IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE

BENCH WALK LIGHTING LLC, Plaintiff, v. LG ELECTRONICS, INC., LG INNOTEK CO., LTD., and LG ELECTRONICS U.S.A., Inc., Defendants.	§ § § § § § § § § §	CIVIL ACTION NO. 20-51 (RGA) JURY TRIAL DEMANDED

SECOND AMENDED COMPLAINT

Plaintiff Bench Walk Lighting LLC ("Plaintiff" or "BWL"), by and through its attorneys, for its Second Amended Complaint for patent infringement against LG Electronics, Inc., LG Innotek Co., Ltd. and LG Electronics U.S.A., Inc. ("LG" or "Defendants"), and demanding trial by jury, hereby alleges on information and belief with regard to the actions of Defendants and on knowledge with regard to its own actions 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, manufacture, importation, 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, import and/or distribute infringing products and services, and encourage others to use their 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. LG Electronics, Inc. is a publicly held Korean corporation located at LG Electronics Twin Towers, 128, Yeoui-daero, Yeongdungpo-gu, Seoul, 07336, South Korea.

6. LG Innotek Co., Ltd. is a Korean corporation located at Seoul Square 20f, Hangang-daero, Jung-Gu, Seoul, 100-714, South Korea. LG Innotek Co., Ltd. may be served with process in Korea pursuant to the Hague Convention on the Service Abroad of Judicial and Extrajudicial Documents, Article 1, Nov. 15, 1965 TIAS No. 6638, 20 UST 361 (U.S. Treaty 1969). LG Innotek Co., Ltd. is owned by LG Electronics, Inc. and manufactures and markets light-emitting diode ("LED") products.

7. LG Electronics U.S.A., Inc. is a corporation organized and existing under the laws of Delaware having a principal place of business at 1000 Sylvan Avenue, Englewood Cliffs, New Jersey 07632. LG Electronics U.S.A., Inc. may be served by serving its registered agent United States Corporation Company, 251 Little Falls Drive, Wilmington, Delaware 19808. LG Electronics U.S.A., Inc. is a wholly-owned subsidiary of LG Electronics, Inc. and manufactures and markets consumer electronic products containing infringing LEDs.

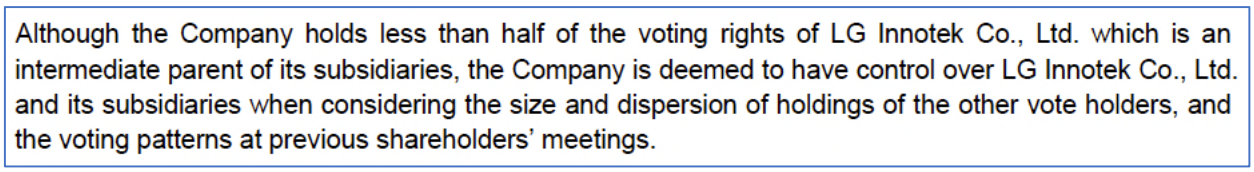
8. Defendants are related entities that operate as part of a corporate group or common business enterprise consisting of a number or related subsidiaries that operate under the LG and/or LG Innotek brand and infringe the Asserted Patents by making, using, importing, offering for sale, and/or selling substantially the same products.

9. Defendant LG Electronics, Inc. is the corporate parent of 142 subsidiaries worldwide, which operates as a common business enterprise ("LG" or "LG Electronics") for the purpose of development, design, manufacture, sale, and distribution of LED products in an infringing manner. The named Defendants are all a part of LG or LG Electronics.

10. LG Electronics, Inc. controls its subsidiaries, including the named defendants, LG Innotek Co. Ltd. and LG Electronics, USA.

https://www.lg.com/global/about-our-brand

11. Defendant LG Electronics, Inc. has legal and effective control over Defendant LG Innotek, Co. Ltd.



https://www.lg.com/global/pdf/ir_report/2014-2Q-Interim-Separate-Financial-Statements.pdf

12. LG is thus jointly and severally liable for the design, manufacture, and distribution of the accused LED products described herein.

III. JURISDICTION AND VENUE

13. 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.

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

15. Venue is proper in this district pursuant to 28 U.S.C. §§ 1391(b), (c), and 1400(b) because Defendant LG Electronics, Inc. and Defendant LG Innotek Co., Ltd. are foreign entities, Defendant LG Electronics U.S.A., Inc. is a Delaware corporation, and 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.

16. 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 to at least 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 this judicial district.

17. Defendants directly and/or through subsidiaries or intermediaries (including distributors, retailers, and others) have committed and continue to commit acts of infringement in this judicial district by, among other things, making, using, importing, offering for sale, and/or selling products and/or services that infringe the Asserted Patents.

18. Defendant LG Innotek Co. Ltd. has a U.S. subsidiary – LG Innotek USA Inc.

19. LG Innotek USA Inc. maintains sales offices in San Jose, CA; San Diego, CA; and Troy, MI that have distributed or sold infringing LEDs in the United States and in Delaware.

20. Defendants LG Innotek Co. Ltd. and LG Electronics, Inc. distribute and sell infringing LEDs in Delaware. Defendant LG Innotek Co. Ltd. signed a strategic supply contract

with Future Lighting Solutions, a business unit of Future Electronics Inc. Future Electronics Inc. imports and distributes infringing LG LEDs in the United States and this judicial district.

21. LG Innotek Co. Ltd. provides infringing LEDs for LG TVs which are distributed and sold in the United States, including Delaware. There are multiple authorized LG dealers in Delaware. *See* https://www.lg.com/us/authorizeddealers/.

22. LG Innotek Co. Ltd. and LG Electronics, Inc. provide infringing LG LEDs to U.S. automobile manufactures whose automobiles are distributed and sold in the United States, including Delaware.

23. Defendants LG Innotek Co. Ltd. and LG Electronics, Inc. have filed lawsuits in this Court and therefore have consented to this Court's jurisdiction. On July 28, 2011, LG Innotek Co. Ltd. and LG Electronics, Inc. filed a complaint for patent infringement against OSRAM GmbH asserting infringement of eight U.S. patents assigned to LG Innotek Co. Ltd. and LG Electronics, Inc. *LG Electronics Inc. and LG Innotek Co., Ltd. v. OSRAM Gmbh et al.*, No. 11-660-RGA (D. Del. 2011). On March 27, 2017, LG Electronics, Inc. filed a complaint for patent infringement against Blu Products, Inc. asserting infringement of U.S. patents assigned to LG Innotek Co. Ltd. and LG Electronics, Inc., *LG Electronics Inc. v. Blu Products, Inc.*, No. 17-327-VAC (D. Del. 2017). On November 26, 2015, LG Electronics, Inc., LG Electronics USA, Inc., and other LG subsidiaries and affiliates filed a declaratory judgment of noninfringement against Personalized Media Communications LLC. *LG Electronics, Inc., LG Electronics U.S.A., Inc. and LG Electronics MobileComm U.S.A., Inc. v. Personalized Media Communications LLC,* No. 15-1096-RGA (D. Del. 2015).

24. Defendant, LG Innotek Co. Ltd sells and distributes infringing LEDs to LG Electronics for use in LG's consumer electronics products that are sold in Delaware.

LGE-LG Innotek	Sales	181.7	221.6	170.1	145.4
Inter-company Transaction (③)	Op. Income	-1.4	7.7	2.5	-2.4

LG Electronics 1Q`20 Earnings Release

25. Defendants LG Electronics, Inc. and LG Electronics USA, Inc. make, use, sell, import, and offer for sale consumer electronic products that infringe the Asserted Patents, such as TVs, Laptops, and Smartphones, which are distributed and sold in the United States, including Delaware.

26. 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

27. Plaintiff is the owner of the entire right, title, and interest of a portfolio of patents, including the right to recover for past infringement, covering technologies used in LED products, including the Asserted Patents. 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

28. 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 7,470,936 (the '936 Patent) (Exhibit D)
U.S. patent 7,519,287 (the '287 Patent) (Exhibit E)

U.S. patent 7,847,300 (the ’300 Patent) (Exhibit F)
U.S. patent 7,488,990 (the ‘990 Patent) (Exhibit G)
U.S. patent 9,209,373 (the ’373 Patent) (Exhibit H)
U.S. patent 9,882,094 (the ’094 Patent) (Exhibit I)
U.S. patent 9,887,338 (the ’338 Patent) (Exhibit J)

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

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

30. The ’524 Patent, entitled “SOLID STATE BASED ILLUMINATION SOURCE FOR A PROJECTION DISPLAY,” was filed on June 29, 1999 and issued on December 4, 2001.

31. Plaintiff is the assignee and owner of all rights, title, and interest to the ’524 Patent, including the right to recover for past infringements, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

Technical Description

32. The ’524 Patent addresses problems of prior art LEDs that caused a significant amount of the light emitted by the LED to be refracted, trapped, and absorbed by the LED. (col. 1, ll. 19-44).

33. The invention overcomes this problem by utilizing a non-planar reflecting heat sink. (col. 1, ll. 45-55).

34. LEDs are mounted on a heat sink having a set of angles such that light that would have been refracted and trapped is now emitted from the LED. (col. 2, ll. 43-63).

35. The invention improves upon the prior art by increasing the light output of the LED while decreasing the amount of energy lost to absorption.

Direct Infringement

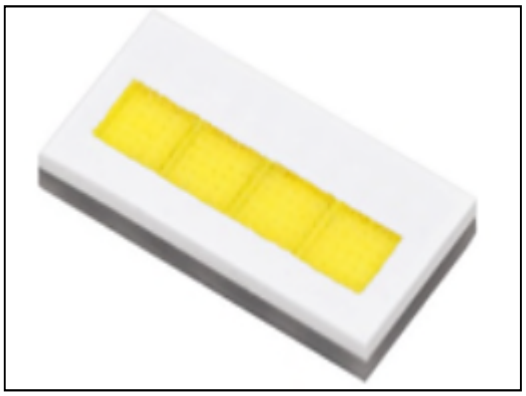
36. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the ’524 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using, (including for testing purposes), selling and offering for sale methods and articles made by methods infringing one or more claims of the ’524 Patent. Defendants, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the ’524 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include Defendants’ White LEDs, including the 5328 White 4in1 SMD LED Package (including model number LEYRS53M04AM) and all other substantially similar products (collectively the “’524 Accused Products”).

37. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants’ infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of ’524 Accused Products that are either known to Plaintiff or revealed during discovery.

