UNITED STATES PATENT AND TRADEMARK OFFICE BEFORE

THE PATENT TRIAL AND APPEAL BOARD

IKEA Supply AG

Petitioner

v.

Everlight Electronics Co., Ltd.,

Patent Owner

Patent No. 9,905,742 to Hsieh *et al.* IPR Case No.: IPR2024-00987

PETITION FOR *INTER PARTES* REVIEW OF

CLAIMS 1, 2, 5-16 and 20-22 OF U.S. PATENT 9,905,742

UNDER 35 U.S.C. §§311-319 AND 37 C.F.R. §§42.100 *ET SEQ.*

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TABLE OF EXHIBITS

Exhibit	Description
1001	U.S. Patent No. 9,905,742 ("the '742 patent")
1002	File history of U.S. Patent No. 9,905,742 ("'742 FH")
1003	Declaration of Dr. Michael Lebby Regarding Invalidity of U.S. Patent No. 9,905,742
1004	United States Patent Publication No. 2014/0054629 by Kim ("Kim")
1005	United States Patent No. 7,825,426 to Kobayakawa ("Kobayakawa")
1006	United States Patent Publication No. 2014/0117403 by Hayashi ("Hayashi")
1007	Joint Motion to Amend Claim Construction Deadlines filed in Everlight Electronics Co., Ltd. v. IKEA US Retail LLC, et al., No. 6:23-cv-00481-AM-DTG (W.D. Tx. Jul. 5, 2023)
1008	U.S. Patent Publication No. 2014/0159098 by Chen ("Chen")
1009	U.S. Patent Publication No. 2004/0016873 by Kida *et al*. ("Kida")
1010	U.S. Patent Publication No. 2011/0193111 by Seo *et al*. ("Seo Pub")
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1016	Claim Construction Order issued in Everlight Electronic Co., Ltd. v. Walmart Inc., No. 23-cv-000439-AM-DTG (W.D. Tx. Jun. 9, 2023)
1017	U.S. Patent No. 7,161,190 to Chikugawa ("Chikugawa")
1018	U.S. Patent No. 6,274,924 to Carey *et al*. ("Carey")
1019	U.S. Patent No. 8,097,937 to Bogner *et al*. ("Bogner")
1020	U.S. Patent Application Publication No. 2007/0139949 by Tanda *et al*. ("Tanda")
1021	U.S. Patent No. 8,035,125 to Abe ("Abe")
1022	W.I.P.O Publication No. WO2013118072A2 to Bierhuizen ("Bierhuizen")
1023	*Curriculum Vitae* of Dr. Michael S. Lebby
1024	Attorney Declaration of Joseph R. Klinicki
1025	Patent Owner's Infringement Contentions – Claim Chart of the '742 Patent to IKEA Ledare 5.5W E26 Bulb

I. INTRODUCTION

IKEA Supply AG ("Petitioner") hereby petitions for *inter partes* review of Claims 1, 2, 5-16 and 20-22 ("the Challenged Claims") of U.S. Patent No. 9,905,742 (Ex-1001 ("the '742 patent")). The Challenged Claims should be canceled because they do not claim anything new or inventive; they claim a previously known light emitting diode (LED) carrier with a "U-shaped" electrode configuration.

II. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(a)(1) FOR INTER PARTES REVIEW

A. Real-Party-in-Interest Under 37 C.F.R. §42.8(b)(1)

A real-party-in-interest in this petition is IKEA Supply AG ("ISAG"). ISAG is a subsidiary of Inter IKEA Holding BV ("Inter IKEA"), which has a place of business at Olof Palmestraat 1, Delft, Zuid-Holland, 2616. IKEA US Retail LLC and IKEA North America Services, LLC, of Conshohocken, Pennsylvania, are real-parties-in-interest as they are currently named as Defendants in the district court proceeding identified in §II(b)*, infra*, and are related through contracts, franchise agreements, and/or indemnification agreements with Inter IKEA and/or ISAG. 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.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

This petition is related to three complaints filed by Patent Owner involving the '742 patent:

1) *Everlight Electronics Co., Ltd. v. IKEA US Retail LLC, et al.* (2:23-cv-00126-JRG) (E.D. Tx. Mar. 27, 2023), complaint served June 1, 2023, and subsequently voluntarily dismissed on July 5, 2023;

2) *Everlight Electronics Co., Ltd. v. IKEA US Retail LLC, et al.* (6:23-cv-00481-AM) (W.D. Tx. Jul. 5, 2023), complaint served July 6, 2023, which is pending ("IKEA-Everlight Litigation"); and

3) *Everlight Electronics Co., Ltd. v. Walmart Inc.* (6:23-cv-00439-AM-DTG) (W.D. Tx. Jun. 9, 2023), which is pending ("Walmart-Everlight Litigation").

In the IKEA-Everlight litigation, Everlight asserts the '742 patent, U.S. Patent No. 9,640,733 ("the '733 patent), and U.S. Patent No. 7,554,126 ("the '126 patent"). The '733 patent is the parent to the '742 patent. ISAG has filed petitions to challenge the '733 patent (IPR2024-00972) and the '126 patent (IPR2024-00988).

Everlight asserted EP2947705, a foreign counterpart to the '742 patent, against

IKEA Deutschland GmbH & Co. KG and IKEA of Sweden AB in Germany in the District Court of Dusseldorf Civil Chamber. That case is pending. Two nullity proceedings have been filed against EP2947705 with the German Federal Patent Court by SLV GmbH (2 Ni 16/23 (EP)) and IKEA Deutschland GmbH & Co. KG (2 Ni 1/24 (EP)). A copy of the initial preliminary opinion finding that the claims of EP2947705 likely lack novelty and/or inventive step is attached as Ex-1012, and an English machine translation of the preliminary opinion is attached as Ex-1013.

The undersigned is unaware of any other pending judicial or administrative matters that would affect, or be affected by, a decision in the proceeding.

C. Lead and Backup Counsel Under 37 C.F.R. §42.8(b)(3) and Service Information under 37 C.F.R. §42.8(b)(4)

Petitioner designates the following lead and backup counsel:

Lead Counsel	**Backup Counsel**
Joseph R. Klinicki (Reg. No. 68,505) Flaster Greenberg P.C. 1717 Arch Street, Suite 3300 Philadelphia, PA 19103 Telephone: 215-587-5687 Facsimile: 215-279-9394 joseph.klinicki@flastergreenberg.com	Michael J. Bonella (Reg. No. 41,628) Flaster Greenberg P.C. 1717 Arch Street, Suite 3300 Philadelphia, PA 19103 Telephone: 215-587-5684 Facsimile: 215-279-939 michael.bonella@flastergreenberg.com

Backup Counsel	**Backup Counsel**
Coraleine Kitt (Reg. No. 72,778) Flaster Greenberg P.C. 1717 Arch Street, Suite 3300 Philadelphia, PA 19103 Telephone: 215-587-5684 Facsimile: 215-279-9394 coraleine.kitt@flastergreenberg.com	

Service on Petitioner may be made by mail or hand delivery to: Flaster Greenberg P.C., 1717 Arch Street, Suite 3300, Philadelphia, PA 19103. Petitioner also consents to and prefers electronic service by emailing IKEA-Everlight-IPRs@flastergreenberg.com and counsel of record (shown above).

III. PAYMENT OF FEES UNDER 37 C.F.R. §42.15

Petitioner submits that the fee set forth in 37 C.F.R. §42.15(a) was properly paid using the USPTO Financial Manager.

IV. CERTIFICATION OF WORD COUNT UNDER 37 C.F.R. § 42.24(d)

Petitioner certifies that the word count in this Petition is 13,927 words, as counted by the word-processing program (Microsoft Word for Office 365) used to generate this Petition, where such word count excludes the table of contents, table of authorities, mandatory notices, certificate of service, table of exhibits, and this certificate of word count. This Petition is in compliance with the 14,000 word limit set forth in 37 C.F.R. §42.24(a)(1)(i).

V. IPR REQUIREMENTS UNDER 37 C.F.R. §42.104

A. Grounds for Standing Under 37 C.F.R. §42.104(a)

Petitioner certifies that the '742 patent is available for *inter partes* review, and that Petitioner is not barred or estopped from requesting an *inter partes* review on the grounds identified in this petition.

B. Identification of Challenge Under 37 C.F.R. §42.104(b) and Relief Requested

Petitioner respectfully requests that the Challenged Claims of the '742 patent be cancelled based on the following grounds of unpatentability:

Ground of Unpatentability	'742 Patent Claim(s)	Basis for Rejection under 35 U.S.C. §§ 102/103
Ground 1	1, 2, 5-16, and 20-22	Anticipated by Kim (Ex-1004)
Ground 2	1, 5-14, 16, and 20-22	Anticipated by Kobayakawa (Ex-1005)
Ground 3	1, 2, 5-16, and 20-22	Anticipated by Hayashi (Ex-1006)
Ground 4	2 and 15	Obvious over Kobayakawa in view of Kim or Hayashi
Ground 5	1, 2, 5-16, and 20-22	Obvious over Kim, Kobayakawa, and/or Hayashi in view of the ordinary level of skill in the art

VI. OVERVIEW OF THE '742 PATENT

A. The Challenged Claims

The Challenged Claims are claims 1-2, 5-16, and 20-22, which generally relate to light emitting devices including an LED carrier having an electrode portion and a housing portion. The focus of the Challenged Claims is the configuration of the electrode portion (Ex-1001 at 13:55-15:28). Claims 1 and 11 are independent apparatus claims. Claims 2, 5-10, 12-16 and 20-22 depend from either claim 1 or 11.

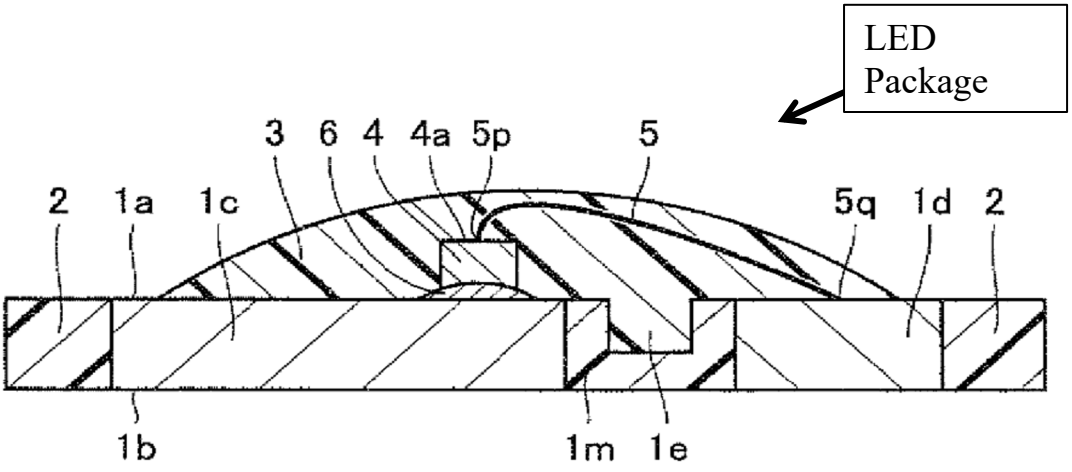
B. Priority and Effective Filing Date

The '742 patent issued from U.S. Patent Application No. 15/441,644, filed February 24, 2017, which was a divisional of U.S. Patent Application No. 14/720,230, filed May 22, 2015, and claims the benefit of Taiwan Patent Application No. 103118060, filed on May 23, 2014, and Taiwan Patent Application No. 104103527, filed on Feb. 3, 2015 (Ex-1001 at Cover). Petitioner applies May 23, 2014 as the effective filing date here, without conceding that the '742 patent is entitled to it. *See PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1303-06 (Fed. Cir. 2008). As the effective filing date of the '742 patent is after March 16, 2013, post-AIA 35 U.S.C. §§ 102 & 103 apply. *Medtronic, Inc. v. Barry,* 891 F.3d 1368, 1375 (Fed. Cir. 2018).

C. Overview of the ’742 Patent

1. General Background to the ’742 Patent

Dr. Michael Lebby explains that LEDs are typically small and fragile and are included in an “LED package” (*See* Ex-1003 at § 6.1). An LED package protects the LED, provides mechanical strength, electrical connections, and heat dissipation (Ex-1003 at ¶¶ 62-64). The LED package may also include an encapsulant having phosphors to change the wavelength of light emitted by an LED (*e.g.*, blue) to a desired color (*e.g.*, white) (*See* Ex-1003 at § 7.4). As Dr. Lebby explains, all of this was well-known to a POSITA (*e.g.*, Takada shows an LED chip 4 inside of an LED package (Ex-1003 at § 6; Ex-1012 at FIG. 1; 6:21-65; 9:31-10:16)).



Takada FIG. 1 (Annotated)

The ’742 patent admits that both “LEDs” and “carrier leadframes” were well-known (Ex-1001 at 1:28-60), stating “dicing-type carrier leadframe[s]” have been

used in "recent years" for manufacturing LED packages (Ex-1001 at 1:42-44). The '742 patent admits that it was well-known for a "plastic body" to be "molded on a metal sheet material," using a "die bonding process" to mechanically bond the LED to the package, "wire bonding" the LED to the package electrodes to create electrical connections, and "encapsulat[ed]" the LED (Ex-1001 at 1:42-49). Dr. Lebby agrees that these processes/structures were well-known (*See* Ex-1003 at §§ 6.2-6.4).

The focus of the '742 patent is alleged manufacturing problems including creating dust while dicing, electrically testing each LED in a sheet of LED packages before cutting into individual LED packages, and cutting LED packages simultaneously (Ex-1001 at 1:49-51; 1:53-60; 5:25-6:26). Despite the '742 patent's focus on manufacturing in the specification, the '742 patent does **not** claim a manufacturing process (Ex-1001 at 13:55-15:28). Rather, the '742 patent claims a "light emitting device" divorced from the disclosed manufacturing processes (*Id.*). In any event, Dr. Lebby explains that the manufacturing processes described in the '742 patent were well-known (*See* Ex-1003 at § 6.4), for example, as exemplified by Takada (Ex-1003 at § 6.4.1; Ex-1012 at 11:3-12, 14:48-53, FIGs. 11-16) and Bierhuizen (Ex-1003 at § 6.4.4; Ex-1022 at [0019]-[0020], FIG. 2).

2. The '742 Patent Description of LED Package

The '742 patent describes LED packages with conventional LED components,

such as an LED chip, electrodes, and a housing (*see infra* §VI(C)(4); Ex-1001 at 3:10-12; 7:15-19). The '742 patent describes different configurations of the claimed "electrode portion" relative to the "housing" (*See e.g.,* Ex-1001 at 7:51-9:3; FIG. 6-11). But no explanation is provided as to why these structural configurations are supposedly inventive.

The '742 patent generally describes that an LED "carrier" or package "includes a housing and at least one electrode portion" (Ex-1001 at 3:10-12). For instance, the carrier 110 of FIG. 1 comprises a housing 111 and two electrode portions 112 having wing portions 112A, and the wing portions 112A are "exposed outside of the housing" (Ex-1001 at 6:41-45). As shown in annotated FIG. 1 below, the "wing portions 112A" have a central protruding area 112A1 [purple] and two outer edge areas 112A2 [green] (Ex-1001 at 3:27-30; 6:41-45).

'742 Patent FIG. 1 (Annotated)

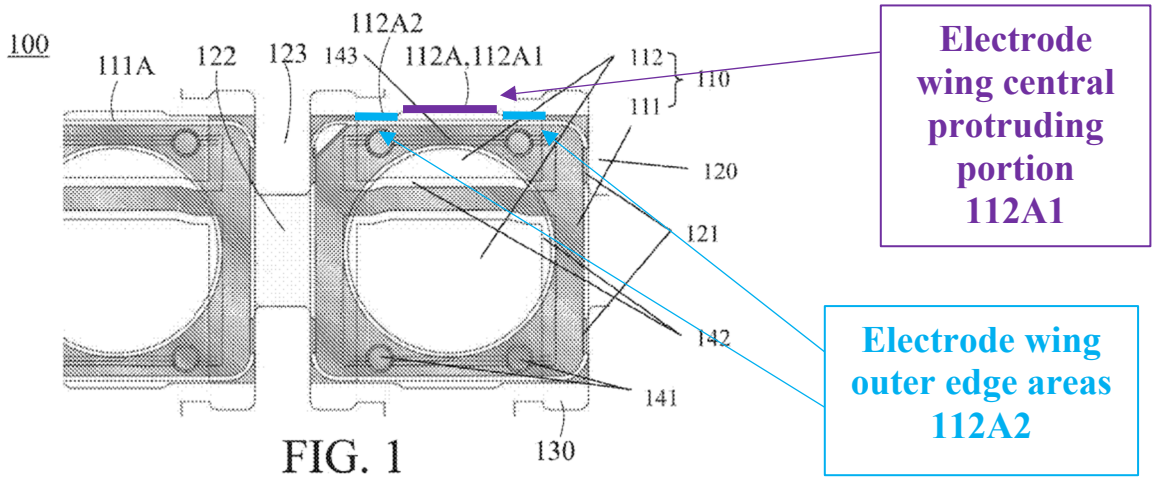


FIG. 1

In FIG. 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" (Ex-1001 at 6:45-49).

