IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF MISSISSIPPI
Eastern Division

PHILIPS LIGHTING NORTH AMERICA CORPORATION and PHILIPS LIGHTING HOLDING B.V.

Plaintiffs,

vs.

HOWARD INDUSTRIES, INC. (d/b/a HOWARD LIGHTING),

Defendant.

Civil Action No. 2:18-cv-12-KS-MTP

JURY TRIAL DEMANDED

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiffs Philips Lighting North America Corporation and Philips Lighting Holding B.V. (collectively, "Philips Lighting") for their complaint against Howard Industries, Inc. (d/b/a Howard Lighting) ("Defendant") 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 Philips Lighting North America Corporation is a corporation organized and existing under the laws of Delaware and has a place of business at 3 Burlington Woods Drive, Burlington, Massachusetts 01803.

3. Plaintiff Philips Lighting Holding B.V. is a corporation organized and existing under the laws of the Netherlands with a place of business at High Tech Campus 45, 5656 AE Eindhoven, The Netherlands.

4. On information and belief, Defendant Howard Industries, Inc. (d/b/a Howard Lighting) is a corporation organized and existing under the laws of Mississippi with a place of business at 3225 Pendorff Road, Laurel, Mississippi 39441. Howard Industries, Inc. can be served with process through its Registered Agent, Richard Yoder, Jr., located at 415 N. Magnolia Street, Suite 400, Laurel, Mississippi 39441.

JURISDICTION AND VENUE

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

6. This Court has personal jurisdiction over Defendant for at least the following reasons: (i) Defendant, on information and belief, has committed acts of patent infringement in this District; (ii) Defendant, on information and belief, regularly does business, solicits business, and/or derives substantial revenue from products provided within this District, including products that infringe Philips Lighting's patented technology; and (iii) Defendant has a place of business within this District, at 3225 Pendorff Road, Laurel, Mississippi 39441.

7. Venue properly lies in this District under the provision of 28 U.S.C. § 1400 because, as described above, upon information and belief, Defendant is a Mississippi corporation and has committed acts of patent infringement in this District, and Defendant has a regular and established place of business in this District.

THE PATENTS-IN-SUIT

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

9. To protect its intellectual property resulting from its significant investments, Philips Lighting applied for and obtained numerous patents directed to various LED inventions and technologies. For example, Philips Lighting's LED-related patents include U.S. Patent Nos. 7,262,559, 6,577,512, 6,586,890, 8,063,577, and 6,250,774 (collectively, the "Patents-in-Suit").

10. U.S. Patent 7,262,559 ("the '559 Patent"), titled "LEDs Driver," was duly and legally issued by the United States Patent and Trademark Office on August 28, 2007. Plaintiff Philips Lighting Holding B.V. is the assignee and owner of all right, title, and interest in the '559 Patent, a copy of which is attached as Exhibit 1.

11. U.S. Patent 6,577,512 ("the '512 Patent"), titled "Power Supply for LEDs," was duly and legally issued by the United States Patent and Trademark Office on June 10, 2003. Plaintiff Philips Lighting Holding B.V. is the assignee and owner of all right, title, and interest in the '512 Patent, a copy of which is attached as Exhibit 2.

12. U.S. Patent 6,586,890 ("the '890 Patent"), titled "LED Driver Circuit with PWM Output," was duly and legally issued by the United States Patent and Trademark Office on July 1, 2003. Plaintiff Philips Lighting Holding B.V. is the assignee and owner of all right, title, and interest in the '890 Patent, a copy of which is attached as Exhibit 3.

13. U.S. Patent 8,063,577 ("the '577 Patent"), titled "Method and a Driver Circuit for LED Operation," was duly and legally issued by the United States Patent and Trademark Office on November 22, 2011. Plaintiff Philips Lighting Holding B.V. is the assignee and owner of all right, title, and interest in the '577 Patent, a copy of which is attached as Exhibit 4.

14. U.S. Patent 6,250,774 ("the '774 Patent"), titled "Luminaire," was duly and legally issued by the United States Patent and Trademark Office on June 26, 2001. Plaintiff Philips Lighting North America Corporation is the assignee and owner of all right, title, and interest in the '774 Patent, a copy of which is attached as Exhibit 5.

DEFENDANTS' EXEMPLARY INFRINGING PRODUCTS

A. HIGH-BAY LINEAR LED SERIES

15. Defendant's High-bay Linear LED Series ("HLED") products are LED lighting fixtures. According to Defendant, HLED products are designed for use in settings such as warehouses, cafeterias, manufacturing facilities, auditoriums, and gymnasiums. On information and belief, Defendant offers for sale and sells HLED products in the United States and in this District.

16. Defendant provides a specification sheet for HLED products on Defendant's website at http://www.howard-lighting.com/Documents/SpecSheets/Fixture/LED/HLED.PDF, a copy of which of which is attached as Exhibit 6. The following image from Exhibit 6 shows an HLED product:

17. The LED driver of a HLED product was reverse-engineered by a third-party vendor, and the resulting schematics are attached as Exhibit 7. The LED driver includes an NXP Semiconductors SSL8516T Greenchip PFC and Flyback Controller, a datasheet for which is attached as Exhibit 8.

B. LED AREA LIGHT

18. Defendant's LED Area Light ("XAL") products are LED lighting fixtures. According to Defendant, XAL products are designed for applications such as security applications, outdoor lighting, warehouses, parking lots, street lights, hotels, and parks. On information and belief, Defendant offers for sale and sells XAL products in the United States and in this District.

19. Defendant provides a specification sheet for XAL products on Defendant's website at http://www.howard-lighting.com/Documents/SpecSheets/Fixture/LED/XAL-LED.pdf, a copy of which is attached as Exhibit 9. The following image from Exhibit 9 shows an XAL product:

20. The LED driver of a 100W 5000K XAL product was reverse-engineered by a third-party vendor, and the resulting schematics are attached as Exhibit 10. The LED driver includes an ST L6599 High-Voltage Resonant Controller, a datasheet for which is attached as Exhibit 11.

C. MINI LED WALLPACK

21. Defendant's Mini LED Wallpack ("MINILWPP") products are LED lighting fixtures. According to Defendant, MINILWPP products are designed for use in commercial and residential outdoor applications, such as warehouses, entryways, perimeters, security

applications, shopping centers, schools, and apartments. On information and belief, Defendant offers for sale and sells MINILWPP products in the United States and in this District.

22. Defendant provides a specification sheet for MINILWPP products on Defendant's website at http://www.howard-lighting.com/Documents/SpecSheets/Fixture/LED/MINILWPP-LED.pdf, a copy of which is attached as Exhibit 12. The following image from Exhibit 12 shows an MINILWPP product:

23. The LED driver of a MINILWPP product was reverse-engineered by a third-party vendor, and the resulting schematics are attached as Exhibit 13. On information and belief, the LED driver includes an ST L6562 Transition-Mode PFC Controller, a datasheet for which is attached as Exhibit 14, and a TSM101/A Voltage and Current Controller, a datasheet for which is attached as Exhibit 15.

D. LED DUSK TO DAWN UTILITY

24. Defendant's LED Dusk-to-Dawn Utility ("DTDU-LED") products are LED light fixtures. According to Defendant, DTDU-LED products are designed for use in residential areas, storage facilities, loading areas, or rural roadways. On information and belief, Defendant offers for sale and sells DTDU-LED products in the United States and in this District.

