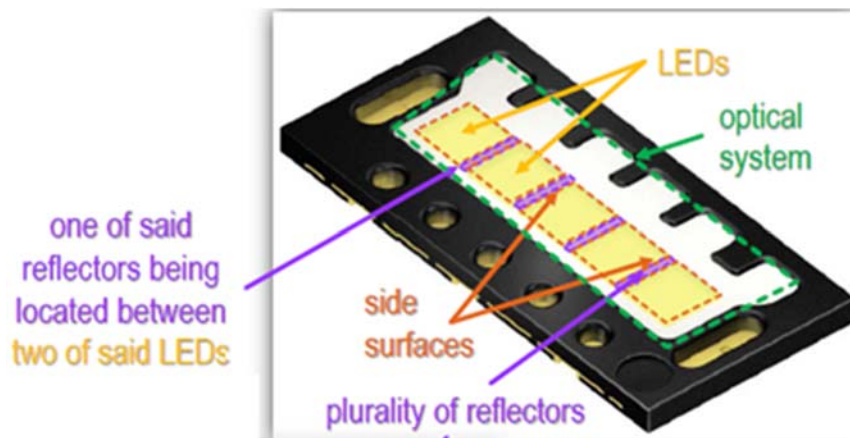
33. On information and belief, Defendants' OSTAR Headlamp Pro comprises a light source for generating light that is collected by an optical system, said optical system accepting light leaving said light source within a predetermined acceptance angle relative to an axis defined in relation to said optical system:



34. On information and belief, Defendants' OSTAR Headlamp Pro comprises a plurality of LEDs mounted on a reflective base, each of said LEDs generating light that leaves that LED via a top surface, a bottom surface, and one or more side surfaces of said LED, said reflective base having a reflective surface in contact with said bottom surface of each of said LEDs.



35. On information and belief, Defendants' OSTAR Headlamp Pro further comprises a plurality of reflectors for reflecting light leaving said side surfaces of said LEDs into said acceptance angle of said optical system, at least one of said reflectors being located between two of said LEDs.



#### Willful Infringement

36. Defendants have had actual knowledge of the '524 Patent at least as of service of Plaintiff's Original Complaint.

37. Defendants and/or closely-related affiliates have further had actual knowledge of the '524 Patent family, gained in its own prosecution activities.

38. Specifically, the prosecution of OSRAM's German patent application DE102007043904A1 cites European Patent Application EP1024398A1 of the '524 Patent family.

39. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '524 Patent.

40. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '524 Patent. Defendants have thus had actual notice of infringement of the '524 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

41. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

42. Defendants are knowingly inducing their customers and/or end users to directly infringe the '524 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

43. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '524 Patent. The '524 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '524 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '524 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '524 Accused Products in numerous infringing applications. In

addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

44. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT TWO**  
**INFRINGEMENT OF U.S. PATENT 6,806,658**

45. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

46. The '658 Patent, entitled "METHOD FOR MAKING AN LED," was filed on March 7, 2003 and issued on October 19, 2004.

47. Plaintiff is the assignee and owner of all right, title and interest to the '658 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

48. The '658 Patent addresses technical problems in the prior art of LED devices, including that a prior art manufacturing method "has a poor yield due to uneven phosphor dispersion in the reflecting cup," and that the "liquid casting epoxy tends to shrink during the heat curing process." (col. 1, ll. 31-41).

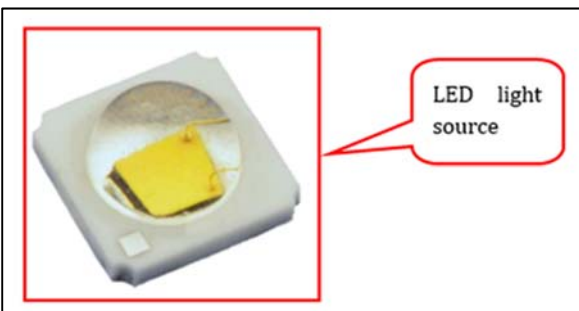
49. The '658 Patent provides a technical solution to the prior art problems by utilizing “a UV cured epoxy that sets in a very short period of time together with a thixotropic agent that retards the sedimentation of the phosphor particles.” (col. 2, ll. 2-4).

#### Direct Infringement

50. On information and belief, Defendants, without authorization or license from Plaintiff, have been and is presently directly infringing the '658 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a) and (g), including through making, using, (including for testing purposes), selling and offering for sale methods and articles and articles made by methods infringing one or more claims of the '658 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a) and (g). Exemplary infringing instrumentalities include the LZ1-00CW02, and all other substantially similar products (collectively the '658 Accused Products”).

51. On information and belief, Defendants' LZ1-00CW02 is a non-limiting example of a light source that meets all limitations of claims 3 and 4 of the '658 Patent, either literally or equivalently.

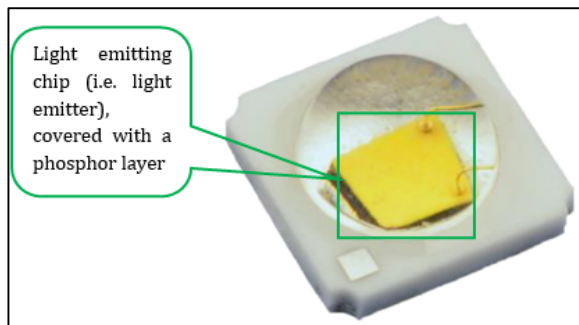
52. On information and belief, Defendants' LZ1-00CW02 comprises a light emitter that emits light of a first wavelength:



Base part number	
Part number	Description
LZ1-00CW02-xxxx	LZ1 emitter
LZ1-10CW02-xxxx	LZ1 emitter on Standard Star MCPCB

Light Emitter

53. On information and belief, Defendants' LZ1-00CW02 comprises a phosphor layer covering said light emitter:



#### Description

The LZ1-00CW02 Cool White LED emitter provides 315 lumens at 3.2W power dissipation in an extremely small package. With a 4.4mm x 4.4mm footprint, this package provides exceptional luminous flux density. LED Engin's patent-pending thermally insulated phosphor layer provides a spatially uniform color across the radiation pattern and a consistent CCT over time and temperature. The high quality materials used in the package are chosen to optimize light output and minimize stresses which results in monumental reliability and lumen maintenance. The robust product design thrives in outdoor applications with high ambient temperatures and high humidity.

54. On information and belief, Defendants' LZ1-00CW02 comprises a phosphor layer converting a portion of said light emitter of said first wavelength to light of a second wavelength.

#### Description

The LZ1-00CW02 Cool White LED emitter provides 315 lumens at 3.2W power dissipation in an extremely small package. With a 4.4mm x 4.4mm footprint, this package provides exceptional luminous flux density. LED Engin's patent-pending thermally insulated phosphor layer provides a spatially uniform color across the radiation pattern and a consistent CCT over time and temperature. The high quality materials used in the package are chosen to optimize light output and minimize stresses which results in monumental reliability and lumen maintenance. The robust product design thrives in outdoor applications with high ambient temperatures and high humidity.

55. On information and belief, Defendants' LZ1-00CW02 comprises a phosphor layer of a powdered phosphor suspended in a photo-curable medium that sets upon exposure to light of a curing wavelength.

56. On information and belief, Defendants' LZ1-00CW02 comprises a phosphor layer wherein said photo-curable medium sets in a time less than that required for a change in concentration of said phosphor in said phosphor layer over said LED of more than 0.5 percent.

#### Willful Infringement

57. Defendants have had actual knowledge of the '658 Patent at least as of service of Plaintiff's Original Complaint.

58. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor of the '658 Patent.

59. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '658 Patent. Defendants have thus had actual notice of infringement of the '658 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

60. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

61. Defendants are knowingly inducing their customers and/or end users to directly infringe the '658 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

62. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other

forms of support that induce their customers and/or end users to directly infringe the '658 Patent. The '658 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '658 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '658 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '658 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

63. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT THREE**  
**INFRINGEMENT OF U.S. PATENT 7,115,428**

64. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

65. The '428 Patent, entitled "METHOD FOR FABRICATING LIGHT-EMITTING DEVICES UTILIZING A PHOTO-CURABLE EPOXY," was filed on March 7, 2005 and issued on October 3, 2006.

66. Plaintiff is the assignee and owner of all right, title and interest to the '428 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.



### Technical Description

67. The '428 Patent addresses technical problems in the prior art of LED devices, including that a prior art manufacturing method “has a poor yield due to uneven phosphor dispersion in the reflecting cup.” (col. 1, ll. 37-38).

68. The '428 Patent further addresses a technical problem in the prior art of LED devices, where “the viscous epoxy-phosphor layer will slump during this time interval [between depositing it and curing it in an oven], and hence, the amount of material over the various chips will vary depending on the point in time that each device was covered.” (col. 2, ll. 44-48).

69. The '428 Patent further addresses a technical problem in the prior art of LED devices, where “the amount of epoxy-phosphor mixture needed per device is relatively large, since the areas to the side of LED 140 must also be filled with the mixture.” (col. 2, ll. 60-62).

70. The '428 Patent provides a technical solution to the prior art problems by utilizing “a mixture of photocurable epoxy and phosphor particles” such that “the dispensed mixture is then irradiated with light to cure the epoxy in a time period that is less than the time period in which the phosphor particles settle.” (col. 1, ll. 52-57).

71. The '428 Patent provides a further technical solution to the prior art problems by “including a reflective cup or some other structure that acts as a mold to define the thickness of the epoxy layer.” (col. 2, ll. 49-50).

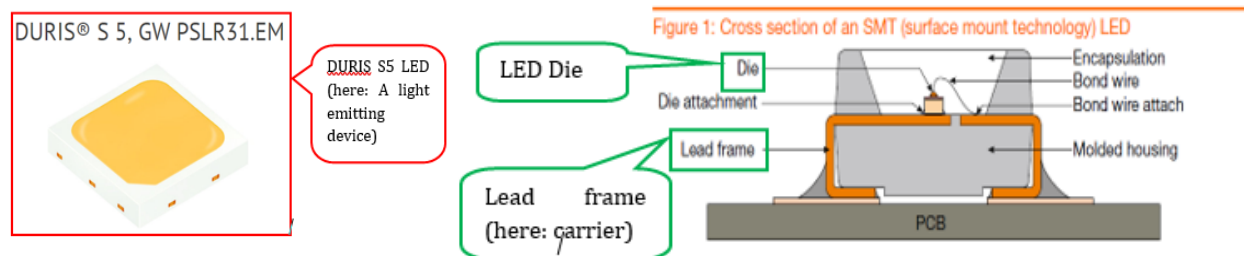
### Direct Infringement

72. On information and belief, Defendants, without authorization or license from Plaintiff, have been and is presently directly infringing the '428 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(g), including through making, using, (including for testing purposes), selling and offering for sale articles made by methods infringing one or more claims of the '428 Patent. Defendants are thus liable for direct infringement

pursuant to 35 U.S.C. § 271(g). Exemplary infringing instrumentalities include the Duris S5 White LED Series, and all substantially similar products (collectively the “’428 Accused Products”).

73. On information and belief, Defendants’ Duris S5 White LED is a non-limiting example of a light source that meets all limitations of claim 1 of the ’428 Patent, either literally or equivalently.

74. On information and belief, Defendants’ Duris S5 White LED is manufactured using a method for fabricating a light emitting device comprising mounting a die comprising a semiconductor light emitting device on a carrier, said die having a face through which light is emitted.

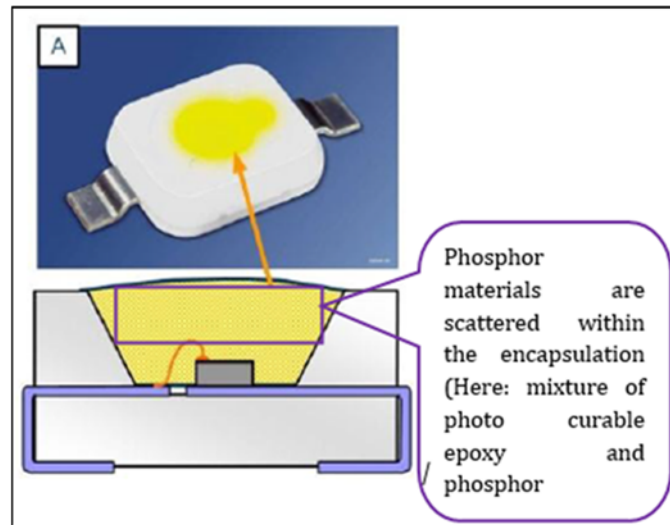


75. On information and belief, the method further comprises dispensing a bead of a mixture of photo curable epoxy and phosphor particles on said face in a pattern that covers said face.

Encapsulations protect the LED chip and lead frame against certain external stress or act as a lens to direct the light beam. Materials ranging from epoxy, epoxy/silicone hybrid, silicone to glass are typically incorporated into the LED devices. The guideline for choosing an encapsulation material for a particular application is mainly based on the material's thermal stability, transmission performance, gas/humidity permeability and refractive index match with the LED packages.

Figure 7 shows two versions of white LED packages, where a blue chip is combined with (yellow) phosphors to generate the desired hue. To tune the color temperature, more or less yellow phosphor can be adjusted or a mixture of yellow and red phosphors can be utilized. The phosphor materials are either dispersed within the bulk encapsulation material or formulated as a conversion layer attached to the chip surface. For color-on-demand LED packages, special phosphor mixtures (e.g., green, red and/or yellow phosphors) can be tailored to meet almost all color requests.

76. On information and belief, the method further comprises irradiating said dispensed mixture in a time period that is less than the time period in which said phosphor particles settle wherein said time period is less than 1 second.



### Willful Infringement

77. Defendants have had actual knowledge of the '428 Patent at least as of service of Plaintiff's Original Complaint.

78. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents to the Asserted Patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '428 Patent.

79. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '428 Patent. Defendants have thus had actual notice of infringement of the '428 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

80. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

81. Defendants are knowingly inducing their customers and/or end users to directly infringe the '428 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

82. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '428 Patent. The '428 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '428 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '428 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '428 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

83. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT FOUR**  
**INFRINGEMENT OF U.S. PATENT 7,145,182**

84. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

85. The '182 Patent, entitled "INTEGRATED EMITTER DEVICES HAVING BEAM DIVERGENCE REDUCING ENCAPSULATION LAYER," was filed on September 12, 2003 and issued on December 5, 2006.

