UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF FLORIDA

SIGNIFY NORTH AMERICA CORPORATION and SIGNIFY HOLDING B.V. Plaintiffs, vs. ROBE LIGHTING INC. and ROBE LIGHTING S.R.O. Defendants.	Civil No. _____ **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiffs Signify North America Corporation and Signify Holding B.V. (collectively, "Signify") for their complaint against Robe Lighting, Inc. and Robe Lighting s.r.o. (collectively, "Defendants" or "Robe") allege as follows:

NATURE OF THE ACTION

1. This is a civil action for patent infringement arising under the patent laws of the United States, 35 U.S.C. § 1 *et seq*. including 35 U.S.C. § 271, which gives rise to the remedies specified under 35 U.S.C. §§ 281 and 283-285.

THE PARTIES

2. Plaintiff Signify North America Corporation is a corporation organized and existing under the laws of Delaware with its principal place of business at 200 Franklin Square Drive, Somerset, New Jersey 08873. Signify North America Corporation is registered to do business in the Commonwealth of Massachusetts and has a place of business at 3 Burlington Woods Drive, Burlington, Massachusetts 01803.

3. Plaintiff Signify Holding B.V. is a corporation organized and existing under the laws of the Netherlands with its registered office at High Tech Campus 48, 5656 AE Eindhoven, The Netherlands.

4. On information and belief, Defendant Robe Lighting Inc. is a corporation organized and existing under the laws of Florida with a place of business at 3410 Davie Road, Suite 401, Davie, Florida 33314.

5. On information and belief, Defendant Robe Lighting s.r.o. is a corporation organized and existing under the laws of the Czech Republic with a place of business at Házovice 2090, 756 61 Rožnov pod Radhoštěm, Czech Republic, ID No. 640 88 791.

JURISDICTION AND VENUE

6. This Court has subject-matter jurisdiction over this patent infringement action pursuant to 28 U.S.C. §§ 1331 and 1338.

7. This Court has personal jurisdiction over Defendants, on information and belief, for at least the following reasons: (i) Defendants have committed acts of patent infringement in this District; (ii) Defendants regularly conduct business, solicit business, and/or derive substantial revenue from products provided within this District, including products that infringe Signify's patented technology; (iii) Defendant Robe Lighting, Inc. has a place of business within this District at 3410 Davie Road, Suite 401, Davie, Florida 33314; and (iv) products manufactured and sold by Defendant Robe Lighting s.r.o. are imported into this District.

8. Venue properly lies in this District. Pursuant to 28 U.S.C. § 1400, on information and belief, Defendant Robe Lighting, Inc. has committed acts of patent infringement in this District and has a regular and established place of business in this District at 3410 Davie Road, Suite 401,

Davie, Florida 33314. Pursuant to 28 U.S.C. § 1391(c)(3), on information and belief, Defendant Robe Lighting s.r.o. is a foreign corporation and may be sued in this District.

THE PATENTS-IN-SUIT

9. Signify is a global market leader with recognized expertise in the development, manufacturing, and application of innovative LED lighting solutions.

10. To protect its intellectual property resulting from its significant investments, Signify applied for and obtained numerous patents directed to various LED inventions and technologies. For example, Signify's LED-related patents include U.S. Patent Nos. 6,478,453, 6,636,003, 7,557,521, 7,802,902, 7,806,558, and 8,414,138 (collectively, the "Patents-in-Suit").

11. U.S. Patent No. 6,478,453 ("the '453 Patent"), titled "Luminaire," was duly and legally issued by the United States Patent and Trademark Office on November 12, 2002. Plaintiff Signify Holding B.V. is the assignee and owner of all right, title, and interest in the '435 Patent, a copy of which may be found at http://patft1.uspto.gov/netacgi/nph-Parser?patentnumber=6478453.

12. U.S. Patent No. 6,636,003 ("the '003 Patent"), titled "Apparatus and Method for Adjusting the Color Temperature of White Semiconductor Light Emitters," was duly and legally issued by the United States Patent and Trademark Office on October 21, 2003. Plaintiff Signify North America Corporation is the assignee and owner of all right, title, and interest in the '003 Patent, a copy of which may be found at http://patft1.uspto.gov/netacgi/nph-Parser?patentnumber=6636003.

13. U.S. Patent No. 7,557,521 ("the '521 Patent"), titled "LED Power Control Methods and Apparatus," was duly and legally issued by the United States Patent and Trademark Office on July 7, 2009. Plaintiff Signify North America Corporation is the assignee and owner of all right,

title, and interest in the '521 Patent, a copy of which may be found at http://patft1.uspto.gov/netacgi/nph-Parser?patentnumber=7557521.

14. U.S. Patent No. 7,802,902 ("the '902 Patent"), titled "LEDs Lighting Fixtures," was duly and legally issued by the United States Patent and Trademark Office on September 28, 2010. Plaintiff Signify Holding B.V. is the assignee and owner of all right, title, and interest in the '902 Patent, a copy of which may be found at http://patft1.uspto.gov/netacgi/nph-Parser?patentnumber=7802902.

15. U.S. Patent No. 7,806,558 ("the '558 Patent"), titled "Methods and apparatus for providing uniform projection lighting," was duly and legally issued by the United States Patent and Trademark Office on October 5, 2010. Plaintiff Signify Holding B.V. is the assignee and owner of all right, title, and interest in the '558 Patent, a copy of which may be found at http://patft1.uspto.gov/netacgi/nph-Parser?patentnumber=7806558.

16. U.S. Patent No. 8,414,138 ("the '138 Patent"), titled "Illumination Device" was duly and legally issued by the United States Patent and Trademark Office on April 9, 2013. Plaintiff Signify Holding B.V. is the assignee and owner of all right, title, and interest in the '138 Patent, a copy of which may be found at http://patft1.uspto.gov/netacgi/nph-Parser?patentnumber=8414138.

DEFENDANTS' ADOPTION OF SIGNIFY'S PATENTED TECHNNOLOGIES

17. Robe has been aware of Signify's patented technologies since at least 2006, as the parties were previously involved in a global licensing arrangement lasting over a decade.

18. In August 2006, Color Kinetics Incorporated (now part of Signify) and Robe entered into a global licensing agreement granting Robe access to Color Kinetics' complete patent portfolio. The global license applied to sales of Robe products in all markets covered by Color

Kinetics' patent portfolio. Robe's website robe.cz still promotes a press release announcing news of the license agreement, the text of which is reproduced below:

> Boston, MA, USA and Hazovice, Czech Republic – August 29, 2006 – Color Kinetics Incorporated (NASDAQ: CLRK) and Robe Show Lighting, respective market leaders in LED and entertainment lighting, today announced a global licensing agreement whereby Robe will have access to Color Kinetics' complete patent portfolio, enabling the development and sale of its LED Series and Anolis product lines.
>
> Robe is a 15-year manufacturer of moving light systems that are widely used in theatrical, touring, television and other entertainment applications. Its LED-based product lines apply Color Kinetics' proprietary control methods to generate millions of colors and color-changing effects. The global license will apply to sales of Robe products in all markets covered by Color Kinetics' patent portfolio.
>
> *"The entertainment lighting market was among the first to embrace intelligent LED lighting technology, and with ever-increasing LED performance, we believe that demand will grow in stride with a host of new, exciting applications. Robe is the latest in a growing number of major entertainment lighting companies to recognize this opportunity and the value of licensing our well-established international patent portfolio. We're very pleased to enable their efforts,"* said Bill Sims, President and CEO, Color Kinetics.
>
> *"The early commercial success of our LED Series and Anolis products suggests that LEDs are perfectly suited for a wide range of uses in entertainment and themed environments,"* said Josef Valchář, General Manager and CEO, Robe Show Lighting. *"We recognize that LED lighting will be an important focus for Robe moving forward, and our commitment is underscored by our decision to align with Color Kinetics"*.

(Press release available at: https://www.robe.cz/news/color-kinetics-amp-robe-show-lighting-announce-licensing-agreement/, visited on November 5, 2020) (attached as Exhibit 1).

19. Color Kinetics' patent portfolio included the '003 Patent, which is one of the Patents-in-Suit in this action. Under the licensing agreement, Robe paid royalties in connection with the sale of its LED products, including on products that are accused of infringing the '003 Patent in this action.

20. Robe extended the term of the licensing agreement in 2013. The agreement then expired in 2017, and Robe did not renew. However, on information and belief, Robe continues to

incorporate Signify's patented technologies into its products. Further, on information and belief, Robe continues to market and sell previously licensed products, substantially unchanged, after the license expired, without paying royalties to Signify.

21. In or about May 2018, Signify (then known as Philips Lighting) sent a letter to Robe notifying it that Robe's products continued to utilize Signify's patented technologies. Among other patents, the May 2018 letter specifically noted Signify's patent infringement concerns regarding the '003 Patent, '453 Patent, and '558 Patent.

22. In or about July 2018, counsel for Signify and Robe met in West Palm Beach, Florida to discuss Signify's patent infringement concerns and Robe's products.

23. From about September 2018 through at least March 2019, counsel for Signify and Robe engaged in further discussions via email and teleconference regarding Signify's patent infringement concerns and Robe's products.

24. Following said correspondence and discussions between the parties, Robe has continued its willful infringement by manufacturing, using, offering to sell, selling, and/or distributing lighting products incorporating Signify's patented technologies. These facts, as summarized herein, reflect an egregious case of willful infringement by Robe.

COUNT ONE

INFRINGEMENT OF U.S. PATENT NO. 6,478,453

25. Signify incorporates by reference the allegations in paragraphs 1-24 as if fully set forth herein.

26. On information and belief, Defendants have infringed and are infringing claims of the '453 Patent, including at least claim 13, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

27. Claim 13 of the ’453 Patent recites:

> A luminaire for projecting an image by a light beam, comprising:
>
> a housing having a light-emitting diode and an optical system for directing light generated by the light-emitting diode,
>
> an image-forming surface located along the light beam,
>
> said optical system including a collimating element for collimating the light and a focusing lens for focusing the light and forming the light beam,
>
> said collimating element being located between the light-emitting diode and the image-forming surface, and
>
> the light-emitting diode being mounted on a metal-core printed circuit board.

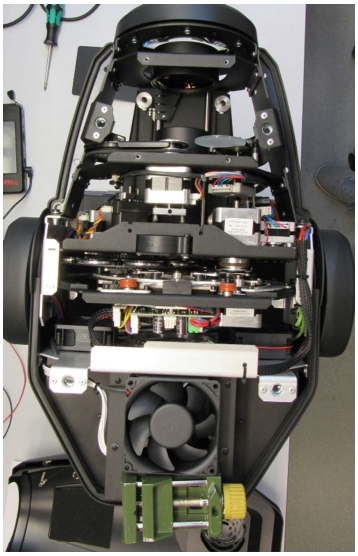
28. On information and belief, Defendants have directly infringed and are directly infringing claim 13 of the ’453 Patent by making, using, offering to sell, selling, and/or importing at least DL4S and DL7S products in this District and elsewhere in the United States.

Infringing DL4S products

29. Defendants provide a specification sheet for DL4S Profile (“DL4S”) products on Defendants’ website at https://cdn.robe.cz/fileadmin/user_upload/product_pdf/en_dl4s_profile.pdf. The following image from the specification sheet shows a DL4S product:

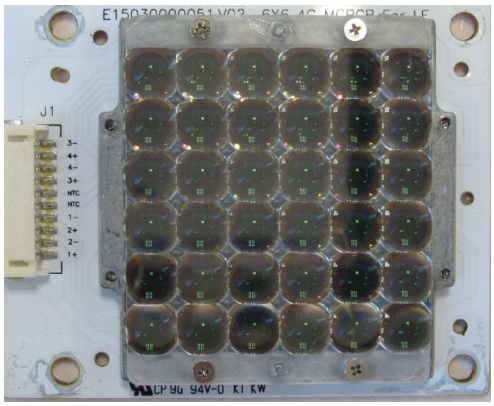
30. On information and belief, DL4S products include a luminaire for projecting an image by a light beam.

31. On information and belief, DL4S products include a housing having a light-emitting diode and an optical system for directing light generated by the light-emitting diode; for example, DL4S products include a housing that encloses three LED matrices, each LED matrix including multiple LEDs, and an optical system for directing light generated by the LED matrices.

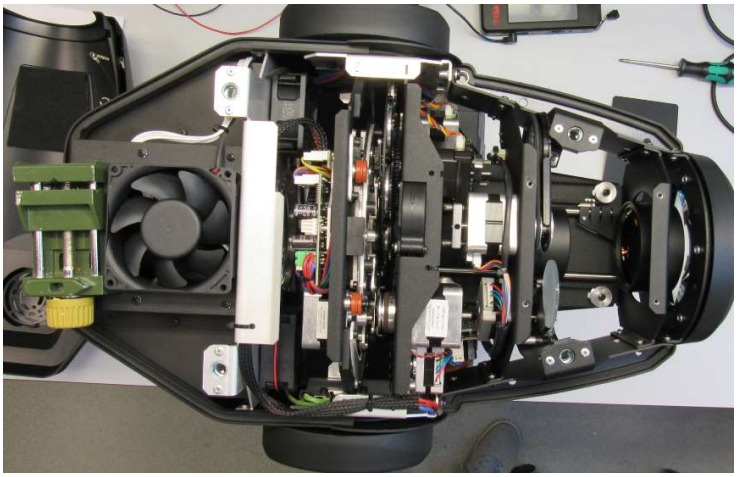


32. On information and belief, DL4S products include an image-forming surface located along the light beam; for example, DL4S products include a gobo wheel located along the light beam path.

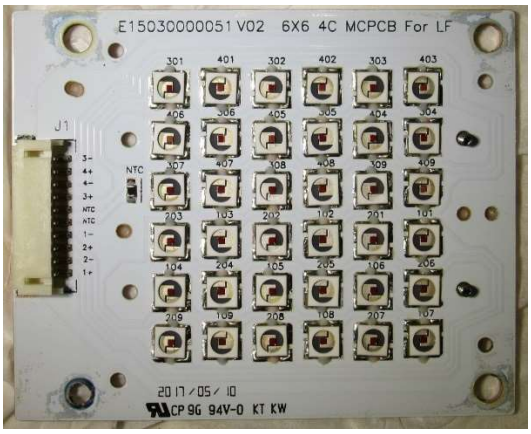
33. On information and belief, the optical system includes a collimating element for collimating the light and a focusing lens for focusing the light and forming the light beam; for example, the optical system includes an Appotronics light engine which includes collimating device arrays, respectively situated over each LED matrix, for collimating the light and a glass biconvex focusing lens for focusing the light and forming the light beam.



34. On information and belief, the collimating element is located between the light-emitting diode and the image-forming surface; for example, each collimating device array is located between the associated LED matrix and the Gobo wheel that forms the image.



35. On information and belief, the light-emitting diode is mounted on a metal-core printed circuit board; for example, each LED matrix is mounted on one of three metal-core printed circuit boards (MCPCB).