'742 Patent FIG. 1 Annotated

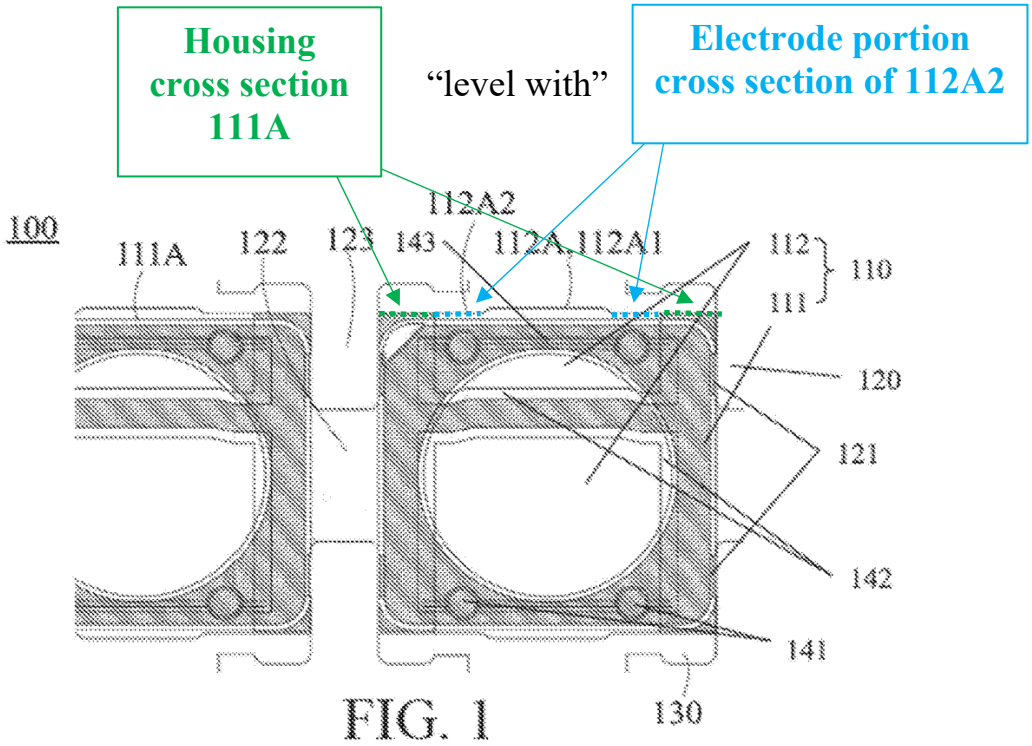


FIG. 1

The '742 patent discusses several variations of its LED packages, with their main differences being the shape of the electrode portion or "wing portion" of the electrode that protrudes from the housing (*See e.g.*, Ex-1001 at FIG. 6-11). For example, FIGs. 7, 9, and 10 depict various examples in which both the central area 112A2 and the edge areas 112A1 protrude from the housing cross section 111A

(Ex-1001 at 8:4-20; 8:38-59). In these examples, the central area 112A1 protrudes from the edge areas 112A2 (Ex-1001 at 8:4-20; 8:38-59).

'742 Patent Figure 7, 9, and 10 (Annotated)

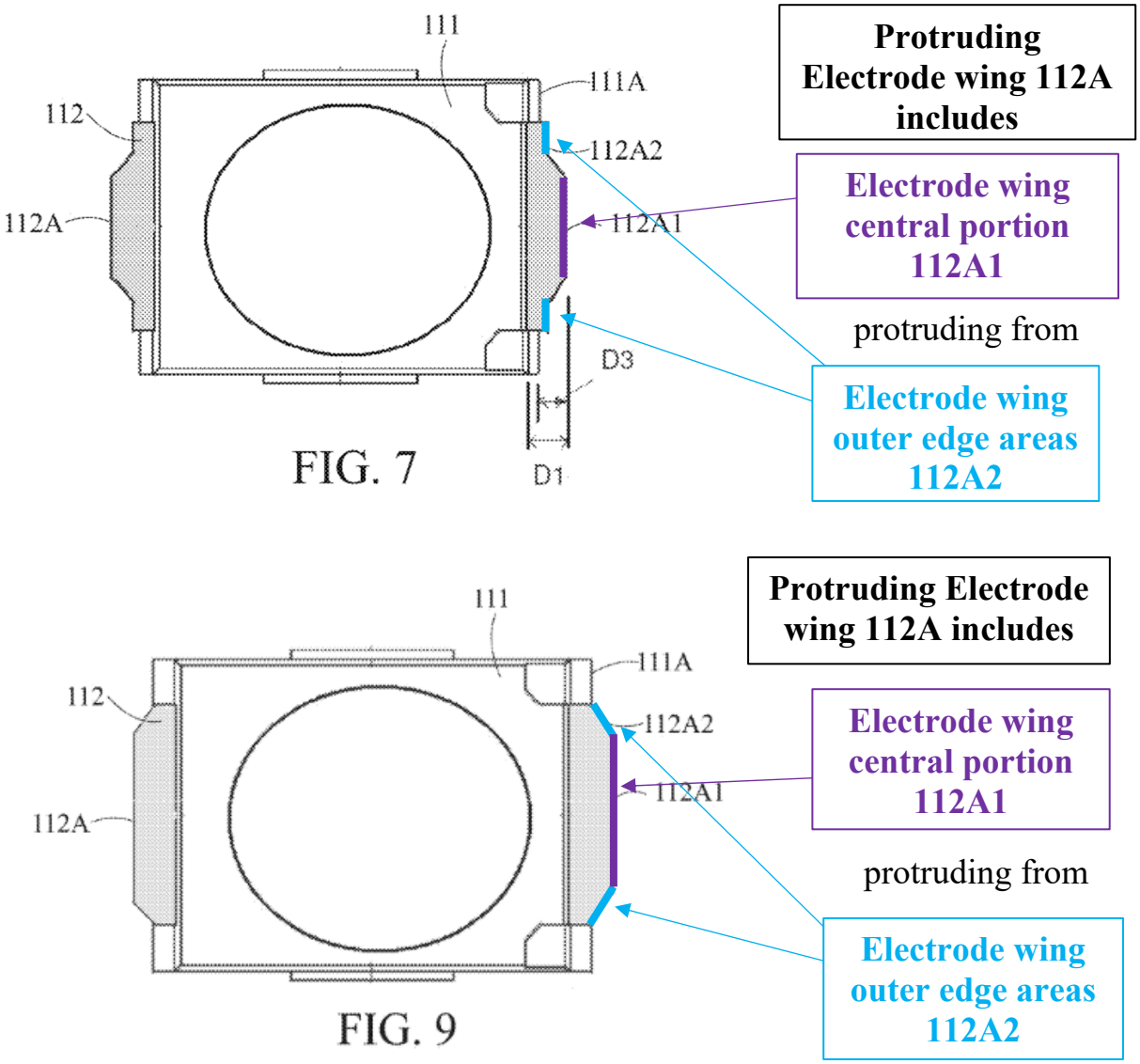


FIG. 7

FIG. 9

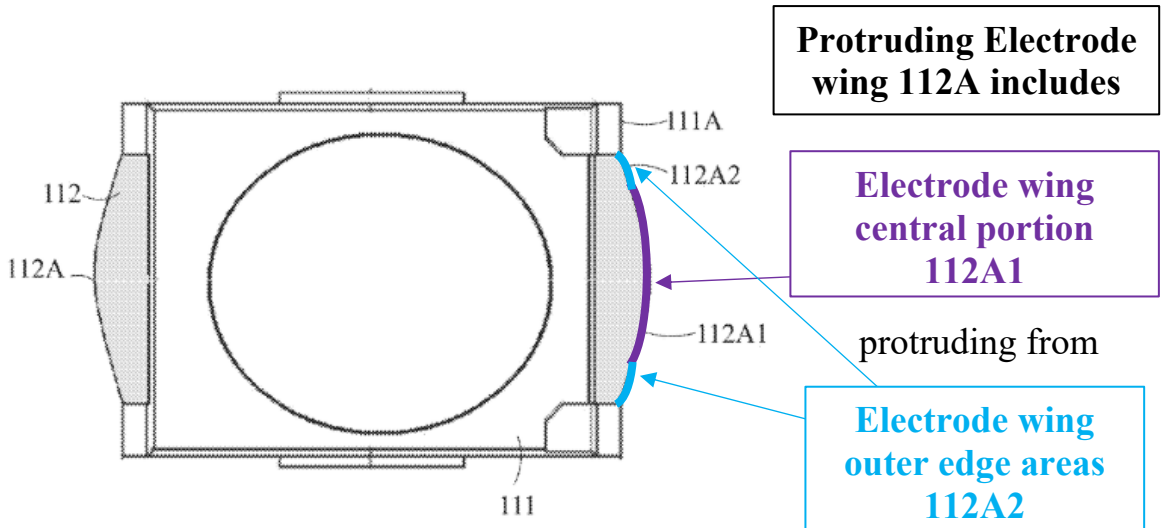


FIG. 10

In contrast, in the examples shown in FIG. 8 and 11, the electrode wing portion 112A is "recessed" within the housing cross section 111A (Ex-1001 at 8:21-37; 8:60-9:3). In these embodiments, central area 112A2 and the edge areas 112A1 are within the housing cross section 111A and do not protrude from the housing cross section 111A (Ex-1001 at 8:21-37; 8:60-9:3).

'742 Patent Figures 8 and 11 (Annotated)

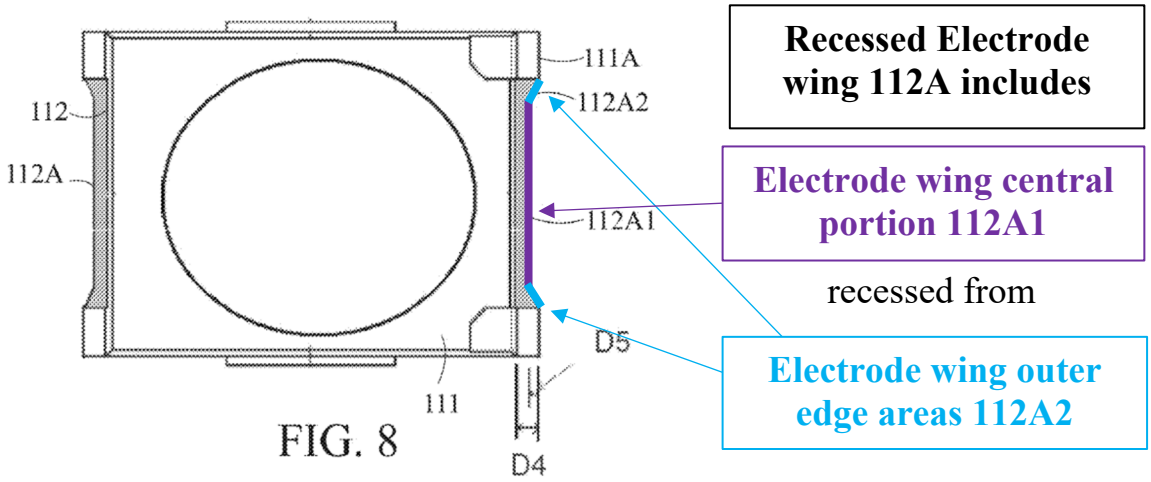


FIG. 8

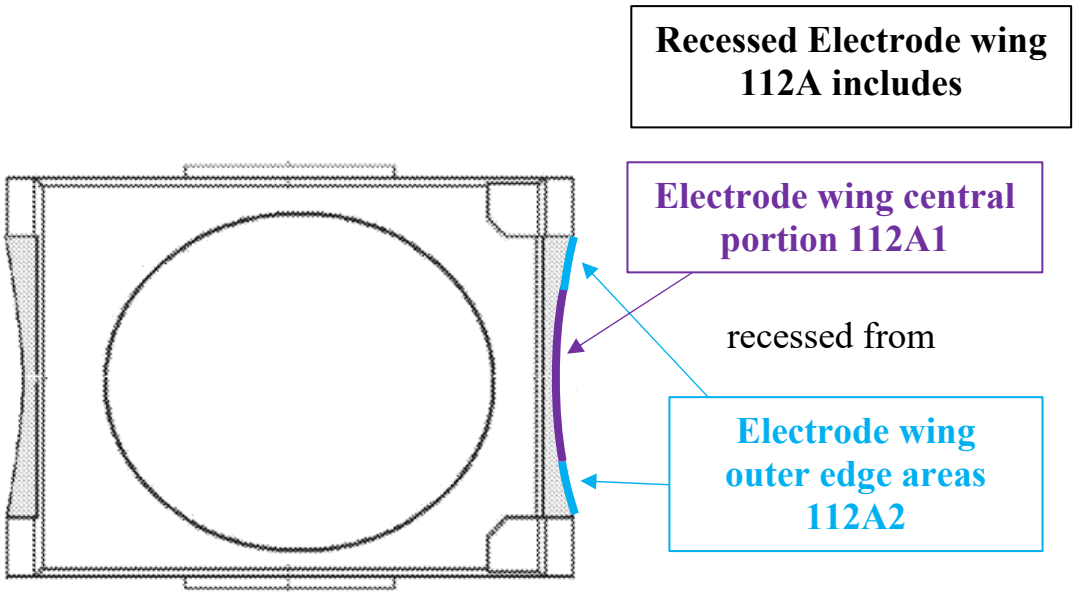


FIG. 11

FIG. 17A (below) illustrates an example with two carrier lead frames before they are cut from each other (Ex-1001 at 11:65-12:4). In this example, the housing cross section 111A may have a "curved surface e.g. rounded corner 111R" (Ex-1001 at 12:19-22). The '742 patent does not disclose any alleged benefit from rounding a housing corner. The "electrode portion cross section of the electrode portion may also comprise a curved surface," though the curved surfaces are not limited to one curved surface (Ex-1001 at 12:24-27). In this embodiment, the housing cross section and the electrode cross section do not form a flat surface such that "the housing cross section is not level with the electrode portion cross section" (Ex-1001 at 12:31-35). There is no description of what delineates the edge areas and the central area with respect to FIG. 17. For example, there is no description of when the edge areas and

the central area start and stop relative to each other.