86. Plaintiff is the assignee and owner of all right, title and interest to the '182 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

87. The '182 Patent addresses technical problems in the prior art of LED devices, causing inaccurate assembly methodology with a relatively costly machining process.

88. Specifically, the '182 Patent addresses the prior art problem that:

LED devices manufactured according to printed circuit board machining suffer from a number of disadvantages. The assembly methodology is inaccurate due to inability to control the dimension, depth, and position of the recess with a relatively high degree of accuracy. Furthermore, the printed circuit board machining process is relatively costly. Specifically, the necessity of a special purpose drill with a precise shape for the recess and a high reject rate contributes to relatively high cost associated with this fabrication technique. Further, the machining process only creates a circular shape thereby limiting the viewing angle. The reflective metal layer deposited on the recess does not have suitable adhesive strength with the transparent epoxy that is used to encapsulate the die and provide a lens. The lack of adhesive strength may result in de-lamination between the epoxy and the surface reflector when the epoxy shrinks after curing, during high temperature operation, and/or the like. The de-lamination may result in lifted LED die and other problems. (col. 1, ll. 27-45).

89. The '182 Patent provides a technical solution to these problems, by teaching a method to “form cups of epoxy or other suitable material to receive an emitter where the cups are formed on a flat printed circuit board or other suitable substrate. Transfer molding may be utilized to form the cups that will each receive an emitter. Wire bonding is performed to provide a signal path to each emitter. Transfer molding is performed to provide a lens and an encapsulation structure for each emitter.” (col. 1, ll. 51-56).

90. The technical solution of the '182 Patent results in the following advantages over the prior art: “The fabrication process may occur in a less expensive manner than known fabrication processes. Moreover, the bonding of the material forming the cup to the material forming the encapsulation structure is improved relative to known designs. Also, a range of viewing angles of the integrated emitter device is enabled by suitably shaping the cup and/or the encapsulation layer.” (col. 1, ll. 57-64).

#### Direct Infringement

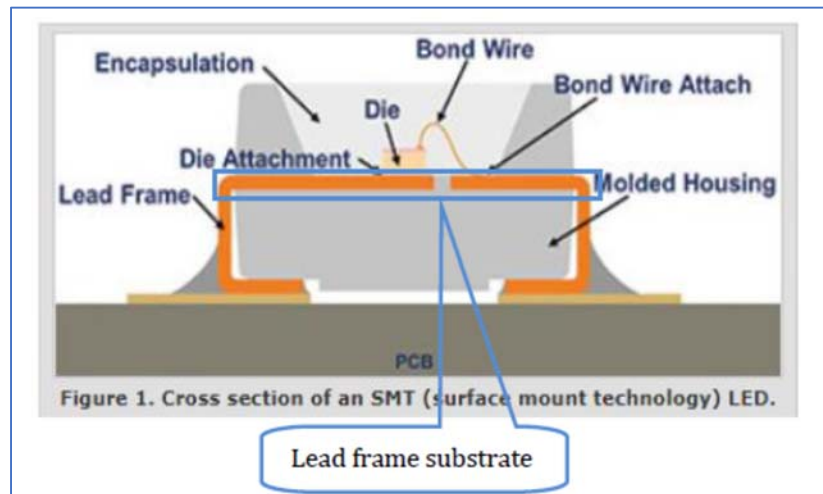
91. On information and belief, Defendants, without authorization or license from Plaintiff, has been and is presently directly infringing the '182 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '182 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the, LV W5AM and other substantially similar products (collectively the “'182 Accused Products”).

92. On information and belief, Defendants' LV W5AM (Golden Dragon Plus) is a non-limiting example of a light source that meets all limitations of at least claim 1 of the '182 Patent, either literally or equivalently.

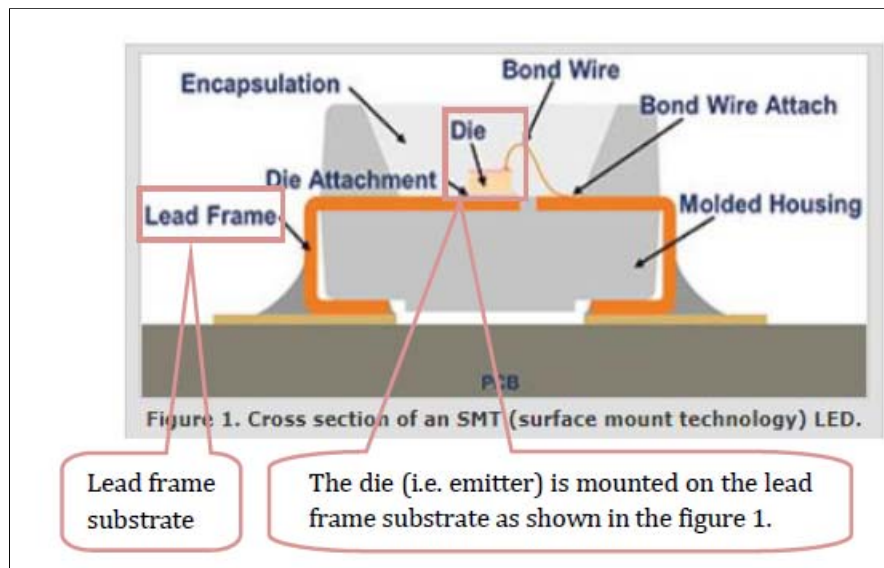
93. On information and belief, Defendants' LV W5AM is an integrated optical emitter device.



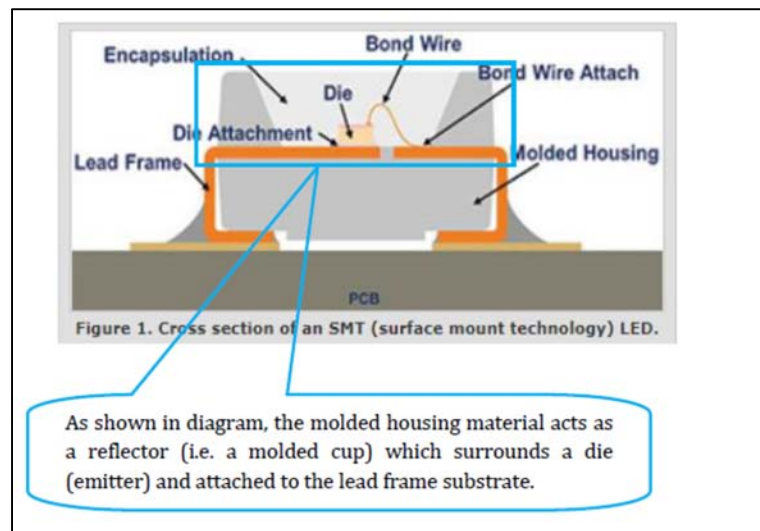
94. On information and belief, Defendants' LV W5AM comprises a substrate.



95. On information and belief, Defendants' LV W5AM comprises an emitter mounted to said substrate.

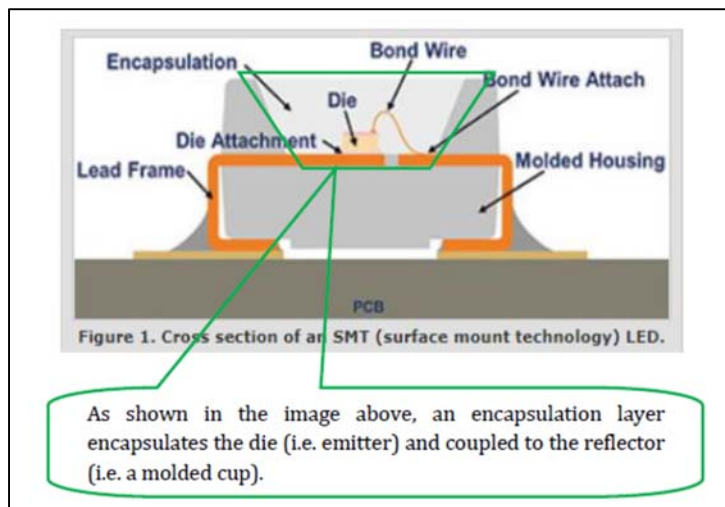


96. On information and belief, Defendants' LV W5AM comprises a molded cup that surrounds said emitter and that is bonded to said substrate.





97. On information and belief, Defendants' LV W5AM comprises a molded encapsulation layer that encapsulates said emitter and that is bonded to said molded cup.



98. On information and belief, Defendants' LV W5AM comprises a molded encapsulation layer wherein said molded encapsulation layer is shaped to direct light emitted by said emitter such that the molded encapsulation layer reduces a difference in beam divergence between a fast-axis and a slow-axis of said emitter.

#### Willful Infringement

99. Defendants have had actual knowledge of the '182 Patent at least as of service of Plaintiff's Original Complaint.

100. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '182 Patent.

101. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '182 Patent. Defendants have thus had actual notice of

infringement of the '182 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

102. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

103. Defendants are knowingly inducing their customers and/or end users to directly infringe the '182 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

104. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '182 Patent. The '182 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '182 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '182 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '182 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

105. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which,

by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT FIVE**  
**INFRINGEMENT OF U.S. PATENT 7,239,080**

106. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

107. The '080 Patent, entitled "LED DISPLAY WITH OVERLAY," was filed on March 11, 2004 and issued on July 3, 2007.

108. Plaintiff is the assignee and owner of all right, title and interest to the '080 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

109. The '080 Patent addresses technical problems in the prior art of LED devices, including that "known multi-LED devices have difficulty maintaining color consistency." (col. 1, ll. 18-19).

110. Specifically, the '080 Patent illustrates a prior art problem in Fig. 2, in which an arrangement of multiple LED cavities, where "each of the cavities may not have the same dimensions. Therefore, the quantity of the phosphor particles and their dispersion within each cavity may be different and cause color variation among the cavities." (col. 2, ll. 30-33).

111. The '080 Patent provides a technical solution to these problems, by teaching the use of an encapsulant and a fluorescent material overlay. The overlay can cover a single LED cavity or multiple LED cavities.

112. Regarding the overlay, the '080 Patent teaches that it has technical advantages over the prior art problems:

By having a substantially consistent thickness, the proportion of the LED radiation that is converted to the fluorescent material radiation is kept generally constant, and, for each LED 300 and associated cavity 340, the amount of the LED radiation absorbed by the fluorescent material overlay 360 will be substantially the same, even if the sizes of the cavities 340 are different. (col. 3, l. 65 – col. 4, l. 4).

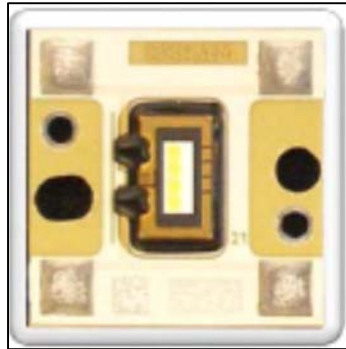
113. The '080 Patent further teaches numerous variations of the composition and construction of the fluorescent particles in the overlay, providing numerous advantages of the prior art problem, including options such that “only a portion of the overlay includes fluorescent material,” that “the amount of fluorescent material in the fluorescent material overlay 360 may be substantially independent from the volume of the cavity 340,” or that “the encapsulant does not affect the resulting color of the LED display.” (col. 3, ll. 8-27).

#### Direct Infringement

114. On information and belief, Defendants, without authorization or license from Plaintiff, have been and is presently directly infringing the '080 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '080 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the OSRAM's Ostar Headlamp Pro – LE UW U1A4 and all other substantially similar products (collectively the “'080 Accused Products”).

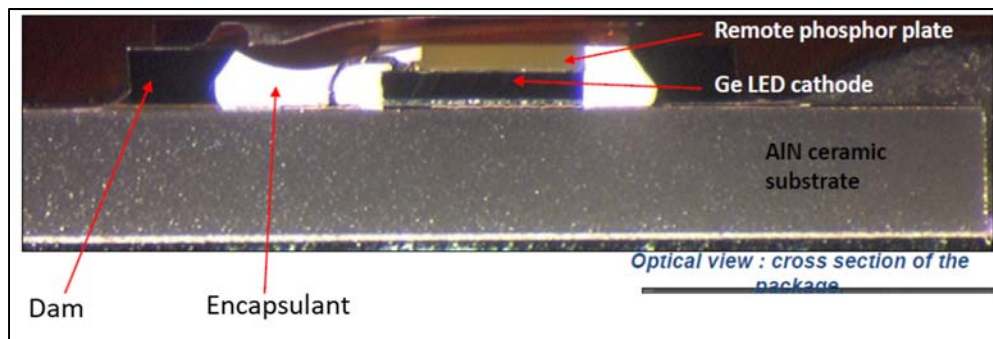
115. On information and belief, Defendants' LE UW U1A4 is a non-limiting example of a light source that meets all limitations of claim 1 of the '080 Patent, either literally or equivalently.