25. Defendant provides a specification sheet for DTDU-LED products on Defendant's website at http://www.howard-lighting.com/Documents/SpecSheets/Fixture/LED/DTDU-LED.pdf, a copy of which is attached as Exhibit 16. The following image from Exhibit 16 shows a DTDU-LED product:

26. The LED driver of a DTDU-LED product was reverse-engineered by a third-party vendor, and the resulting schematics are attached as Exhibit 17. On information and belief, the LED driver includes an ST L6562 Transition-Mode PFC Controller, a datasheet for which is attached as Exhibit 14, and an FP103 Voltage and Current Controller, a datasheet for which is attached as Exhibit 18.

COUNT ONE

INFRINGEMENT OF U.S. PATENT NO. 7,262,559

27. Philips Lighting incorporates by reference the allegations in paragraphs 1-26 as if fully set forth herein.

28. On information and belief, Defendant has infringed and is infringing claims of the '559 Patent, including at least claims 6, 10 and 11, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

29. Claim 6 of the '559 Patent recites:

> A power supply for an LED light source, said power supply comprising:
>
> a power converter operable to provide a regulated power including an LED current and an LED voltage;
>
> an LED control switch operable to control a flow of the LED current through the LED light source; and
>
> a detection circuit operable to provide a detection signal indicative of an operating condition of the LED light source associated with the LED voltage,
>
> wherein said LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source,
>
> wherein the detection signal has a first level representative of a load condition of the LED light source, and
>
> wherein the detection signal has a second level representative of either a short condition or an open condition of the LED light source.

30. On information and belief, Defendant has directly infringed and is directly infringing claim 6 of the '559 Patent by making, using, offering to sell, selling, and/or importing at least HLED, MINILWPP, and DTDU-LED products in this District and elsewhere in the United States.

Infringing HLED Products

31. On information and belief, HLED products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 7. The individual components cited below refer to Exhibit 7 unless stated otherwise.

32. On information and belief, HLED products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T4 and diode D61A, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals OUT+ and OUT-.

33. On information and belief, HLED products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q31 controls the flow of current supplied by the flyback converter through the LEDs.

34. On information and belief, HLED products include a detection circuit operable to provide a detection signal indicative of an operating condition of the LED light source associated with the LED voltage; for example, Overcurrent Protection and Overpower Protection circuits (Exhibit 8) of U1 each provide a detection signal indicative of an operating condition (e.g. normal operation or an overcurrent or overpower condition) of the LED light associated with the LED voltage. The value of the detection signals will be determined by the value of the voltage across the LEDs, which appears across resistors R66, R67, R68 and the inverting input of differential amplifier U62A. Differential amplifier U62A generates a signal that propagates through optocoupler U31 to U1 FBCTRL pin 3 and the input of Overcurrent Protection and Overpower Protection circuits.

35. On information and belief, the control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, U1 and control switch Q31 function to clamp the LED current during an initial loading stage of the LED light source, according to the U1 soft-start functions of PFCSENSE pin 11 or FBSENSE pin 10 (Exhibit 8).

36. On information and belief, the detection signal has a first level representative of a load condition of the LED light source, and a second level representative of either a short condition or an open condition of the LED light source; for example, Overcurrent Protection and Overpower Protection circuits (Exhibit 8) output a first level if an overcurrent or overpower

condition is not present, and a second level if an overcurrent or overpower condition (e.g. a short condition of the LED light source) is present.

Infringing MINILWPP Products

37. On information and belief, MINILWPP products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 13. The individual components cited below refer to Exhibit 13 unless stated otherwise.

38. On information and belief, MINILWPP products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T1 and diodes Q13, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals V and GND.

39. On information and belief, MINILWPP products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q11 controls the flow of current supplied by the flyback converter through the LEDs.

40. On information and belief, MINILWPP products include a detection circuit operable to provide a detection signal indicative of an operating condition of the LED light source associated with the LED voltage; for example, Overvoltage Detection circuit (Exhibit 14) of IC3 provides a detection signal indicative of an operating condition (e.g., normal operation or overvoltage condition) of the LED light associated with the LED voltage. The value of the detection signals will be determined by the value of the voltage across the LEDs, which appears across at least voltage sense resistors R57, R38, and VR1. The voltage across voltage sense resistor VR1, proportional to the voltage applied to the LEDs, appears at the inverting input of the differential amplifier coupled to IC5 Vref pin 1 and IC5 VRIN pin 7 (Exhibit 15), which

generates a signal at IC5 OUT pin 6 that propagates through optocoupler IC2A, IC2B and appears at U1 INV pin 1 and the input of Overvoltage Detection circuit.

41. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, IC3 and control switch Q11 function to clamp the LED current during an initial loading stage of the LED light source, according to the IC3 "ultra-low (≤ 70 μA) start-up current" (Exhibit 14).

42. On information and belief, the detection signal has a first level representative of a load condition of the LED light source and a second level representative of either a short condition or an open condition of the LED light source; for example, Overvoltage Detection circuit (Exhibit 14) outputs a first level if the LEDs are operating normally, and a second level if an overvoltage condition (e.g. an open condition of the LED light source) is present.

Infringing DTDU-LED Products

43. On information and belief, DTDU-LED products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 17. The individual components cited below refer to Exhibit 17 unless stated otherwise.

44. On information and belief, DTDU-LED products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T3 and diodes D4, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals DC+ and DC-.

45. On information and belief, DTDU-LED products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q1 controls the flow of current supplied by the flyback converter through the LEDs.

46. On information and belief, DTDU-LED products include a detection circuit operable to provide a detection signal indicative of an operating condition of the LED light source associated with the LED voltage; for example, Overvoltage Detection circuit (Exhibit 14) of U1 provides a detection signal indicative of an operating condition (e.g., normal operation or overvoltage condition) of the LED light associated with the LED voltage. The value of the detection signals will be determined by the value of the voltage across the LEDs, which appears across resistors R28, R29, and R30, generating a signal that propagates through optocoupler U2 to U1 INV pin 1 and the input of the Overvoltage Detection circuit.

47. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, U1 and control switch Q1 function to clamp the LED current during an initial loading stage of the LED light source, according to the U1 "ultra-low (≤ 70 µA) start-up current" (Exhibit 14).

48. On information and belief, the detection signal has a first level representative of a load condition of the LED light source and a second level representative of either a short condition or an open condition of the LED light source; for example, Overvoltage Detection circuit (Exhibit 14) will output a first level if an overvoltage condition is not present and a second level if an overvoltage (e.g., an open condition of the LED light source) is present.

49. Claim 10 of the '559 Patent recites:

> A power supply for an LED light source, said power supply comprising:
>
> a power converter operable to provide a regulated power including an LED current and an LED voltage;
>
> an LED control switch operable to control a flow of the LED current through the LED light source; and
>
> a current sensor operable to sense the LED current flowing through the LED light source, said current sensor including

an differential amplifier, and

means for adjusting a gain of said differential amplifier,

wherein said LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source.

50. On information and belief, Defendant has directly infringed and is directly infringing claim 10 of the '559 Patent by making, using, offering to sell, selling, and/or importing at least HLED, XAL, MINILWPP, and DTDU-LED products in this District and elsewhere in the United States.