'742 Patent FIGs. 17A & D (Annotated)

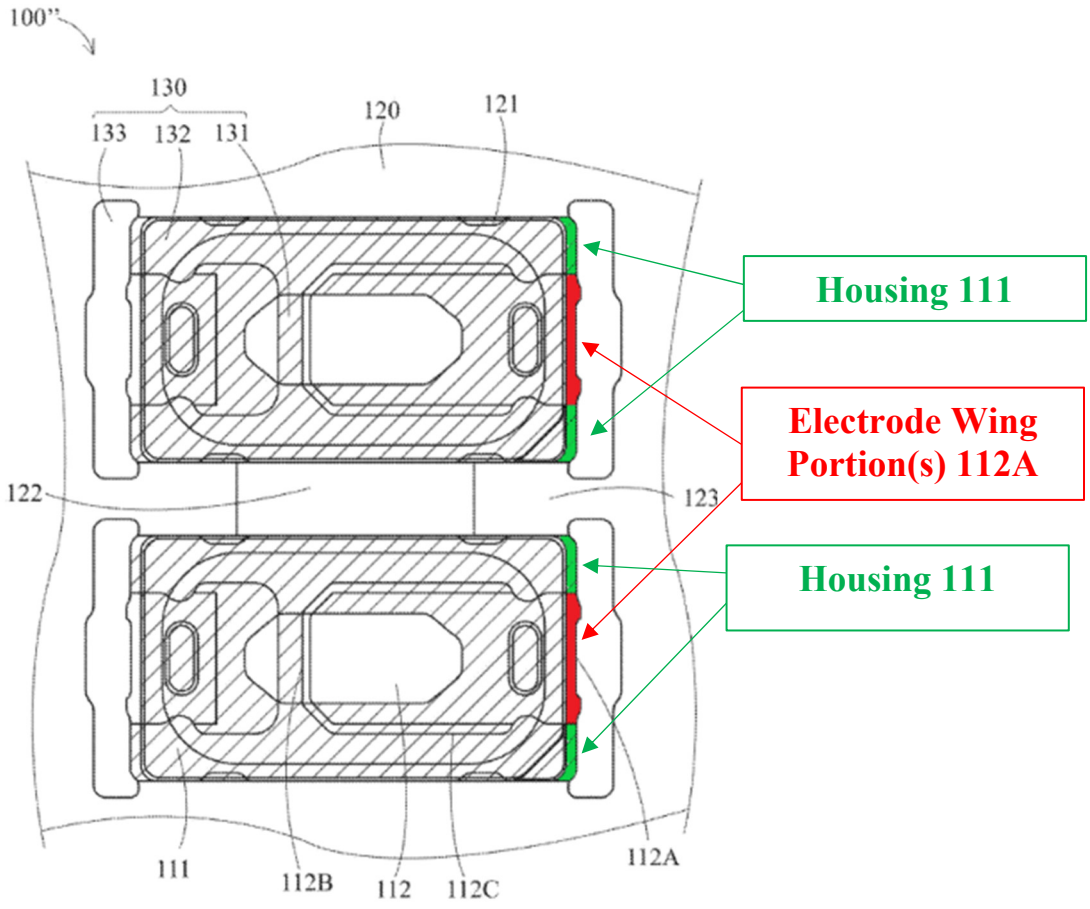


FIG. 17A

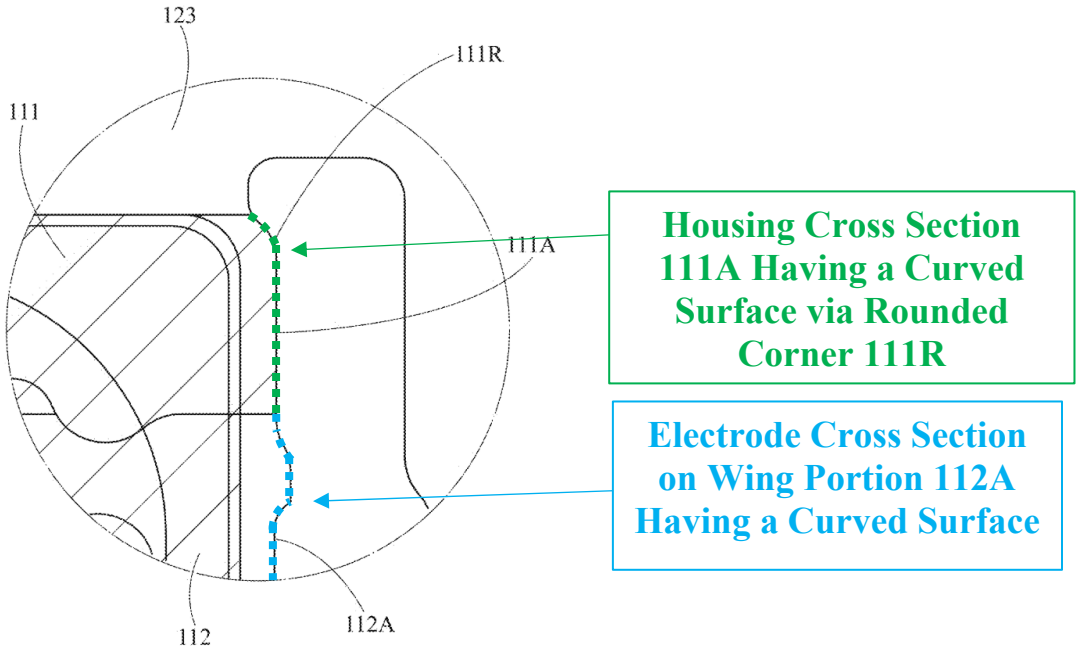


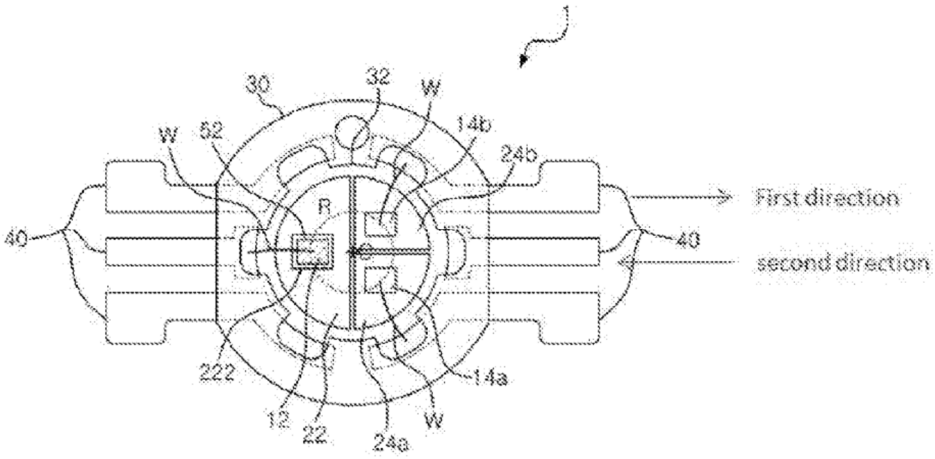
FIG. 17D

As the ’742 patent admits, LED packages having a plastic body molded on a metal sheet, an LED that was die bonding to the package, wire bonds for electrically connecting the LED to the electrode, and an encapsulant for encapsulating the LED were all well-known (Ex-1001 at 1:42-60). The ’742 patent does not provide much, if any, explanation of what was allegedly new or inventive about its disclosures of the very same structures.

3. Prosecution History

The ’742 patent was filed as U.S. App. No. 15/441,644 on February 24, 2017 (Ex-1001 at Cover). The USPTO rejected the originally filed application claims as obvious over Seo Pub (Ex-1010) in view of Kida (Ex-1009) (Ex-1002 at FH_000211). In response to the rejection, the applicant amended the claims and represented that “Applicant submits that the support for amended claims 1 and 10 [’742 patent claims 1 and 11] can be found in for example, paragraphs [0041], [0060], and [0069] along with FIG. 17D of the originally filed Specification” (Ex-1002 at FH_000090, FH_000257-0000258, FH_000266, FH_000269-270). These citations are references to Figures 1, 12D, and 17D (Ex-1002 FH-00090, Ex-1001 at 6:41-59; 10:38-56; 12:5-35). With respect to patent claim 11 (application claim 10), Applicant represented that the following are the claimed “first direction” and “second direction” in reference to Seo (Ex-1002 at FH_000093).

’742 Patent File History



Applicant argued that Seo did not disclose at least the elements "i) the wing portion (112A) extends in a length-wise direction of the wing position along an edge of the housing (111)," "ii) the wing portion (112A) protrudes from the housing (111) in a width-wise direction of the wing portion," "iii) at least one edge 12A has a length in the length-wise direction short than that of the central area (112A1)," "iii) at least one edge (112A2) area has a length in the length-wise direction shorter than that of the central area (112A1)," and "iv) the at least one edge area (112A2) protrudes in the width-wise direction from an end portion of the central area (112A1)" (Ex-1002 at FH_000091).

The USPTO issued a notice of allowability with an examiner's amendment to claim 10 [now claim 11] stating that "at least one edge area comprises two edge areas, and wherein the two edge areas protrude from central area in the first direction" (Ex. at FH_000044-FH-000047). The stated reason for allowance of claim 1 was "wherein the at least one edge area protrudes in the width-wise direction for an end portion of the central area" and the stated reason for application claim 10 (patent claim 11) was "wherein the at least one edge area comprises two edge areas, wherein the two edge areas protrude from central [sic] are[a] in the first direction" (Ex at FH-000047).

4. The '742 Patent Claims

Clams 1 and 11 are independent. Claim 1's "light emitting device" has two

main structural elements, an "at least one electrode portion" and a "resin housing" and claims relationships between these portions (Ex-1001 at 13:55-14:14). Claim 1 is set forth below with claim identifiers for reference below.

Claim Limitation Identifier	**Claim Limitation**
preamble	A light emitting device comprising:
electrode portion	at least one electrode portion
resin housing	a resin housing containing a reflecting material and covering a portion of said at least one electrode portion
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
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
edge area protrudes	wherein the at least one edge area protrudes in the width-wise direction from an end portion of the central area,
electrode portion cross section	wherein the at least one electrode portion further comprises an electrode portion cross section,
housing cross section	wherein the resin housing comprises at least one housing cross section,
four corners	wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing, and
not level	wherein the at least one housing cross section is not level with the electrode portion cross section.

While written obtusely, claim 1 has limitations related to the "at least one edge area" and a "central area" that define half of what can be thought of as a "U-shape." As discussed above, Patent Owner referenced FIG. 1, 12, and 17 as allegedly providing support for the claims during the prosecution of the '742 patent (Ex-1002 FH-00090; FH-00211). Some, but not all, of claim 1's limitations are shown below in FIGs. 17A and 17D to illustrate this U-shaped concept contained in claim 1.

Resin Housing Limitation: As shown in one package from FIG. 17A below, the light emitting device includes an electrode portion 112 (orange) and a resin housing (green) 111 having four corners. Although not shown, the resin housing is described in the '742 patent as containing a reflecting material such as titanium dioxide (TiO2), zinc oxide (ZnO) or boron nitride (BN) (Ex-1001 at 4:65-5:4).

'742 Patent FIGs. 17A Cropped and Annotated

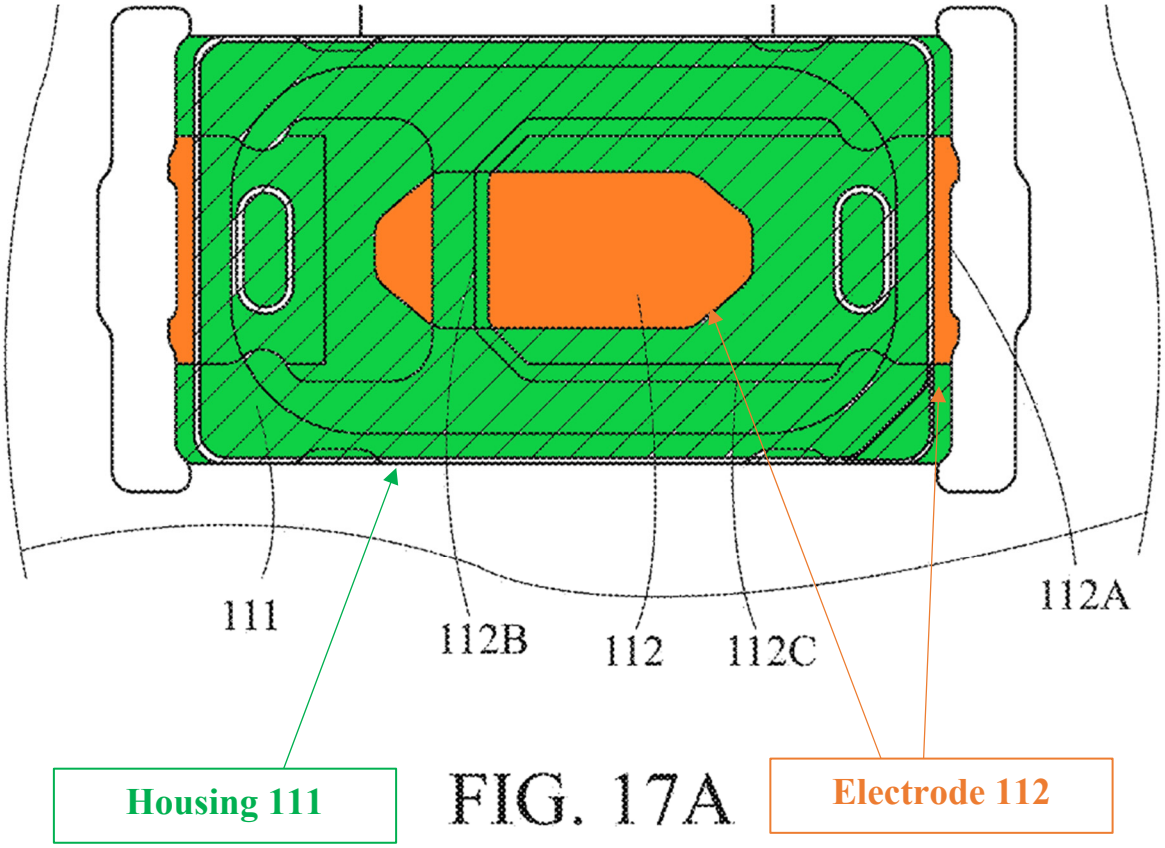
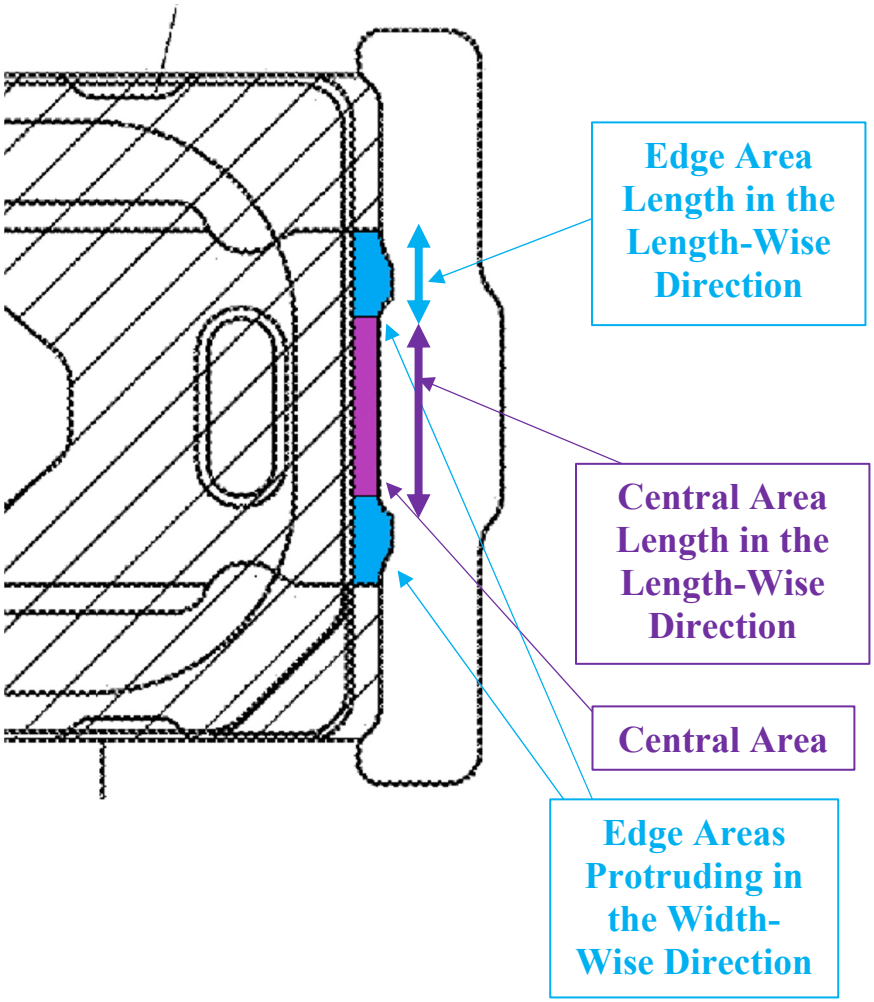


FIG. 17A

Electrode Portion Limitation: Below FIG. 17A is cropped and illustrates some, but not all, aspects of the claimed "electrode portion." FIG. 17A shows that the electrode portion has two small parts or "edge areas" (blue) and a "central area" (purple). FIG. 17A's "edge areas" have "a length in the length-wise direction shorter than that of the central area." Also, FIG. 17A's edge areas protrude "in the width-wise direction from an end portion of the central area." These features generally define a "U-shape," which in FIG. 17A is a flattened U-shape. Because claim 1 only

claims "at least one edge area" claim 1 relates to a shape that is akin to only half of the U-shape.

'742 Patent FIGs. 17A (Cropped and Annotated)



Cross Sections: The claim requires that the "electrode portion" comprises an "electrode portion cross section" but does not state where to take this cross section. An example "electrode portion cross section" is shown below. The claim also requires the "housing" to have "at least one housing cross section" that is "located in a vicinity of four corners of the resin housing." An example "housing cross section"

is shown below (only one corner is shown in FIG. 17D). The '742 patent states that in FIG. 17D, "the at least one housing cross section is not level with the electrode portion cross section" (Ex-1001 at 12:32-35).