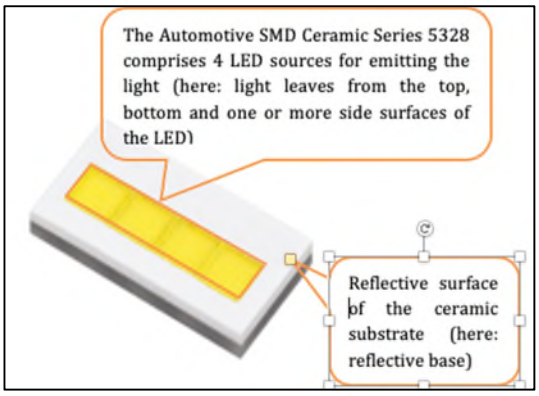
38. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale or distribution of Defendants’ 5328 White 4in1 SMD LED Package. Each Defendant individually manufactures, sells, and distributes the ’524 Accused Products. Defendant LG Electronics and LG Electronics USA utilize the ’524 Accused Products in its electronic products that are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the ’524 Accused Products as part of a common business enterprise.

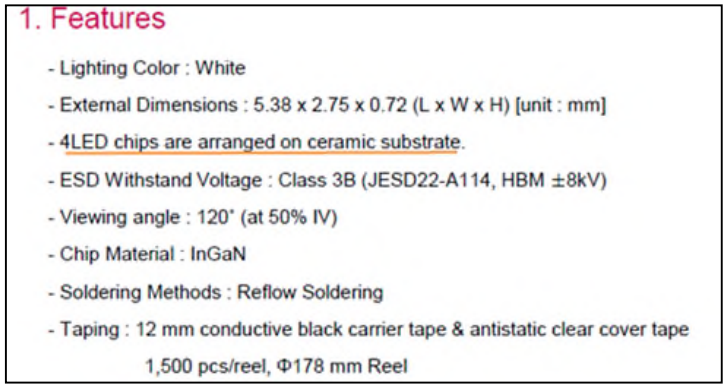
39. Defendants' 5328 White 4in1 SMD LED Package is a non-limiting example of a light source that meets all limitations of claim 1 of the '524 Patent, either literally or equivalently.

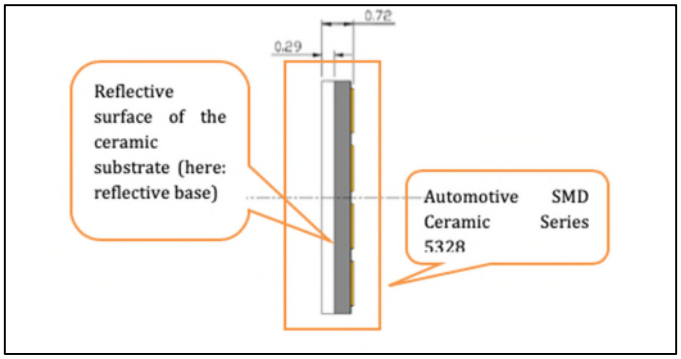
40. Defendants' 5328 White 4in1 SMD LED Package is a light source that generates light for an optical system accepting light leaving the light source within a predetermined acceptance angle relative to an axis defined in relation to the light source:



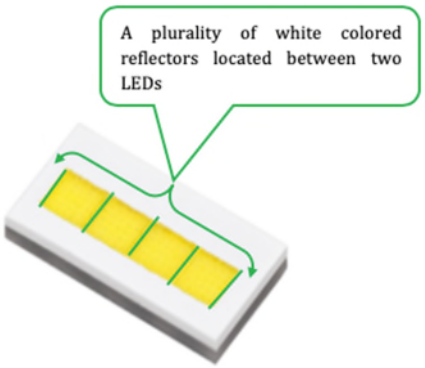
41. Defendants' 5328 White 4in1 SMD LED Package comprises a plurality of LEDs mounted on a reflective base, each of the LEDs generating light that leaves that LED via a top surface or side surface, the reflective base having a reflective surface in contact with the bottom surface of each of the LEDs:

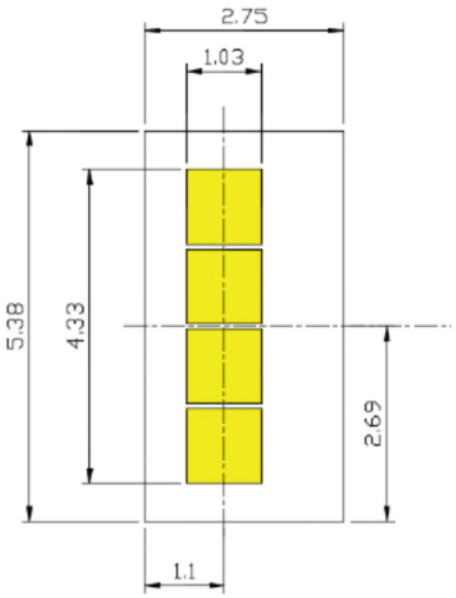






42. Defendants' 5328 White 4in1 SMD LED Package comprises a plurality of reflectors for reflecting light leaving the side surfaces of the LEDs into the acceptance angle of the optical system, with at least one reflector located between two of the LEDs:





Willful Infringement

43. Defendants have had actual knowledge of their infringement of the ’524 Patent at least as of receipt of Plaintiff’s notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff’s notice letter in the course of business.

44. Defendants have had actual knowledge of the ’524 Patent due to their relationship with Intellectual Discovery Co. Ltd. (“Intellectual Discovery”), the former owner of Plaintiff’s patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including the Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff’s patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the ’524 patent.

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

46. Defendants’ risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

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

48. 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

49. Defendants have induced and 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.

50. Defendants' indirect infringement 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. (*See, e.g.*, Exhibit L) Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '524 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '524 Accused Products in numerous infringing applications.[1] As a non-limiting example, Defendants' customers such as automobile makers and manufacturers of lighting and consumer electronic devices incorporate Defendants' Accused Products in automobiles, commercial and consumer lighting, or consumer electronic devices using Defendants' provided data sheets and technical

[1] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that inform its customers of the specifications of the '524 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit L; Exhibit M. Each data sheet provides instructions that LG knows to infringe the '524 patent when performed.

manuals. Incorporation of the Accused LEDs in automobiles, lighting, or consumer electronic devices directly infringe the '524 patent. 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 to serve and develop the United States market for Defendants' infringing products.

51. 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

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

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

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

Technical Description

55. 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).

56. 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

57. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the ’658 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using, (including for testing purposes), selling and offering for sale methods and articles made by methods infringing one or more claims of the ’658 Patent. Defendants, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the ’658 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include Defendants’ White LEDs, including the 5328 White 4in1 LED Package (including model number LEYRS53M04AM) and all other substantially similar products (collectively the “’658 Accused Products”).

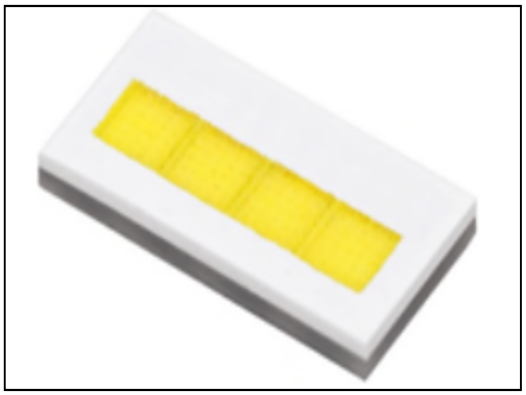
58. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants’ infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of ’658 Accused Products that are either known to Plaintiff or revealed during discovery.

59. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale or distribution of Defendants’ 5328 White 4in1 SMD LED Package. Each Defendant individually manufactures, sells, and distributes the ’658 Accused Products. Defendants LG Electronics and LG Electronics USA utilizes the ’658 Accused Products in its electronic products which are manufactured, sold, and distributed in the

United States. Defendants develop, design, manufacture, and distribute the ’658 Accused Products as part of a common business enterprise.

60. Defendants’ 5328 White 4in1 SMD LED Package is a non-limiting example of a LED that meets all limitations of claims 3 and 4 of the ’658 Patent, either literally or equivalently.

61. Defendants’ 5328 White 4in1 SMD LED Package comprises a LED, fabricated by mounting on a substrate, that emits light of a first wavelength:



62. Defendants’ 5328 White 4in1 SMD LED Package comprises a powder of phosphor.

63. Defendants’ 5328 White 4in1 SMD LED Package comprises a powdered phosphor converting light of a first wavelength to light of a second wavelength.

64. Defendants’ 5328 White 4in1 SMD LED Package comprises a phosphor layer of a powdered phosphor suspended in a photo-curable medium that sets upon exposure to light of a curing wavelength. Photo (UV) curing is a dominant technique for encapsulant curing and provides significant benefits versus heat curing. *See* “*UV-curable Encapsulants for LED*”, Oriental Journal of Chemistry, 2012, Vol. 28, No. (3): pg. 1135-1140; “*Thermally resistant UV-curable epoxy–siloxane hybrid materials for light emitting diode (LED) encapsulation*”, J. Mater. Chem., 2012, 22, pg. 8874-8880.

> **CURING**
>
> There are two common methods of encapsulant cure – temperature and ultraviolet exposure. The prime consideration with temperature cure systems is the robustness of the package components, as most phosphor is able to withstand, without permanently degrading, processing temperatures of 200°C (400°F), which is above normal cure temperatures. UV cure systems are generally compatible with phosphors, but consideration must be given to the ability of the phosphor to absorb some of the UV energy and convert it into visible light energy, resulting in the need for longer exposure/cure times, or higher exposure intensities.

65. Defendants' 5328 White 4in1 SMD LED Package comprises a phosphor layer wherein said photo-curable medium sets in a time less than that required for a change in

> **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.

concentration of said phosphor in said phosphor layer over said LED of more than 0.5 percent. Minimizing the change in concentration of the phosphor in a phosphor layer over an LED to less than 0.5 percent via expedient photo-curing is a dominant technique for encapsulant curing and provides significant benefits. *See* "UV-curable Encapsulants for LED", Oriental Journal of Chemistry, 2012, Vol. 28, No. (3): pg. 1135-1140; "*Thermally resistant UV-curable epoxy–siloxane hybrid materials for light emitting diode (LED) encapsulation*", J. Mater. Chem., 2012, 22, pg. 8874-8880.

66. Curing the phosphor mixture via irradiation to minimize the time period in which phosphor particles settle is a dominant technique and provides significant benefits. *See* "UV-curable Encapsulants for LED", Oriental Journal of Chemistry, 2012, Vol. 28, No. (3): pg. 1135-1140; "*Thermally resistant UV-curable epoxy–siloxane hybrid materials for light emitting diode (LED) encapsulation*", J. Mater. Chem., 2012, 22, pg. 8874-8880; "*Considerations for*

Encapsulant Material Selection for Phosphor-Converted LEDs," Application Note #16 Intematix Corp., December 2011.