Infringing DL7S products

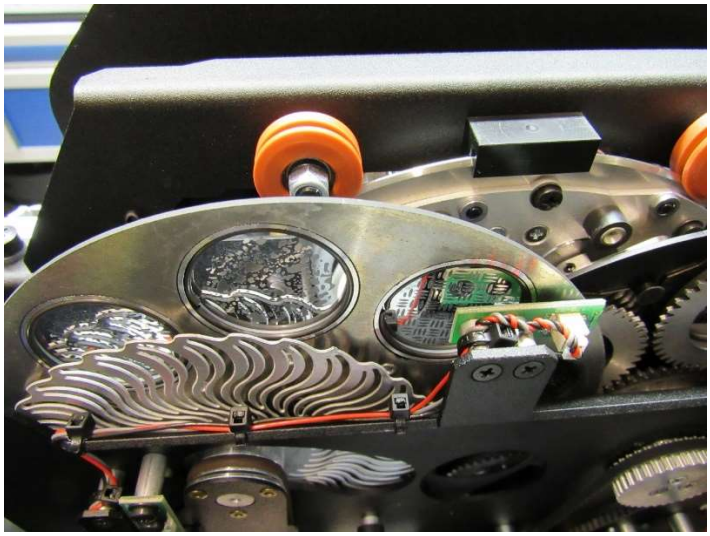
36. Defendants provide a specification sheet for DL7S Profile ("DL7S") products on Defendants' website at https://cdn.robe.cz/fileadmin/user_upload/product_pdf/en_dl7s_profile.pdf. The following image from the specification sheet shows a DL7S product:

37. On information and belief, DL7S products include a luminaire for projecting an image by a light beam.

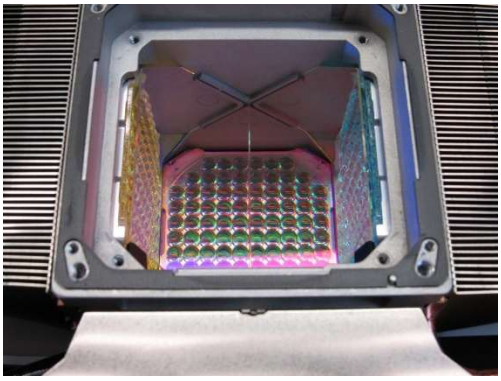
38. On information and belief, DL7S products include a housing having a light-emitting diode and an optical system for directing light generated by the light-emitting diode; for

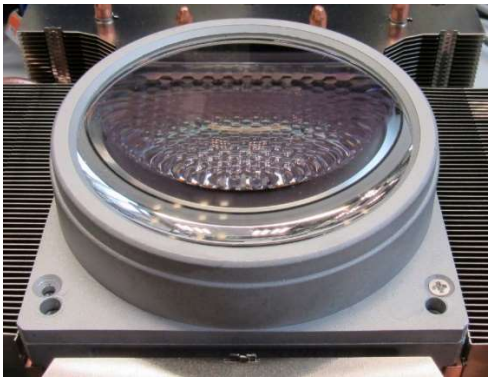
example, DL7S products include a housing that encloses three LED matrices and an optical system for directing light generated by the LED matrices.

39. On information and belief, DL7S products include an image-forming surface located along the light beam; for example, DL7S products include a gobo wheel located along the light beam path.



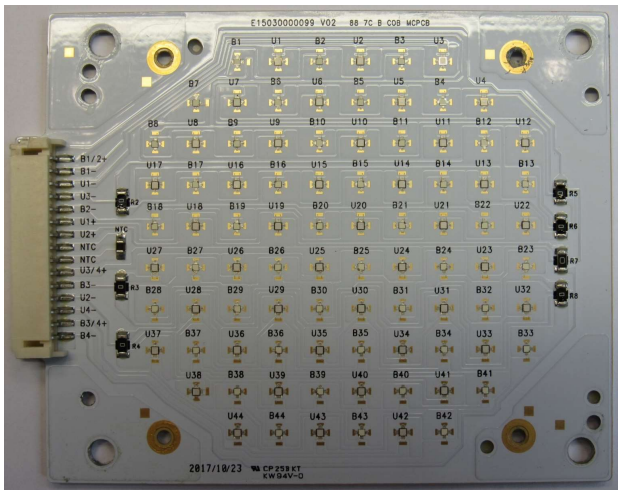
40. On information and belief, the optical system includes a collimating element for collimating the light and a focusing lens for focusing the light and forming the light beam; for example, the optical system includes an Appotronics light engine, which includes a collimating device array over each LED matrix for collimating the light, and a glass biconvex focusing lens for focusing the light and forming the light beam.





41. On information and belief, the collimating element is located between the light-emitting diode and the image-forming surface; for example, each collimating device array is respectively located between the associated LED matrix and the Gobo wheel that forms the image.

42. On information and belief, the light-emitting diode is mounted on a metal-core printed circuit board; for example, each LED matrix is mounted on one of three metal-core printed circuit boards (MCPCB).



43. The full extent of Defendants' infringement is not presently known to Signify. On information and belief, Defendants have made and sold, or will make and sell, products under different names or part numbers that infringe the '453 Patent in a similar manner. Signify makes this preliminary identification of infringing products and infringed claims in Count One without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identifications based on additional information obtained through discovery or otherwise.

44. Signify has suffered and continues to suffer damages as a result of Defendants' infringement of the '453 Patent in an amount to be determined at trial.

45. Defendants' infringement of the '453 Patent is causing irreparable harm for which Signify has no adequate remedy at law unless Defendants are enjoined by this Court. Under 35 U.S.C. § 283, Signify is entitled to a permanent injunction against further infringement of the '453 Patent.

46. On information and belief, Defendants have been aware of and have had notice and actual knowledge of the '453 Patent and its infringement of the '453 Patent since at least as early as May 2018, and Defendants' infringement of the '453 Patent has been willful. For example, Robe was notified on several occasions before the present action was filed that Defendants' products were infringing the '453 Patent. Defendants' pre-suit knowledge of the '453 Patent and failure to substantively address Signify's numerous notifications of infringement are sufficient to support a plausible inference that Defendants' infringement was willful and egregious, warranting enhancement of damages under 35 U.S.C. § 284, and attorneys' fees and costs incurred under 35 U.S.C. § 285.

COUNT TWO

INFRINGEMENT OF U.S. PATENT NO. 6,636,003

47. Signify incorporates by reference the allegations in paragraphs 1-46 as if fully set forth herein.

48. On information and belief, Defendants have infringed and are infringing claims of the '003 Patent, including at least claim 1, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

49. Claim 1 of the '003 Patent recites:

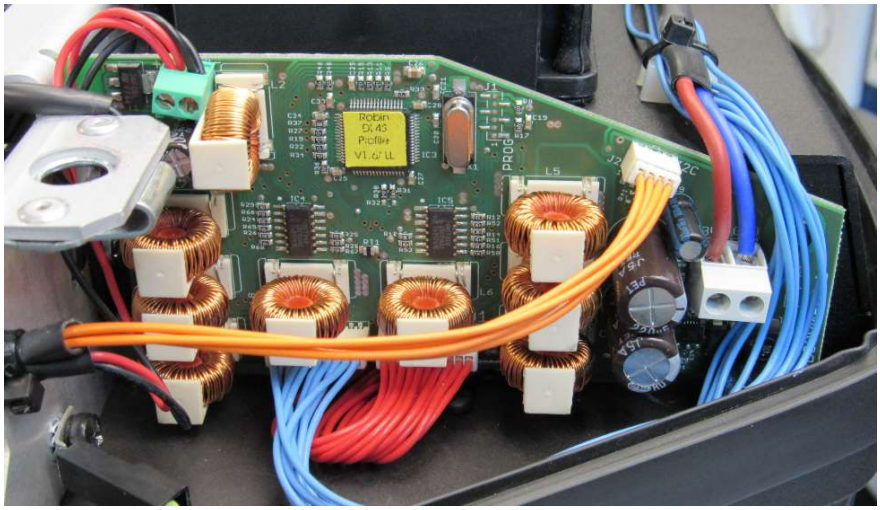
> A temperature adjustable LED arrangement comprising:
>
> at least one white LED;
>
> a first drive circuit operable to supply a first drive current to the at least one white LED such that a white light is output at a first intensity;
>
> at least one colored LED arranged such that a colored light is output from the at least one colored LED and combines with the white light to produce a resultant light having a color temperature; and
>
> a second drive circuit operable to supply a second drive current to the at least one colored LED such that the colored light is output at a second

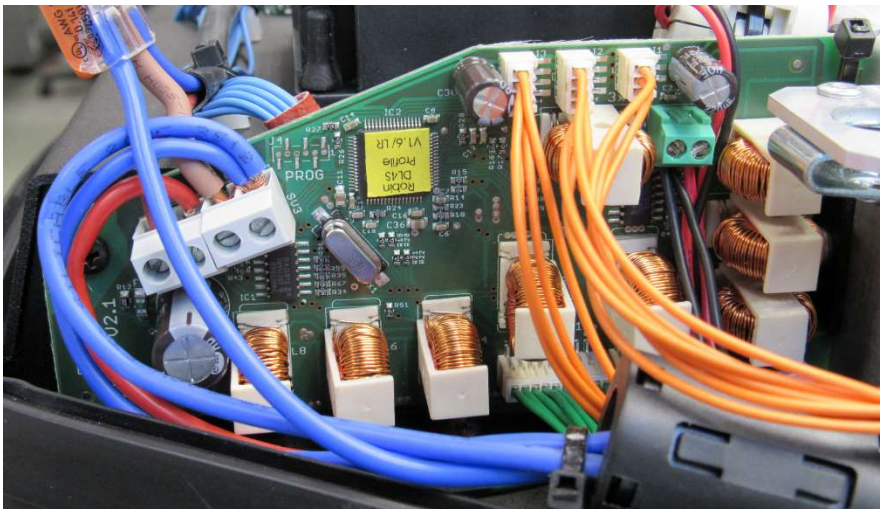
intensity, the second drive circuit being adjustable so as to adjust a level of the second drive current supplied so as to vary the color temperature of the resultant light; wherein the color temperature of the resultant light is adjustable between about 2500 to about 5000 degrees Kelvin.

50. On information and belief, Defendants have directly infringed and are directly infringing claim 1 of the ’003 Patent by making, using, offering to sell, selling, and/or importing at least DL4S, LEDBeam 150, Spiider, and Spikie products in this judicial district and elsewhere in the United States.

Infringing DL4S products

51. DL4S products contain two LED drivers, LED Driver LL and LED Driver LR:





52. Exhibit 2 depicts a circuit schematic of portions of the LED Driver LL ("LED Driver 1 of 2") and LED Driver LR ("LED Driver 2 of 2").

53. On information and belief, DL4S products include a temperature adjustable LED arrangement.

54. On information and belief, DL4S products include at least one white LED; for example, as stated in the specification sheet, DL4S products include a 480 Watt RGBW (red, green blue, and white) LED engine, which includes thirty-six white LEDs:

Light source type: 480 W RGBW LED engine

The white LEDs are arranged into four strings of nine white LEDs each, which are partially represented in Exhibit 2 as white LED string Phosphor1-1–Phosphor1-9 and white LED string Phosphor4-1–Phosphor4-9 (two white LED strings are omitted for conciseness).

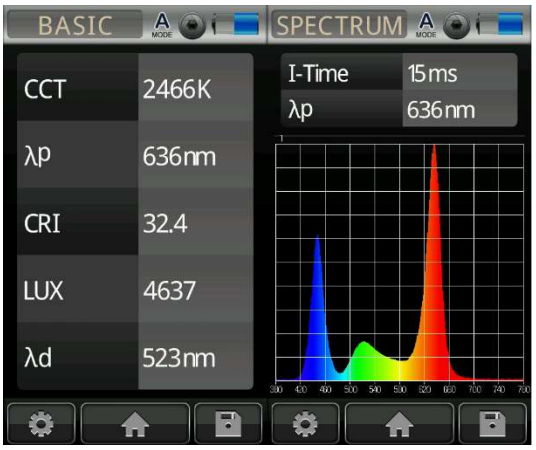
55. On information and belief, DL4S products include a first drive circuit operable to supply a first drive current to the at least one white LED such that a white light is output at a first intensity; for example, a Buck converter formed by diode D12, inductor L9, and switch T9 is a first drive circuit that supplies a drive current to white LED string Phosphor1-1–Phosphor1-9, such that the white LED string outputs white light at an intensity dictated by the magnitude of the average drive current through it.

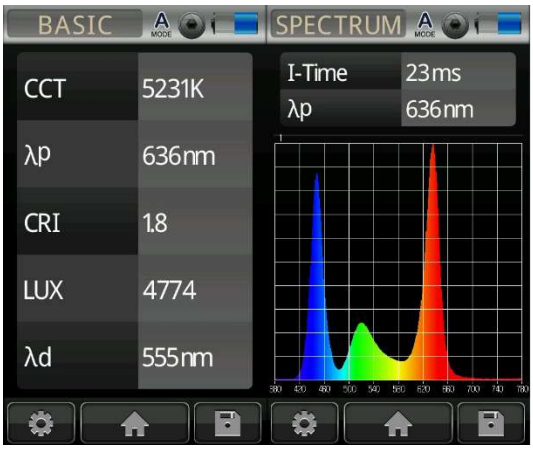
56. On information and belief, DL4S products include at least one colored LED arranged such that a colored light is output from the at least one colored LED and combines with the white light to produce a resultant light having a color temperature; for example, the 480 Watt RGBW LED engine includes thirty-six red LEDs, forty green LEDs, and thirty-six blue LEDs. The red LEDs are arranged into four strings of nine red LEDS, which are represented in Exhibit 2 as red LED string RED1-1–RED1-9 and red LED string RED4-1–4-9 (two red LED strings are

omitted for conciseness). Likewise, the blue LEDs are arranged into four strings of nine blue LEDs, which are represented in Exhibit 2 as blue LED string BLUE1-1–BLUE1-9 and blue LED string BLUE4-1–4-9 (two blue LED strings are omitted for conciseness). The green LEDs are similarly arranged into four strings of ten green LEDs, which are represented in Exhibit 2 as green LED string GREEN1-1–GREEN1-10 and green LED string GREEN4-1–GREEN4-10 (two green LED strings are omitted for conciseness).

57. On information and belief, DL4S products include a second drive circuit operable to supply a second drive current to the at least one colored LED such that the colored light is output at a second intensity, the second drive circuit being adjustable so as to adjust a level of the second drive current supplied so as to vary the color temperature of the resultant light; for example, a Buck converter formed by diode D7, inductor L4, and switch T3 is a second drive circuit that supplies a drive current to red LED string RED1-1–RED1-9, such that the red LED string outputs red light at an intensity dictated by the magnitude of the average drive current through it, so as to vary the color temperature of the resultant light.

58. On information and belief, the color temperature of the resultant light is adjustable between at least about 2500 degrees Kelvin to at least about 5000 degrees Kelvin, by varying the magnitude of the drive current supplied to the red LED string.





Infringing LEDBeam 150 products

59. Defendants provide a specification sheet for LEDBeam 150 products on Defendants' website at https://cdn.robe.cz/fileadmin/user_upload/product_pdf/en_ledbeam_150.pdf. The following image from the specification sheet shows an LEDBeam 150 product:

60. Exhibit 3 depicts a circuit schematic of portions of the LED driver of an LEDBeam 150 product.

61. On information and belief, LEDBeam 150 products include a temperature adjustable LED arrangement.

62. On information and belief, LEDBeam 150 products include at least one white LED; for example, as stated in the specification sheet, LEDBeam 150 products include seven 40 Watt RGBW multichips, each of which include a white LED:

- Light source type: 7x 40W RGBW multichips

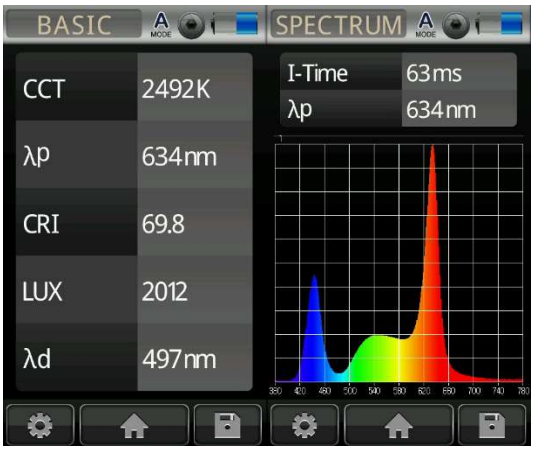
These white LEDs are arranged into a string, which is represented in Exhibit 3 as LEDs WHITE1-WHITE7.

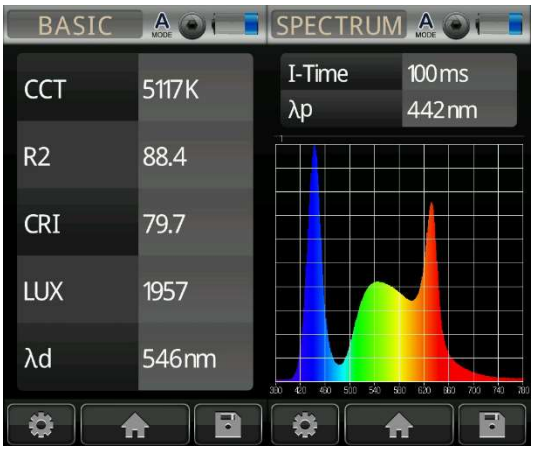
63. On information and belief, LEDBeam 150 products include a first drive circuit operable to supply a first drive current to the at least one white LED such that a white light is output at a first intensity; for example, a Buck converter formed by diode D5, inductor L3, and switch T2 is a first drive circuit that supplies a drive current to the string of white LEDs WHITE1-WHITE7, such that the white LED string outputs white light at an intensity dictated by the magnitude of the average drive current through it.