116. On information and belief, Defendants' LE UW U1A4 is a light emitting diode (LED) display device.



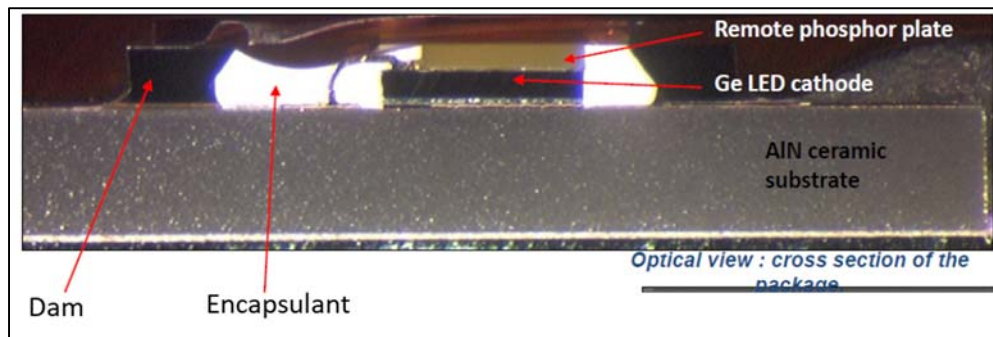
**OSRAM OSTAR: Automotive Headlamp Pro**

117. On information and belief, Defendants' LE UW U1A4 comprises a substrate.

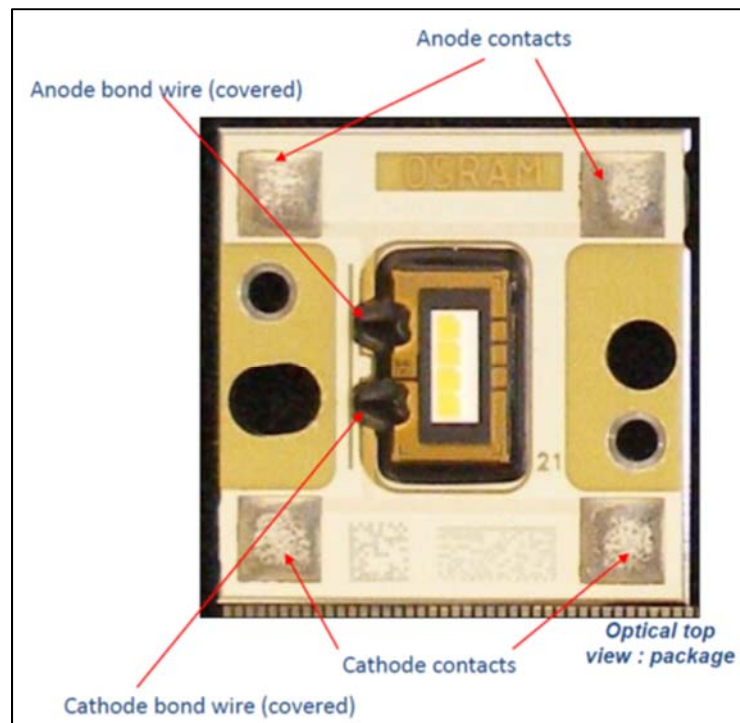


118. On information and belief, Defendants' LE UW U1A4 comprises a plurality of walls disposed on the substrate, the plurality of walls forming a cavity, the cavity being filled

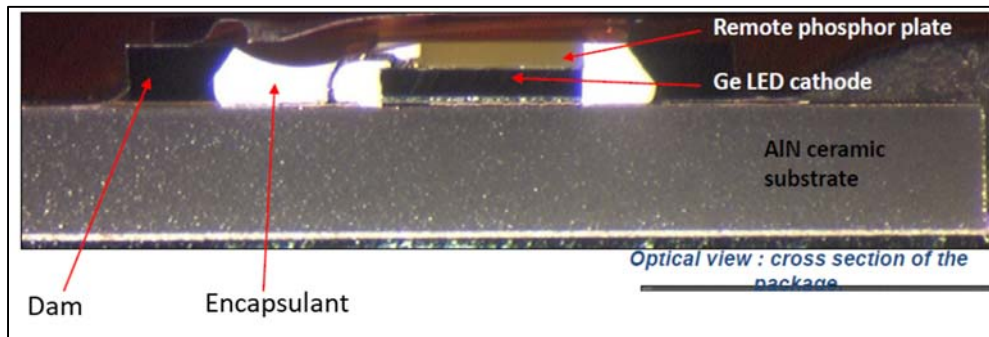
with an encapsulant, the encapsulant not including fluorescent material and an LED disposed on a first portion of the substrate within the cavity..



119. On information and belief, Defendants' LE UW U1A4 comprises an electrical connection between the LED and a second portion of the substrate.



120. On information and belief, Defendants' LE UW U1A4 comprises a fluorescent material overlay at a top end of the cavity, wherein the fluorescent material overlay has a thickness that substantially fully converts all light emitted from the LED to fluorescent radiation.



### Willful Infringement

121. Defendants have had actual knowledge of the '080 Patent at least as of service of Plaintiff's Original Complaint.

122. Defendants and/or closely-related affiliates have had actual knowledge of the '080 Patent, gained in its own prosecution activities.

123. Specifically, the prosecution of OSRAM's U.S. patent US 9,212,788 cites the '080 Patent family.

124. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '080 Patent.

125. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '080 Patent. Defendants have thus had actual notice of

infringement of the '080 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

126. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

127. Defendants are knowingly inducing their customers and/or end users to directly infringe the '080 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

128. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '080 Patent. The '080 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '080 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '080 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '080 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

129. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which,



by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT SIX**  
**INFRINGEMENT OF U.S. PATENT 7,470,936**

130. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

131. The '936 Patent, entitled "LIGHT EMITTING DIODE WITH A STEP SECTION BETWEEN THE BASE AND THE LENS OF THE DIODE," was filed on March 9, 2007 and issued on December 30, 2008.

132. Plaintiff is the assignee and owner of all right, title and interest to the '936 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

133. The '936 Patent addresses technical problems in the prior art of LED devices, resulting from prior art process where "black resin material is generally provided in the gaps among the LEDs 100 in order to prevent reduction in contrast due to reflection of light from the base 40." (col. 1, ll. 24-27).

134. The '936 Patent teaches an LED that solves prior art problems, "such as reduced contrast and a narrower viewing angle." (col. 1, ll. 49-50).

135. Specifically, the '936 Patent addresses the prior art problem that:

In general, when resin material is injected into the gaps among a plurality of arranged LEDs, it is difficult to check that a desired amount of resin material (or the amount that provides an appropriate height) has been injected. In particular, if the resin material comes into contact with the convex lens (light emitting surface) when the resin material is injected, the surface tension of the resin material shapes the surface of the resin material into a meniscus at the portion where the resin material is in contact with the lens, as shown in FIG. 6. Then, the resin material 110 may cover the lens SO, which is the light emitting surface, in such a way that the height of the resin material is higher than the desired height. In this case, light

emitted from the lens will be absorbed by the resin material, resulting in reduced contrast and a narrower viewing angle. (col. 1, ll. 36-50).

136. The '936 Patent provides several technical solutions to this problem, and “allows resin material to be easily filled when the resin material is used to cover a base of an LED with a lens having a hemispherical light emitting surface.” (col. 1, ll. 58-61).

137. Specifically, the '936 Patent provides a technical solution to address these prior art problems by using a “step section which is provided around the outside of the lens having a hemispherical light emitting surface and which projects from the base prevents the resin material from being in direct contact with the lens. The height of the step section defines the amount of the resin material enough for reliably covering the lead section and the base of the LEDs.” (col. 2, ll. 38-44).

138. The '936 Patent further provides a technical solution to address these prior art problems by including a cutout in the step section where “the cutout provided in the step section allows the operator to easily check that the amount of the resin material being injected is approaching a predetermined level. In this way, an appropriate amount of resin material can easily be injected, so that there is provided an LED that solves problems, such as reduced contrast and a narrower viewing angle.” (col. 2, ll. 44-50).

139. The '936 Patent provides a technical solution to these problems where “a plurality of the LEDs described above can be used to provide an LED display device with increased contrast and a wider viewing angle usable as an outdoor display.”

#### Direct Infringement

140. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the '936 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using,

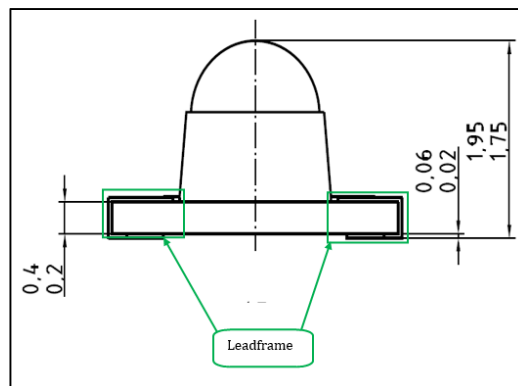
(including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '936 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the SFH 4059SR High Power Infrared Emitter and all substantially similar products (collectively the “'936 Accused Products”).

141. On information and belief, Defendants' SFH 4059SR is a non-limiting example of a light source that meets all limitations of claim 1 of the '936 Patent, either literally or equivalently.

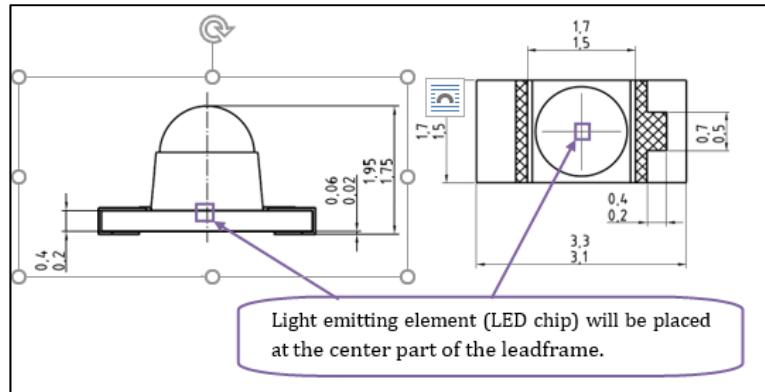
142. On information and belief, Defendants' SFH 4059SR is a light emitting diode.



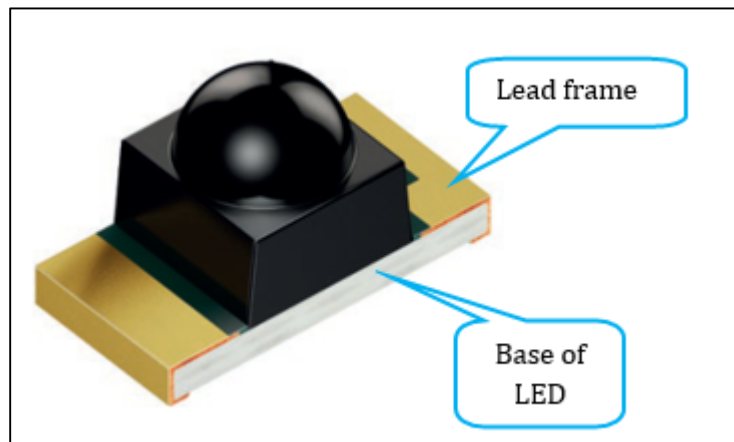
143. On information and belief, Defendants' SFH 4059SR comprises a leadframe.



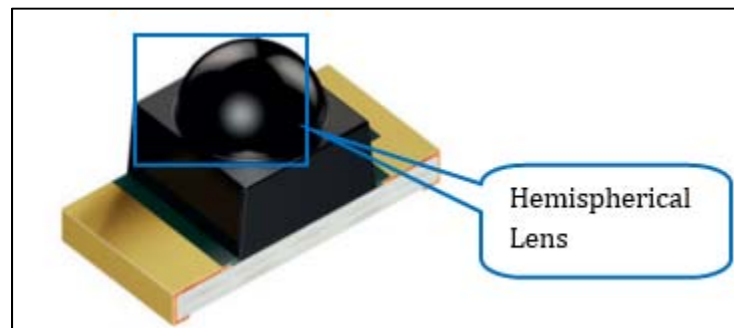
144. On information and belief, Defendants' SFH 4059SR comprises a light emitting element positioned on the leadframe.



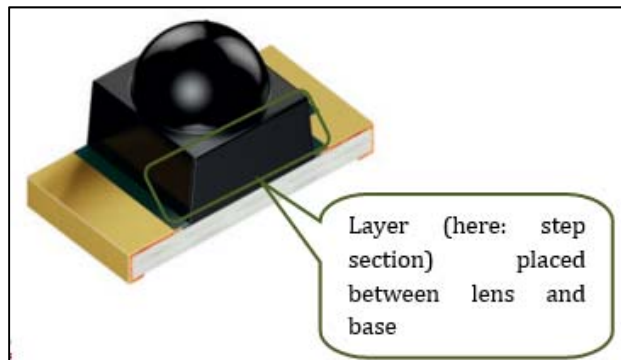
145. On information and belief, Defendants' SFH 4059SR comprises a base configured to cover the leadframe such that portions of the leadframe extend from the base.



146. On information and belief, Defendants' SFH 4059SR comprises a lens disposed on the base, the lens having a hemispherical light emitting surface.



147. On information and belief, Defendants' SFH 4059SR comprises a step section disposed between the base and the lens, the step section having a diameter larger than that of the lens and smaller than a length or a width of the base.



#### Willful Infringement

148. Defendants have had actual knowledge of the '936 Patent at least as of service of Plaintiff's Original Complaint.

149. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '936 Patent.

150. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '936 Patent. Defendants have thus had actual notice of infringement of the '936 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

151. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

### Indirect Infringement

152. Defendants are knowingly inducing their customers and/or end users to directly infringe the '936 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

153. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '936 Patent. The '936 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '936 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '936 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '936 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

154. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

### **COUNT SEVEN** **INFRINGEMENT OF U.S. PATENT 7,488,990**

155. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

156. The '990 Patent, entitled "USING MULTIPLE TYPES OF PHOSPHOR IN COMBINATION WITH A LIGHT EMITTING DEVICE," was filed on April 2, 2004 and issued on February 10, 2009.

157. Plaintiff is the assignee and owner of all right, title and interest to the '990 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

#### Technical Description

158. The '990 Patent addresses technical problems in the prior art of LED devices relating to limitations regarding "colors that can be achieved by such a combination of blue light with a single-color phosphor. For example, yellowish green and greenish-white colors cannot be produced by a known combination of a blue LED light and a single-color phosphor." (col. 1, ll. 25-29).

159. The '990 Patent addresses these technical problems in the prior art of LED devices by teaching the use of "multiple types of phosphor in combination with a light emitting device." (col. 1, ll. 8-10).

160. The technical solution of the '990 Patent results in advantages over the prior art, including that: "by adjusting the mixture and ratio of green phosphor and yellow phosphor, a wide variety of colors in this color spectrum can be obtained." (col. 2, ll. 23-25).

