PUBLIC VERSION

UNITED STATES INTERNATIONAL TRADE COMMISSION

Washington, D.C.

In the Matter of **CERTAIN FILAMENT LIGHT-EMITTING DIODES AND PRODUCTS CONTAINING SAME (II)**	**INV. NO. 337-TA-1220**

INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge Clark S. Cheney

(November 19, 2021)

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Table of Abbreviations

CC Order	Order No. 19 issued on March 31, 2021
CC Tr.	Transcript of claim construction hearing held September 17, 2020
CDX	Complainant's demonstrative exhibit
CIB	Complainant's initial post-hearing brief
CPB	Complainant's pre-hearing brief
CPX	Complainant's physical exhibit
CRB	Complainant's responsive post-hearing brief
CX	Complainant's exhibit
Dep.	Deposition
JX	Joint Exhibit
LED	Light-emitting diode
RDX	Respondents' demonstrative exhibit
RIB	Respondents' initial post-hearing brief
RPB	Respondents' pre-hearing brief
RPX	Respondents' physical exhibit
RRB	Respondents' responsive post-hearing brief
RRP	Reduced risk product
RX	Respondents' exhibit
SSC	Seoul Semiconductor
SSLEEC	UC Santa Barbara's Solid State Lighting and Energy Electronic Center
Stip.	Stipulation of the parties
TIA	UCSB Office of Technology and Industry Alliances
Tr.	Transcript

UCSB	University of California, Santa Barbara

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INITIAL DETERMINATION ON VIOLATION OF SECTION 337 AND RECOMMENDED DETERMINATION ON REMEDY AND BOND

Administrative Law Judge Clark S. Cheney

(November 19, 2021)

Pursuant to the Notice of Investigation, 85 Fed. Reg. 62761 (October 5, 2020), and 19 C.F.R. §§ 210.10(b), 210.42(a)(1)(i), this is the final initial determination in the matter of *Certain Filament Light-Emitting Diodes and Products Containing Same (II)*, Investigation No. 337-TA-1220.

For the reasons stated herein, I have determined that no violation of section 337 of the Tariff Act of 1930, as amended, has occurred in the importation into the United States and the sale within the United States after importation of certain light-emitting diodes and products containing the same based on infringement of U.S. Patent No. 9,240,529 ("the '529 patent"); U.S. Patent No. 9,859,464 ("the '464 patent"); U.S. Patent No. 10,593,854 ("the '854 patent"); and U.S. Patent No. 10,658,557 ("the '557 patent").

I. INTRODUCTION

A. Procedural History

On August 31, 2020, complainant The Regents of the University of California ("Complainant" or "The Regents") filed a complaint alleging violations of section 337 based on the importation into the United States, the sale for importation, and the sale within the United States after importation of certain light-emitting diodes and products containing the same. 85 Fed. Reg. 62761 (Oct. 5, 2020); *see* EDIS Doc. ID 718435.

On August 31, 2020, the Commission instituted Investigation No. 337-TA-1220 to determine:

> [W]hether there is a violation of subsection (a)(1)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain products identified in paragraph (2) infringement of one or more of claims 1, 6, 8, and 9 of the '529 patent; claims 1, 7, 9, and 10 of the '464 patent; claims 1, 2, and 6 of the '854 patent; claims 1 and 2 of the '213 patent; and claims 1 and 2 of the '557 patent; and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

85 Fed. Reg. 62761 (October 10, 2020) ("Notice of Investigation").

The plain language description of the accused products is "light bulbs containing filament LEDs and lighting products containing filament LEDs." Notice of Investigation; *see also* 19 C.F.R. § 210.10(b)(1).

The Notice of Investigation named the following parties as respondents: General Electric Company, Consumer Lighting (U.S.) LLC, d/b/a GE Lighting ("GE"); Savant Systems, Inc.; Home Depot Product Authority, LLC, Home Depot U.S.A., Inc., The Home Depot, Inc. (collectively, "Home Depot"); Feit Electric Company, Inc. ("Feit"); Satco Products, Inc. ("Satco"); IKEA Supply AG, IKEA U.S. Retail LLC, IKEA of Sweden AB (collectively, "IKEA"). *Id.* at 62762. I subsequently terminated Savant Systems, Inc. from the investigation for good cause. *See* Order No. 47 (August 27, 2021), *not reviewed*, EDIS Doc. ID 751838.

Signify North America Corporation ("Signify") and Global Value Lighting LLC ("GVL"), suppliers to some of the named respondents, intervened in the investigation. *See* Order No. 14 (granting Signify's motion to intervene), *not reviewed* EDIS Doc. ID 726654; Order No. 15 (granting GVL's motion to intervene), *not reviewed* EDIS Doc. ID 727475.

The Commission Investigative Staff ("Staff") is a party to this investigation. *See* Notice of Investigation at 62762.

In accordance with the procedural schedule issued as Order No. 10 (Oct. 23, 2020), the parties submitted a joint chart of proposed claim constructions on February 11, 2021. Under the procedural schedule, the parties submitted opening claim construction briefs on February 25, 2021, and responsive claim construction briefs on March 11, 2021. On March 25, 2021, I convened a claim construction hearing. I subsequently issued Order No. 39 ("CC Order") on June 15, 2021, construing certain disputed claim terms.

On May 13, 2021, Respondents moved for summary determination on various grounds. Motion Docket Nos. 1220-027. That motion remains pending.

On June 15, 2021, I terminated this investigation in part based on withdrawal of the complaint with respect to the entirety of the '213 patent, claim 9 of the '529 patent; claim 10 of the '464 patent; claims 2 and 6 of the '854 patent; and claim 2 of the '577 patent. Order No. 37 (June 15, 2021), *not reviewed*, EDIS Doc. ID 745712 (June 29, 2021). The remaining patents and claims at issue are claims 1, 6, and 8 of the '529 patent; claims 1, 7, and 9 of the '464 patent; claim 1 of the '854 patent; and claim 1 of the '577 patent.

To narrow the issues for the evidentiary hearing, Complainant and various Respondents entered stipulations regarding undisputed facts. *See* JX-0016 (Joint Stipulation of Material Facts Relating to Importation and Inventory between Complainant and Respondent Satco) ("Satco

Import. Stip."); JX-0017 (Stipulation Between Complainant The Regents of the University of California and Respondent Satco Products, Inc. on Representative Products for Proof of Infringement) ("Satco Representative Products Stip."); JX-0018 (Joint Stipulation Relating to Signify's Importation, Inventory, and Sales to The Home Depot Respondents between The Regents and Signify) ("Signify Import. Stip."); JX-0019 (Joint Stipulation of Material Facts Relating to Importation and Inventory between The Regents and Feit) ("Feit Import. Stip."); JX0020 (Joint Stipulation Relating to Global Value Lighting LLC Importation and Inventory between The Regents and GVL) ("GVL Import. Stip."); JX-0021 (Joint Stipulation of Material Facts Relating to Importation and Inventory between The Regents and GE Lighting) ("GE Import. Stip."); JX-0022 (Joint Stipulation Between The Regents & Home Depot Regarding Authenticity) ("Home Depot Authenticity Stip."); JX-0023 (Joint Stipulation Regarding Non-Accused Products between The Regents and Feit)("Feit Non-Accused Products Stip."); JX-0044 (Joint Stipulation of Material Facts Relating to Licensed Products Between The Regents and Home Depot) ("Home Depot Fact Stip."); JX-0051 (Joint Stipulation of Material Facts Relating to Importation, Inventory, and Non-Accussed Products Between Home Depot & Regents) ("Home Depot. Import Stip.").

On July 2, 2021, I suspended the procedural schedule to postpone the evidentiary hearing at the request of Complainant due to exigent circumstances. Order No. 43. I held a prehearing conference on August 27, 2021, and convened the evidentiary hearing on August 30, 2021. The evidentiary hearing ended on September 3, 2021. *See* Tr. at 1-1361.

Because of the rescheduled hearing, I extended the target date for completion of the investigation to March 14, 2022. Order No. 48. I subsequently extended the target date for

completion of the investigation by one additional week to March 21, 2022, making this initial determination due no later than November 19, 2021. Order No. 50.

B. The Private Parties

1. Complainant

Complainant The Regents of the University of California ("the University") is a California constitutional corporation having an address of 1111 Franklin Street, Oakland, California 94607. CIB at 3; Complaint at ¶ 9. Complainant is the assignee and sole owner of the patents asserted in this investigation. *See* JX-0001 ("the '529 patent"), JX-0002 ("the '464 patent"), JX-0003 ("the '854 patent"), JX-0005 ("the '557 patent").

2. Respondents

a) Feit

Respondent Feit Electric Company, Inc. ("Feit") is a corporation organized under the laws of California and maintains its principal place of business at 4901 Gregg Road, Pico Rivera, CA 90660. *See* Compl. ¶ 27 and Ex. 10.

b) Home Depot

Respondent Home Depot Product Authority, LLC, is a limited liability company organized under the laws of Georgia and maintains its principal place of business at 2455 Paces Ferry Road, Atlanta, GA 30339. Respondent Home Depot U.S.A., Inc., is a corporation organized under the laws of Delaware and maintains its principal place of business at 2455 Paces Ferry Road, Atlanta, Georgia 30339. Respondent The Home Depot, Inc., is a corporation organized under the laws of Delaware and maintains its principal place of business at 2455 Paces Ferry Road, Atlanta, Georgia 30339.

c) IKEA

Respondent IKEA Supply AG is a corporation organized under the laws of Switzerland and maintains its principal place of business at Griissenweg 15, CH-4133 Pratteln, Switzerland. Respondent IKEA U.S. Retail LLC is a limited liability company organized under the laws of Virginia and maintains its principal place of business at 420 Alan Wood Road, Conshohocken, Pennsylvania 19428. Respondent IKEA of Sweden AB is a corporation organized under the laws of Sweden. Ex. 25. IKEA of Sweden AB maintains its principal place of business at Tulpanvagen 8 Almhult, 343 34 Sweden.

d) GE

Respondent Consumer Lighting (U.S.) LLC d/b/a GE Lighting is a limited liability company organized under the laws of Delaware and maintains its principal place of business at 1975 Noble Road, East Cleveland, OH 44112. Respondent General Electric Company is a corporation organized under the laws of New York and maintains its principal place of business at 5 Necco Street, Boston, MA, 02210.

e) Satco

Respondent Satco Products, Inc. is a corporation organized under the laws of New York and maintains its principal place of business at 110 Heartland Boulevard, Brentwood, NY 11717.

3. Intervenors

Because the companies that intervened in this investigation are suppliers to some of the respondents and have aligned interests with their customers, the term "Respondents" in this final initial determination includes the following intervenors.

a) Signify

Signify North America Corp. is a corporation organized under the laws of Delaware and maintains its principal place of business at 200 Franklin Square Drive, Somerset, New Jersey, 08873. RPB at 7.

b) GVL

Global Value Lighting LLC is a corporation organized under the laws of Delaware and maintains its principal place of business at 1350 Division Road, Suite 204, West Warwick, RI, 02893. RPB at 6-7.

C. The Asserted Patents

Complainant asserts four patents in this investigation: the ’529 patent, the ’464 patent, the ’854 patent, and the ’557 patent (collectively, the “Asserted Patents”).

1. U.S. Patent No. 9,240,529

The ’529 patent, titled “Textured Phosphor Conversion Layer Light Emitting Diode” issued on January 19, 2016, and names Natalie Fellows DeMille, Steven P. DenBaars, and Shuji Nakamura as inventors. ’531 patent at Cover. The ’529 patent issued from Application No. 14/483,501, filed on September 11, 2014, and claims a priority date of November 15, 2006. *Id.* The’529 patent is assigned to Complainant. *Id.*

Complainant asserts claims 1, 6, and 8 of the ’529 patent, which are reproduced below.

1. A light emitting device, comprising:

   an LED chip emitting light at a first wavelength, wherein the emitted light is extracted from both front and back sides of the LED chip; a lead frame to which the LED chip is attached, wherein the LED chip resides on or above a transparent plate in the lead frame that allows the emitted light to be extracted out of the LED chip through the transparent plate in the lead frame; and a phosphor for converting the light emitted by the LED chip at the first wavelength to a second wavelength.

6. The device of claim 1, wherein the transparent plate is roughened, textured or patterned to increase light extraction from the LED chip through the transparent plate in the lead frame.

8. The device of claim 1, wherein the LED chip includes a transparent substrate and the transparent substrate is adjacent the transparent plate.

’529 patent at claims 1, 6, 8.

2. U.S. Patent No. 9,859,464

The ’464 patent, titled “Lighting [sic] Emitting Diode With Light Extracted From Front And Back Sides Of A Lead Frame,” issued on January 2, 2018, and names Natalie Fellows DeMille, Steven P. DenBaars, and Shuji Nakamura as inventors. ’464 patent at Cover. The ’464 patent issued from Application No. 14/757,937, filed on December 23, 2015, which is a continuation of Application No. 14/483,501, filed on September 11, 2014, which issued as the ’529 patent. *Id.* The ’464 patent claims priority to November 15, 2006. *Id.* The ’464 patent is assigned to Complainant. *Id*.

Complainant asserts claims 1, 7, and 9 of the ’464 patent, which are reproduced below.

1. A light emitting device, comprising:

   a lead frame including a transparent plate; and

   an LED chip, attached to the lead frame, for emitting light;

   wherein the LED chip resides on or above the transparent plate and at least some of the light emitted by the LED chip is transmitted through the transparent plate; and

   wherein at least a portion of the light emitted by the LED chip is extracted from a front side of the lead frame and another portion of the light emitted by the LED chip is extracted from a back side of the lead frame.

7. The device of claim 1, wherein the transparent plate is roughened, textured or patterned to increase transmission of the light through the transparent plate.

9. The device of claim 1, wherein the LED chip includes a transparent substrate positioned adjacent the transparent plate.

’464 patent at claims 1, 7, 9.

3. U.S. Patent No. 10,593,854

The ’854 patent, titled “Transparent Light Emitting Device with Light Emitting Diodes,” issued on March 17, 2020, and names Shuji Nakamura, Steven P. DenBaars, and Hirokuni Asamizu as inventors. ’854 patent at Cover. The ’854 patent issued from a series of continuation

applications stretching back to U.S. Provisional Application No. 60/869,447 ("the '447 provisional"), which was filed on December 11, 2007. *Id.* The '854 patent is assigned to Complainant. *Id.*

Complainant asserts claim 1 of the '854 patent, which is reproduced below.

1. A light emitting device, comprising:

> a transparent surface, a cathode on a first end of the transparent surface and an anode on a second end of the transparent surface, wherein the cathode and anode provide structural support to the transparent surface and are adapted to provide an electrical connection between the light emitting device and a structure outside the light emitting device;
>
> at least one III-nitride light emitting diode (LED) comprising a sapphire growth substrate, the LED in mechanical communication with the transparent surface, and the LED and transparent surface configured to extract light emitted by the LED through the transparent surface; and
>
> a molding comprising a phosphor and surrounding the LED, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device.

'854 patent at claim 1.

4. U.S. Patent No. 10,658,557

The '557 patent, titled "Transparent Light Emitting Device with Light Emitting Diodes," issued on May 19, 2020, and names Shuji Nakamura, Steven P. DenBaars, and Hirokuni Asamizu as inventors. '557 patent at Cover. The '557 patent issued from a series of continuation applications stretching back to the '447 provisional, which was filed on December 11, 2007. *Id.* The '557 patent is assigned to Complainant. *Id.*

Complainant asserts claim 1 of the '557 patent, which is reproduced below.

1. A light emitting device, comprising:

> a sapphire plate, a cathode on a first end of the sapphire plate and an anode on a second end of the sapphire plate, wherein the cathode and anode provide structural support to the sapphire plate and are adapted to provide an electrical

> connection between the light emitting device and a structure outside the light emitting device;
>
> a plurality of III-nitride light emitting diode (LED) comprising a sapphire growth substrate and each in mechanical communication with the sapphire plate, and the LEDs and sapphire plate configured to extract light emitted by the LEDs through the sapphire plate; and
>
> a molding comprising a phosphor and surrounding the LEDs, the molding configured to extract light from both a front side of the light emitting device and a back side of the light emitting device.