64. On information and belief, LEDBeam 150 products include at least one colored LED arranged such that a colored light is output from the at least one colored LED and combines with the white light to produce a resultant light having a color temperature; for example, the seven 40 Watt RGBW multichips each include three colored LEDs (red, green, and blue). As shown in Exhibit 3, the red, green, and blue colored LEDs are respectively arranged into LED strings RED1-RED7, GREEN1-GREEN7, and BLUE1-BLUE7. The colored light from these colored LEDs mixes with the white light to produce a resultant light having a color temperature.

65. On information and belief, LEDBeam 150 products include a second drive circuit operable to supply a second drive current to the at least one colored LED such that the colored light is output at a second intensity, the second drive circuit being adjustable so as to adjust a level of the second drive current supplied so as to vary the color temperature of the resultant light; for example, a Buck converter formed by diode D10, inductor L6, and switch T5 is a second drive circuit that supplies a drive current to the red LED string, RED1-RED7, such that the red LED string outputs red light at an intensity dictated by the magnitude of the average drive current through it, so as to vary the color temperature of the resultant light.

66. On information and belief, the color temperature of the resultant light is adjustable between at least about 2500 degrees Kelvin to at least about 5000 degrees Kelvin, by varying the magnitude of the average drive current supplied to the red LED string, RED1-RED7.

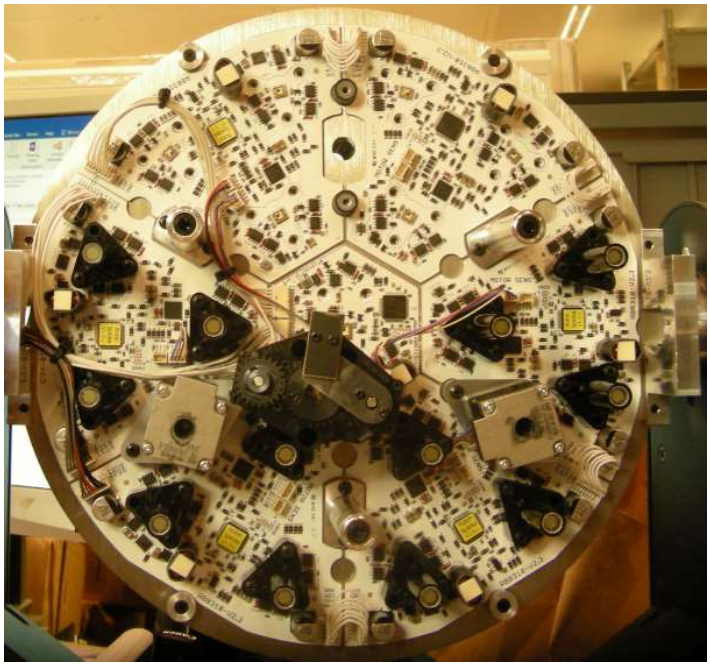




Infringing Spiider products

67. Defendants provide a specification sheet for Spiider products on Defendants' website at https://cdn.robe.cz/fileadmin/user_upload/product_pdf/en_spiider.pdf. The following image from the specification sheet shows a Spiider product:

68. Spiider products include a center LED engine and six outer LED engines arranged about the center module:



69. Exhibit 4 is a circuit schematic of the center LED engine.

70. On information and belief, Spiider products include a temperature adjustable LED arrangement.

71. On information and belief, Spiider products include at least one white LED; for example, as stated in the specification sheet, Spiider products include a 60 Watt RGBW multichip (in the center LED engine) and eighteen 30 Watt RGBW multichips (the six outer LED engines each include three 30 Watt RGBW multichips), each of which include a white LED:

- Light Source Type: 1x 60W RGBW and 18x 40W RGBW LED multichips

The white LED of the center LED engine is represented in Exhibit 4 as LED 1-3.

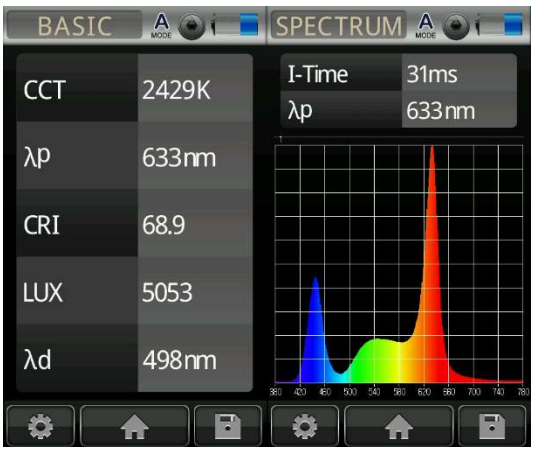
72. On information and belief, Spiider products include a first drive circuit operable to supply a first drive current to the at least one white LED such that a white light is output at a first intensity; for example, FAN73611 controller IC6 and switch Mx5 together form a first drive circuit

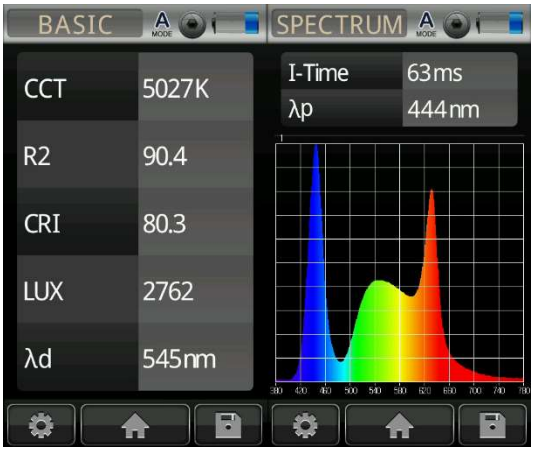
that supplies a drive current to white LED 1-3, by shunting current to or from it, such that white light is output at an intensity dictated by the magnitude of the average drive current through white LED 1-3.

73. On information and belief, Spiider products include at least one colored LED arranged such that a colored light is output from the at least one colored LED and combines with the white light to produce a resultant light having a color temperature; for example, the 60 Watt RGBW multichip and eighteen 30 Watt RBGW multichips each include a three colored LEDs (red, green, and blue), each of which are arranged in the luminaire to combine with the white light to produce a resultant light color with a color temperature. As shown in Exhibit 4, the red, green, and blue colored LEDs of the center LED engine are shown as LEDs 1-2, 1-4, and 1-1, respectively.

74. On information and belief, Spiider products include a second drive circuit operable to supply a second drive current to the at least one colored LED such that the colored light is output at a second intensity, the second drive circuit being adjustable so as to adjust a level of the second drive current supplied so as to vary the color temperature of the resultant light; for example, FAN73611 controller IC5 and switch Mx4 together form a second drive circuit that supplies a drive current to red LED 1-2, by shunting current to or from it, such that red light is output at an intensity dictated by the magnitude of the average drive current through red LED 1-2, so as to vary the color temperature of the resultant light.

75. On information and belief, the color temperature of the resultant light is adjustable between at least about 2500 degrees Kelvin to at least about 5000 degrees Kelvin, by varying the magnitude of the average drive current supplied to the red LED 1-2.





76. While the allegations of paragraphs 68-74 are made with reference to the LEDs and drive circuits of the center module, on information and belief the same allegations apply to each of the six outer LED engines, or between combinations of the same.

Infringing Spikie products

77. Defendants provide a specification sheet for Spikie products on Defendants' website at https://cdn.robe.cz/fileadmin/user_upload/product_pdf/en_spikie.pdf. The following image from the specification sheet shows a Spikie product:

78. On information and belief, the LED engine of Spikie products is the same as the center LED engine of the Spiider products. Accordingly, a schematic representing an LED engine of a Spikie product is attached as Exhibit 4.

79. On information and belief, Spikie products include a temperature adjustable LED arrangement.

80. On information and belief, Spikie products include at least one white LED; for example, as stated in the specification sheet, Spikie products include a 60 Watt RGBW multichip, each of which include a white LED:

- Light source: 60W RGBW LED

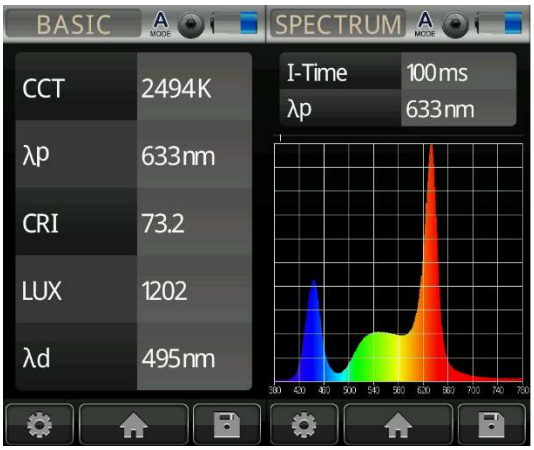
The white LED is represented in Exhibit 4 as LED 1-3.

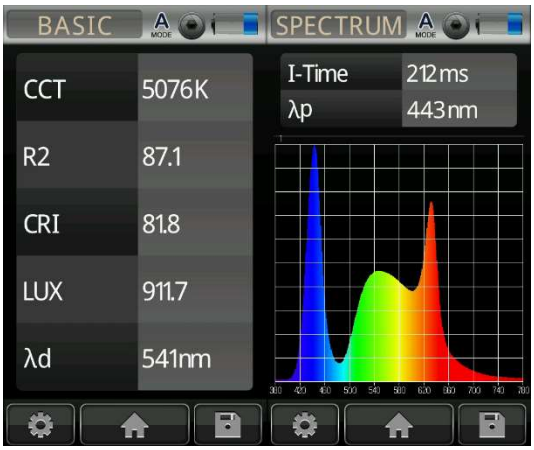
81. On information and belief, Spikie products include a first drive circuit operable to supply a first drive current to the at least one white LED such that a white light is output at a first intensity; for example, FAN73611 controller IC6 and switch Mx5 together form a first drive circuit that supplies a drive current to white LED 1-3, by shunting current to or from it, such that white light is output at an intensity dictated by the magnitude of the average drive current through white LED 1-3.

82. On information and belief, Spikie products include at least one colored LED arranged such that a colored light is output from the at least one colored LED and combines with the white light to produce a resultant light having a color temperature; for example, the 60 Watt RGBW multichip three colored LEDs (red, green, and blue), each of which are arranged in the luminaire to combine with the white light to produce a resultant light color with a color temperature. As shown in Exhibit 4, the red, green, and blue colored LEDs are shown as LEDs 1-2, 1-4, and 1-1, respectively.

83. On information and belief, Spikie products include a second drive circuit operable to supply a second drive current to the at least one colored LED such that the colored light is output at a second intensity, the second drive circuit being adjustable so as to adjust a level of the second drive current supplied so as to vary the color temperature of the resultant light; for example, FAN73611 controller IC5 and switch Mx4 together form a second drive circuit that supplies a drive current to red LED 1-2 by shunting current to or from it, such that red light is output at an intensity dictated by the magnitude of the average drive current through red LED 1-2, so as to vary the color temperature of the resultant light.

84. On information and belief, the color temperature of the resultant light is adjustable between at least about 2500 degrees Kelvin to at least about 5000 degrees Kelvin, by varying the magnitude of the average drive current supplied to the red LED 1-2.





85. The full extent of Defendants' infringement is not presently known to Signify. On information and belief, Defendants have made and sold, or will make and sell, products under different names or part numbers that infringe the '003 Patent in a similar manner. Signify makes this preliminary identification of infringing products and infringed claims in Count Two without the benefit of discovery or claim construction in this action, and expressly reserves the right to

augment, supplement, and revise its identifications based on additional information obtained through discovery or otherwise.

86. Signify has suffered and continues to suffer damages as a result of Defendant's infringement of the '003 Patent in an amount to be determined at trial.

87. Defendants' infringement of the '003 Patent is causing irreparable harm for which Signify has no adequate remedy at law unless Defendants are enjoined by this Court. Under 35 U.S.C. § 283, Signify is entitled to a permanent injunction against further infringement of the '003 Patent.

88. On information and belief, Defendants have been aware of and have had notice and actual knowledge of the '003 Patent since at least August 2006 and its infringement of the '003 Patent since at least as early as May 2018, and Defendants' infringement of the '003 Patent has been willful. For example, the '003 Patent was part of the global patent portfolio of Color Kinetics (now part of Signify) that Robe licensed from 2006 to 2017, and Robe was notified on several occasions before the present action was filed that Defendants' products were infringing the '003 Patent. Defendants' pre-suit knowledge of the '003 Patent and failure to substantively address Signify's numerous notifications of infringement are sufficient to support a plausible inference that Defendants' infringement was willful and egregious, warranting enhancement of damages under 35 U.S.C. § 284, and attorneys' fees and costs incurred under 35 U.S.C. § 285.

COUNT THREE

INFRINGEMENT OF U.S. PATENT NO. 7,557,521

89. Signify incorporates by reference the allegations in paragraphs 1-88 as if fully set forth herein.

90. On information and belief, Defendants have infringed and are infringing claims of the ’521 Patent, including at least claim 23, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

91. Claim 23 of the ’521 Patent recites:

> An apparatus, comprising:
>
> at least one first LED;
>
> at least one first power controller configured to provide a first controllably variable predetermined power to the at least one first LED; and
>
> at least one second LED;
>
> at least one second power controller configured to provide a second controllably variable predetermined power to the at least one second LED,
>
> wherein:
>
> the at least one first power controller includes a first single switch;
>
> a DC supply voltage provides a power source to the apparatus;
>
> the at least one first power controller is configured to apply a first converted DC voltage across the at least one first LED;
>
> the at least one first power controller is further configured to control the first single switch to facilitate a first conversion of the DC supply voltage to the first converted DC voltage and concurrently provide the first controllably variable predetermined power to the at least one first LED;
>
> the at least one second power controller includes a second single switch;
>
> the at least one second power controller is configured to apply a second converted DC voltage across the at least one second LED; and
>
> the at least one second power controller is further configured to control the second single switch to facilitate a second conversion of the DC supply voltage to the second converted DC voltage and concurrently provide the second controllably variable predetermined power to the at least one second LED, and
>
> wherein the at least one first power controller is configured to control at least one of a frequency and a duty cycle of multiple switching operations of the first single switch.

92. On information and belief, Defendants have directly infringed and are directly infringing claim 23 of the '521 Patent by making, using, offering to sell, selling, and/or importing at least DL4S, DL7S, and LEDBeam 150 products in this District and elsewhere in the United States.

Infringing DL4S Products

93. On information and belief, DL4S products are lighting apparatuses.

94. On information and belief, DL4S products include at least one first LED; for example, as shown in Exhibit 2, DL4S products include at least one first LED formed by LED string RED1-1–RED1-9.

95. On information and belief, DL4S products include at least one first power controller configured to provide a first controllably variable predetermined power to the at least one first LED; for example, STM32F103 microcontroller IC3 and a buck converter, formed by diode D7, inductor L4, and switch T3, together form a first power controller that provides power to the first LEDs, RED1-1–RED1-9, as predetermined and controllably varied by the user-selected brightness settings.

96. On information and belief, DL4S products include at least one second LED; for example, at least one second LED is formed by LED string Phosphor1-1–Phosphor1-9.

97. On information and belief, DL4S products include at least one second power controller configured to provide a second controllably variable predetermined power to the at least one second LED; for example, STM32F103 microcontroller IC2 and a buck converter, formed by diode D12, inductor L9, and switch T9, together form a second power controller that provides power to the second LEDs, Phosphor1-1–Phosphor1-9, as predetermined and controllably varied by the user-selected brightness settings.

98. On information and belief, the at least one first power controller includes a first single switch; for example, the first power controller includes a single switch T3.

99. On information and belief, a DC supply voltage provides a power source to the apparatus; for example, a 48VDC bus provides a power source to the first power controller and the second power controller.