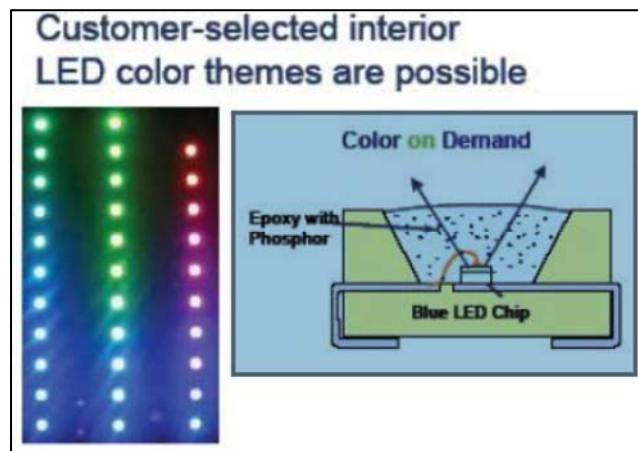
#### Direct Infringement

161. On information and belief, Defendants, without authorization or license from Plaintiff, has been and is presently directly infringing the '990 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '990 Patent. Defendants are thus liable for direct infringement pursuant to

35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the OSRAM Color on Demand technology LEDs, and all other substantially similar products (collectively the “’990 Accused Products”).

162. On information and belief, Defendants’ Color on Demand technology is a non-limiting example of a light source that meets all limitations of claim 12 of the ’990 Patent, either literally or equivalently.

163. On information and belief, Defendants’ Color on Demand technology comprises a light generating device.

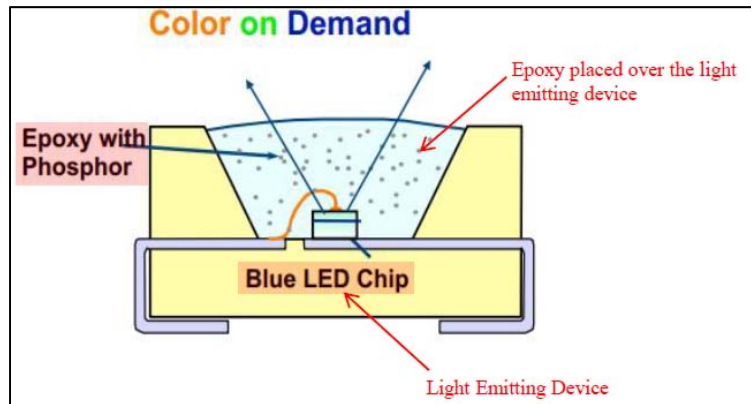


164. On information and belief, Defendants’ Color on Demand technology comprises a blue light emitting device that emits blue light with peak wavelength within a range from 460 nanometers (nm) to 480 nm.

OSRAM, in effect, changed the few black and white interior color choices into a full spectrum of technicolor and white LEDs. This innovation was based on OSRAM's application of blue LED light to "excite," or activate yellow phosphor materials, while later adding red and green phosphor materials to the mix.



165. On information and belief, Defendants' Color on Demand technology comprises an epoxy placed over the light emitting device.



166. On information and belief, Defendants' Color on Demand technology comprises an epoxy including a first type of phosphor and a second type of phosphor.

**What is the technology behind Color on Demand?**  
A CoD LED consists of a blue indium gallium nitride chip (InGaN) and red, yellow or green phosphors in the encapsulation material. A special mixing process ensures that the phosphors are evenly distributed in the encapsulation material and provide homogeneous light in their excited state. The blue light of the chip causes the relevant phosphors to emit light. The mixture of the blue light and the light from the evenly distributed phosphors produces the required LED color. By carefully selecting the material for the phosphor it is possible to generate customer-specific colours and fine shades that have not been available before. CoD technology is used in surface mountable components such as TOPLED and PowerTOPLED. Miniature formats such as the SmartLED are also suitable for CoD. OSRAM's semiconductor specialists have taken new active phosphor materials and special mixing processes and developed an electronic LED color box that can produce individual customer colors and lighting solutions for special brand products.

167. On information and belief, Defendants' Color on Demand technology comprises an epoxy wherein the first type of phosphor, when excited, emits green light; and, wherein the second type of phosphor, when excited, emits yellow light.

OSRAM, in effect, changed the few black and white interior color choices into a full spectrum of technicolor and white LEDs. This innovation was based on OSRAM's application of blue LED light to "excite," or activate yellow phosphor materials, while later adding red and green phosphor materials to the mix.

### Willful Infringement

168. Defendants have had actual knowledge of the '990 Patent at least as of service of Plaintiff's Original Complaint.

169. Defendants and/or closely-related affiliates have had actual knowledge of the '990 Patent, gained in its own prosecution activities.

170. Specifically, the prosecution of OSRAM's German patent application DE102011106478A1 cites U.S. patent application 20090122515 of the '990 patent family.

171. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '990 Patent.

172. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '990 Patent. Defendants have thus had actual notice of infringement of the '990 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

173. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

### Indirect Infringement

174. Defendants are knowingly inducing their customers and/or end users to directly infringe the '990 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

175. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '990 Patent. The '990 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '990 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '990 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '990 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

176. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT EIGHT**  
**INFRINGEMENT OF U.S. PATENT 7,519,287**

177. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

178. The '287 Patent, entitled "ELECTRONIC FLASH, IMAGING DEVICE AND METHOD FOR PRODUCING A FLASH OF LIGHT HAVING A RECTANGULAR RADIATION PATTERN," was filed on August 19, 2005 and issued on April 14, 2009.

179. Plaintiff is the assignee and owner of all right, title and interest to the '287 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

#### Technical Description

180. The '287 Patent addresses technical problems in the prior art of LED devices, wherein “a significant portion of the emitted light from the conventional LED flashes is not used when capturing an image of a scene of interest.” (col. 1, ll. 37-39).

181. Specifically, the '287 Patent addresses technical problems in the prior art, illustrated in Fig. 1, that “the radiation pattern 10 of flashes of light produced by the LED flashes is round or oval. However, the imaging field of view 12 of a camera is rectangular. Since the imaging field of view 12 needs to be within the radiation field 10, a significant portion of the emitted light from the conventional LED flashes is not used when capturing an image of a scene of interest.” (col. 1, ll. 32-38).

182. Accordingly, the '287 Patent teaches a technical solution to these prior art problems, including “an LED flash and method for producing a flash of light that allows the flash of light to be used efficiently by an imaging device, such as a digital camera.” (col. 1, ll. 42-45).

183. Specifically, the teachings of the '287 Patent include an LED design wherein “an electronic flash, imaging device and method for producing flashes of light uses a diffractive optical element to produce a flash of light having a rectangular radiation pattern.” (col. 1, ll. 49-51). Since “the image sensor is configured to electronically capture an image of a scene of interest using the flash of light having the rectangular radiation pattern,” (col. 2, ll. 12-15), the portion of the emitted light from the LED flash is improved.

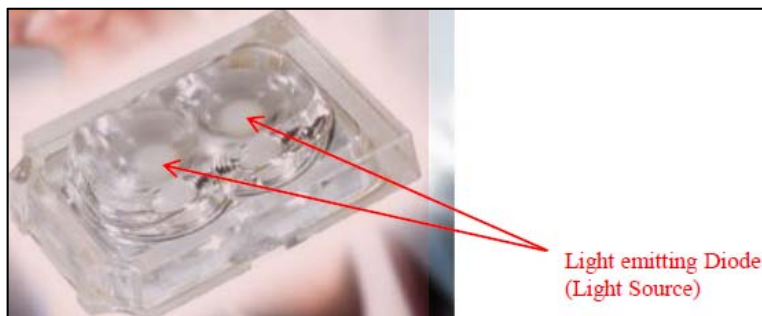
## Direct Infringement

184. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing claim 16 and 17 of the '287 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a) and (g), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '287 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a) and (g). Exemplary infringing instrumentalities include the OSLUX LEDs (LUW F65G) and other substantially similar products (collectively the "'287 Accused Products").

185. On information and belief, Defendants' OSLUX LED is a non-limiting example of a light source that meets all limitations of claim 16 of the '287 Patent, either literally or equivalently.

186. On information and belief, Defendants' OSLUX LED is an electronic flash for producing flashes of light and is used as flash LED in smart phones.

187. On information and belief, Defendants' OSLUX LED comprises a light source, said light source being configured to emit light.



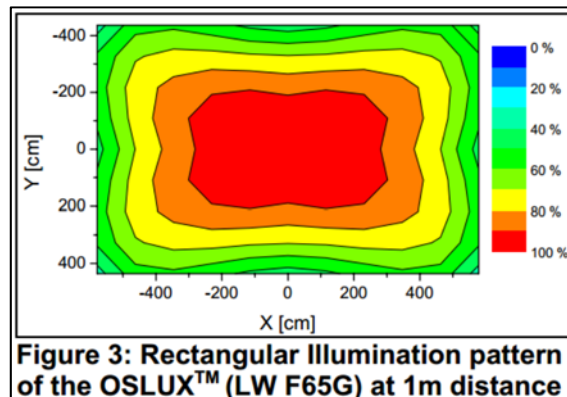
188. On information and belief, Defendants' OSLUX LED comprises a diffractive optical element optically coupled to said light source, said diffractive optical element being configured to diffract said light emitted from said light source such that the radiation pattern of

said light emitted from said diffractive optical element is rectangular to produce a flash of light having a rectangular radiation pattern.

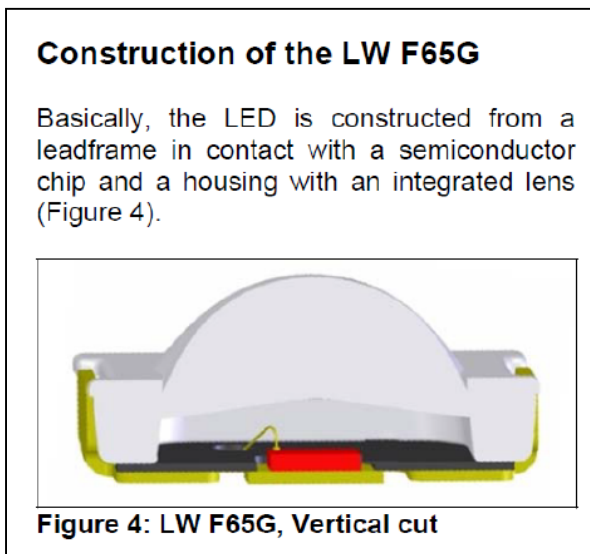
The LED is available in two versions with different lenses. These are already integrated in the LED and are matched to the beam characteristics of the top-emitting UX:3 chips. The subject of the picture is illuminated in a uniform rectangular pattern. The distribution of the light depends on the lens used: 40% or 20% of the center brightness is possible in the corners. At a distance of one meter the LED flash uniformly illuminates a diagonal of 90 cm, which is sufficient to produce razor-sharp pictures even in low light conditions.

### Consistently bright

Thanks to UX:3 chip technology, the Oslux LED provides very consistent illumination for photos. Even at a distance of 1 m a brightness level of 150 lux is achieved. When flashing, the light is evenly distributed and shines into the corners of the rectangular illuminated image. This means no round spot is generated in the center as might occur in conventional flashing. As all the elements of the flash are combined in a single component, the Oslux LED is also easily integrated. Thanks to its compact design, the LED is exceptionally durable and resistant to shocks and vibrations – and its power means it can manage even multiple repeated flashes.



189. On information and belief, Defendants' OSLUX LED comprises and integrated lens that focuses the light to narrow the viewing angle prior to the light being diffracted by the diffractive optical element.



#### Willful Infringement

190. Defendants have had actual knowledge of the '287 Patent at least as of service of Plaintiff's Original Complaint.

191. Defendants and/or closely-related affiliates have had actual knowledge of the '287 Patent, gained in its own prosecution activities.

192. Specifically, the prosecution of OSRAM's German patent application DE102013217967A1 cites the '287 Patent family.

193. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '287 Patent.

194. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '287 Patent. Defendants have thus had actual notice of infringement of the '287 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

195. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

196. Defendants are knowingly inducing their customers and/or end users to directly infringe the '287 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

197. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '287 Patent. The '287 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '287 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '287 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '287 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.



198. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT NINE**  
**INFRINGEMENT OF U.S. PATENT 7,847,300**

199. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

200. The '300 Patent, entitled "LIGHT-EMITTING DIODE PACKAGE," was filed on March 28, 2008 and issued on December 7, 2010.

201. Plaintiff is the assignee and owner of all right, title and interest to the '300 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

202. The '300 Patent addresses technical problems in the prior art of LED devices, which may cause inaccurate assembly methodology with a relatively costly machining process.

203. Specifically, the '300 Patent addresses technical problems in the prior art, including:

A recent LED package tends to be manufactured in the type of a surface mount device (SMD) that permits the LED package to be very small in size to keep pace with slim and compact designed devices on which to be mounted. A SMD type of LED package includes a housing configuring its appearance, at least one electrode pad, and at least one electrode lead extended from the electrode pad to be exposed outside the housing and bent in a direction of the housing. Such bending of the electrode lead may leave a clearance between the electrode pad and a portion of the housing where the electrode pad meets. (col. 1, ll. 30-40).

204. Accordingly, the '300 Patent teaches a technical solution to these prior art problems which “provides a light-emitting diode package with a high reliability and an excellent light efficiency.” (col. 1, ll. 46-47).

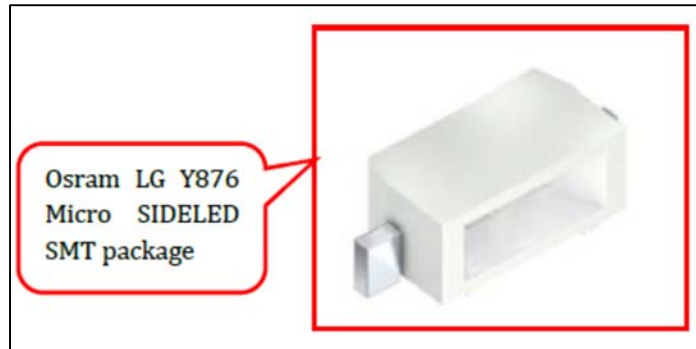
205. Specifically, the teachings of the '300 Patent include an LED design wherein “[a]s described above, making second portion 116 thicker than other portions of housing wall 112 may increase the area of the top surface of lead electrode 140 which abuts the bottom surface of the front portion of housing 110, and this may prevent the occurrence of a clearance therebetween.” (col. 2, ll. 58-63).