Infringing HLED Products

51. On information and belief, HLED products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 7. The individual components cited below refer to Exhibit 7 unless stated otherwise.

52. On information and belief, HLED products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T4 and diode D61A, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals OUT+ and OUT-.

53. On information and belief, HLED products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q31 controls the flow of current supplied by the flyback converter through the LEDs.

54. On information and belief, HLED products include a current sensor operable to sense the LED current flowing through the LED light source, the current sensor including a differential amplifier and means for adjusting a gain of the differential amplifier; for example, current sensor, including at least current sense resistor R63 and differential amplifier U62B is

operable to sense current flowing through the LEDs. The voltage across current sense resistor R63, proportional to the current through the LEDs, appears at the inverting input of differential amplifier U62B. The gain of differential amplifier U62B is adjusted according to the value of resistor R74.

55. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, U1 and control switch Q31 function to clamp the LED current during an initial loading stage of the LED light source, according to the U1 soft-start functions of PFCSENSE pin 11 or FBSENSE pin 10 (Exhibit 8).

Infringing XAL Products

56. On information and belief, XAL products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 10. The individual components cited below refer to Exhibit 10 unless stated otherwise.

57. On information and belief, XAL products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, resonant converter comprising, at least, transformer T1, capacitor C9, and diodes DS1 and DS2, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals Vo+ and Vo-.

58. On information and belief, XAL products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch, comprising switches Q6 and/or Q7, controls the flow of current supplied by the resonant converter through the LEDs.

59. On information and belief, XAL products include a current sensor operable to sense the LED current flowing through the LED light source, the current sensor including a differential amplifier and means for adjusting a gain of the differential amplifier. For example, current sensor, including at least current sense resistor RS1 and differential amplifier U1B is operable to sense current flowing through the LEDs. The voltage across current sense resistor RS1, proportional to the current through the LEDs, appears at the inverting input of differential amplifier U1B. The gain of differential amplifier U1B is adjusted according to the value of resistor RS25.

60. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, UL1 and switches Q6/Q7 function to clamp the LED current during an initial loading stage of the LED light source, according to the UL1 soft-start function (Exhibit 11).

Infringing MINILWPP Products

61. On information and belief, MINILWPP products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 13. The individual components cited below refer to Exhibit 13 unless stated otherwise.

62. On information and belief, MINILWPP products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T1 and diodes Q13, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals V and GND.

63. On information and belief, MINILWPP products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q11 controls the flow of current supplied by the flyback converter through the LEDs.

64. On information and belief, MINILWPP products include a current sensor operable to sense the LED current flowing through the LED light source, the current sensor including a differential amplifier and means for adjusting a gain of the differential amplifier. For example, current sensor, including at least current sense resistor R58 and differential amplifier (Exhibit 15) of IC5 coupled to IC5 SRIN pin 5 and IC5 CRREF pin 3 is operable to sense current flowing through the LEDs. The voltage across current sense resistor R58, proportional to the current through the LEDs, appears at the inverting input of the differential amplifier. The gain of the differential amplifier is adjusted according to the value of resistor R54.

65. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, IC3 and control switch Q11 function to clamp the LED current during an initial loading stage of the LED light source, according to the IC3 "ultra-low (≤ 70 μA) start-up current" (Exhibit 14).

Infringing DTDU-LED Products

66. On information and belief, DTDU-LED products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 17. The individual components cited below refer to Exhibit 17 unless stated otherwise.

67. On information and belief, DTDU-LED products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T3 and diodes D4, provides

regulated power, including an LED current and an LED voltage, to LEDs connected to terminals DC+ and DC-.

68. On information and belief, DTDU-LED products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q1 controls the flow of current supplied by the flyback converter through the LEDs.

69. On information and belief, DTDU-LED products include a current sensor operable to sense the LED current flowing through the LED light source, the current sensor including a differential amplifier and means for adjusting a gain of the differential amplifier. For example, current sensor, including at least current sense resistor R32 and diode D5 and differential amplifier OPA2 (Exhibit 18) of U3 is operable to sense current flowing through the LEDs. The voltage across current sense resistor R32, proportional to the current through the LEDs, appears at the inverting input of differential amplifier OPA2. The gain of differential amplifier OPA2 is adjusted according to the value of resistor R26.

70. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, U1 and control switch Q1 function to clamp the LED current during an initial loading stage of the LED light source, according to the U1 "ultra-low (≤ 70 µA) start-up current." (Exhibit 14.)

71. Claim 11 of the '559 Patent recites:

> A power supply for an LED light source, said power supply comprising:
>
> a power converter operable to provide a regulated power including an LED current and an LED voltage;
>
> an LED control switch operable to control a flow of the LED current through the LED light source; and
>
> a voltage sensor operable to sense the LED voltage applied to the LED light source, said voltage sensor including

an differential amplifier, and

means for adjusting a gain of said differential amplifier,

wherein said LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source.

72. On information and belief, Defendant has directly infringed and is directly infringing claim 11 of the '559 Patent by making, using, offering to sell, selling, and/or importing at least HLED, XAL, MINILWPP, and DTDU-LED products in this District and elsewhere in the United States.

Infringing HLED Products

73. On information and belief, HLED products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 7. The individual components cited below refer to Exhibit 7 unless stated otherwise.

74. On information and belief, HLED products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T4 and diode D61A, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals OUT+ and OUT-.

75. On information and belief, HLED products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q31 controls the flow of current supplied by the flyback converter through the LEDs.

76. On information and belief, HLED products include a voltage sensor operable to sense the LED voltage applied to the LED light source, the voltage sensor including a differential amplifier and means for adjusting a gain of the differential amplifier; for example, voltage sensor, including at least voltage sense resistors R66, R67, and R68, and differential amplifier

U62A is operable to sense voltage applied to the LEDs. The voltage across voltage sense resistor R68, proportional to the voltage applied to the LEDs, appears at the inverting input of differential amplifier U62A. The gain of differential amplifier U62A is adjusted according to the value of resistor R73.

77. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, U1 and control switch Q31 function to clamp the LED current during an initial loading stage of the LED light source, according to the U1 soft-start functions of PFCSENSE pin 11 or FBSENSE pin 10 (Exhibit 8).

Infringing XAL Products

78. On information and belief, XAL products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 10. The individual components cited below refer to Exhibit 10 unless stated otherwise.

79. On information and belief, XAL products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, resonant converter comprising, at least, transformer T1, capacitor C9, and diodes DS1 and DS2, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals Vo+ and Vo-.

80. On information and belief, XAL products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch, comprising switches Q6 and/or Q7, controls the flow of current supplied by the resonant converter through the LEDs.

81. On information and belief, XAL products include a voltage sensor operable to sense the LED voltage applied to the LED light source, the voltage sensor including a differential amplifier and means for adjusting a gain of the differential amplifier. For example, voltage sensor, including at least voltage sense resistor RS52, RS54, RS61, RS62 and differential amplifier U1A is operable to sense the voltage applied to the LEDs. The voltage across voltage sense resistors RS61, RS62, proportional to the voltage applied to the LEDs, appears at the inverting input of differential amplifier U1A. The gain of differential amplifier U1A is adjusted according to the value of resistor RS51.

82. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, UL1 and switches Q6/Q7 function to clamp the LED current during an initial loading stage of the LED light source, according to the UL1 soft-start function (Exhibit 11).

Infringing MINILWPP Products

83. On information and belief, MINILWPP products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 13. The individual components cited below refer to Exhibit 13 unless stated otherwise.

84. On information and belief, MINILWPP products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T1 and diodes Q13, provides regulated power, including an LED current and an LED voltage, to LEDs connected to terminals V and GND.

85. On information and belief, MINILWPP products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q11 controls the flow of current supplied by the flyback converter through the LEDs.

86. On information and belief, MINILWPP products include a voltage sensor operable to sense the LED voltage applied to the LED light source, the voltage sensor including a differential amplifier and means for adjusting a gain of the differential amplifier. For example, voltage sensor, including at least voltage sense resistors R57, R38, and VR1 differential amplifier (Exhibit 15) coupled to IC5 Vref pin 1 and IC5 VRIN pin 7 is operable to sense voltage applied to the LED light source. The voltage across voltage sense resistor VR1, proportional to the voltage applied to the LEDs, appears at the inverting input of the differential amplifier. The gain of the differential amplifier is adjusted according to the value of resistor VR1.

87. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, IC3 and control switch Q11 function to clamp the LED current during an initial loading stage of the LED light source, according to the IC3 "ultra-low (≤ 70 μA) start-up current" (Exhibit 14).

Infringing DTDU-LED Products

88. On information and belief, DTDU-LED products include a power supply for an LED light source, as shown for example in the schematics of Exhibit 17. The individual components cited below refer to Exhibit 17 unless stated otherwise.

89. On information and belief, DTDU-LED products include a power converter operable to provide a regulated power including an LED current and an LED voltage; for example, flyback converter comprising, at least, transformer T3 and diodes D4, provides

regulated power, including an LED current and an LED voltage, to LEDs connected to terminals DC+ and DC-.

90. On information and belief, DTDU-LED products include an LED control switch operable to control a flow of the LED current through the LED light source; for example, control switch Q1 controls the flow of current supplied by the flyback converter through the LEDs.

91. On information and belief, DTDU-LED products include a voltage sensor operable to sense the LED voltage applied to the LED light source, the voltage sensor including a differential amplifier and means for adjusting a gain of the differential amplifier. For example, voltage sensor, including at least voltage sense resistors R28, R29, and R30 and differential amplifier OPA1 (Exhibit 18) of U3 is operable to sense voltage applied to the LEDs. The voltage across voltage sense resistor R30, proportional to the voltage applied to the LEDs, appears at the inverting input of differential amplifier OPA1. The gain of differential amplifier OPA1 is adjusted according to the value of resistor R25.

92. On information and belief, the LED control switch is further operable to clamp a peak of the LED current during an initial loading stage of the LED light source; for example, U1 and control switch Q1 function to clamp the LED current during an initial loading stage of the LED light source, according to the U1 "ultra-low (≤ 70 µA) start-up current." (Exhibit 14.)

93. The full extent of Defendant's infringement is not presently known to Philips Lighting. On information and belief, Defendant has made and sold, or will make and sell, products under different names or part numbers that infringe the '559 Patent in a similar manner. Philips Lighting 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.

94. Philips Lighting has suffered and continues to suffer damages as a result of Defendant's infringement of the '559 Patent in an amount to be determined at trial.

95. Defendant's infringement of the '559 Patent is causing irreparable harm for which Philips Lighting has no adequate remedy at law unless Defendant is enjoined by this Court. Under 35 U.S.C. § 283, Philips Lighting is entitled to a permanent injunction against further infringement of the '559 Patent.

96. On information and belief, Defendant has been aware of and has had notice and actual knowledge of the '559 Patent and its infringement of the '559 Patent at least as early as November 12, 2014, and Defendant's infringement of the '559 Patent has been willful. For example, Ms. Linda Tabor Howard, President of Defendant, was notified before the present action was filed that Defendant's products were infringing the '559 Patent. *See* Exhibit 19. Defendant's pre-suit knowledge of the '559 Patent and failure to substantively address Philips Lighting's numerous notifications of infringement are sufficient to support a plausible inference that Defendant's 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. 6,557,512

97. Philips Lighting incorporates by reference the allegations in paragraphs 1-96 as if fully set forth herein.

98. On information and belief, Defendant has infringed and is infringing claims of the '512 Patent, including at least claims 28 and 38, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

99. Claim 28 (including the limitations of claim 19) of the '512 Patent recites:

> A circuit for supplying power for LEDs comprising:
>
> a transformer, the transformer supplying current to the LEDs and being responsive to a transformer control signal;
>
> a current sensor for sensing current to the LEDs, the current sensor generating a sensed current signal;
>
> a current reference for generating a reference current signal;
>
> a current controller for comparing the sensed current signal to the reference current signal, the current controller generating a feedback signal;
>
> a PFC responsive to the feedback signal, the PFC generating a gate drive signal;
>
> a transistor responsive to the gate drive signal, the transistor generating the transformer control signal; and
>
> a protective circuit limiting the current to the LEDs.
>
> an optocoupler for isolating the current controller from the PFC.

100. On information and belief, Defendant has directly infringed and is directly infringing claim 28 of the '512 Patent by making, using, offering to sell, selling, and/or importing at least HLED, MINILWPP, and DTDU-LED products in this District and elsewhere in the United States.

Infringing HLED Products

101. On information and belief, HLED include a circuit for supplying power for LEDs, as shown for example in the schematics of Exhibit 7. The individual components cited below refer to Exhibit 7 unless stated otherwise.

102. On information and belief, HLED products include a transformer, the transformer supplying current to the LEDs and being responsive to a transformer control signal; for example, transformer T4 supplies current to an LED array connected to output terminals OUT+ and OUT- and is responsive to a control signal generated by switch Q31.

103. On information and belief, HLED products include a current sensor for sensing current to the LEDs, the current sensor generating a sensed current signal; for example current sense resistor R63 senses current passing through the LED array and generates a signal proportional to the sensed current. The current sense signal is applied to inverting input of current controller U62B.

104. On information and belief, HLED products include a current reference for generating a reference current signal; for example, current reference, formed by DIM+ and resistors R82, R76, R77, and R78, generates a reference signal that is applied to the non-inverting input of current controller U62B.

105. On information and belief, HLED products include a current controller for comparing the sensed current signal to the reference current signal, the current controlling generating a feedback signal; for example, current controller U62B compares the sensed current signal received at the inverting input to the reference signal received at noninverting input. The output of current controller U62B is a feedback signal that is applied, via optocoupler U31, to PFC U1 at FBCTRL pin 3.

106. On information and belief, HLED products include a PFC responsive to feedback signal, the PFC generating a gate drive signal; for example, PFC U1, in response to the feedback signal received at FBCTRL pin 3, generates a gate drive signal at PFC U1 FBDRIVER pin 13.

107. On information and belief, HLED products include a transistor responsive to the gate drive signal, the transistor generating the transformer control signal; for example, the gate drive signal drives switch Q31, and switch Q31, in turn, generates the transformer control signal to control transformer T4.