'742 Patent FIG. 17D (Annotated)

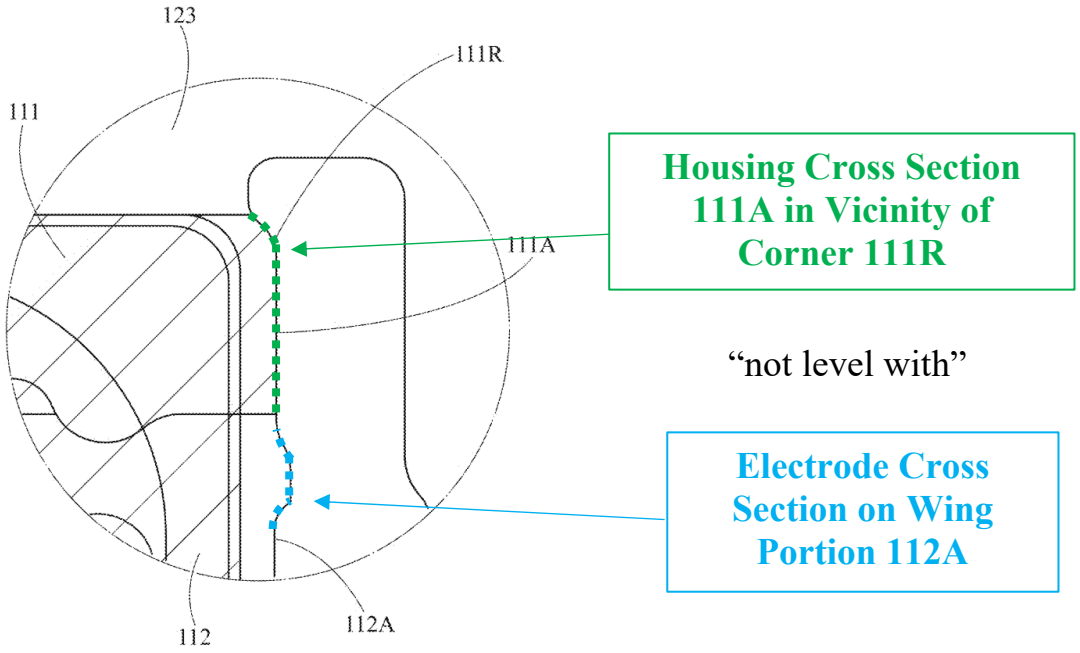


FIG. 17D

Claim 11 is set forth below with claim identifiers for reference below.

Claim Limitation Identifier	Claim Limitation
preamble	A light emitting device comprising:
electrode portion	at least one electrode portion having a wing portion;
resin housing	and a resin housing containing a reflecting material,

central area	wherein the wing portion comprises: a central area protruding from the housing in a first direction away from the housing;
edge area	and at least one edge area protruding from an edge portion of the central area, in the first direction,
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,
electrode portion cross section	wherein the at least one electrode portion further comprises an electrode portion cross section,
housing cross section	wherein the resin housing comprises at least one housing cross section,
housing corner	wherein the at least one housing cross section is located in a vicinity of a comer of the resin housing, and
not level	wherein the at least one housing cross section is not level with the electrode portion cross section,
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.

Claim 11 differs slightly from claim 1 in a few respects, one of which is that the "at least one edge area comprises two edge areas, wherein the two edge areas protrude from the central area in the first direction," where the first direction generally corresponds to the "width wise" direction of claim 1. Because claim 11 claims "two edge areas," claim 11 claims a general U-shape, as shown above, as opposed to half of a general U-shape, as indicated by claim 1, which claimed only one edge area.

VII. Overview of the Prior Art

The light emitting device claimed in the '742 patent is nothing new. In essence, the '742 patent claims half or all of a "U-shaped" electrode extending from a housing. The prior art is replete with this structure.

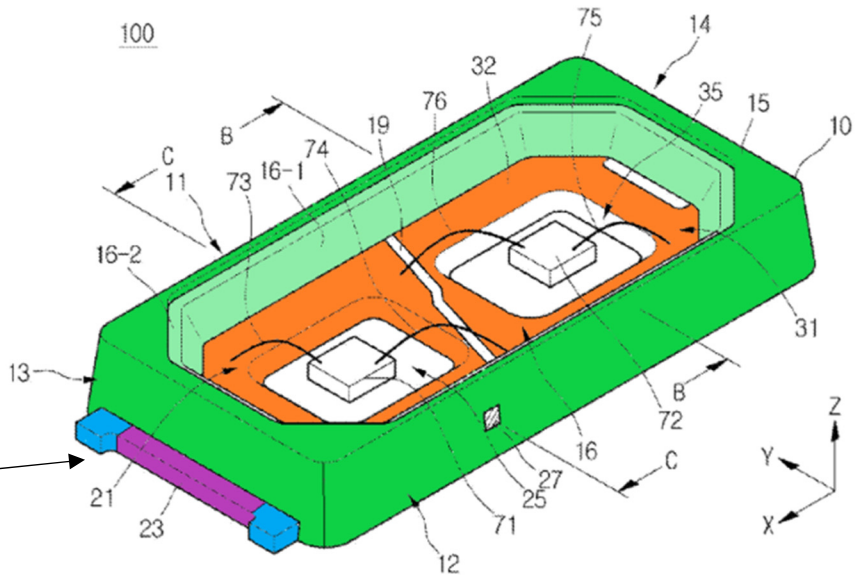
A. Kim

Kim (Ex-1004) is U.S. Patent Publication No. 2014/0054629, which published on February 27, 2014 (Ex-1004 at Cover). Kim was filed on July 10, 2013 and claims priority to Korean Patent Application No. 10-2012-0092594 filed August 23, 2012 (Ex-1004 at Cover), and thus has an effective filing date as early as August 23, 2012 and no later than July 10, 2013. Kim is prior art under 35 U.S.C. § 102(a)(1) because Kim published earlier than May 23, 2014 (*i.e.*, the earliest claimed effective filing date for the '742 patent) and prior art under 35 U.S.C. § 102(a)(2) because Kim names another inventor and was effectively filed prior to May 23, 2014.

Kim discloses a light emitting device including light emitting chips, a resin body, and a lead frame having a lead part that extends outside the resin body (Ex-1004 at [0050]-[0051], [0074]). As shown in Kim FIG. 1, the lead part of lead frame 23 that extends out of the resin body 10 is generally U-shaped (Ex-1004 at FIG. 1).

Kim FIG. 1

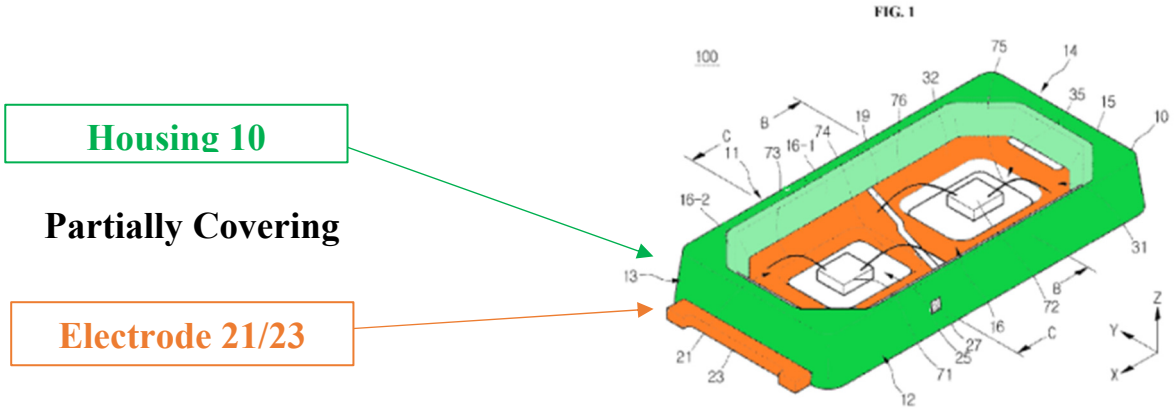
FIG. 1



Protruding "U-Shaped" Electrode with Central and Edge Areas

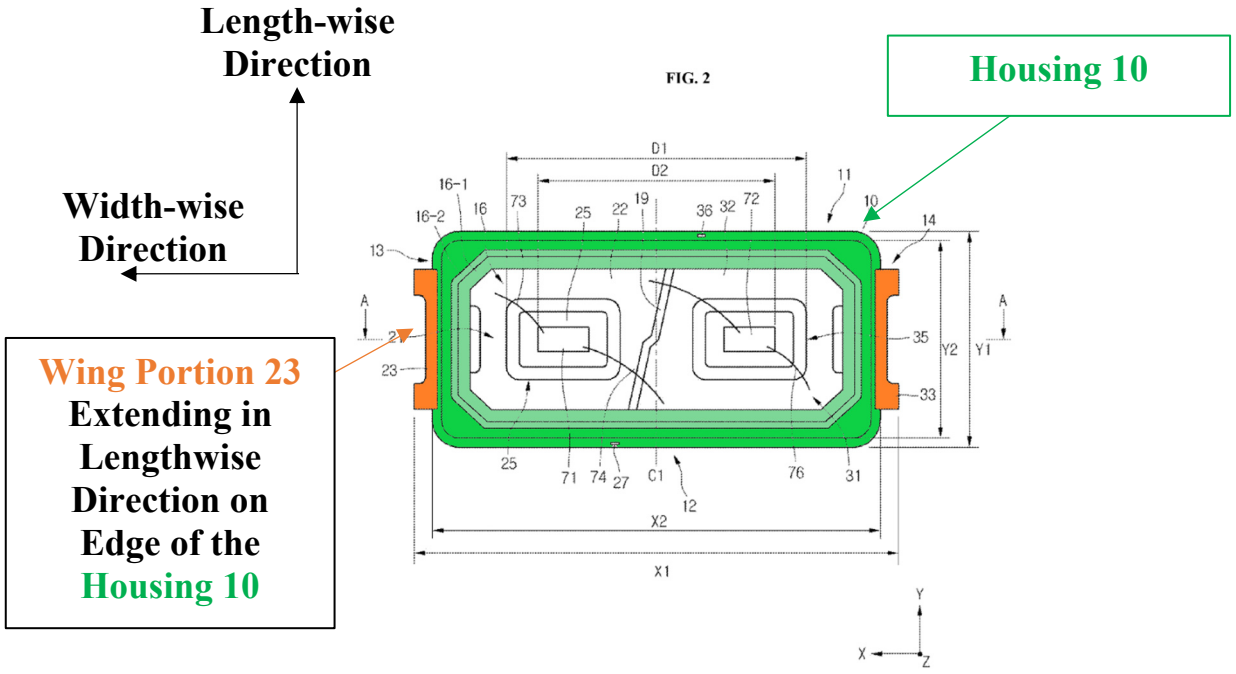
Kim discloses the same structure as claims 1 and 11 of the '742 patent. For instance, Kim's light emitting device 100 includes an electrode portion (*i.e.*, lead frames 21 including first lead part 23 [orange]) and a resin housing (body 10 [green]) covering at least a portion of the electrode portion (Ex-1004 at [0050]-[0051], [0074]). Although not shown, the body 10 "may include at least one of a resin material" and may contain a reflecting material such as "a filler serving as a metal oxide such as TiO2 or SiO2 may be added … in order to increase reflection efficiency" (Ex-1004 at [0051]).

Kim FIG. 1 (Annotated)



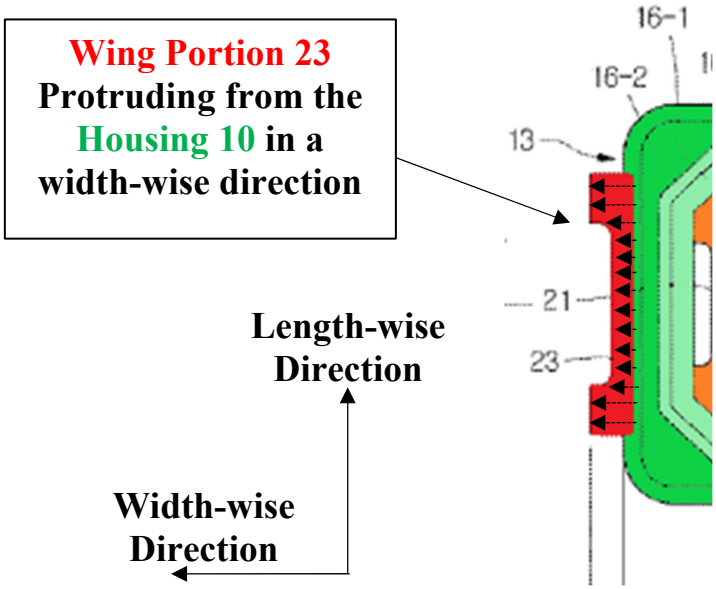
As shown in annotated Kim FIG. 2, below, the electrode portion (*i.e.*, lead frame 21) comprises a wing portion (*i.e.*, first lead part 23 [orange]) which is exposed outside the housing (*i.e.*, body 10 [green]; Ex-1004 at [0074]), the wing portion extending in a length-wise direction of the wing portion along an edge of the housing.

Kim FIG. 2 Annotated



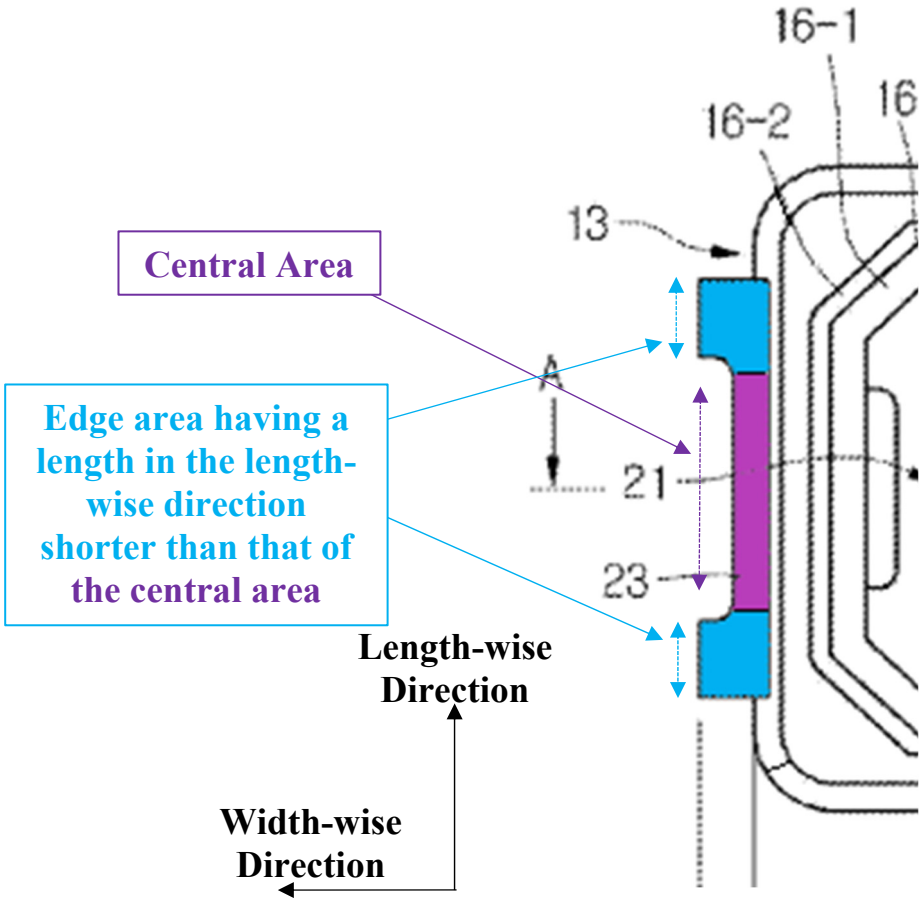
Further, as shown in the enlarged version of the left side of Kim FIG. 2, the wing portion (*i.e.*, first lead part 23 [red]) protrudes from the housing (*i.e.*, body 10 [green]) in a width-wise direction of the wing portion, the length-wise direction being substantially perpendicular to the width-wise direction.