Willful Infringement

67. Defendants have had actual knowledge of their infringement of the '658 Patent at least as of receipt of Plaintiff's notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff's notice letter in the course of business.

68. Defendants have had actual knowledge of the '658 Patent due to their relationship with Intellectual Discovery Co. Ltd. ("Intellectual Discovery"), the former owner of Plaintiff's patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K)

69. Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff's patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the '658 patent.

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

71. Defendants' risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

72. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '658 Patent. Defendants continue to infringe despite knowledge of Plaintiff's patent. Defendants have thus had actual notice of infringement of the '658 Patent

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

73. 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

74. Defendants have induced and 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.

75. Defendants' indirect infringement 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. (*See e.g.* Exhibit L) Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '658 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '658 Accused Products in numerous infringing applications.[2] As a non-limiting example, Defendants' customers such as automobile makers and manufacturers of lighting and consumer electronic

[2] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that inform its customers of the specifications of the '658 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit L; Exhibit M. Each data sheet provides instructions that LG knows to infringe the '658 patent when performed.

devices incorporate Defendants' Accused Products in automobiles or electronic devices using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in automobiles, commercial and consumer lighting, or consumer electronic devices directly infringe the '658 patent. 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 to serve and develop the United States market for Defendants' infringing products.

76. 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

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

78. 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.

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

Technical Description

80. 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).

81. 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).

82. 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).

83. 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).

84. 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

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

’428 Patent. Defendants, individually and operating as a common business enterprise with their subsidiaries, develop, design, manufacture, and distribute LED products that infringe one or more claims of the ’428 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include Defendants’ LED products, including the 5630 series mid power LED (including model number LEMWS59R80JZ3DA0) and all substantially similar products (collectively the “’428 Accused Products”).

86. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants’ infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of ’428 Accused Products that are either known to Plaintiff or revealed during discovery.

87. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale, or distribution of Defendants’ 5630 series LED. Each Defendant individually manufactures, sells, and distributes the ’428 Accused Products. Defendant LG Electronics and LG Electronics USA utilizes the ’428 Accused Products in its electronic products which are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the ’428 Accused Products as part of a common business enterprise.

88. Defendants’ 5630 series 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.

89. Defendants’ 5630 series 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.

90. 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.

91. 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. Curing the phosphor mixture via irradiation to minimize the time period in which phosphor particles settle is a dominant technique and provides significant benefits. *See* "UV-curable Encapsulants for LED", Oriental Journal of Chemistry, 2012, Vol. 28, No. (3): pg. 1135-1140; "*Thermally resistant UV-curable epoxy–siloxane hybrid materials for light emitting diode (LED) encapsulation*", J. Mater. Chem., 2012, 22, pg. 8874-8880; "*Considerations for Encapsulant Material Selection for Phosphor-Converted LEDs,"* Application Note #16 Intematix Corp., December 2011.

Willful Infringement

92. Defendants have had actual knowledge of their infringement of the '428 Patent at least as of receipt of Plaintiff's notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff's notice letter in the course of business.

93. Defendants have had actual knowledge of the '428 Patent due to their relationship with Intellectual Discovery Co. Ltd. ("Intellectual Discovery"), the former owner of Plaintiff's patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including the Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff's

patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the ‘428 patent.

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

95. Defendants’ risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

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

97. 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

98. Defendants have induced and 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.

99. Defendants’ indirect infringement 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. (*See, e.g.*, Exhibit N) Defendants’ indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '428 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '428 Accused Products in numerous infringing applications.[3] As a non-limiting example, Defendants' customers such as automobile makers and manufacturers of lighting and consumer electronic devices incorporate Defendants' Accused Products in automobiles or electronic devices using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in automobiles, commercial or consumer lighting, or consumer electronic devices directly infringe the '428 patent. 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 to serve and develop the United States market for Defendants' infringing products.

100. 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 7,470,936

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

[3] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that inform its customers of the specifications of the '428 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M; Exhibit N. Each data sheet provides instructions that LG knows to infringe the '428 patent when performed.

102. 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.

103. Plaintiff is the assignee and owner of all rights, title, and interest to the ’936 Patent, including the right to recover for past infringements, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

Technical Description

104. The ’936 Patent addresses technical problems in the prior art of LED devices, resulting from a 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).

105. 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).

106. 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 50, 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).

107. 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).

108. 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).

109. 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).

110. 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.” (col. 2, ll. 50-54).

Direct Infringement

111. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the ’936 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, 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, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the ’936 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary

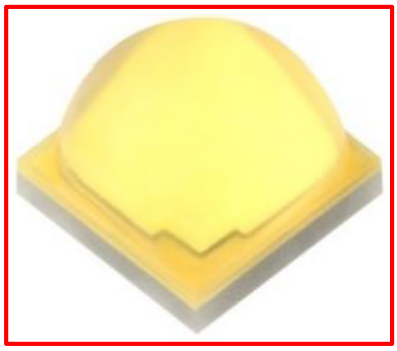
infringing instrumentalities include the LEMWE333 White SMD LED (including model number LEMWE33370HU5000) and all substantially similar products (collectively the "'936 Accused Products").

112. Defendants' LEMWE333 White SMD LED is a non-limiting example of a light source that meets all limitations of claim 1 of the '936 Patent, either literally or equivalently.

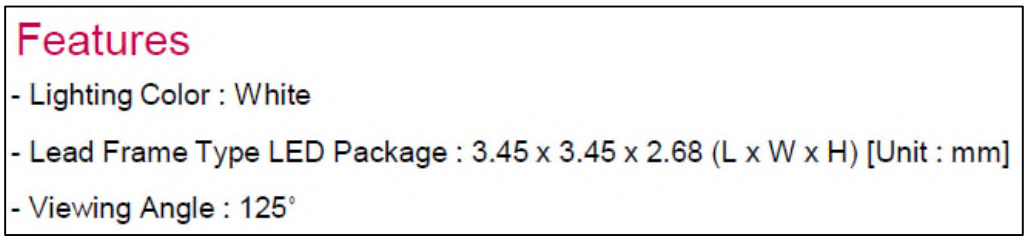
113. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants' infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of '936 Accused Products that are either known to Plaintiff or revealed during discovery.

114. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale, or distribution of Defendants' LEMWE333 White SMD LED. Each Defendant individually manufactures, sells, and distributes the '936 Accused Products. Defendants LG Electronics and LG Electronics USA utilizes the '936 Accused Products in its electronic products and devices, including as a non-limiting example LG TVs, electronic displays, and other consumer electronics, which are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the '936 Accused Products as part of a common business enterprise.

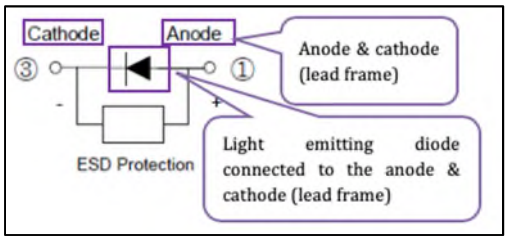
115. Defendants' LEMWE333 White SMD LED is a light emitting diode.



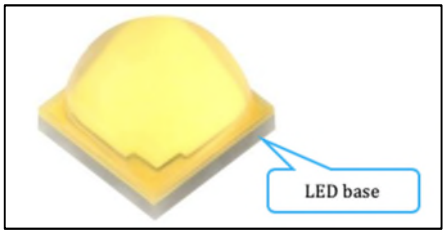
116. Defendants' LEMWE333 White SMD LED comprises a leadframe.



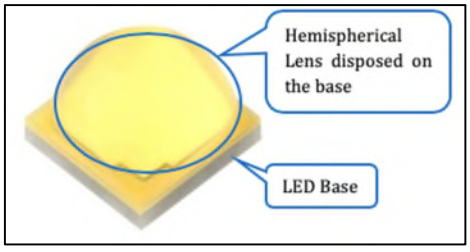
117. Defendants' LEMWE333 White SMD LED comprises a light emitting element positioned on the leadframe.



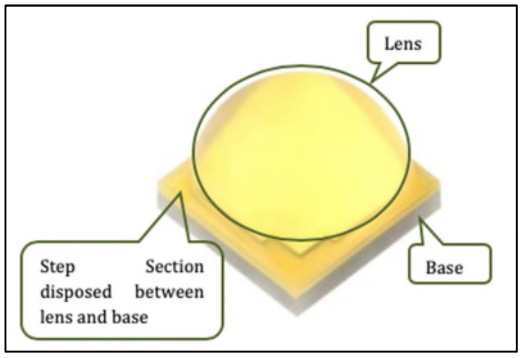
118. Defendants' LEMWE333 White SMD LED comprises a base configured to cover the leadframe such that portions of the leadframe extend from the base.



119. Defendants' LEMWE333 White SMD LED comprises a lens disposed on the base, the lens having a hemispherical light emitting surface.



120. Defendants' LEMWE333 White SMD LED 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

121. Defendants have had actual knowledge of their infringement of the '936 Patent at least as of receipt of Plaintiff's notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff's notice letter in the course of business.

122. Defendants have had actual knowledge of the '936 Patent due to their relationship with Intellectual Discovery Co. Ltd. ("Intellectual Discovery"), the former owner of Plaintiff's patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff's patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the '936 patent.

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

124. Defendants’ risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

125. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the ’936 Patent. Defendants continue to infringe despite knowledge of Plaintiff’s patent. Defendants have thus had actual notice of infringement of the ’936 Patent and acted despite an objectively high likelihood that their 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 and reimbursement of its reasonable attorney fees 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 ’936 Patent, with the specific intent to encourage such infringement, and knowing that the induced acts constitute patent infringement, either literally or equivalently.

128. Defendants’ indirect infringement 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. (*See, e.g.*, Exhibit O) Defendants’ indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who

purchase the '936 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use Accused Products in numerous infringing applications.[4] As a non-limiting example, Defendants' customers incorporate Defendants' Accused Products in electronic devices such as TVs, electronic displays, and other consumer electronic devices using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in consumer electronic devices directly infringe the '936 patent. 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 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 FIVE
INFRINGEMENT OF U.S. PATENT 7,519,287

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

131. 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.

[4] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that inform its customers of the specifications of the '936 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M; Exhibit O. Each data sheet provides instructions that LG knows to infringe the '936 patent when performed.

132. Plaintiff is the assignee and owner of all rights, title, and interest to the '287 patent, including the right to recover for past infringements, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

Technical Description

133. 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).

134. Specifically, the '287 patent addresses technical problems in the prior art, illustrated in Fig. 1 of the '287 Patent, 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).