100. On information and belief, the at least one first power controller is configured to apply a first converted DC voltage across the at least one first LED; for example, a voltage, converted by the first power controller, is applied across first LEDs, RED1-1–RED1-9, at terminals R-1+ and R-1-.

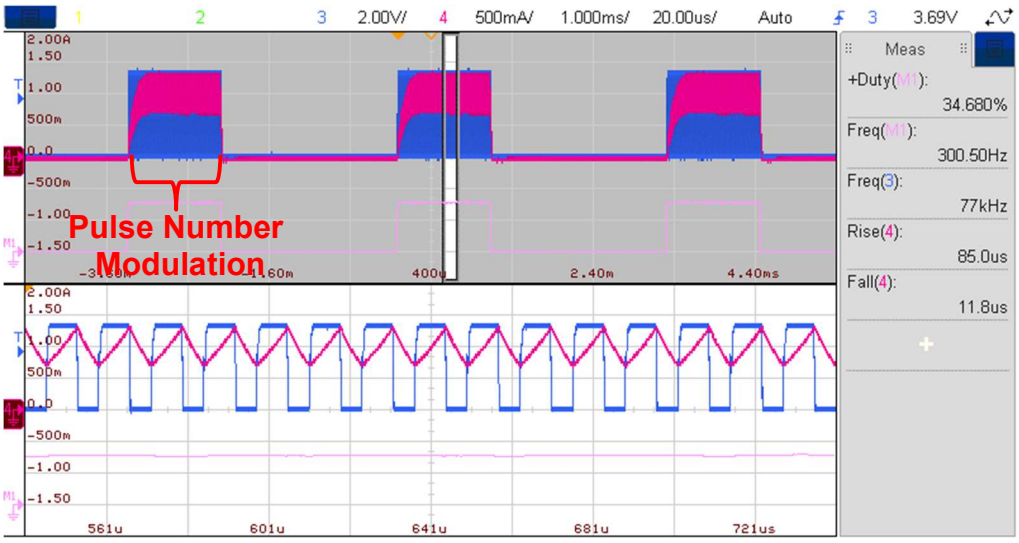
101. On information and belief, the at least one first power controller is further configured to control the first single switch to facilitate a first conversion of the DC supply voltage to the first converted DC voltage and concurrently provide the first controllably variable predetermined power to the at least one first LED; for example, STM32F103 microcontroller IC3 controls switch T3 to facilitate the conversion of the 48VDC power supply to the voltage applied across the first LEDs, RED1-1–RED1-9, at terminals R-1+ and R-1- and to concurrently provide power as predetermined and controllably varied by the user-selected brightness settings.

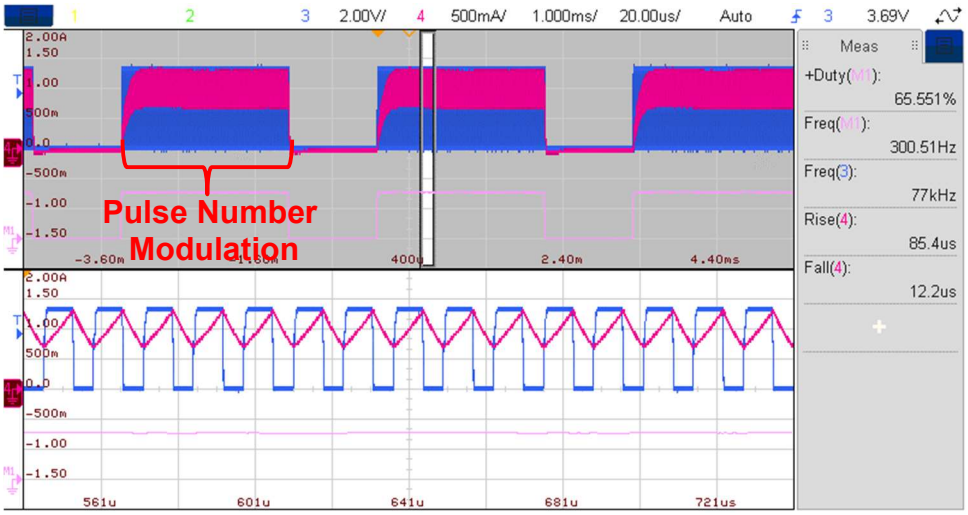
102. On information and belief, the at least one second power controller includes a second single switch; for example, the second power controller includes a switch T9.

103. On information and belief, the at least one second power controller is configured to apply a second converted DC voltage across the at least one second LED; for example, voltage, converted by the second power controller, is applied across second LEDs, Phosphor1-1–Phosphor1-9, at terminals P-1+ and P-1-.

104. On information and belief, the at least one second power controller is further configured to control the second single switch to facilitate a second conversion of the DC supply voltage to the second converted DC voltage and concurrently provide the second controllably variable predetermined power to the at least one second LED; for example, STM32F103 microcontroller IC2 controls switch T9 to facilitate the conversion of the 48VDC power supply to the voltage applied across the second LEDs, Phosphor1-1–Phosphor1-9, at terminals P-1+ and P-1- and to concurrently provide power as predetermined and controllably varied by the user-selected brightness settings.

105. On information and belief, the at least one first power controller is configured to control at least one of a frequency and a duty cycle of multiple switching operations of the first single switch; for example, the first power controller is configured to control at least the frequency of multiple switching operations, via pulse number modulation, of switch T3 to vary the brightness of the first LEDs, RED1-1–RED1-9, according to the user-selected brightness setting:





Infringing DL7S products

106. Exhibit 5 depicts a circuit schematic of portions of the LED driver of a DL7S product.

107. On information and belief, DL7S products are lighting apparatuses.

108. On information and belief, DL7S products include at least one first LED; for example, as shown in Exhibit 5, DL7S products include at least one first LED formed by LED string RED1-1–RED1-11.

109. On information and belief, DL7S products include at least one first power controller configured to provide a first controllably variable predetermined power to the at least one first LED; for example, an STM32F103 microcontroller IC10 and a buck converter, formed by diode D31, inductor L28, and switch T26, together form a first power controller that provides power to the first LEDs, RED1-1–RED1-11, as predetermined and controllably varied by the user-selected brightness settings.

110. On information and belief, DL7S products include at least one second LED; for example, at least one second LED formed by LED string Amber1-1–Amber1-11.

111. On information and belief, DL7S products include at least one second power controller configured to provide a second controllably variable predetermined power to the at least one second LED; for example, STM32F103 microcontroller IC10 and a buck converter, formed by diode D29, inductor L26, and switch T24, together form a second power controller that provides power to the second LEDs, AMBER1-1–AMBER1-11, as predetermined and controllably varied by the user-selected brightness settings.

112. On information and belief, the at least one first power controller includes a first single switch; for example, the first power controller includes a single switch T26.

113. On information and belief, a DC supply voltage provides a power source to the apparatus; for example, a 48VDC bus provides a power source to the first power controller and the second power controller.

114. On information and belief, the at least one first power controller is configured to apply a first converted DC voltage across the at least one first LED; for example, a voltage, converted by the first power controller, is applied across the first LEDs, RED1-1–RED1-11.

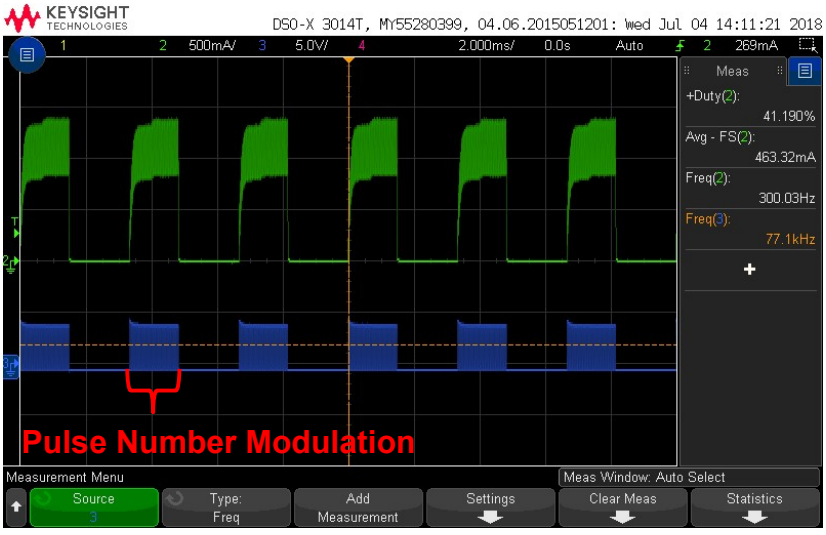
115. On information and belief, the at least one first power controller is further configured to control the first single switch to facilitate a first conversion of the DC supply voltage to the first converted DC voltage and concurrently provide the first controllably variable predetermined power to the at least one first LED; for example, STM32F103 microcontroller IC10 controls switch T26 to facilitate the conversion of the 48VDC power supply to the voltage applied across the first LEDs, RED1-1–RED1-11, and to concurrently provide power as predetermined and controllably varied by the user-selected brightness settings.

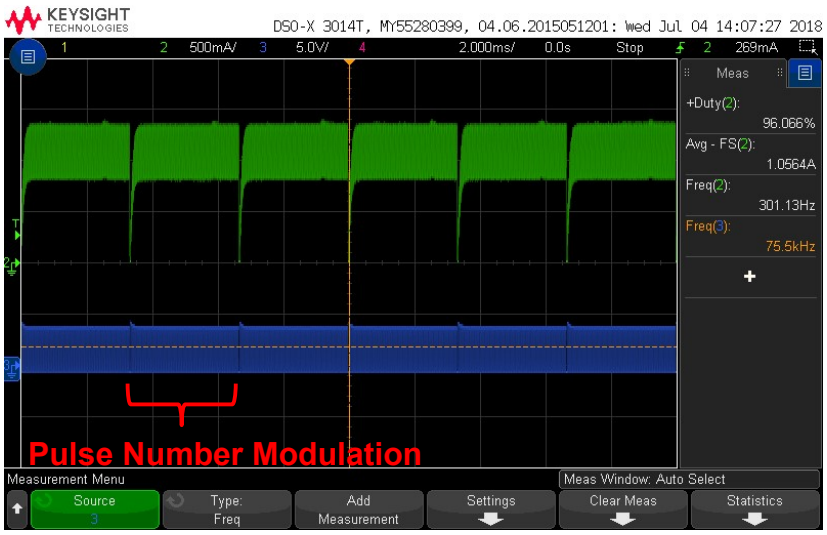
116. On information and belief, the at least one second power controller includes a second single switch; for example, the second power controller includes a switch T24.

117. On information and belief, the at least one second power controller is configured to apply a second converted DC voltage across the at least one second LED; for example, a voltage, converted by the second power controller, is applied across the second LEDs, AMBER1-1–AMBER1-11.

118. On information and belief, the at least one second power controller is further configured to control the second single switch to facilitate a second conversion of the DC supply voltage to the second converted DC voltage and concurrently provide the second controllably variable predetermined power to the at least one second LED; for example, STM32F103 microcontroller IC10 controls switch T24 to facilitate the conversion of the 48VDC power supply to the voltage applied across the second LEDs, AMBER1-1–AMBER1-11, and to concurrently provide power as predetermined and controllably varied by the user-selected brightness settings.

119. On information and belief, the at least one first power controller is configured to control at least one of a frequency and a duty cycle of multiple switching operations of the first single switch; for example, the first power controller is configured to control at least the frequency of multiple switching operations, via pulse number modulation, of switch T26 to vary the brightness of the first LEDs, RED1-1–RED1-11, according to the user-selected brightness setting.





Infringing LEDBeam 150 products

120. On information and belief, LEDBeam 150 products are lighting apparatuses.

121. On information and belief, LEDBeam 150 products include at least one first LED; for example, as shown in Exhibit 3, LEDBeam 150 products include at least one first LED formed by LED string RED1–RED7.

122. On information and belief, LEDBeam 150 products include at least one first power controller configured to provide a first controllably variable predetermined power to the at least one first LED; for example, a STM32F303 microcontroller and a buck converter, formed by diode D10, inductor L6, and switch T5, together form a first power controller that provides power to the first LED string, RED1–RED7, as predetermined and controllably varied by the user-selected brightness settings.

123. On information and belief, LEDBeam 150 products include at least one second LED; for example, at least one second LED formed by LED string WHITE1–WHITE7.

124. On information and belief, LEDBeam 150 products include at least one second power controller configured to provide a second controllably variable predetermined power to the

at least one second LED; for example, the STM32F303 microcontroller and a buck converter, formed by diode D5, inductor L3, and switch T2, together form a second power controller that provides power to the second LEDs, WHITE1–WHITE7, as predetermined and controllably varied by the user-selected brightness settings.

125. On information and belief, the at least one first power controller includes a first single switch; for example, the first power controller includes a single switch T5.

126. On information and belief, a DC supply voltage provides a power source to the apparatus; for example, a 48VDC bus provides a power source to first power controller and the second power controller.

127. On information and belief, the at least one first power controller is configured to apply a first converted DC voltage across the at least one first LED; for example, a voltage, converted by the first power controller, is applied across first LEDs, RED1–RED7.

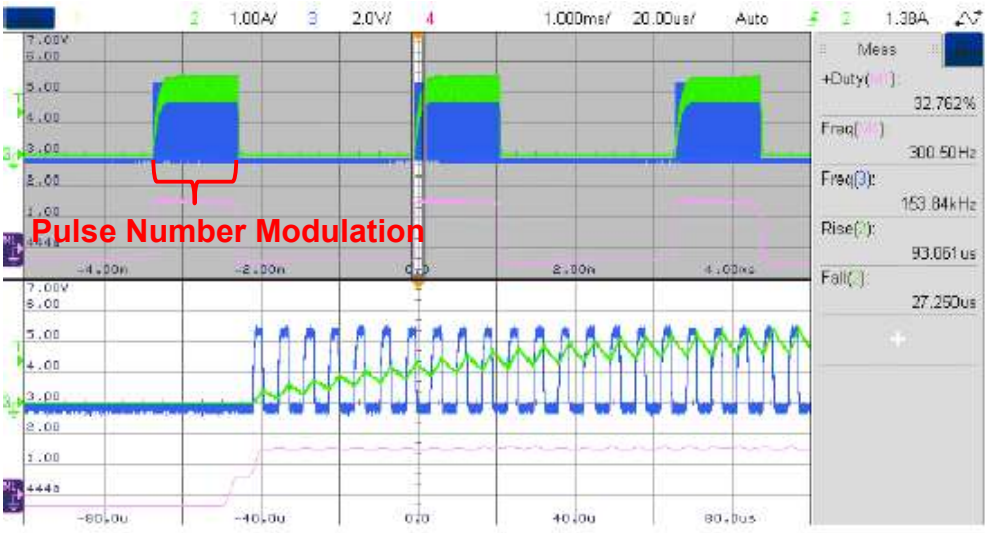
128. On information and belief, the at least one first power controller is further configured to control the first single switch to facilitate a first conversion of the DC supply voltage to the first converted DC voltage and concurrently provide the first controllably variable predetermined power to the at least one first LED; for example, the STM32F303 microcontroller controls switch T5 to facilitate the conversion of the 48VDC power supply to the voltage applied across the first LEDs, RED1–RED7, and to concurrently provide power as predetermined and controllably varied by the user-selected brightness settings.

129. On information and belief, the at least one second power controller includes a second single switch; for example, the second power controller includes a switch T2.

130. On information and belief, the at least one second power controller is configured to apply a second converted DC voltage across the at least one second LED; for example, a voltage, converted by the second power controller, is applied across second LEDs, WHITE1–WHITE7.

131. On information and belief, the at least one second power controller is further configured to control the second single switch to facilitate a second conversion of the DC supply voltage to the second converted DC voltage and concurrently provide the second controllably variable predetermined power to the at least one second LED; for example, the STM32F303 microcontroller controls switch T2 to facilitate the conversion of the 48VDC power supply to the voltage applied across the second LEDs, WHITE1–WHITE7, and to concurrently provide power as predetermined and controllably varied by the user-selected brightness settings.