#### Direct Infringement

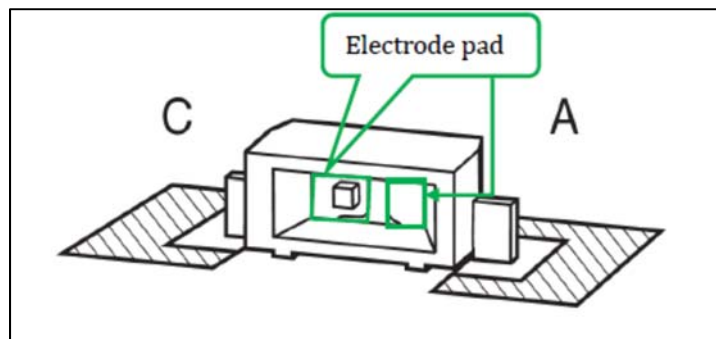
206. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the '300 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '300 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the OSRAM Micro SIDELED – LG Y876, and all other substantially similar products (collectively the “'300 Accused Products”).

207. On information and belief, Defendants' LG Y876 is a non-limiting example of a light source that meets all limitations of claim 1 of the '300 Patent, either literally or equivalently.

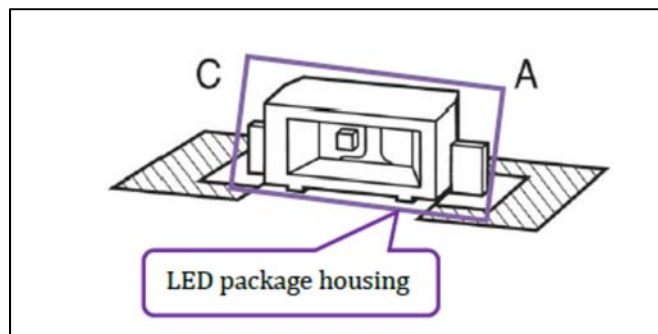
208. On information and belief, Defendants' LG Y876 is a light-emitting diode package.



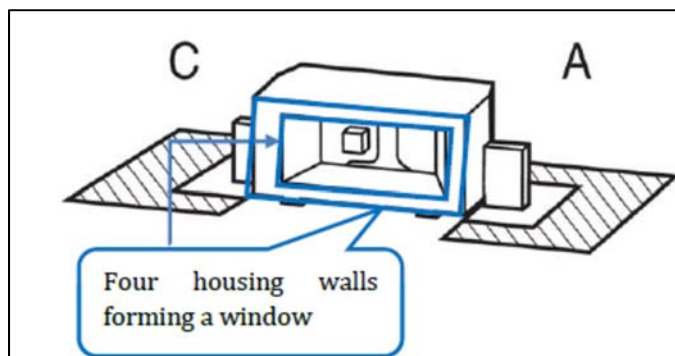
209. On information and belief, Defendants' LG Y876 comprises an electrode pad on which a chip is placed.



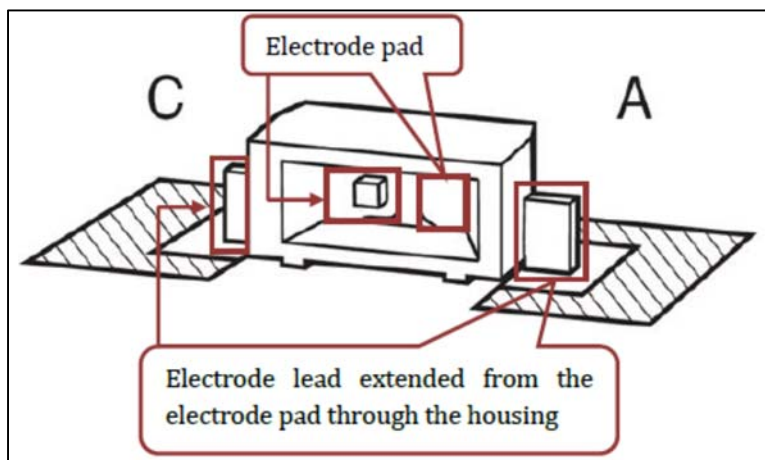
210. On information and belief, Defendants' LG Y876 comprises a housing having a window through which the chip is exposed.



211. On information and belief, Defendants' LG Y876 comprises a housing wall defining the window.



212. On information and belief, Defendants' LG Y876 comprises an electrode lead extended from the electrode pad through the housing to be exposed in a first direction of the housing, wherein the housing wall formed in the first direction comprises a first portion and a second portion, the second portion thicker than the first portion to cover the electrode lead.



#### Willful Infringement

213. Defendants have had actual knowledge of the '300 Patent at least as of service of Plaintiff's Original Complaint.

214. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '300 Patent. Defendants have thus had actual notice of

infringement of the '300 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

215. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

216. Defendants are knowingly inducing their customers and/or end users to directly infringe the '300 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

217. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '300 Patent. The '300 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '300 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '300 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use '300 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

218. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which,

by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT TEN**  
**INFRINGEMENT OF U.S. PATENT 8,034,644**

219. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

220. The '644 Patent, entitled "LIGHT EMITTING DEVICE," was filed on January 23, 2009 and issued on October 11, 2011.

221. Plaintiff is the assignee and owner of all right, title and interest to the '644 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

222. The '644 Patent addresses technical problems in Light Emitting Diodes, specifically in TTW device (Through The Wave soldering packages) and SMT devices (Surface Mount Technology).

223. The '644 Patent teaches that "TTW type light emitting devices tend to have better optical performance, potting capabilities, and other benefits over SMT (surface mount technology) devices. However, surface mount technology offers benefits in manufacturing over through the wave techniques." (col. 1, ll. 9-14).

224. The '644 Patent addresses technical problems in the prior art of LED devices, including by teaching a device where "the light emitter 100 is a surface mount technology (SMT) device that has the characteristics of a through the wave (TTW) type device." (col. 1, ll. 31-33).

225. Specifically, the '644 Patent addresses the prior art problem, by teaching a device where “the light emitter 100 is able to have the advantages of a thru-hole device, but in a surface mount package.” (col. 1, ll. 63-65).

226. By teaching an “SMT device that has TTW light characteristics,” (col. 2, l. 50), the '644 Patent provides a technical solution that combines the advantages of prior art SMT and TTW technology that was not previously known to be possible.

#### Direct Infringement

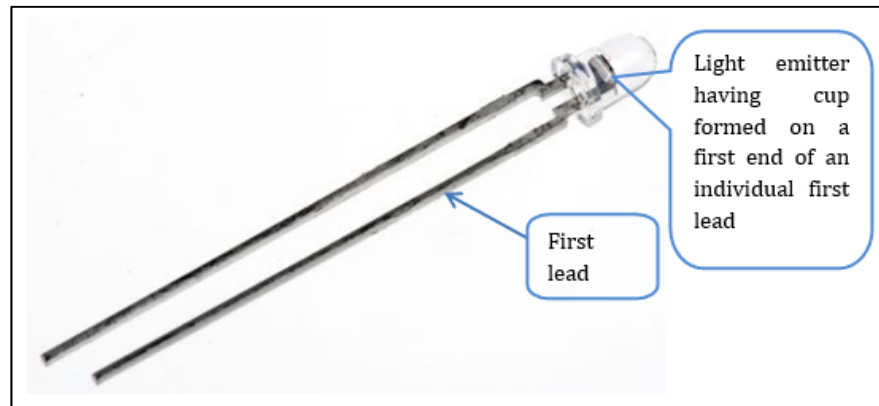
227. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the '644 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a) and (g), including through making, using, (including for testing purposes), selling and offering for sale methods and articles and articles produced by methods infringing one or more claims of the '644 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a) and (g). Exemplary infringing instrumentalities include the SFH 4356 Infrared Emitter Array, and other substantially similar products (collectively the “'644 Accused Products”).

228. On information and belief, Defendants' SFH 4356 IR LED is a non-limiting example of a light source that meets all limitations of claim 1 of the '644 Patent, either literally or equivalently.

229. On information and belief, Defendants' SFH 4356 is a light emitter.



230. On information and belief, Defendants' SFH 4356 is manufactured by fabricating a line of first leads, the line of first leads comprising a plurality of connected individual first leads each having a cup formed on a first end thereof.



231. On information and belief, Defendants' SFH 4356 is manufactured by fabricating a line of second leads, the line of second leads comprising a plurality of connected individual second leads.

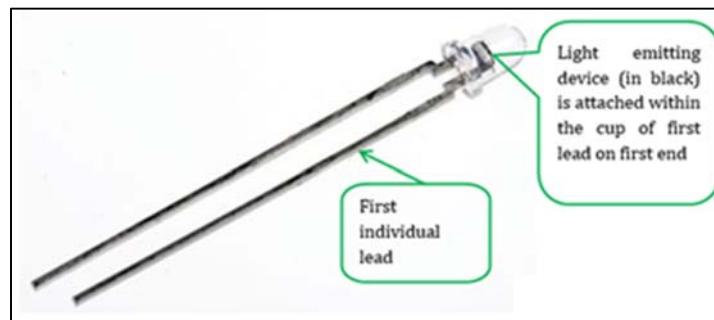


232. On information and belief, Defendants' SFH 4356 is manufactured by physically connecting the line of first leads to the line of second leads with a rail, wherein a first individual

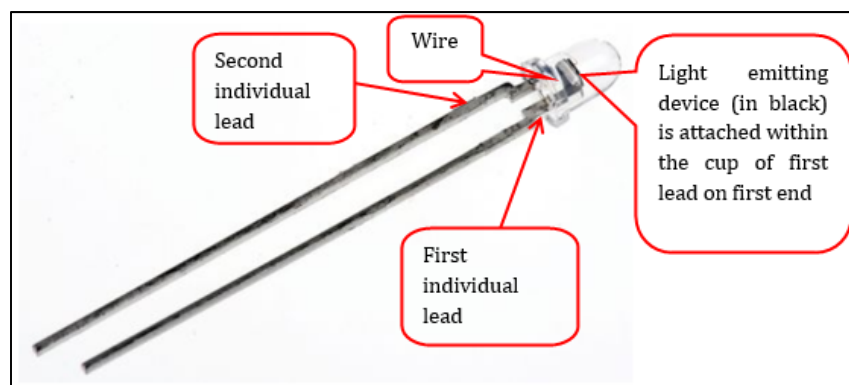


first lead is on a first side of the rail and adjacent a first individual second lead which is on a second side of the rail, wherein the second side of the rail opposes the first side of the rail.

233. On information and belief, Defendants' SFH 4356 is manufactured by attaching a light emitting device to the first individual first lead within the cup formed on the first end of the first individual lead such that the light emitting device is located substantially along a major axis of the first individual lead.



234. On information and belief, Defendants' SFH 4356 is manufactured by electrically connecting the light emitting device to the first individual second lead.



235. On information and belief, Defendants' SFH 4356 is manufactured by encapsulating a portion of the individual first lead and a portion of the individual second lead as a single unit.



236. On information and belief, Defendants' SFH 4356 is manufactured by separating the encapsulated first individual lead and the second individual lead from the first line of leads and the second line of leads.



### Willful Infringement

237. Defendants have had actual knowledge of the '644 Patent at least as of service of Plaintiff's Original Complaint.

238. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '644 Patent.

239. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '644 Patent. Defendants have thus had actual notice of

infringement of the '644 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

240. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

241. Defendants are knowingly inducing their customers and/or end users to directly infringe the '644 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

242. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '644 Patent. The '644 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '644 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '644 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '644 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

243. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which,

by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT ELEVEN**  
**INFRINGEMENT OF U.S. PATENT 8,405,181**

244. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

245. The '181 Patent, entitled "HIGH BRIGHTNESS AND HIGH CONTRAST PLASTIC LEADED CHIP CARRIER LED," was filed on March 16, 2011 and issued on March 26, 2013.

246. Plaintiff is the assignee and owner of all right, title and interest to the '181 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

247. The '181 Patent addresses technical problems in the prior art of LED devices, including that there was no known LED package that combines the low-profile nature of a PLCC package as well as simultaneously achieves high contrast and brightness.

248. Specifically, the '181 Patent addresses technical problems in the prior art, including that "currently available PLCC packages cannot simultaneously provide high contrast and high brightness" and that a "thru-hole LED is almost always brighter than a PLCC package, regardless of whether a black or white plastic is used for the housing." (col. 1, ll. 31-41).

249. Accordingly, the '181 Patent teaches a technical solution to these prior art problems wherein "the PLCC package 100 simultaneously provides both good contrast and brightness properties." (col. 3, ll. 31-32).

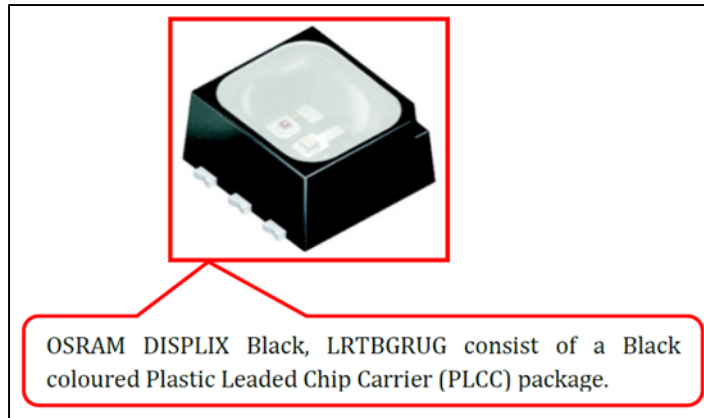
250. Specifically, the teachings of the '181 Patent include an LED design wherein “by incorporating the lead frame 104 into the interior walls of the reflector cup 116, the reflectivity of the reflector cup 116 can be enhanced without requiring an additional step of applying a reflective material to the interior surface of the reflector cup 116.” (col. 4, ll. 2-6).

#### Direct Infringement

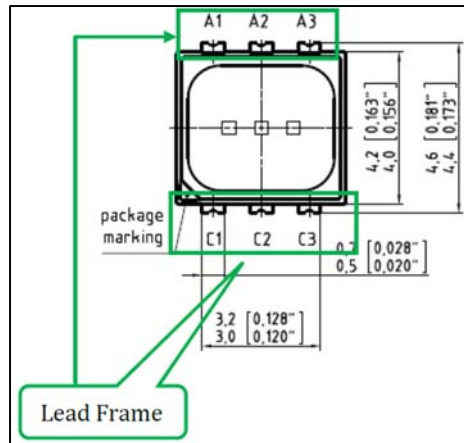
251. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the '181 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '181 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the, OSRAM DISPLIX Black, LRTBGRUG, and other substantially similar products (collectively the “'181 Accused Products”).