135. 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).

136. 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

137. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the ’287 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, 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, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the ’287 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include the Flash Module 4040 and other substantially similar products (collectively the “’287 Accused Products”).

138. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants’ infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of ’287 Accused Products that are either known to Plaintiff or revealed during discovery.

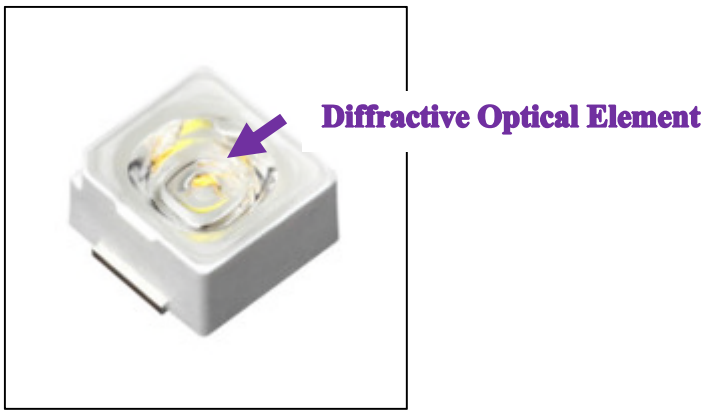
139. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale or distribution of Defendants’ Flash Module 4040. Each Defendant individually manufactures, sells, and distributes the ’287 Accused Products. Defendants LG Electronics and LG Electronics USA utilizes the ’287 Accused Products in its electronic products, including as a non-limiting example LG smartphones and other consumer electronics, which are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the ’287 Accused Products as part of a common business enterprise.

140. Defendants' Flash Module 4040 is a non-limiting example of an electronic flash that meets all limitations of at least claim 1 of the '287 Patent, either literally or equivalently.

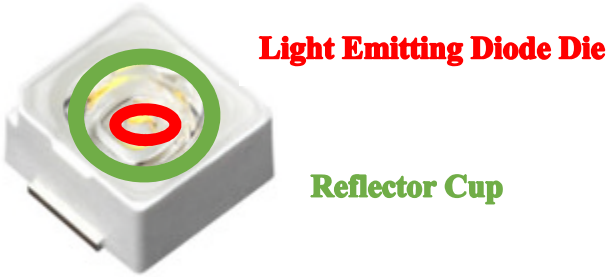
141. Defendants' Flash Module 4040 is an electronic flash comprising a substrate:

142. Defendants' Flash Module 4040 is an electronic flash comprising a light source configured to emit light attached to the substrate:

143. Defendants' Flash Module 4040 is an electronic flash comprising a diffractive optical element optically coupled to the light source configured to diffract light from the light source such that the radiation pattern of the light emitted from the diffractive optical element is rectangular to produce a flash of light having a rectangular radiation pattern:



144. Defendants' Flash Module 4040 is an electronic flash comprising a light emitting diode die and the substrate includes a reflector cup in which the diode die is mounted, where the diffractive element is attached to an encapsulant positioned on the substrate such that the reflector cup is filled with the encapsulant:



Willful Infringement

145. Defendants have had actual knowledge of their infringement of the '287 Patent at least as of receipt of Plaintiff's notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff's notice letter in the course of business.

146. Defendants have had actual knowledge of the '287 Patent due to their relationship with Intellectual Discovery Co. Ltd. ("Intellectual Discovery"), the former owner of Plaintiff's

patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including the Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff's patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the '287 patent.

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

148. Defendants' risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

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

150. 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

151. 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.

152. Defendants' indirect infringement 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. Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '287 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '287 Accused Products in numerous infringing applications.[5] As a non-limiting example, Defendants' customers incorporate Defendants' Accused Products in electronic devices such as smartphones and electronic displays using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in consumer electronic devices directly infringe the '287 patent. 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 to serve and develop the United States market for Defendants' infringing products.

153. 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.

[5] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that inform its customers of the specifications of the '287 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M. Each data sheet provides instructions that LG knows to infringe the '287 patent when performed.

COUNT SIX
INFRINGEMENT OF U.S. PATENT 7,847,300

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

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

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

Technical Description

157. The '300 Patent addresses technical problems in the prior art of LED devices caused by inaccurate assembly methodology combined with a relatively costly machining process.

158. 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).

159. 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).

160. 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

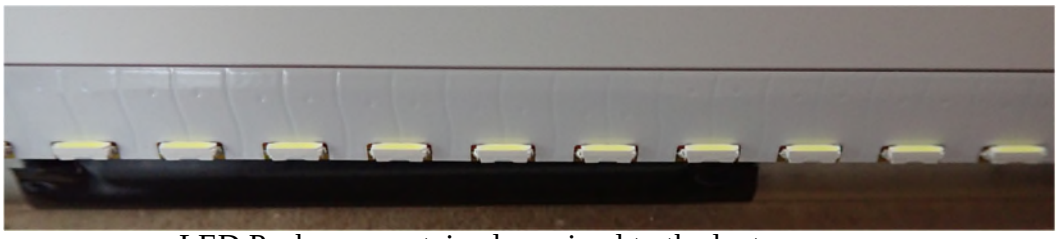
161. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the '300 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '300 Patent. Defendants, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the '300 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include the 0.2W 6014 White PKG SMD LED (including model number LEWWS61A00DM1000) the LG Gram Laptop, the LG Q70 Smartphone, and all other substantially similar products (collectively the "'300 Accused Products").

162. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants' infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of '300 Accused Products that are either known to Plaintiff or revealed during discovery.

163. The LG Gram laptop (P/N: 14Z90N), as shown below, is a non-limiting example of a light source that meets all limitations of claim 10 of the '300 Patent, either literally or equivalently.

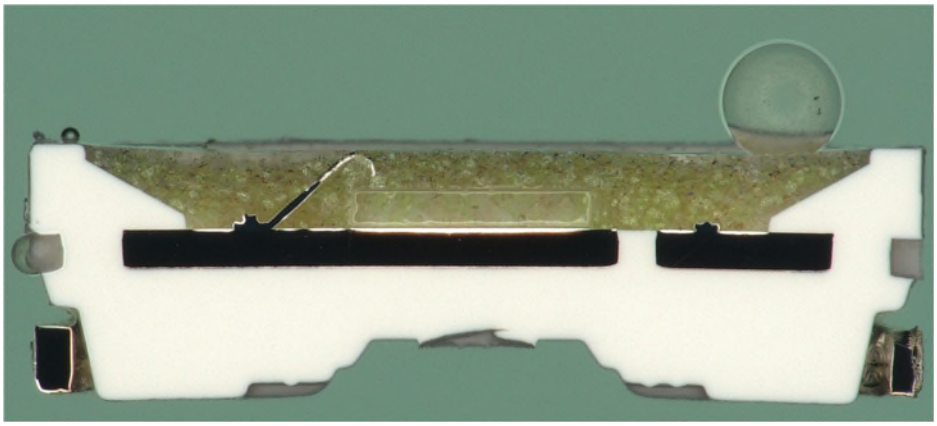
LG 14” Gram Laptop

164. The LG Gram Laptop contains light-emitting diode packages (Laptop LED Packages).

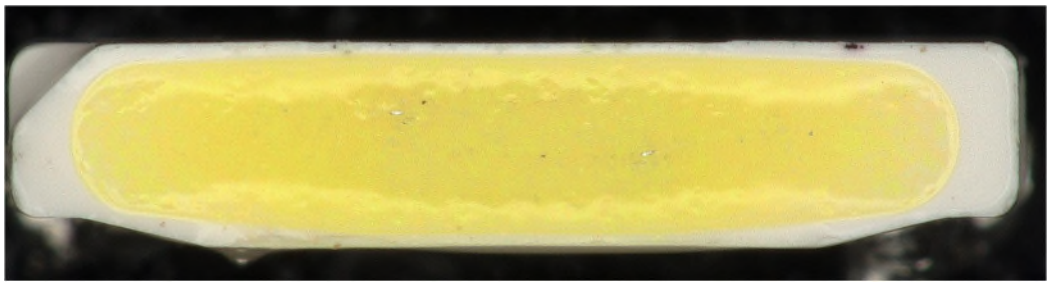


LED Packages contained proximal to the laptop screen

165. The Laptop LED Packages comprise an electrode pad on which a chip is placed.

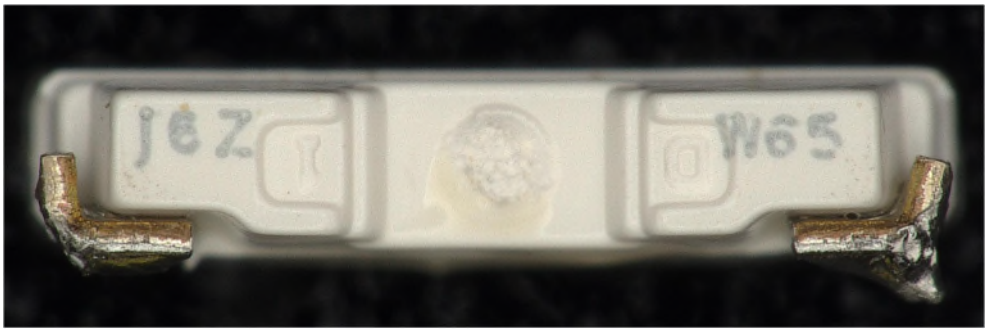


166. The Laptop LED Package comprises a housing having a window through which the chip is exposed.



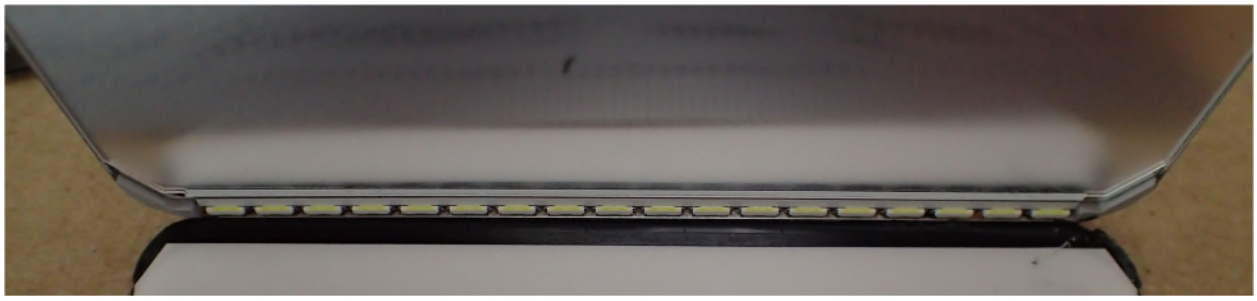
167. The Laptop LED Package comprises an electrode lead extended from the electrode pad through the housing to be exposed in a first direction of the housing, wherein the electrode lead is bent to an outside surface of the housing at through the housing.