108. On information and belief, HLED products include a protective circuit limiting the current to the LEDs; for example, Overcurrent Protection and Overpower Protection circuits (Exhibit 8) of PFC U1 each limit current to the LEDs, in response to the input at PFC U1 FBCTRL pin 3 of PFC U1 indicative of overcurrent or overpower conditions.

109. On information and belief, HLED products include an optocoupler for isolating the current controller from the PFC; for example, optocoupler U31 isolates current controller U62B from PFC U1.

Infringing MINILWPP Products

110. On information and belief, MINILWPP products include a circuit for supplying power for LEDs, as shown for example in the schematics of Exhibit 13. The individual components cited below refer to Exhibit 13 unless stated otherwise.

111. On information and belief, MINILWPP products include a transformer, the transformer supplying current to the LEDs and being responsive to a transformer control signal; for example, transformer T1 supplies current to an LED array connected to output terminals V and GND and is responsive to a control signal generated by switch Q11.

112. On information and belief, MINILWPP products include a current sensor for sensing current to the LEDs, the current sensor generating a sensed current signal; for example, current sense resistor R58 senses current passing through the LED array and generates a signal proportional to the sensed current. The current sense signal is applied to IC5 CRREF pin 3.

113. On information and belief, MINILWPP products include a current reference for generating a reference current signal; for example, current reference, formed by the output of IC5 Vref pin 1 and resistors R53 and R40, generates a reference signal that is applied to IC5 SRIN pin 5.

114. On information and belief, MINILWPP products include a current controller for comparing the sensed current signal to the reference current signal, the current controlling generating a feedback signal; for example, current controller (Exhibit 15) coupled to IC5 SRIN pin 5 and IC5 CRREF pin 3 compares the sensed current signal received at IC5 CRREF pin 3 and the reference signal received at IC5 SRIN pin 5. The output of current controller is a feedback signal that is output from IC5 VOUT pin 6 and is applied to PFC IC3 INV pin 1 via optocoupler IC2A, IC2B.

115. On information and belief, MINILWPP products include a PFC responsive to feedback signal, the PFC generating a gate drive signal; for example, PFC IC3, in response to feedback signal received at PFC IC3 INV pin 1, generates a drive signal at GD pin 7.

116. On information and belief, MINILWPP products include a transistor responsive to the gate drive signal, the transistor generating the transformer control signal; for example, the gate drive signal drives switch Q11, and switch Q11, in turn, generates the transformer control signal to control transformer T1.

117. On information and belief, MINILWPP products include a protective circuit limiting the current to the LEDs; for example, Zero Current Detector and Disable circuits (Exhibit 14) of PFC IC3 each limit current to the LEDs in response to an input at PFC IC3 pin 5 indicative of a zero current condition. A high current through the LEDs will flow through resistors R59 and R58, creating a voltage across R58 proportional to the current through the

LEDs. The voltage across resistor R58 will appear at the inverting input of IC4A, thus turning on switch Q12, and generating a signal through optocoupler IC1A, IC1B that will propagate through switch Q4 to PFC IC3 ZCD pin 5 and the input of Zero Current Detector and Disable circuits.

118. On information and belief, MINILWPP products include an optocoupler for isolating the current controller from the PFC; for example, optocoupler IC2A, IC2B isolates current controller from PFC IC3.

Infringing DTDU-LED Products

119. On information and belief, DTDU-LED products include a circuit for supplying power for LEDs, as shown for example in the schematics of Exhibit 17. The individual components cited below refer to Exhibit 17 unless stated otherwise.

120. On information and belief, DTDU-LED products include a transformer, the transformer supplying current to the LEDs and being responsive to a transformer control signal; for example, transformer T3 supplies current to an LED array connected to output terminals DC+ and DC- and is responsive to a control signal generated by switch Q1.

121. On information and belief, DTDU-LED products include a current sensor for sensing current to the LEDs, the current sensor generating a sensed current signal; for example, current sense resistor R32 and diode D5 sense current passing through the LED array and generate a signal proportional to the sensed current. The current sense signal is applied to U3 B- pin 6.

122. On information and belief, DTDU-LED products include a current reference for generating a reference current signal; for example, current reference, formed by the output of Q4 VOUT pin 1 and resistors R23, R35, and R40, generates a reference signal that is applied to U3 B+ pin 5.

123. On information and belief, DTDU-LED products include a current controller for comparing the sensed current signal to the reference current signal, the current controlling generating a feedback signal; for example, current controller OPA2 (Exhibit 18) of U3 compares the sensed current received at U3 B- pin 6 to the reference signal received at U3 B+ pin 5. The output of comparator OPA2 is a feedback signal that is output from U3 Bout pin 7 and is applied to PFC U1 INV pin 1 via optocoupler U2.

124. On information and belief, DTDU-LED products include a PFC responsive to feedback signal, the PFC generating a gate drive signal; for example, PFC U1, in response to the feedback signal received at PFC U1 INV pin 1, generates a drive signal at GD pin 7.

125. On information and belief, DTDU-LED products include a transistor responsive to the gate drive signal, the transistor generating the transformer control signal; for example, the gate driver signal drives switch Q1, and switch Q1, in turn, generates the transformer control signal to control transformer T3.

126. On information and belief, DTDU-LED products include a protective circuit limiting the current to the LEDs; for example, Zener diode ZD3 and Overvoltage Detection circuit of PFC U1 limits current to the LEDs in response to an input at PFC U1 INV pin 1 indicative of an overvoltage condition.

127. On information and belief, DTDU-LED products include an optocoupler for isolating the current controller from the PFC; for example, optocoupler U2 isolates current controller OPA2 (Exhibit 18) of U3 from PFC U1.

128. Claim 38 of the '512 Patent recites:

> A circuit for supplying power for LEDs comprising:
>
> a transformer, the transformer supplying current to the LEDs and being responsive to a transformer control signal;

a current sensor for sensing current to the LEDs, the current sensor generating a sensed current signal;

a current reference for generating a reference current signal;

a current controller for comparing the sensed current signal to the reference current signal, the current controller generating a feedback signal;

a PFC responsive to the feedback signal, the PFC generating a gate drive signal;

a transistor responsive to the gate drive signal, the transistor generating the transformer control signal; and

a protective circuit limiting the voltage to the LEDs.

129. On information and belief, Defendant has directly infringed and is directly infringing claim 38 of the '512 Patent by making, using, offering to sell, selling, and/or importing, at least MINILWPP products in this District and elsewhere in the United States.

Infringing MINILWPP Products

130. On information and belief, MINILWPP products include a circuit for supplying power for LEDs, as shown for example in the schematics of Exhibit 13. The individual components cited below refer to Exhibit 13 unless stated otherwise.

131. On information and belief, MINILWPP products include a transformer, the transformer supplying current to the LEDs and being responsive to a transformer control signal; for example, transformer T1 supplies current to an LED array connected to output terminals V and GND and is responsive to a control signal generated by switch Q11.

132. On information and belief, MINILWPP products include a current sensor for sensing current to the LEDs, the current sensor generating a sensed current signal; for example, current sense resistor R58 senses current passing through the LED array and generates a signal proportional to the sensed current. The current sense signal is applied to IC5 CRREF pin 3.

133. On information and belief, MINILWPP products include a current reference for generating a reference current signal; for example, current reference, formed by the output of IC5 Vref pin 1 and resistors R53 and R40, generates a reference signal that is applied to IC5 SRIN pin 5.