'854 patent at claim 1.

D. The Technologies at Issue

The Asserted Patents are from two different patent families, which correspond to two different case numbers used internally at the University of California: case number 2007-270 comprises the '529 and '464 patents and case number 2007-282 comprises the '557 and '854 patents. Tr. (DenBaars) at 104:9-105:1; *see also id*. (Englander) at 401:23-402:3. Both patent families relate to transparent LED technology. Tr. (DenBaars) at 101:24-102:12. The Asserted Patents generally disclose placing a transparent LED chip on a transparent plate or surface that has been optimized for light extraction. *Id*. at 108:14-109:6.

E. The Accused Products

The Accused Products are filament LEDs with ceramic submounts, *see* CX-2213C.0001 ("Accused Rigid Products"), and filament LEDs with flexible (polyimide) surfaces, *see* CX-2213C.0004, ("Accused Flexible Products"). CIB at 8.

1. Representative Accused Products

Complainant has accused more than 3,000 LED bulb models of infringement in this investigation. RRB at 10. Complaint's evidence at the hearing, however, compared only a little over a dozen accused models to each element of the asserted patent claims. Complainant argues

that the models it analyzed at the hearing are representative of the other Accused Products and that the hearing evidence is sufficient to conclude that all accused models infringe. CIB at 8-9.

The following are Complainant's purportedly representative Accused Products:

Accused Rigid Product Name	Supporting Exhibits
Feit	
Feit Vintage ST19	CX-0203 (Report), CPX-0008 (Specimen)
Feit T8	CX-0764 (Report), CPX-0011 (Specimen)
Feit A15	CX-0765 (Report), CPX-0010 (Specimen)
[redacted]Filament LED	CX-0766C (Report), CPX-0012C (Specimen)
GE	
GE Refresh	CX-0200 (Report), CPX-0001 (Specimen)
GE Relax	CX-0693 (Report), CPX-0005 (Specimen)
GE Basic	CX-0694 (Report), CPX-0003 (Specimen)
Great Value	CX-0768 (Report), CPX-0004 (Specimen)
Home Depot/GVL/Signify	
Ecosmart ST19/ GVL/ '737 SKU	CX-0202 (Report), CPX-0006 (Specimen)
Philips ST19	CX-0179 (Report), CPX-0013 (Specimen)
IKEA	
IKEA SILLBO LED 370 lm	CX-0767C (Report), CPX-0022 (Specimen)
IKEA SILLBO LED 140 lm	CX-0205 (Report), CPX-0020 (Specimen)
IKEA Ryet	CX-0206 (Report), CPX-0021 (Specimen)
Satco	
Satco S29876 (representative of Satco S11361 and S11353)	CX-0207 (Report), CPX-0015 (Specimen)

Tr. (Schubert) at 611:4-19; CX-2213C.001.

Accused Flexible Product Name	Supporting Exhibits
Feit	
Feit Vintage ST19 Dimmable	CX-0201 (Report), CPX-0009 (Specimen)
GE	
GE Vintage A19	CX-0208 (Report), CPX-0002 (Specimen)
Home Depot/GVL/Signify	
Philips A50	CX-0210 (Report), CPX-0014 (Specimen)
Satco	
Satco S9966 (representative of Satco S22433)	CX-0207 (Report), CPX-0015 (Specimen)

Tr. (Schubert) at 615:9-17; CX-2213C.0004. Complainant's expert witness Dr. Schubert showed slides describing the larger product groups that these examples purportedly represent. CX-2213C.006-.019.

To meet its burden of proving infringement, Complainant must show by a preponderance of evidence that the products it examined and specifically compared to the claims are representative of other products. *Certain Semiconductor Devices, Semiconductor Device Packages, and Products Containing Same*, Inv. No. 337-TA-1010, Order No. 77 at 9 (March 15, 2017) (EDIS Doc. No. 609297), *affirmed with modifications to citations*, Notice (April 14, 2017) (EDIS ID 608676).

Complainant's expert Dr. Schubert opined that the products listed in the slides above were representative of other unanalyzed products under two theories: (1) a commodity theory, and (2) a supplier theory. Tr. (Schubert) at 746:5-9, 789:19-25. As explained below, the evidence does not support a conclusion that all accused products have materially identical structures as the purportedly representative products Complainant discussed at the hearing.

a. Commodity Theory

Complainant's commodity theory argues that filament LED bulbs are commodities that are identical in all respects material to this investigation. Under this theory, any rigid filament product is representative of any other rigid filament product and any flexible filament product is representative of any other flexible filament product, regardless of filament supplier. Tr. (Schubert) at 880:12-881:3. Complainant cites four categories of evidence to support this conclusion, which I evaluate in turn below.

i. Satco Stipulation

Satco entered into a stipulation with Complainant during the discovery phase of this investigation to avoid certain discovery. *See* JX-0017. The Satco stipulation stipulates that "one

specific Satco product is representative of all Satco products that have a rigid filament, no matter who makes those filament products" and that all Satco flexible filament products are represented by one specific flexible Satco product. Tr. (Schubert) at 746:11-14, 753:3-10, 792:6-10.

Complainant's expert Dr. Schubert opined that the Satco stipulation is evidence of a truism across the filament LED industry that "one product is representative for all products *made by different manufacturers*." *Id*. at 746:14-17 (emphasis added). The weakness of such a conclusion is apparent on its face. Satco made no representation in the stipulation that any LED filament made by any manufacturer has the same structure as the LED filaments Satco buys for its products. *See* JX-0017; Tr. (Schubert) at 865:17-866:18 (Satco stipulation does not mention any other Respondent or Intervenor). At best, the stipulation indicates that Satco obtains filaments that have certain similar characteristics that suit Satco's purposes. It does not logically flow from that fact that all filament LEDs made by Satco's suppliers are the same, let alone that all filaments in the industry are the same. If anything, the Satco stipulation cuts against a presumption that LED filament structures are the same regardless of the supplier because the stipulation itself admits that Satco products use two different kinds of filaments—rigid and flexible—that are not representative of each other. *See* JX-0017 (noting that flexible and rigid products are not representative of one another).

ii. Uniformity of Design

Complainant next argues that "great similarities" among a "large number of light bulbs" show that the products discussed at the hearing are representative of the thousands of other filament LEDs accused in this investigation.[1] Tr. (Schubert) at 746:18-20. Complainant's expert witness

[1] Differences between the products were observed but deemed irrelevant to claim features. Tr. (Schubert) at 751:2-19.

Dr. Schubert testified he examined more than 200 filament LED products, and in his opinion they all had a transparent plate or surface, or a sapphire plate. CX-2082; Tr. (Schubert) at 616:3-617:10, 750:3-21, 808:7-16. He also opined that each examined product had an LED chip; a lead frame; an anode and cathode; a roughened, textured, or patterned transparent plate; and a molding comprising a phosphor. Tr. at 750:3-21. Dr. Schubert further testified that the products he examined emit light at a first wavelength; emit light towards the front and back sides of the LED chip; extract light from the front and back side of the LED; and extract light through the transparent plate or surface, or through the sapphire plate. *Id.* Dr. Schubert concluded from these observations that the Accused Products are commodities with no differences relevant to the asserted claims. *Id*. at 750:22-751:1.

The main evidence cited in support of Dr. Schubert's testimony is a chart containing comments about 200-plus filament LED products, shown in CX-2082. CIB at 10; Tr. (Schubert) at 616:3-617:10, 808:7-16. The chart describes characteristics like uniformity of light intensity, uniformity of color, and color temperature, but it does not address many structural characteristics recited in the asserted claims. *Id*. at 616:12-23. For example, Dr. Schubert observes that in the products he examined, "Light is emitted from the populated side (front side) as well as the unpopulated side (back side)." While a structure having a "transparent plate" might emit light from both sides, so also might a non-sapphire semi-opaque plate. The later would not satisfy any claims asserted in this investigation.

Other structures required by the claims make no appearance in CX-2082, including the location of a transparent plate in a "lead frame" ('529 patent claim 1; '464 patent claim 1), a "phosphor" ('529 patent claim 1; '854 patent claim 1; '557 patent claim 1), a "roughened, textured or patterned" surface ('529 patent claim 6; '464 patent claim 7); a transparent substrate positioned

adjacent the transparent plate (’464 patent claim 9); and an LED in mechanical communication with the transparent surface (’854 patent claim 1);

Dr. Schubert’s methods leading to CX-2082 could not have identified these and other features critical to the asserted claims. No model-specific specifications or diagrams of the Accused Products in CX-2082 exist in the record. Dr. Schubert did not take apart the devices in CX-2082, so he could not know the characteristics of the LED chips, details about the anode and the cathode, whether the plate was sapphire, and whether the plate was roughened, textured, or patterned. Tr. (Schubert) at 806:15-23, 807:13-21, 808:17-21, 886:1-888:13.

In sum, Dr. Schubert’s observations in CX-2082 do not show that the products he analyzed are uniform with respect to features relevant to the asserted claims. And they certainly do not show that thousands of other products that Dr. Schubert never saw or analyzed necessarily have the same features material to the asserted claims.

iii. Corporate Testimony

Complainant also relies on testimony from employees of GE, Feit, IKEA, Home Depot, Signify, and GVL to show that the products Complainant discussed at the hearing are representative of other Accused Products. CIB at 10-12. As discussed below, this testimony tends to show only that certain light output characteristics have some degree of commoditization, not that the structures relevant to infringement have been commoditized.

First, Complainant argues that each “tech lamp” number in GE’s product line can include filament LEDs from multiple suppliers that are expected to *perform* the same regardless of source. CIB at 10. Complainant extrapolates from this that any filament assigned the same tech lamp number by GE has the same relevant structure as any other in the same group. *Id*. But this evidence actually shows that the specific *structural* features claimed in the Asserted Patents are not considered by GE to be material. Indeed, GE’s witness explained that GE categorizes devices by

the bulb's outer dimensions, the type of bulb base, whether the bulb is clear or coated, wattage consumed, light output, color of the light output, and life rating. JX-0029, 65:18-16. Notably, Complainant failed to demonstrate how any of these characteristics are in any way tied to the claimed structures. *See id.* at 72:16–73:14.

Next, Complainant continues on in the same, wrong, direction, by noting that Feit does not know the identity of its filament LED suppliers. CIB at 11. However, as with GE, Feit "normally purchase[s] a product for the product, not for the components." JX-0024, 61:20-3. Feit has specifications "on the package, you know, lumens, watts"— the characteristics relevant to the performance of the bulb. *Id*. So long as the filament LED can meet these specifications, it does not matter to Feit what structural configuration it has. The Feit evidence does not show that all filament LEDs have a commoditized *structure*.

Complainant repeats this logical error with respect to Home Depot ("What matters is 'the performance of the bulb[,] not [the] individual components"), GVL ("Price, performance, and aesthetics matter… Performance is tested at the level of the finished product, not the filament LED level"), and Signify ("Signify 'doesn't specify any components or supply chain of the components'… it 'specifies at the … performance level'"). CIB at 11. Complainant similarly argues that IKEA expects its products to perform the same, regardless of the source of the filament and has its vendors certify its products at the bulb, not the filament level. CIB at 11-12.

While this testimony shows that filament LEDs may be commoditized for purposes of the end product's *performance* or light output, Complainant has presented no evidence that common performance characteristics necessarily result from common structural configurations, and specifically from the unique structural arrangements recited in the asserted claims.

iv. Dr. Schubert's Inconsistent Testimony Undermines His Commodity Theory

When questioned by Complainant's counsel, Dr. Schubert testified that, based on his commodity theory, "any rigid filament product would be representative of any other rigid filament product . . . regardless of the LED filament supplier." Tr. at 880:12-19; *see also id*. at 746:3-17. But on cross-examination, Dr. Schubert was confronted with two different passages from his prior deposition testimony in which he declined to draw such a sweeping conclusion:[2]

> Q. Okay. If we could pull up that deposition at page 395, lines 19 through 23, you were asked: "Is it your opinion that filaments made by one filament manufacturer are representative of filaments made by a different filament manufacturer?"
>
> And you answered: "No."
>
> Isn't that right?
>
> A. Correct.

Id. at 867:9-20.

> Q. Sir, you were deposed -- let's go back to your deposition, page 372. This is your May 11th, 2021 deposition. If we could go to page 372, lines 19 through 24.
>
> You were asked: "Is it your position that because you have concluded let's say one GE product or one Satco product infringes, that demonstrates infringement as against all Respondents and Intervenors?"
>
> And did you testify in response to that question: "Answer: No."
>
> A. That is correct.

[2] Dr. Schubert's testimony that the [redacted] filament LEDs are interchangeable only with respect to Feit products also contradicts his commodity theory. Tr. (Schubert) at 882:21-883:21.

Id. at 868:4-14.

Dr. Schubert's equivocal testimony undermines the credibility of his opinion that the LED filaments in this investigation are commodities that can be treated similarly for all purposes material to the patent infringement analysis. I therefore give Dr. Schubert's opinion on this point little weight.

v. Conclusion

In sum, Complainant's commodity theory stretches the Satco stipulation and the scant record evidence too far, without logical and factual basis. Complainant has not met its burden to show that the products Dr. Schubert described at the hearing are commodities representative of all Accused Products in all material ways. *See Spansion, Inc.*, 629 F.3d at 1350 (complainant bears the burden of showing that its representative product grouping is justified).

b. Supplier Theory

Complainant also argues that any filament from one supplier is materially identical to all other filaments from the same supplier. CIB at 12-16. Complainant's supplier theory of representativeness is based on the "analysis of documents received from suppliers" who were not named as respondents in this investigation, including a Samsung document (CX-2031C), a Bridgelux exhibit (CX-1678C), and various documents from suppliers Refond, Intematix, [redacted], [redacted], and [redacted].[3] *Id*. As discussed below, these documents do not support the sweeping conclusions advanced by Complainant.

[3] Complainant also cites to a handful of purported OSRAM documents as proof that all OSRAM filaments in Accused Products are the same. *See* CIB 12-14 (citing CX-1589, CX-1590, and CX-1591). However, the documents Complainant cites were never admitted into the evidentiary record and I decline to consider them.

With respect to the Samsung document, Complainant's expert witness Dr. Schubert reasoned that because "[t]here was only one type of filament LED" in that document, "all Samsung products" in the Accused Products are the same. CIB at 12 (citing CX-2031C and Tr. (Schubert) at 746:23-747:3). However, Dr. Schubert did not consider that other portions of the same Samsung document describe significant variations in Samsung filament structures, including the option to have a ceramic substrate, a sapphire substrate, a linear filament, a flexible filament, and varying filament lengths. *Compare* CX-2031C *with* Tr. (Schubert) at 883:23-884:2. At least five times the document says Samsung makes "customized designs" of filaments "per customer request" or "based on customer bulb designs." *See, e.g.*, CX-2031C.0003. In view of this record, I find Complainant has not shown that all Accused Products known to have a Samsung filament have the same relevant structure.

Dr. Schubert cursorily testified that the Bridgelux exhibit "revealed the same" conclusion as the Samsung exhibit, namely that all Bridgelux filaments in the Accused Products have the same structure. Tr. (Schubert) at 747:12-13; *see* CX-1678C. However, the exhibit itself tells a different story. The exhibit appears to be a conglomeration of different data sheets for different products, including a .7 W filament, a 1.1 W filament, a 1.5 W filament, a 1.4 W filament, and a 1.26 W filament. CX-1678C at footers. The exhibit demonstrates that filaments within the same "Product Family" can have different components to produce different color temperatures of light. CX-1678C.0039. The data sheets also explain the labeling convention Bridgelux uses for its filaments. According to that convention, products can also have different structures as indicated by different "Length" and different "Version" attributes. *Compare, e.g.*, CX-1678C.0036 *with id*. .0051. Some products have 24 "chips," some 25, some as few as 13, some as many as 50. *See*,

e.g., *id*. at .0011, .0027, .0043, .0058. Dr. Schubert's one sentence conclusion of similarity cannot be justified in light of these disclosures in the exhibit.

