

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

IKEA SUPPLY AG,
Petitioner,

v.

EVERLIGHT ELECTRONICS CO., LTD.,
Patent Owner.

IPR2024-00987
Patent 9,905,742 B2

Before NABEEL U. KHAN, ARTHUR M. PESLAK, and
STEVEN M. AMUNDSON, *Administrative Patent Judges*.

PESLAK, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

IKEA Supply AG (“Petitioner”) filed a Petition pursuant to 35 U.S.C. §§ 311–319 requesting an *inter partes* review of claims 1, 2, 5–16, and 20–22 (“the challenged claims”) of U.S. Patent No. 9,905,742 B2 (“the ’742 patent,” Ex. 1001). Paper 2. Petitioner filed a Declaration of Dr. Michael S. Lebbby in support of the Petition. Ex. 1003. Everlight Electronics Co., Ltd. (“Patent Owner”) did not file a preliminary response.

We have authority, acting on the designation of the Director, to determine whether to institute an *inter partes* review under 35 U.S.C. § 314(a). *See* 37 C.F.R. § 42.4(a) (2023) (“The Board institutes the trial on behalf of the Director.”). Under 35 U.S.C. § 314(a), an *inter partes* review may not be instituted unless the information presented in the Petition shows “there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”

Considering the Petition as well as all supporting evidence, we conclude that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in its challenge of at least one claim of the ’742 patent as unpatentable. Pursuant to 35 U.S.C. § 314, we hereby institute an *inter partes* review of all challenged claims of the ’742 patent on all grounds stated in the Petition.

Our factual findings, claim construction, and legal conclusions at this stage of the proceeding are based on the evidentiary record developed thus far. This decision to institute trial is not a final decision as to the unpatentability of the claims for which *inter partes* review is instituted. Our final decision will be based on the full record developed during trial.

A. Related Matters

The parties identify the following proceedings as related matters: *Everlight Electronics Co., Ltd. v. IKEA US Retail LLC, et al.*, 2:23-cv-00126-JRG (E.D. Tex.); *Everlight Electronics Co., Ltd. v. IKEA US Retail LLC, et al.*, 6:23-cv-00481 (W.D. Tex.); *Everlight Electronics Co., Ltd. v. Walmart Inc.*, 6:23-cv-00439¹ (W.D. Tex.) (“Walmart-Everlight Litigation”). Pet. 2; Paper 5, 1–2.

In addition to the ’742 patent, Petitioner identifies U.S. Patent No. 9,640,733 (“the ’733 patent”), and U.S. Patent No. 7,554,126 (“the ’126 patent”) as being asserted by Patent Owner in the IKEA-Everlight Litigation, wherein the ’733 patent is the parent to the ’742 patent. Pet. 2. Petitioner states that it has filed petitions to challenge the ’733 patent in IPR2024-00972, and the ’126 patent in IPR2024-00988. *Id.* Petitioner also identifies a foreign counterpart to the ’742 patent being asserted by Patent Owner and the nullity proceedings filed against the foreign counterpart in Germany. *Id.* at 2–3.

B. Real Parties in Interest

Petitioner identifies IKEA Supply AG (“ISAG”), IKEA US Retail LLC, and IKEA North America Services, LLC as real parties-in-interest. Pet. 1. Petitioner represents that IKEA Supply AG is a subsidiary of Inter IKEA Holding BV (“Inter IKEA”), and that IKEA US Retail LLC and IKEA North America Services, LLC are “currently named as Defendants in the district court proceeding identified in [the related matters] and are related

¹ Patent Owner mis-identifies the case number for *Everlight Electronics Co., Ltd. v. Walmart Inc.* in the U.S. District Court for the Western District of Texas as “6:23-cv-00481.” Paper 5, 1–2.

through contracts, franchise agreements, and/or indemnification agreements with Inter IKEA and/or ISAG.” *Id.* Petitioner also states that

OSRAM Opto Semiconductors Gmbh, of Regensburg, Germany, Samsung Electronics Co., Ltd., of Suwon-si, South Korea, Seoul Semiconductor Co., Ltd, of Ansan-si, South Korea, Philips Lumileds Lighting LLC, of San Jose, California, Bridgelux, Inc. of Fremont, California, Shenzhen Smalite Semiconductor Co., Ltd., of Shenzhen, China, and/or Intematix, Inc., of Fremont, California, may be real-parties-in-interest insofar as they supply components to ISAG that Patent Owner has accused of infringement and have certain contractual and/or indemnification obligations to ISAG in relation to those accused products.

Id. at 1–2.

Patent Owner identifies itself and no others as a real party-in-interest. Paper 5, 1.

C. The '742 Patent

The '742 patent is titled “Carrier, Carrier Leadframe, and Light Emitting Device.” Ex. 1001, code (54). The '742 patent relates to “a carrier leadframe for receiving a light emitting diode (LED) chip and a light emitting device made from the leadframe.” *Id.* at 1:19–21. As background, the '742 patent notes that “[t]o impart the LEDs with good reliability, most of the LEDs are subjected to a packaging process to form durable light emitting devices.” *Id.* at 1:38–41. The '742 patent describes the recent development of a dicing-type carrier leadframe, wherein

a plastic body is molded on a metal sheet material, then a die bonding process, a wire bonding process and an encapsulation process are performed, and then the metal sheet material and the plastic body are diced away simultaneously to form individual light emitting devices that are separate from each other.

Id. at 1:42–49. However, the '742 patent points out that a large amount of plastic and metal dust produced during the dicing process “seriously pollute

the surfaces of the final products and thus degrade the reliability of the products.” *Id.* at 1:50–53. The ’742 patent also points out that “this process does not allow for a light-on test prior to the encapsulation process, and measurements can only be made after the products are singulated.” *Id.* at 1:53–56.

According to the '742 patent, it addresses these problems by providing “a carrier and a carrier leadframe, which has at least one carrier that is separated in advance and mechanically engaged with the leadframe, thereby facilitating quick release of material after die bonding, wire bonding and encapsulation.” Ex. 1001, 2:6–11. The '742 patent explains that in this carrier leadframe, “each carrier is electrically isolated from other carriers, so after LEDs are die bonded and wire bonded to the carriers, the electric measurement can be performed before the release of material.” *Id.* at 2:11–15. According to the '742 patent, “with the advantages of the aforesaid carrier leadframe, the production speed and yield of the light emitting device can be greatly improved.” *Id.* at 2:18–20.

Figure 1 of the '742 patent is reproduced below.

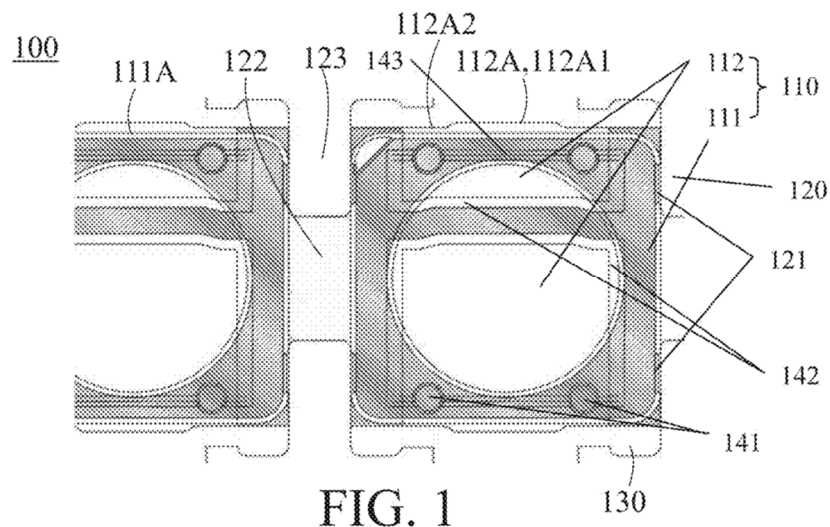


Figure 1 shows “a partial schematic view of an embodiment of a carrier leadframe,” wherein “a carrier leadframe 100 comprises a carrier 110 and a frame body 120, and the carrier 110 comprises a housing 111 and two electrode portions 112.” Ex. 1001, 3:27–31. Figure 1 also shows that

the frame body 120 beneath the carrier leadframe 100 comprises four supporting portions 121, and four concave portions are formed at the border between the side surfaces and the bottom surface of the housing 111 (corresponding to positions of the supporting portions 121) so that each of the four supporting portions 121 is positioned on the bottom surface of the carrier 110 with a half thereof being exposed outside.

Id. at 3:32–40. The ’742 patent describes that “[e]ach carrier in the carrier leadframe of the present disclosure is supported on the frame body via the mechanical engagement between the concave portion and the supporting portion, and the electrode portions of different carriers are electrically isolated from each other.” *Id.* at 3:63–67. Thus, the ’742 patent explains,

after the die bonding process, the wire bonding process and the encapsulation process subsequently performed on the light emitting devices, the electric measurement can be made on the light emitting devices that have not been singulated (i.e., the light emitting devices that are still supported on the frame body in a regular way). Since the light emitting devices are arranged regularly, equipment and time required for surface orientation and direction adjustment are eliminated and the production speed of the light emitting devices can be greatly improved.

Id. at 3:67–4:10.

The ’742 patent states that “the electrode portion 112 has a wing portion 112A exposed outside the housing, and the wing portion 112A comprises a central protruding area (or called central area) 112A1 and two outer edge areas (or called edge areas) 112A2.” Ex. 1001, 6:41–45.

According to the ’742 patent, in the embodiment of Figure 1, “each of the

edge areas 112A2 comprises an electrode portion cross section, and the electrode portion cross sections are level with a part of the housing cross section 111A of the housing 111” such that “the carrier has a relatively flat appearance.” *Id.* at 6:45–49. Referring to Figure 5, the ’742 patent also describes a different embodiment wherein “the electrode portion cross section of the electrode portion 112 is not level with the housing cross section 111A of the housing 111,” and wherein “the electrode portion 112 has an additional lateral area that can increase the binding force with the solder so as to increase the component bonding strength of the light emitting devices after the subsequent component bonding process.” *Id.* at 6:49–59.

The ’742 patent also describes a light emitting device made from the carrier leadframe, wherein the light emitting device includes an LED chip carried within a carrier and covered by an encapsulant. Ex. 1001, 7:14–18. According to the ’742 patent, the light emitting device may be manufactured by providing a carrier leadframe, die bonding and wire bonding an LED chip into the reflection concave cup of the carrier, filling the reflection concave cup with an encapsulant to encapsulate the LED chip to form a light emitting device on the frame body, and separating the light emitting device from the frame body to form a separate light emitting device. *Id.* at 7:32–42.

wise direction of the wing portion, the length-wise direction being substantially perpendicular to the width-wise direction,

wherein the wing portion comprises:

a central area; and

at least one edge area having a length in the length-wise direction shorter than that of the central area, and

wherein the at least one edge area protrudes in the width-wise direction from an end portion of the central area,

wherein the at least one electrode portion further comprises an electrode portion cross section,

wherein the resin housing comprises at least one housing cross section,

wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing, and

wherein the at least one housing cross section is not level with the electrode portion cross section.

Ex. 1001, 13:56–14:14.

E. Prior Art and Asserted Grounds

Petitioner asserts that claims 1, 2, 5–16, and 20–22 would have been unpatentable on the following grounds (Pet. 5):

Claim(s) Challenged	35 U.S.C. §	References/Basis
1, 2, 5–16, 20–22	102 ²	Kim ³
1, 5–14, 16, 20–22	102	Kobayakawa ⁴

² The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112–29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. §§ 102, 103. Because the ’742 patent claims priority to an application filed after March 16, 2013 (the effective date of the amendments), the AIA version of §§ 102, 103 applies.

³ U.S. Patent Application Publication No. US 2014/0054629 A1 (filed July 10, 2013; published February 27, 2014) (Ex. 1004, “Kim”).

⁴ U.S. Patent No. 7,825,426 B2 (filed March 28, 2008; issued November 2, 2010) (Ex. 1005, “Kobayakawa”).

Claim(s) Challenged	35 U.S.C. §	References/Basis
1, 2, 5–16, 20–22	102	Hayashi ⁵
2, 15	103	Kobayakawa, Kim
2, 15	103	Kobayakawa, Hayashi
1, 2, 5–16, 20–22	103	Kim
1, 2, 5–16, 20–22	103	Kobayakawa
1, 2, 5–16, 20–22	103	Hayashi
1, 2, 5–16, 20–22	103	Kim, Kobayakawa
1, 2, 5–16, 20–22	103	Kim, Hayashi
1, 2, 5–16, 20–22	103	Kobayakawa, Hayashi
1, 2, 5–16, 20–22	103	Kim, Kobayakawa, Hayashi

II. ANALYSIS

A. Overview

Petitioner bears the burden of persuasion to prove unpatentability of the claims challenged in the Petition, and that burden never shifts to Patent Owner. *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

To establish anticipation under 35 U.S.C. § 102, each and every element in a claim, arranged as recited in the claim, must be found in a single prior art reference. *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008); *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). Each element of the challenged claim must be found, either expressly or inherently, in the single prior art reference. *Verdegaal Bros., Inc. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). When evaluating a prior art reference in the context of anticipation, the reference must be “considered together with the knowledge

⁵ U.S. Patent Application Publication No. US 2014/0117403 A1 (filed October 28, 2013; published May 1, 2014) (Ex. 1006, “Hayashi”).

of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)). “[A] reference can anticipate a claim even if it ‘d[oes] not expressly spell out’ all the limitations arranged or combined as in the claim, if a person of skill in the art, reading the reference, would ‘at once envisage’ the claimed arrangement or combination.” *Kennametal, Inc. v. Ingersoll Cutting Tool Co.*, 780 F.3d 1376, 1381 (Fed. Cir. 2015) (quoting *In re Petering*, 301 F.2d 676, 681 (CCPA 1962)).

A claim is unpatentable as obvious “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious before the effective filing date of the claimed invention to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103; *see KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) when in evidence, objective indicia of non-obviousness (i.e., secondary considerations).⁶ *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

The Supreme Court explained in *KSR International Co. v. Teleflex Inc.* that

[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an

⁶ No evidence of secondary considerations has been presented at this stage of the proceeding.

apparent reason to combine the known elements in the fashion claimed by the patent at issue.
550 U.S. at 418 (citing *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)) (“[R]ejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” (alteration in original)).

“Whether an ordinarily skilled artisan would have been motivated to modify the teachings of a reference is a question of fact.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1327 (Fed. Cir. 2016) (citations omitted). “[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan ‘would have had a reasonable expectation of success from doing so.’” *Arctic Cat Inc. v. Bombardier Recreational Prods. Inc.*, 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig.*, 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)).

B. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill in the art (“POSITA”) “would have (1) a Bachelor’s 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.” Pet. 42 (citing Ex. 1003 ¶ 33). Petitioner further states that “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, an M.S. in any of the above fields and two years of practical experience would qualify one as a POSITA).” *Id.* at 42–43 (citing Ex. 1003 ¶ 33).

For the purposes of this Decision, we apply Petitioner’s proffered level of skill in the art with the exception of the phrase “at least” which injects potential ambiguity into the level of skill. Notwithstanding this exception, Petitioner’s proffered level of skill appears consistent with the problems addressed in the ’742 patent and the prior art.

C. Claim Construction

We apply the same claim construction standard used by Article III federal courts and the International Trade Commission, both of which follow *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny. 37 C.F.R. § 42.100(b) (2023). Accordingly, we construe each challenged claim of the ’742 patent to generally be “the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.*

If the specification “reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess[,] . . . the inventor’s lexicography governs.” *Phillips*, 415 F.3d at 1316 (citing *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002)). Another exception to the general rule that claims are given their ordinary and customary meaning is “when the patentee disavows the full scope of a claim term either in the specification or during prosecution.” *Uship Intellectual Props., LLC v. United States*, 714 F.3d 1311, 1313 (Fed. Cir. 2013) (quoting *Thorner v. Sony Comput. Ent. Am., LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)).

Petitioner states that for the terms construed in the claim construction order issued in the Walmart-Everlight Litigation (Ex. 1016), Petitioner applies the district court’s constructions for “electrode portion cross section”

and “housing cross section” in the Petition. Pet. 46 (citing Ex. 1016, 2–3). Petitioner further asserts that “[o]therwise, no other constructions are needed for purposes of this petition, and Petitioner applies the plain meaning.” *Id.* (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Petitioner also argues that although the claim 1 and 11 elements “wherein the at least one housing cross section is not level with the electrode portion cross section” were found indefinite by the district court in the Walmart-Everlight Litigation (Ex. 1016, 3), “the prior art clearly falls within the scope of any meaning that can be ascribed to the claims because the art is identical to the structural embodiments disclosed and claimed in the ’742 patent.” Pet. 46. Petitioner argues that it “applies a plain meaning construction for the ‘not level’ term.” *Id.* at 47.

Although the district court in the Walmart-Everlight Litigation determined that the “not level” limitation is “[i]ndefinite,” it did so without explanation. Ex. 1016, 3. Consequently, we address the construction of this limitation.

The Specification provides that

when the electrode portion cross section and the housing cross section are located on the same surface of the carrier, the electrode portion cross-section and the housing portion cross section may be level with each other (i.e., form a flat surface) or may not be level with each other (i.e., do not form a flat surface).

Ex. 1001, 6:35–40. The Specification appears consistent with the plain and ordinary meaning of the word “level” which is “an approximately horizontal line or surface taken as an index of altitude” or “to make (a line or surface) horizontal: make flat or level.” Level Definition & Meaning - Merriam-Webster. Ex. 3001. Consequently, based on the current record, we do not

agree with the district court in the Walmart-Everlight Litigation that this limitation is indefinite. Further, we preliminarily determine that a person of ordinary skill in the art would understand the “not level” limitation to mean that the housing cross section and the electrode portion cross section do not form a flat surface with each other.⁷ Thus, based on the current record, we are able to ascertain the scope of claims 1 and 11 with reasonable certainty for purposes of assessing patentability. *Cf. Samsung Elecs. Am., Inc. v. Prisia Eng’g Corp.*, 948 F.3d 1342, 1353 (Fed. Cir. 2020) (“[T]he proper course for the Board to follow, if it cannot ascertain the scope of a claim with reasonable certainty for purposes of assessing patentability, is to decline to institute the [*inter partes* review] or, if the indefiniteness issue affects only certain claims, to conclude that it could not reach a decision on the merits with respect to whether petitioner had established the unpatentability of those claims under sections 102 or 103.”).