168. The Laptop LED Package comprises a bottom surface of the housing with a first bottom surface and a second bottom surface having a first recessed space in a top direction of the housing so that the electrode lead is arranged in the first recessed space.



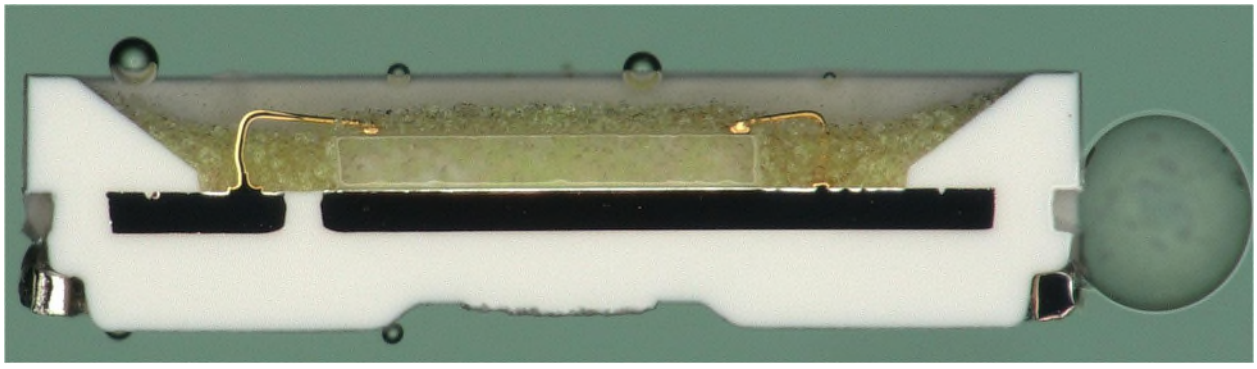
169. The LG Q70 Smartphone, as shown below, is a non-limiting example of a light source that meets all limitations of claim 10 of the '300 Patent, either literally or equivalently.

170. The LG Q70 Smartphone contains light-emitting diode packages (Smartphone LED Packages).

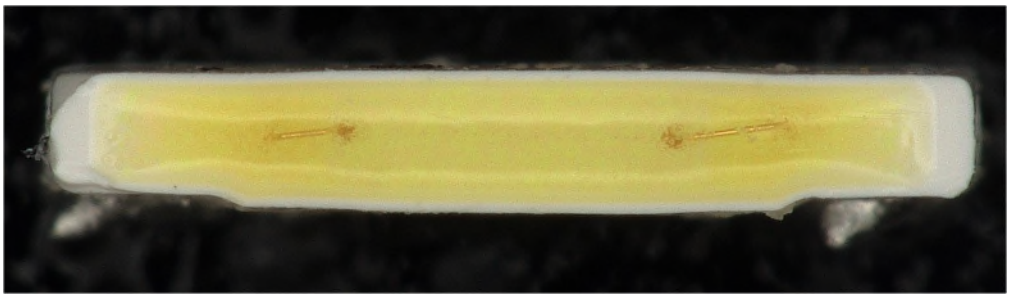


LED Packages contained proximal to the Smartphone screen (Smartphone LED Packages)

171. The Smartphone LED Packages comprise an electrode pad on which a chip is placed.



172. The Smartphone LED Packages comprise a housing having a window through which the chip is exposed.



173. The Smartphone LED Packages comprise an electrode lead extended from the electrode pad through the housing to be exposed in a first direction of the housing, wherein the electrode lead is bent to an outside surface of the housing at through the housing.

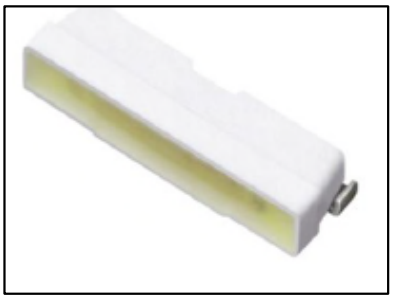
174. The Smartphone LED Packages comprise a bottom surface of the housing with a first bottom surface and a second bottom surface having a first recessed space in a top direction of the housing so that the electrode lead is arranged in the first recessed space.

175. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale, or distribution of Defendants' 0.2W 6014 White PKG

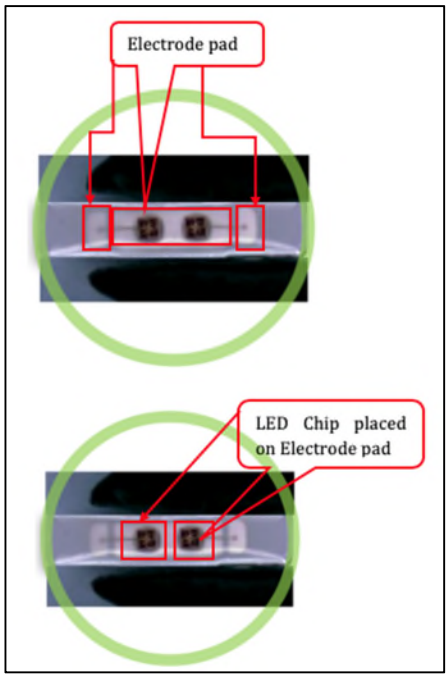
SMD LED. Each Defendant individually manufactures, sells, and distributes the '300 Accused Products.

176. Defendants' 0.2W 6014 White PKG SMD LED is a non-limiting example of a light source that meets all limitations of claim 10 of the '300 Patent, either literally or equivalently.

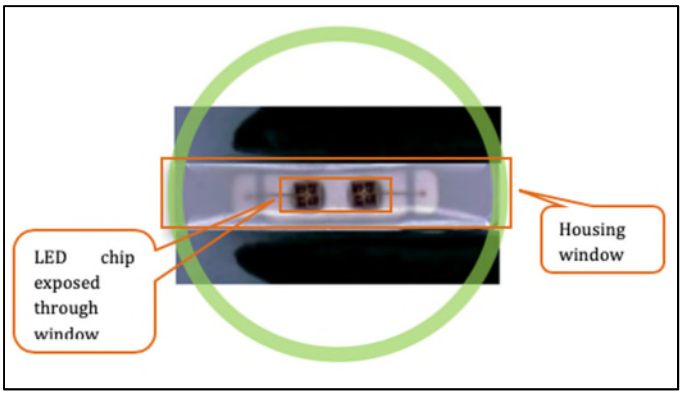
177. Defendants' 0.2W 6014 White PKG SMD LED is a light-emitting diode package.



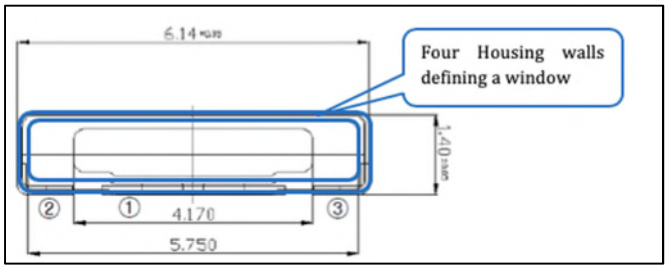
178. Defendants' 0.2W 6014 White PKG SMD LED comprises an electrode pad on which a chip is placed.



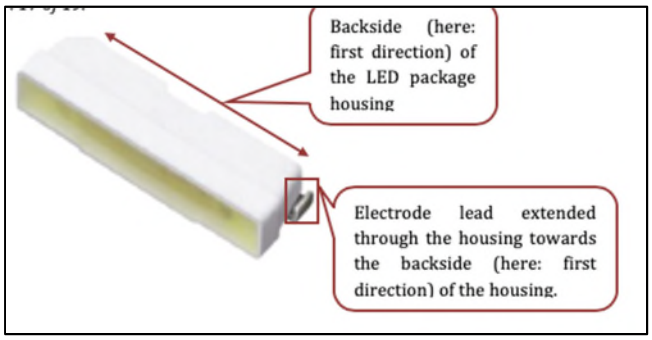
179. Defendants' 0.2W 6014 White PKG SMD LED comprises a housing having a window through which the chip is exposed.

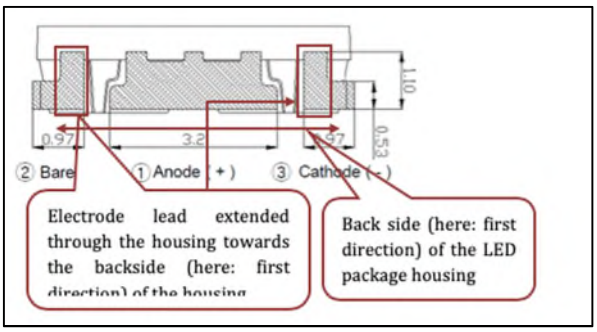


180. Defendants' 0.2W 6014 White PKG SMD LED comprises a housing wall defining the window.

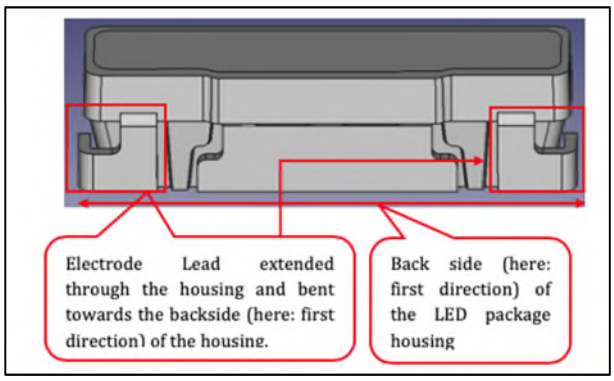


181. Defendants' 0.2W 6014 White PKG SMD LED comprises an electrode lead extended from the electrode pad through the housing to be exposed in a first direction of the housing, wherein the electrode lead is bent to an outside surface of the housing at through the housing.





182. Defendants' 0.2W 6014 White PKG SMD LED comprises a bottom surface of the housing with a first bottom surface and a second bottom surface having a first recessed space in a top direction of the housing so that the electrode lead is arranged in the first recessed space.



Willful Infringement

183. Defendants have had actual knowledge of their infringement of the '300 Patent at least as of receipt of Plaintiff's notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff's notice letter in the course of business.

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

185. Defendants' risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

186. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the '300 Patent. Defendants continue to infringe despite knowledge of Plaintiff's patent. Defendants have thus had actual notice of infringement of the '300 Patent and acted despite an objectively high likelihood that their actions constituted infringement of Plaintiff's valid patent rights, either literally or equivalently.