Complainant cites two Refond data sheets, but no witness discussed them at the trial. CIB at 15 (citing CX-1647C; CX-1712C). The images of the two Refond filaments in those documents are not the same. *Compare, e.g.*, CX-1647C.0004, Fig. 1-2 (no layers), *with* CX-1712C.0004, Fig. 1-2 (layers). And neither data sheet shows the same structural details as are shown for the part Complainant x-rayed. *Compare id*. *with* CX-0693, slides 9 and 10. Like the Bridgelux data sheets, the Refond data sheets do not show how LEDs are positioned in relation to a plate, nor do they show that all Refond filaments in the Accused Products are materially identical.

With respect to Intematix, [redacted], [redacted], and [redacted], Complainant again argues that any Accused Product filament from one of those suppliers is materially identical to any other from the same company. CIB at 15-16. But again, none of the cited documents support that conclusion, and no witness testified to that effect.

Complainant's supplier theory also fails to account for Respondents' affirmative evidence of differences in products from a single supplier. For instance, Feit adduced evidence showing its products have differing: (1) LED reflective layers, which are material to the limitations about "extract[ing]" light found in all asserted claims (Tr. 1129:1–14; CX-0764.28; CX-0765.28); (2) submount compositions, which are material to the "transparent" and "sapphire" limitations found in all asserted claims (Tr. 1129:15–24; CX-0203.33; CX-0766.33); (3) phosphor applications, which are material to the "molding" limitations in the '854 and '557 patent claims (Tr. 1129:25–1130:12; RPX-0015–16; RX-0598); and (4) electrical lead connections, which are material to the limitations in the '854 and '557 patent claims requiring a cathode and an anode on

the "end" of the transparent plate or sapphire plate (Tr. 1130:13–21; CX-0203.48; CX-0764.48). Complainant addresses none of these variations.

In sum, Complainant has failed to persuasively show that any filament from a given supplier is identical to any other filament from that supplier in all respects relevant to the asserted claims. *See Spansion, Inc. v. Int'l Trade Comm'n*, 629 F.3d 1331, 1350 (Fed Cir. 2010) (complainant bears the burden of showing that its representative product grouping is justified).

c. Factual Findings Apply Only to Products Specifically Compared to the Claims at the Hearing

Because Complainant has failed to meet its burden to show the specific Accused Products it compared to the claims at the evidentiary hearing are identical in all material respects to the purportedly corresponding groups of Accused Products, my infringement findings herein apply only to those Accused Products specifically discussed at the hearing, which are listed here at I.E.1. The only exception is for the Satco Accused Products, because Satco stipulated that each of its accused models is represented for all relevant purposes by the Satco models Complainant compared to the claims at the hearing. JX-0017. All other Accused Products have not been shown to infringe any asserted claims.

2. Metal Filament Products Do Not Infringe Any Asserted Patent

IKEA and Home Depot have imported some products that contain filament LEDs with a metal submount. Complainant has conceded that "filament LEDs with metal submount ***do not infringe.***" CIB at 1. This concession is corroborated by the record: Dr. Eden, an expert retained by some Respondents, deconstructed certain metal filament products and determined that the metal submounts were opaque. Tr. (Eden) at 947:5-948:3. Likewise, Complainant's expert Dr. Schubert admitted that "[m]etal plates are not transparent." Tr. (Schubert) at 747:17-748:8. Accordingly, I find that filament LED products with metal submounts do not infringe the Asserted Patents. *See*

MSD Ex. G-1, Eden Rpt. at ¶¶ 79, 86-87; MSD Ex. G-2 at IKEA-ITC-1220-000202205-2210 (non-infringing IKEA metal filament products); MSD Ex. G-1, Eden Rpt. ¶¶ 228-230; MSD Ex. G-3, CREE LIGHTING-337-TA-1220-00000093; CREE LIGHTING_337-TA-1220-00000091; THD-1220-00018731; THD-1220-00018737; THD-1220-00018745, MSD Ex. U, THD-1220-00006308, and Ex. V, THD-1220-00006310 (non-infringing Home Depot metal filament products). In view of this finding, the pending motion for summary determination on this point, Motion Docket No. 1220-027, is denied as moot.

F. The Domestic Industry Products

As discussed in more detail later, Complainant's domestic industry theory involves the activities of an entity called the Solid State Lighting & Energy Electronics Center (SSLEEC) at University of California Santa Barbara. SSLEEC's "main research focus" is making highly efficient LED lighting. Tr. (DenBaars) at 105:2-8. Patents on technology developed by SSLEEC are licensed to others. *See* Tr. (Englander) at 404:12-405:3; CX-0708C, CX-0710C, CX-0711C, 712C, 714C, 722C, and 735C. Complainant identifies the domestic industry products relevant to this investigation as (1) certain filament LED articles that were developed by researchers at SSLEEC ("SSLEEC Domestic Industry Products"), and (2) licensed filament LED products ("Licensee Domestic Industry Products"). Tr. (Schubert) at 614:3-615:8; CIB at 17-18.

1. SSLEEC Domestic Industry Products

The SSLEEC Domestic Industry Products include prototype LED devices made at SSLEEC by researchers Abdulla Alhassan, Sang Ho Oh, Ezzah Azimah, and Matthew Wong. *See* CPX-0034 (Alhassan FY2016 (no phosphor)); CPX-0035 (Alhassan FY2016 (with phosphor); CPX-0037 (Oh FY2017 (no phosphor)); CPX-0038 (Oh FY2017 (phosphor)); CPX-0044 (Azimah FY2018); CPX-0046 (Wong FY2021 (phosphor)); CPX-0047 (Wong FY2021 (2) (no phosphor)). Complainant also points to what it calls "Additional SSLEEC DI Samples" which it did not

compare to the patent claims. *See* CPX-0036 (Alhassan Additional Samples –Sample Box 1 of 1); CPX-0039 through CPX-0043 (Oh Additional Samples –Sample Boxes 1 through 5); CPX-0045 (Azimah Additional Sample); CPX-0048 (Wong Additional Samples –Sample Box 1 of 1); CPX-0049 and CPX-0050 (Pan Additional Samples -Sample Boxes 1 and 2); CPX-0051 (Zhao and Vampola Additional Samples –Sample Box 1 of 1); *see also* CX-2213C.0003; Tr. (Schubert) at 614:20-615:8. Complainant also relies on publications describing LED structures developed at SSLEEC, some of which are shown in CX-2213C.0003.

Complainant contends the SSLEEC Domestic Industry Products each practice at least one claim of the ’464 and ’529 patents. Tr. (Schubert) at 614:3-615:8; CIB, 17-18.

2. Licensee Domestic Industry Products

In addition to the SSLEEC Domestic Industry Products, Complainant also relies upon products made by entities who have licensed the Asserted Patents (“Licensee Domestic Industry Products”). Complainant identifies two categories of such products, those with ceramic plates and those with flexible filaments.

The licensed filaments with ceramic plates ("Rigid Domestic Industry Products") are as follows:

Licensee Product Name	Related Exhibits	Asserted Claims
Acclaim Tamarac * (single-crystal sapphire plate)	CX-0198 (Report) CPX-0026 (Specimen)	'529 patent, claims 1 and 8 '464 patent, claims 1 and 9 '854 patent, claim 1 '557 patent, claim 1
NewHouse Lighting	CX-0196 (Report) CPX-0029 (Specimen)	'529 patent, claims 1, 6, and 8 '464 patent, claims 1, 7 and 9 '854 patent, claim 1 '557 patent, claim 1
Luminance	CX-0197 (Report) CPX-0028 (Specimen)	'529 patent, claims 1, 6, and 8 '464 patent, claims 1, 7 and 9 '854 patent, claim 1 '557 patent, claim 1
GE Relax G16.5 (sold by Licensee Lamps Plus)	CX-0199 (Report) CPX-0027(Specimen)	'529 patent, claims 1, 6, and 8 '464 patent, claims 1, 7 and 9 '854 patent, claim 1 '557 patent, claim 1
Sunlite	CX-0212 (Report) CPX-0023 (Specimen)	'529 patent, claims 1, 6, and 8 '464 patent, claims 1, 7 and 9 '854 patent, claim 1 '557 patent, claim 1
Sylvania	CX-0213 (Report) CPX-0025(Specimen)	'529 patent, claims 1, 6, and 8 '464 patent, claims 1, 7 and 9 '854 patent, claim 1 '557 patent, claim 1
Great Value (supplied by Licensee Elong)	CX-0214 (Report) CPX-0030(Specimen)	'529 patent, claims 1, 6, and 8 '464 patent, claims 1, 7 and 9 '854 patent, claim 1 '557 patent, claim 1
SSC Filament LED	CX-0215 (Report) CPX-0032C (Specimen)	'529 patent, claims 1, 6, and 8 '464 patent, claims 1, 7 and 9 '854 patent, claim 1 '557 patent, claim 1

Tr. (Schubert) at 614:3-18; CX-2213C.002. The Acclaim Tamarac product ("Acclaim Domestic Industry Product") noted in the list above with an asterisk has a single crystal sapphire plate, whereas the other products have ceramic alumina plates ("Ceramic Domestic Industry Products").

Tr. (Schubert) at 614:14-18. The Ceramic Domestic Industry Products and Acclaim Tamarac product are collectively referred to as the "Rigid Domestic Industry Products."

The licensed products with flexible filaments ("Flexible Domestic Industry Products") are as follows:

Licensee Product Name	Supporting Exhibits	Asserted Claims
Globe Electric B10	CX-0209 (Report) CPX-0024 (Specimen)	'854 patent, claim 1 '557 patent, claim 1
Bullbrite 776512	CX-0195 (Report) CPX-0031 (Specimen)	'854 patent, claim 1 '557 patent, claim 1
SSC Filament LED	CX-0216 (Report) CPX-0033C (Specimen)	'854 patent, claim 1 '557 patent, claim 1

Tr. (Schubert) at 615:19-23; CX-2213C.0005.

Complainant contends the Licensee Domestic Industry Products practice claims in all Asserted Patents. Tr. (Schubert) at 614:3-615:8; Tr. (Thomas) at 520:18-521:1; CIB at 17-18. Complainant contends the Ceramic Domestic Industry Products infringe claims 1, 6, and 8 of the '529 patent, claims 1, 7 and 9 of the '464 patent, claim 1 of the '854 patent, and claim 1 of the '557 patent. CIB at 55-62 ('529 patent), 71-76 ('464 patent), 97-101 ('854 patent), 109-113 ('557 patent). Complainant contends the Acclaim Domestic Industry Product infringes all of those claims other than claim 6 of the '529 patent and claim 7 of the '464 patent. *ID.*at 55-62 (not presenting evidence of infringement for of claim 6 of the '529 patent), CIB at 71-76 (not presenting evidence for infringement of claim 7 of the '464), 97-101 ('854 patent), 109-113 ('557 patent); Tr. (Schubert) at 694:10-14. And Complainant contends the Flexible Domestic Industry Products infringe claim 1 of the '854 patent and claim 1 of the '557 patent. CIB at 101-104 ('854 patent), 109-113 ('557 patent).

II. JURISDICTION & IMPORTATION

A. Subject Matter Jurisdiction

Section 337 of the Tariff Act prohibits the importation, the sale for importation, or the sale after importation of articles that infringe a valid and enforceable patent if an industry exists in the United States relating to articles protected by the patent. 19 U.S.C. §§ 1337(a)(1)–(2). Complainant's Amended Complaint states a cause of action under section 337 by alleging that Respondents import and sell after importation certain filament LED products that infringe the Asserted Patents. *See* Compl. at ¶¶ 1-3, 87-156. Respondents do not contest that the Commission has subject matter jurisdiction over this Investigation. RPB at 9.

I conclude the Commission has subject matter jurisdiction over this investigation.

B. Personal Jurisdiction

By filing a complaint and amended complaint and participating in the investigation, Complainant has consented to personal jurisdiction at the Commission. *See Certain Toner Cartridges, Components Thereof, and Systems Containing the Same*, 337-TA-1174, Initial Determination at 35, *not reviewed*, Comm'n Determination Not to Review an Initial Determination Granting Complainants' Motion for Summary Determination of a Violation of Section 337, EDIS Doc. ID 728235 (Dec. 17, 2020). By appearing and participating in this investigation and not contesting the Commission's jurisdiction over it, Respondents have each consented to personal jurisdiction at the Commission. *See* RPB at 9. I therefore conclude that the Commission has personal jurisdiction over all parties. *See, e.g.*, *Certain Strontium-Rubidium Radioisotope Infusion Systems, and Components Thereof Including Generators*, Inv. No. 337-TA-1110, Initial Determination at 9, USITC Pub. No. 5025 (Feb. 2021), *not reviewed in pertinent part*, EDIS Doc. ID 689653 ("*Radioisotope Infusion Systems*").

C. Importation

A violation of section 337 based on patent infringement requires "[t]he importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee" of infringing products. 19 U.S.C. §§ 1337(a)(1)(A)–(B). All Respondents other than IKEA have each stipulated that they have imported the Accused Products into the United States, imported, sold for importation, or sold after importation at least one Accused Product. JX-0016C; JX-0018C; JX-0019C; JX-0020C; JX-0021C; JX-0051C. IKEA does not dispute that IKEA Supply AG and IKEA US Retail LLC satisfy the importation requirement with respect to IKEA Accused Products. RPB at 140; RRB at 5-6. IKEA alleges IKEA of Sweden AB is not a proper party to this investigation because it does not import, sell for importation, or sell after importation the IKEA Accused Products. RPB at 140-41; RRB at 5-6.

To determine whether the importation requirement is satisfied as to a particular respondent, the Commission applies a fact-intensive inquiry as to the extent of a respondent's conduct in causing infringing articles to enter the United States. *See Certain Apparatus for the Continuous Prod. of Copper Rod*, Inv. No. 337-TA-052, Initial Determination, 1979 WL 61155, at *13-14 (Aug. 13, 1979) (concluding that a respondent was an importer where it purchased equipment that it was aware was produced in Germany and the evidence on balance established that the respondent "put in motion the importation" of those articles), *not reviewed*, Comm'n Determination & Order, USITC Pub. No. 1017 (Nov. 23, 1979); *Certain Large Video Matrix Display Sys. & Components Thereof*, Inv. No. 337-TA-075, Order No. 14, 1980 WL 140805, at *1-2 (June 30, 1980) (considering the "degree" of involvement in causing a scoreboard to enter the country, and concluding that the "direct nature of the involvement of the Brewers and the magnitude of their purchase" showed that the team was an "importer"), *not reviewed*, Comm'n Op. (June 19, 1981); *Certain Plastic-Capped Decorative Emblems*, Inv. No. 337-TA-121 (Oct. 1, 1982), Order No. 11,

1982 WL 213041, at *1-2 (finding a respondent to be an importer where it purchased articles from a Canadian corporation "f.o.b. Buffalo"), *not reviewed*, Comm'n Action & Order (Dec. 1, 1982); *Certain Salinomycin Biomass & Preparations Containing Same*, Inv. No. 337-TA-370, Order No. 19, 1995 WL 945787, at *1-3 (Sept. 18, 1995) (concluding, based on the evidence presented, that respondent Merck was not an importer because of the lack of its involvement in causing the goods to enter the country), not reviewed, Notice (Feb. 9, 1996); *Certain Cigarettes & Packaging Thereof*, Inv. No. 337-TA-643, Comm'n Op., 2009 WL 6751505, at *4-6 (Oct. 1, 2009) (concluding, based on the evidence adduced at trial, that the respondent was an importer where its acts were "integral to the importation"); *Certain Digital Set-Top Boxes & Components Thereof*, Inv. No. 337-TA-712, Initial Determination, 2011 WL 2567284, at *10-12 (May 20, 2011) (concluding, based on the record evidence, that "Cablevision was sufficiently involved in the manufacture and importation of the Cisco STBs to meet the importation requirement"), *not reviewed*, Notice (July 21, 2011).

IKEA contends that because IKEA of Sweden AB does not manufacture, import, maintain any inventory of, or sell any Accused Product in the United States, it cannot be found to have satisfied the importation requirement. *See* RRB at 5-6; Tr. (Rodin) at 906:2-14. IKEA further argues that because IKEA of Sweden AB never owned the Accused Products, Complainant has failed to show that IKEA of Sweden places any accused product "into the stream of commerce" or "brought the Accused Products to market." RRB at 6.