We determine that no express construction of any other claim term is necessary for purposes of this Decision. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

The parties are free to address the construction of any claim term in subsequent briefing during trial.

⁷ If the parties disagree with our preliminary determination, they are encouraged to address this limitation in subsequent briefing.

D. Ground 1: Alleged Anticipation of Claims 1, 2, 5–16, and 20–22 by Kim

Petitioner contends that claims 1, 2, 5–16, and 20–22 are anticipated by Kim. Pet. 47–82. Petitioner supports its contentions with the Declaration of Dr. Lebby. Ex. 1003.

We begin with a brief summary of Kim, and then address Petitioner’s contentions.

1. Kim (Ex. 1004)

Kim is titled “Light Emitting Device and Lighting System Having the Same.” Ex. 1004, code (54). Kim is directed to “a light emitting device having a body of a novel structure.” *Id.* ¶ 8.

Figures 1–3 of Kim are reproduced below.

FIG. 1

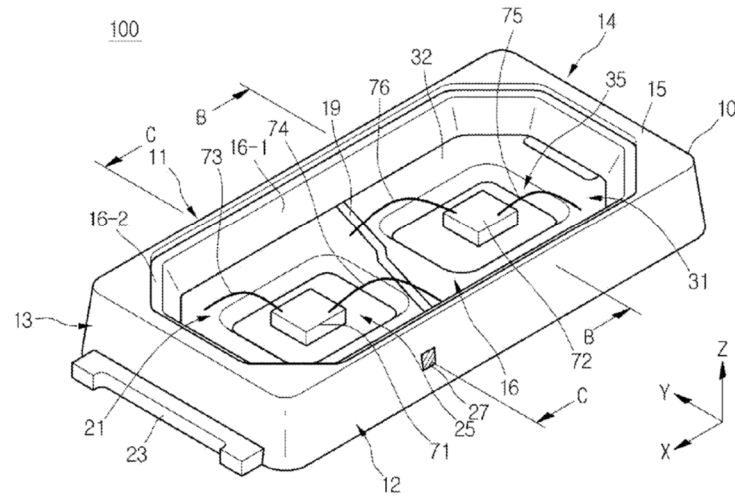
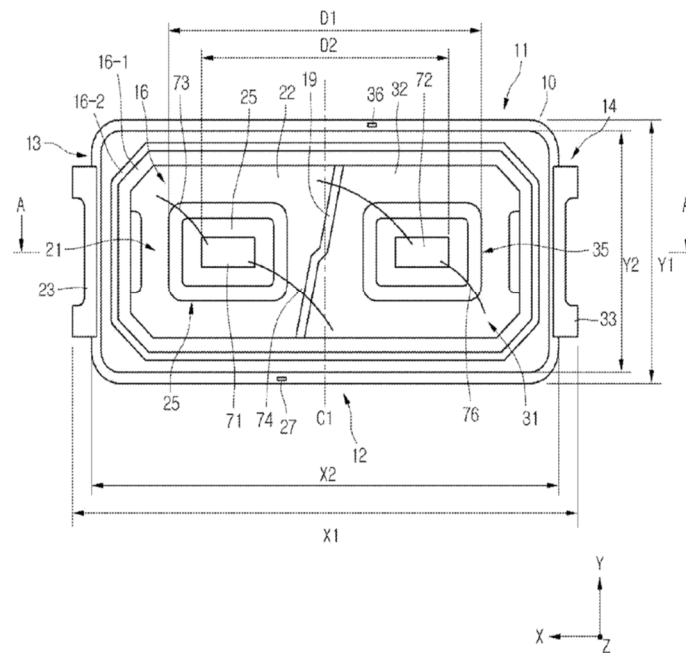
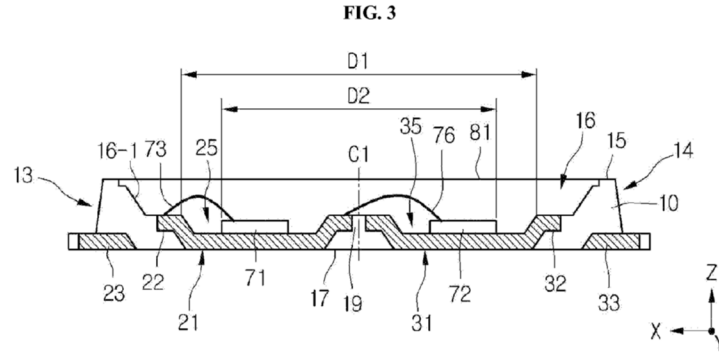


FIG. 2





Figures 1–3 respectively show a perspective view, a plan view, and a sectional view (taken along line A-A of Figure 2) of a light emitting device.

Ex. 1004 ¶ 49. Kim describes that “the light emitting device 100 may include a body 10 having a concave portion 16, a first lead frame 21 having a first lead part 23 and a support protrusion 27, a second lead frame 31 having a second lead part 33 and a support protrusion 36, light emitting chips 71 and 72, wires 73, 74, 75, and 76, and a molding member 81.”

Id. ¶ 50. According to Kim, “the body 10 may be formed of a resin material such as PPA, epoxy or Si” and “[a] filler serving as a metal oxide such as TiO₂ or SiO₂ may be added in an epoxy or silicon material used for the body 10 in order to increase reflection efficiency.” *Id.* ¶ 51.

Referring to Figures 2 and 3, Kim describes that “the first lead frame 21 includes a first lead part 23,” which “may protrude from the first support part 22 to a third sidewall 13 through an inside of the body 10.” Ex. 1004 ¶ 74. According to Kim, “[t]he first lead part 23 extends to a bottom of the body 10, and may be provided at a position lower than the first support part 22.” *Id.*

2. *Claims 1 and 11*

Petitioner provides a limitation-by-limitation analysis of independent claims 1 and 11,⁸ mapping the prior art to the claim limitations. Pet. 47–59, 66–74. Petitioner’s contentions are undisputed at this time because, as noted above, Patent Owner did not submit a preliminary response.

With this background, we analyze Petitioner’s contentions.

Independent Claim 1

[Preamble]: A light emitting device comprising:

Petitioner contends that “Kim discloses ‘a light emitting device’ whether or not the preamble is a limitation.” Pet. 47 (citing Ex. 1003 § 9.1.1; Ex. 1004 ¶ 50).

We reviewed the evidence cited by Petitioner and, based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses the subject matter of the preamble regardless of whether the preamble is limiting.

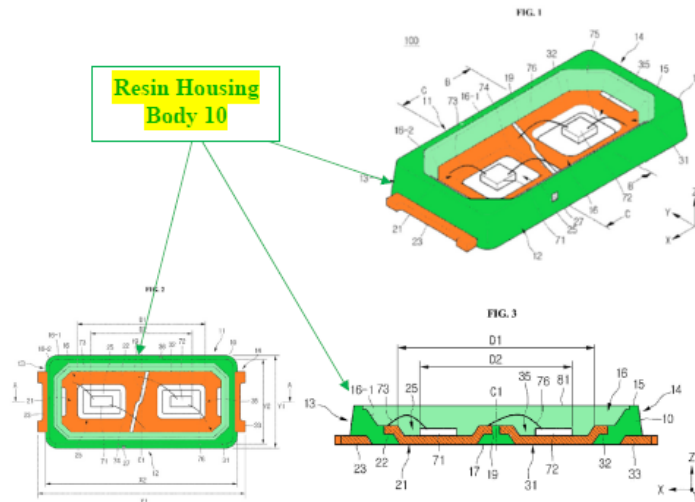
[Electrode Portion]: at least one electrode portion; and

Petitioner provides the following annotated version of Figure 3 of Kim:

⁸ For ease of reference, in our analysis, we refer to Petitioner’s claim limitation identifiers. See Pet. 18, 23.

silicon material used for the body 10 in order to increase reflection efficiency.” *Id.* (citing Ex. 1004 ¶ 51). Petitioner reproduces the following annotated version of Kim’s Figures 1 to 3:

Kim FIGs. 1-3 (Annotated)



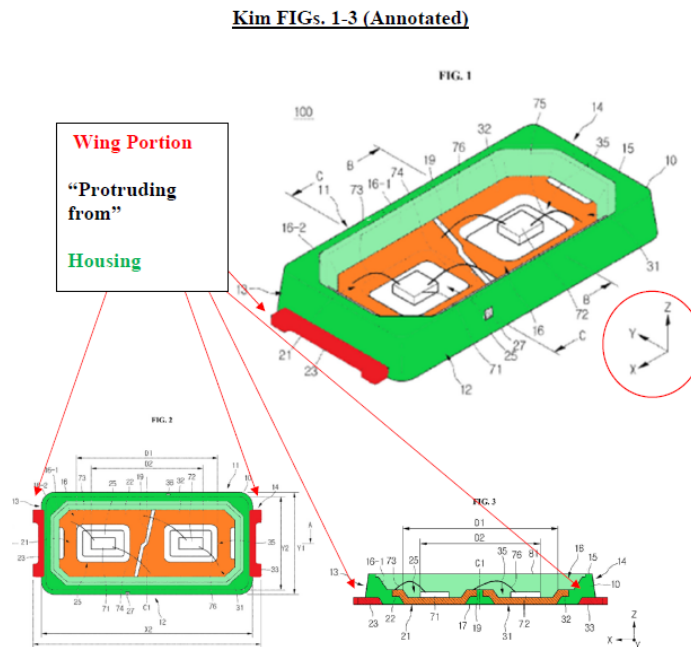
Id. Figure 1 is a perspective view of a light emitting device, Figure 2 is a plan view of the light emitting device, and Figure 3 is a sectional view of the light emitting device. Ex. 1004 ¶¶ 19–21. In each figure, Petitioner shades body 10 in green and elements 21, 23, 31, and 33 in orange. Pet. 50. Petitioner adds a green rectangular box with the text “Resin Housing Body 10” and three green arrows pointing to body 10 in each of Figures 1, 2, and 3. *Id.*

Petitioner contends that Kim’s Figures 1–3 show that “body 10 covers a portion of the lead frame 21 having first lead part 23 as well as lead frame 31 having a second lead part 33 (e.g., ‘electrode portion’).” Pet. 49.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Wing Portion]: wherein said at least one electrode portion comprises a wing portion which is exposed outside the housing, the wing portion extending in a length-wise direction of the wing portion along an edge of the housing and protruding from the housing in a width-wise direction of the wing portion, the length-wise direction being substantially perpendicular to the width-wise direction,

Petitioner provides the following annotated version of Kim's Figures 1–3:



Pet. 51. Figure 1 is a perspective view of a light emitting device, Figure 2 is a plan view of the light emitting device, and Figure 3 is a sectional view of the light emitting device. Ex. 1004 ¶¶ 19–21. In each figure, Petitioner shades body 10 in green and elements 23 and 33 in orange and elements 21 and 31 in red. Pet. 51. Petitioner adds a black rectangular box with the text “Wing Portion,” ““Protruding from,”” and “Housing” with four red arrows pointing to the asserted wing portions in each of Figures 1, 2, and 3.

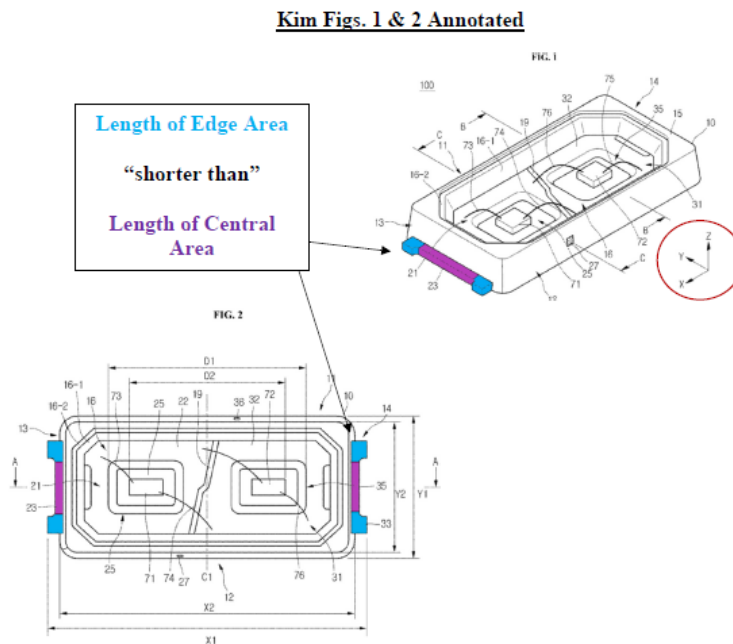
Petitioner contends that “‘first/second lead parts 23, 33’ of lead frames 21, 31, respectively, each correspond to the claimed ‘wing portion.’”

Pet. 50. According to Petitioner, “lead frame portions 23, 33 (*e.g.*, ‘wing portions’) are exposed outside of the body 10 (*e.g.*, housing), extend in the . . . ‘length-wise direction’ [] along an edge of body 10 . . . , protrude from the body 10 . . . in . . . width-wise direction [] of the wing portion” with the length-wise “direction being substantially perpendicular to the” width-wise direction. *Id.* at 50–51 (citing Ex. 1003 § 9.1.1.4; Ex. 1004 ¶¶ 74–76, Fig. 1).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Central Area and Edge Area]: wherein the wing portion comprises: a central area; and at least one edge area having a length in the length-wise direction shorter than that of the central area, and

Petitioner provides the following annotated version of Kim’s Figures 1 and 2:



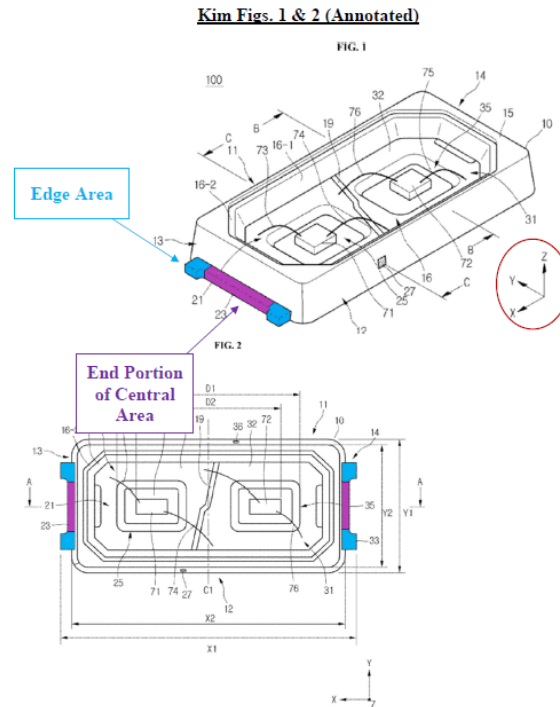
Pet. 52. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades element 23 purple in the central area and blue on each end. Pet. 52. Petitioner adds a black rectangular box with the text “Length of Edge Area,” “shorter than,” and “Length of Central Area” with two black arrows pointing to the asserted wing portion in each of Figures 1 and 2.

Petitioner contends that Kim’s first/second lead parts 23, 33 “each have a ‘central area’ (purple) and ‘at least one edge area (blue) having a length in the length-wise direction’” that is “shorter than that of the central area.” Pet. 52 (citing Ex. 1003 § 9.1.1.5; Ex. 1004, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Edge Area Protrudes]: wherein the at least one edge area protrudes in the width-wise direction from an end portion of the central area,

Petitioner provides the following annotated version of Kim’s Figures 1 and 2:



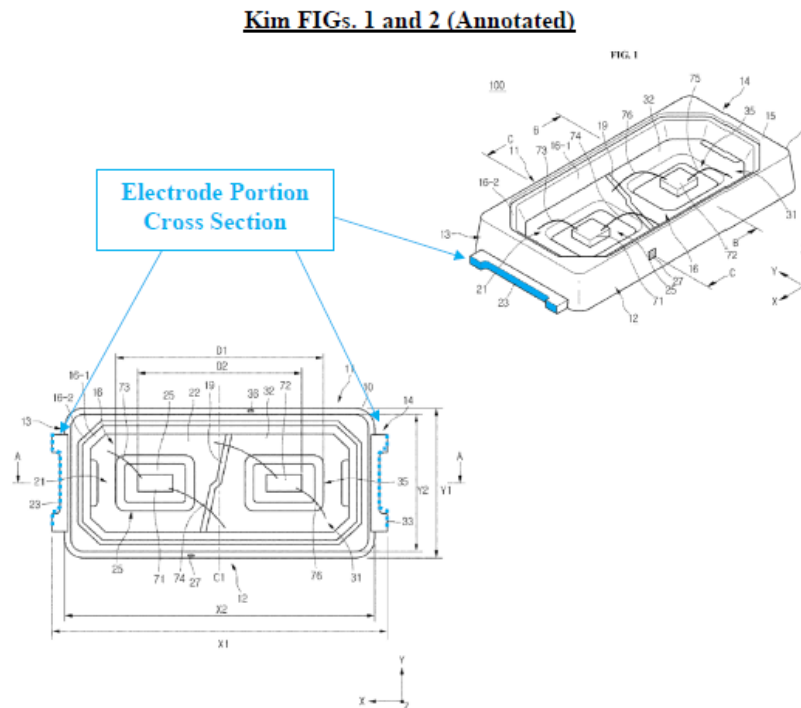
Pet. 54. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades element 23 purple in the central area and blue on each end. Pet. 54. Petitioner adds a blue rectangular box with the text “Edge Area” and a blue arrow pointing to the asserted “Edge Area” in Figure 1 and a purple rectangular box with the text “End Portion of Central Area” and a purple arrow pointing to the center of element 23 in Figure 1. *Id.*

Petitioner contends that Kim’s “‘first/second lead parts 23, 33’ each have [an] ‘edge area that protrudes in the width-wise direction’” that is “‘from an end portion of the central area.’” Pet. 53 (citing Ex. 1003 § 9.1.1.6, Figs. 1, 2). Petitioner argues that one such “edge area” satisfies this limitation but “Kim discloses four of the claimed ‘edge areas.’” *Id.*