187. 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

188. 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.

189. Defendants' indirect infringement 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. e.g. Ex. P. Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '300 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use '300 Accused Products in numerous infringing applications.[6] As a non-limiting example, Defendants' customers such as

[6] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that

automobile makers and manufacturers of lighting and electronic devices incorporate Defendants' Accused Products in automobiles or electronic devices using Defendants' provided data sheets and technical manuals. (*See, e.g.*, Exhibit P) Incorporation of the Accused LEDs in automobiles, commercial or consumer lighting, or consumer electronic devices directly infringe the '300 patent. 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 to serve and develop the United States market for Defendants' infringing products.

190. 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

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

192. 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.

inform its customers of the specifications of the '300 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M; Exhibit P. Each data sheet provides instructions that LG knows to infringe the '300 patent when performed.

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

Technical Description

194. 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).

195. 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).

196. 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

197. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the '990 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, 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, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the '990 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary

infringing instrumentalities include the 5630 Series Mid power LED (including model number LEMWS59RB0LZ3B0C) and all other substantially similar products (collectively the "'990 Accused Products").

198. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants' infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of '990 Accused Products that are either known to Plaintiff or revealed during discovery.

199. Defendants' 5630 Series Mid power LED is a non-limiting example of a light source that meets all limitations of claim 12 of the '990 Patent, either literally or equivalently.

200. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale, or distribution of Defendants' 5630 Series Mid power LED. Each Defendant individually manufactures, sells, and distributes the '990 Accused Products. Defendants LG Electronics and LG Electronics USA utilizes the '990 Accused Products in its electronic products which are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the '990 Accused Products as part of a common business enterprise.

201. Defendants' 5630 Series Mid power LED comprises a light generating device.

202. Defendants' 5630 Series Mid power LED comprises a blue light emitting device that emits blue light with peak wavelength within a range from 460 nanometers (nm) to 480 nm.

203. Defendants' 5630 Series Mid power LED comprises an epoxy placed over the light emitting device.

204. Defendants' 5630 Series Mid power LED comprises an epoxy including a first type of phosphor and a second type of phosphor.

205. Defendants' 5630 Series Mid power LED 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. To obtain White LEDs, manufacturers use a multi-phosphor conversion model. *See* https://www.nature.com/articles/lsa20136.

Willful Infringement

206. Defendants have had actual knowledge of their infringement of the '990 Patent at least as of receipt of Plaintiff's notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff's notice letter in the course of business.

207. Defendants have had actual knowledge of the '990 Patent due to their relationship with Intellectual Discovery Co. Ltd. ("Intellectual Discovery"), the former owner of Plaintiff's patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff's patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the '990 Patent.

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

209. Defendants' risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

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

211. 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

212. Defendants have induced and 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.

213. Defendants' indirect infringement 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. (*See, e.g.*, Exhibit N) Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '990 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '990 Accused Products in numerous infringing applications.[7] As a non-limiting example, Defendants'

[7] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that

customers such as automobile makers and manufacturers of lighting and electronic devices incorporate Defendants' Accused Products in automobiles or electronic devices using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in automobiles, commercial or consumer lighting, or consumer electronic devices directly infringe directly infringe the '990 patent. 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 to serve and develop the United States market for Defendants' infringing products.

214. 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 9,209,373

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

216. 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.

inform its customers of the specifications of the '990 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M; Exhibit N. Each data sheet provides instructions that LG knows to infringe the '990 patent when performed.

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

Technical Description

218. 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 assemble 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).

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

> the PLCC package l08 comprises a plastic housing 112 molded around a lead frame 120. As can be seen in FIGS. lA and lB, 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 l08 on a single package carrier 104." (col. 2, ll. 54-61).

220. 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

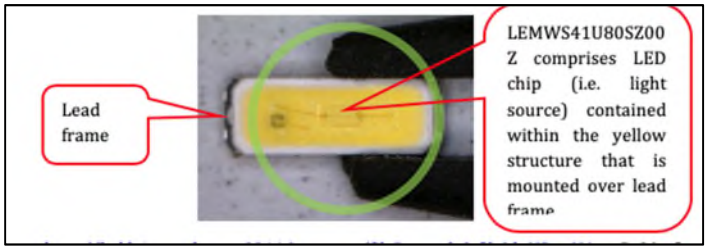
221. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the '373 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, including through making, using (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the '373 Patent. Defendants, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the '373 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include the LEMWS41U80SZ00Z LED, and all other substantially similar products (collectively the "'373 Accused Products").

222. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants' infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of '373 Accused Products that are either known to Plaintiff or revealed during discovery.

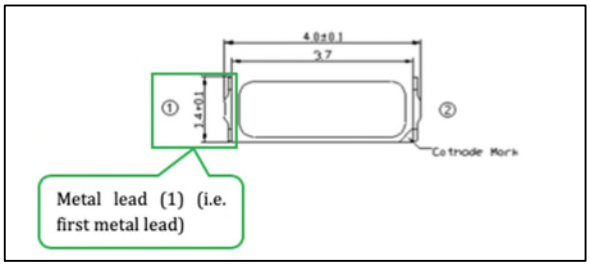
223. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale, or distribution of Defendants' LEMWS41U80SZ00Z LED. Each Defendant individually manufactures, sells, and distributes the '373 Accused Products. Defendants LG Electronics and LG Electronics USA utilizes the '373 Accused Products in its electronic products which are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the '373 Accused Products as part of a common business enterprise.

224. Defendants' LEMWS41U80SZ00Z LED is a non-limiting example of a light source that meets all limitations of claim 13 of the '373 Patent, either literally or equivalently.

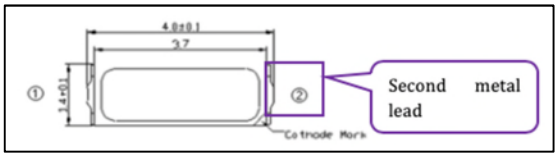
225. Defendants' LEMWS41U80SZ00Z LED has a lead frame with a light source mounted thereto:



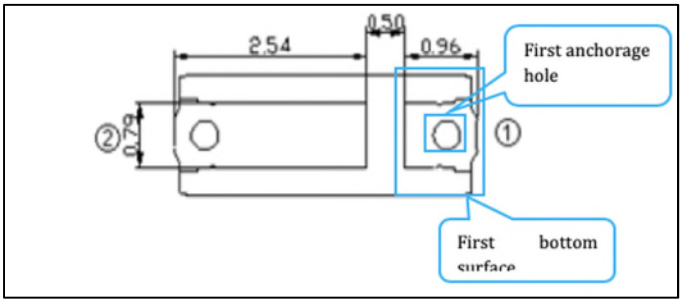
226. Defendants' LEMWS41U80SZ00Z LED has a first metal lead with a first bottom surface extending to a first side configured to be a first electrical terminal for the light source:



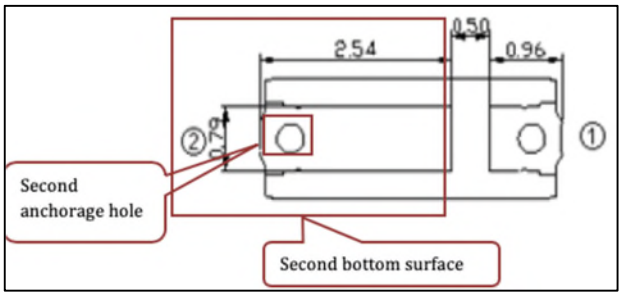
227. Defendants' LEMWS41U80SZ00Z LED has a second metal lead with a second bottom surface extending to a second side configured to be a second electrical terminal for the light source:



228. Defendants' LEMWS41U80SZ00Z LED has a first anchorage hole on the first bottom surface:

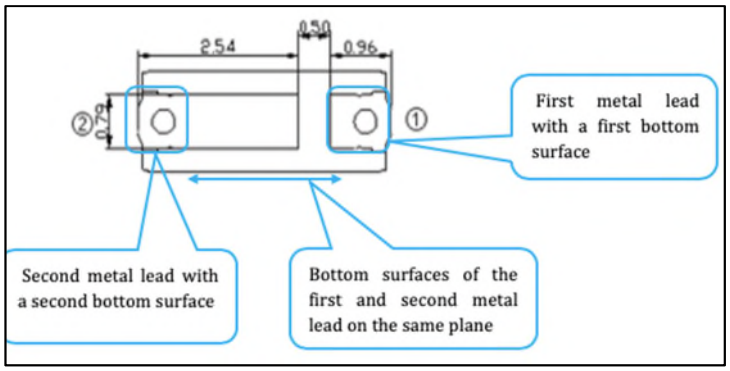


229. Defendants' LEMWS41U80SZ00Z LED has a second anchorage hole on the second bottom surface:

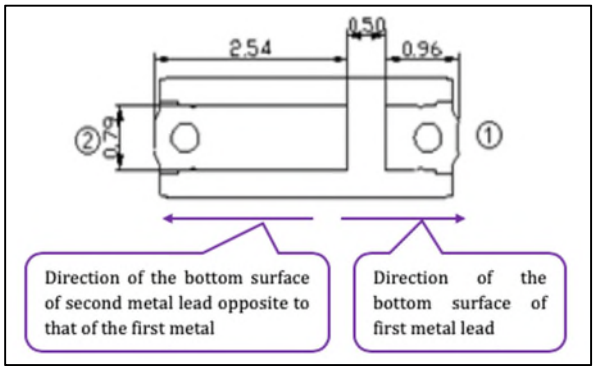


230. Defendants' LEMWS41U80SZ00Z LED has a heat sink comprising a lead frame cavity that is configured to have the light source mounted therein and reflect light emitted by the light source, the heat sink physically separated from the second metal lead and disposed between

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 the same plane:



231. Defendants' LEMWS41U80SZ00Z LED has first and bottom surfaces that extend in opposite directions:



Willful Infringement

232. Defendants have had actual knowledge of their infringement of the '373 Patent at least as of receipt of Plaintiff's notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff's notice letter in the course of business.

233. Defendants have had actual knowledge of the '373 Patent due to their relationship with Intellectual Discovery Co. Ltd. ("Intellectual Discovery"), the former owner of Plaintiff's patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government

and prominent Korean companies, including Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff's patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the '373 patent.

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

235. Defendants' risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

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

237. 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

238. 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.