Kim FIG. 2 (Cropped and Annotated)



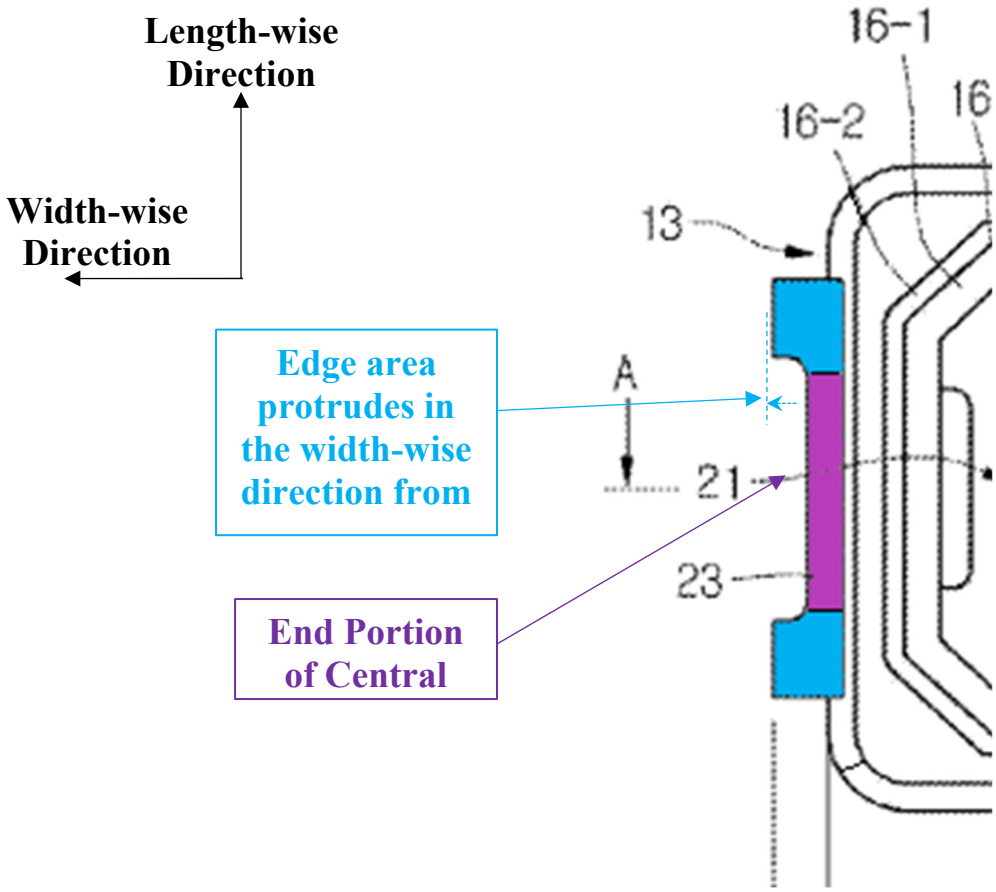
Further, as shown in an enlarged portion of the left side of Kim FIG. 2, the wing portion (*i.e.*, first lead part 23) includes a central area [purple] and at least one edge area [blue] having a length in the length-wise direction shorter than that of the central area.

'742 Patent FIG. 17A Annotated



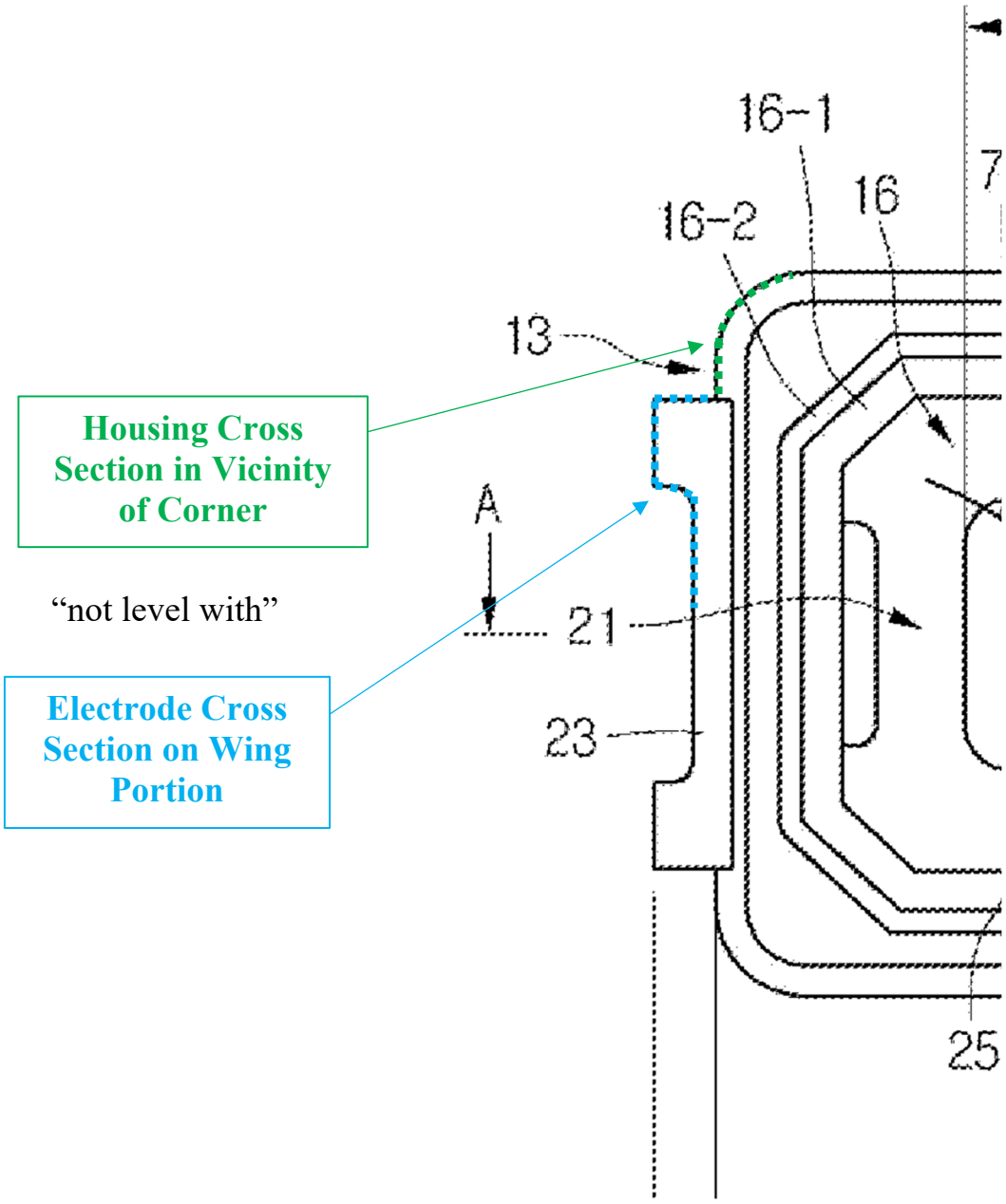
As shown an enlarged portion of the left side of Kim FIG. 2, the at least one edge area of first lead part 23 [blue] protrudes in the width-wise direction from an end portion of the central area of first lead part 23 [purple], though the claims of the '742 do not otherwise define where the "end portion" of the central area is located.

Kim FIG. 2 Annotated



Finally, although Kim does not use the same "cross-section" terminology as is used in the '742 patent, as shown in an enlarged portion of the left side of Kim FIG. 2, the electrode portion (*i.e.*, first lead part 23) comprises an electrode portion cross section, the resin housing (*i.e.*, body 10) comprises at least one housing cross section, the at least one housing cross section is located in a vicinity of four corners of the resin housing, and the at least one housing cross section is not level with the electrode portion cross section.

Kim FIG. 2 Annotated



B. Kobayakawa

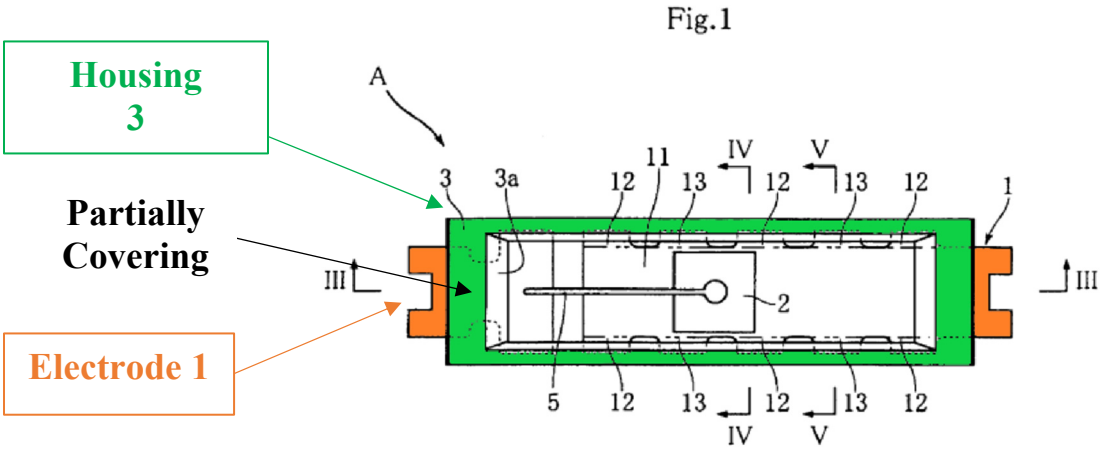
United States Patent No. 7,825,426 ("Kobayakawa") issued on November 2, 2010 (Ex-1005 at Cover) and is prior art to the '742 patent under 35 U.S.C. §

102(a)(1) because Kobayakawa published before May 23, 2014, which the earliest claimed effective filing date of the application for the '742 patent. Kobayakawa is also prior art under 35 U.S.C. § 102(a)(2) because Kobayakawa issued from an application for a patent that was filed by another on March 28, 2008 (Ex-1005 at Cover), which is before the earliest claimed effective filing date of the application for the '742 patent.

Kobayakawa discloses a semiconductor light-emitting device having a "case 3" or housing that for example is "made of a white resin" such that "[t]the inner surfaces of the case 3 serve as a reflector 3 a that tapers downward. The reflector 3 upwardly reflects light which is emitted laterally from the LED chip 2" (Ex-1005 at 3:21-29). Kobayakawa's semiconductor light emitting device also includes a "lead frame 1" that "is exposed out of the case 3" (Ex-1005 at 2:39-41).

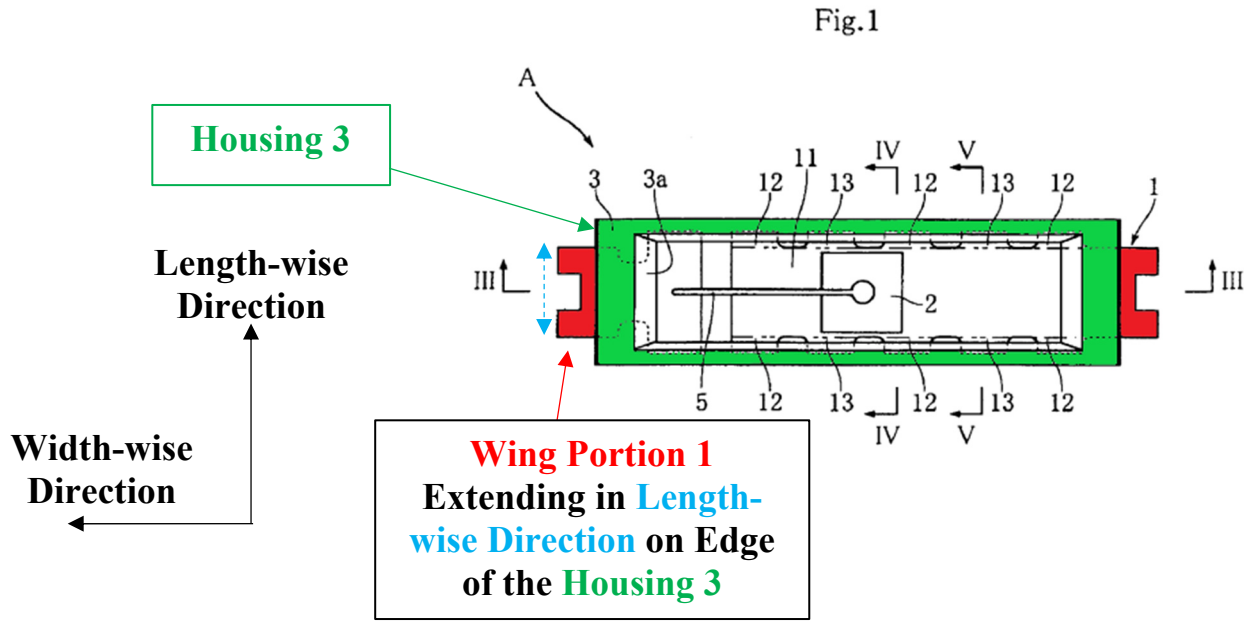
Kobayakawa discloses the same structure as claims 1 and 11 of the '742 patent. For instance, Kobayakawa's semiconductor light-emitting device comprises an electrode portion (*i.e.*, lead frames 1 [orange]) and a resin housing (*i.e.*, case 3 [green]) covering at least a portion of the electrode portion (Ex-1005 at 2:39-41; 3:31-4:3). This is shown in annotated FIG. 1, below.

Kobayakawa FIG. 1 Annotated



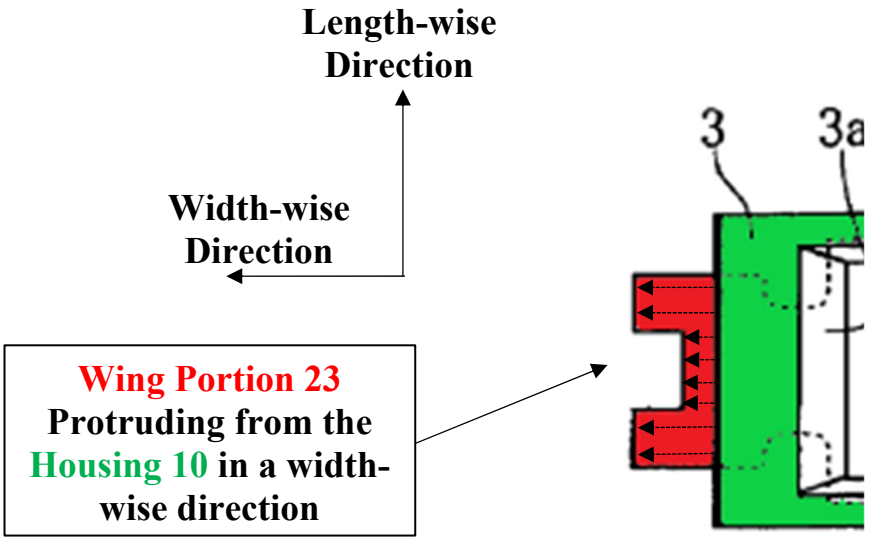
As shown in an annotated version of Kobayakawa FIG. 1 below, the electrode portion (*i.e.*, lead frame 1) comprises a wing portion (*i.e.*, "U-shaped" portion [red]) which is exposed outside the housing (*i.e.*, case 3 [green]), the wing portion extending in a length-wise direction of the wing portion along an edge of the housing.

Kobayakawa FIG. 1 Annotated



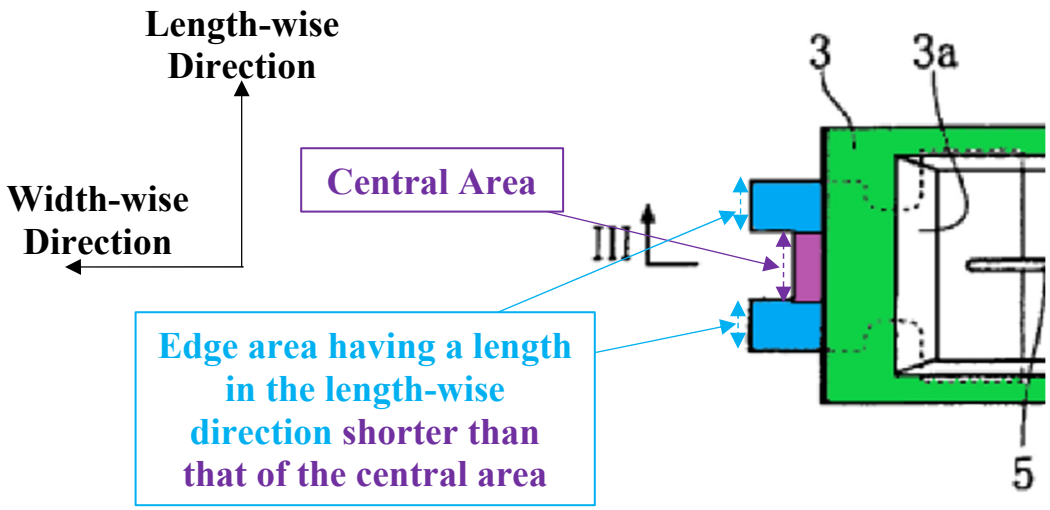
Further, as shown in the enlarged version of the left side of Kobayakawa FIG. 1, the wing portion (*i.e.*, lead frame 1 [red]) protrudes from the housing (*i.e.*, case 3 [green]) in a width-wise direction of the wing portion, the length-wise direction being substantially perpendicular to the width-wise direction.