252. On information and belief, Defendants' DISPLIX Black, LRTBGRUG is a non-limiting example of a light source that meets all limitations of claim 1 of the '181 Patent, either literally or equivalently.

253. On information and belief, Defendants' DISPLIX Black, LRTBGRUG comprises a Plastic Leaded Chip Carrier (PLCC) package.

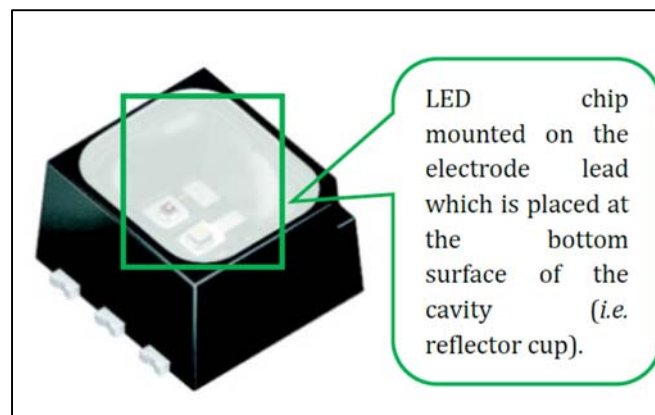


254. On information and belief, Defendants' DISPLIX Black, LRTBGRUG comprises a lead frame.



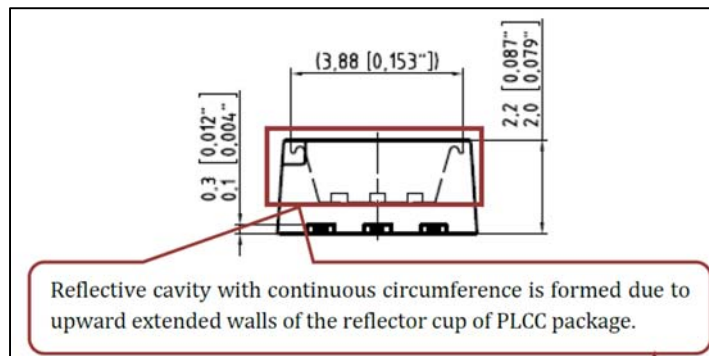
255. On information and belief, Defendants' DISPLIX Black, LRTBGRUG comprises a plastic housing attached to the lead frame.

256. On information and belief, Defendants' DISPLIX Black, LRTBGRUG comprises said plastic housing the plastic housing comprising at least one cavity which defines part of a reflector cup configured to receive a light source and exposes one or more leads of the lead frame such that a light source can be positioned in a bottom surface of the reflector cup and connected to the one or more leads.



257. On information and belief, Defendants' DISPLIX Black, LRTBGRUG comprises said reflector cup wherein a wall of the reflector cup extending from the bottom surface of the reflector cup to a top surface of the plastic housing comprises a portion of the lead frame and a

portion of the plastic housing so the wall has a continuous circumference crossing the portion of the lead frame and the portion of the housing.



### Willful Infringement

258. Defendants have had actual knowledge of the '181 Patent at least as of service of Plaintiff's Original Complaint.

259. Defendants and/or closely-related affiliates have had actual knowledge of the '181 Patent, gained in its own prosecution activities.

260. Specifically, the prosecution of OSRAM's German patent application DE102013100121A1 cites the '181 Patent family.

261. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '181 Patent.

262. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '181 Patent. Defendants have thus had actual notice of infringement of the '181 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.



263. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

264. Defendants are knowingly inducing their customers and/or end users to directly infringe the '181 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

265. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '181 Patent. The '181 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '181 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '181 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '181 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

266. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT TWELVE**  
**INFRINGEMENT OF U.S. PATENT 9,209,373**

267. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

268. The '373 Patent, entitled "HIGH POWER PLASTIC LEADED CHIP CARRIER WITH INTEGRATED METAL REFLECTOR CUP AND DIRECT HEAT SINK," was filed on February 23, 2011 and issued on December 8, 2015.

269. Plaintiff is the assignee and owner of all right, title and interest to the '373 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

**Technical Description**

270. The '373 Patent addresses technical problems in the prior art of LED devices, including that "to increase the capacity of an LED package to dissipate more heat, various designs are used in the industry; however, each of these designs results in LED packages with limited heat dissipation capacities which simultaneously increase the complexity and the costs associated with manufacturing the LED packages." For example:

Some LED package designs utilize a large heat sink slug that is distinct from the lead frame. The heat sink slug increases the capacity of the LED package to dissipate heat; however, because the heat sink slug is a separate component, the costs associated with manufacturing LED packages according to this design are relatively difficult and more costly, particularly because the number of manufacturing steps are increased due to the need to assembly the multiple pieces together. Furthermore, LED packages which incorporate a separate heat sink slug are larger in size due to the increased number of components in the LED package. Another shortcoming is that because a large LED package is required to accommodate the separate heat sink slug, a larger lens is also required to fit onto the larger LED package. All of this increases the cost of the LED package. (col. 1, ll. 28-47).

271. The '373 Patent provides technical solutions, including use of a "plastic molded lead frame" such that

the PLCC package 108 comprises a plastic housing 112 molded around a lead frame

120. As can be seen in FIGS. 1A and 1B, the lead frame 120 may be carried by the package carrier 104. In some embodiments, the package carrier 104 comprises a plurality of lead frames 120. Thus, batch manufacturing techniques can be employed to manufacture a plurality of PLCC packages 108 on a single package carrier 104.” (col. 2, ll. 54-61).

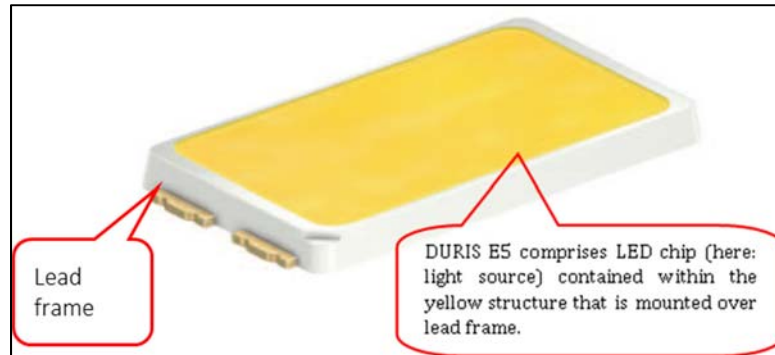
272. The ’373 Patent provides that a technical advantage of its solutions is that “some or all of the features of the lead frame 120 may be created in a single manufacturing step (*e.g.*, a single stamping step) or in multiple manufacturing steps (*e.g.*, a stamping step followed by a machining or etching step).” (col. 3, ll. 8-12).

#### Direct Infringement

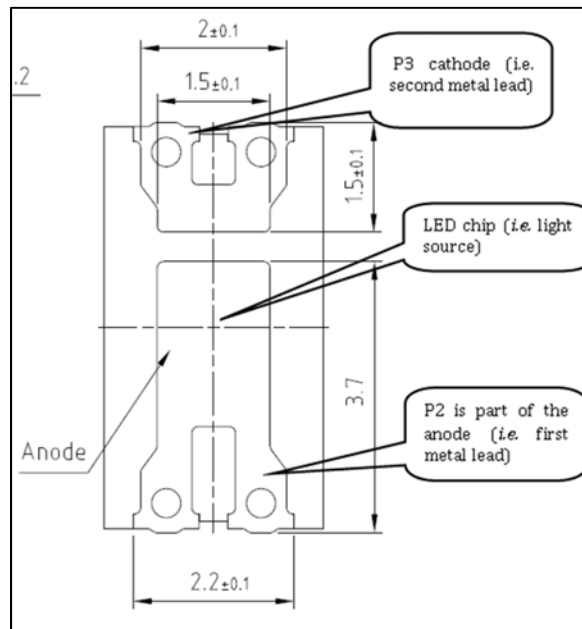
273. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the ’373 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the ’373 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the OSRAM DURIS E5 Series, and other substantially similar products (collectively the “’373 Accused Products”).

274. On information and belief, Defendants’ DURIS E5 is a non-limiting example of a light source that meets all limitations of claim 13 of the ’373 Patent, either literally or equivalently.

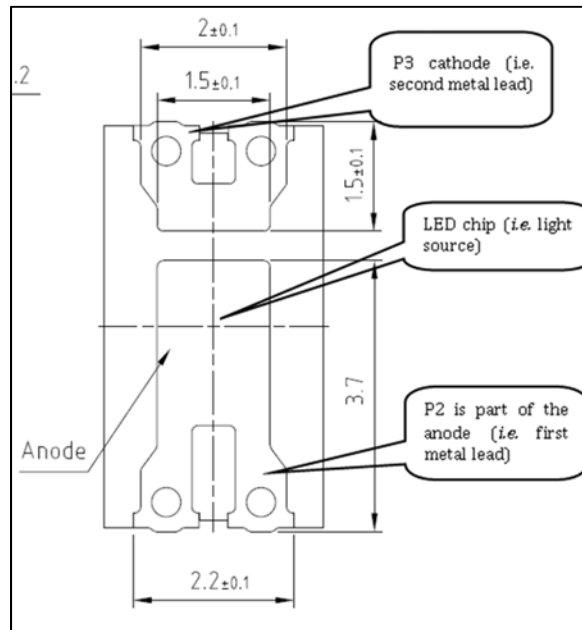
275. On information and belief, Defendants' DURIS E5 comprises a lead frame configured to have a light source mounted thereto.



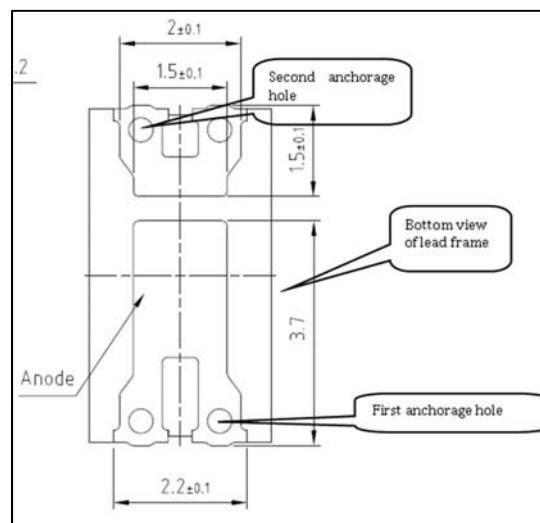
276. On information and belief, Defendants' DURIS E5 comprises a first metal lead with a first bottom surface extending to a first side and configured to be a first electrical terminal for the light source.



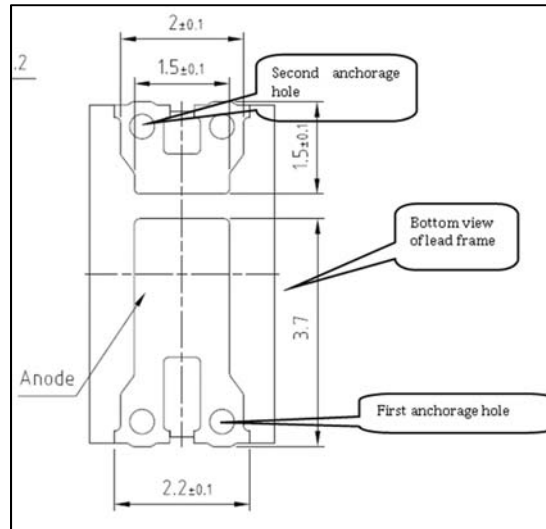
277. On information and belief, Defendants' DURIS E5 comprises a second metal lead with a second bottom surface extending to a second side and configured to be a second electrical terminal for the light source.



278. On information and belief, Defendants' DURIS E5 comprises a first anchorage hole in the first bottom surface.

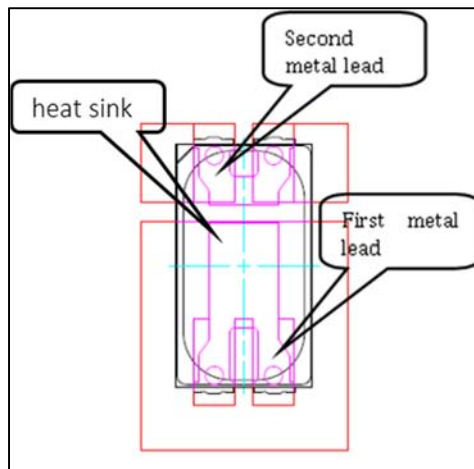


279. On information and belief, Defendants' DURIS E5 comprises a second anchorage hole in the second bottom surface.

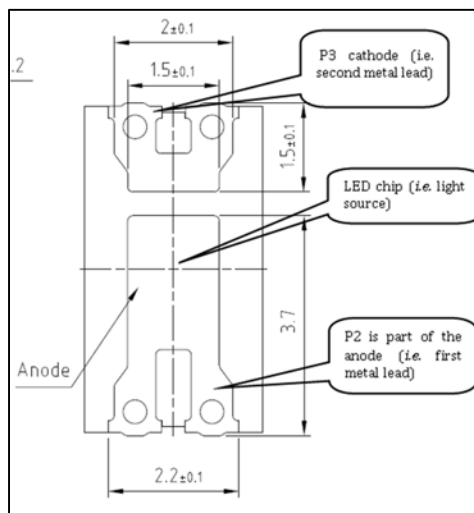


280. On information and belief, Defendants' DURIS E5 comprises a heat sink comprising a lead frame cavity that is configured to have the light source mounted therein and reflect light emitted by the light source, the heat sink being separated physically from the second metal lead and disposed between the first metal lead and the second metal lead such that the first

bottom surface of the first metal lead and the second bottom surface of the second metal lead are on a same plane.



281. On information and belief, Defendants' DURIS E5 comprises a lead frame wherein the bottom surfaces of the first metal lead and the second metal lead extend in opposite directions.



### Willful Infringement

282. Defendants have had actual knowledge of the '373 Patent at least as of service of Plaintiff's Original Complaint.

283. Defendants and/or closely-related affiliates have had actual knowledge of the '373 Patent, gained in its own prosecution activities.