As Complainant notes, however, the record reflects that IKEA of Sweden AB designed the IKEA Accused Products; contracts with IKEA's suppliers for manufacture of the IKEA Accused Products; directs that the IKEA Accused Products be sold in the United States; and selects the filament vendors a lamp manufacture can use in IKEA products destined for the United States.

JX-0030C at 59:3-6, 70:20-74:17, 77:7-78:22, 87:1-89:3, 91:2-92:8, 96:1-21, 98:7-99:16, 121:16-122:4. The name "IKEA of Sweden AB" also appears on the packaging of the imported IKEA bulbs. JX-0030C at 89:15-90:1; 95:2-12; Tr. (Rodin) 911:12-15.

Based on these facts, I find that IKEA of Sweden AB, in its role as corporate parent of IKEA Supply AG and IKEA US Retail LLC, was materially involved in the design, manufacture, importation, and sale of the IKEA Accused Products in the United States. IKEA of Sweden AB also coordinated the marketing of these products in the United States and held itself out as directly responsible for them by marking the products with its corporate name. *See* JX-0030C at 89:15-90:1; 95:2-12; Tr. (Rodin) 911:12-15. Such conduct strongly indicates that IKEA of Sweden AB was responsible for placing the IKEA Accused Products into the stream of commerce. Accordingly, I find that IKEA of Sweden AB caused the IKEA Accused Products to be imported into the United States and sold in the United States within the meaning of 19 U.S.C. § 1337(a)(1)(B).

I therefore find that the importation requirement of section 337 has been satisfied as to all Respondents. *See Certain Subsea Telecommunications Systems & Components Thereof*, Inv. No. 337-TA-1098, Initial Determination at 11-15 (April. 26, 2019) (EDIS ID 675837), *not reviewed in pertinent part*, EDIS Doc. ID 682999.

D. *In Rem* Jurisdiction

Respondents do not dispute that the Commission has *in rem* jurisdiction over the accused products. RPB at 9. I therefore find the Commission has *in rem* jurisdiction over the Accused Products in this investigation. *See Sealed Air Corp. v. Int'l Trade Comm'n*, 645 F.2d 976, 985–86 (C.C.P.A. 1981) (noting the Commission has jurisdiction over imported goods).

E. Standing

Respondents do not dispute Complainant's ownership of the Asserted Patents. The record demonstrates that Complainant has standing in this investigation due to its ownership of the Asserted Patents. *See* '529 patent at Cover; '464 patent at Cover; '854 patent at Cover; '557 patent at Cover.

III. LEVEL OF ORDINARY SKILL IN THE ART

The parties have agreed that a person of ordinary skill in the art at the time of the alleged invention of the Asserted Patents would have had (1) a bachelor of science degree in electrical engineering, physics, or a comparable field of study, and (2) at least three years of professional experience with semiconductor optoelectronic devices and packaging. This description is approximate, and a higher level of education or skill might make up for less experience, and additional experience could make up for a lower education level (for example, a master of science degree in any of the above fields and two years of practical experience would suffice).

For the purposes of this final initial determination, I adopt the agreed level of skill as the appropriate standard for the hypothetical ordinary artisan.

IV. SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

Complainant provides several arguments directed to secondary considerations bearing on the obviousness of the asserted claims. CRB at 61-66. Though I have considered the proffered evidence and arguments in considering each claim of each assert patent's obviousness, I address each category proffered by Complainant in turn here in order to simplify the structure and readability of this determination.

A. Commercial Success

"There is a presumption of nexus for objective considerations when the patentee shows that the asserted objective evidence is tied to a specific product and that product is the invention

disclosed and claimed in the patent." *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1329 (Fed. Cir. 2016).

Because I find that the Acclaim Domestic Industry product practices claims 1 and 8 of the '529 and claims 1 and 9 of the '464 patent, *see infra* parts VI-IX, Complainant is entitled to the presumption of nexus between the secondary considerations tied to their products and the novel aspects of those claims. They are not, however, entitled to that presumption for licensees for whom no evidence has been entered to show that the licensed products embody the Asserted Patents. Nor can Complainant rely on the commercial success of the Accused Products, as none of those products have been shown to embody the Asserted Patents. *See infra* parts V-VII.D.1.

Complainant presented some evidence of the success of the Licensee Domestic Industry Products, and I give this factor weight commensurate with that evidence.

B. Skepticism of Experts

SSLEEC's inventions were met with skepticism, including by SSLEEC's member companies. Tr. (DenBaars) at 111:15-25. Of the ten SSLEEC member companies that were initially invited to take a license, all but one turned down the opportunity due to fears that the inventions would not effectively dissipate and disburse heat. *Id*.; *Pressure Prod. Med. Supplies, Inc. v. Greatbatch Ltd.*, 599 F.3d 1308, 1319 (Fed. Cir. 2010) (the fact that "companies initially turned down the opportunity to license . . . because they did not believe that the invention would work" supported finding that claims were not obvious).

As another example, Cree Lighting's general manager thought the inventions were "a bad idea," among other reasons, because he thought the light emitting devices would "get too hot." Tr. (DenBaars)111:15-112:17; *Transocean*, 699 F.3d at 1352-53 (testimony from named inventors regarding skepticism from industry experts supported conclusion of nonobviousness); *but see Allergan, Inc. v. Apotex Inc.*, 754 F.3d 952, 968 (Fed. Cir. 2014) ("[T]he oral testimony of an

inventor…must [be] treat[ed] with skepticism due to the possibility of an inventor's self-interest in obtaining or maintaining an existing patent.").

This testimony shows that at least some individuals in the field expressed skepticism with respect to whether the inventions claimed in the Asserted Patents would work for their intended purposes. The testimony is uncorroborated, self-serving testimony of an inventor, however, and so I give it little weight.

C. Licensing

Complainant contends that its licenses to the Asserted Patents show non-obviousness. CRB at 65-66. Complainant's licenses to the filament LED portfolio have generated approximately [redacted] revenue from 2012 through 2020, from 23 non-exclusive license agreements. Tr. (Englander) at 417:14-408:16, 409:23-410:2, 417:5-20. Much of that revenue, however, is attributable to an enforcement campaign involving litigation ("new licensing program") that began in June 2019. Tr. (Englander) at 406:15-24; RX-0087. Indeed, most of the licenses were entered into after the enforcement campaign commenced. RIB at 73. Additionally, the domestic industry licensees were making the Licensee Domestic Industry Products before they executed a license with Complainant. Tr. (Thomas) at 522:5-14.

Moreover, SSC converted its license from an exclusive to a non-exclusive license to enable Complainant to begin its enforcement campaign. Tr. (Englander) at 418:10-22. In its new non-exclusive license, [redacted] CX-0712C.0024. [redacted] Tr. (Englander) at 441:23-442:3.

The foregoing shows that Complainant's licenses are potentially valuable, but not as valuable as Complainant contends. Additionally, the bulk of the licenses appear to either directly

or indirectly be a result of Complainant's enforcement campaign, instead of uncoerced interest in the Asserted Patents and their technology. *Dow Jones & Co., Inc. v. Ablaise Ltd.*, 606 F.3d 1338, 1352 (Fed. Cir. 2010) (giving no weight to "coercive licensing agreements that had more to do with avoiding the costs of litigation than with the novelty of the patent."); *Bosch Automotive Service Solutions, LLC v. Matal*, 878 F.3d 1027, 1037-38 (Fed. Cir. 2017) ("There is no evidence in the record that these agreements arose out of a recognition and acceptance of the merits of the claimed invention, rather than solely to avoid the costs of defending against further litigation."). For these reasons, Complainant's licensing evidence is of limited use in demonstrating non-obviousness, and will be given moderate weight.

D. Simultaneous Invention

Simultaneous invention can "supply 'indicia of obviousness.'" *Geo M. Martin Co. v. Alliance Mach. Sys. Int'l LLC*, 618 F.3d 1294, 1304 (Fed. Cir. 2010). Respondents contend that the Tanda reference, discussed *infra* part f, discloses all the features of the asserted claims of the '854 and '557 patents. *See* RIB at 61-63; RDX-0003.077. The application that led to the Tanda reference was filed in Japan on December 16, 2005, almost a year before the earliest filing date claimed by the '854 and '557 patents (*i.e.*, December 11, 2006). RX-0850; Tr. at 1267:4-1268:10. The Tanda reference discloses work done by Nichia Corporation independent of any work done by Complainant. RX-0850. To the extent Tanda in fact discloses each element of the '854 and '557 patents, this constitutes evidence that the steps needed to make the purported invention were within the ability of a person of ordinary skill, and weighs in favor of a finding of obviousness with respect to those two patents.

Complainant did not contest this evidence of simultaneous invention ahead of or during the hearing, but now challenges that Respondents failed to meet their burden of showing that Tanda discloses all of the required limitations. CPB at 420-431; Tr. at 1269:24-1270:3, 1330:8-1335:21.

Tanda is in the record, and is teachings speak for themselves. RX-0850. Respondents' expert Dr. Lebby gave competent, if cursory, testimony that he understood Tanda to meet all limitations of the '854 and '557 patents. I give this factor some weight.

V. THE '529 PATENT

A. Claim Construction

I construed the disputed terms "transparent," "lead frame," and "roughened, textured, or patterned" in Order No. 39. *See* CC Order at 8–16. I hereby incorporate the discussion of those terms on pages 8-16 of Order No. 39 as part of this initial determination.

B. Infringement

I find that Complainant has failed to demonstrate any of the asserted claims of the '529 patent are infringed by any Accused Products.[4] My reasoning follows.

1. Claim 1

I find that the Accused Rigid Products have not been shown to infringe claim 1 of the '529 patent.

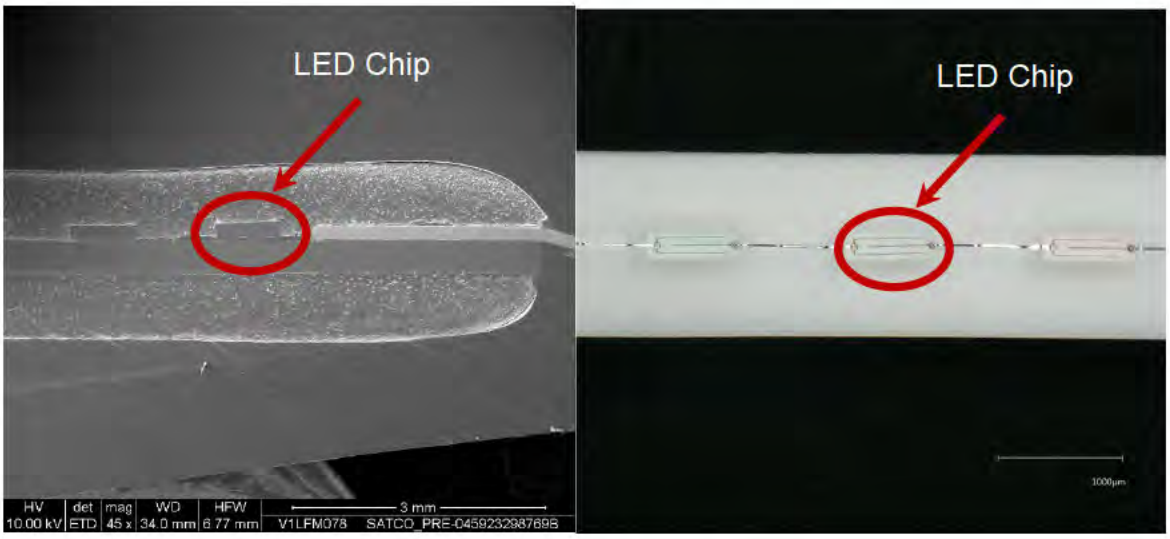
a. "A light emitting device, comprising:"

The parties agreed that the preamble of claim 1 is not limiting. JX-0015 at 2. In light of the parties' agreement and the presumption that preambles are not limiting, I find that the preamble is not limiting.

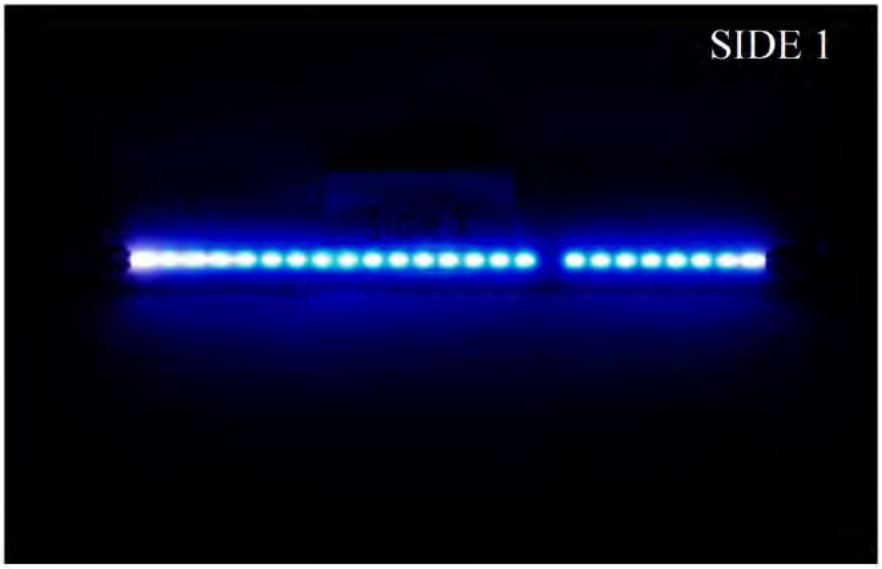
[4] As noted above, *supra* part I.E.1, Complainant has failed to meet its burden to prove the products it selected as representative products are materially identical to all Accused Products in the respective categories identified by Complainant. My findings about the structure of the Accused Products in this section are therefore limited to those products Complainant actually compared to the patent claims at the hearing, which are listed at I.E. The only exception is for the Satco Accused Products, because Satco stipulated that each of its accused models is represented for all relevant purposes by the Satco models Complainant compared to the claims at the hearing.

i. "an LED chip emitting light at a first wavelength,"

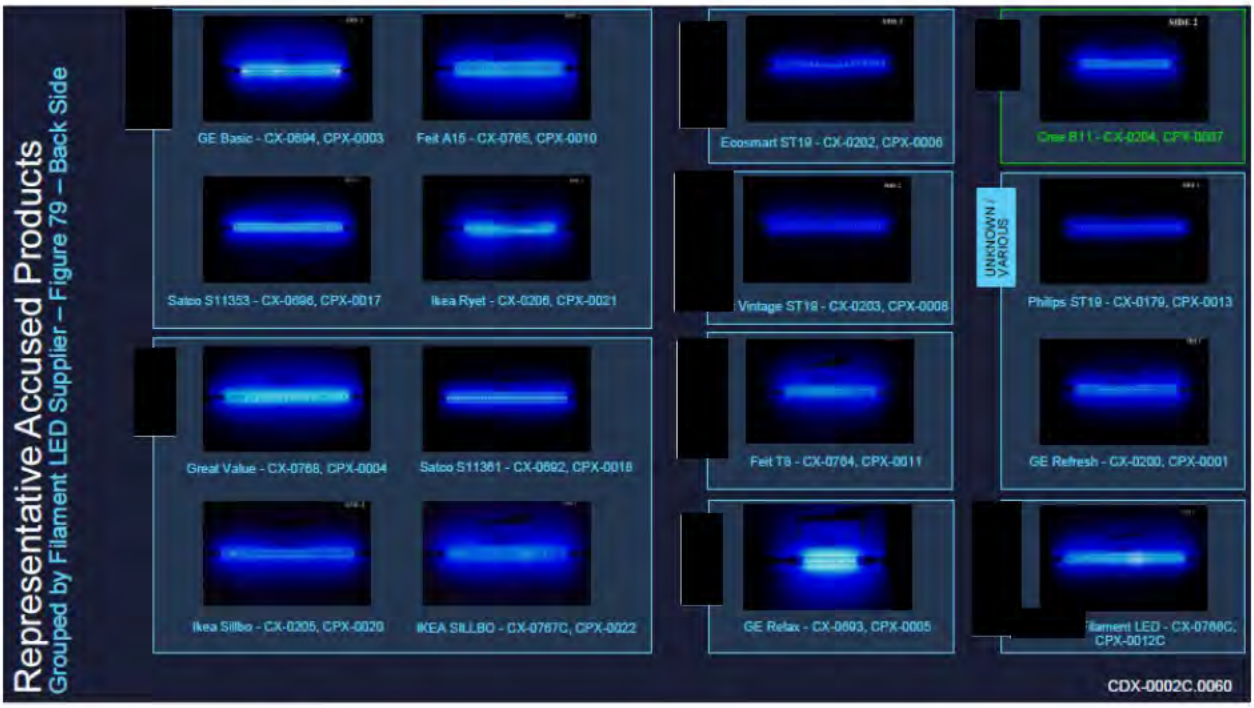
I find that the Accused Products have multiple LED chips that emit light at the blue wavelength. Tr. (Schubert) at 644:14-645:4, 646:3-22. For example, the accused Satco S29876 filament has a series of LED chips, as shown below:



CX-0207 at .0017 (left) (annotated x-ray of Satco S29876 depicting LEDs on submount), .0047 (right) (annotated photograph of decapsulated LEDs). These LEDs emit light at a blue wavelength.