132. On information and belief, the at least one first power controller is configured to control at least one of a frequency and a duty cycle of multiple switching operations of the first single switch; for example, the first power controller is configured to control at least the frequency of multiple switching operations, via pulse number modulation, of switch T5 to vary the brightness of the first LEDs, RED1–RED7, according to the user-selected brightness setting:



133. The full extent of Defendants' infringement is not presently known to Signify. On information and belief, Defendants have made and sold, or will make and sell, products under different names or part numbers that infringe the '521 Patent in a similar manner. Signify makes this preliminary identification of infringing products and infringed claims in Count Three without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identifications based on additional information obtained through discovery or otherwise.

134. Signify has suffered and continues to suffer damages as a result of Defendants' infringement of the '521 Patent in an amount to be determined at trial.

135. Defendants' infringement of the '521 Patent is causing irreparable harm for which Signify has no adequate remedy at law unless Defendants are enjoined by this Court. Under 35 U.S.C. § 283, Signify is entitled to a permanent injunction against further infringement of the '521 Patent.

136. On information and belief, Defendants have been aware of and have had notice and actual knowledge of the '521 Patent and its infringement of the '521 Patent at least as early as the service of this Complaint.

COUNT FOUR

INFRINGEMENT OF U.S. PATENT NO. 7,802,902

137. Signify incorporates by reference the allegations in paragraphs 1-136 as if fully set forth herein.

138. On information and belief, Defendants have infringed and are infringing claims of the '902 Patent, including at least claim 1, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

139. Claim 1 of the '902 Patent recites:

> A lighting apparatus, comprising:
>
> a lighting fixture; and
>
> a LED module mechanically enclosed by the lighting fixture, wherein the LED module includes:
>
> at least one LED,
>
> a LED driver in electrical communication with the at least one LED to operably provide a LED drive signal to the at least one LED, and
>
> a thermal sensor operable to facilitate a control by the LED driver of a magnitude of the LED drive signal based on an operating temperature of the at least one LED as sensed by the thermal sensor.

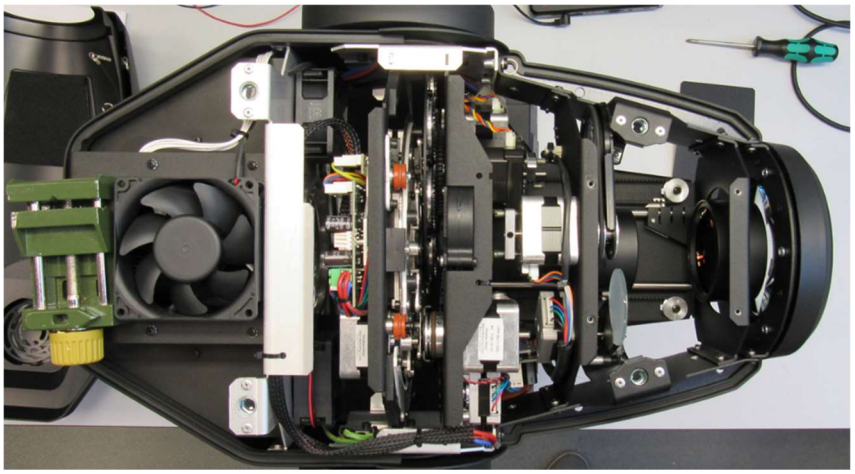
140. On information and belief, Defendants have directly infringed and are directly infringing claim 1 of the '902 Patent by making, using, offering to sell, selling, and/or importing at least DL4S, DL7S, LEDBeam 150, LEDBeam 100, Spiider, and Spikie products in this District and elsewhere in the United States.

Infringing DL4S Products

141. On information and belief, DL4S products are lighting apparatuses.

142. On information and belief, DL4S products include a lighting fixture; for example, DL4S products include a housing forming a light fixture.

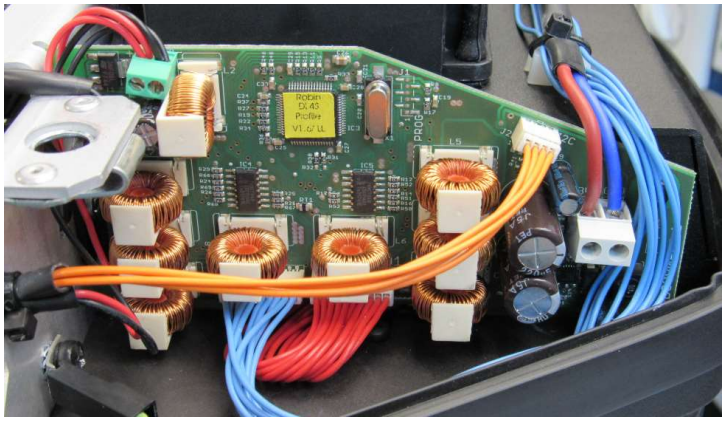
143. On information and belief, DL4S products include a LED module mechanically enclosed by the lighting fixture; for example, DL4S products include an LED module, comprising LEDs, an LED driver, and a thermal sensor is mechanically enclosed by the housing.

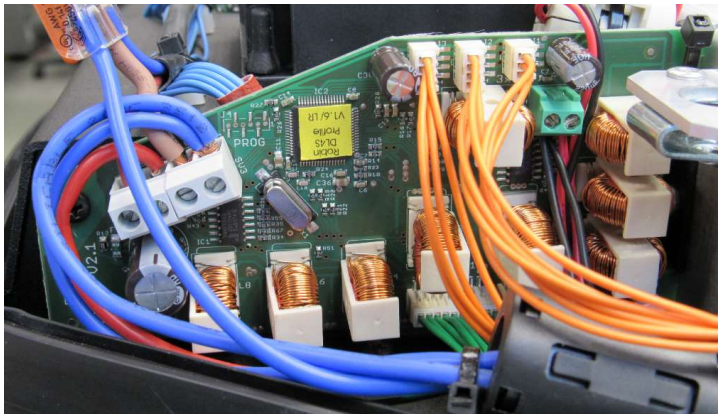


144. On information and belief, the LED module includes at least one LED; for example, the LED module includes a 480 Watt RGBW LED engine including LEDs arranged into sixteen LED strings.

Light source type: 480 W RGBW LED engine

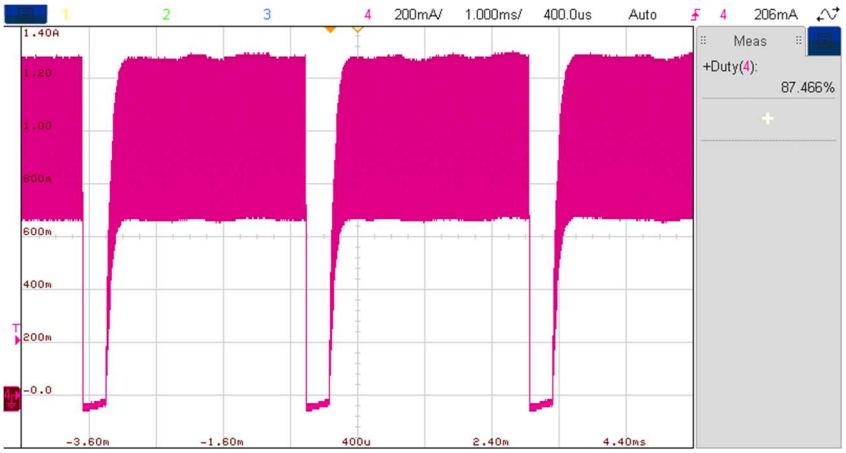
145. On information and belief, the LED module includes a LED driver in electrical communication with the at least one LED to operably provide a LED drive signal to the at least one LED; for example, DL4S products include LED Driver LL and LED Driver LR.



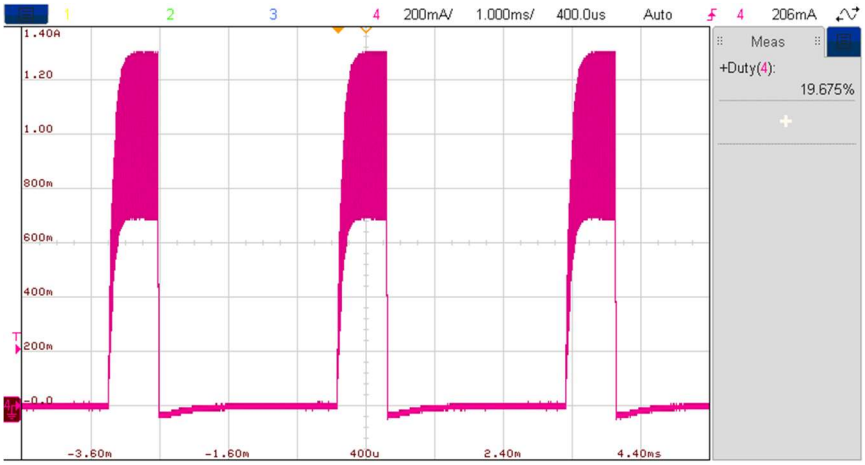


146. On information and belief, the LED module includes a thermal sensor operable to facilitate a control by the LED driver of a magnitude of the LED drive signal based on an operating temperature of the at least one LED as sensed by the thermal sensor; for example, the LED drivers adjust the magnitude of the average current flowing through each LED string in response to a

temperature sensed by thermal sensors (NTC) positioned to detect the operating temperature of the LEDs. The below plot represents the measured current through the LEDs when the LEDs are at 84° C:



The below plot represents the measured current through the LEDs when the LEDs are at 87° C:



As shown, the current pulse width is lowered, thus lowering the average current through the LEDs, as the temperature increases.

Infringing DL7S Products

147. On information and belief, DL7S products are lighting apparatuses.

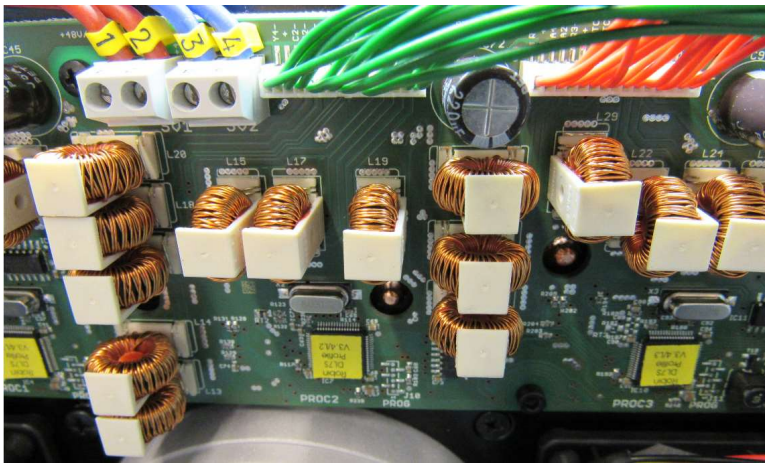
148. On information and belief, DL7S products include a lighting fixture; for example, DL7S products include a housing forming a light fixture.

149. On information and belief, DL7S products include a LED module mechanically enclosed by the lighting fixture; for example, DL7S products include an LED module, comprising LEDs, an LED driver, and a thermal sensor is mechanically enclosed by the housing.

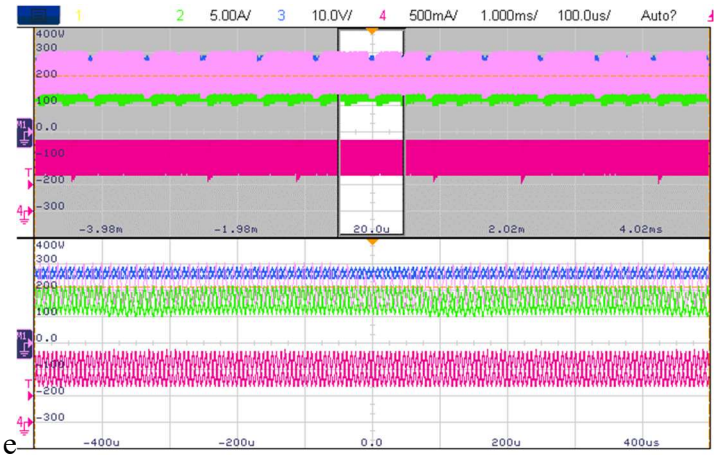
150. On information and belief, the LED module includes at least one LED; for example, according the DL7S specification sheet, the DL7S includes an 800 W 7 colors LED engine, which includes LEDs arranged into twenty-four LED strings.

- Light source: Robe's 800 W 7 colours LED engine

151. On information and belief, the LED module includes a LED driver in electrical communication with the at least one LED to operably provide a LED drive signal to the at least one LED; for example, the LED module of the DL7S contains an LED driver in electrical communication with the twenty-four LED strings to operably provide a respective LED drive signals to each of the LED strings.

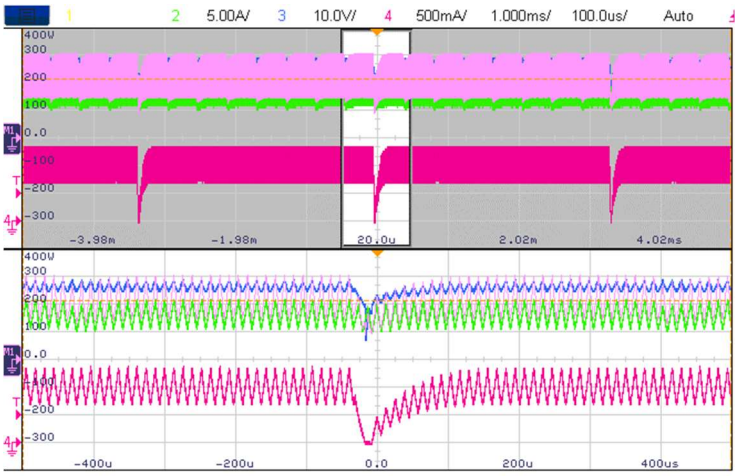


152. On information and belief, the LED module includes a thermal sensor operable to facilitate a control by the LED driver of a magnitude of the LED drive signal based on an operating temperature of the at least one LED as sensed by the thermal sensor; for example, the LED driver adjusts the magnitude of the average current flowing through the LEDs in response to a temperature sensed by a thermal sensor (NTC) positioned to detect the operating temperature of the LEDs. The below plot represents the measured current through the LEDs when the LEDs are at 30° C:

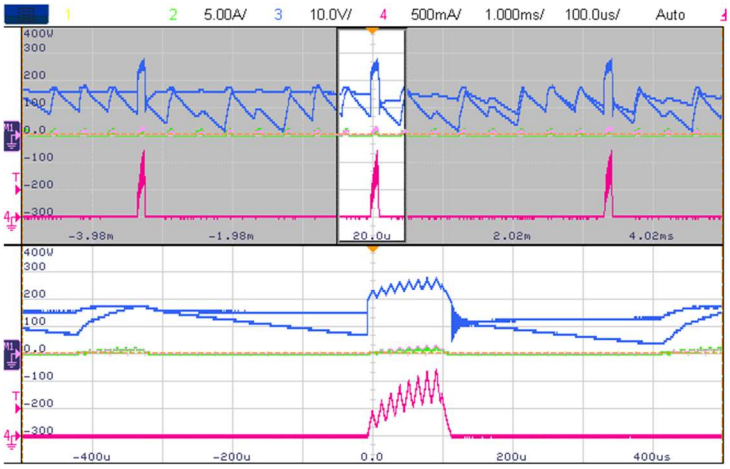


e

The below plot represents the measured current through the LEDs when the LEDs are at 55° C:



The below plot represents the measured current through the LEDs when the LEDs are at 75° C:



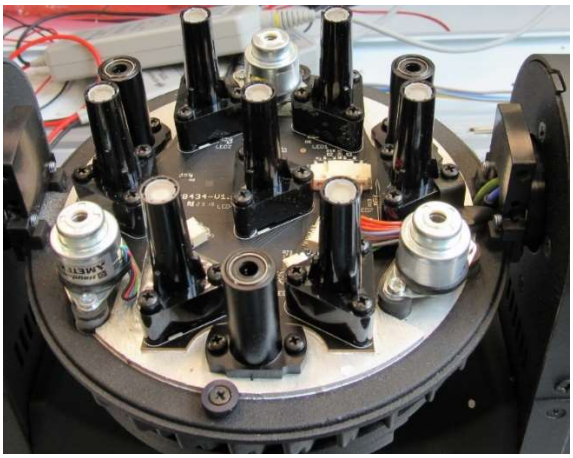
As shown, the current pulse width is lowered, thus lowering the average current through the LEDs, as the temperature increases.