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Electrode Portion Cross Section]: wherein the at least one electrode portion further comprises an electrode portion cross section,

Petitioner provides the following annotated version of Kim's Figures 1 and 2:



Pet. 55. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades element 23 in blue. Pet. 55. Petitioner adds a blue rectangular box with the text “Electrode Portion Cross Section” and three blue arrows pointing to the asserted electrode portion cross section in Figures 1 and 2. *Id.*

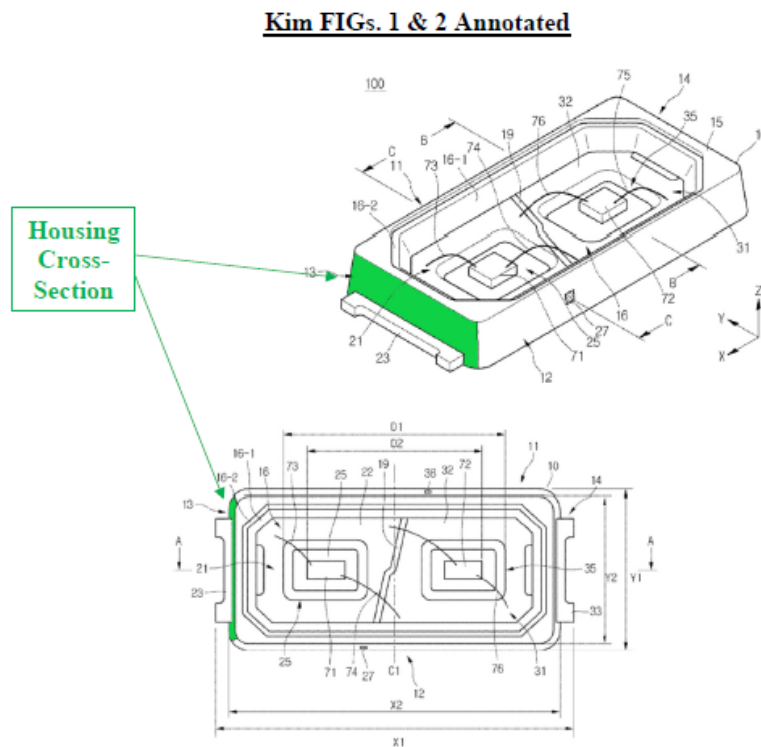
Petitioner contends that “[a]lthough Kim does not use the same ‘cross section’ language as the ’742 patent, as can be appreciated its electrode

portion (e.g., ‘first/second lead parts 23, 33’ of ‘lead frames 21, 23’) has a cross section.” Pet. 55 (citing Ex. 1003 § 9.1.1.7; Ex. 1004, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Housing Cross Section]: wherein the resin housing comprises at least one housing cross section,

Petitioner provides the following annotated version of Kim’s Figures 1 and 2:



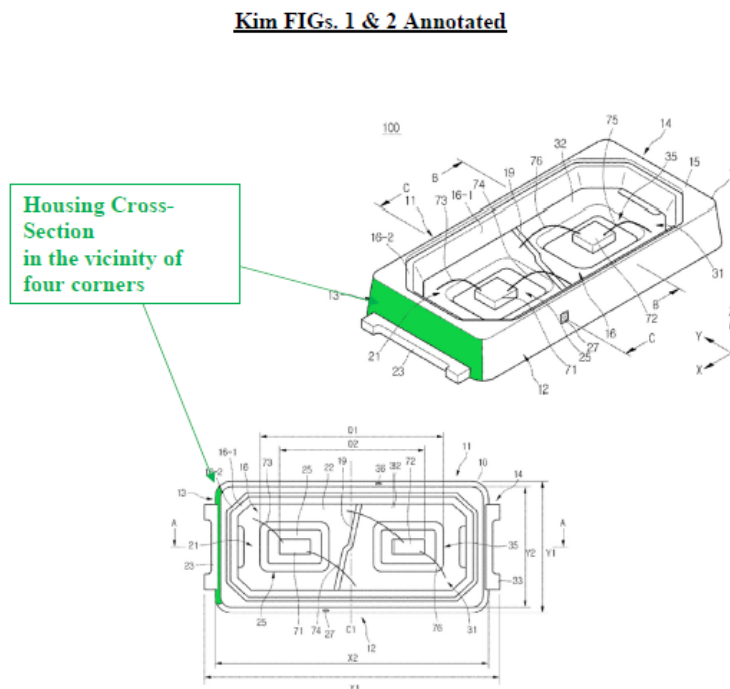
Pet. 56. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades side wall 13 in green. Pet. 56. Petitioner adds a green rectangular box with the text “Housing Cross-Section” and two green arrows pointing to the asserted housing cross section in Figures 1 and 2. *Id.*

Petitioner contends that “[a]n example cross section is shown of ‘third sidewall 13’ of ‘body 10’ in Kim FIGS. 1 & 2, [above], but as may be appreciated, additional cross sections could also be drawn on ‘first sidewall 11,’ ‘second sidewall 12,’ and/or ‘fourth sidewall 14.’” Pet. 56.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Four Corners]: wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing, and

Petitioner provides the following annotated version of Kim’s Figures 1 and 2:



Pet. 58. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades side wall 13 in green. Pet. 58. Petitioner adds a green rectangular box with the text “Housing Cross-Section in the vicinity

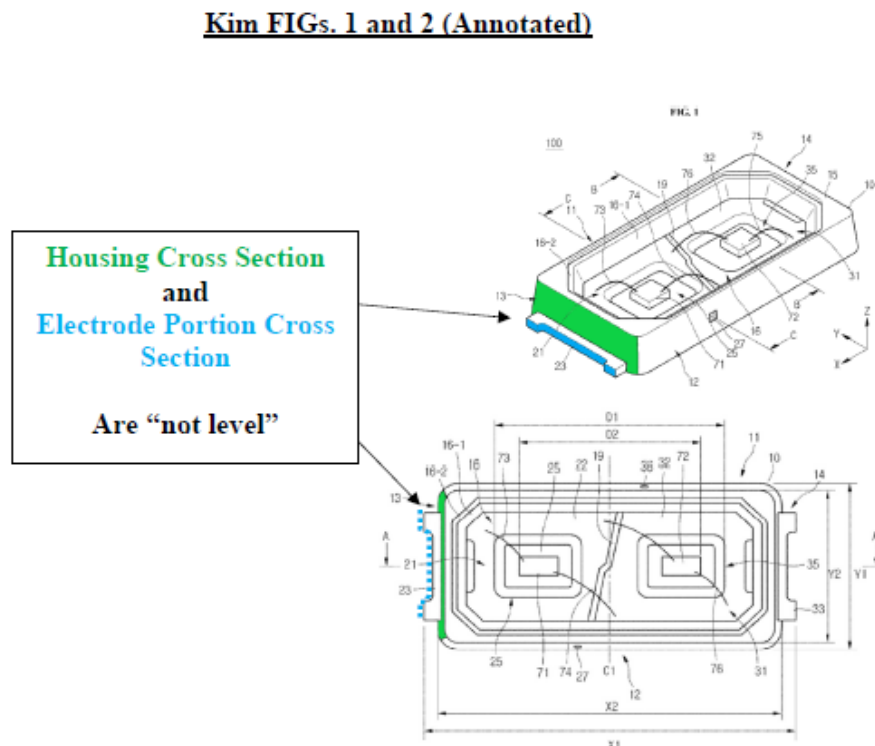
of four-corners” and two green arrows pointing to a corner of the housing in Figures 1 and 2. *Id.*

Petitioner contends that the annotated figures shown above show one housing cross section but “any number of cross sections can be drawn through Kim’s body 10 . . . that satisfies the claim limitation.” Pet. 57.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Not Level]: wherein the at least one housing cross section is not level with the electrode portion cross section.

Petitioner provides the following annotated version of Kim’s Figures 1 and 2:



Pet. 59. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades side wall 13 in green and element 23 in blue.

Pet. 59. Petitioner adds a black rectangular box with the text “Housing Cross-Section and Electrode Portion Cross Section” and “Are ‘not level’” and two black arrows pointing to Figures 1 and 2. *Id.*

Petitioner contends that “[t]he housing cross-section is on an angle along the face of the body 10 and is not in line with or level with the electrode portion.” Pet. 58. Because Kim’s housing cross section and electrode portion cross section do not form a flat surface with each other, Kim meets this limitation under our preliminary claim construction.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

Summary of Claim 1

For all the foregoing reasons, Petitioner establishes a reasonable likelihood that claim 1 is anticipated by Kim.

Independent Claim 11

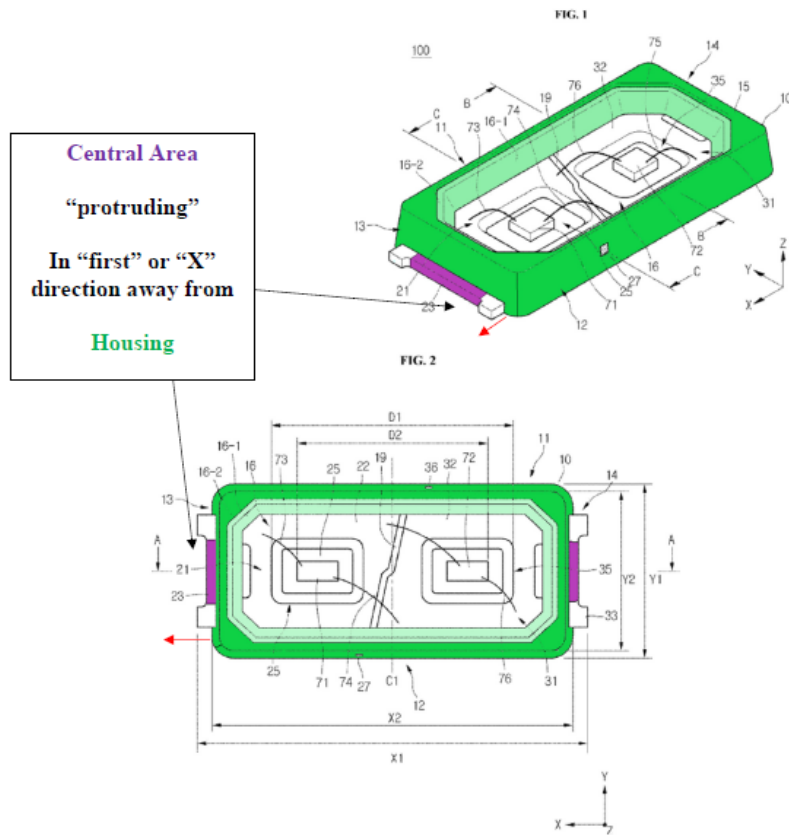
For the preamble, the electrode portion limitation, and the resin housing limitation, Petitioner relies on its contentions discussed above for claim 1. Pet. 66.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses the preamble, the electrode portion limitation, and the resin housing limitation of claim 11.

[Central Area]: wherein the wing portion comprises: a central area protruding from the housing in a first direction away from the housing; and

Petitioner provides the following annotated version of Kim’s Figures 1 and 2:

Kim FIGs. 1 and 2 (Annotated)



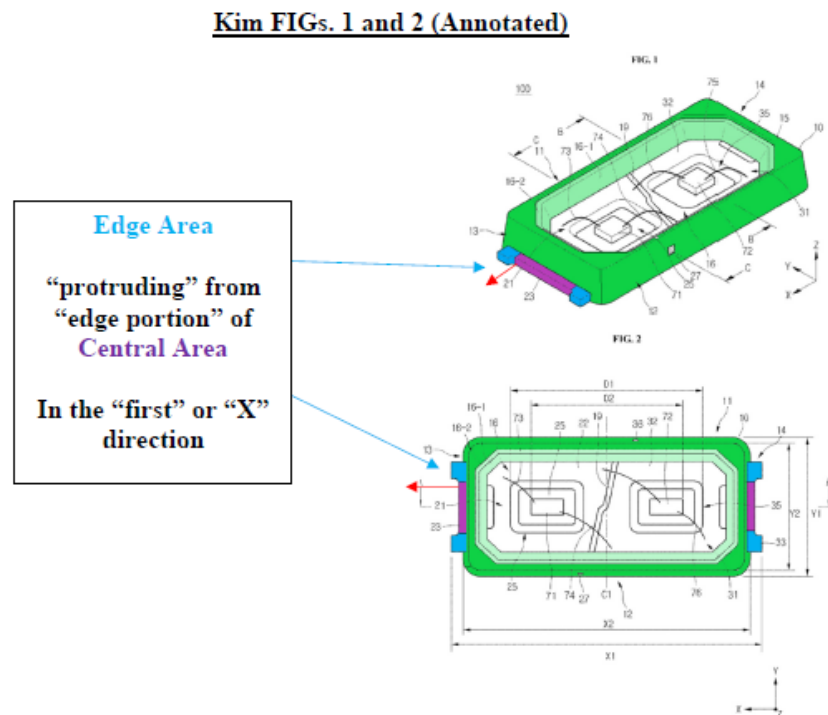
Pet. 67. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades housing 10 in green and element 23 in purple. Pet. 67. Petitioner adds a black rectangular box with the text “protruding,” “In ‘first’ or ‘X’ direction away from,” and “Housing” with two black arrows pointing to element 23 in each of Figures 1 and 2. *Id.*

Petitioner contends that Kim discloses this limitation because first/second lead parts 23 “hav[e] a central area that protrudes from body 10 . . . as shown in FIGs. 1 & 2.” Pet. 67 (citing Ex. 1003 § 9.1.9.4; Ex. 1004 ¶¶ 74–75, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Edge Area]: at least one edge area protruding from an edge portion of the central area, in the first direction,

Petitioner provides the following annotated version of Kim's Figures 1 and 2:



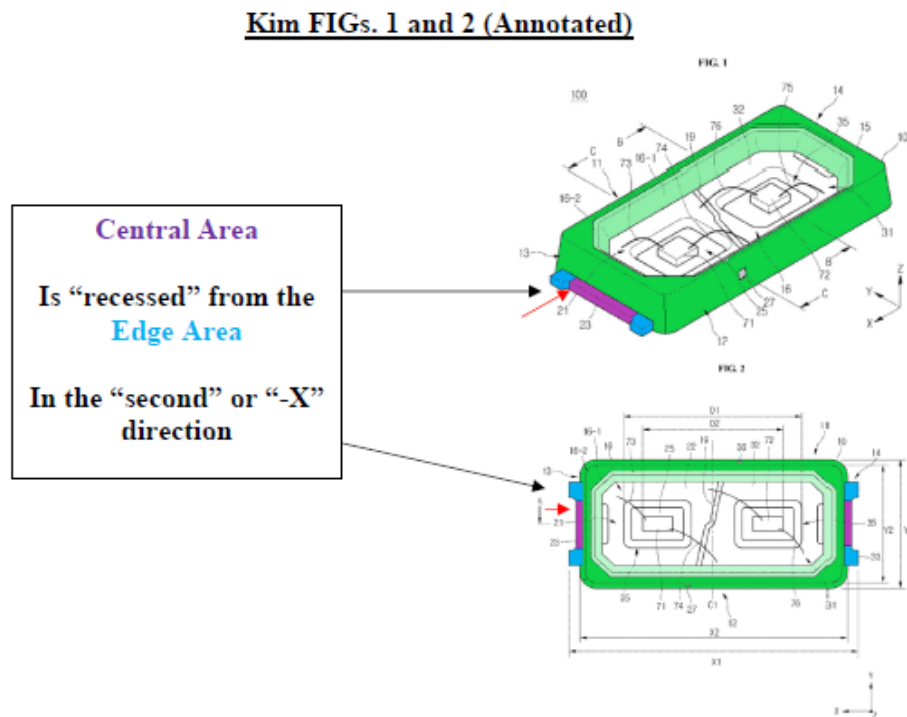
Pet. 68. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades housing 10 in green and element 23 in purple in the center and blue on each end. Pet. 68. Petitioner adds a black rectangular box with the text “Edge Area,” “‘protruding’ from ‘edge portion’ of Central Area,” and “In the ‘first’ or ‘X’ direction” with two blue arrows pointing to element 23 in each of Figures 1 and 2, and a red arrow in each of Figures 1 and 2 pointing in the X direction. *Id.*

Petitioner contends that Kim discloses this limitation because “first/second lead parts 23 hav[e] edge areas that protrude from edges of the central area . . . as shown in FIGs. 1 & 2.” Pet. 68 (citing Ex. 1003 § 9.1.9.5; Ex. 1004 ¶¶ 74–75, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Recessed]: wherein the central area is recessed from the at least one edge area in a second direction opposite from the first direction toward the housing,

Petitioner provides the following annotated versions of Kim’s Figures 1 and 2:



Pet. 69. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades housing 10 in green and element 23 in purple

in the center and blue on each end. Pet. 69. Petitioner adds a black rectangular box with the text “Central Area,” “Is ‘recessed’ from the Edge Area,” and “In the ‘second’ or ‘-X’ direction” with two black arrows pointing to element 23 in each of Figures 1 and 2, and a red arrow in each of Figures 1 and 2 pointing in the X direction. *Id.*

Petitioner contends that Kim discloses this limitation because the first/second lead parts 23 have “a central area recessed from at least one edge area in the x-direction.” Pet. 69 (citing Ex. 1003 § 9.1.9.6; Ex. 1004 ¶¶ 74–75).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Electrode Portion Cross Section]: wherein the at least one electrode portion further comprises an electrode portion cross section,

Petitioner reproduces the same annotated version of Kim’s Figures 1 and 2 that are shown above for the electrode portion cross section limitation of claim 1. Pet. 69–70. Petitioner relies on its contentions for the electrode portion cross section limitation for claim 1. *Id.*

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

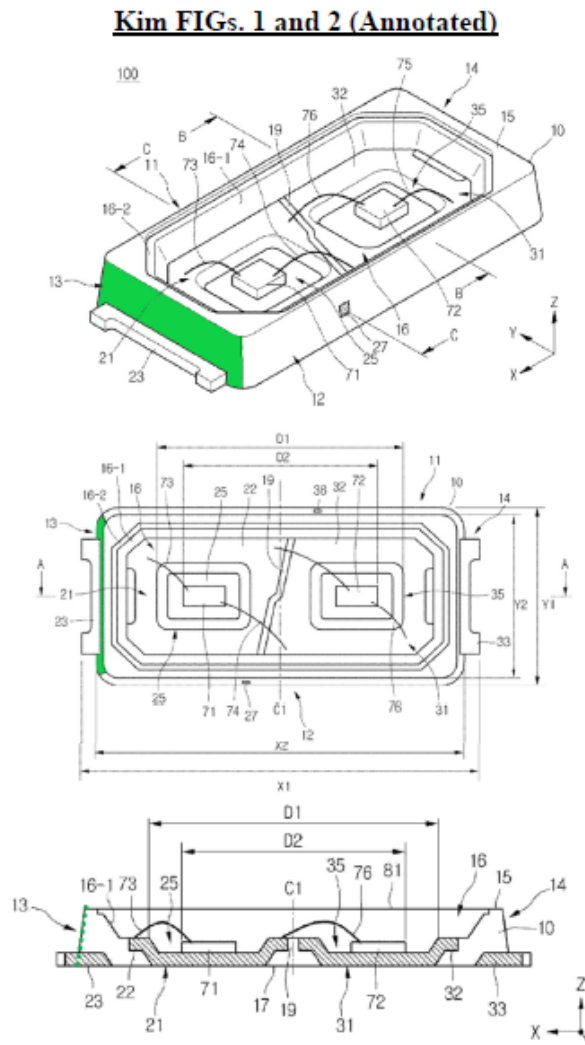
[Housing Cross Section]: wherein the resin housing comprises at least one housing cross section,

Petitioner reproduces the same annotated version of Kim’s Figures 1 and 2 that are shown above for the housing cross section limitation of claim 1. Pet. 70–71. Petitioner relies on its contentions for the housing cross section limitation for claim 1. *Id.*

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Housing Corner]: wherein the at least one housing cross section is located in a vicinity of a corner of the resin housing, and

Petitioner provides the following annotated version of Kim's Figures 1–3:



Pet. 72. Figure 1 is a perspective view of a light emitting device, Figure 2 is a plan view of the light emitting device, and Figure 3 is a sectional view of

the light emitting device. Ex. 1004 ¶¶ 19–21. In each figure, Petitioner shades body 10 in green. Pet. 72.