CX-0207 at .0052 (depicting decapsulated Satco S29876 emitting light). The other Accused Products likewise have LEDs that emit light, as shown in materially identical evidence in the record for each product.



See CDX-0002C.0060.

The Accused Products therefore satisfy this limitation.

ii. "wherein the emitted light is extracted from both front and back sides of the LED chip"

I find that most of the Accused Rigid Products satisfy this limitation based on photographs of the decapsulated filaments, CDX-0002C above, showing blue light emission from the front and back sides of the LED chip. Tr. (Schubert) at 645:5-17, 646:3-10.

The only exceptions to this finding involve two Feit products, the Feit Rigid – T8C/CL/VG/CA/LED and the Feit Rigid – [redacted] 2700K. Complainant hired a contractor named EAG to analyze these products. *See, e.g.,* CX-0766 (EAG analysis of [redacted] 2700k). The evidence shows that during its analysis EAG removed the silicone coating or encapsulant and

damaged the structure of the devices in the process. Tr. (Shanfield) at 1098:4-1099:25. Specifically, a chemical used by EAG to decapsulate the filament of the [redacted] 2700K filament removed a metal coating on the top LED submount, as shown by a comparison of the before (RX-0593C.3) and after photographs (CX-0766) reproduced below:[5]

Before Decapsulation
RX-0593C.3

After Decapsulation
CX-0766.45-47

See also Tr. (Shanfield) at 1098:11-1099:25.

EAG's own reports admitted that its decapsulation process also lifted the LED chain off the submount for the [redacted] 2700K:

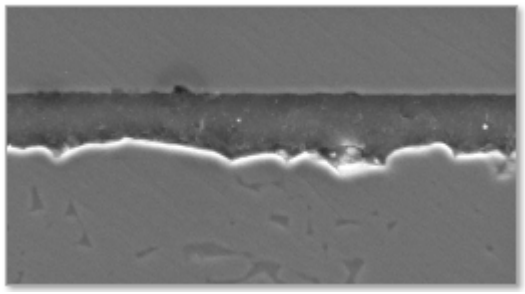
> Note: The LED chain lifted off the submount during decapsulation. It was re-attached to the submount using adhesive (Loctite Superglue 1775409).

CX-0766C.0046 (excerpted); *see* CX-0764.0046 (same); *see also* Tr. (Shanfield) at 1099:6-10, 1178:6-1179:3.

The evidence above shows that Complainant's decapsulation process materially altered the Feit Rigid – T8C/CL/VG/CA/LED and Feit Rigid – [redacted] 2700K samples. Thus, EAG in effect analyzed a structure made by EAG, not structures imported and sold by Feit. I therefore decline to credit Complainant's infringement analysis of those two Feit models.

[5] Feit's expert Dr. Shanfield credibly testified that the product shown in RX 0593C was likely the same product tested by EAG in CX-0766 based on an inspection of the physical sample. Tr. (Shanfield) at 1153:9-1155:7.

Feit raises separate noninfringement arguments based on the layering found in some Feit models. Feit's expert Dr. Shanfield testified that he saw evidence of a reflective metal layer at the interface between the bottom of the LED chip and the submount in the EAG micrographs of some Feit products. Tr. (Shanfield) at 1144:3-18. For example, in the micrograph of the [redacted] 2700K filament below (CX-0766, slide 28), the bright white line indicates the presence of a thin metal layer on top of the submount beneath the LED. *Id.* at 1098:18-1099:3; 1144:3-18 (explaining that metal layers appear as bright white line due to electrons generated by conduction when exposed to SEM imaging).



CX-0766.028.

Dr. Shanfield opined that this reflective metal layer would prevent emitted light from being extracted from the back side of the chip. Tr. (Shanfield) at 1145:16-23 ("light coming from the light-emitting region of the LED is going to be blocked. It's not going to reach the back side.").

Additionally, Dr. Shanfield testified he saw layers in some of Feit's Rigid Filament LED chips that were consistent with a Distributed Bragg Reflector or DBR.[6] Tr. (Shanfield) at 1141:15-1144:2. Dr. Shanfield explained that a Distributed Bragg Reflector is made by alternating layers of material having a high refractive index with material having a low refractive index. *Id.* at

[6] As will be discussed more later in connection with the '854 patent, Dr. Shanfield also opined that the Feit Accused Flexible Products had layering consistent with a Distributed Bragg Reflector. Tr. (Shanfield) at 1143:1-21.

1141:24-1142:14. Each time light crosses from material of one index to material of another, some of the light is reflected. *Id.* at 1142:1-14. Dr. Shanfiled testified that a Distributed Bragg Reflector can be designed to block light from the LED. Tr. (Shanfield) at 1141:17-1146:13; RRB at 14-18.

According to Feit, the layering evidence observed by Dr. Shanfield indicates that the Feit Accused Products do not extract light from the back side of the LED chip because light from the LED does not reach the back side. *Id*. at 1145:16-23. I reject Feit's conclusion on this point. Even if some Feit products have the metal layer or the Distributed Bragg Reflector that Dr. Shanfield identified, other evidence shows that those layers do not prevent all light from being transmitted through the back side of the submount. Instead, the record shows some light is extracted from both sides of the LED chip. *See* CX-0765.0044, .0052 (LUX plots and photographs showing light emitted out back of submounts of accused FEIT products that Dr. Shanfield identified as having a DBR and/or metallic layer); CX-0764.0044, .0052 (same); CX-0766.0044, .0052 (same). I find that some light is extracted from the back of the LED chips in the Feit devices that Dr. Shanfield identified as having a metal reflecting layer or a Distributed Braff Reflector.

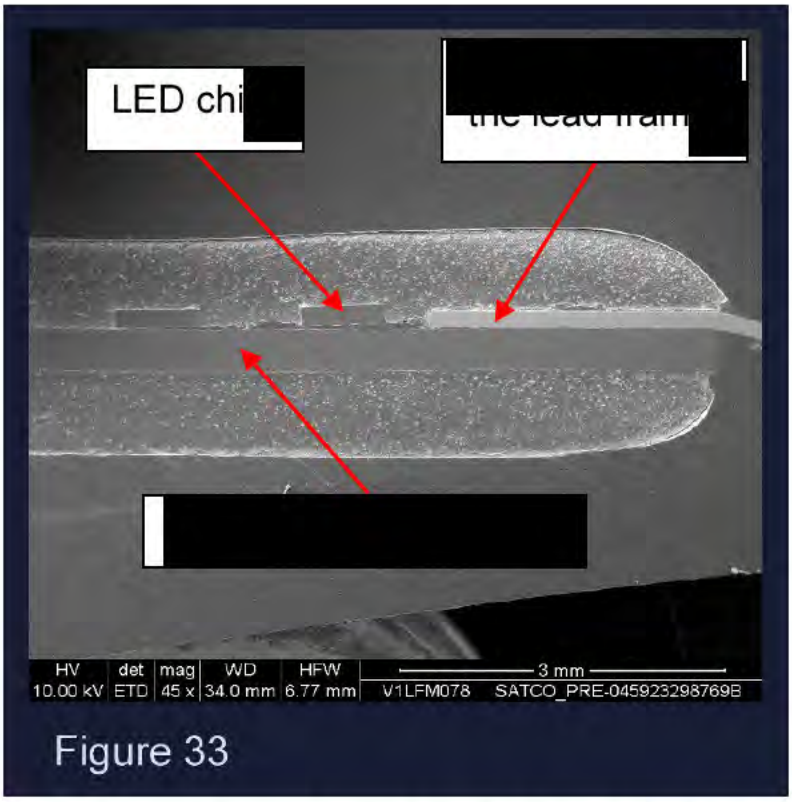
In sum, I find that Complainant has shown, with the exception of the Feit Rigid – T8C/CL/VG/CA/LED and the Feit Rigid – [redacted] 2700K, that light is extracted from both front and back sides of the LED chip in all Feit Accused Products.

iii. "a lead frame to which the LED chip is attached, wherein the LED chip resides on or above a transparent plate in the lead frame that allows the light to be extracted out of the LED chip through the transparent plate in the lead frame"

I find that the Accused Rigid Products satisfy the "lead frame" part of this claim language, but that the plates in the Accused Rigid Products are not the "transparent."

(a) "lead frame"

All Accused Products have an LED chip on or above a plate in a lead frame. The accused Satco S29876 product is illustrative:



CX-0207, slide 17, Fig. 33; *see also id.* Figs. 17, 23, 72; CDX-0002C.0050.

The other Accused Rigid Products have a plate[7] in the lead frame, as shown in magnified images of the filaments in the Accused Products. Tr. (Schubert) at 636:5-637:2, 650:1-651:7, 652:4-10, 652:12-21, 652:24-653:11. The Accused Rigid Products all have an LED chip attached to the lead frame, and the chip resides on or above the plate in the lead frame. CDX-0002C.0050; RRB at 19 (Respondents concede the Accused Rigid Products satisfy this limitation other than "transparent plate"). These features are present in all of the Accused Rigid Products, as shown in

[7] The transparency of the plate in each Accused Rigid Product is considered in detail in the next section. *Infra* part I.A.1.a)(1)(b).

analysis reports by EAG. *See* CDX-0002C.0065 (listing EAG analysis reports depicting lead frames in the Accused Rigid Products).

For these reasons, I find that the Accused Rigid Products satisfy the "lead frame" limitation.

(b) "transparent plate"

The Accused Rigid Products do not satisfy the "transparent" limitation under its plain and ordinary meaning. The parties do not appear to dispute that to measure transparency, one shines light on a material and determines if the light comes out the other side, at least in a basic sense. Tr. (Speck) at 283:19-23; Tr. (Schubert) at 890:2-12 (a "person of skill at the time of the invention would have tested if these filaments let light pass through" to determine whether they are transparent). Accordingly, the testing data most relevant to a determination of whether the Accused Rigid Products (or any other Accused Product) are transparent is light transmission data.

Complainant contends that so long as *any* light passes through a material, it is transparent as I have construed the term. But the plain and ordinary meaning of "transparent" is not simply any material that lets some light through. As was discussed at various points in the trial, sheets of paper, human ears, and white clothing all allow the transmission of *some* light, but no reasonable fact finder would say those items are "transparent." On the other end of the spectrum, Respondents and Staff contend that to be transparent, a material must transmit at least 80% of the light incident on it. *See* SIB at 3-4 (citing Tr. (Eden) at 1056:11-14, 1056:22-1057:5, 1057:13-25); RRB at 20-25. That may be true, but I do not need to set a specific numerical threshold for light transmission to resolve the factual infringement inquiry.

The following evidence supports my factual finding that the Accused Rigid Products do not have a transparent plate. Complainant's witness Mr. Wong testified that older technologies

used in the field of LEDs used metal contact layers described as "semi-transparent," which had transmissivity of "about 40 percent compared to" more modern contact materials that are considered transparent, like indium tin oxide (ITO), Gallium Nitride (GaN), and tunnel junctions, which have transmissivity of "at least 85 percent", "95 percent" and "95 percent," respectively. Tr. (Wong) at 349:9-17. This testimony aligns with the testimony of Dr. Speck from the 1172 investigation that "transparent" means "low" light loss, which means "maybe 1 to 10 percent" loss, that is, 99 to 90 percent transmissivity. Tr. (Speck) at 280:2-282:21.

The record is clear, based on evidence from both Respondents *and* Complainant that all of the Accused Rigid Products have transmissivity below about 60 percent of light incident on their submounts, as discussed in detail below. That evidence indicates that the submounts in those products are not "transparent."

(i) Transmission Testing

Complainant's expert Dr. Schubert had EAG perform measurements of the 360-degree light intensity of certain Accused Rigid Products' filaments (angularly resolved intensity distribution measurements ("LUX plots")).[8] Tr. (Schubert) at 604:22-605:13, *see also id*. at 618:13-619:6. Dr. Schubert described these measurements as showing "the angular intensity" of the light "around the equator" if you "think of the filament as going from the north pole to the

[8] Dr. Schubert also had photographs taken of the populated and unpopulated sides of encapsulated and decapsulated filaments emitting light to purportedly show that the submounts are transparent. Tr. (Schubert) at 617:13-618:12. However, these photographs are of little probative value because it is difficult to determine from them the amount of light passing through the submount. Moreover, as Respondents' expert Dr. Shanfield explained, the images of the populated sides were saturated—as evident by the fact that the blue LEDs appear white—and thus result in a misleading comparison with the non-saturated unpopulated-side images. Tr. (Shanfield) 1126:3-1128:16; RDX-0002.6.

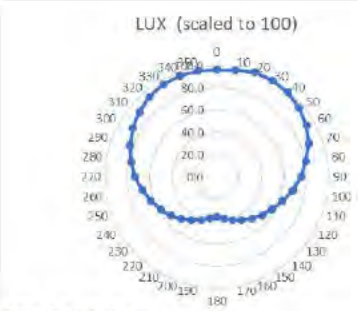
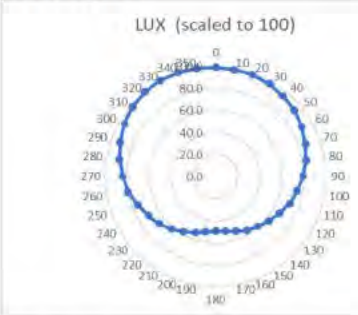
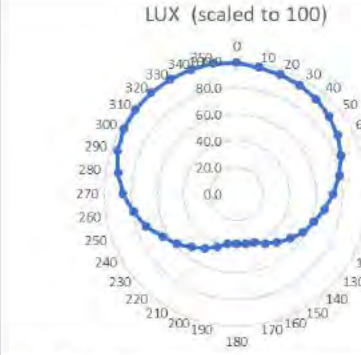
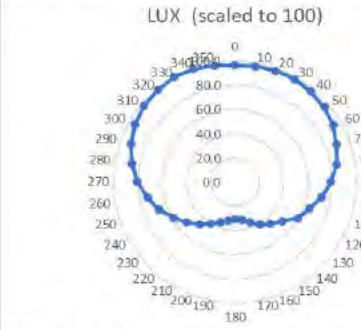
south pole of the earth." *Id*. at 820:9-17.[9] Because the testing measured light on the backside of the submount when the LED on the front of the submount was emitting, the test plots are evidence of the amount of light that passes through the submount in the Accused Rigid Products.