239. Defendants' indirect infringement 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. (*See, e.g.*, Exhibit Q) Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '373 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '373 Accused Products in numerous infringing applications.[8] As a non-limiting example, Defendants' customers such as automobile makers and manufacturers of lighting or consumer electronic devices incorporate Defendants' Accused Products in automobiles, consumer or commercial lighting, or electronic devices using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in automobiles, commercial or consumer lighting, or consumer electronic devices directly infringe the '373 patent. 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 to serve and develop the United States market for Defendants' infringing products.

240. 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.

[8] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that inform its customers of the specifications of the '373 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M; Exhibit Q. Each data sheet provides instructions that LG knows to infringe the '373 Patent when performed.

COUNT NINE
INFRINGEMENT OF U.S. PATENT 9,882,094

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

242. 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.

243. Plaintiff is the assignee and owner of all rights, title, and interest to the ’094 Patent, including the right to recover for past infringement, and has the legal right to enforce the patent, sue for infringement, and seek equitable relief and damages.

Technical Description

244. 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).

245. 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).

246. 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).

247. 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).

248. 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).

249. 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).

250. 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.* 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

251. Defendants, without authorization or license from Plaintiff, have been and are directly infringing the ’094 Patent, either literally or equivalently, as infringement is defined by

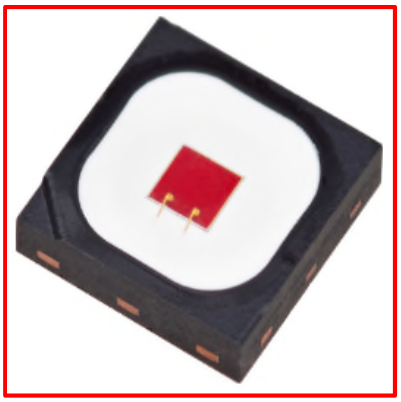
35 U.S.C. § 271, including through making, using, (including for testing purposes), selling and offering for sale methods and articles infringing one or more claims of the ’094 Patent. Defendants, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the ’094 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include the LERRS37G13TM01 LED, and all other substantially similar products (collectively the “’094 Accused Products”).

252. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants’ infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of ‘094 Accused Products that are either known to Plaintiff or revealed during discovery.

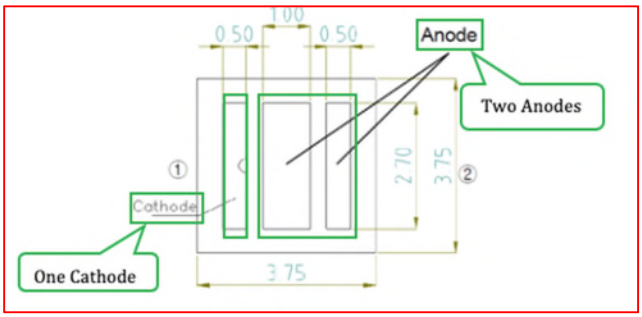
253. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale, or distribution of Defendants’ LERRS37G13TM01 LED. Each Defendant individually manufactures, sells, and distributes the ’094 Accused Products. Defendants LG Electronics and LG Electronics USA utilizes the ’094 Accused Products in its electronic products, including as a non-limiting example LG smartphones, TVs, and other consumer electronics, which are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the ’094 Accused Products as part of a common business enterprise.

254. Defendants’ LERRS37G13TM01 LED is a non-limiting example of a light source that meets all limitations of claim 1 of the ’094 Patent, either literally or equivalently.

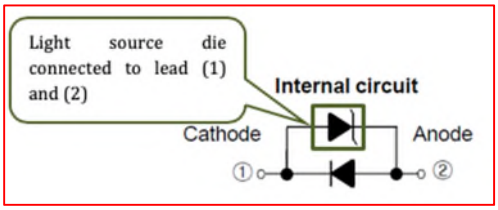
255. Defendants’ LERRS37G13TM01 LED is a light source packaging:



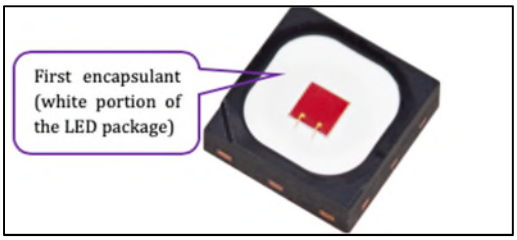
256. Defendants' LERRS37G13TM01 LED comprises a plurality of leads:



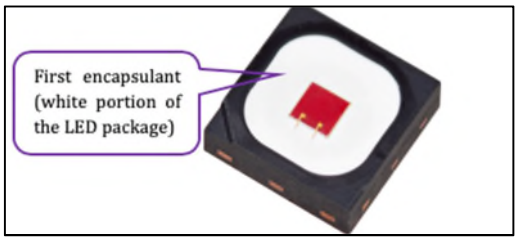
257. Defendants' LERRS37G13TM01 LED has at least one light source die attached on one of the plurality of leads:



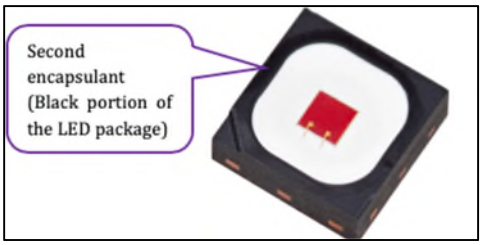
258. Defendants' LERRS37G13TM01 LED has a first encapsulant encapsulating a first portion of the leads defining an inner reflective body, where the first encapsulant consists of an inner reflective surface, a bottom reflective portion, and an outer reflective surface, and encapsulates the first portion of the leads in the bottom reflective portion. A white encapsulant is a known reflector and surrounds the LED.



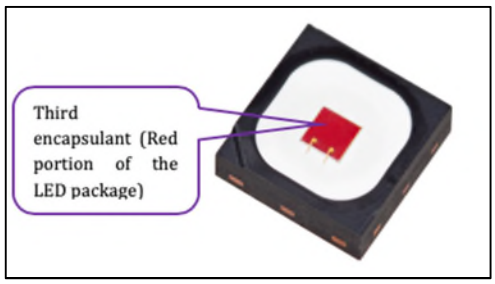
259. Defendants' LERRS37G13TM01 LED has a reflector defined by the inner reflective surface. White is a known reflector and as shown defines an inner reflective surface:



260. Defendants' LERRS37G13TM01 LED has a second encapsulant encapsulating 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:



261. Defendants' LERRS37G13TM01 LED has a third encapsulant encapsulating the light source die and the inner reflective surface in a way that the top surface of the third encapsulant is below a top surface of the inner reflective body:



Willful Infringement

262. Defendants have had actual knowledge of their infringement of the ’094 Patent at least as of receipt of Plaintiff’s notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff’s notice letter in the course of business.

263. Defendants have had actual knowledge of the ’094 Patent due to their relationship with Intellectual Discovery Co. Ltd. (“Intellectual Discovery”), the former owner of Plaintiff’s patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff’s patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the ‘094 patent.

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

265. Defendants’ risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

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

267. 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

268. 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.

269. Defendants' indirect infringement 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. (*See, e.g.*, Exhibit R) Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '094 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '094 Accused Products in numerous infringing applications.[9] As a non-limiting example, Defendants'

[9] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that

customers such as automobile makers and manufacturers of electronic devices incorporate Defendants' Accused Products in automobiles or electronic devices using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in automobiles or electronic devices directly infringe the '094 patent. 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 to serve and develop the United States market for Defendants' infringing products.

270. 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 9,887,338

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

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

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

inform its customers of the specifications of the '094 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M; Exhibit R. Each data sheet provides instructions that LG knows to infringe the '094 patent when performed.

Technical Description

274. 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).

275. 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).

276. 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).

277. 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).

278. 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).

279. Figure 4 of the ’338 Patent illustrates “an optional heat sink 318 on the surface opposite from the LED 300.” (col. 3, ll. 24-25).

280. 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).

281. 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

282. Defendants, without authorization or license from Plaintiff, have been and are directly infringing claim 3 of the '338 Patent, either literally or equivalently, as infringement is defined by 35 U.S.C. § 271, 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, individually and operating as part of a common business enterprise, develop, design, manufacture, and distribute LED products that infringe one or more claims of the '338 Patent. Defendants are thus liable for direct infringement pursuant to 35 U.S.C. § 271. Exemplary infringing instrumentalities include the LG 7070 White SMD LED (including model number LEMWA77670H) and other substantially similar products (collectively the "'338 Accused Products").

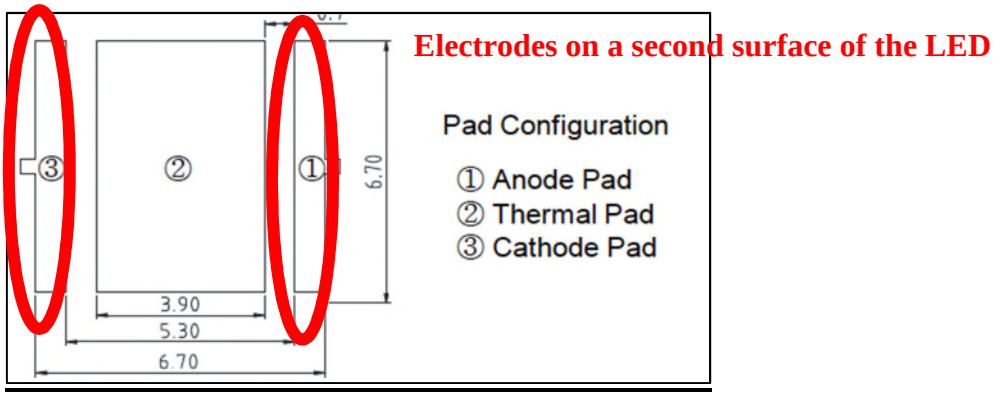
283. Plaintiff names this exemplary infringing instrumentality to serve as notice of Defendants' infringing acts, however Plaintiff reserves the right to include additional infringing products into the definition of '338 Accused Products that are either known to Plaintiff or revealed during discovery.

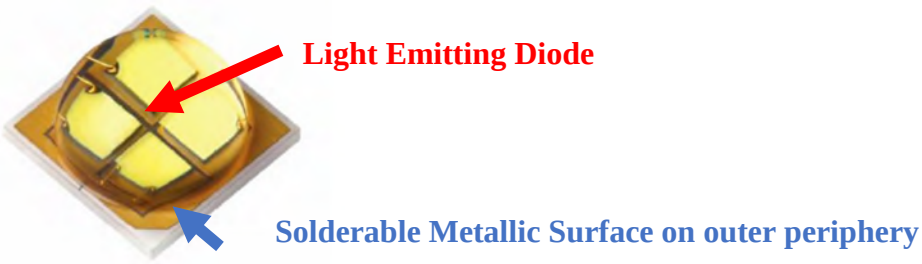
284. Defendants are liable for direct infringement pursuant to 35 U.S.C. § 271 for the development, design, manufacture, sale or distribution of Defendants' LG 7070 White SMD LED. Each Defendant individually manufactures, sells, and distributes the '338 Accused

Products. Defendants LG Electronics and LG Electronics USA utilizes the '338 Accused Products in its electronic consumer products, including as a non-limiting example LG smartphones, TVs and other consumer electronics, which are manufactured, sold, and distributed in the United States. Defendants develop, design, manufacture, and distribute the '338 Accused Products as part of a common business enterprise.