284. Specifically, the prosecution of OSRAM's German patent application DE102013100121A1 cites the '373 Patent family.

285. Further, on information and belief, Defendants became aware of Plaintiff's patent portfolio as early as July of 2017, upon being served with a patent infringement lawsuit alleging infringement of several related patents. *See Document Security Systems, Inc. v. OSRAM GmbH et al.*, Case No. 2:17-cv-05184-JVS-JCG ("DSS Case"). The patents-in-suit in the DSS case originate from the same assignor as the '373 Patent.

286. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '373 Patent. Defendants have thus had actual notice of infringement of the '373 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

287. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

288. Defendants are knowingly inducing their customers and/or end users to directly infringe the '373 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

289. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '373 Patent. The '373 Accused Products are designed in such a way that when they are used for their intended



purpose, the user infringes the '373 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '373 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '373 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

290. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT THIRTEEN**  
**INFRINGEMENT OF U.S. PATENT 9,882,094**

291. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

292. The '094 Patent, entitled "LIGHT SOURCE WITH INNER AND OUTER BODIES COMPRISING THREE DIFFERENT ENCAPSULANTS," was filed on March 14, 2011 and issued on January 30, 2018.

293. Plaintiff is the assignee and owner of all right, title and interest to the '094 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

### Technical Description

294. The '094 Patent addresses technical problems in the prior art of LED devices, including that most “electronic infotainment display systems are placed outdoors and thus require high reliability specifications, such as wider operating temperature, resistance to moisture, and longer life.” (col. 1, ll. 16-20).

295. Additionally, the '094 Patent addresses technical problems including that for “infotainment display systems that require high resolution, the LEDs are preferably as small as possible so that more LEDs can be placed into a limited space to represent more pixels per unit area.” (col. 1, ll. 41-44).

296. The '094 Patent further discloses that “another feature of LEDs affecting the infotainment display quality may be the brightness of LEDs. To be viewable from a distance, the LEDs [infotainment display systems] are required to produce more lumen per unit area.” (col. 1, ll. 46-47).

297. Further, the '094 Patent discloses that “for an application such as an infotainment display system in which the performance of the display may be sensitive to form factors of the LEDs, the high reflectivity of the leads 110 and the outer surface 121 may reduce the contrast of the display.” (col. 3, ll. 35-39).

298. The '094 Patent provides technical solutions to increase reliability of prior art devices, for example by teaching that “the inner reflective body and the outer non-reflective body may comprise interlock structures, as well as interlock geometries to further improve interlocking between the bodies to increase reliability.” (col. 2, ll. 6-11).

299. The '094 Patent further discloses that “reliability performance of the light-emitting device may be improved by using interlocking aperture at the lead frame, interlock

structure and interlock geometries defined by the inner reflective body and the outer non-reflective body.” (’094 Abstract)

300. The ’094 Patent provides further technical solutions to these problems, including a “light-emitting device having an inner reflective body and an outer non-reflective body” to improve contrast of the display. *Id.*

301. Specifically, the ’094 Patent discloses that

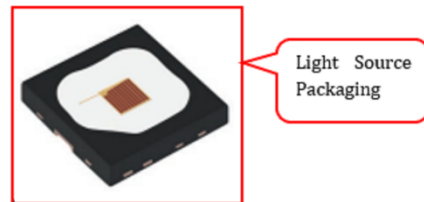
the inner reflective body defines a reflector configured to reflect light. In one embodiment, the outer non-reflective body encloses the inner reflective body to minimize reflectivity of the light emitting device. When assembled into an infotainment display system, the outer non-reflective body may be configured to reduce reflection of ambient light and hence, increase contrast ratio of the display. *Id.*

#### Direct Infringement

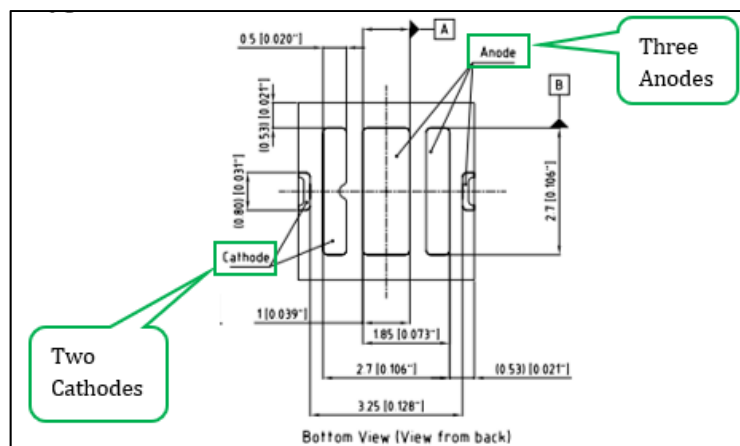
302. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the ’094 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271(a), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the ’094 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271(a). Exemplary infringing instrumentalities include the OSLON Black Flat, LY H9PP and other substantially similar products (collectively the “’094 Accused Products”).

303. On information and belief, Defendants’ OSLON Black Flat is a non-limiting example of a light source that meets all limitations of claim 1 of the ’094 Patent, either literally or equivalently.

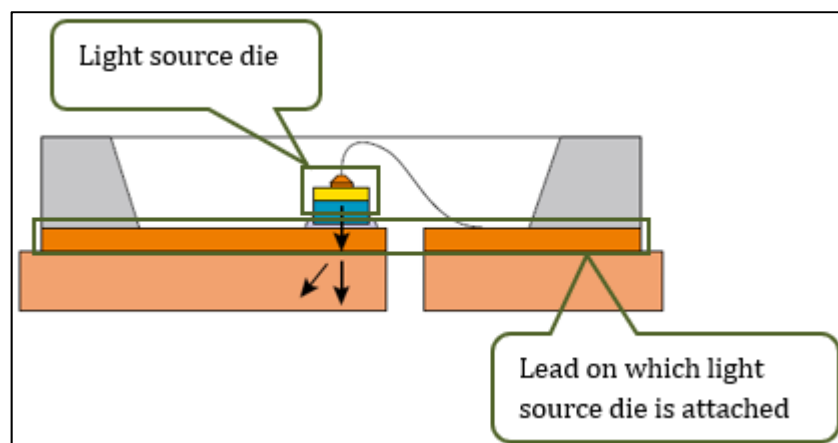
304. On information and belief, Defendants' OSLON Black Flat comprises a light source packaging.



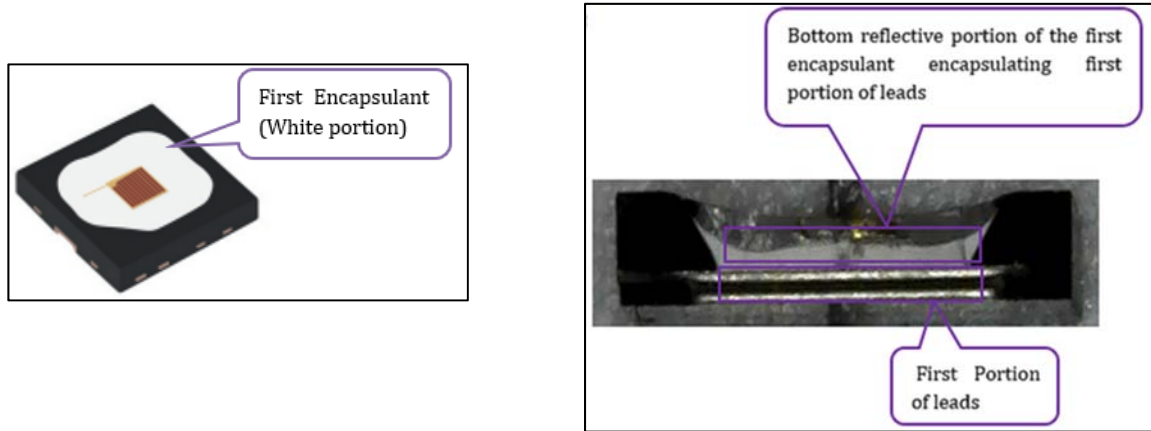
305. On information and belief, Defendants' OSLON Black Flat comprises a plurality of leads.



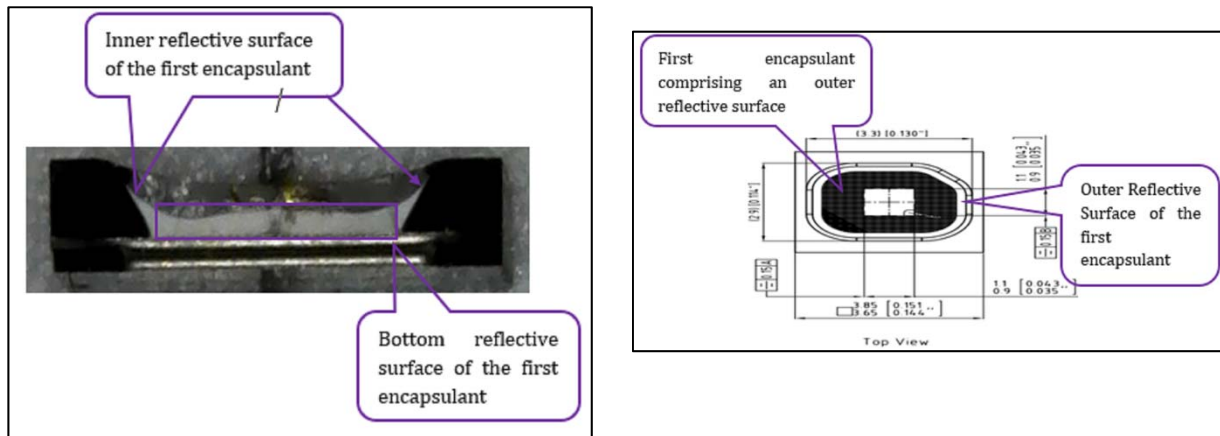
306. On information and belief, Defendants' OSLON Black Flat comprises at least one light source die attached on one of the plurality of leads.



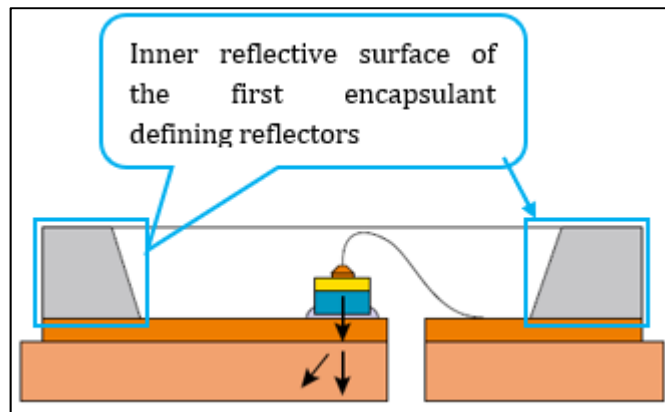
307. On information and belief, Defendants' OSLON Black Flat comprises a first encapsulant encapsulating a first portion of the leads defining an inner reflective body.



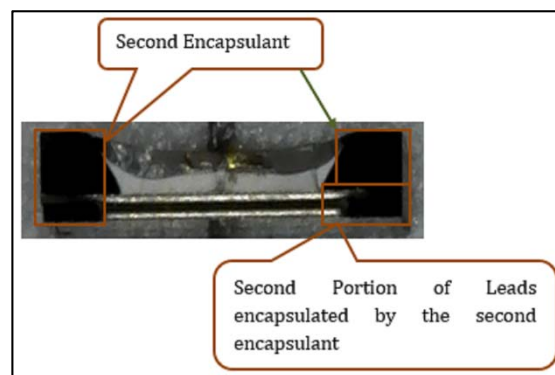
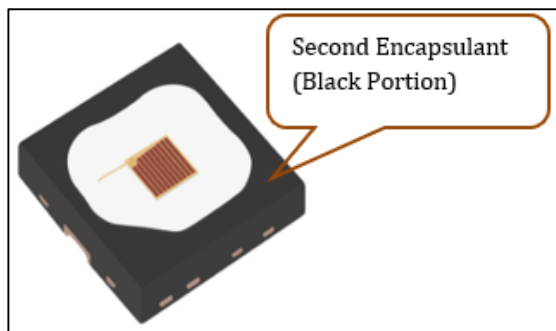
308. On information and belief, Defendants' OSLON Black Flat comprises a first encapsulant consisting of an inner reflective surface, a bottom reflective portion and an outer reflective surface, and encapsulates the first portion of the leads in the bottom reflective portion.



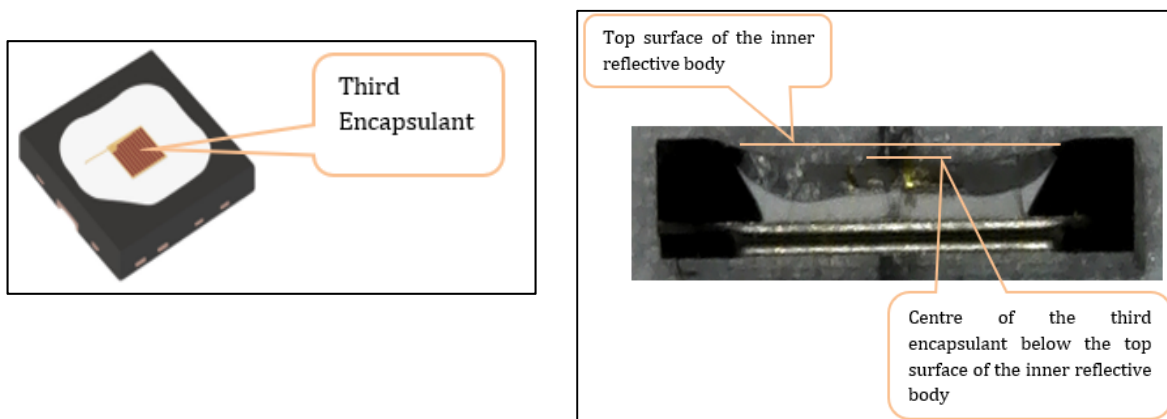
309. On information and belief, Defendants' OSLON Black Flat comprises a reflector defined by at least the inner reflective surface.