Infringing LEDBeam 150 Products

153. On information and belief, LEDBeam 150 products are lighting apparatuses.

154. On information and belief, LEDBeam 150 products include a lighting fixture; for example, LEDBeam 150 products include a housing forming a light fixture.

155. On information and belief, LEDBeam 150 products include a LED module mechanically enclosed by the lighting fixture; for example, an LED module, comprising LEDs, an LED driver, and a thermal sensor is mechanically enclosed by the housing.

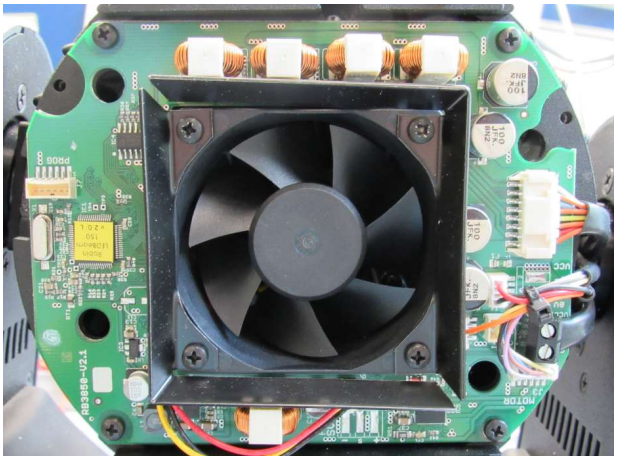


156. On information and belief, the LED module includes at least one LED; for example, as stated in the specification sheet, LEDBeam 150 products include seven 40 Watt RGBW multichips

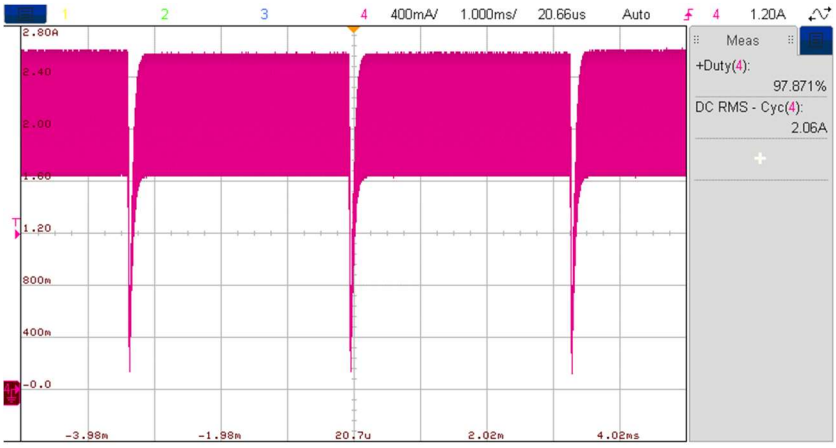
- Light source type: 7x 40W RGBW multichips

arranged into four strings of LEDs.

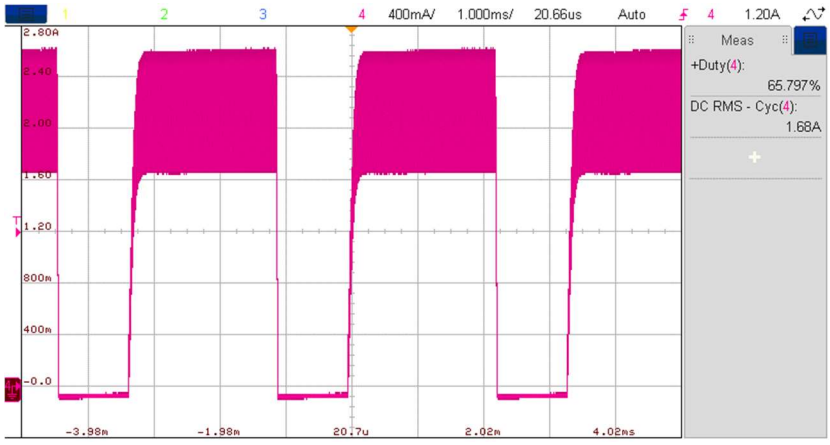
157. On information and belief, the LED module includes a LED driver in electrical communication with the at least one LED to operably provide a LED drive signal to the at least one LED; for example, LEDBeam 150 products contain an LED driver in electrical communication with the four LED strings to operably provide a respective LED drive signals to each of the LED strings.



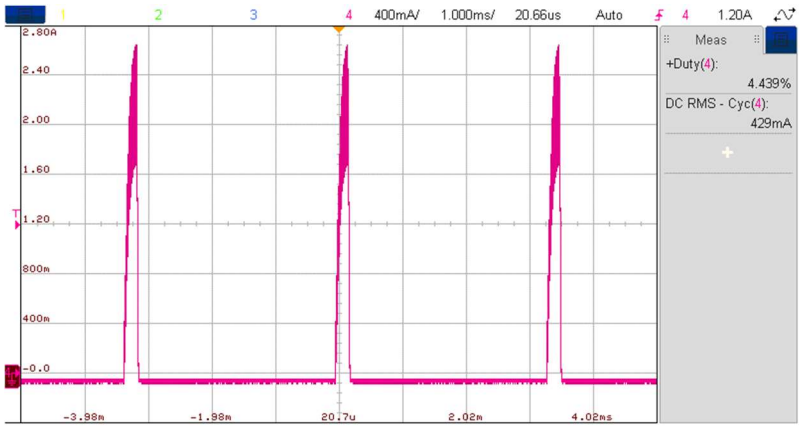
158. On information and belief, the LED module includes a thermal sensor operable to facilitate a control by the LED driver of a magnitude of the LED drive signal based on an operating temperature of the at least one LED as sensed by the thermal sensor; for example the LED driver adjusts the magnitude of the average current flowing through each LED string in response to a temperature sensed by a thermal sensor (NTC) positioned to detect the operating temperature of the LEDs. The below plot represents the measured current through the LEDs when the LEDs are at 70° C:



The below plot represents the measured current through the LEDs when the LEDs are at 76° C:



The below plot represents the measured current through the LEDs when the LEDs are 80° C:



As shown, the current pulse width is lowered, thus lowering the average current through the LEDs, as the temperature increases.

Infringing LEDBeam 100 Products

159. On information and belief, LEDBeam 100 products are lighting apparatuses.

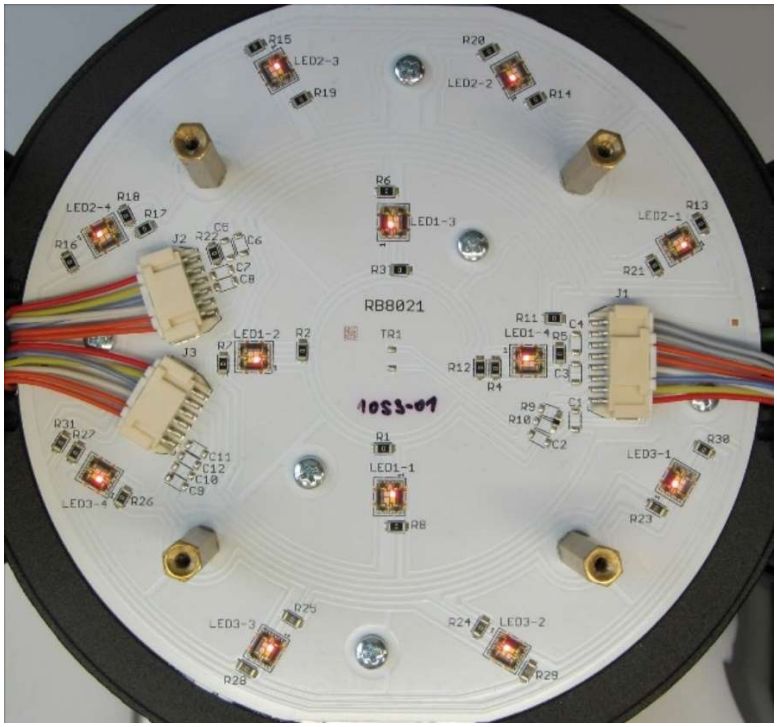
160. On information and belief, LEDBeam 100 products include a lighting fixture; for example, LEDBeam 100 products include a housing forming a light fixture.

161. On information and belief, LEDBeam 100 products include a LED module mechanically enclosed by the lighting fixture; for example, an LED module, comprising LEDs, an LED driver, and a thermal sensor is mechanically enclosed by the housing.

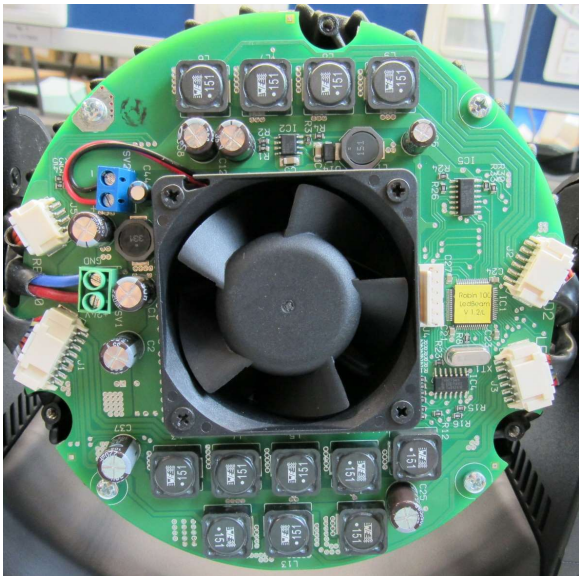
162. On information and belief, the LED module includes at least one LED; for example, as stated in the specification sheet, LEDBeam 100 products include twelve 15 Watt RGBW multichips:

12x 15W RGBW multichips

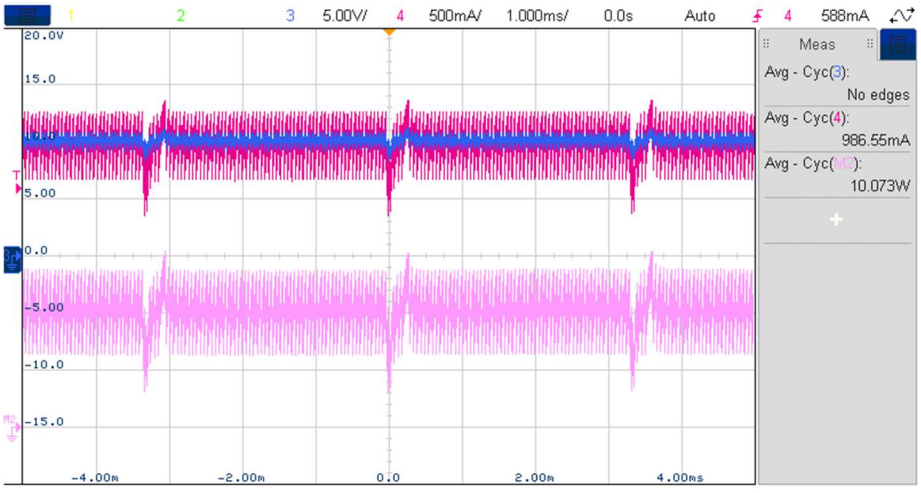
arranged into twelve strings of LEDs.



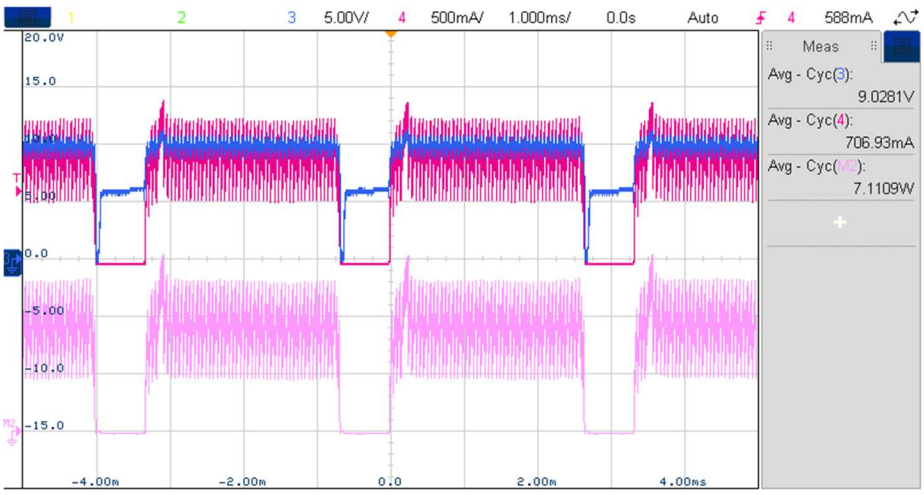
163. On information and belief, the LED module includes a LED driver in electrical communication with the at least one LED to operably provide a LED drive signal to the at least one LED; for example, LEDBeam 100 products contain an LED driver in electrical communication with the twelve LED strings to operably provide a respective LED drive signals to each of the LED strings.



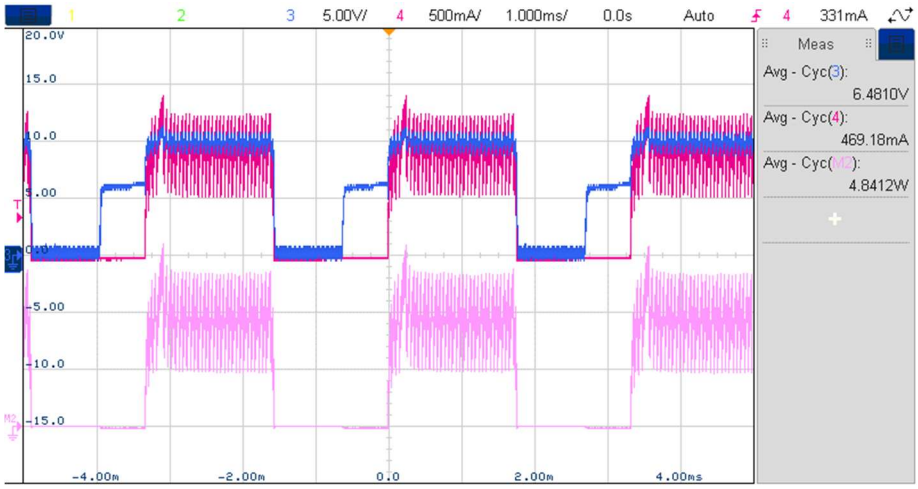
164. On information and belief, the LED module includes a thermal sensor operable to facilitate a control by the LED driver of a magnitude of the LED drive signal based on an operating temperature of the at least one LED as sensed by the thermal sensor; for example the LED driver adjusts the magnitude of the average current flowing through each LED string in response to a temperature sensed by a thermal sensor (NTC) positioned to detect the operating temperature of the LEDs. The below plot represents the measured current through the LEDs when the LEDs are at 45° C:



The below plot represents the measured current through the LEDs when the LEDs are at 65° C:



The below plot represents the measured current through the LEDs when the LEDs are 70° C:



As shown, the current pulse width is lowered, thus lowering the average current through the LEDs, as the temperature increases.

Infringing Spiider products

165. On information and belief, Spiider products are lighting apparatuses.

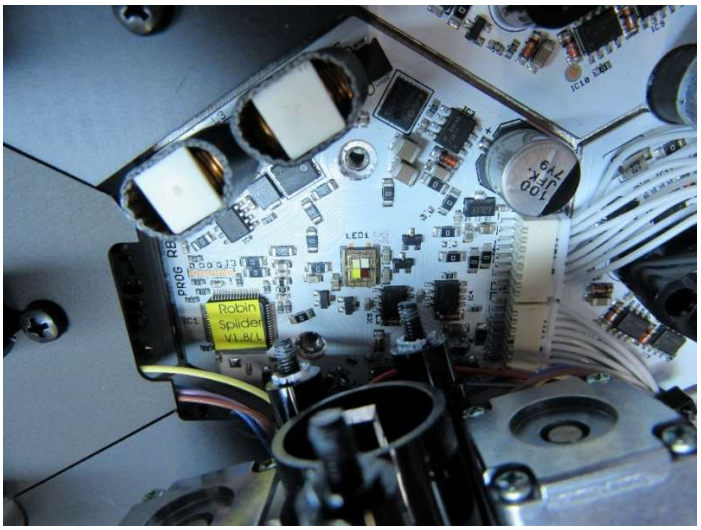
166. On information and belief, Spiider products include a lighting fixture; for example, Spiider products include a housing forming a light fixture.