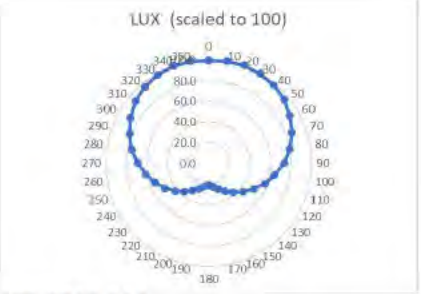
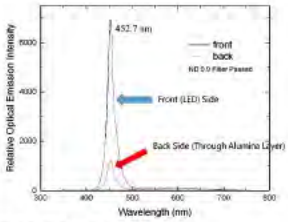
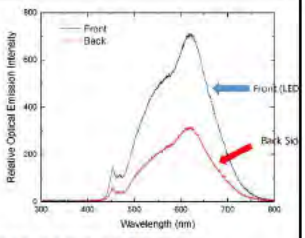
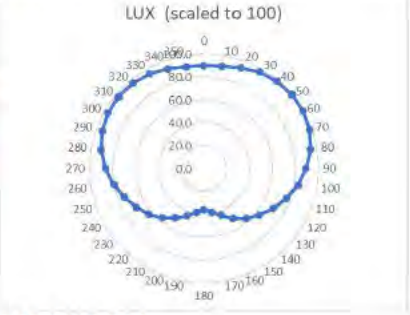
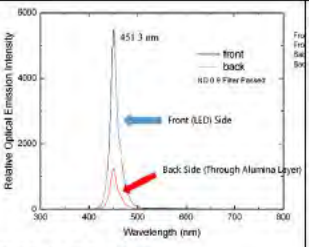
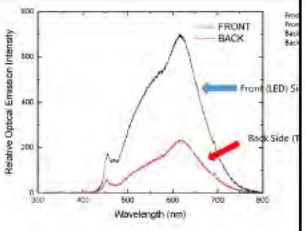
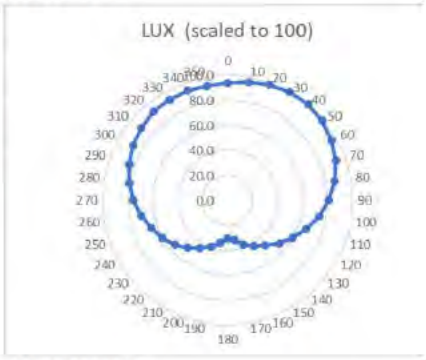
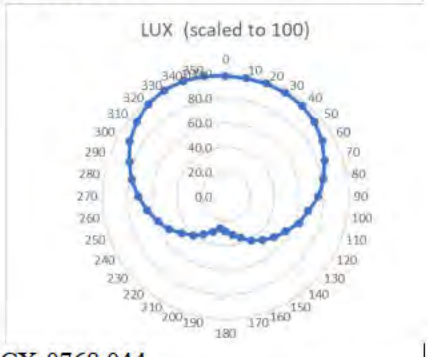
Respondent's expert Dr. Eden also conducted several light transmission tests: Transmission Test 1, where he measured transmission of light from the native LEDs through a decapsulated submount ("intact filament" test); Transmission Test 2, where he tested transmission of light of the same wavelength as the native LEDs from an LED or laser supplied by another manufacturer through a decapsulated submount ("non-native LED" testing); and, finally, he tested transmission with the silicone still on the filament.[10] Tr. (Eden) at 951:10-952:11, 952:14-958:1, 958:15-969:1, 969:14-973:23, 975:24-979:20. Dr. Eden conducted tests with the silicone coating intact to compare his testing procedure and results to those obtained by Dr. Schubert/EAG. *Id*. at 970:7-21.

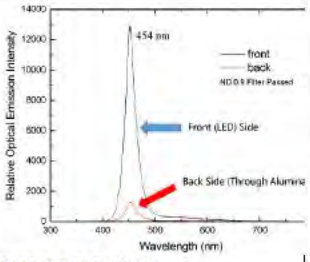
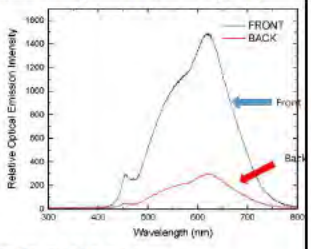
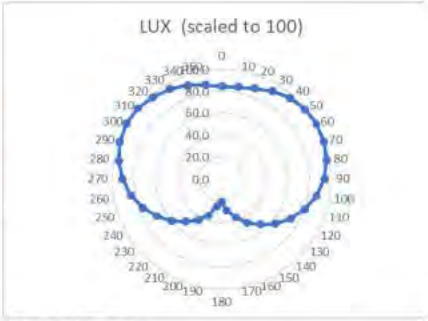
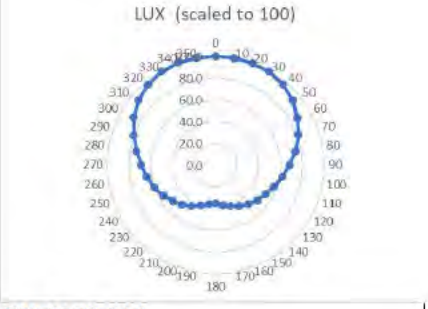
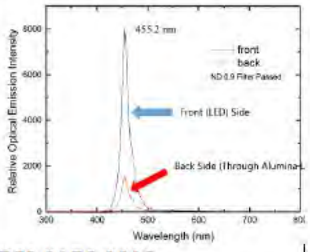
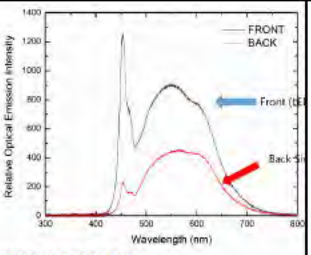
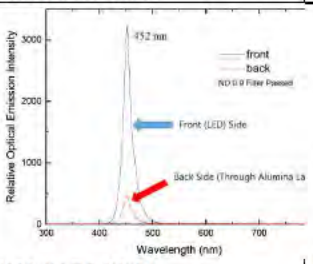
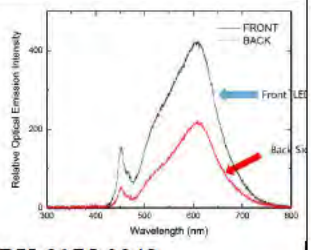
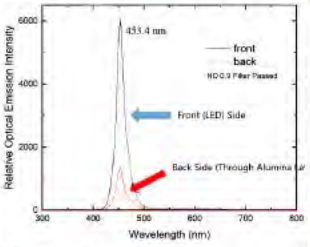
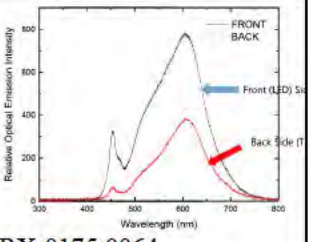
The table below compares Complainant's LUX plots, Respondents' Transmission Test 1 (without silicone), and Respondents' transmission testing with silicone.

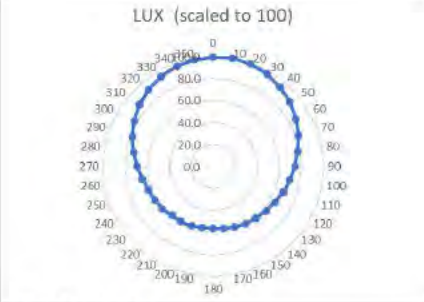
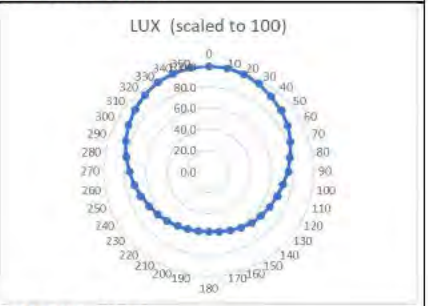
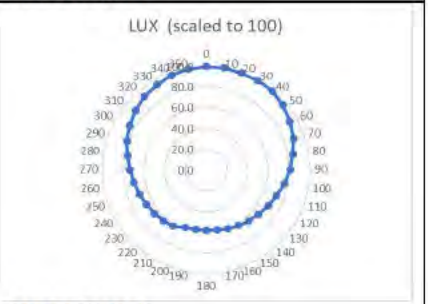
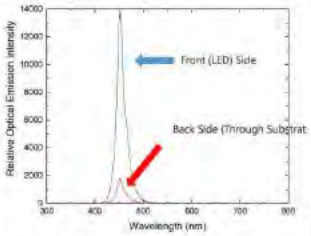
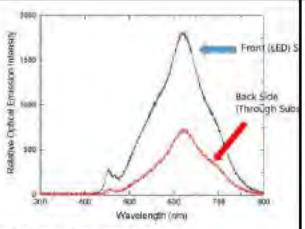
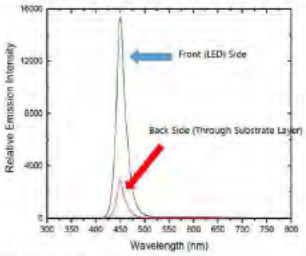
[9] In addition to providing LUX plots, EAG provided plots of the data on a logarithmic scale. *Id*. 605:14-22. According to Complainant, the logarithmic plots show the "realistic intensity distribution of the filament" because under the Weber-Fechner law the human eye perceives light intensity on a logarithmic scale. *Id*. Changing the scale of test results does not mean more light passed through a material. To appropriate the familiar conundrum, the amount of light passing through a leaf in a forest is the same whether or not someone sees it. Human-perceived luminosity is a different parameter than transparency, so I give evidence about luminosity less weight.

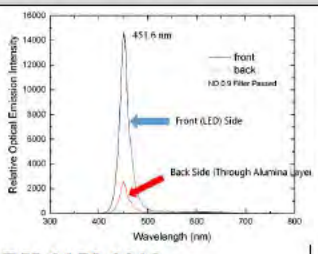
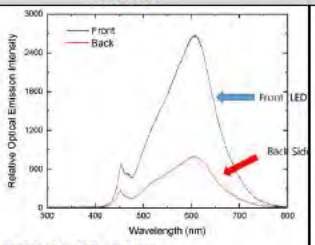
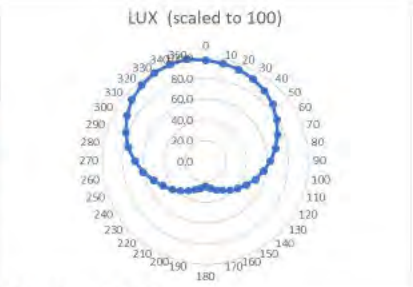
[10] Respondents' experts Dr. Eden and Dr. Shanfield also performed visual inspections of decapsulated submounts from Accused Rigid Products and they concluded that the submounts were opaque. Tr. (Eden) at 944:13-945:17, 973:24-975:23, RX-2616.0005, RX-0547.0002, RX-0550.0003; Tr. (Shanfield) at 1134:7-1135:22. In contrast, Dr. Eden concluded from a visual inspection that the alleged domestic industry Acclaim filament has a transparent submount. *Id*. at 948:17-950:9; RX-193.0005; RX-173.0052-56. I give this subjective evidence less weight.

Transmission Testing Data			
Product	**Respondents' Testing (without silicone)**	**Respondents' Testing (with silicone)**	**Complainant's Testing**
Feit			
Feit Vintage ST19	None.	None.	 CX-0203.044
Feit T8	None.	None.	 CX-0764.044
Feit A15	None.	None.	 CX-0765.044
[redacted] Filament LED	None.	None.	 CX-0766.044

Transmission Testing Data			
Product	**Respondents' Testing (without silicone)**	**Respondents' Testing (with silicone)**	**Complainant's Testing**
		GE	
GE Refresh	None.	None.	 CX-0200.044
GE Relax	 RX-0177.0044	 RX-0177.0044	 CX-0693.044
GE Basic	 RX-0177.0012	 RX-0177.0013	 CX-0694.044
Great Value	None.	None.	 CX-0768.044

Transmission Testing Data			
Product	**Respondents' Testing (without silicone)**	**Respondents' Testing (with silicone)**	**Complainant's Testing**
Home Depot/GVL/Signify			
Eco-smart ST19/ GVL/ '737 SKU	 RX-0176.0012.	 RX-0176.013	 CX-0202.044
Philips ST19	RDX-001.039, RX-0547.0007; RX-0547.0009; Tr. (Eden) 977:3-978:9.	None.	 CX-0179.044
Eco-smart 1002 459 555	 RX-0175.0012	 RX-0175.013	None.
Eco-smart 1002 459 562	 RX-0175.0041	 RX-0175.0042	None.
Eco-smart 309 672 273	 RX-0175.0063	 RX-0175.0064.	None.

Transmission Testing Data			
Product	**Respondents' Testing (without silicone)**	**Respondents' Testing (with silicone)**	**Complainant's Testing**
IKEA			
IKEA Sillbo 140 lm (104.501.82)	None.	None.	 CX-0767C.044
IKEA Sillbo 140 lm (104.501.82)			 CX-205.0044
IKEA Ryet			 CX-206.0044
IKEA Lunnom (104.164.66)	 RX-0173.0045	 RX-0173.0046	None.
IKEA Lunnom (203.821.83)	 RX-0174.0018	None.	None.

Transmission Testing Data			
Product	**Respondents' Testing (without silicone)**	**Respondents' Testing (with silicone)**	**Complainant's Testing**
Satco			
Satco S29876 (representative of S11361 and S11353)	 RX-0178.0012	 RX-0178.0013	 CX-0207.0044

The test results in the table above show that the submounts in the Accused Rigid Products substantially inhibit the transmission of light therethrough. Tr. (Eden) at 965:1-11. Indeed, Complainant's LUX plots show transmissivity for most accused products below even 40%, which Mr. Wong characterized as the lower end of what those in the field would call "semi-transparent." Tr. (Wong) at 349:9-17. These results, adduced by *both* Complainant and Respondents,[11] show no Accused Rigid Products with transmissivity beyond roughly 60%. Thus, the testing evidence shows that, for all the Accused Rigid Products, a significant portion of light produced by the LED in each device is not transmitted through the submount.

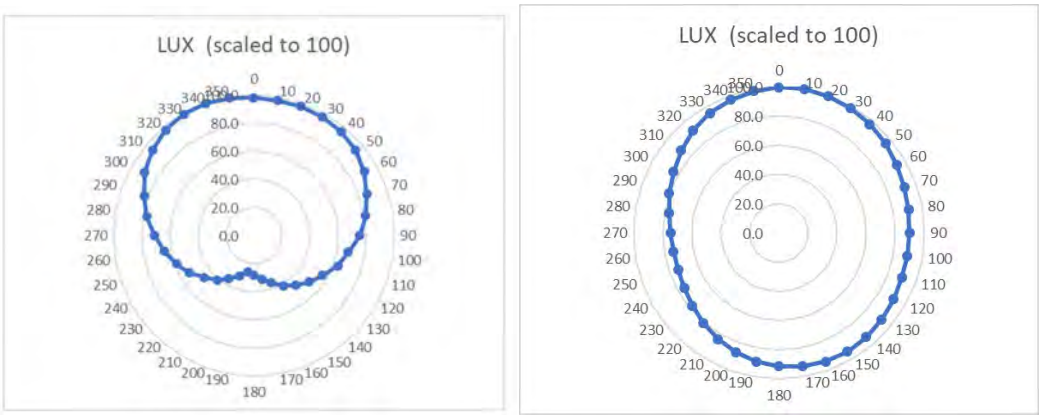
Complainant contends that Respondents' tests were flawed in various ways. *See* Tr. (Schubert) at 606:23-609:13, Tr. (Eden) at 1040:6-1045:9, 1045:10-1049:1. But Complainant's LUX plots correlate to Respondents' transmission testing data with the silicone intact,[12] which indicates the reliability and increased probative value of Respondents' findings. Tr. (Eden) at

[11] Because the evidence challenged in Complainant's motion to strike does not persuade me to reach a different conclusion, that motion is denied as moot. Motion Docket No. 1220-046.

[12] The differences between the capsulated and decapsulated test results stem in part from the silicon acting as "an optical wave guide that redistributes the light that is emitted out of the top of the chip and … spreads it around … to the back side." Tr. (Eden) at 973:14-23. Although the extent of this effect is not quantified in the record, the variance between decapsulated and encapsulated results does not persuade me to conclude that the submounts are transparent.

971:15-972:21. Every test has its limitations, but Respondents' results are, ultimately, still reliable evidence, particularly given that they largely correlate with Complainant's own measurements. *See* CIB at 28 (non-scaled LUX plots are on the left of each figure).

Notably none of the products measured transmittance anywhere near the 80 or even 90% transmission rates of materials the parties and experts agree *are* transparent, such as single crystal sapphire, glass, quartz, ITO, and others.