Petitioner contends that the housing cross section shaded in green in Figures 1–3 above meets the limitation of “at least one housing cross section is located in a vicinity of a corner of the resin housing.” Pet. 71 (citing Ex. 1003 § 9.1.9.9; Ex. 1004, Figs. 1–3).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

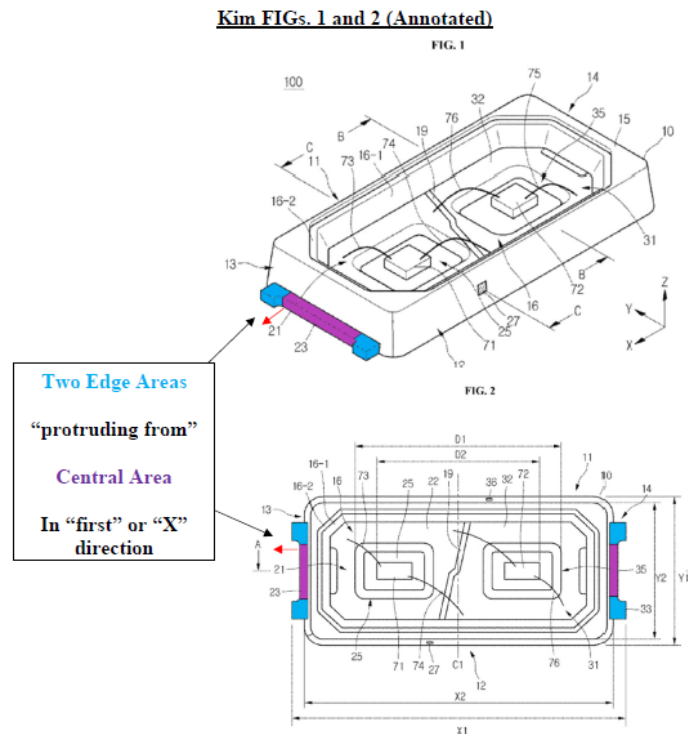
[Not Level]: wherein the at least one housing cross section is not level with the electrode portion cross section,

Petitioner reproduces the same annotated versions of Kim’s Figures 1 and 2 that are shown above for the not level limitation of claim 1. Pet. 72–73. Petitioner relies on its contentions for the not level limitation for claim 1. *Id.*

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

[Edge Areas Protrude]: wherein the at least one edge area comprises two edge areas, wherein the two edge areas protrude from the central area in the first direction.

Petitioner provides the following annotated versions of Kim’s Figures 1 and 2:



Pet. 74. Figure 1 is a perspective view of a light emitting device and Figure 2 is a plan view of the light emitting device. Ex. 1004 ¶¶ 19–20. In each figure, Petitioner shades 23 purple in the center and blue on each end. Pet. 69. Petitioner adds a black rectangular box with the text “Two Edge Areas,” “protruding from,” “Central Area,” and “In the ‘first’ or ‘X’ direction” with two black arrows pointing to element 23 in each of Figures 1 and 2, and a red arrow in each of Figures 1 and 2 pointing in the X direction. *Id.*

Petitioner contends that Kim discloses this limitation because “two respective areas of first/second lead parts 23, 33 . . . each protrude in the ‘x direction’ from the respective central areas of first/second lead parts 23, 33, as shown in FIG. 1 & 2.” Pet. 73–74 (citing Ex. 1003 §§ 9.1.9.11–9.1.9.12; Ex. 1004, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kim discloses this limitation.

Summary of Claim 11

For all the foregoing reasons, we determine that Petitioner establishes a reasonable likelihood that claim 11 is anticipated by Kim.

3. Claims 2, 5–10, 12–16, and 20–22

These claims depend directly or indirectly from either claim 1 or claim 11. Ex. 1001, 14:15–17, 14:26–42, 14:63–15:8, 15:19–28. Petitioner sets forth evidence and argument as to why Kim allegedly anticipates claims 2, 5–10, 12–16, and 20–22. Pet. 59–66, 75–82.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner establishes a reasonable likelihood that Kim anticipates these dependent claims.

E. Ground 2: Alleged Anticipation of Claims 1, 5–14, 16, and 20–22 by Kobayakawa

Petitioner contends claims 1, 5–14, 16, and 20–22 are anticipated by Kobayakawa. Pet. 82–107. Petitioner supports its contentions with the Declaration of Dr. Lebby. Ex. 1003.

We begin with a brief summary of Kobayakawa, and then address Petitioner’s contentions.

1. Kobayakawa (Ex. 1005)

Kobayakawa is titled “Semiconductor Light-Emitting Device.” Ex. 1005, code (54). Kobayakawa is directed to “a semiconductor light-emitting device that is compact and capable of emitting bright light.” *Id.* at 1:49–50.

Figures 1–3 of Kobayakawa are reproduced below.

Fig.1

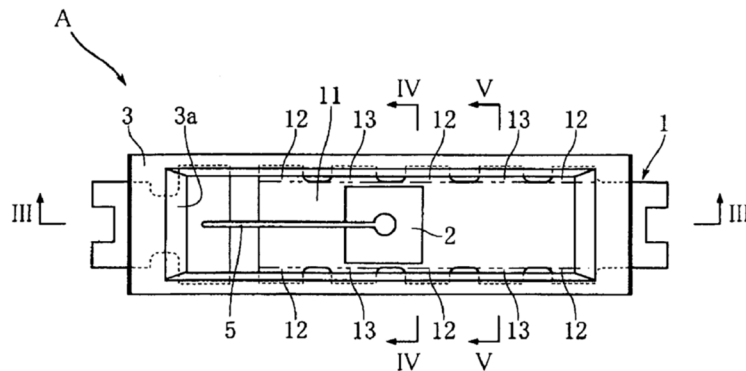


Fig.2

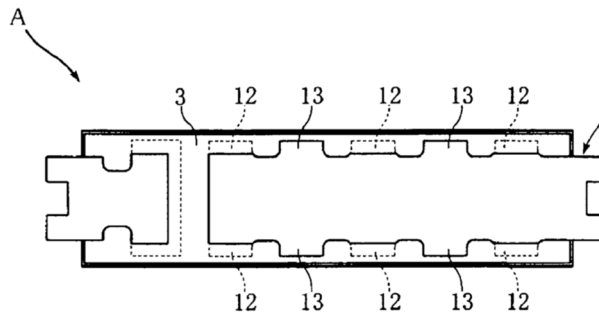
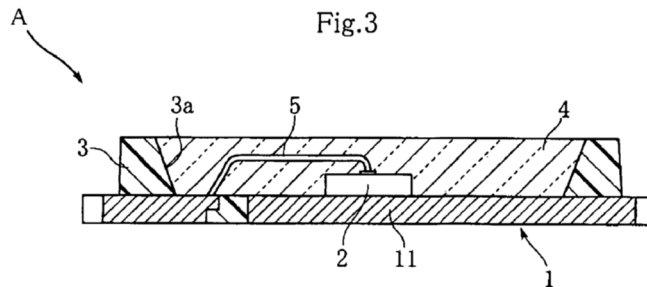


Fig.3



Figures 1–3 respectively show a plan view, a bottom view, and a sectional view (taken along line III-III of Figure 1) of a semiconductor light-emitting device. Ex. 1005, 2:10–15. As shown in these figures, “[t]he semiconductor light-emitting device A includes a lead frame 1, a light-emitting diode (LED) chip 2, a case 3, and a protection resin 4 that allows the passage of light emitted from the LED chip 2.” *Id.* at 2:31–34.

Referring to Figure 2, Kobayakawa describes that “the lead frame 1 is exposed out of the case 3 at its bottom surface, and is divided into a longer primary portion and a shorter secondary portion,” wherein “[t]he primary portion includes a bonding region 11, a plurality of thin extensions 12, and a plurality of thick extensions 13.” Ex. 1005, 2:40–44. According to Kobayakawa, “the thin extensions 12 and the thick extensions 13 are arranged to alternate with each other, and the bottom surfaces of the thick extensions 13 are exposed to the outside of the case 3” such that “the exposed area of the lead frame 1 can be increased.” *Id.* at 4:4–8.

Kobayakawa also describes that “[t]he case 3 is made of a white resin, for example, and is a generally rectangular frame.” Ex. 1005, 3:12–13. According to Kobayakawa, as shown in Figure 3, “the inner surfaces of the case 3 serve as a reflector 3a that tapers downward” and “upwardly reflects light which is emitted laterally from the LED chip 2.” *Id.* at 3:13–16.

According to Kobayakawa, “the case 3 is held in unreleasable engagement with the thin extensions 12,” such that “the lead frame 1 is reliably held by the case 3, to be prevented from dropping off from the case 3.” Ex. 1005, 3:27–30. Referring to Figure 2, Kobayakawa explains that since “the lead frame 1 is exposed out of the case 3 in a relatively large area . . . heat can be efficiently conducted from the LED chip 2 to a printed circuit board, for example, which contributes to attaining light emission of desired intensity.” *Id.* at 3:30–4:3.

Kobayakawa also describes that the protection resin 4, which covers the LED chip 2, “is made of a transparent or transparent epoxy resin, for example, filled in a space defined by the case 3.” Ex. 1005, 3:21–24.

2. *Claims 1 and 11*

Petitioner provides a limitation-by-limitation analysis of independent claims 1 and 11, mapping the prior art to the claim limitations. Pet. 82–92, 98–102.

With this background, we analyze Petitioner’s contentions.

Independent Claim 1

[Preamble]: A light emitting device comprising:

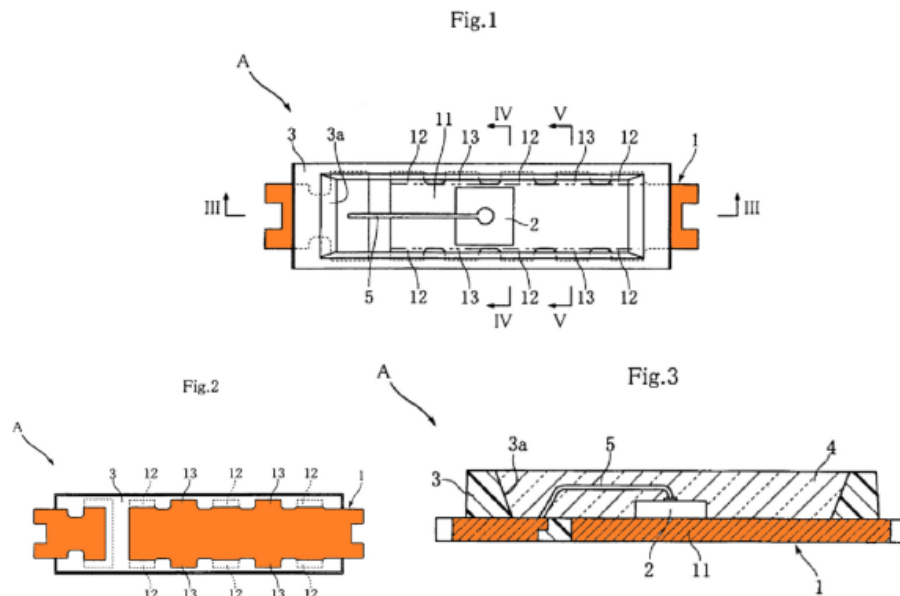
Petitioner contends that “Kobayakawa discloses a ‘light emitting device’ whether or not the preamble is a limitation.” Pet. 82–83 (citing Ex. 1003 § 9.2.1.1; Ex. 1005, 1:47–50, 2:37–38, Figs. 1–5).

We reviewed the evidence cited by Petitioner and, based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses the subject matter of the preamble regardless of whether the preamble is limiting.

[Electrode Portion]: at least one electrode portion; and

Petitioner provides the following annotated version of Kobayakawa’s Figures 1–3:

Kobayakawa FIGs. 1-3 (Annotated)



Pet. 83. Figure 1 is a plan view of Kobayakawa's light emitting device, Figure 2 is a bottom view of the device of Figure 1, and Figure 3 is a sectional view of the device of Figure 1 taken along lines III-III in Figure 1. Ex. 1005, 2:10–15. Petitioner annotates these figures by shading lead frame 1 in orange. Pet. 83.

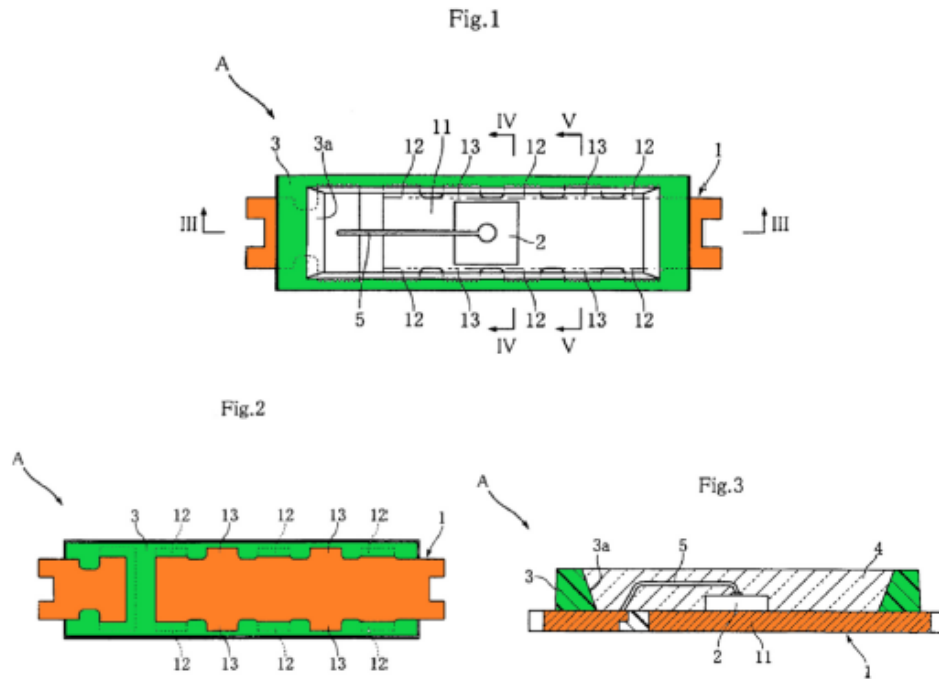
Petitioner contends that lead frame 1 corresponds to the “at least one electrode portion” recited in claim 1. Pet. 83 (citing Ex. 1003 § 9.1.1.2; Ex. 1005, 2:39–46, 3:9–10, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Resin Housing]: a resin housing containing a reflecting material and covering a portion of said at least one electrode portion,

Petitioner provides the following annotated version of Kobayakawa's Figures 1–3:

Kobayakawa FIGs. 1-3 (Annotated)



Pet. 85. Figure 1 is a plan view of Kobayakawa's light emitting device, Figure 2 is a bottom view of the device of Figure 1, and Figure 3 is a sectional view of the device of Figure 1 taken along lines III-III in Figure 1. Ex. 1005, 2:10–15. Petitioner annotates these figures by shading lead frame 1 in orange and case 3 in green. Pet. 85.