134. On information and belief, MINILWPP products include a current controller for comparing the sensed current signal to the reference current signal, the current controlling generating a feedback signal; for example, current controller (Exhibit 15) coupled to IC5 SRIN pin 5 and IC5 CRREF pin 3 compares the sensed current signal received at IC5 CRREF pin 3 and the reference signal received at IC5 SRIN pin 5. The output of current controller is a feedback signal that is output from IC5 VOUT pin 6 and is applied to PFC IC3 INV pin 1 via optocoupler IC2A, IC2B.

135. On information and belief, MINILWPP products include a PFC responsive to feedback signal, the PFC generating a gate drive signal; for example, PFC IC3, in response to feedback signal received at PFC IC3 INV pin 1, generates a drive signal at GD pin 7.

136. On information and belief, MINILWPP products include a transistor responsive to the gate drive signal, the transistor generating the transformer control signal; for example, the gate drive signal drives switch Q11, and switch Q11, in turn, generates the transformer control signal to control transformer T1.

137. On information and belief, MINILWPP products include a protective circuit limiting the voltage to the LEDs; for example, Zero Current Detector and Disable circuits (Exhibit 14) of PFC IC3 each limit voltage to the LEDs in response to an input at PFC IC3 pin 5 indicative of a zero current condition. A high voltage at the output, resulting from a zero current condition, will cause Zener diodes ZD3 and ZD6 to enter breakdown, thus turning on switch

Q12, and generating a signal through optocoupler IC1A, IC1B that will propagate through switch Q4 to PFC IC3 ZCD pin 5.

138. The full extent of Defendant's infringement is not presently known to Philips Lighting. On information and belief, Defendant has made and sold, or will make and sell, products under different names or part numbers that infringe the '512 Patent in a similar manner. Philips Lighting 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.

139. Philips Lighting has suffered and continues to suffer damages as a result of Defendant's infringement of the '512 Patent in an amount to be determined at trial.

140. Defendant's infringement of the '512 Patent is causing irreparable harm for which Philips Lighting has no adequate remedy at law unless Defendant is enjoined by this Court. Under 35 U.S.C. § 283, Philips Lighting is entitled to a permanent injunction against further infringement of the '512 Patent.

141. On information and belief, Defendant has been aware of and has had notice and actual knowledge of the '512 Patent and its infringement of the '512 Patent at least as early as November 12, 2014, and Defendant's infringement of the '512 Patent has been willful. For example, Ms. Linda Tabor Howard, President of Defendant, was notified before the present action was filed that Defendant's products were infringing the '512 Patent. *See* Exhibit 19. Defendant's pre-suit knowledge of the '512 Patent and failure to substantively address Philips Lighting's numerous notifications of infringement are sufficient to support a plausible inference

that Defendant's 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. 6,586,890

142. Philips Lighting incorporates by reference the allegations in paragraphs 1-141 as if fully set forth herein.

143. On information and belief, Defendant has infringed and is infringing claims of the '890 Patent, including at least claim 30, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

144. Claim 30 (including the limitations of claim 23) of the '890 Patent recites:

> A circuit for supplying power to an LED array comprising:
>
> a power supply 52, the power supply 52 supplying current to the LED array 54 and being responsive to a drive signal;
>
> a current sensor 60 for sensing current to the LED array 54, the current sensor 60 generating a sensed current signal;
>
> a reference current source 62 for generating a reference signal;
>
> a comparator 58 for comparing the sensed current signal to the reference signal, the comparator 58 generating a feedback signal; and
>
> a PWM control IC 56 responsive to the feedback signal, the PWM control IC 56 generating the drive signal.
>
> an LED monitor, said LED monitor generating an LED array inoperable signal when said LED array is inoperable.

145. On information and belief, Defendant has directly infringed and is directly infringing claim 30 of the '890 Patent by making, using, offering to sell, selling, and/or importing at least HLED, MINILWPP, and DTDU-LED products in this District and elsewhere in the United States.

Infringing HLED Products

146. On information and belief, HLED products include a circuit for supplying power to an LED array as shown for example in the schematics of Exhibit 7. The individual components cited below refer to Exhibit 7 unless stated otherwise.

147. On information and belief, HLED products include a power supply, suppling current to the LED array and being responsive to a drive signal; for example, power supply, formed by a flyback converter comprised of, at least, transformer T4, diode D4, and switch Q31, supplies current to an LED array connected to output terminals OUT+ and OUT- and is responsive to a drive signal generated by PWM control IC U1 FBDRIVER pin 13.

148. On information and belief, HLED products include a current sensor for sensing current to the LED array, the current sensor generating a sensed current signal; for example, current sense resistor R63 senses current passing through the LED array and generates a sensed current signal proportional to the sensed current. The sensed current signal is applied to inverting input of comparator U62B.

149. On information and belief, HLED products include a reference current source for generating a reference signal; for example, reference current source, formed by DIM+ and resistors R82, R76, R77, and R78, generates a reference signal that is applied to the non-inverting input of comparator U62B.

150. On information and belief, HLED products include a comparator for comparing the sensed current signal to the reference signal, the comparator generating a feedback signal; for example, comparator U62B compares the sensed current signal received at the inverting input to the reference signal received at noninverting input. The output of comparator U62B is a feedback signal that is applied, via optocoupler U31 to PWM control IC U1 at FBCTRL pin 3.

151. On information and belief, HLED products include a PWM control IC responsive to the feedback signal, the PWM control IC generating the drive signal; for example, PWM control IC U1, in response to the feedback signal received at FBCTRL pin 3, generates a drive signal at FBDRIVER pin 13, driving switch Q31 of the flyback converter.

152. On information and belief, HLED products include an LED monitor, said LED monitor generating an LED array inoperable signal when said LED array is inoperable; for example, Overcurrent Protection and Overpower Protection circuits (Exhibit 8) of PWM control IC U1 each generate a signal in response to the input at FBCTRL pin 3, indicating that an overcurrent or overpower condition exists because the LED array is inoperable.

Infringing MINILWPP Products

153. On information and belief, MINILWPP products include a circuit for supplying power to an LED array as shown for example in the schematics of Exhibit 13. The individual components cited below refer to Exhibit 13 unless stated otherwise.

154. On information and belief, MINILWPP products include a power supply, suppling current to the LED array and being responsive to a drive signal; for example, power supply, formed by a flyback converter comprised of, at least, transformer T1, diodes Q13, and switch Q11, supplies current to an LED array connected to output terminals V and GND and is responsive to a drive signal generated by PWM control IC3 at GD pin 7.

155. On information and belief, MINILWPP products include a current sensor for sensing current to the LED array, the current sensor generating a sensed current signal; for example, current sense resistor R58 senses current passing through the LED array and generates a sensed current signal proportional to the sensed current. The sensed current signal is applied to IC5 CRREF pin 3.

156. On information and belief, MINILWPP products include a reference current source for generating a reference signal; for example, reference current source, formed by the output of IC5 Vref pin 1 and resistors R53 and R40 generates a reference signal that is applied to IC5 SRIN pin 5.