Kobayakawa FIG. 1 Annotated



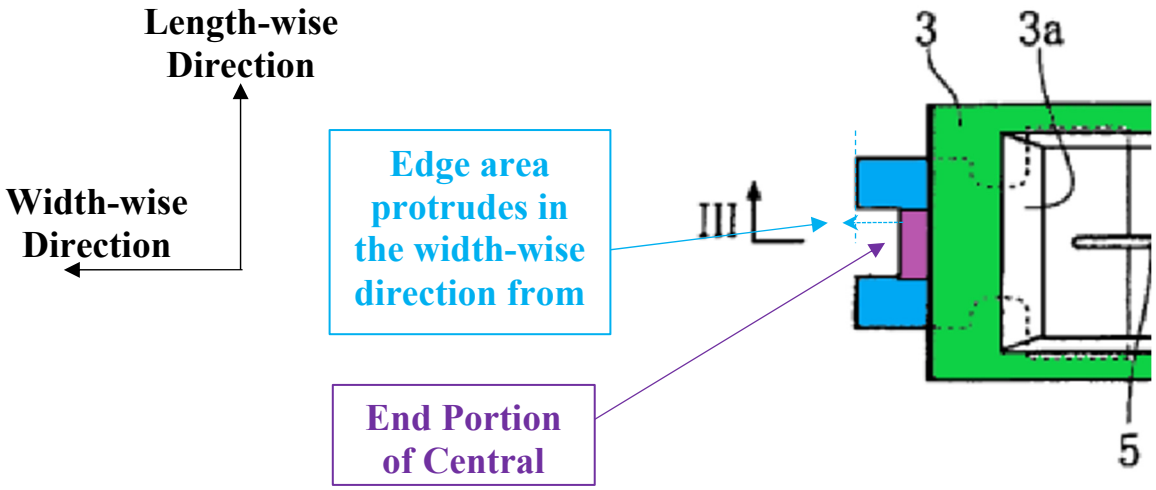
Further, as shown in an enlarged portion of the left side of Kobayakawa FIG. 1, the wing portion (*i.e.*, lead frame 1 exposed from case 3) includes a central area [purple] and at least one edge area [blue] having a length in the length-wise direction shorter than that of the central area.

Kobayakawa FIG. 1 Annotated



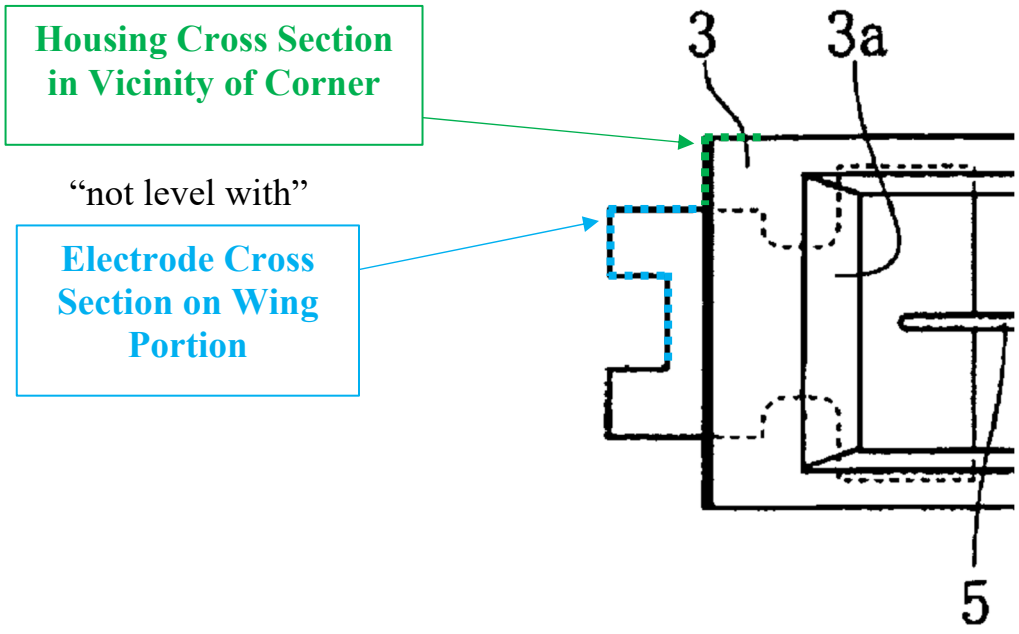
As shown an enlarged portion of the left side of Kobayakawa FIG. 1, the at least one edge area of lead frame 1 [blue] protrudes in the width-wise direction from an end portion of the central area of lead frame 1 [purple], though the claims of the '742 do not otherwise define where the "end portion" of the central area is located.

Kobayakawa FIG. 1 Annotated



Finally, although Kobayakawa does not use the same "cross-section" terminology as is used in the '742 patent, as shown in an enlarged portion of the left side of Kobayakawa FIG. 1, the electrode portion (*i.e.*, lead frame 1) comprises an electrode portion cross section, the resin housing (*i.e.*, case 3) comprises at least one housing cross section, the at least one housing cross section is located in a vicinity of four corners of the resin housing, and the at least one housing cross section is not level with the electrode portion cross section.

Kobayakawa FIG. 1 Annotated



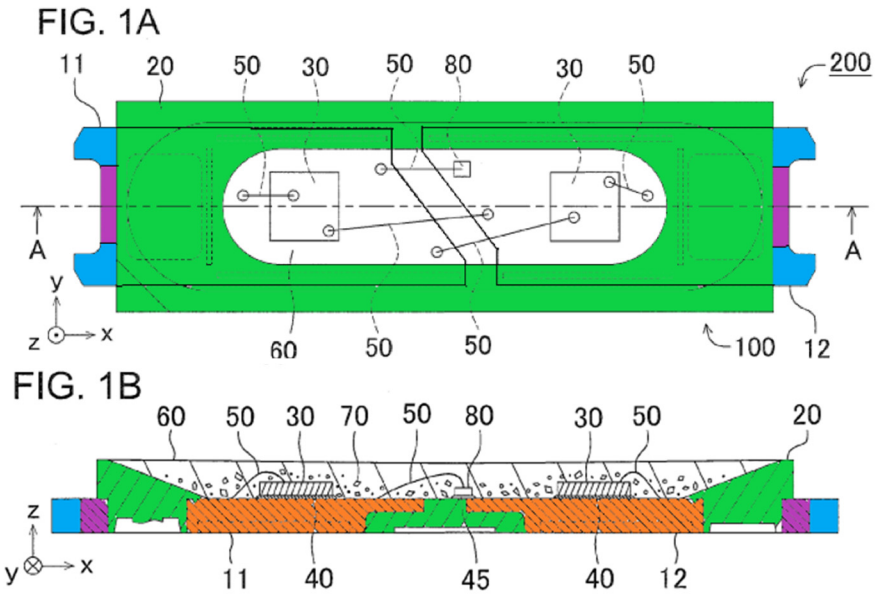
C. Hayashi

Hayashi (Ex-1006) is U.S. Patent Publication No. 2014/0117403, which published on May 1, 2014 (Ex-1006 at Cover). Hayashi was filed on October 28, 2013 and claims priority to Japanese Patent Application No. 2012-241155, filed

October 31, 2012, (Ex-1006 at Cover), and thus has an effective filing date as early as October 31, 2012 and no later than October 28, 2013. Thus, Hayashi is prior art under 35 U.S.C. § 102(a)(1) because Hayashi published earlier than May 23, 2014 (*i.e.*, the earliest claimed effective filing date for the '742 patent) and prior art under 35 U.S.C. § 102(a)(2) because Hayashi names another inventor and was effectively filed prior to May 23, 2014.

Hayashi discloses a molded resin housing 20 and an electrode 11 extending from the housing have a general u-shaped configuration as shown in FIG. 1A & 1B below.

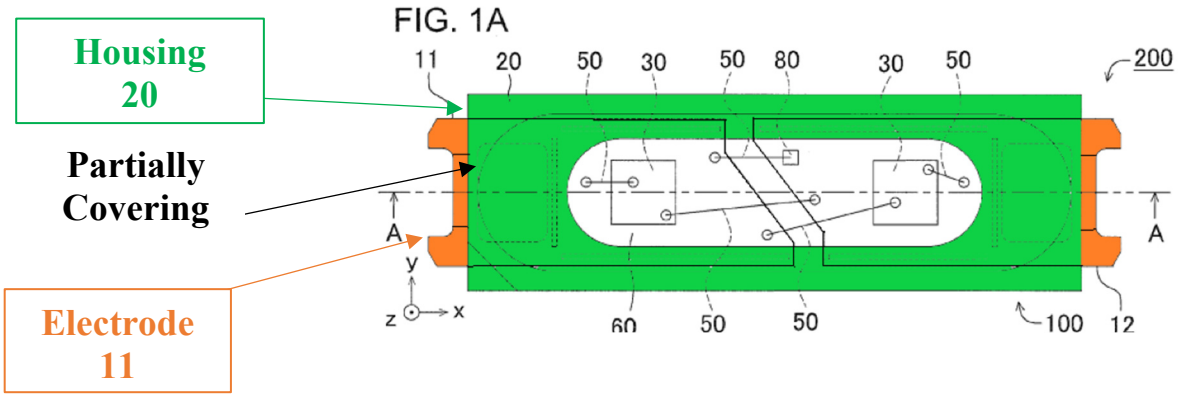
Hayashi FIGs. 1A & 1B



Hayashi discloses the same structure as claims 1 and 11 of the '742 patent. For

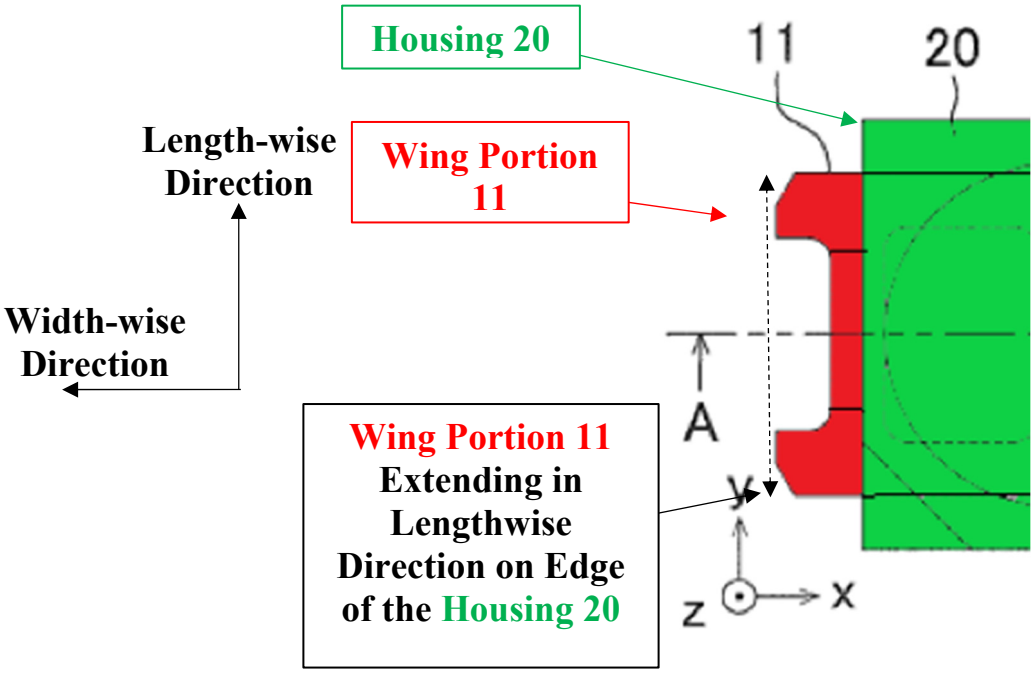
instance, Hayashi's light emitting device shown in Hayashi FIG. 1A comprises an electrode portion (*i.e.*, lead frames 11, 12 [orange]) and a resin housing (*i.e.*, molded resin 20 [green]) covering at least a portion of the electrode portion (Ex-1005 at [0023]-[0025]) and the "side-walls of the molded resin 20 cavity … function stably as light-reflecting surfaces" (Ex-1006 at [0045]).

Hayashi FIG. 1A Annotated



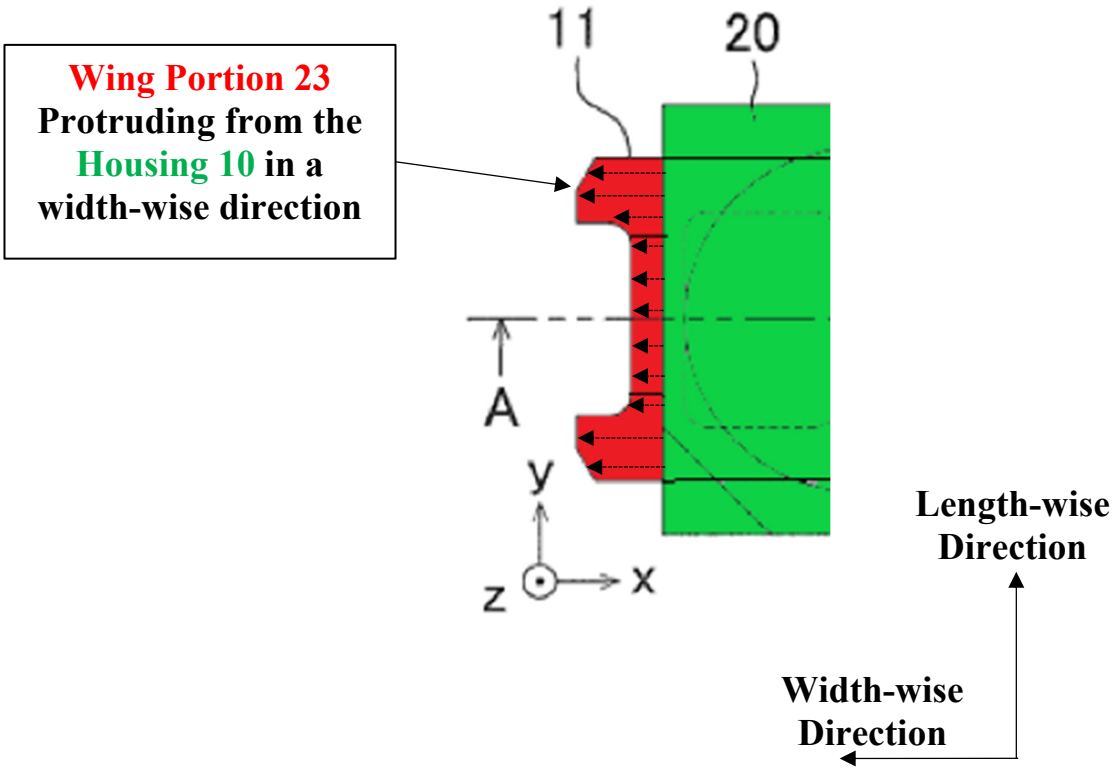
As shown in an annotated version of Hayashi FIG. 1A below, the electrode portion (*i.e.*, lead frames 11) comprises a wing portion (*i.e.*, "U-shaped" portion [red]), which is exposed outside the housing (*i.e.*, molded resin 20 [green]), the wing portion extending in a length-wise direction ("y-direction") of the wing portion along an edge of the housing.