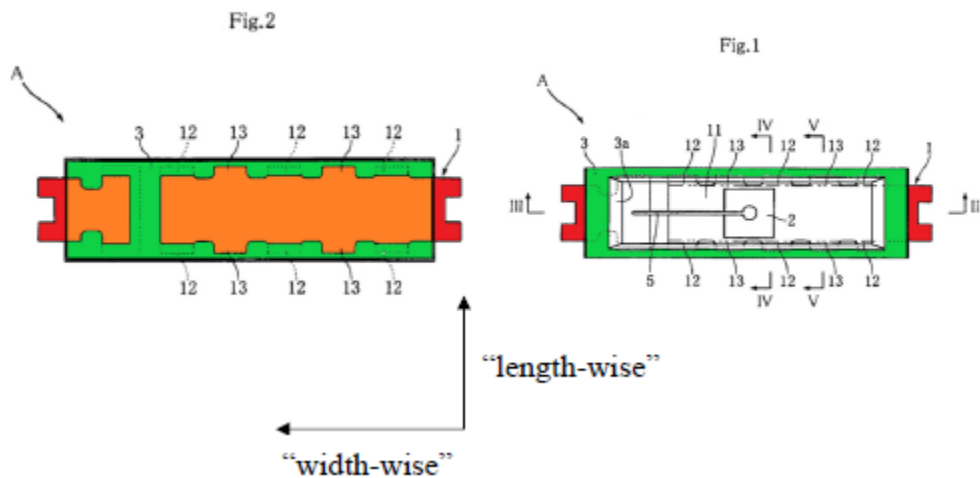
Petitioner contends that Kobayakawa's case 3 corresponds to the recited resin housing. Pet. 84. (citing Ex. 1003 § 9.2.1.3; Ex. 1005, 2:40–41, 3:21–29). According to Petitioner, case 3 “is ‘made of a white resin’ . . . such that ‘[t]he inner surfaces of the case 3 serve as a reflector [3a] that tapers downward. The reflector 3 upwardly reflects light which is emitted laterally from the LED chip.’” *Id.* (citing Ex. 1005, 3:21–29). Petitioner further contends that Figure 3 illustrates that case 3 “covers a portion of lead frame 1 (*e.g.*, a portion of the claimed electrode).” *Id.*

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Wing Portion]: wherein said at least one electrode portion comprises a wing portion which is exposed outside the housing, the wing portion extending in a length-wise direction of the wing portion along an edge of the housing and protruding from the housing in a width-wise direction of the wing portion, the length-wise direction being substantially perpendicular to the width-wise direction,

Petitioner provides the following annotated version of Kobayakawa's Figures 1 and 2:

Kobayakawa FIGs. 1 and 2 (Annotated)



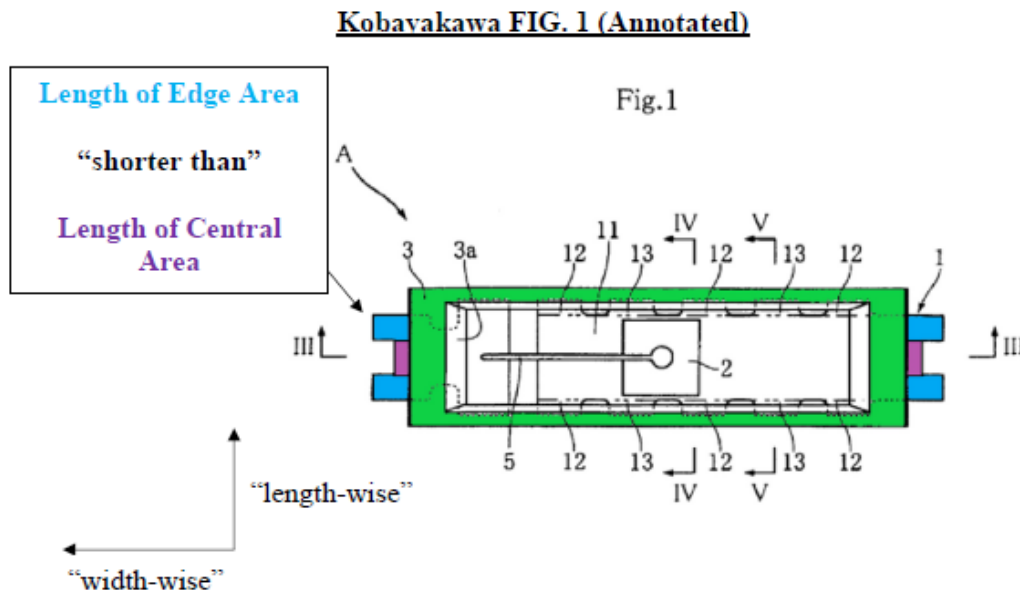
Pet. 86. Figure 1 is a plan view of Kobayakawa's light emitting device and Figure 2 is a bottom view of the device of Figure 1. Ex. 1005, 2:10–15. Petitioner annotates these figures by shading lead frame 1 in orange, case 3 in green, and the asserted wing portions in red. Pet. 86. Petitioner adds two black arrows at the bottom which intersect each other at a 90-degree angle with the horizontal line labeled "width-wise" and the vertical line labeled "length-wise." *Id.*

Petitioner contends that “Kobayakawa discloses that ‘the lead frame 1 is exposed out of the case 3’ . . . which corresponds to ‘a wing portion which is exposed outside of the resin housing.’” Pet. 85–86 (citing Ex. 1005, 2:40–41). According to Petitioner “the exposed portion of lead frame 1 extends in a length-wise direction along the edge of case 3 and protrudes from case in a width-wise direction that is substantially perpendicular to the length-wise direction.” *Id.* at 86 (citing Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Central Area and Edge Area]: wherein the wing portion comprises: a central area; and at least one edge area having a length in the length-wise direction shorter than that of the central area, and

Petitioner provides the following annotated version of Kobayakawa’s Figure 1:



Pet. 87. Figure 1 is a plan view of Kobayakawa’s light emitting device. Ex. 1005, 2:10–15. Petitioner annotates this figure by shading case 3 in

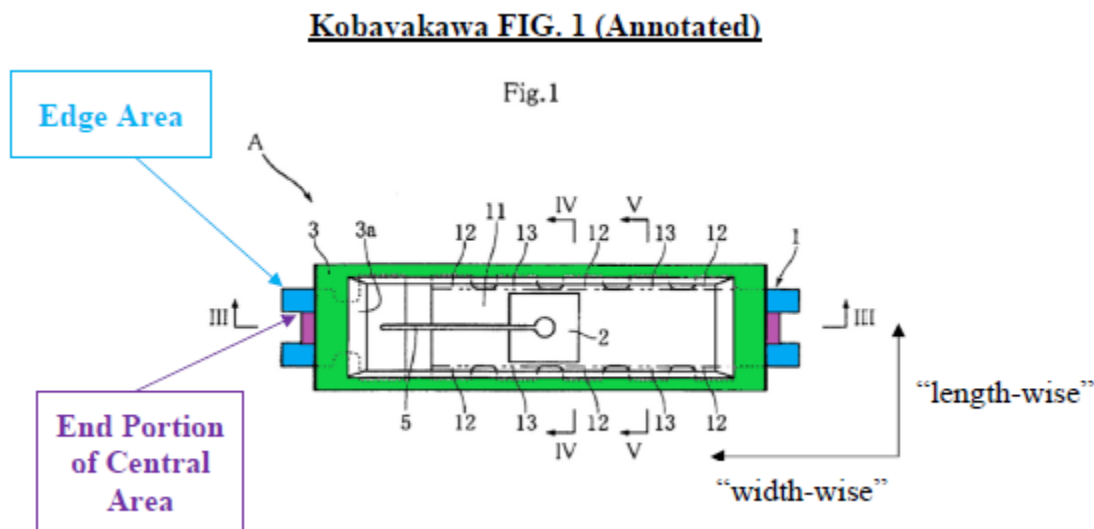
green, the asserted edge area of lead frame 1 in blue, and the asserted central area of lead frame 1 in purple. Pet. 87. Petitioner adds a black rectangular box on the left with the text “Length of Edge Area,” “shorter than,” and “Length of Central Area” with a black arrow pointing to the asserted edge area, and two black arrows at the bottom which intersect each other at a 90-degree angle with the horizontal line labeled “width-wise” and the vertical line labeled “length-wise.” *Id.*

Petitioner contends that the annotated version of Kobayakawa’s Figure 1 shows that “lead frame 1 . . . has a ‘central area’ and ‘at least one edge area having a length in the length-wise direction shorter than that of the central area.’” Pet. 86 (citing Ex. 1003 § 9.2.1.5; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Edge Area Protrudes]: wherein the at least one edge area protrudes in the width-wise direction from an end portion of the central area,

Petitioner provides the following annotated version of Kobayakawa’s Figure 1:



Pet. 88. Figure 1 is a plan view of Kobayakawa's light emitting device. Ex. 1005, 2:10–15. Petitioner annotates this figure by shading case 3 in green, the asserted edge area of lead frame 1 in blue, and the asserted central area of lead frame 1 in purple. Pet. 88. Petitioner adds a blue rectangular box on the upper left with the text “Edge Area” and a blue arrow pointing to the asserted edge area, a purple rectangular box on the lower left with the text “End Portion of Central Area” and a purple arrow pointing the intersection of the asserted edge area and central portion, and two black arrows at the bottom right which intersect each other at a 90-degree angle with the horizontal line labeled “width-wise” and the vertical line labeled “length-wise.” *Id.*

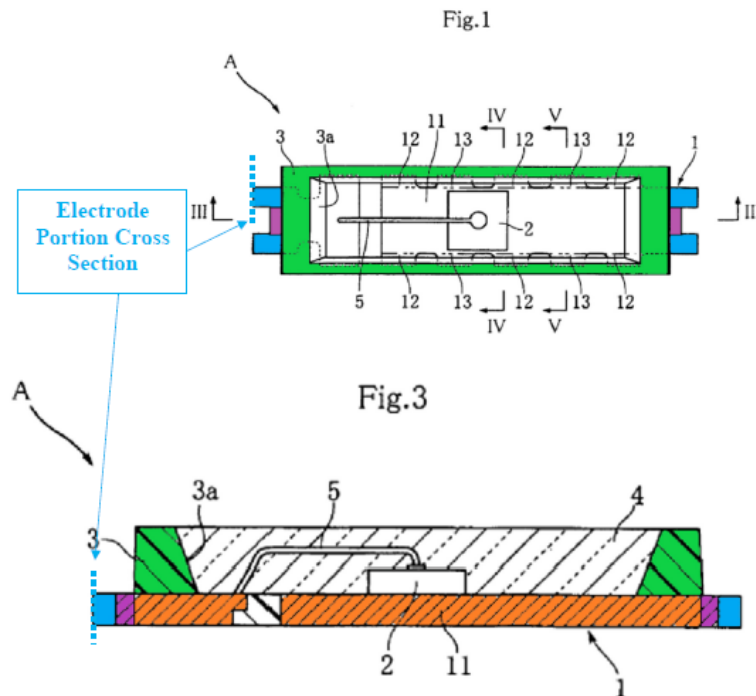
Petitioner contends that this annotated version of Figure 1 shows that “lead frame 1 . . . has an ‘at least one edge area [that] protrudes in the width-wise direction from an end portion of the central area.’” Pet. 87 (citing Ex. 1003 § 9.2.1.6; Ex. 1005, Figs. 1, 2) (second alteration in original).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Electrode Portion Cross Section]: wherein the at least one electrode portion further comprises an electrode portion cross section,

Petitioner provides the following annotated version of Kobayakawa's Figures 1 and 3:

Kobayakawa FIGs. 1 and 3 (Annotated)



Pet. 89. Figure 1 is a plan view of Kobayakawa's light emitting device and Figure 3 is a sectional view of the device of Figure 1 taken along lines III-III in Figure 1. Ex. 1005, 2:10–15. Petitioner annotates these figures by shading case 3 in green, lead frame 1 in orange, the asserted edge area of lead frame 1 in blue, and the asserted central area of lead frame 1 in purple. Pet. 89. Petitioner adds a blue rectangular box on the left with the text "Electrode Portion Cross Section" and blue arrows pointing to the asserted electrode portion cross section. *Id.*

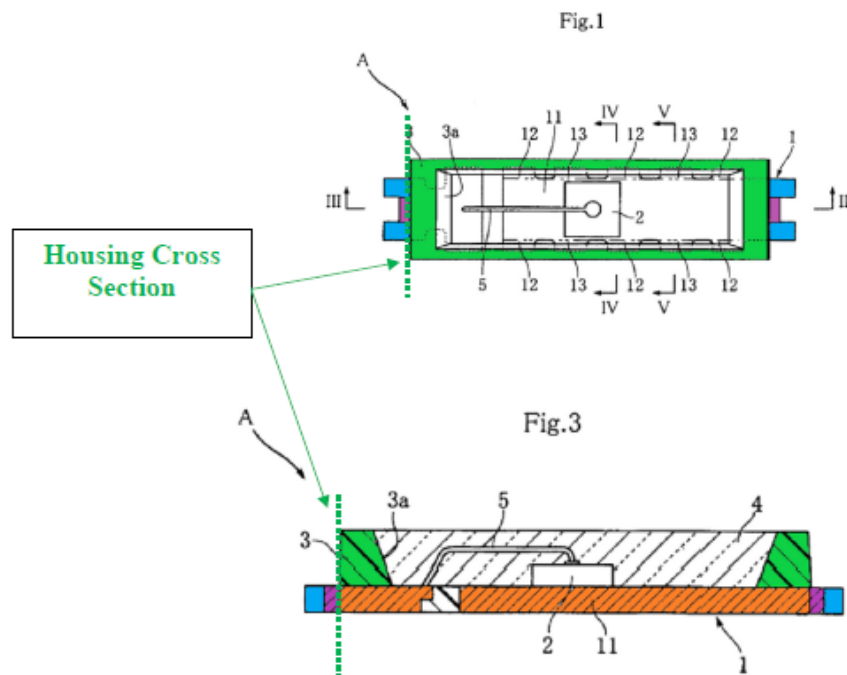
Petitioner contends that these annotated figures show a "cross-section on the edge of lead frame 1." Pet. 88 (citing Ex. 1003 § 9.2.1.7; Ex. 1005, Figs. 1, 2). Petitioner notes that "[a]lthough one electrode cross-section is drawn below, it will be appreciated that many cross-sections can be drawn through the electrode." *Id.*

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Housing Cross Section]: wherein the resin housing comprises at least one housing cross section,

Petitioner provides the following annotated version of Kobayakawa's Figures 1 and 3:

Kobayakawa FIGs. 1 and 3 (Annotated)



Pet. 90. Figure 1 is a plan view of Kobayakawa's light emitting device and Figure 3 is a sectional view of the device of Figure 1 taken along lines III-III in Figure 1. Ex. 1005, 2:10–15. Petitioner annotates these figures by shading case 3 in green, lead frame 1 in orange, the asserted edge area of lead frame 1 in blue, and the asserted central area of lead frame 1 in purple. Pet. 90. Petitioner adds a black rectangular box on the left with the text "Housing Cross Section" and green arrows pointing to the asserted housing cross section. *Id.*

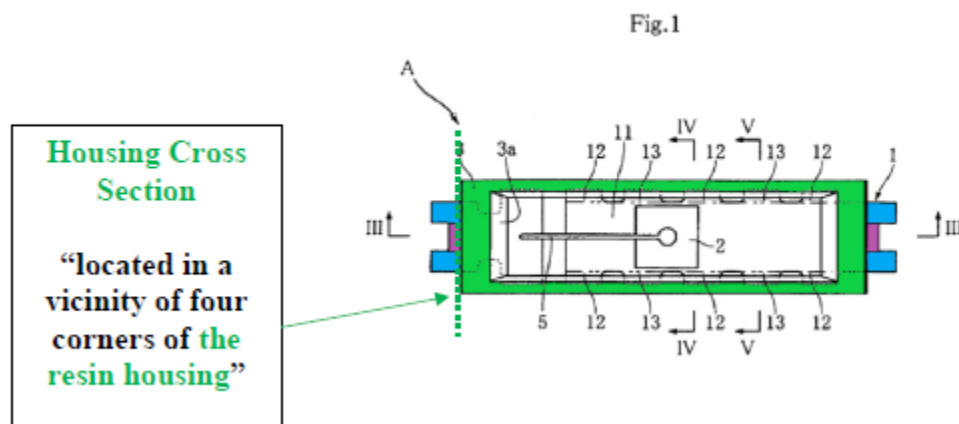
Petitioner contends that “a cross-section on the edge of case 3 as shown in Fig. 1” corresponds to the recited housing cross section. Pet. 89 (citing Ex. 1003 § 9.2.1.8; Ex. 1005, Figs. 1, 2). Petitioner notes that “[a]lthough one housing cross-section is drawn below, it will be appreciated that many cross-sections can be drawn through the housing.” *Id.* at 89–90.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Four Corners]: wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing, and

Petitioner provides the following annotated version of Kobayakawa's Figure 1:

Kobayakawa FIG. 1 (Annotated)



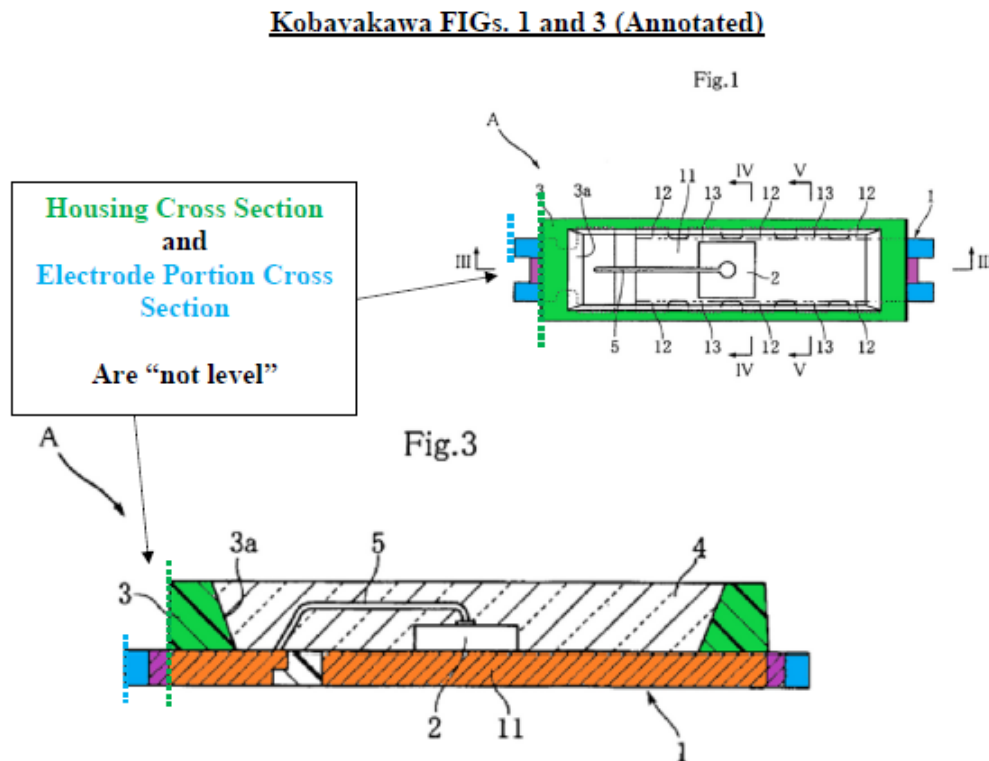
Pet. 91. Figure 1 is a plan view of Kobayakawa's light emitting device. Ex. 1005, 2:10–15. Petitioner annotates this figure by shading case 3 in green, the asserted edge area of lead frame 1 in blue, and the asserted central area of lead frame 1 in purple. Pet. 91. Petitioner adds a black rectangular box on the left with the text “Housing Cross Section” and “located in a vicinity of four corners of the resin housing” and a green arrow pointing to the asserted housing cross section. *Id.*

Petitioner contends that Kobayakawa's "cross-section on the edge of case 3" discloses this limitation. Pet. 90 (citing Ex. 1003 § 9.2.1.9, Ex. 1005, Fig. 1, 2). Petitioner notes that "many cross sections can be drawn through the housing all [of] which are in the vicinity of the four corners of the resin housing." *Id.* at 90–91.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Not Level]: wherein the at least one housing cross section is not level with the electrode portion cross section.