167. On information and belief, Spiider products include a LED module mechanically enclosed by the lighting fixture; for example, an LED module, comprising LEDs, an LED driver, and a thermal sensor is mechanically enclosed by the housing.

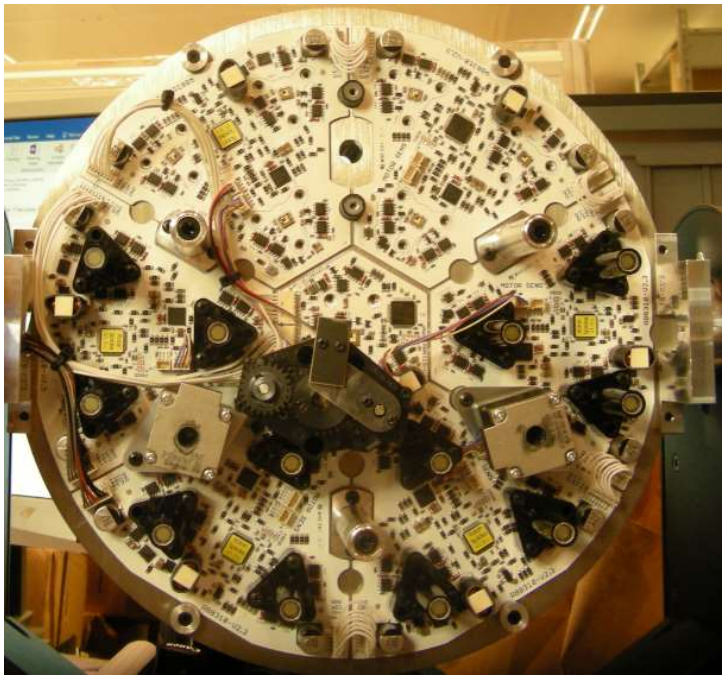
168. On information and belief, the LED module includes at least one LED; for example, as stated in the specification sheet, Spiider products include a 60 Watt RGBW multichip and eighteen 30 Watt RGBW multichips, each of which include four LEDs

- Light Source Type: 1x 60W RGBW and 18x 40W RGBW LED multichips

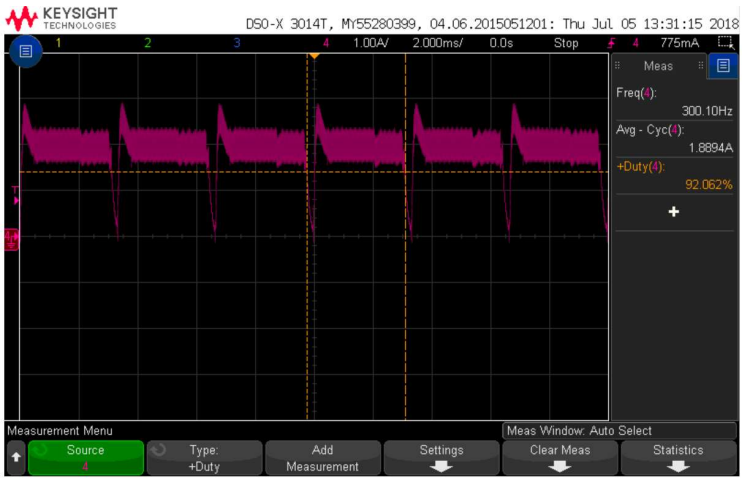
and which are arranged into seven strings of LEDs.



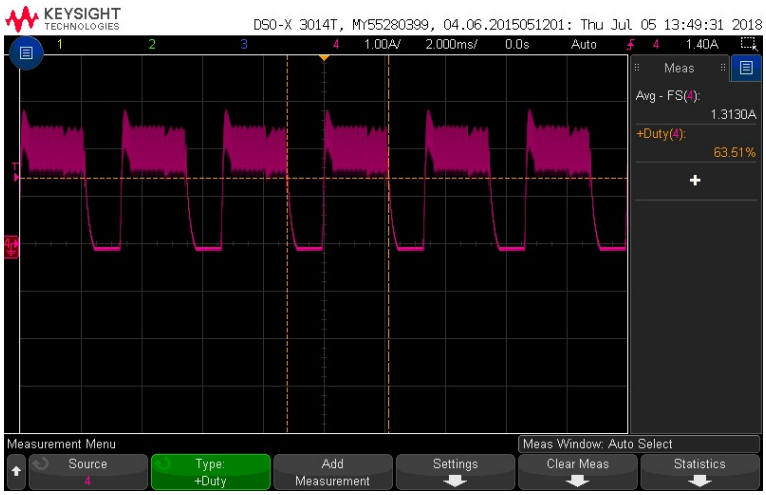
169. On information and belief, the LED module includes a LED driver in electrical communication with the at least one LED to operably provide a LED drive signal to the at least one LED; for example, Spiider products include an LED driver including a center LED engine and six outer LED engines, the center LED engine includes a string of four LEDs and each of the six outer LED engines includes a string of twelve LEDs, the center LED engine and each center LED engines respectively provides a drive signal to the associated LED string.



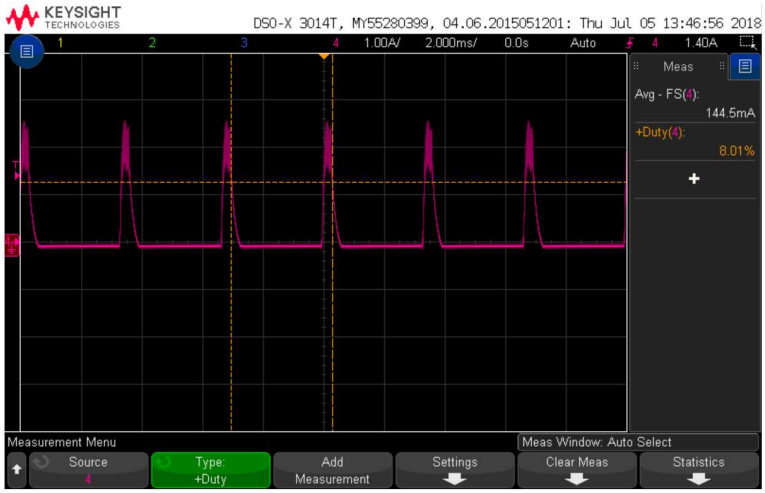
170. On information and belief, the LED module includes a thermal sensor operable to facilitate a control by the LED driver of a magnitude of the LED drive signal based on an operating temperature of the at least one LED as sensed by the thermal sensor; for example the LED driver adjusts the magnitude of the average current flowing through the LEDs in response to a temperature sensed by a thermal sensor (NTC) positioned to detect the operating temperature of the LEDs. The below plot represents the measured current through the LEDs when the LEDs are at 55° C:



The below plot represents the measured current through the LEDs when the LEDs are at 73° C:



The below plot represents the measured current through the LEDs when the LEDs are at 88° C:



As shown, the current pulse width is lowered, thus lowering the average current through the LEDs, as the temperature increases.

Infringing Spikie Products

171. On information and belief, Spikie products are lighting apparatuses.

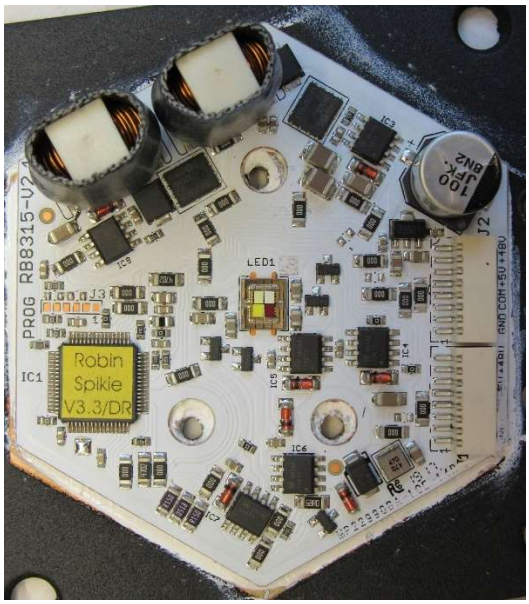
172. On information and belief, Spikie products include a lighting fixture; for example, Spikie products include a housing forming a light fixture.

173. On information and belief, Spikie products include a LED module mechanically enclosed by the lighting fixture; for example, an LED module, comprising LEDs, an LED driver, and a thermal sensor is mechanically enclosed by the housing.

174. On information and belief, the LED module includes at least one LED; for example, for example, Spikie products include a 60 Watt RGBW multichip,

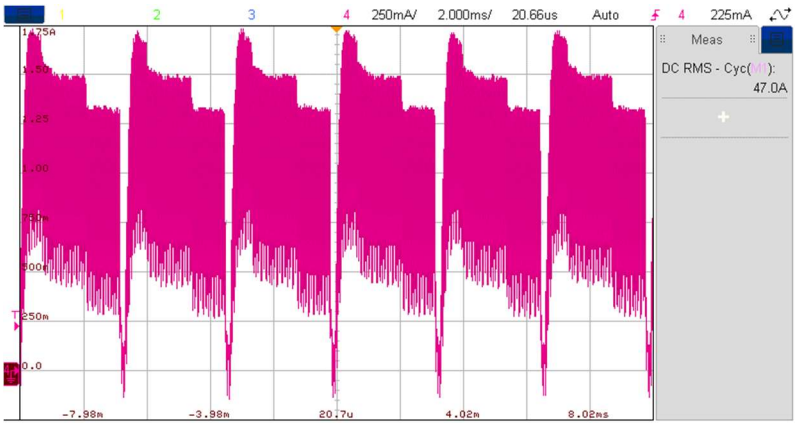
- Light source: 60W RGBW LED

which are arranged into a string of four LEDs.

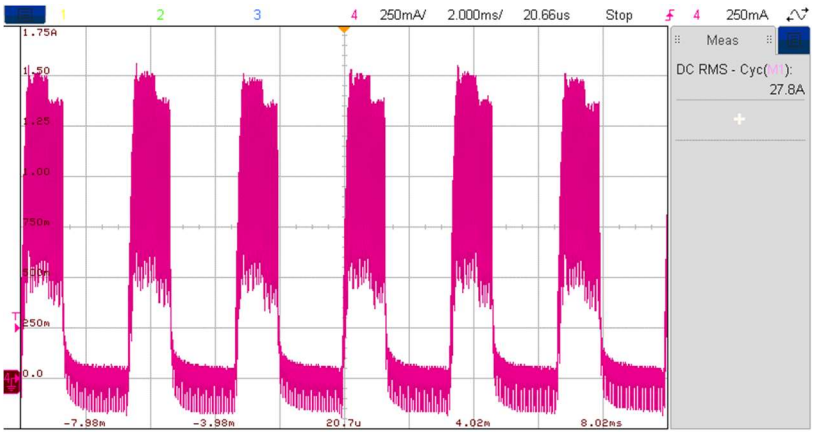


175. On information and belief, the LED module includes a LED driver in electrical communication with the at least one LED to operably provide a LED drive signal to the at least one LED; for example, the LED module of the Spikie contains an LED driver in electrical communication with the LED string to operably provide an LED drive signals to the LED string.

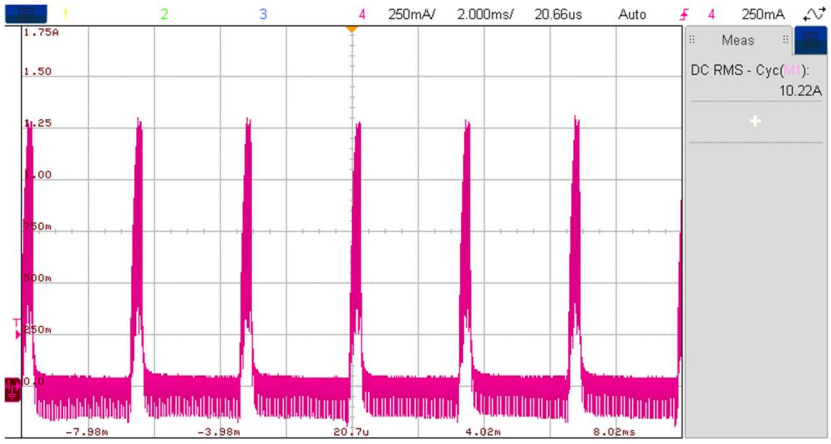
176. On information and belief, the LED module includes a thermal sensor operable to facilitate a control by the LED driver of a magnitude of the LED drive signal based on an operating temperature of the at least one LED as sensed by the thermal sensor; for example, the LED driver adjusts the magnitude of the average current flowing through the LEDs in response to a temperature sensed by a thermal sensor (NTC) positioned to detect the operating temperature of the LEDs. The below plot represents the measured current through the LEDs when the LEDs are at 70° C:



The below plot represents the measured current through the LEDs when the LEDs are at 75° C:



The below plot represents the measured current through the LEDs when the LEDs are 80° C:



As shown, the current pulse width is lowered, thus lowering the average current through the LEDs, as the temperature increases.

177. The full extent of Defendants' infringement is not presently known to Signify. On information and belief, Defendants have made and sold, or will make and sell, products under different names or part numbers that infringe the '902 Patent in a similar manner. Signify makes this preliminary identification of infringing products and infringed claims in Count Four without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identifications based on additional information obtained through discovery or otherwise.

178. Signify has suffered and continues to suffer damages as a result of Defendants' infringement of the '902 Patent in an amount to be determined at trial.

179. Defendants' infringement of the '902 Patent is causing irreparable harm for which Signify has no adequate remedy at law unless Defendants are enjoined by this Court. Under 35 U.S.C. § 283, Signify is entitled to a permanent injunction against further infringement of the '902 Patent.

180. On information and belief, Defendants have been aware of and have had notice and actual knowledge of the '902 Patent and its infringement of the '902 Patent at least as early as the service of this Complaint.

COUNT FIVE

INFRINGEMENT OF U.S. PATENT NO. 7,806,558

181. Signify incorporates by reference the allegations in paragraphs 1-180 as if fully set forth herein.

182. On information and belief, Defendants have infringed and are infringing claims of the '558 Patent, including at least claim 1, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

183. Claim 1 of the ’558 Patent recites:

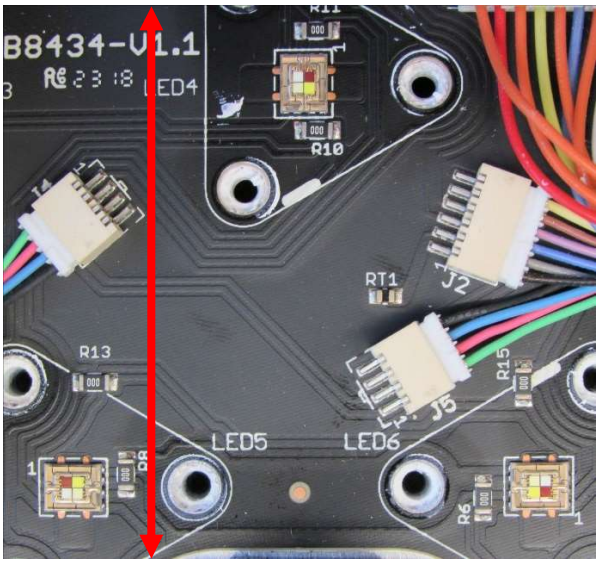
> A lighting apparatus, comprising:
>
> an essentially planar mounting board having a first reference axis in a first plane defined by the mounting board; and
>
> a plurality of LED-based light sources disposed on the mounting board, each light source comprising an LED package including a chip-on-board assembly of multiple LED chips and a collimator coupled to the LED package, each light source having a second reference axis indicating an orientation of the light source, the second reference axis for each light source being designated identically for all light sources of the plurality of light sources, wherein the plurality of LED-based light sources are disposed on the mounting board such that a first orientation of a first light source of the plurality of light sources, relative to the first reference axis of the mounting board, is different from at least one other orientation of at least one other light source of the plurality of light sources relative to the first reference axis of the mounting board.