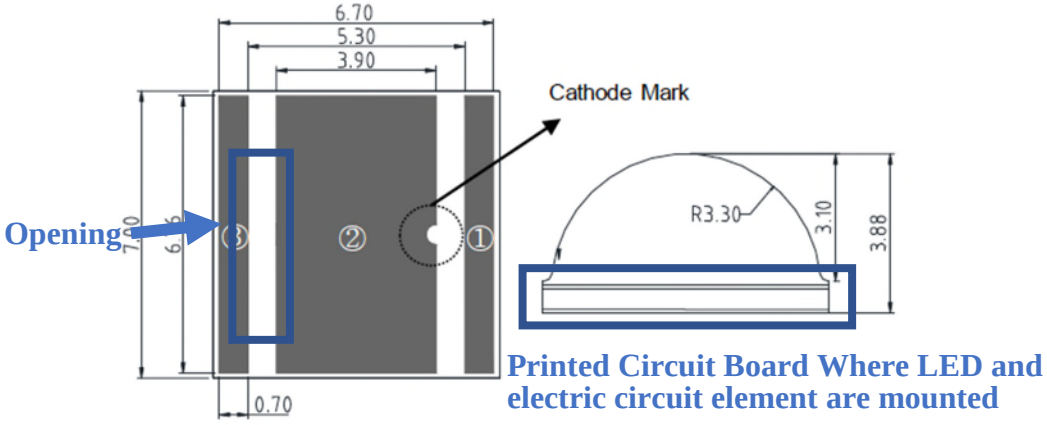
285. Defendants' LG 7070 White SMD LED is a non-limiting example of a light source that meets all limitations of claim 3 of the '338 Patent, either literally or equivalently.

286. Defendants' LG 7070 White SMD LED is made by a method of making an electronic assembly comprising forming a solderable metallic surface on a Light Emitting Diode such that the solderable metallic surface is only within an outer periphery of the Light Emitting Diode, the solderable metallic surface being a first surface of the Light Emitting Diode other than a second surface of the Light Emitting Diode having electrodes:

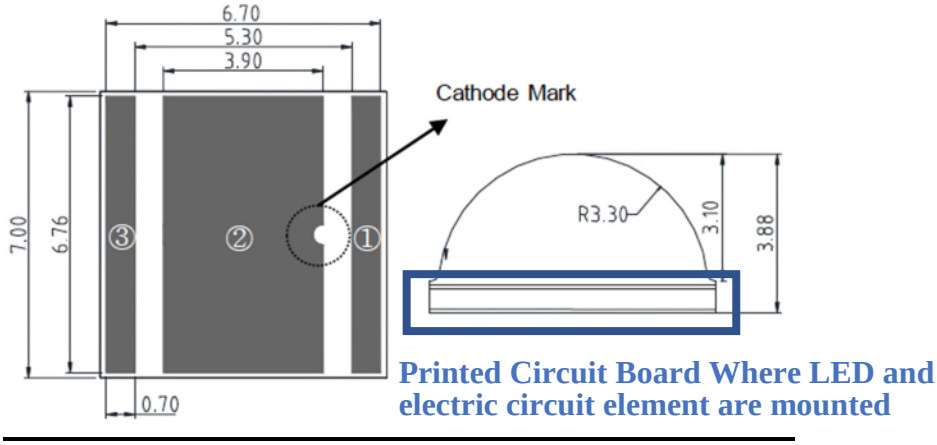




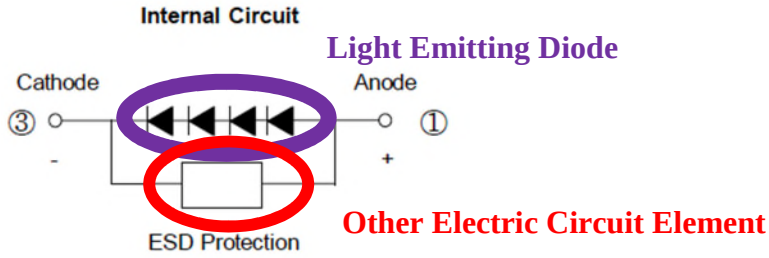
287. Defendants' LG 7070 White SMD LED is made by forming an opening on a printed circuit board:



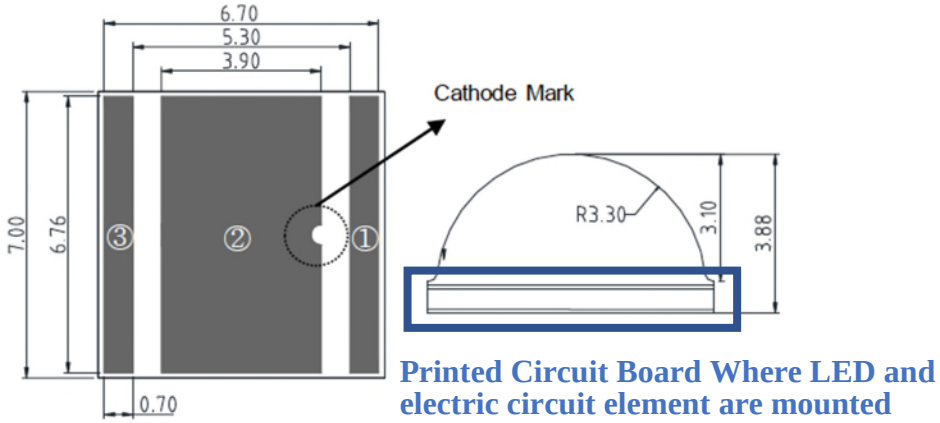
288. Defendants' LG 7070 White SMD LED is made by mounting the solderable metallic surface across the opening and in direct contact with a first surface of the printed circuit board:

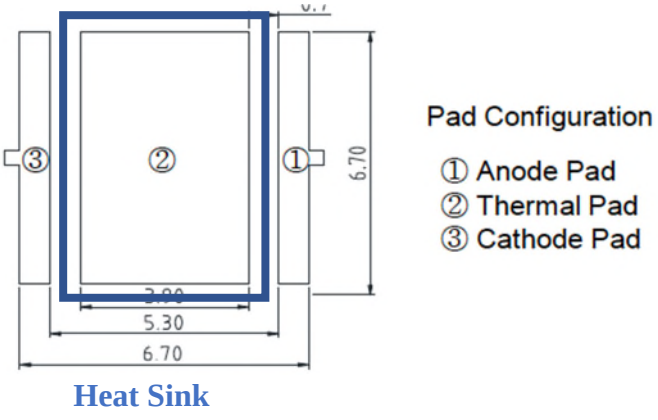


289. Defendants' LG 7070 White SMD LED is made by mounting at least one electric circuit element other than the Light Emitting Diode on the first surface of the printed circuit board:



290. Defendants' LG 7070 White SMD LED is made by disposing a heat sink on a second surface of the printed circuit board, where the second surface is opposed to the first surface and the solderable metallic surface is thermally connected to the heat sink through the opening to dissipate heat generated by the Light Emitting Diode:





Willful Infringement

291. Defendants have had actual knowledge of their infringement of the ’338 Patent at least as of receipt of Plaintiff’s notice letter dated May 25, 2019. As a common business enterprise, each LG entity would have been aware of Plaintiff’s notice letter in the course of business.

292. Defendants have had actual knowledge of the ’338 Patent due to their relationship with Intellectual Discovery Co. Ltd. (“Intellectual Discovery”), the former owner of Plaintiff’s patent portfolio. Defendants owned a 20% stake in Intellectual Discovery. (Exhibit K) Intellectual Discovery is a Korean patent aggregator jointly owned by the Korean government and prominent Korean companies, including Defendants. Intellectual Discovery focuses on pooling patents to protect South Korean industry, including Korean technology companies such as LG. Additionally, Intellectual Discovery sought to protect LG from enforcement of Plaintiff’s patent portfolio. Therefore, LG would have had actual knowledge of Intellectual Discovery's patent portfolio, including the ‘338 Patent.

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

294. Defendants’ risk of infringement of the Asserted Patents was either known or was so obvious that it should have been known to Defendants.

295. Notwithstanding this knowledge, Defendants have knowingly or with reckless disregard willfully infringed the ’338 Patent. Defendants continue to infringe despite knowledge of Plaintiff’s patent. Defendants have thus had actual notice of infringement of the ’338 Patent

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

296. 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

297. Defendants have induced and 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.

298. Defendants' indirect infringement 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. (*See, e.g.*, Exhibit S) Defendants' indirect infringement additionally includes marketing their products for import by their customers into the United States. 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 who purchase the '338 Accused Products will use those products for their intended purpose. For example, Defendants' United States website instructs customers to use the '338 Accused Products in numerous infringing applications.[10] As a non-limiting example, Defendants' customers incorporate Defendants' Accused Products in consumer electronic devices such as

[10] LG Innotek's website http://www.lginnotek.com provides data sheet and product manuals that inform its customers of the specifications of the '338 Accused Products and encourage their customers to infringe. *See, e.g.*, Exhibit M; Exhibit S. Each data sheet provides instructions that LG knows to infringe the '338 patent when performed.

smartphones, TVs, and electronic displays using Defendants' provided data sheets and technical manuals. Incorporation of the Accused LEDs in electronic devices directly infringe the '338 Patent. 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 to serve and develop the United States market for Defendants' infringing products.

299. 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

300. Plaintiff 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

301. 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. A determination that one or more claims of the Asserted Patents is infringed by Defendants, both literally and under the doctrine of equivalents;

B. A determination that one or more claims of the Asserted Patents is indirectly infringed by Defendants;

C. An award of 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. For Defendants to be permanently enjoined pursuant to 35 U.S.C. § 283;

E. A finding that this case is exceptional pursuant to 35 U.S.C. § 285;

F. A determination that Defendants' infringements were willful;

G. An award of enhanced damages against Defendants pursuant to 35 U.S.C. § 284;

H. An award of reasonable attorneys' fees; and

I. An award of any such other relief to Plaintiff as the Court deems just and proper.

Dated: April 14, 2021

Respectfully Submitted,

/s/ Edward M. Lilly

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