Hayashi FIG. 1A Annotated



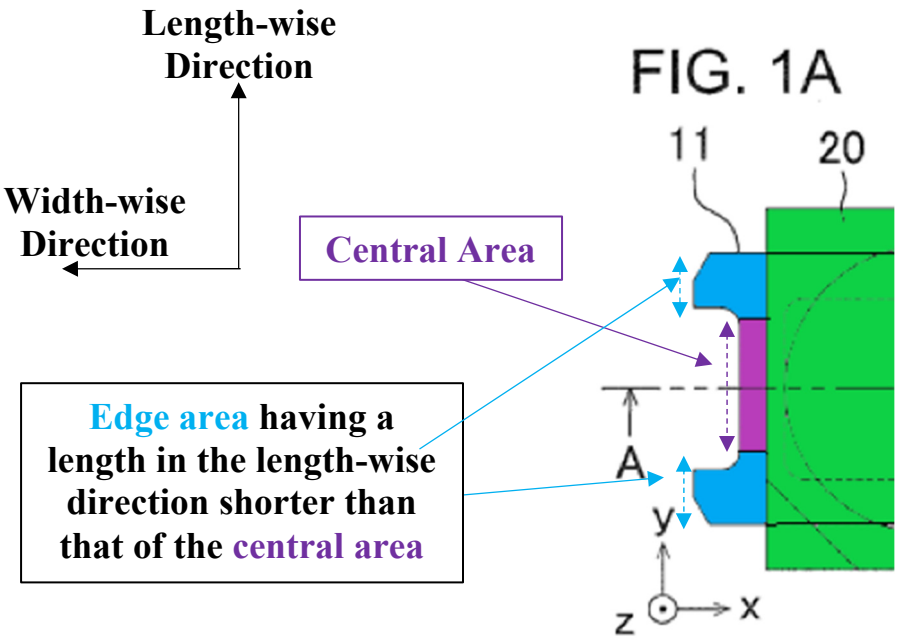
Further, as shown in the enlarged version of the left side of Hayashi FIG. 1A, the wing portion (*i.e.*, lead frame 11 [red]) protrudes from the housing (*i.e.*, molded resin 20 [green]) in a width-wise direction of the wing portion, the length-wise direction being substantially perpendicular to the width-wise direction.

Hayashi FIG. 1A Annotated



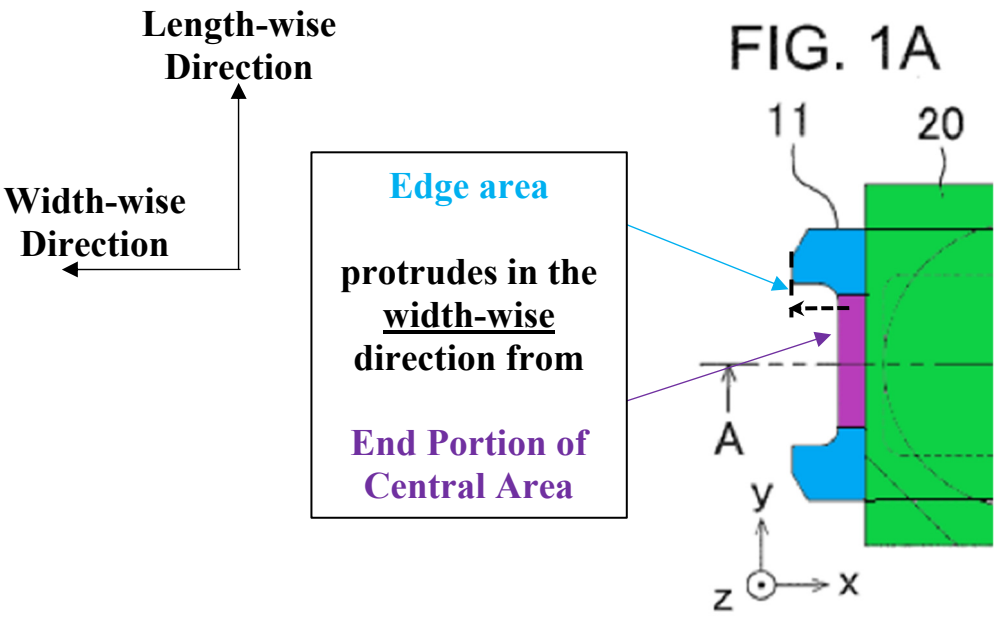
Further, as shown in an enlarged portion of the left side of Hayashi FIG. 1A, the wing portion (*i.e.*, lead frame 11 exposed molded resin 20) includes a central area [purple] and at least one edge area [blue] having a length in the length-wise direction shorter than that of the central area.

Hayashi FIG. 1A Annotated



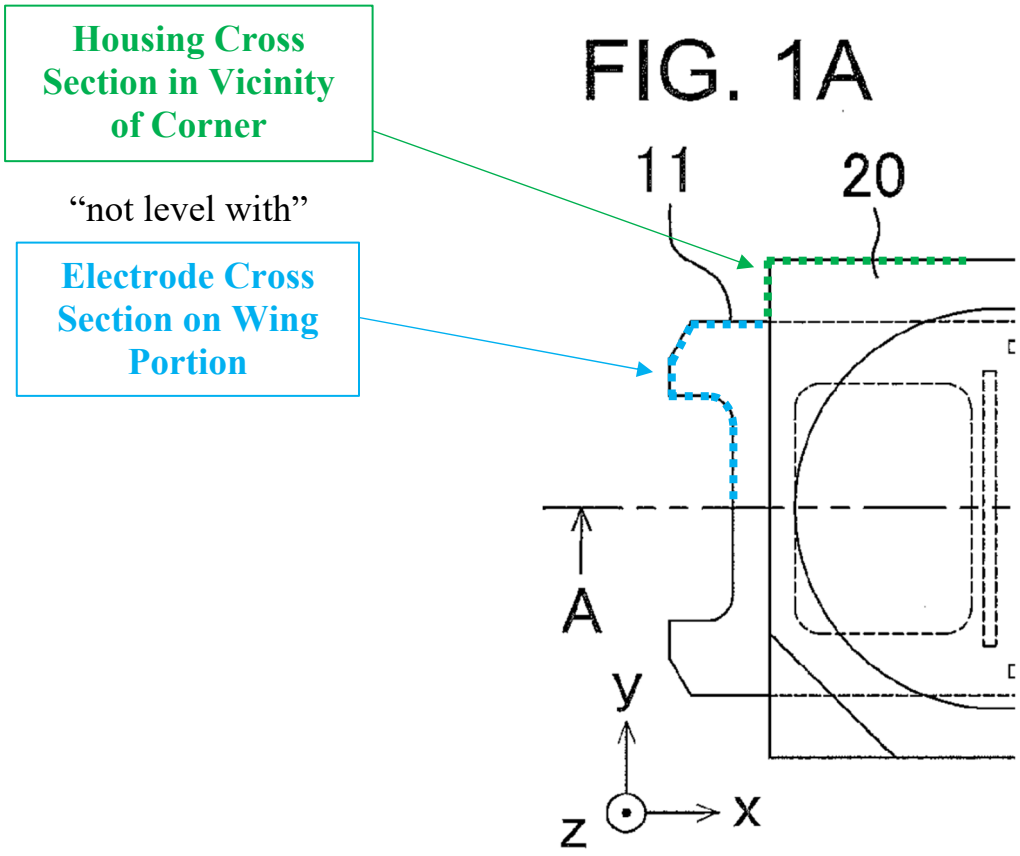
As shown in enlarged portion of the left side of Hayashi FIG. 1A, the at least one edge area of lead frame 11 [blue] protrudes in the width-wise direction from an end portion of the central area of lead frame 11 [purple], though the claims of the '742 do not otherwise define where the "end portion" of the central area is located.

Hayashi FIG. 1A (Annotated)



Finally, although Hayashi does not use the same "cross-section" terminology as is used in the '742 patent, as shown in an enlarged portion of the left side of Kobayakawa FIG. 1A, the electrode portion (*i.e.*, lead frame 11) comprises an electrode portion cross section, the resin housing (*i.e.*, resin molding 20) comprises at least one housing cross section, the at least one housing cross section is located in a vicinity of four corners of the resin housing, and the at least one housing cross section is not level with the electrode portion cross section.

Hayashi FIG. 1A (Annotated)



VIII. PERSON OF ORDINARY SKILL IN THE ART ("POSITA")

A POSITA in the field of the '742 patent at the time of the effective filing date 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 (Ex-1003 at ¶ 33). This description is approximate, and a higher level of education or skill might make up for less experience, and additional experience could make up for a lower education level (for example, an M.S. in any of the above fields and two years of practical experience

would qualify one as a POSITA) (*Id.*).

IX. NO BASIS EXISTS FOR DISCRETIONARY DENIAL UNDER §§ 314(A) AND 325(D)

Each factor regularly considered under § 314(a) weighs in favor of institution or is neutral. *General Plastics* does not apply, as this is the only IPR filed against the '742 patent, so the Board can satisfy the requirements of 35 U.S.C. § 316(a)(11). *General Plastic Indus. Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) (precedential: §II.B.4.i).

Factors considered under § 314(a) related to parallel district court litigations weigh in favor of institution. Each of factors set forth in *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 (March 20, 2020) (precedential) are addressed below:

1. **District Court Stay**: Favors institution. On May 30, 2024, a joint motion for a 30-day delay/stay of pending deadlines was filed in the Everlight-IKEA litigation (Ex-1007), which favors institution. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 12 (PTAB May 13, 2020).
2. **Proximity of Trial Date**: Favors Institution. Jury selection/trial has been scheduled for November 10, 2025 in the IKEA-Everlight Litigation (Ex-1013), which is close to the projected statutory deadline for this IPR. It is unlikely that Court would hold the trial if this IPR is instituted and

a final written decision is imminent. A motion to move the trial date is likely if this IPR is instituted. Further, given that the claims of the '742 patent were found indefinite (Ex-1016 at 2-3), it is unlikely that the claims of the '742 patent will be litigated at any upcoming trial.

3. **Investment in Parallel Proceedings**: Favors Institution. Although the IKEA-Everlight Litigation was filed in July 2023, due to jurisdictional disputes and related briefing, a schedule for the suit was not set until March 6, 2024 (Ex-1013). The only scheduled dates that have passed are initial contention disclosures and identification of claim terms for construction (Ex-1013). Further, a delay of pending deadlines was recently jointly requested (Ex-1007). Other than an initial identification of claim terms, claim construction has not yet begun, fact discovery is not open (and does not open until after the claim construction hearing, which has not been scheduled), and does not close until April 2025. Expert discovery is from May to June 2025. Based on the initial nature of the litigation, this factor favors institution.
4. **Overlap in Issues**: Favors Institution. The grounds raised here are only a subset of the grounds being raised in the IKEA-Everlight litigation. Additionally, claims 13, 14, 16, and 22 are challenged here but are not

asserted in the IKEA-Everlight litigation (Ex-1025 at § I). Further, given that the claims of the '742 patent were found indefinite (Ex-1016 at 2-3), it is unlikely that prior art validity of the '742 patent will be litigated at any upcoming trial.

5. **Same Party:** Favors Institution. ISAG is not a party to any of the pending litigations involving the '742 patent, though ISAG has contractual relations with IKEA companies in the IKEA-Everlight Litigation.
6. **Other Circumstances**: Favors Institution. This Petition is strong on the merits in establishing the unpatentability of the claims. The factors considered for discretionary denial weigh in favor of the Board declining to exercise its discretion to deny institution.

Factors considered under § 325(d) related whether the same or substantially the same art was previously considered weigh in favor of institution. For example, each of Kim, Kobayakawa, and Hayashi form the basis of lack of novelty grounds, and none of these references was considered by the Examiner (*See* Ex-1002; Ex-1001 at Cover ("references Cited")), which favors institution. *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH*, IPR2019-01469, Paper 6 (PTAB. Feb. 13, 2020) (precedential).

X. CLAIM CONSTRUCTION

A claim construction order was recently issued in the Walmart-Everlight Litigation (Ex-1016). For the terms construed in the Order, Petitioner applies the constructions here (Ex-1016). For instance, when defining electrode and/or housing cross sections below, Petitioner identifies plane surfaces formed by cutting a solid (Ex-1016 at 2-3).

Otherwise, no other constructions are needed for purposes of this petition, and Petitioner applies the plain meaning. Given that the prior art is nearly identical to the structures disclosed in the '742 patent, additional constructions do not appear necessary. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

Petitioner notes that 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 in the Everlight-Walmart litigation (Ex-1016 at p. 3). While a Court found the claim scope indefinite and indefiniteness is beyond the scope of an *inter partes* review, 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. The "cross sections" identified in the prior art references are clearly "not level" under any meaning that can be ascribed to the claim term, and – regardless of whether the full claim scope can be ascertained – "the phrase is broad

enough to create a reasonable likelihood that it reads on the prior art that is asserted here." *Amneal Pharmaceuticals LLC v. Alkermes Pharma Ireland Limited*, IPR2018-00943, Paper 8 at p. 12 (PTAB Nov. 7, 2018). It is not necessary to determine the precise contours of the "not level" limitation to determine that it encompasses the prior art and that trial should be instituted. *Id.* at pp. 12-13 (*citing Vivid Techs.*, 200 F.3d at 803). The merits of the prior art unpatentability grounds are sufficiently strong that they should be affirmed even if the claims do not comply with § 112. *Vibrant Media Corp. v. General Electric Co.*, IPR2013-00172, Paper 50 at pp. 9-11 (PTAB July 29, 2013) (*citing In re Collier*, 397 F.2d 1003, 1005–1006 (CCPA 1968). For the purposes of this petition, Petitioner applies a plain meaning construction for the "not level" term.

XI. SPECIFIC GROUNDS FOR PETITION

The five petition grounds are provided below. As set forth below, Dr. Lebby testifies that the Challenged Claims are anticipated by and/or rendered obvious over Kim, Kobayakawa, Hayashi, and/or the ordinary level of skill in the art.

A. GROUND 1: Anticipation by Kim

For Ground 1, the prior art consists of Kim (Ex-1004). The challenged claims are claims 1, 2, 5-16, and 20-22.

1. Kim Anticipates Claim 1

Kim anticipates claim 1 (*See* Ex-1003 at § 9.1.1).

a) Kim Discloses Claim 1's Preamble

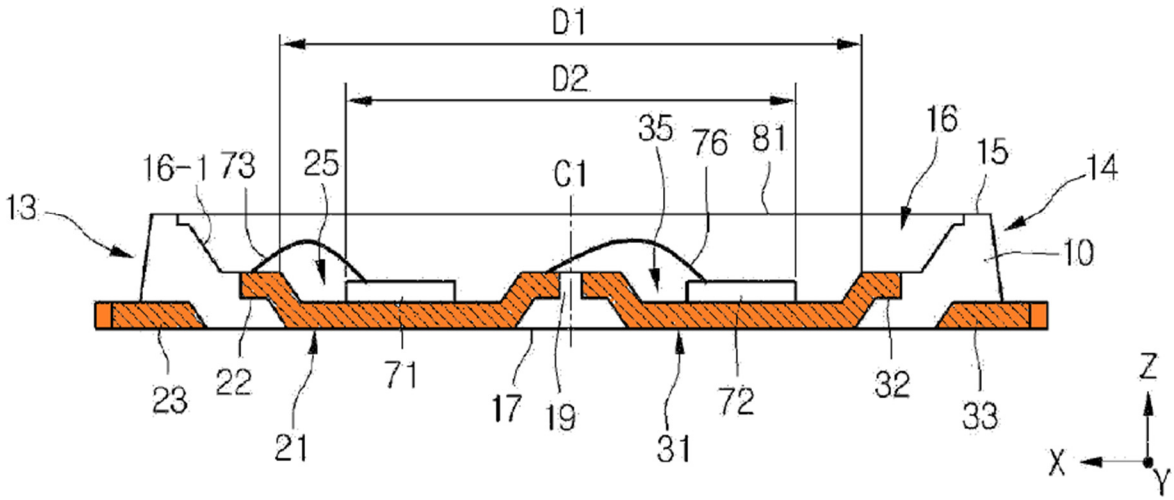
Kim discloses a "light emitting device" whether or not the preamble is a limitation (*See* Ex-1003 at § 9.1.1). Kim discloses a "light emitting device 100" (Ex-1004 at [0050]).

b) Kim Discloses Claim 1's "Electrode Portion"

Kim discloses a "lead frames 21, 23" that have "first/second lead parts 23, 33" respectively (*See* Ex-1003 at § 9.1.2; Ex-1004 at [0050], [0065]; as shown in FIG. 2, below), which are the claimed "at least one electrode portion" (Ex-1004 at [0050], [0065]).