184. On information and belief, Defendants have directly infringed and are directly infringing claim 1 of the ’558 Patent by making, using, offering to sell, selling, and/or importing at least LEDBeam 150 products in this District and elsewhere in the United States.

Infringing LEDBeam 150 products

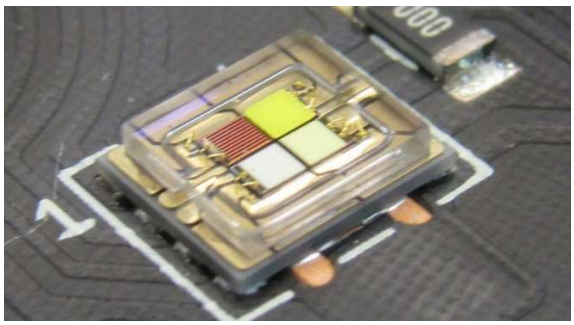
185. On information and belief, LEDBeam 150 products are lighting apparatuses.

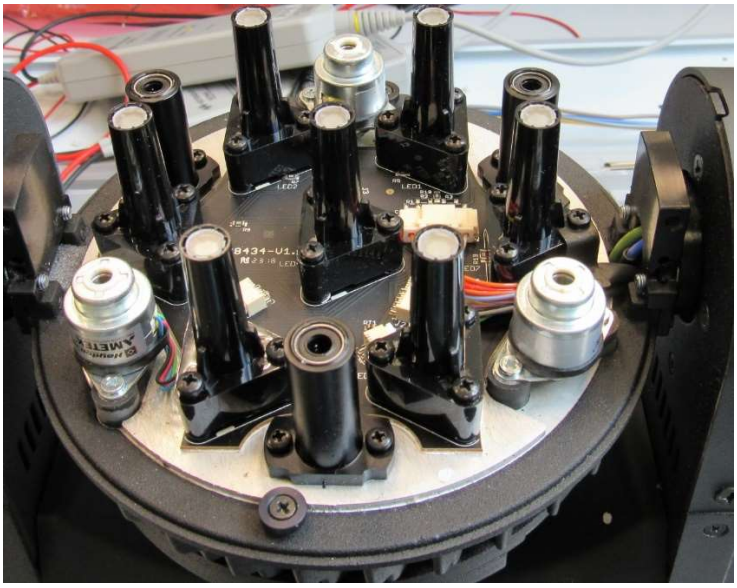
186. On information and belief, LEDBeam 150 products include an essentially planar mounting board having a first reference axis in a first plane defined by the mounting board; for example, the LEDBeam 150 has an essentially planar printed circuit board (PCB) a reference axis in a plane defined by the surface of the PCB.



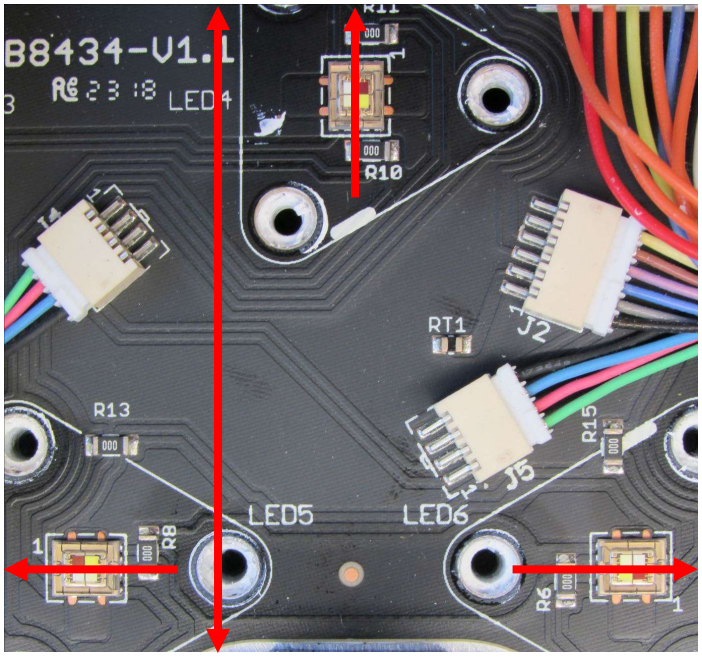
187. On information and belief, LEDBeam 150 products include a plurality of LED-based light sources disposed on the mounting board; for example, the LEDBeam 150 has 7 RGBW multichips mounted to the surface of the PCB, as shown above.

188. On information and belief, each light source comprises an LED package including a chip-on-board assembly of multiple LED chips and a collimator coupled to the LED package; for example, each RGBW multichip is a chip-on-board assembly of multiple LEDs and includes a collimating light guide coupled to the LED package.

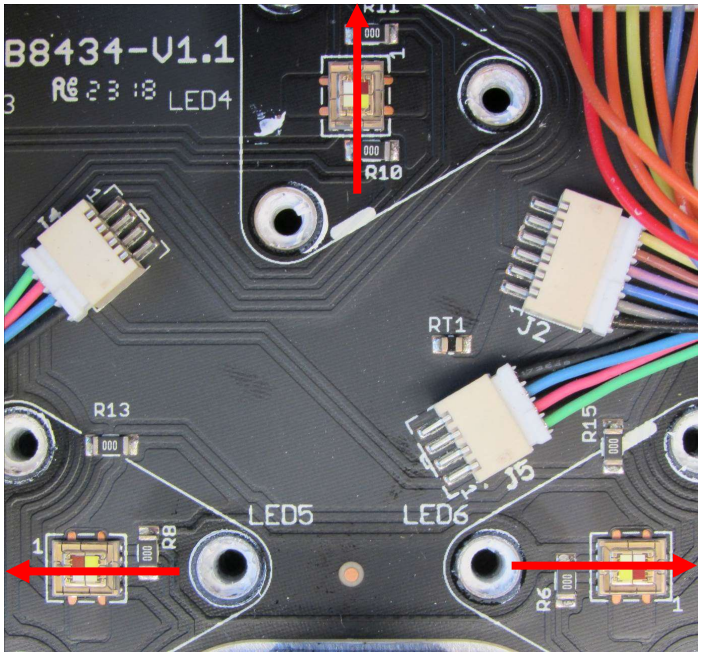




189. On information and belief, each light source has a second reference axis indicating an orientation of the light source, the second reference axis for each light source being designated identically for all light sources of the plurality of light sources; for example, each RGBW multichip has a second reference axis taken through the center of the RGBW multichip, parallel to the longer side of the multichip's rectangular shape.



190. On information and belief, the plurality of LED-based light sources are disposed on the mounting board such that a first orientation of a first light source of the plurality of light sources, relative to the first reference axis of the mounting board, is different from at least one other orientation of at least one other light source of the plurality of light sources relative to the first reference axis of the mounting board; for example, the RGBW multichips are disposed on the PCB such that the orientation of each RGBW multichip is different from the orientation of at least one other RGBW multichip, relative to the first reference axis of the PCB.



191. The full extent of Defendants' infringement is not presently known to Signify. On information and belief, Defendants have made and sold, or will make and sell, products under different names or part numbers that infringe the '558 Patent in a similar manner. Signify makes this preliminary identification of infringing products and infringed claims in Count Five without the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identifications based on additional information obtained through discovery or otherwise.

192. Signify has suffered and continues to suffer damages as a result of Defendants' infringement of the '558 Patent in an amount to be determined at trial.

193. Defendants' infringement of the '558 Patent is causing irreparable harm for which Signify has no adequate remedy at law unless Defendants are enjoined by this Court. Under 35 U.S.C. § 283, Signify is entitled to a permanent injunction against further infringement of the '558 Patent.

194. On information and belief, Defendants have been aware of and have had notice and actual knowledge of the '558 Patent and its infringement of the '558 Patent at least as early as May 2018, and Defendants' infringement of the '558 Patent has been willful. For example, Robe was notified on several occasions before the present action was filed that Defendants' products were infringing the '558 Patent. Defendants' pre-suit knowledge of the '558 Patent and failure to substantively address Signify's numerous notifications of infringement are sufficient to support a plausible inference that Defendants' infringement was willful and egregious, warranting enhancement of damages under 35 U.S.C. § 284, and attorneys' fees and costs incurred under 35 U.S.C. § 285.

COUNT SIX

INFRINGEMENT OF U.S. PATENT NO. 8,414,138

195. Signify incorporates by reference the allegations in paragraphs 1-194 as if fully set forth herein.

196. On information and belief, Defendants have infringed and are infringing claims of the '138 Patent, including at least claim 1, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

197. Claim 1 of the '138 Patent recites:

Illumination device, comprising:

at least one light emitting diode (LED) adapted to emit light having an emission maximum in a first wavelength range;

at least one LED adapted to emit light having an emission maximum in a first subrange of a second wavelength range;

at least one LED adapted to emit light having an emission maximum in a second subrange of the second wavelength range; and

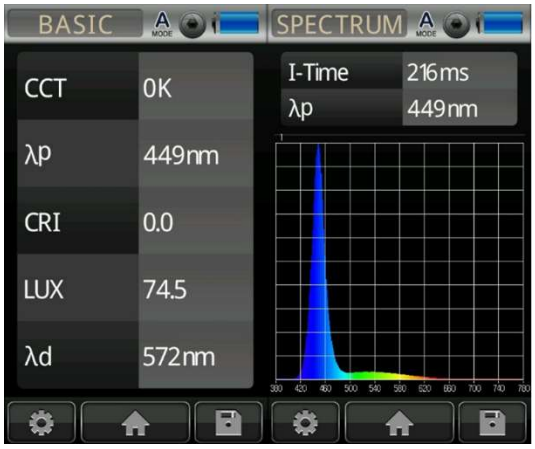
a wavelength converting material arranged to receive light of at least said first wavelength range and having an emission maximum in a third wavelength range which is between said first wavelength range and said second wavelength range.

198. On information and belief, Defendants have directly infringed and are directly infringing claim 1 of the ’138 Patent by making, using, offering to sell, selling, and/or importing at least DL7S products in this District and elsewhere in the United States.

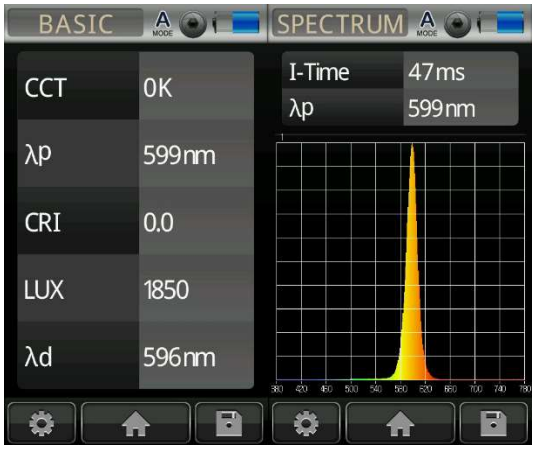
199. On information and belief, DL7S products are illumination devices.

200. On information and belief, DL7S products include at least one light emitting diode (LED) adapted to emit light having an emission maximum in a first wavelength range; for example, DL7S products include an 800 Watt 7 colors LED engine, which include multiple light green LEDs

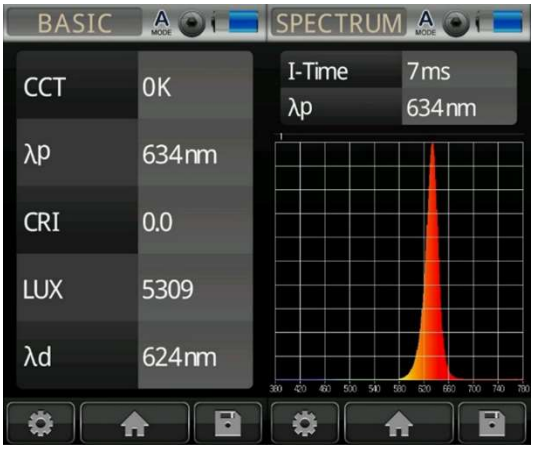
adapted to emit light having an emission maximum in a first wavelength range. This can be seen in the below spectrum, which was taken with the phosphor of light green LED P33 removed.



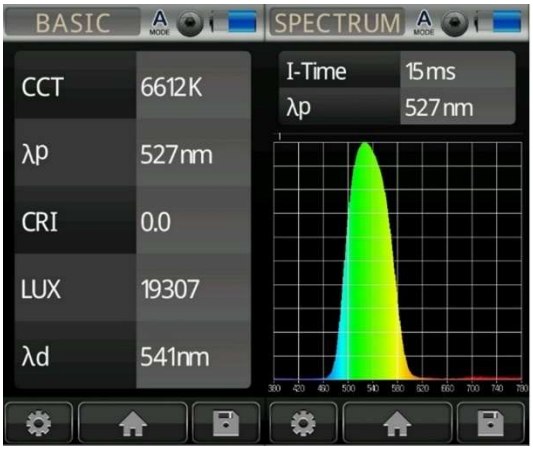
201. On information and belief, DL7S products include at least one LED adapted to emit light having an emission maximum in a first subrange of a second wavelength range; for example, DL7S products include amber LEDs adapted to emit light having an emission maximum in a first subrange of a second wavelength range, as shown in the below spectrum.



202. On information and belief, DL7S products include at least one LED adapted to emit light having an emission maximum in a second subrange of the second wavelength range; for example, DL7S products have red LEDs adapted to emit light having an emission maximum in a second subrange of a second wavelength range.



203. On information and belief, DL7S products include a wavelength converting material arranged to receive light of at least said first wavelength range and having an emission maximum in a third wavelength range which is between said first wavelength range and said second wavelength range; for example, DL7S products have a wavelength converting material (phosphor of light green LEDs) arranged to receive light of the first wavelength range and having an emission maximum in a third wavelength range which is between the first wavelength range and second wavelength range.



204. The full extent of Defendants' infringement is not presently known to Signify. On information and belief, Defendants have made and sold, or will make and sell, products under different names or part numbers that infringe the '138 Patent in a similar manner. Signify makes this preliminary identification of infringing products and infringed claims in Count Six without

the benefit of discovery or claim construction in this action, and expressly reserves the right to augment, supplement, and revise its identifications based on additional information obtained through discovery or otherwise.

205. Signify has suffered and continues to suffer damages as a result of Defendants' infringement of the '138 Patent in an amount to be determined at trial.

206. Defendants' infringement of the '138 Patent is causing irreparable harm for which Signify has no adequate remedy at law unless Defendants are enjoined by this Court. Under 35 U.S.C. § 283, Signify is entitled to a permanent injunction against further infringement of the '138 Patent.

207. On information and belief, Defendants have been aware of and have had notice and actual knowledge of the '138 Patent and its infringement of the '138 Patent at least as early as the service of this Complaint.

PRAYER FOR RELIEF

WHEREFORE, Signify prays for the following judgments and relief:

(a) A judgment that Defendants have infringed and are infringing the Patents-in-Suit;

(b) A permanent injunction against Defendants and their affiliates, subsidiaries, assigns, employees, agents or anyone acting in privity or concert from infringing the Patents-in-Suit, including enjoining the making, offering to sell, selling, using, or importing into the United States products claimed in any of the claims of the Patents-in-Suit; using or performing methods claimed in any of the claims of the Patents-in-Suit; inducing others to use and perform methods that infringe any claim of the Patents-in-Suit; or contributing to others using and performing methods that infringe any claim of the Patents-in-Suit, until the expiration of the Patents-in-Suit;

(c) An award of damages adequate to compensate Signify for Defendants' patent infringement, and an accounting to adequately compensate Signify for the infringement, including, but not limited to, lost profits and/or a reasonable royalty;

(d) An award of pre-judgment and post-judgment interest at the maximum rate allowed by law;

(e) An order finding that this is an exceptional case and awarding Signify its costs, expenses, disbursements, and reasonable attorneys' fees related to Defendants' patent infringement under 35 U.S.C. § 285 and all other applicable statutes, rules and common law; and

(f) Such other further relief, in law or equity, as this Court deems just and proper.

JURY TRIAL

In accordance with Rule 38 of the Federal Rules of Civil Procedure, Signify hereby demands a jury trial on all issues triable before a jury.

Dated: November 12, 2020

Respectfully submitted,

BOND, SCHOENECK & KING, PLLC

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