157. On information and belief, MINILWPP products include a comparator for comparing the sensed current signal to the reference signal, the comparator generating a feedback signal; for example, IC5 comparator (Exhibit 14) coupled to IC5 SRIN pin 5 and IC5 CRREF pin 3 compares the sensed current signal received at IC5 CRREF pin 3 and the reference signal received at IC5 SRIN pin 5. The output of the comparator is a feedback signal that is output from IC5 VOUT pin 6 and is applied to PWM control IC3 INV pin 1 via optocoupler IC2A, IC2B.

158. On information and belief, MINILWPP products include a PWM control IC responsive to the feedback signal, the PWM control IC generating the drive signal; for example, PWM control IC3, in response to feedback signal received at PWM control IC3 INV pin 1, generates a drive signal at GD pin 7, driving switch Q11 of the flyback converter.

159. On information and belief, MINILWPP products include an LED monitor, said LED monitor generating an LED array inoperable signal when said LED array is inoperable; for example, Overvoltage Detection circuit (Exhibit 14) of PWM control IC3 generates a signal in response to the signal input at PWM control ICS INV pin 1. A high voltage at the output, indicative of an inoperable LED array, appears across at least voltage sense resistors R57, R38, and VR1. The voltage across voltage sense resistor VR1, proportional to the voltage applied to the LEDs, appears at the inverting input of the differential amplifier coupled to IC5 Vref pin 1 and IC5 VRIN pin 7 (Exhibit 15), which generates a signal at IC5 OUT pin 6 that propagates

through optocoupler IC2A, IC2B and appears at U1 INV pin 1 and the input of Overvoltage Detection circuit.

Infringing DTDU-LED Products

160. On information and belief, DTDU-LED products include a circuit for supplying power to an LED array as shown for example in the schematics of Exhibit 17. The individual components cited below refer to Exhibit 17 unless stated otherwise.

161. On information and belief, DTDU-LED products include a power supply, suppling current to the LED array and being responsive to a drive signal; for example, power supply, formed by a flyback converter comprised of, at least, transformer T3, diodes D4, and switch Q1 supplies current to an LED array connected to output terminals DC+ and DC- and is responsive to a drive signal generated by PWM control IC U1 at GD pin 7.

162. On information and belief, DTDU-LED products include a current sensor for sensing current to the LED array, the current sensor generating a sensed current signal; for example, current sense resistor R32 and diode D5 sense current passing through the LED array and generate a sensed current signal proportional to the sensed current. The sensed current signal is applied to U3 B- pin 6.

163. On information and belief, DTDU-LED products include a reference current source for generating a reference signal; for example, reference current source, formed by the output of Q4 VOUT pin 1 and resistors R23, R35, and R40, generates a reference signal that is applied to U3 B+ pin 5.

164. On information and belief, DTDU-LED products include a comparator for comparing the sensed current signal to the reference signal, the comparator generating a feedback signal; for example, comparator OPA2 (Exhibit 18) of U3 compares the sensed current

received at U3 B- pin 6 to the reference signal received at U3 B+ pin 5. The output of comparator OPA2 is a feedback signal that is output from U3 Bout pin 7 and is applied to PWM control IC U1 INV pin 1 via optocoupler U2.

165. On information and belief, DTDU-LED products include a PWM control IC responsive to the feedback signal, the PWM control IC generating the drive signal; for example, PWM control IC U1, in response to the feedback signal received at PWM control IC U1 INV pin 1, generates a drive signal at GD pin 7, driving switch Q1 of the flyback converter.

166. On information and belief, DTDU-LED products include an LED monitor, said LED monitor generating an LED array inoperable signal when said LED array is inoperable; for example, Overvoltage Detection circuit (Exhibit 14) of PWM control IC U1 generates a signal in response to the input at PWM control IC U1 INV pin 1, indicating that an overvoltage condition exists because the LED array is inoperable.

167. The full extent of Defendant's infringement is not presently known to Philips Lighting. On information and belief, Defendant has made and sold, or will make and sell, products under different names or part numbers that infringe the '890 Patent in a similar manner. Philips Lighting 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.

168. Philips Lighting has suffered and continues to suffer damages as a result of Defendant's infringement of the '890 Patent in an amount to be determined at trial.

169. Defendant's infringement of the '890 Patent is causing irreparable harm for which Philips Lighting has no adequate remedy at law unless Defendant is enjoined by this Court.

Under 35 U.S.C. § 283, Philips Lighting is entitled to a permanent injunction against further infringement of the '890 Patent.

170. On information and belief, Defendant has been aware of and has had notice and actual knowledge of the '890 Patent and its infringement of the '890 Patent at least as early as November 12, 2014, and Defendant's infringement of the '890 Patent has been willful. For example, Ms. Linda Tabor Howard, President of Defendant, was notified before the present action was filed that Defendant's products were infringing the '890 Patent. *See* Exhibit 19. Defendant's pre-suit knowledge of the '890 Patent and failure to substantively address Philips Lighting's numerous notifications of infringement are sufficient to support a plausible inference that Defendant's 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 FOUR

INFRINGEMENT OF U.S. PATENT NO. 8,063,577

171. Philips Lighting incorporates by reference the allegations in paragraphs 1-170 as if fully set forth herein.

172. On information and belief, Defendant has infringed and is infringing claims of the '577 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.

173. Claim 1 of the '577 Patent recites:

> A driver circuit for operating a light emitting diode, the driver circuit being configured to control a current to be supplied to the LED, the driver circuit comprising:
>
> a set of input terminals for receiving a supply voltage;
>
> a resonant capacitor;

> a transformer, a primary winding of the transformer and the resonant capacitor being coupled in series to the set of input terminals;
>
> a rectifier means coupled to the secondary winding of the transformer for rectifying an alternating load voltage on the secondary winding of the transformer;
>
> an output circuit coupled to the rectifier means for receiving a rectified voltage, the output circuit comprising a buffer circuitry and a set of output terminals for coupling the LED to the driver circuit, wherein the buffer circuitry comprises an inductor connected in series with the set of output terminals, and the value of the inductor is selected to provide a substantially constant current through the LED.

174. On information and belief, Defendant has directly infringed and is directly infringing claim 1 of the '577 Patent by making, using, offering to sell, selling, and/or importing at least XAL products in this District and elsewhere in the United States.

175. On information and belief, XAL products include a driver circuit for operating a light emitting diode, the driver circuit being configured to control a current to be supplied to the LED, as shown for example in the schematics of Exhibit 10. The individual components cited below refer to Exhibit 10 unless stated otherwise.

176. On information and belief, XAL products include a set of input terminals for receiving a supply voltage; for example, input terminals +VHVDC and Ground receive a supply voltage.

177. On information and belief, XAL products include a resonant capacitor; for example, resonant capacitor formed by capacitor C9.

178. On information and belief, XAL products include a transformer, a primary winding of the transformer and the resonant capacitor being coupled in series to the set of input terminals; for example, primary winding of transformer T1 and resonant capacitor are coupled in series with input terminals +VHVDC and Ground.

179. On information and belief, XAL products include a rectifier means coupled to the secondary winding of the transformer for rectifying an alternating load voltage on the secondary winding of the transformer; for example, rectifier means comprised of diodes DS1 and DS2 is coupled to the secondary winding of transformer T1 and rectifies the alternating load voltage on the secondary winding of the transformer. The alternating load voltage arises from operation of switches Q6 and Q7, which are rapidly turned on and off such that an alternating voltage is formed from the DC supply voltage received at input terminal +VHVDC.