See, e.g., CX-0205 at slide 44 (left) (an exemplary LUX plot of the IKEA Saibo accused product); CX-0198 at slide 44 (right) (LUX plot of Acclaim Domestic Industry Product; Acclaim product has a sapphire substrate which the parties agree is transparent).

(ii) Supplier Documents

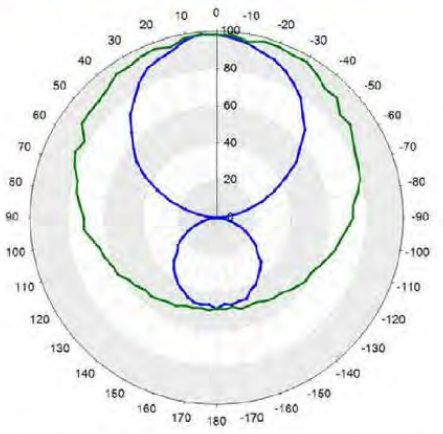
Complainant also relies on an excerpt from a Samsung document, which labels part of a cartoon as "Transparent substrate (Ceramic or Sapphire)," as proof that *all* Accused Rigid Products with ceramic substrates meet this limitation. The excerpt is reproduced below:

CX-2031C.0004. Complainant concluded that "Samsung considers the ceramic submounts to be transparent" and that the document describes *all* filaments made by Samsung. Tr. (Schubert) at 621:7-622:9; *see also* infra part b.

In what is a recurring theme, Complainant points to no evidence that this document describes *all* Samsung rigid LED filaments, nor is there any evidence tying the filament depicted in the cartoon to any Accused Rigid Product. Of particular note is the absence of any evidence indicating the sort of ceramic used by Samsung has equivalent optical properties to those used in the Accused Rigid Products, or even that the Samsung document, which appears to be a marketing document, accurately describes the specific optical properties of any product. Without those critical pieces of additional evidence, the Samsung document does not support a conclusion that any Accused Rigid Product contains a "transparent" filament, even for those Accused Rigid Products containing a Samsung filament.

Complainant makes similar arguments with respect to an OSRAM document, CIB at 29-30 (citing CX-0044.0006), but those arguments fail for the same reasons. Moreover, as with Complainant's own LUX plots, the transmission characteristics plotted in the OSRAM document in fact show that, while the OSRAM submount depicted transmits *some* light, the submount does not constitute the claimed "transparent plate:"

Figure 8: DURIS® L38 radiation characteristic



As the flux is asymmetric distributed over all angles, an optimal arrangement is necessary in order to achieve a homogeneous bulb emission. An optimized arrangement is shown in Figure 9 and Figure 10 as an example.

CX-0044 at 6 (showing transmission through the submount of slightly below 50%).

(iii) RAT = 1 Analysis

Complainant disputes the accuracy of certain light measurements put forward by Respondents' expert Dr. Eden. *See* Tr. (Schubert) at 599:11-25. Dr. Eden reviewed testing of certain Accused Rigid Products done by a company called Covalent Metrology, which were used to calculate the transmittance ("T"), reflection ("R"), and absorption ("A") of light in the submounts of certain Accused Rigid Products:

Covalent Metrology's Results

Brand	Bulb	Exhibit	Type	T	R	A
Tamarac (licensed)	G16.5	RX-0193.0012-14	sapphire	78.7	4.9	16.4
GE	Refresh (SKU 93122167)	RX-0192.0006-11	ceramic	24.1	26.6	49.4
	Basic (SKU 48368)	RX-0187.0007-12	ceramic	1.8	31.7	66.5
	Relax (SKU 47957)	RX-0188.0007-12	ceramic	1.7	22.3	76.0
GVL	'737 SKU	RX-0186.0012-14	ceramic	2.8	21.6	75.6
IKEA	Sillbo (104.501.82)	RX-0185.0011-13	ceramic	24.6	14.2	61.2
	Sillbo (404.165.49)	RX-0184.0014-16	ceramic	12.6	19.1	68.4
	Ryet (404.468.67)	RX-0183.0014-16	ceramic	12.4	17.8	69.9
Satco	S29876	RX-1470.0011-13	ceramic	20.8	34.6	44.6
GE	Vintage A19 (SKU 33574)	RX-0191.0006-11	flexible	38.6	5.9	55.6
Satco	S9966	RX-1480.0012-14	flexible	45.6	10.3	44.1

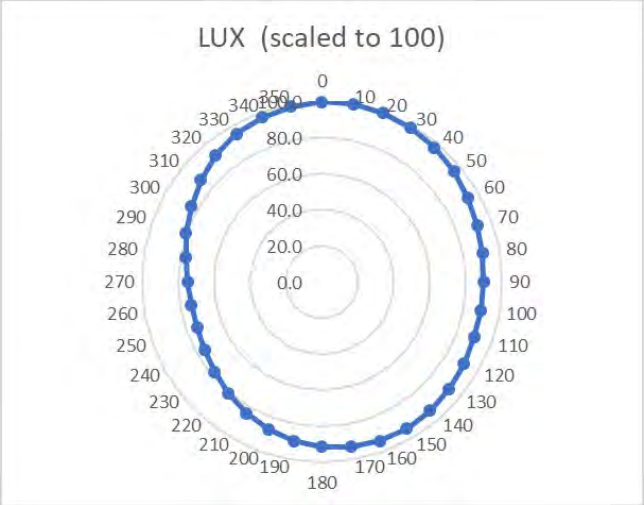
RDX-0001.046; Tr. (Eden) at 979:22-989:11.

Complainant disputes the accuracy of these measurements, contending they substantially overstate the absorption and understate transmission. *See* CIB at 35; Tr. (Schubert) at 606:23-609:13; *but see* Tr. (Eden) at 1035:25-1040:5. Specifically, Complainant's point to Dr. Schubert's testimony that the absorption values were too high, and "contrary to common sense." Tr. (Schubert) at 607:2-11. Complainant contends that the "absorption" number is inflated by failing to account for purportedly "forward-scattered" light that should, they claim, be included in the transmission readings. *Id.*

While there could be some lack of precision or accuracy with respect to these tests, I find they are sufficiently reliable evidence to inform my conclusion that no Accused Rigid Products have transparent submounts. I note specifically that I did not find credible Dr. Schubert's testimony criticizing the configuration of the integration sphere used in Respondents' testing setup. Dr. Schubert admitted he had never measured transmissivity in the way he thought Respondents should have performed their tests. *See* Tr. at 608:13-19, 831:25-834:5. In contrast, I find the testimony of Respondents' experts on their test setup to be credible, and I find the methodology

used in Respondents' testing meets with industry standards. *See* Tr. at 981:5-982:8, 983:8-984:2; 984:3-11; 1036:11-16; 1039:23-1040:5; RDX-001.041.

In the end, Respondents' evidence is sufficiently reliable to confirm that none of the Accused Rigid Products contain a "transparent" plate as required by claim 1 of the '529 patent. Their testing shows that a transparent material, such as sapphire, has a transmission of about 80% (78.7%), which is what would be expected for a transparent material. Tr. (Eden) at 989:6-11. This is only slightly below the results recorded on the same sapphire product by Complainant's methodology:

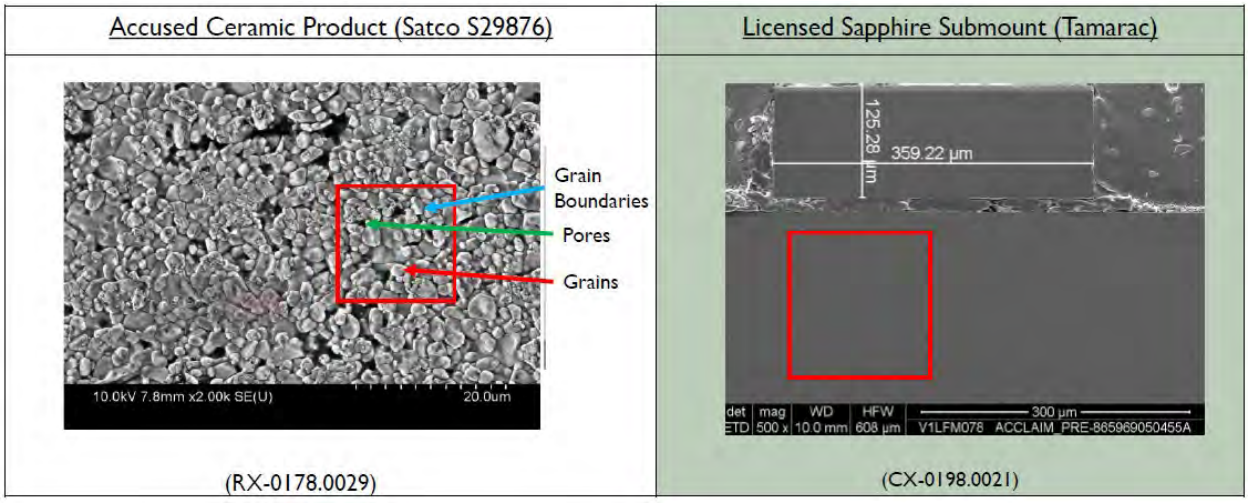


See, e.g., CX-0198 at slide 44 (LUX plot of Acclaim Domestic Industry Product). Respondents' testing also shows that the Accused Rigid Products have a light transmission of much less than 80%, and indeed none transmit more than 50%[13], with some transmitting as little as 1.7% of incident light. These results also corroborate Dr. Eden's transmission testing results discussed above. *Id*. at 989:19-990:5.

[13] This is largely in accord with Complainant's LUX plots that show a maximum transmittance of around 60% among the Accused Rigid Products). *See supra* part V.B.1.iii.(b).(i).

(iv) Grains, Pores, and Boundaries

Although only circumstantial evidence of transparency, SEM testing showed the presence of grains, pores, and grain boundaries in the submounts of the Accused Rigid Products. Tr. (Eden) at 993:9-994:13, 995:7-13. The presence of grain boundaries and pores cause the material to be "highly absorbing and scattering," indicating that the submounts are opaque. *Id*. at 994:11-13, 994:24-995:6, Tr. (Shanfield) at 1192:25-1193:5. In contrast, the same analysis of the licensed Acclaim product, which has a sapphire submount, shows no pores, grains, or grain boundaries. *Id*. at 994:14-23.



This evidence further confirms my finding that the Accused Rigid Products do not satisfy the "transparent plate" limitation.

(v) Doctrine of Equivalents Analysis

To the extent that the "transparent" limitation is not literally present in the Accused Rigid Products, Complainant argues infringement under the doctrine of equivalents. CIB at 30-31; Tr. (Schubert) at 624:16-625:3. I find that the Accused Rigid Products do not satisfy the "transparent" limitation under the doctrine of equivalents.

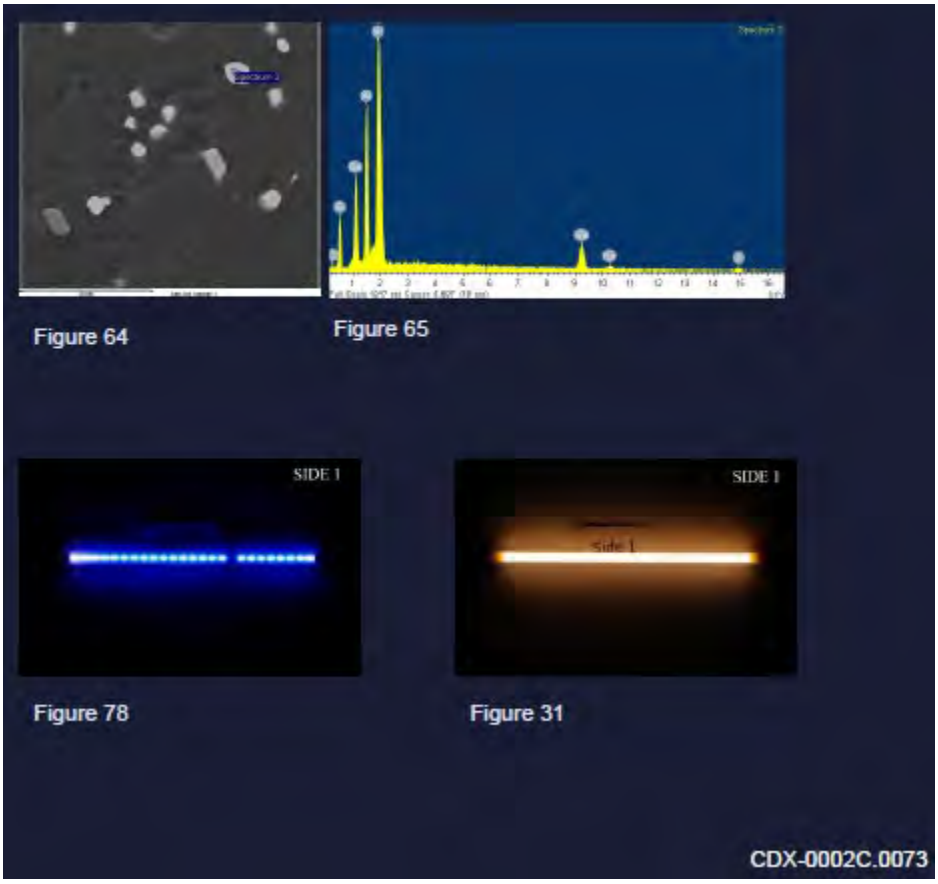
Complainant purportedly provides a function-way-result analysis to demonstrate that the Accused Rigid Products satisfy this limitation. However, Complainant's analysis reduces to a variation of its claim construction argument that the term "transparent" means "allows light to pass through." *See* Order No. 39, 8; Tr. (Schubert) at 625:4-626:22. Putting aside the attempt to circumvent an adverse claim construction, the all-limitations rule precludes Complainant's argument. *Freedman Seating Co. v. American Seating Co.*, 420 F.3d 1350, 1358 (Fed. Cir. 2005); *SciMed Life Sys., Inc. v. Advanced Cardiovascular Sys., Inc.*, 242 F.3d 1337, 1347 (Fed. Cir. 2001). Finding something that is not transparent to be equivalent to something that is transparent would entirely vitiate the "transparent" limitation. The doctrine of equivalents is not so capacious. *Freedman Seating Co.*, 420 F.3d at 1358 ("an element of an accused product or process is not, as a matter of law, equivalent to a limitation of the claimed invention if such a finding would entirely vitiate the limitation").

(vi) "Transparent" Conclusion

For all of the reasons above, I find, as a factual matter, that Complainant has not shown by a preponderance of the evidence that any Accused Rigid Products comprise a "transparent plate" as required by claim 1 of the '529 patent.

iv. "and a phosphor for converting the light emitted by the LED chip at the first wavelength to a second wavelength."

I find that the Accused Rigid Products meet this limitation, as shown by the following: (1) micrographs of the products' glob tops showing white phosphor particles; (2) elemental analysis of glob top particles showing that they contain elements typical for a phosphor; and (3) the conversion of a first wavelength of blue light to a second wavelength of white light, as shown by the photographs of the decapsulated (blue light) and capsulated filaments (white light). Tr. (Schubert) at 656:1-657:2, 658:4-659:1.



CDX-0002C.0073 (depicting Satco S29876). All of the Accused Products have comparable evidence supporting this finding. *See* CDX-0002C.0074-76 (excerpting analysis showing satisfaction of this limitation for each Accused Product).