310. On information and belief, Defendants' OSLON Black Flat comprises second encapsulant encapsulating substantially a second portion of the leads and the outer reflective surface surrounding the reflector of the inner reflective body defining an outer non-reflective body.



311. On information and belief, Defendants' OSLON Black Flat comprises a third encapsulant encapsulating the light source die and the inner reflective surface in a way that a top surface of the third encapsulant is below a top surface of the inner reflective body.



#### Willful Infringement

312. Defendants have had actual knowledge of the '094 Patent at least as of service of Plaintiff's Original Complaint.

313. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '094 Patent. Defendants have thus had actual notice of infringement of the '094 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

314. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

#### Indirect Infringement

315. Defendants are knowingly inducing their customers and/or end users to directly infringe the '094 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

316. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '094 Patent. The '094 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '094 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '094 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '094 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the United States in order to serve and develop the United States market for Defendants' infringing products.

317. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

**COUNT FOURTEEN**  
**INFRINGEMENT OF U.S. PATENT 9,887,338**

318. Plaintiff incorporates by reference the allegations in all preceding paragraphs as if fully set forth herein.

319. The '338 Patent, entitled "LIGHT EMITTING DIODE DEVICE," was filed on July 28, 2009 and issued on February 6, 2018.



320. Plaintiff is the assignee and owner of all right, title and interest to the '338 Patent, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

#### Technical Description

321. The '338 Patent addresses technical problems in the prior art of LED devices, including that “typically, there are multiple thermal interfaces, comprising multiple layers of dissimilar materials, which impede heat flow.” (col. 1, ll. 20-22).

322. Additionally, the '338 Patent addresses technical problems including that:

Sometimes, a LED package includes a heat slug (a mass of metal, typically copper) and heat generated by the LED is dissipated by the heat slug, or transferred through the heat slug. . . . In order to attach the LED to the heat slug, proper metallic configurations are needed at each of the mating surfaces. . . . In addition, if the heat slug is soldered to a circuit board (for example, a metal-core printed circuit board), then the circuit board also needs compatible metal plating, for example, copper, nickel, and silver/gold. All these various plating layers with dissimilar materials impede heat flow and add manufacturing cost. (col. 1, ll. 23-38).

323. To address these prior art problems, the '338 Patent discloses a technical solution of an “LED device, mounted on a circuit board or other substrate, with a reduced number of thermal interfaces layers of dissimilar materials), and with improved heat flow, and reduced manufacturing cost.” (col. 2, ll. 18-21).

324. Specifically, the '338 Patent discloses the technical solution as an improvement over having the electrodes in the primary path of heat flow (col. 2, ll. 53-55).

325. The '338 Patent further teaches the technical solution including a substrate with a solder filled via such that “the solder filled via then acts as a heat plug, without requiring an intermediate package substrate or a package that includes a heat plug.” (col. 2, ll. 6-11).

326. The '338 Patent further uses Fig. 4 to illustrate “an optional heat sink 318 on the surface opposite from the LED 300.” (col. 3, ll. 24-25).

327. The '338 Patent further teaches that an advantage of its technical solution is that “the resulting structure has only two heat transfer interfaces: (1) from the LED body to the solder filled via, and (2) from the solder-filled via to the substrate or circuit board (or other heat sink).” (col. 3, ll. 32-36).

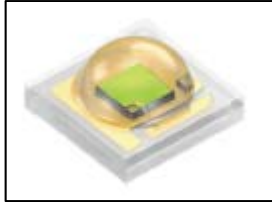
328. The '338 Patent teaches that a further advantage of its technical solution is that “solder is commonly used for circuit board assembly, eliminating the need for a separate process step for a heat conducting material.” (col. 3, ll. 39-41).

#### Direct Infringement

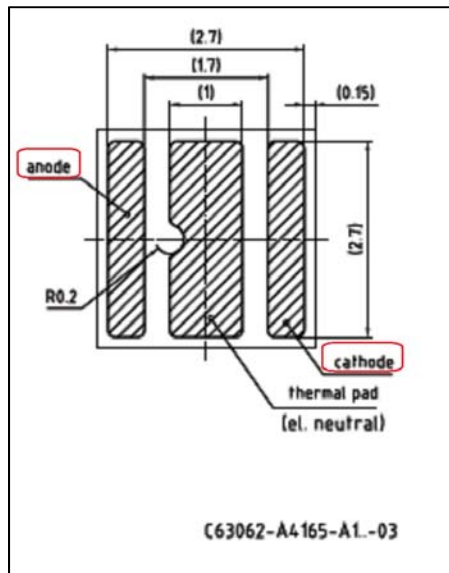
329. On information and belief, Defendants, without authorization or license from Plaintiff, have been and are presently directly infringing the '338 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. §§ 271(a) and (g), including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '338 patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. §§ 271(a) and (g). Exemplary infringing instrumentalities include the OSLON LX ECE and all substantially similar products (collectively the “'338 Accused Products”).

330. On information and belief, Defendants' OSLON LX ECE is a non-limiting example of a light source that meets all limitations of claim 3 of the '338 Patent, either literally or equivalently.

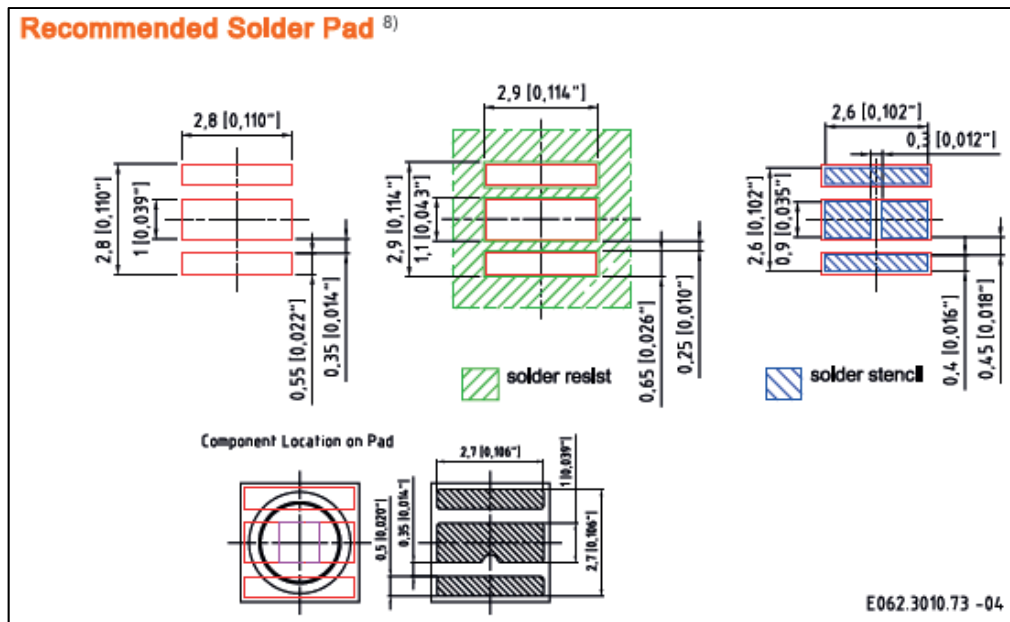
331. On information and belief, Defendants' OSLON LX ECE is an electronic assembly.



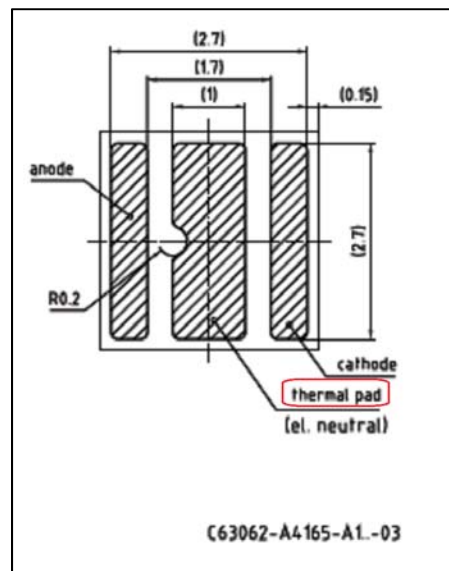
332. On information and belief, Defendants' OSOLON LX ECE is a Light Emitting Diode having an outer periphery and including a first surface with at least two electrodes.



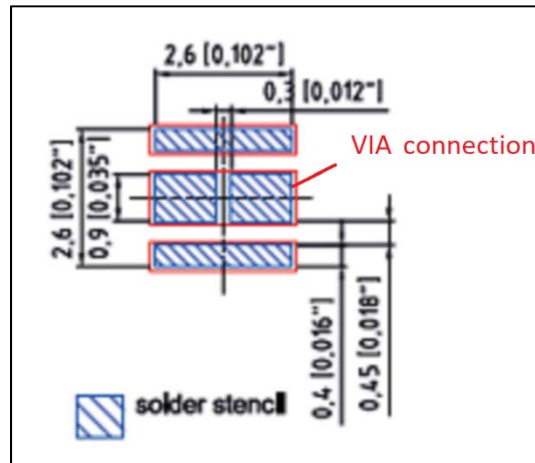
333. On information and belief, Defendants' OSOLON LX ECE is a Light Emitting Diode also having a solderable metallic surface on a second surface of the Light Emitting Diode opposite to the first surface such that the solderable metallic surface is only within the outer periphery of the Light Emitting Diode.



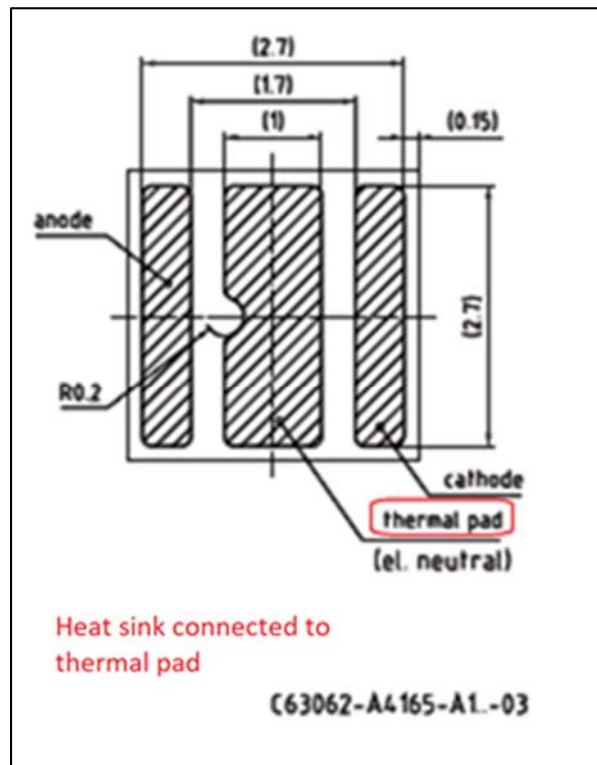
334. On information and belief, Defendants' OSLOX LX ECE comprises at least one electric circuit element other than the at least one Light Emitting Diode.



335. On information and belief, Defendants' OSLOX LX ECE comprises a printed circuit board having a first surface on which the Light Emitting Diode and the at least one electric circuit element are mounted, wherein the printed circuit board has a via.



336. On information and belief, Defendants' OSRON LX ECE comprises a heat sink disposed on a second surface of the printed circuit board, wherein the second surface is opposed to the first surface, wherein the solderable metallic surface is positioned across the via and in direct contact with the printed circuit board and thermally connected to the heat sink through the via to dissipate heat generated by the at least one Light Emitting Diode.



### Willful Infringement

337. Defendants have had actual knowledge of the '338 Patent at least as of service of Plaintiff's Original Complaint.

338. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '338 Patent. Defendants have thus had actual notice of infringement of the '338 Patent and acted despite an objectively high likelihood that its actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

339. This objective risk was either known or so obvious that it should have been known to Defendants. Accordingly, Plaintiff seeks enhanced damages pursuant to 35 U.S.C. §§ 284 and 285.

### Indirect Infringement

340. Defendants are knowingly inducing their customers and/or end users to directly infringe the '338 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

341. Defendants' inducement includes, for example, providing data sheets, technical guides, demonstrations, software and hardware specifications, installation guides, and other forms of support that induce their customers and/or end users to directly infringe the '338 Patent. The '338 Accused Products are designed in such a way that when they are used for their intended purpose, the user infringes the '338 Patent, either literally or equivalently. Defendants know and intend that customers that purchase the '338 Accused Products will use those products for their intended purpose. For example, Defendants' United States website: <https://www.osram.com/os/>, instructs customers to use the '338 Accused Products in numerous infringing applications. In addition, Defendants specifically intend that their customers, such as United States distributors, retailers and consumer product companies, will import, use, and sell infringing products in the

United States in order to serve and develop the United States market for Defendants' infringing products.

342. As a result of Defendants' infringement, Plaintiff has suffered monetary damages, and is entitled to an award of damages adequate to compensate it for such infringement which, by law, can be no less than a reasonable royalty, together with interest and costs as fixed by this Court under 35 U.S.C. § 284.

## **VI. NOTICE**

343. BWL has complied with the notice requirement of 35 U.S.C. § 287 and does not currently distribute, sell, offer for sale, or make products embodying the Asserted Patents.

## **VII. JURY DEMAND**

344. Plaintiff demands a trial by jury of all matters to which it is entitled to trial by jury, pursuant to FED. R. CIV. P. 38.

## **VIII. PRAYER FOR RELIEF**

WHEREFORE, Plaintiff prays for judgment and seeks relief against Defendants as follows:

- A. That the Court determine that one or more claims of the Asserted Patents is infringed by Defendants, both literally and under the doctrine of equivalents;
- B. That the Court determine that one or more claims of the Asserted Patents is indirectly infringed by Defendants;
- C. That the Court award damages adequate to compensate Plaintiff for the patent infringement that has occurred, together with prejudgment and post-

judgment interest and costs, and an ongoing royalty for continued infringement;

- D. That the Court permanently enjoin Defendants pursuant to 35 U.S.C. § 283;
- E. That the Court determine that Defendants' infringements were willful;
- F. That the Court award enhanced damages against Defendants pursuant to 35 U.S.C. §§ 284 and 285; and
- G. That the Court award such other relief to Plaintiff as the Court deems just and proper.



Dated: May 10, 2019

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