180. On information and belief, XAL products include an output circuit coupled to the rectifier means for receiving a rectified voltage, the output circuit comprising a buffer circuitry and a set of output terminals for coupling the LED to the driver circuit, wherein the buffer circuitry comprises an inductor connected in series with the set of output terminals, and the value of the inductor is selected to provide a substantially constant current through the LED; for example, an output circuit is coupled to the rectifier means, DS1 and DS2, comprising buffer circuitry and a set of output terminals Vo+ and Vo- for coupling an LED to the driver circuit. The buffer circuitry comprises inductor L5, which is connected in series with Vo+ and Vo- and is selected to provide substantially constant current through the LEDs.

181. The full extent of Defendant's infringement is not presently known to Philips Lighting. On information and belief, Defendant has made and sold, or will make and sell, products under different names or part numbers that infringe the '577 Patent in a similar manner. Philips Lighting 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.

182. Philips Lighting has suffered and continues to suffer damages as a result of Defendant's infringement of the '577 Patent in an amount to be determined at trial.

183. Defendant's infringement of the '577 Patent is causing irreparable harm for which Philips Lighting has no adequate remedy at law unless Defendant is enjoined by this Court. Under 35 U.S.C. § 283, Philips Lighting is entitled to a permanent injunction against further infringement of the '577 Patent.

184. Defendant has been aware of and has had notice of the '577 Patent and its infringement of the '577 Patent at least as early as the service of this Complaint.

COUNT FIVE

INFRINGEMENT OF U.S. PATENT NO. 6,250,774

185. Philips Lighting incorporates by reference the allegations in paragraphs 1-184 as if fully set forth herein.

186. On information and belief, Defendant has infringed and is infringing claims of the '774 Patent, including at least claims 1 and 7, in violation of 35 U.S.C. § 271(a) by manufacturing, using, offering to sell, selling, and/or importing infringing products.

187. Claim 1 of the '774 patent recites:

> A luminaire comprising:
>
> a housing with a light emission window,
>
> at least one lighting module in said housing for illuminating an object outside said housing,
>
> the lighting module comprising a set of lighting units,
>
> each of said lighting units comprising at least one LED chip and an optical system configured to illuminate portions of the object during operation, each said LED chip supplying a luminous flux of at least 5 lm during operation.

188. On information and belief, Defendant has directly infringed and is directly infringing claim 1 of the '774 Patent by making, using, offering to sell, selling, and/or importing at least XAL products in this judicial district and elsewhere in the United States.

189. On information and belief, XAL products include a luminaire, as shown for example in the schematics of Exhibit 10. The individual components cited below refer to Exhibit 10 unless stated otherwise.

190. On information and belief, XAL products include a housing with a light emission window.

191. On information and belief, XAL products include at least one lighting module in said housing for illuminating an object outside said housing, comprising a set of lighting units, each of said lighting units comprising at least one LED chip and an optical system configured to illuminate portions of the object during operation, each said LED chip supplying a luminous flux of at least 5 lm during operation. For example, the XAL products include, multiple (e.g., four) lighting modules, each module including multiple (e.g., thirty) lighting units. The lighting units comprise, for example, two LED chips and an optical system in the form of a bubble optic. The LED chips each supply more than 5 lm luminous flux. For example, XAL-5100-LED-MV includes two lighting modules each with 60 LED chips and outputs 10,000 lumens, i.e., 83.3 luminous flux per LED, as shown in Exhibit 9.

192. Claim 7 (including the limitations of claim 1) of the '774 patent recites:

> A luminaire comprising:
>
> a housing with a light emission window,
>
> at least one lighting module in said housing for illuminating an object outside said housing,
>
> the lighting module comprising a set of lighting units,

> each of said lighting units comprising at least one LED chip and an optical system configured to illuminate portions of the object during operation, each said LED chip supplying a luminous flux of at least 5 lm during operation,
>
> wherein components of the optical systems of different lighting units are mutually integrated.

193. On information and belief, Defendant has directly infringed and is directly infringing claim 7 of the '774 Patent by making, using, offering to sell, selling, and/or importing at least XAL products in this judicial district and elsewhere in the United States.

194. On information and belief, XAL products include a luminaire, as shown for example in the schematics of Exhibit 10. The individual components cited below refer to Exhibit 10 unless stated otherwise.

195. On information and belief, XAL products include a housing with a light emission window.

196. On information and belief, XAL products include at least one lighting module in said housing for illuminating an object outside said housing, comprising a set of lighting units, each of said lighting units comprising at least one LED chip and an optical system configured to illuminate portions of the object during operation, each said LED chip supplying a luminous flux of at least 5 lm during operation. For example, the XAL products include, multiple (e.g., four) lighting modules, each module including multiple (e.g., thirty) lighting units. The lighting units comprise, for example, an LED chip and an optical system in the form of a bubble optic. The LED chips each supply more than 5 lm luminous flux. For example, XAL-5100-LED-MV includes two lighting modules each with 60 LED chips and outputs 10,000 lumens, i.e., 83.3 luminous flux per LED, as shown in Exhibit 9.

197. On information and belief, the components of the optical systems of different lighting units are mutually integrated; for example, the bubble optics of different lighting units are mutually integrated into a single plate.

198. The full extent of Defendant's infringement is not presently known to Philips Lighting. On information and belief, Defendant has made and sold, or will make and sell, products under different names or part numbers that infringe the '774 Patent in a similar manner. Philips Lighting 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.

199. Philips Lighting has suffered and continues to suffer damages as a result of Defendant's infringement of the '774 Patent in an amount to be determined at trial.

200. Defendant's infringement of the '774 Patent is causing irreparable harm for which Philips Lighting has no adequate remedy at law unless Defendant is enjoined by this Court. Under 35 U.S.C. § 283, Philips Lighting is entitled to a permanent injunction against further infringement of the '774 Patent.

201. Defendant has been aware of and has had notice of the '774 Patent and its infringement of the '774 Patent at least as early as the service of this Complaint.

PRAYER FOR RELIEF

WHEREFORE, Philips Lighting prays for the following judgments and relief:

(a) A judgment that Defendant has infringed and is infringing the Patents-in-Suit;

(b) A permanent injunction against Defendant and its 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 Philips Lighting for Defendant's patent infringement, and an accounting to adequately compensate Philips Lighting 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 Philips Lighting its costs, expenses, disbursements, and reasonable attorneys' fees related to Defendant's 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, Philips Lighting hereby demands a jury trial on all issues triable before a jury.

Dated: January 23, 2018

Respectfully submitted,

COUNSEL FOR PLAINTIFFS
Philips Lighting North America Corporation and Philips Lighting Holding B.V.

Of Counsel:

Jeremy P. Oczek, Esq.
(*pro hac vice* forthcoming)
BOND, SCHOENECK & KING, PLLC
200 Delaware Avenue
Buffalo, New York 14202
Telephone: (716) 416-7037
Email: jpoczek@bsk.com

J. Stephen Kennedy (MS Bar No. 100040)
BAKER, DONELSON, BEARMAN
CALDWELL & BERKOWITZ, PC
100 Vision Drive, Suite 400
Jackson, MS 39211
Telephone: (601) 351-2400
Email: skennedy@bakerdonelson.com