Petitioner provides the following annotated version of Kobayakawa's Figures 1 and 3:



Pet. 92. Figure 1 is a plan view of Kobayakawa's light emitting device and Figure 3 is a sectional view of the device of Figure 1 taken along lines III-III in Figure 1. Ex. 1005, 2:10–15. Petitioner annotates these figures by

shading case 3 in green, lead frame 1 in orange, the asserted edge area of lead frame 1 in blue, and the asserted central area of lead frame 1 in purple. Pet. 92. Petitioner adds a black rectangular box on the left with the text “Housing Cross Section and Electrode Portion Cross Section” and “Are ‘not level’” and black arrows pointing to the asserted housing cross section and electrode portion cross section. *Id.*

Petitioner contends that these annotated figures show that “[t]he housing cross-section is on case 3 and is not in line with or level with the electrode portion cross section on lead frame 1.” Pet. 91 (citing Ex. 1003 § 9.2.1.10; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa⁹ discloses this limitation.

Summary of Claim 1

For all the foregoing reasons, Petitioner establishes a reasonable likelihood that claim 1 is anticipated by Kobayakawa.

Independent Claim 11

For the preamble, the electrode portion limitation, and the resin housing limitation, Petitioner relies on its contentions discussed above for claim 1. Pet. 98.

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently

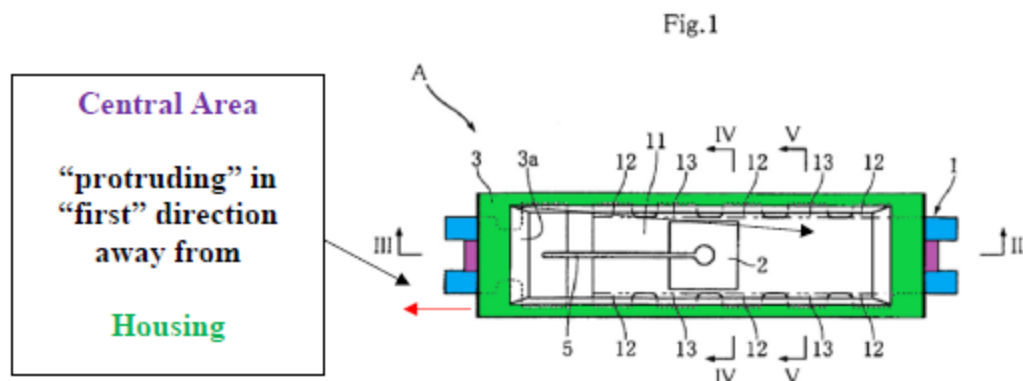
⁹ Similar to the Kim anticipation ground, we preliminarily find that Kobayakawa’s housing cross section and electrode portion cross section do not form a flat surface with each other.

establishes that Kobayakawa discloses the preamble, the electrode portion limitation, and the resin housing limitation of claim 11.

[Central Area]: wherein the wing portion comprises: a central area protruding from the housing in a first direction away from the housing; and

Petitioner provides the following annotated version of Kobayakawa's Figure 1:

Kobayakawa FIG. 1 (Annotated)



Pet. 99. Figure 1 is a plan view of Kobayakawa's light emitting device. Ex. 1005, 2:10–15. Petitioner annotates this figure by shading case 3 in green, the asserted edge area of lead frame 1 in blue, the asserted central area of lead frame 1 in purple, and adding a red horizontal arrow to the bottom of housing pointing to the left. Pet. 99. Petitioner adds a black rectangular box on the left with the text “Central Area,” ““protruding’ in ‘first’ direction away from,” and “Housing.” *Id.*

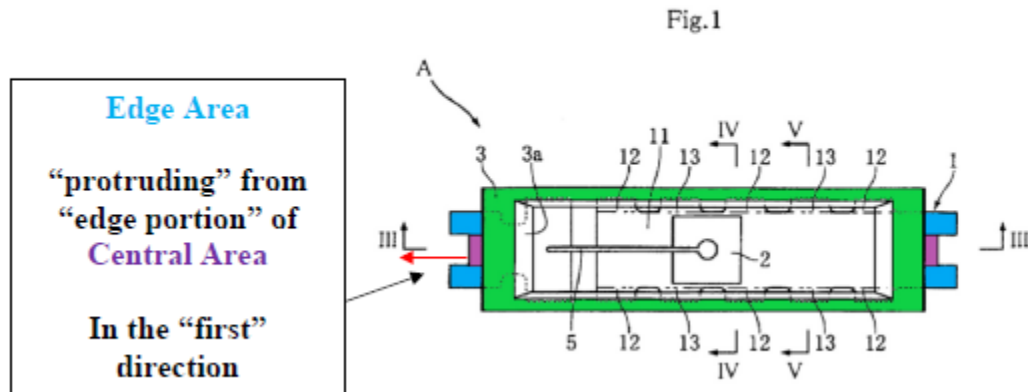
Petitioner contends that “the central area of ‘the lead frame 1,’ which is exposed out of the case 3,” corresponds to this limitation. Pet. 98 (citing Ex. 1003 § 9.2.8.4; Ex. 1005, 2:40–41, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Edge Area]: at least one edge area protruding from an edge portion of the central area, in the first direction,

Petitioner provides the following annotated version of Kobayakawa's Figure 1:

Kobayakawa FIG. 1 (Annotated)



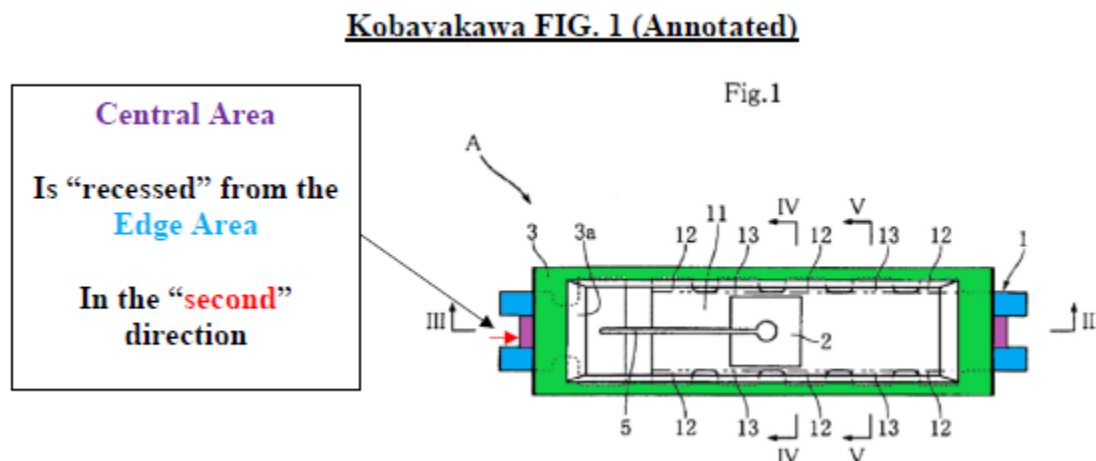
Pet. 99. Figure 1 is a plan view of Kobayakawa's light emitting device. Ex. 1005, 2:10–15. Petitioner annotates this figure by shading case 3 in green, the asserted edge area of lead frame 1 in blue, the asserted central area of lead frame 1 in purple, and adding a red horizontal arrow to the bottom of the housing pointing to the left. Pet. 99. Petitioner adds a black rectangular box on the left with the text “Edge Area,” ““protruding’ from ‘edge portion’ of Central Area,” and “In the ‘first’ direction.” *Id.*

Petitioner contends that this annotated Figure 1 discloses the recited “at least one edge area protruding from an edge portion of the central area in the first direction.” Pet. 99 (citing Ex. 1003 § 9.2.8.5; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Recessed]: wherein the central area is recessed from the at least one edge area in a second direction opposite from the first direction toward the housing,

Petitioner provides the following annotated version of Kobayakawa's Figure 1:



Pet. 100. Figure 1 is a plan view of Kobayakawa's light emitting device. Ex. 1005, 2:10–15. Petitioner annotates this figure by shading case 3 in green, the asserted edge area of lead frame 1 in blue, the asserted central area of lead frame 1 in purple, and adding a red horizontal arrow to the bottom of housing pointing to the right. Pet. 100. Petitioner adds a black rectangular box on the left with the text “Central Area,” “Is ‘recessed’ from Edge Area,” and “In the ‘second’ direction.” *Id.*

Petitioner contends that “the recessed central area of exposed lead frame 1 relative to the edge areas of exposed lead frame” corresponds to this limitation. Pet. 100 (citing Ex. 1003 § 9.2.8.6; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Electrode Portion Cross Section]: wherein the at least one electrode portion further comprises an electrode portion cross section,

Petitioner, relying on its contentions for the similar limitation in claim 1, contends that the “cross-section on the edge of lead frame 1 as shown in FIG. 1” corresponds to this limitation. Pet. 100 (citing Ex. 1003 § 9.2.8.7; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Housing Cross Section]: wherein the resin housing comprises at least one housing cross section,

Petitioner, relying on its contentions for the similar limitation in claim 1, contends that the “cross-section on the edge of case 3 as shown in FIG. 1” corresponds to this limitation. Pet. 101 (citing Ex. 1003 § 9.2.8.8; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Housing Corner]: wherein the at least one housing cross section is located in a vicinity of a corner of the resin housing, and

Petitioner, relying on its contentions for the similar limitation in claim 1, contends that the “cross-section on the edge of case 3 as shown in FIG. 1” corresponds to this limitation. Pet. 101 (citing Ex. 1003 § 9.2.8.9; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

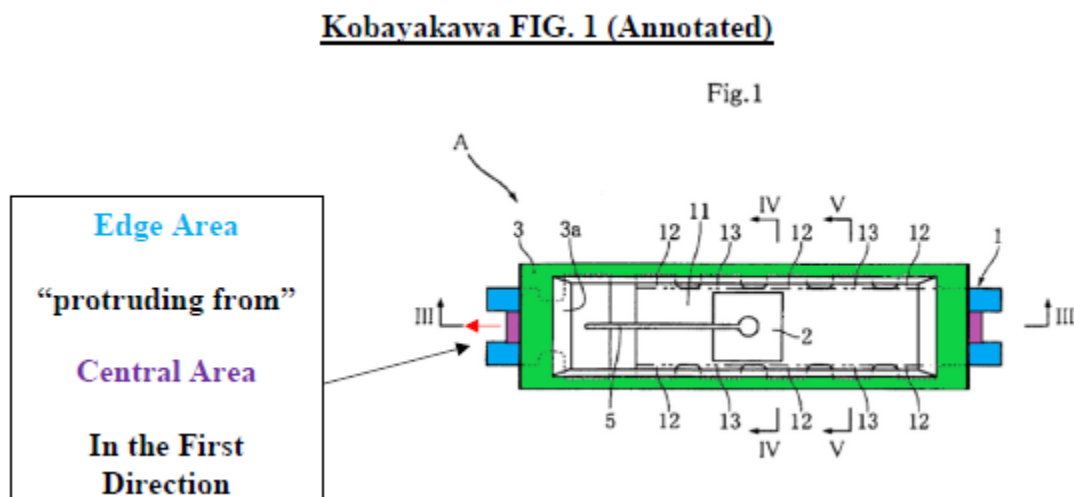
[Not Level]: wherein the at least one housing cross section is not level with the electrode portion cross section,

Petitioner, relying on its contentions for the similar limitation in claim 1, contends that the “housing cross-section is on case 3 and is not in line with or level with the electrode portion cross section on lead frame 1.” Pet. 101 (citing Ex. 1003 § 9.2.8.10; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

[Edge Areas Protrude]: wherein the at least one edge area comprises two edge areas, wherein the two edge areas protrude from the central area in the first direction.

Petitioner provides the following annotated version of Kobayakawa’s Figure 1:



Pet. 102. Figure 1 is a plan view of Kobayakawa’s light emitting device. Ex. 1005, 2:10–15. Petitioner annotates this figure by shading case 3 in green, the asserted edge area of lead frame 1 in blue, the asserted central area of lead frame 1 in purple, and adding a red horizontal arrow to the bottom of housing pointing to the left. Pet. 102. Petitioner adds a black

rectangular box on the left with the text “Edge Area,” “protruding from,” “Central Area,” and “In the First direction.” *Id.*

Petitioner contends that “the multiple edge portions of lead frame 1 that protrude from the central area of lead frame 1” correspond to this limitation. Pet. 102 (citing Ex. 1003 §§ 9.2.8.11–9.2.8.12; Ex. 1005, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Kobayakawa discloses this limitation.

Summary of Claim 11

For all the foregoing reasons, we determine that Petitioner establishes a reasonable likelihood that claim 11 is anticipated by Kobayakawa.

3. Claims 5–10, 12–14, 16, and 20–22

These claims depend directly or indirectly from either claim 1 or claim 11. Ex. 1001, 14:26–42, 14:63–15:2, 15:6–8, 15:19–28. Petitioner sets forth evidence and argument as to why Kobayakawa allegedly anticipates claims 5–10, 12–14, 16, and 20–22. Pet. 92–98, 102–107.

We reviewed Petitioner’s evidence and arguments and determine that Petitioner establishes a reasonable likelihood that these dependent claims are anticipated by Kobayakawa.

F. Ground 3: Alleged Anticipation of Claims 1, 2, 5–16, and 20–22 by Hayashi

Petitioner contends that claims 1, 2, 5–16, and 20–22 are anticipated by Hayashi. Pet. 107–133. Petitioner supports its contentions with the Declaration of Dr. Lebby. Ex. 1003.

We begin with a brief summary of Hayashi, and then address Petitioner’s contentions.

1. Hayashi (Ex. 1006)

Hayashi is titled “Light Emitting Device Package and Light Emitting Device.” Ex. 1006, code (54). Hayashi discloses a light emitting device package “provided with two lead-frames lined-up in the lengthwise direction and molded resin formed as a single unit with the two lead-frames,” and a light emitting device comprising “the light emitting device package; and a light emitting element mounted on the upper surface of at least one of the two lead-frames.” *Id.* ¶¶ 6–7.

Figures 2A, 2B, 1A, and 1B of Hayashi are reproduced below.

FIG. 2A

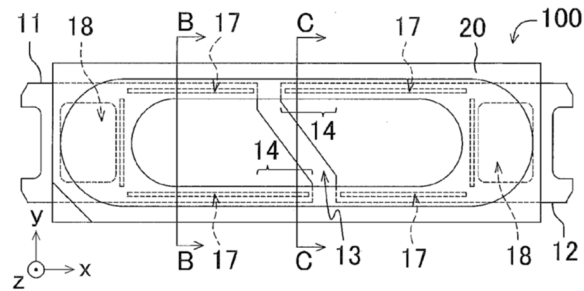


FIG. 2B

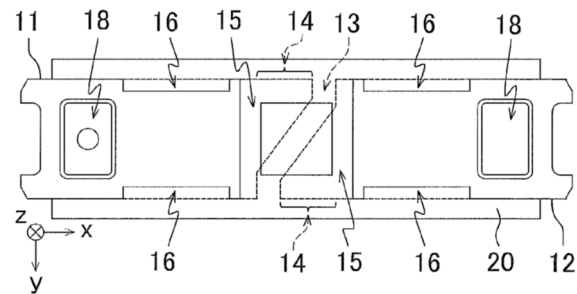


FIG. 1A

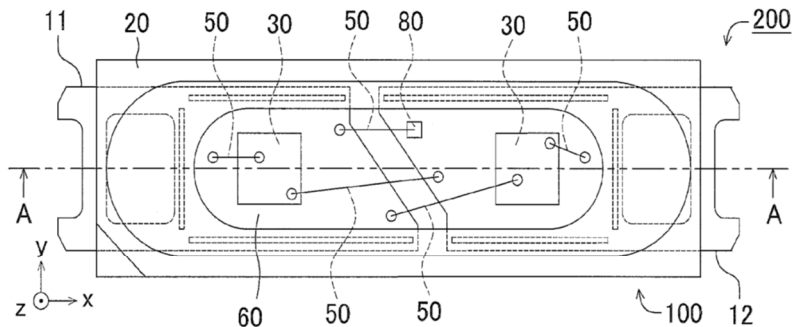
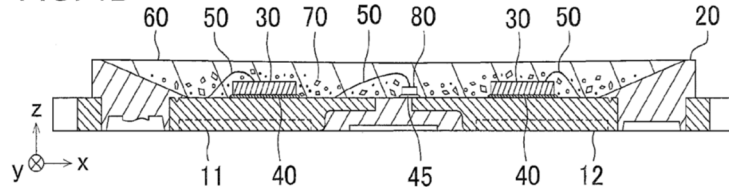


FIG. 1B



Figures 2A and 2B show top and bottom views of a light emitting device package. Ex. 1006 ¶ 20. Figure 1A shows a top view of a light emitting device, and Figure 1B shows a cross-section view showing cross-section through line A-A in Figure 1A. *Id.* As shown in Figures 2A and 2B, the

light emitting device package 100 is “provided with two lead-frames 11, 12, and molded resin 20 formed as a single unit with the two lead-frames.”