2. Claim 6

I find that the Accused Rigid Products do not satisfy claim 6 of the ’529 patent. My reasoning follows.

a. “The device of claim 1”

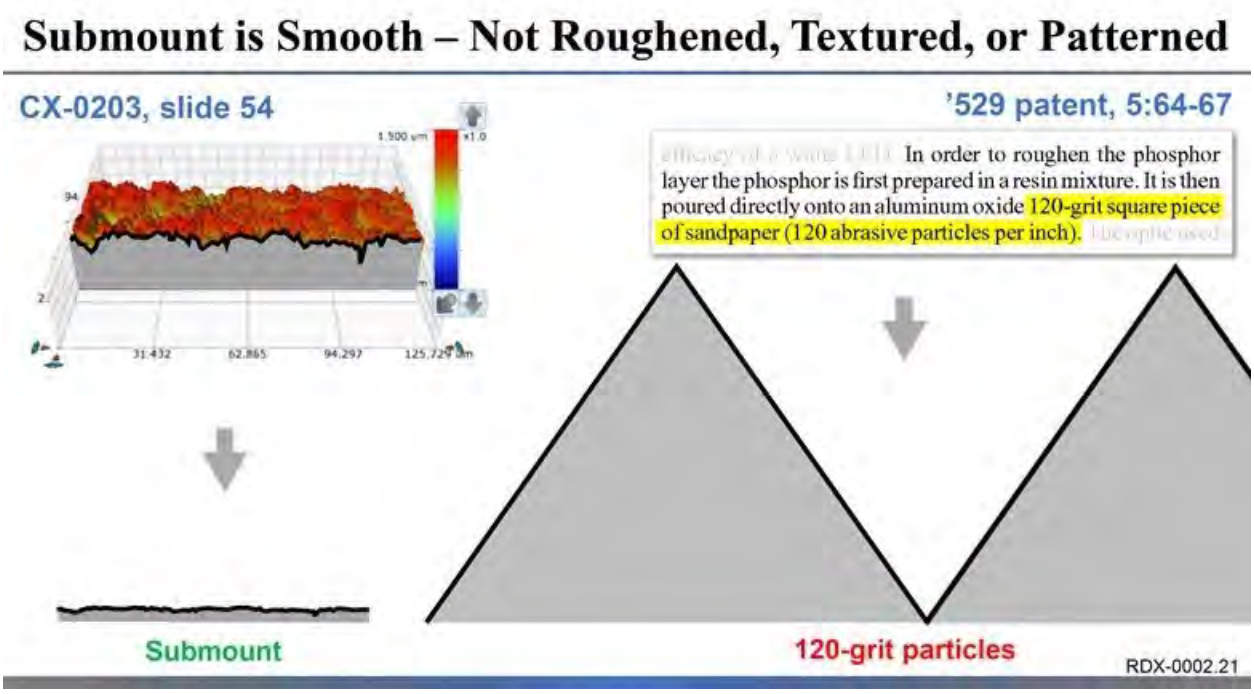
For the reasons discussed above, *supra* part V.B.1 I find that the Accused Rigid Products have not been shown to infringe claim 1 of the ’529 patent. The Accused Rigid Products have not been shown to infringe dependent claim 6 for at least that reason.

b. "wherein the transparent plate is roughened, textured or patterned to increase light extraction from the LED chip through the transparent plate in the lead frame."

There is no evidence showing that the submounts in the Accused Rigid Products are "roughened, textured or patterned *to increase light extraction*," as required by the claims.

Complainant relies on the following to show infringement: (1) microscopy, optical profilometry, and visual inspection, such as the white color of the submount, allegedly showing that Accused Rigid Products' submounts have a roughened surface; (2) the quantification of the roughening, around 0.31 micrometers, which is on the order of the wavelength of light and would cause the type of scattering beneficial to light extraction; and (3) a visual inspection purportedly showing the plates are roughened to increase light extraction. CIB at 44-47; Tr. (Schubert) at 637:23-638:11, 638:16-639:11, 661:25-662:12, 664:4-21; *see* CDX-0002C.0080-.0083 (excerpting relevant figures from analysis reports of Accused Products). Respondents[14] argue this evidence is insufficient to show that the surface is "roughened," pointing in particular to Professor Shanfield's analysis that the submount surfaces are substantially smooth as compared to the roughening contemplated in the specification. RRB at 65.

[14] Ikea did not join this argument.



Respondents also contend that the term "roughened, textured, or patterned" is an indefinite term of degree not explained in the specification, relying on *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014).

Respondents' indefiniteness argument ignores the full context of the term, which is "roughened, textured, or patterned *to increase light extraction.*" As the record makes clear, this required purpose gives objective criteria by which a person of skill in the art would be able to ascertain whether the limitation is met. *See* Tr. (Schubert) 662:22-663:7, 690:25-691:11; Tr. (DenBaars) 155:13-21, 233:18-234:17 (roughening on the order of 0.1-0.2 μm or greater increases light extraction);CX-0207 (Ra=0.315), CX-0694 (Ra=0.417), CX-0765 (Ra=0.369), CX-0696 (Ra=0.354), CX-0206 (Ra=0.315), CX-0768 (Ra=0.408), CX-0692 (Ra=0.488), CX-0205 (Ra=0.305), CX-0767C (Ra=0.400), CX-0202 (Ra=0.341), CX-0203 (Ra=0.398), CX-0764 (Ra=0.291), CX-0693 (Ra=0.355), CX-0179 (Ra=0.442), CX-0200 (Ra=0.319), CX-0766

(Ra=0.412); see also Tr. (Eden) 994:4-13 (grains with dimensions "on the order of the wavelength of blue light" cause scattering); Tr. (Lebby) 1211:10-13, 1212:20-1213:4.

Complainant failed, however, to demonstrate that roughening present on the Accused Products—if any—will "increase light extraction." Dr. Schubert testified that the roughness of at least one Accused Rigid Product was *sufficient* to cause the type of light scattering that improves light extraction, but he did not show that the alleged roughening does, in fact, increase light extraction given the underlying characteristics of the substrate material. Tr. (Eden) at 1007:15-1008:11.

To the contrary, Dr. Speck testified that, in order to determine whether a surface was roughened "to improve light extraction" would require a comparison of light extraction efficiency between the same material in roughened and not roughened states. Tr. (Speck) at 296:23-297:18. Dr. Eden testified similarly. Tr. (Eden) at 1059:2-22. As did Dr. DenBaars. Tr. (DenBaars) at 189:21-191:17. For example, if a structure already scatters light, roughening its surface would not necessarily "increase light extraction." *See* Tr. 1053:22-1054:9, 1133:17-1134:6, 604:8-20, 986:22-987:12, RDX-0001.045; CDX-0002C.0027.

I find Complainant has not shown a transparent plate in the Accused Rigid Products that is roughened, textured, or patterned to increase light extraction. I therefore find that none of the Accused Rigid Products infringe claim 6 for this additional reason.

3. Claim 8

I find that the Accused Products have not been shown to infringe claim 8 of the '529 patent.

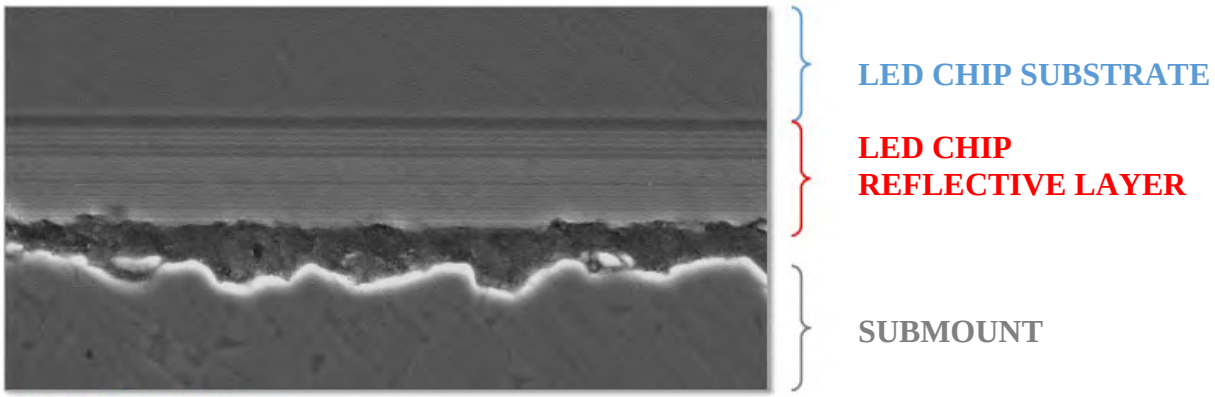
a. "The device of claim 1"

For the reasons discussed above, *supra* part V.B.1, I find that the Accused Products have not been shown to infringe claim 1 of the '529 patent. The Accused Rigid Products have not been shown to infringe dependent claim 8 for at least that reason.

b. "wherein the LED chip includes a transparent substrate and the transparent substrate is adjacent the transparent plate."

I find that the Accused Rigid Products—other than the Feit Accused Products discussed below—satisfy this limitation. Respondents other than Feit admit this limitation is satisfied with respect to their Accused Rigid Products. RRB at 67-68. The LED chips in the Accused Rigid Products have a single crystal sapphire growth substrate, as confirmed by elemental analysis.[15] Tr. (Schubert) at 668:16-669:2. All parties agree that single crystal sapphire is transparent. CIB at 1, 2 (parties agree single-crystal sapphire is transparent); RRB at 20 ("sapphire is transparent"); Tr. (Shanfield) at 1131:23-25. Further, microscopic images show that the growth substrate of the LED is adjacent to the submount. *Id*. at 669:2-670:11. Thus, I find that at least the non-Feit Accused Rigid Products satisfy this limitation. *See* CDX-002C.0086.

Feit argues that the presence of reflective metal or a Distributed Bragg Reflector between the LED growth substrate and the submount in its Accused Rigid Products prevents the substrate from being adjacent to the transparent plate, as shown below. Tr. (Shanfield) at 1145:24-1146:13.



RDX-0002.20.

[15] Respondents' expert Dr. Eden does not dispute that the Accused Rigid Products have transparent sapphire growth substrates. Tr. (Eden) at 1052:25-1053:6.

I find that those of Feit's Accused Products that have been shown to have a DBR or metal layer in between the LED chip substrate and submount do not meet this limitation of claim 8. *See* Tr. (Shanfield) at 1098:11-1099:3, 1141:15–1144:18, CX-0201.24; CX-0764.28; CX-0765.28; CX-0766.28; RDX-0002.17–18; RDX-0002.19; RX-0593C.3.

c. Conclusion

For the foregoing reasons, I find that no Accused Products have been shown to infringe claim 8.

C. Technical Prong of the Domestic Industry Requirement

The technical prong of the domestic industry requirement is satisfied when the complainant in a patent-based section 337 investigation establishes that it is practicing or exploiting the patents at issue. *See* 19 U.S.C. § 1337(a)(2) and (3); *Certain Microsphere Adhesives, Process for Making Same and Prods. Containing Same, Including Self-Stick Repositionable Notes,* Inv. No. 337-TA-366, Comm'n Op. at 8, USITC Pub. No. 2949 (Jan. 1996). "The test for satisfying the 'technical prong' of the industry requirement is essentially [the] same as that for infringement, *i.e*., a comparison of domestic products to the asserted claims." *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003). To prevail, the patentee must establish by a preponderance of the evidence that the domestic product practices one or more valid claims of the patent. *See id.*; *Spansion*, 629 F.3d at 1349; *Certain Vision-Based Driver Assistance System Cameras and Components Thereof*, Inv. No. 337-TA-907, Comm'n Op. at 36, USITC Pub. No. 4866 (Feb. 2019).

Complainant relies on two sets of products to satisfy the domestic industry requirement: its own internal prototypes (SSLEEC Domestic Industry Products), and commercial products made under licenses to the Asserted Patents (Licensee Domestic Industry Products). I address each group separately below.

1. SSLEEC Domestic Industry Products

Complainant asserts that a number of SSLEEC Domestic Industry Products practice the asserted claims of the ’529 patent. These prototypes are named for the researcher who made them in the SSLEEC lab. *See* CPX-0034 (Alhassan FY2016 without phosphor); CPX-0035 (Alhassan FY2016 with phosphor); CPX-0037 (Oh FY2017 with phosphor); CPX-0038 (Oh FY2017 with phosphor); CPX-0044 (Azimah FY2018); CPX-0046 (Wong FY2021 with phosphor); CPX-0047 (Wong FY2021 (2) without phosphor).

For the reasons discussed below, I find that only the Wong FY2021 prototype (CPX-0046) has been shown to practice claims 1 and 8 of the ’529 patent. All other SSLEEC Domestic Industry Products have not been shown to have a lead frame with a transparent plate.

a. Claim 1

I find that only Wong FY2021 (CPX-0046) practices claim 1 of the ’529 patent.

i. “A light emitting device, comprising:”

The preamble of claim 1 is not limiting. *See supra* part V.B.1.

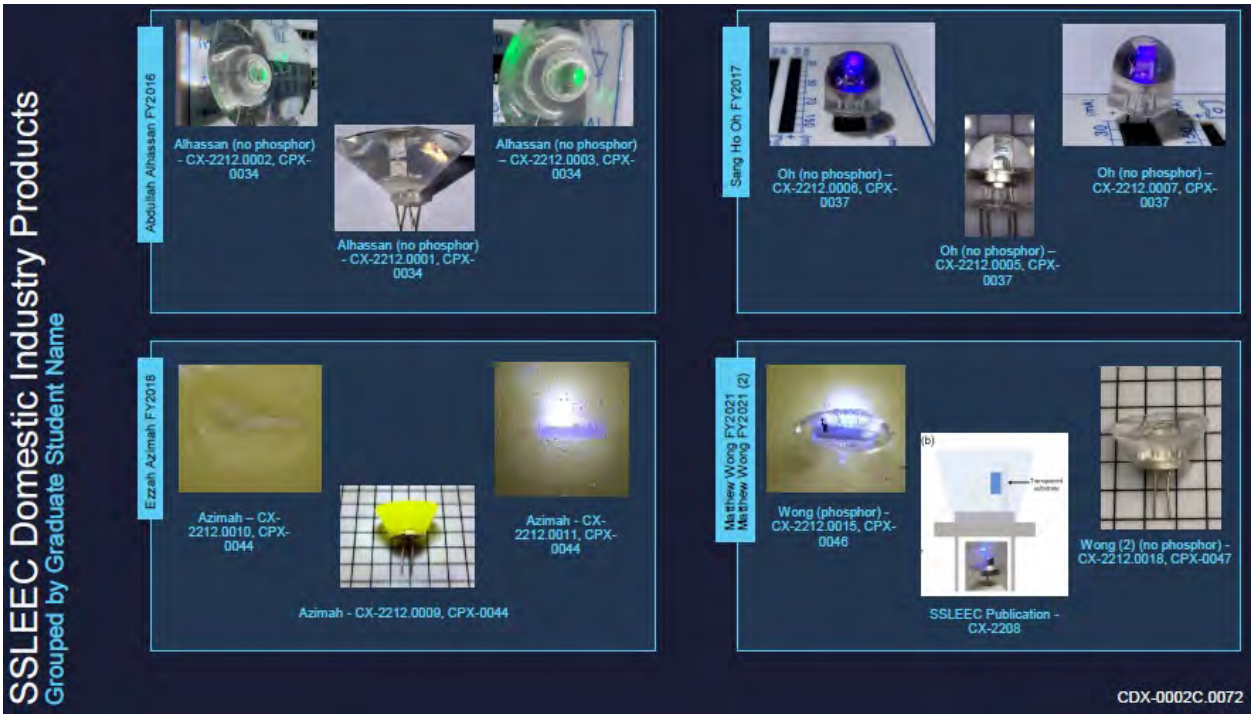
ii. “an LED chip emitting light at a first wavelength, wherein the emitted light is extracted from both front and back sides of the LED chip”

Respondents do not contest that this limitation is met in the SSLEEC Domestic Industry Products. Dr. Schubert testified that the SSLEEC Domestic Industry Products “have LED chips” that “emit light at a first wavelength … through-- to the front side as well as the back side of the device.” Tr. (Schubert) at 649:6-12, 23-25. I therefore find that each of the SSLEEC Domestic Industry Products meet this limitation.

iii. "a lead frame to which the LED chip is attached, wherein the LED chip resides on or above a transparent plate in the lead frame that allows the emitted light to be extracted out of the LED chip through the transparent plate in the lead frame"

The parties dispute whether the SSLEEC Domestic Industry Products practice the "lead frame" and "transparent plate" limitations.

Dr. Schubert testified that the SSLEEC Domestic Industry Products satisfy this limitation because they have LED chips mounted on a transparent plate where light is emitted to the front and back sides of the lead frame. Tr. (Schubert) at 654:25-655:5. Dr. Schubert explained that he believes the lead frame includes "a transparent substrate that is vertically oriented" together with metal parts of "a so-called TO package." *Id*. at 655:6-10. The photographs on which Dr. Schubert relied include the following:



CDX-0002C.0072.