Id. ¶ 23. As shown in Figures 1A and 1B, the light emitting device 200 is configured with light emitting elements 30 mounted in the light emitting device package 100 and enclosed by encapsulating material 60. *Id.* ¶ 21. According to Hayashi, “[t]he gap region 13 that separates the two lead-frames 11, 12 is embedded in the molded resin 20 and is maintained by the single unit structure of the molded resin 20 as an electrical isolation region.” *Id.* ¶ 23.

Referring to Figures 1A and 1B, Hayashi describes that the two thin regions 16 in each lead-frame 11, 12 of the light emitting device 200 “are established extending in the lengthwise direction on both sides of the light emitting element 30,” such that “delamination of molded resin 20 near the light emitting element 30 can be suppressed allowing the side-walls of the molded resin 20 cavity to function stably as light-reflecting surfaces.”

Ex. 1006 ¶ 45. Hayashi further explains that “the lower surfaces of lead-frames 11, 12 that are positioned directly under the light emitting elements 30 are exposed outside the bottom of the molded resin 20,” thereby allowing “the exposed lead-frame regions to act as surface mounting areas of the light emitting device 200 and mak[ing] it easy to improve heat transfer from the light emitting elements 30.” *Id.*

2. *Claims 1 and 11*

Petitioner provides a limitation-by-limitation analysis of independent claims 1 and 11, mapping the prior art to the claim limitations. Pet. 107–117, 122–128.

With this background, we analyze Petitioner’s contentions.

Independent Claim 1

[Preamble]: A light emitting device comprising:

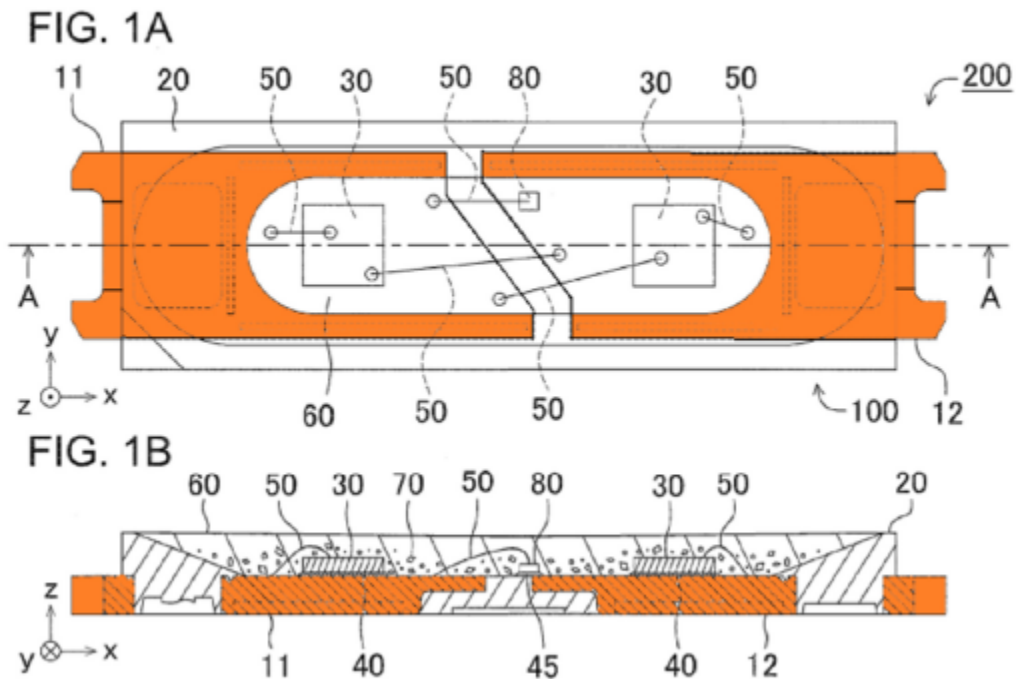
Petitioner contends that “Hayashi discloses a ‘light emitting device’ whether or not the preamble is a limitation.” Pet. 107 (citing Ex. 1003 § 9.3.1.1; Ex. 1006 ¶¶ 6, 8–14, Figs. 1A, 1B, 2A–2D).

We reviewed the evidence cited by Petitioner and, based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses the subject matter of the preamble regardless of whether the preamble is limiting.

[Electrode Portion]: at least one electrode portion; and

Petitioner provides the following annotated versions of Hayashi’s Figures 1A and 1B:

Hayashi FIGs. 1A and 1B (Annotated)



Pet. 108. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange. Pet. 108.

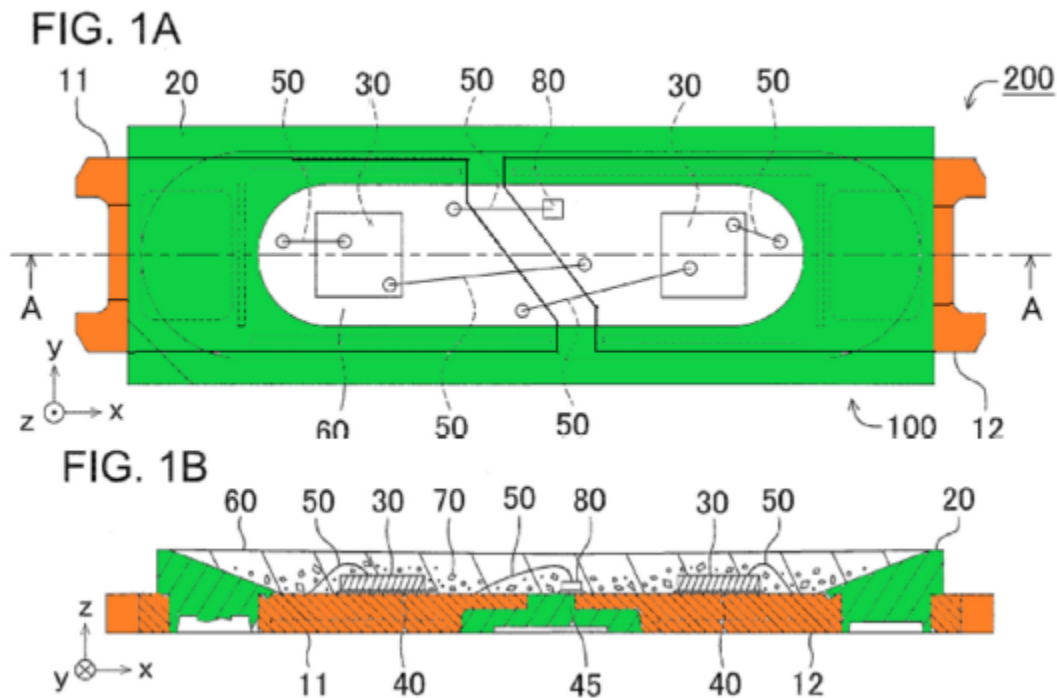
Petitioner contends that Hayashi’s lead frames 11, 12 “conduct electricity and can be connected with the light emitting elements” and correspond to the recited “at least one electrode portion.” Pet. 107 (citing Ex. 1003 § 9.3.1.2; Ex. 1006 ¶¶ 47–48, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Resin Housing]: a resin housing containing a reflecting material and covering a portion of said at least one electrode portion,

Petitioner provides the following annotated version of Hayashi’s Figures 1A and 1B:

Hayashi FIGs. 1A and 1B (Annotated)



Pet. 109. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange and molded resin 20 in green. Pet. 109.

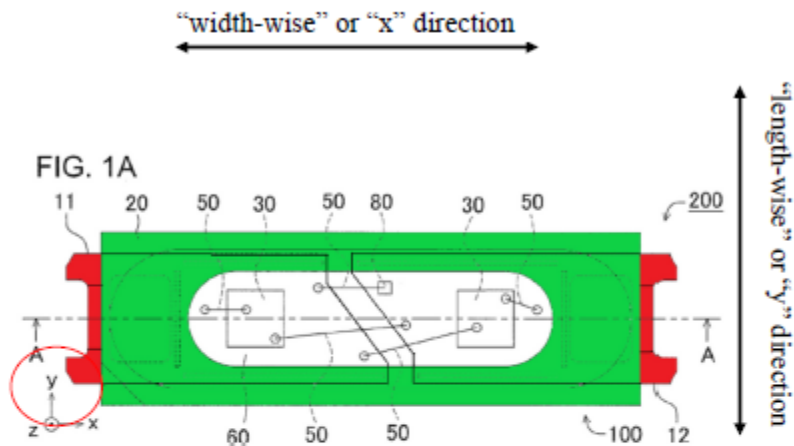
Petitioner contends that Hayashi’s molded resin 20 “covers part (or all) of both sides (lateral surfaces) of the lead frames 11, 12” and covers “part of the lead frames 11, 12.” Pet. 108 (citing Ex. 1006 ¶ 25, Figs. 1A, 1B). Petitioner further contends that the “molded resin 20 is shaped to reflect light emitted by the LED outward (e.g., up) from the LED package.” *Id.* at 109 (citing Ex. 1006 ¶ 45). Petitioner argues that Hayashi discloses a number of materials can be used in the resin including zinc oxide and that the ’742 patent “describes zinc oxide as a reflective material.” *Id.* at 109–10 (citing Ex. 1001, 4:65–5:4; Ex. 1006 ¶ 50).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

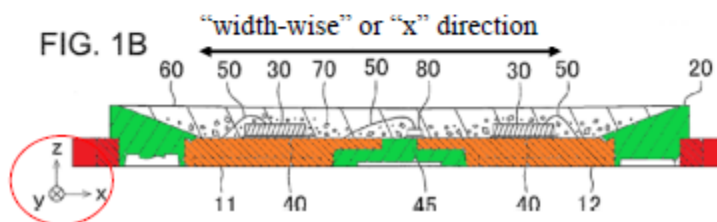
[Wing Portion]: wherein said at least one electrode portion comprises a wing portion which is exposed outside the housing, the wing portion extending in a length-wise direction of the wing portion along an edge of the housing and protruding from the housing in a width-wise direction of the wing portion, the length-wise direction being substantially perpendicular to the width-wise direction,

Petitioner provides the following annotated version of Hayashi's Figures 1A and 1B:

Hayashi FIGs. 1A (Annotated)



Hayashi FIGs. 1B (Annotated)



Pet. 111. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange, molded resin 20 in green, and the asserted wing portions in red. Pet. 111. Petitioner adds a black double pointed vertical arrow to the right of Figure 1A with the text “‘length-wise’ or ‘y’ direction” and a black double pointed horizontal arrow over each of Figures 1A and 1B with the text “‘width-wise’ or ‘x’ direction.”” *Id.*

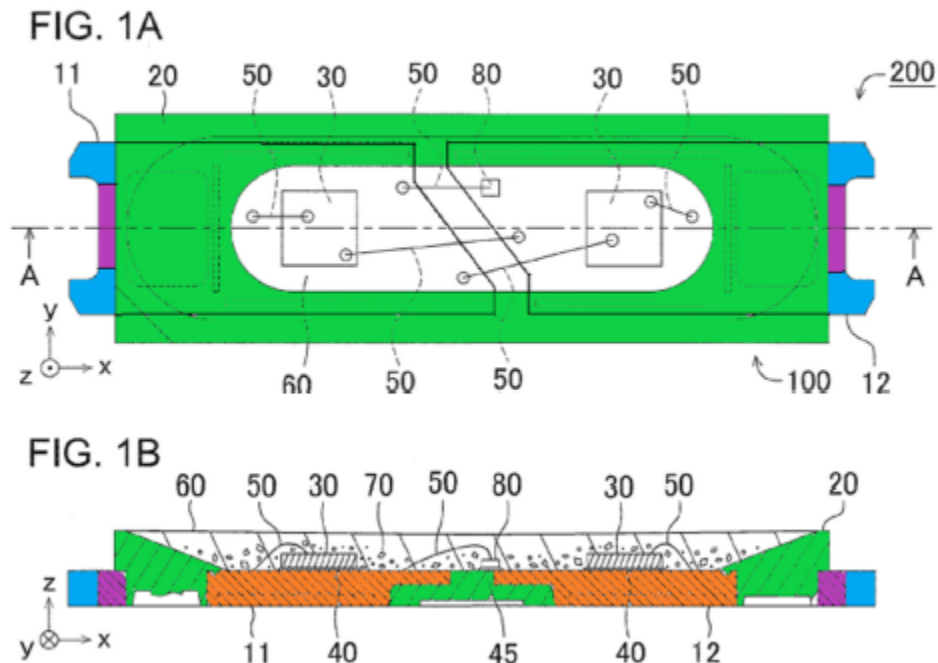
Petitioner contends that “lead frame portions 11, 12 each correspond to the claimed ‘wing portion’ as [they] are exposed outside molded resin 20 an[d] extend along the edge . . . of the molded resin 20 (i.e., the ‘y direction’) and protrude from the molded resin in a direction substantially perpendicular to the edge of molded resin 20 (i.e., the ‘x’ direction).” Pet. 110 (citing Ex. 1003 § 9.3.1.4; Ex. 1006 ¶¶ 22–24, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Central Area and Edge Area]: wherein the wing portion comprises: a central area; and at least one edge area having a length in the length-wise direction shorter than that of the central area, and

Petitioner provides the following annotated versions of Hayashi’s Figures 1A and 1B:

Hayashi FIGs. 1A and 1B (Annotated)



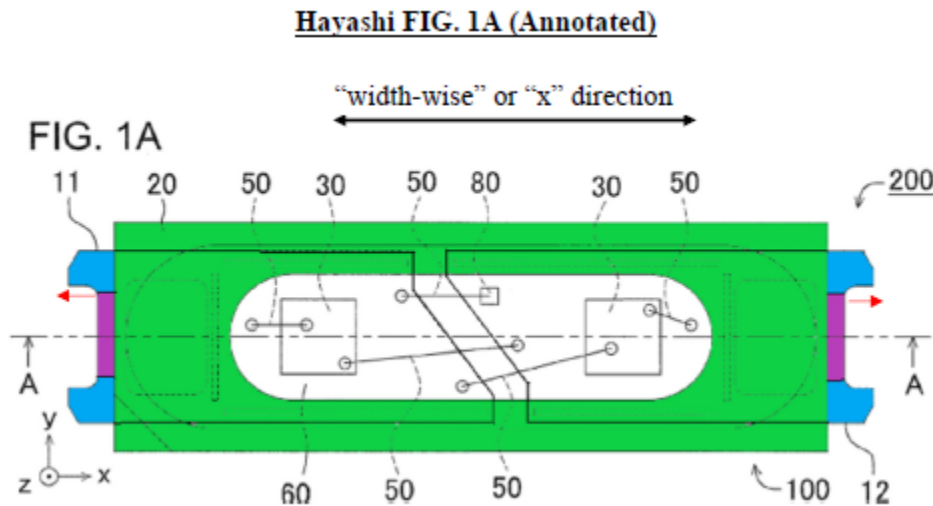
Pet. 112. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange, molded resin 20 in green, the central area of the asserted wing portions in purple, and the edge portions of the asserted wing portions in blue. Pet. 112.

Petitioner contends that these annotated figures illustrate that lead frames 11, 12 “each have a wing portion having a ‘central area’ and ‘at least one edge area having a length in the length-wise direction,’ . . . ‘shorter than that of the central area.’” Pet. 111–12 (citing Ex. 1003 § 9.3.1.5; Ex. 1006, Fig. 1A).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Edge Area Protrudes]: wherein the at least one edge area protrudes in the width-wise direction from an end portion of the central area,

Petitioner provides the following annotated version of Hayashi's Figure 1A:



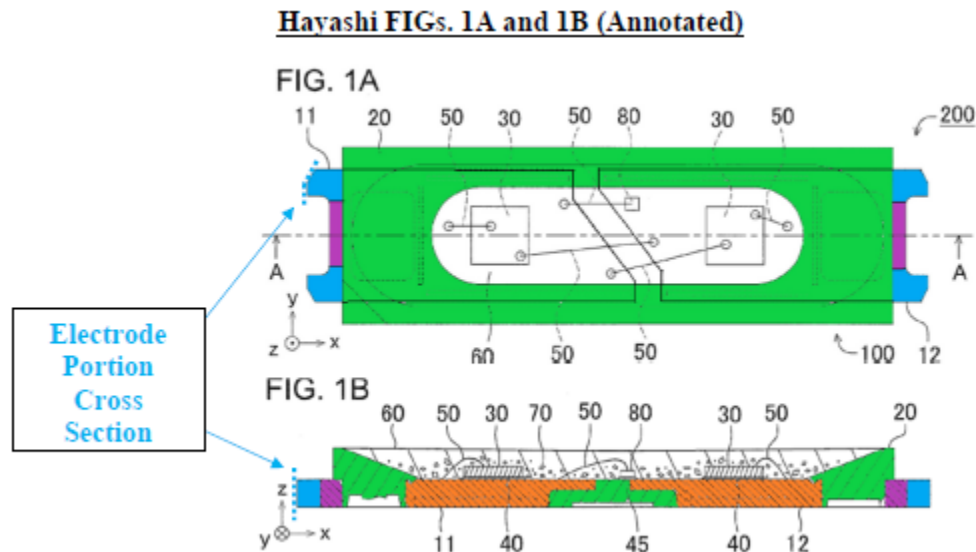
Pet. 113. Figure 1A “is an abbreviated top view (plan view) of a light emitting device.” Ex. 1006 ¶ 8. Petitioner annotates this figure by shading molded resin 20 in green, the central area of asserted wing portions in purple, and the edge portions of the asserted wing portions in blue. Pet. 113. Petitioner adds a double ended black horizontal arrow on the top of Figure 1A with the text “‘width-wise’ or ‘x’ direction” and red horizontal arrows pointing away from the asserted central area. *Id.*

Petitioner contends that “lead frames 11, 12 each have [an] ‘edge area that protrudes in the width-wise direction,’ which is the ‘x-direction’ from an end portion of the central area.” Pet. 112 (citing Ex. 1003 § 9.3.1.6; Ex. 1006, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Electrode Portion Cross Section]: wherein the at least one electrode portion further comprises an electrode portion cross section,

Petitioner provides the following annotated versions of Hayashi's Figures 1A and 1B:



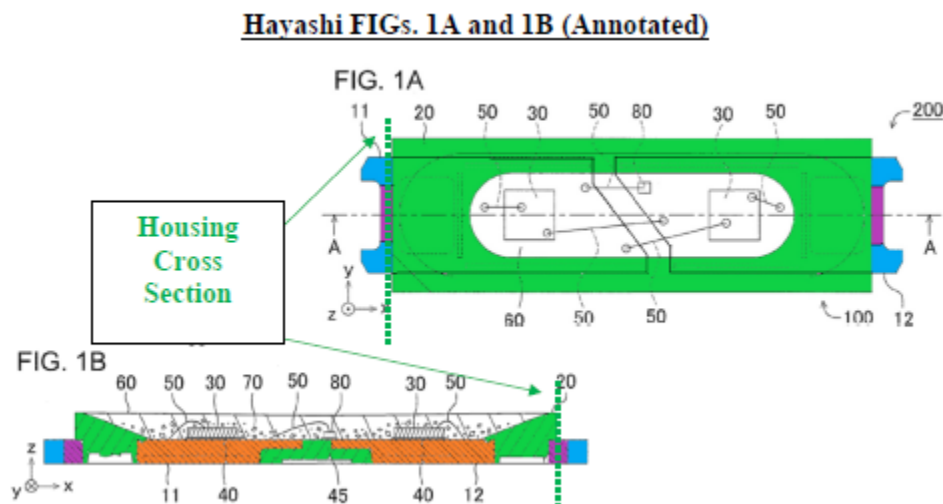
Pet. 114. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange, molded resin 20 in green, the central area of asserted wing portions in purple, and the edge portions of the asserted wing portions in blue. Pet. 114. Petitioner adds a black rectangular box to the left of the figures with the text “Electrode Portion Cross Section” and two blue arrows pointing to the asserted electrode portion cross-section. *Id.*

Petitioner contends that the “cross-section on the edge of the lead frame 11 as shown in FIG. 1A” corresponds to the recited electrode portion cross-section. Pet. 113 (citing Ex. 1003 § 9.3.1.7; Ex. 1006, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Housing Cross Section]: wherein the resin housing comprises at least one housing cross section,

Petitioner provides the following annotated versions of Hayashi's Figures 1A and 1B:



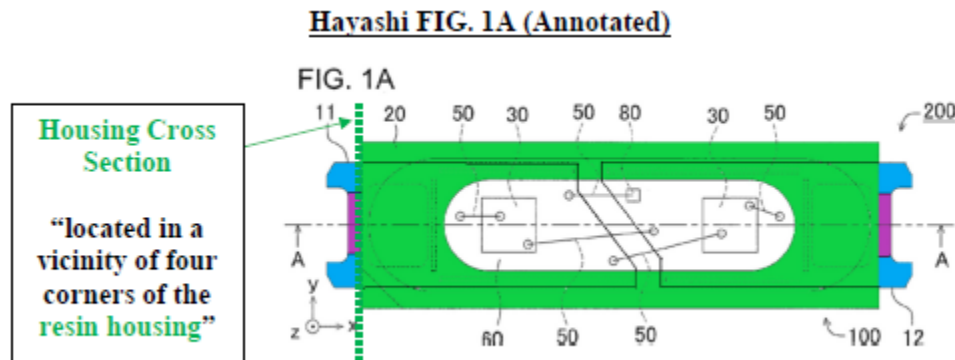
Pet. 115. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange, molded resin 20 in green, the central area of the asserted wing portions in purple, and the edge portions of the asserted wing portions in blue. Pet. 115. Petitioner adds a black rectangular box to the left of the figures with the text “Housing Cross Section” and two green arrows pointing to the asserted housing cross section. *Id.*

Petitioner contends that “the cross-section on the edge of molded resin 20 as shown in FIG. 1A” corresponds to the recited housing cross section. Pet. 114 (citing Ex. 1003 § 9.3.1.8; Ex. 1006, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Four Corners]: wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing, and

Petitioner provides the following annotated version of Hayashi’s Figure 1A:



Pet. 116. Figure 1A “is an abbreviated top view (plan view) of a light emitting device.” Ex. 1006 ¶ 8. Petitioner annotates this figure by shading molded resin 20 in green, the central area of the asserted wing portions in purple, and the edge portions of the asserted wing portions in blue. Pet. 116. Petitioner adds a black rectangular box to the left of Figure 1A with the text “Housing Cross Section ‘located in a vicinity of four corners of the resin housing’” with a green arrow pointing to a dotted vertical green line aligned with the housing cross section. *Id.*

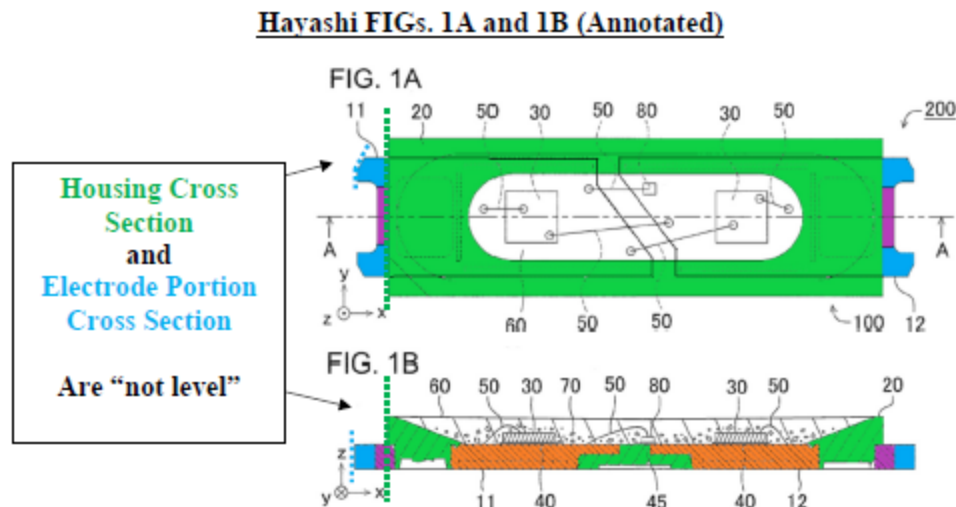
Petitioner contends that the “housing cross-section on the edge of molded resin 20 as shown in FIG 1A” corresponds to the recited “located in

a vicinity of four corners of the housing resin” and that “many cross sections can be drawn through the housing all [of] which are in the vicinity of the four corners of the resin housing.” Pet. 115 (citing Ex. 1003 § 9.3.1.9; Ex. 1006, Fig. 1A).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Not Level]: wherein the at least one housing cross section is not level with the electrode portion cross section.

Petitioner provides the following annotated versions of Hayashi’s Figures 1A and 1B:



Pet. 117. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange, molded resin 20 in green, the central area of the asserted wing portions in purple, and the edge portions of the asserted wing portions in blue. Pet. 117. Petitioner adds a black rectangular box to the left of the figures with the text “Housing Cross

Section and Electrode Portion Cross Section Are ‘not level’” and two black arrows pointing to the asserted electrode portion cross section and housing cross section. *Id.*

Petitioner contends that the “housing cross section is on molded [resin] 20 and is not in line or level with the electrode portion cross section on lead frame 11.” Pet. 116 (citing Ex. 1003 § 9.3.1.10; Ex. 1006, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.¹⁰

Summary of Claim 1

For all the foregoing reasons, Petitioner establishes a reasonable likelihood that claim 1 is anticipated by Hayashi.

Independent Claim 11

For the preamble, the electrode portion limitation, and the resin housing limitation, Petitioner relies on its contentions discussed above for claim 1. Pet. 122.

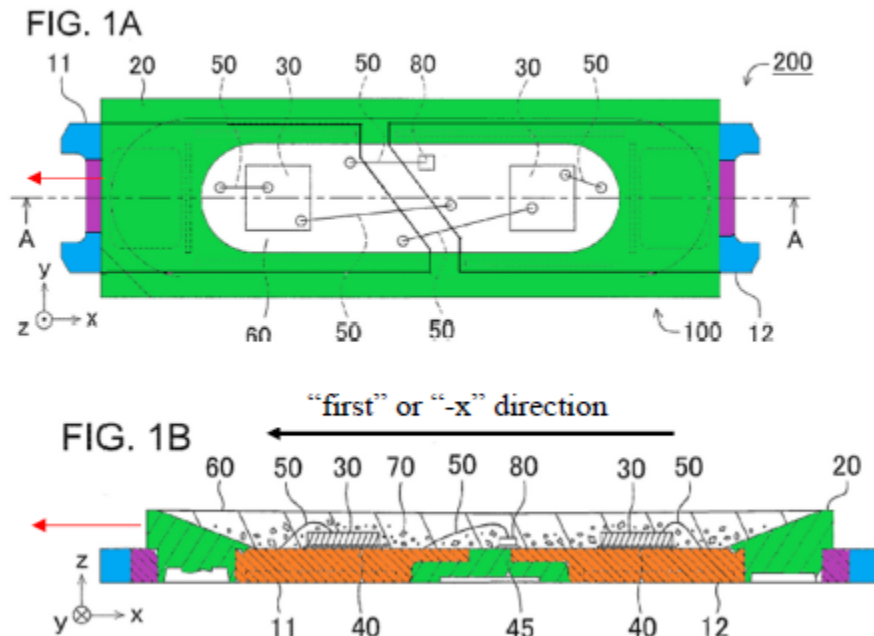
We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses the preamble, the electrode portion limitation, and the resin housing limitation of claim 11.

[Central Area]: wherein the wing portion comprises: a central area protruding from the housing in a first direction away from the housing; and

¹⁰ Similar to the Kim anticipation ground, we preliminarily find that Hayashi’s housing cross section and electrode portion cross section do not form a flat surface with each other.

Petitioner provides the following annotated version of Hayashi's Figures 1A and 1B:

Havashi FIGs. 1A and 1B (Annotated)



Pet. 123. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange, molded resin 20 in green, the central area of the asserted wing portions in purple, and the edge portions of the asserted wing portions in blue, adding a red horizontal arrow to each of the figures pointing to the left, and adding a black horizontal arrow on top of Figure 1B pointing to the left with text “‘first’ or ‘-x’ direction.” Pet. 123.

Petitioner contends that “lead-frames 11, 12 that extend from molded resin 20 (*i.e.*, ‘the wing portion’) hav[e] a central area[] that protrudes from the molded resin 20 in the x-direction (‘first direction away from the housing’).” Pet. 122 (citing Ex. 1003 § 9.3.9.4; Ex. 1006, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Edge Area]: at least one edge area protruding from an edge portion of the central area, in the first direction,

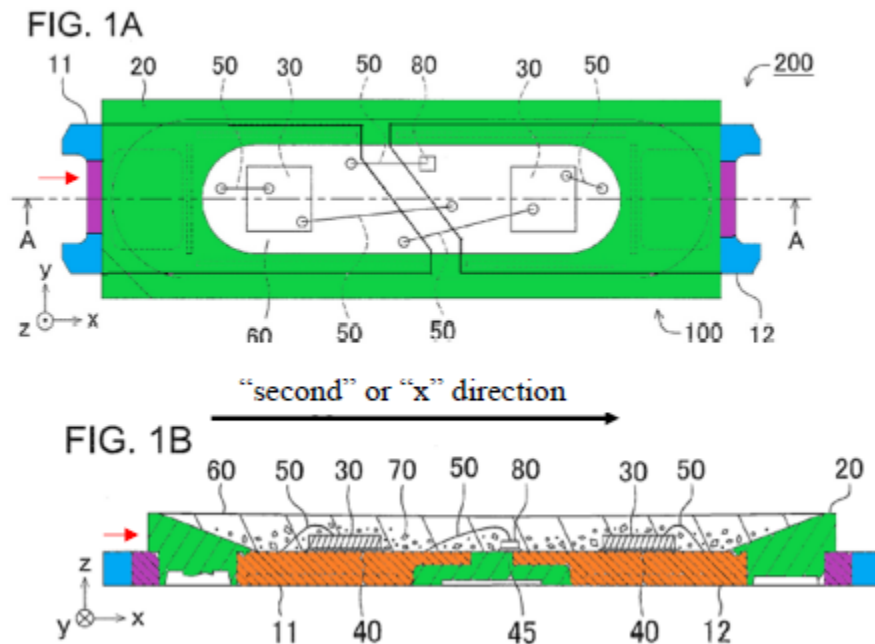
Petitioner reproduces the same annotated Figures 1A and 1B of Hayashi shown above for the central area limitation. Pet. 124. Petitioner contends that “lead-frames 11, 12 having respective edge areas that extend in the ‘x-direction’ away from molded resin 20 (*i.e.*, first direction) from the respective central areas of lead-frames 11, 12” correspond to this limitation. *Id.* at 123 (citing Ex. 1003 § 9.3.9.5; Ex. 1006, Fig. 1A).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Recessed]: wherein the central area is recessed from the at least one edge area in a second direction opposite from the first direction toward the housing,

Petitioner reproduces the following annotated version of Hayashi’s Figures 1A and 1B:

Havashi FIGs. 1A and 1B (Annotated)



Pet. 125. Figure 1A “is an abbreviated top view (plan view) of a light emitting device” and Figure 1B “is an abbreviated cross-section view through line A-A in FIG. 1A.” Ex. 1006 ¶¶ 8–9. Petitioner annotates these figures by shading lead frames 11 and 12 in orange, molded resin 20 in green, the central area of the asserted wing portions in purple, and the edge portions of the asserted wing portions in blue, adding a red horizontal arrow to each of the figures pointing to the right, and adding a black horizontal arrow on top of Figure 1B pointing to the right with text “‘second’ or ‘x’ direction.” Pet. 125.

Petitioner contends that “lead-frames 11, 12 having respective central areas that are recessed in the ‘x-direction’ towards . . . molded resin 20 (*i.e.*, second direction) from the respective edge areas of lead-frames 11, 12” correspond to this limitation. Pet. 124 (citing Ex. 1003 § 9.3.9.6; Ex. 1006, Fig. 1A).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Electrode Portion Cross Section]: wherein the at least one electrode portion further comprises an electrode portion cross section,

Relying on its contentions for the similar limitation in claim 1, Petitioner contends that the “cross-section on the edge of lead-frame 11 as shown in Fig. 1A” corresponds to this limitation. Pet. 125 (citing Ex. 1003 § 9.3.9.7; Ex. 1006, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Housing Cross Section]: wherein the resin housing comprises at least one housing cross section,

Relying on its contentions for the similar limitation in claim 1, Petitioner contends that the “cross-section on the edge of molded resin 20 as shown in Fig. 1A” corresponds to this limitation. Pet. 125–26 (citing Ex. 1003 § 9.3.9.8; Ex. 1006, Figs. 1A, 1B).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Housing Corner]: wherein the at least one housing cross section is located in a vicinity of a corner of the resin housing, and

Relying on its contentions for the similar limitation in claim 1, Petitioner contends that the “housing cross-section on the edge of molded resin 20 shown in FIG. 1A” corresponds to this limitation. Pet. 126 (citing Ex. 1003 § 9.3.9.9; Ex. 1006, Fig. 1A).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Not Level]: wherein the at least one housing cross section is not level with the electrode portion cross section,

Petitioner reproduces the annotated version of Hayashi's Figures 1A and 1B discussed above in connection with the not level limitation in claim 1. Pet. 127. Petitioner contends that "[t]he housing cross-section is on molded [resin] 20 and is not in line with or level with the electrode portion cross section on lead frame 11." *Id.* at 126–27 (citing Ex. 1003 § 9.3.9.10; Ex. 1006, Figs. 1, 2).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

[Edge Areas Protrude]: wherein the at least one edge area comprises two edge areas, wherein the two edge areas protrude from the central area in the first direction.

Petitioner contends that Hayashi's "lead-frames 11, 12 each hav[e] two respective edge areas that protrude from respective central areas in the 'x-direction' away from molded resin 20 (*i.e.*, the 'first direction')." Pet. 127 (citing Ex. 1003 §§ 9.3.9.11–9.3.9.12; Ex. 1006, Fig. 1A).

We reviewed the evidence cited by Petitioner, and based on the current record at this stage of the proceeding, Petitioner sufficiently establishes that Hayashi discloses this limitation.

Summary of Claim 11

For all the foregoing reasons, we determine that Petitioner establishes a reasonable likelihood that claim 11 is anticipated by Hayashi.

3. *Claims 2, 5–10, 12–16, and 20–22*

These claims depend directly or indirectly from either claim 1 or claim 11. Ex. 1001, 14:15–17, 14:26–42, 14:63–15:8, 15:19–28. Petitioner sets forth evidence and argument as to why Hayashi allegedly anticipates claims 2, 5–10, 12–16, and 20–22. Pet. 117–122, 128–133.

We reviewed Petitioner’s evidence and arguments and determine that Petitioner establishes a reasonable likelihood that these dependent claims are anticipated by Hayashi.

G. Remaining Obviousness Grounds

Petitioner alternatively contends that claims 2 and 15 would have been obvious over Kobayakawa in view of Kim or Hayashi (Pet. 133–34) and that claims 1, 2, 5–16, and 20–22 would have been obvious over Kim, Kobayakawa, and/or Hayashi in view of the ordinary level of skill in the art. Pet. 134.

Because we have already determined that Petitioner has shown a reasonable likelihood that these claims are anticipated by each of Kim, Kobayakawa, and Hayashi and Patent Owner has not submitted a preliminary response, we do not reach these grounds at this time. *See* 37 C.F.R. § 42.108(a) (2023).

III. CONCLUSION

Based on the present record, we determine that Petitioner demonstrates a reasonable likelihood that it would prevail in establishing that at least one challenged claim of the ’742 patent is unpatentable. We, thus, institute an *inter partes* review of all challenged claims of the ’742 patent based on all grounds in the Petition. At this stage of the

proceeding, we have not made a final determination under 35 U.S.C. § 318(a) with respect to the unpatentability of any challenged claim.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314(a), an *inter partes* review of the '742 patent is instituted with respect to all challenged claims and grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(a) and 37 C.F.R. § 42.4(b), *inter partes* review of the '742 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

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Patent 9,905,742 B2

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