Kim Fig. 3 (Annotated)

FIG. 3

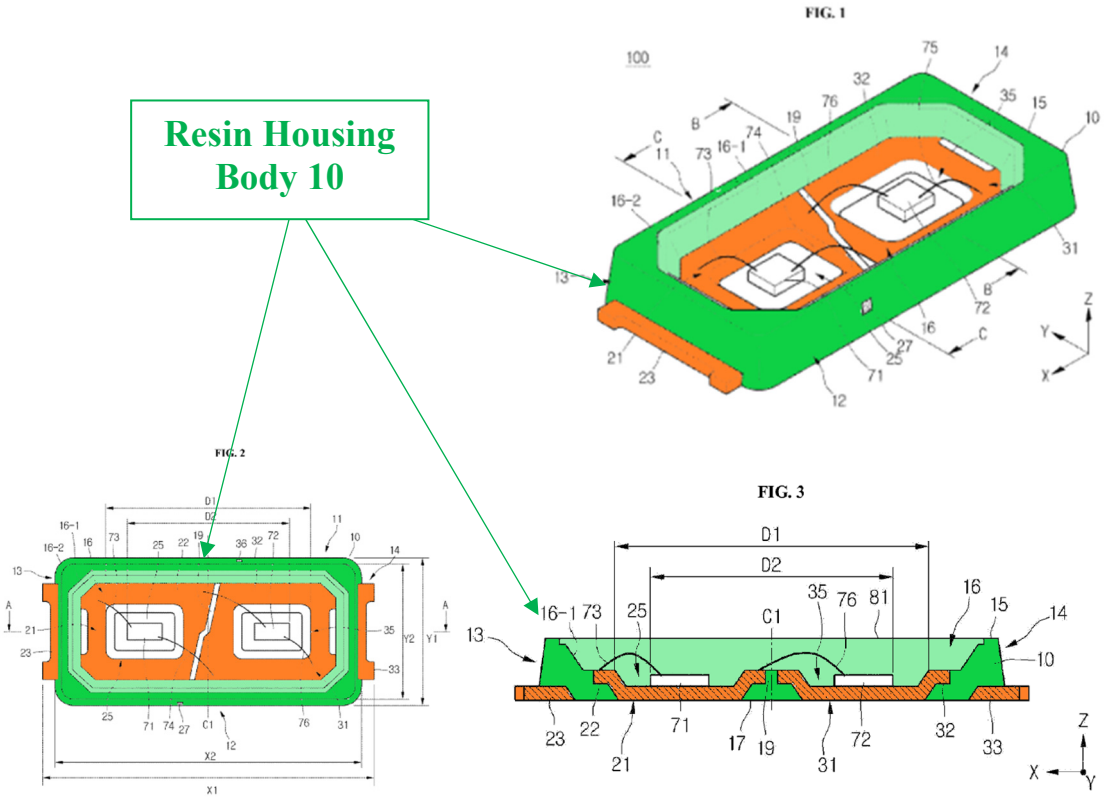


c) Kim Discloses Claim 1's "Resin Housing"

Kim discloses a "body 10" that comprises the claimed "a resin housing containing a reflective material and covering a portion of said at least one electrode

portion" (Ex-1003 at § 9.1.1.3). Kim describes that "body 10 may include at least one of a resin material, such as PPA (Polyphthalamide), Si, a metallic material, PSG (photosensitive glass, Al203, and PCB" (Ex-1004 at [0051]). Resins and metallic materials are reflective (Ex-1003 at ¶ 120). Kim further states that 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" (Ex-1004 at [0051]). As shown in Kim FIGs. 1 and 3, body 10 covers a portion of the lead frame 21 having first lead part 23 as well as lead frame 31 having second lead part 33 (*e.g.*, "electrode portion").

Kim FIGs. 1-3 (Annotated)

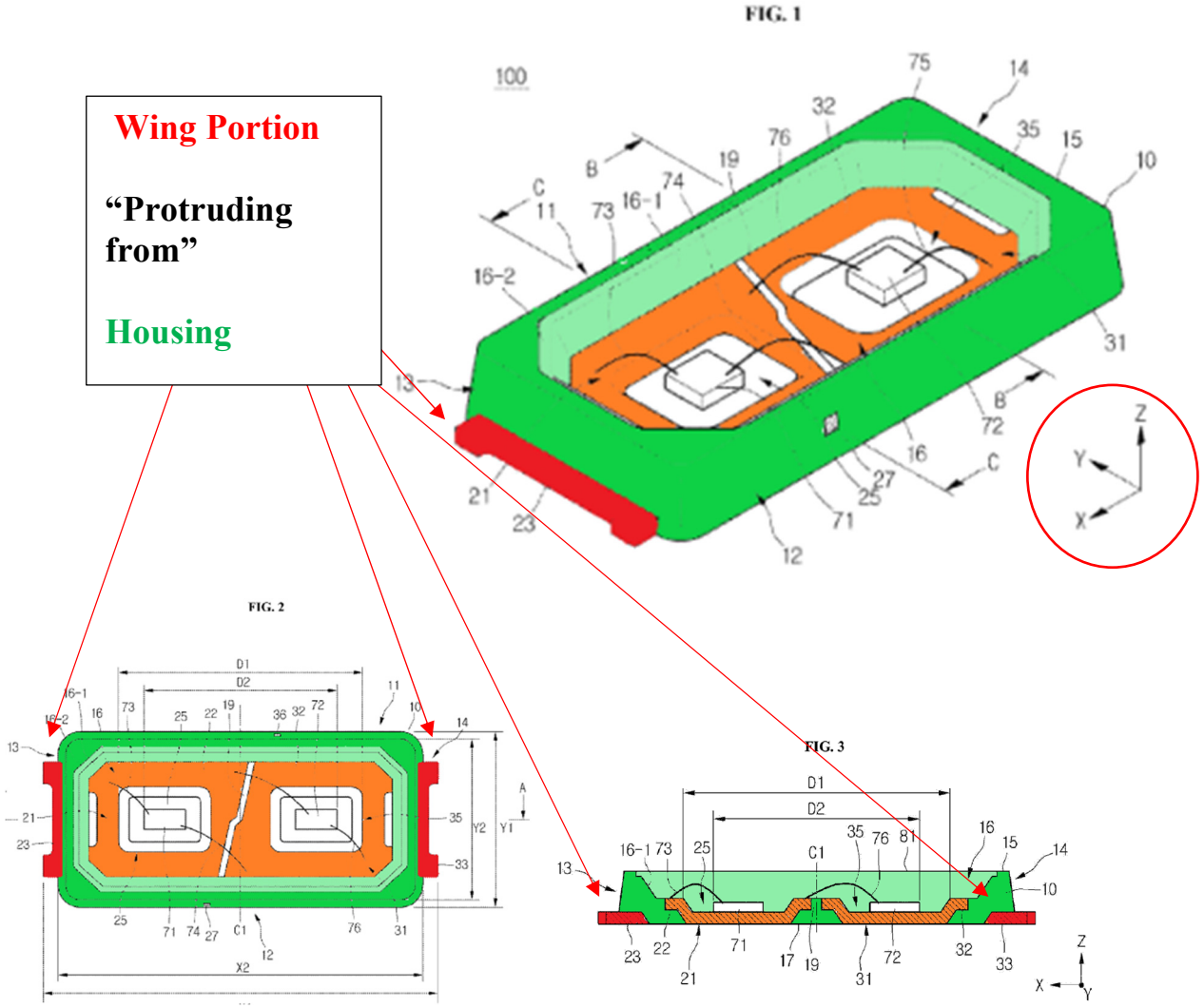


d) Kim Discloses Claim 1's "Wing Portion"

Kim discloses "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" (*See* Ex-1003 at 9.1.1.4; Ex-1004 at [0074]-[0076]). As shown in FIG. 1, "first/second lead parts 23, 33" of lead frames 21, 31, respectively, each correspond to the claimed "wing portion." Kim also shows that lead frame portions 23, 33 (*e.g.,* "wing portions") are

exposed outside of the body 10 (*e.g.*, "housing"), extend in the "y" direction (*e.g.*, "length-wise direction") along an edge of the body 10 (*e.g.*, "housing"), protrude from the body 10 (*e.g.*, "housing") in an "x" direction (*e.g.*, width-wise direction) of the wing portion, with the "y" (*e.g.*, "length-wise") direction being substantially perpendicular to the "x" (*e.g.*, width-wise) direction.

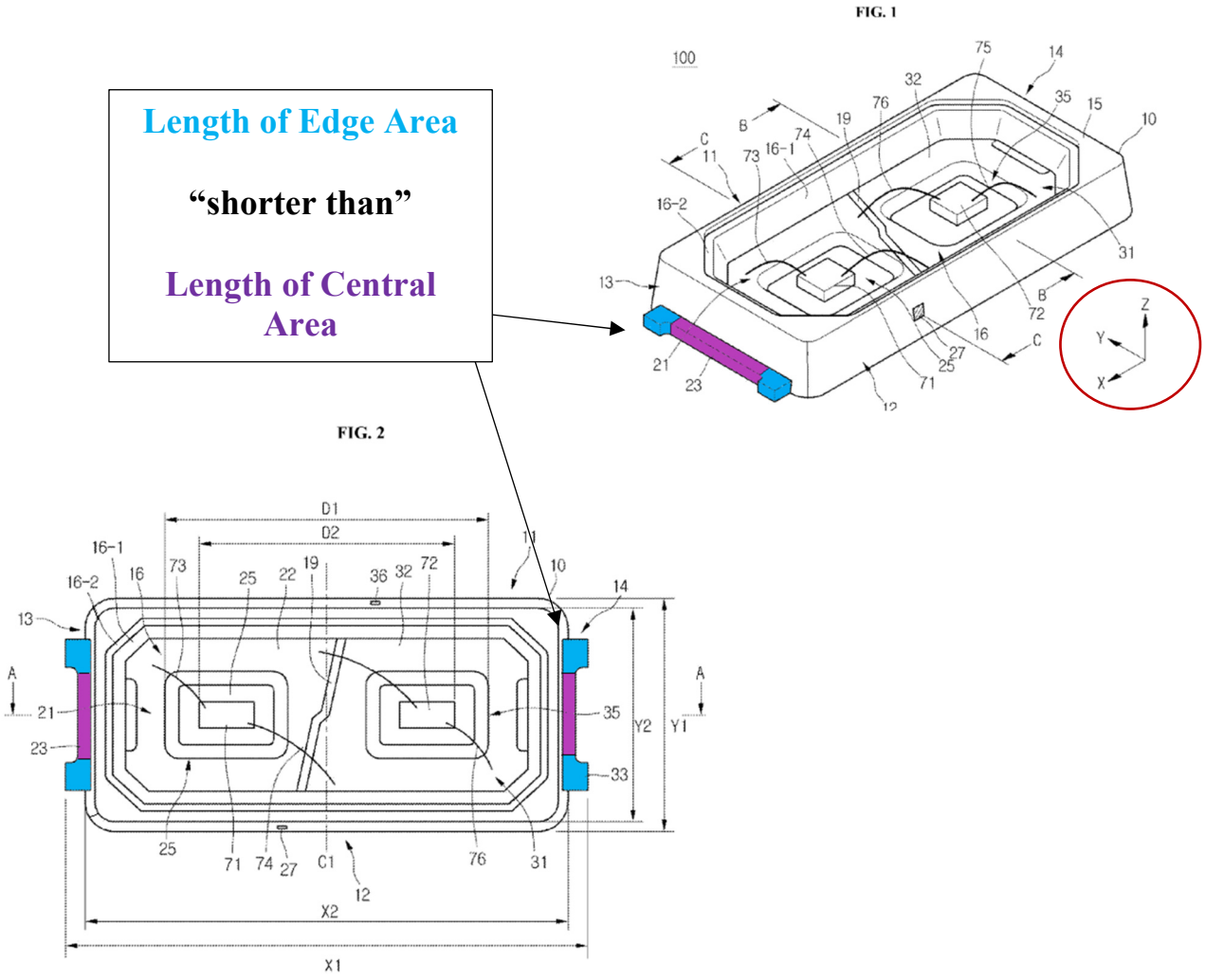
Kim FIGs. 1-3 (Annotated)



e) Kim Discloses Claim 1's "Central Area and Edge"

Kim discloses that "first/second lead parts 23, 33" (*e.g.*, electrode portion) each have a "central area" (purple) and "at least one edge area" (blue) having a length in the length-wise direction" (*e.g.*, "y-direction") "shorter than that of the central area" as shown in Figures 1-2 (*See* Ex-1003 at § 9.1.1.5).

Kim Figs. 1 & 2 Annotated



f) Kim Discloses Claim 1's "Edge Area Protrudes"

Kim discloses that "first/second lead parts 23, 33" each have "edge area that protrudes in the width-wise direction" (*e.g.*, "x-direction") "from an end portion of the central area" as shown in FIGs. 1-2 (Ex-1003 at § 9.1.1.6). Although one "edge area" satisfying this limitation is labeled below, it will be appreciated that Kim discloses four of the claimed "edge areas."

Kim Figs. 1 & 2 (Annotated)

FIG. 1

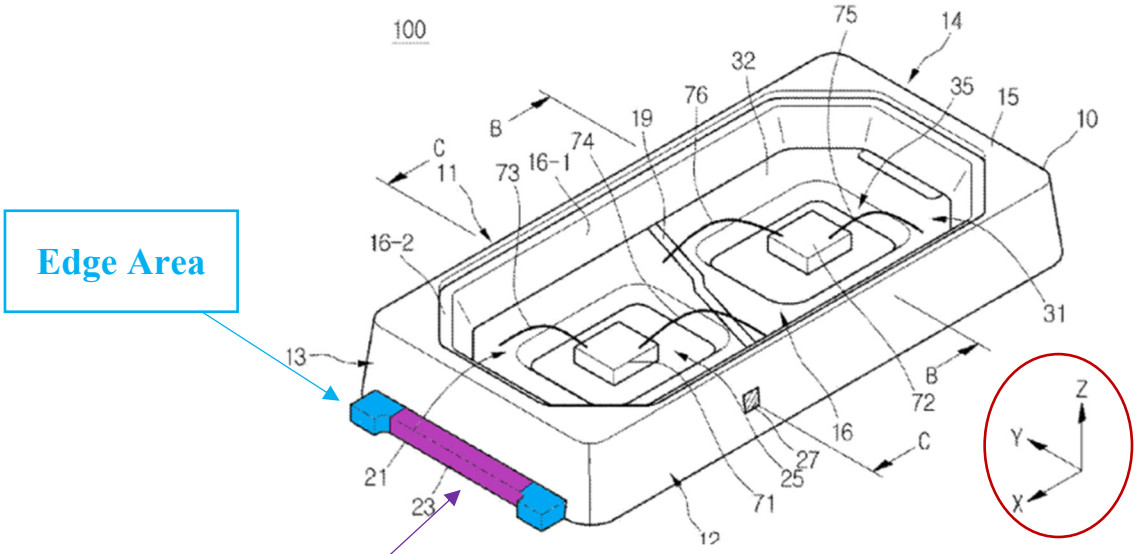
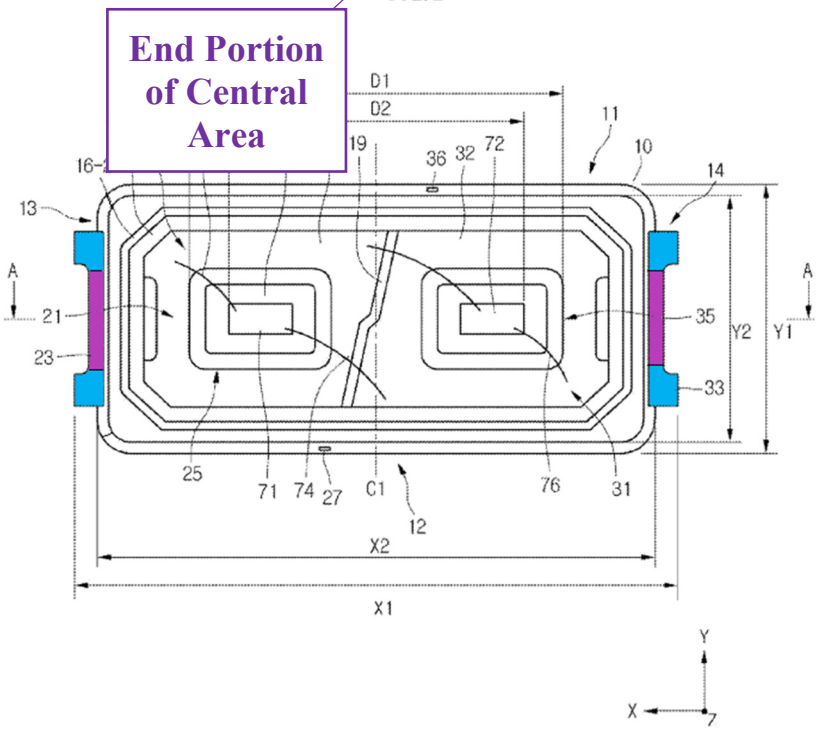


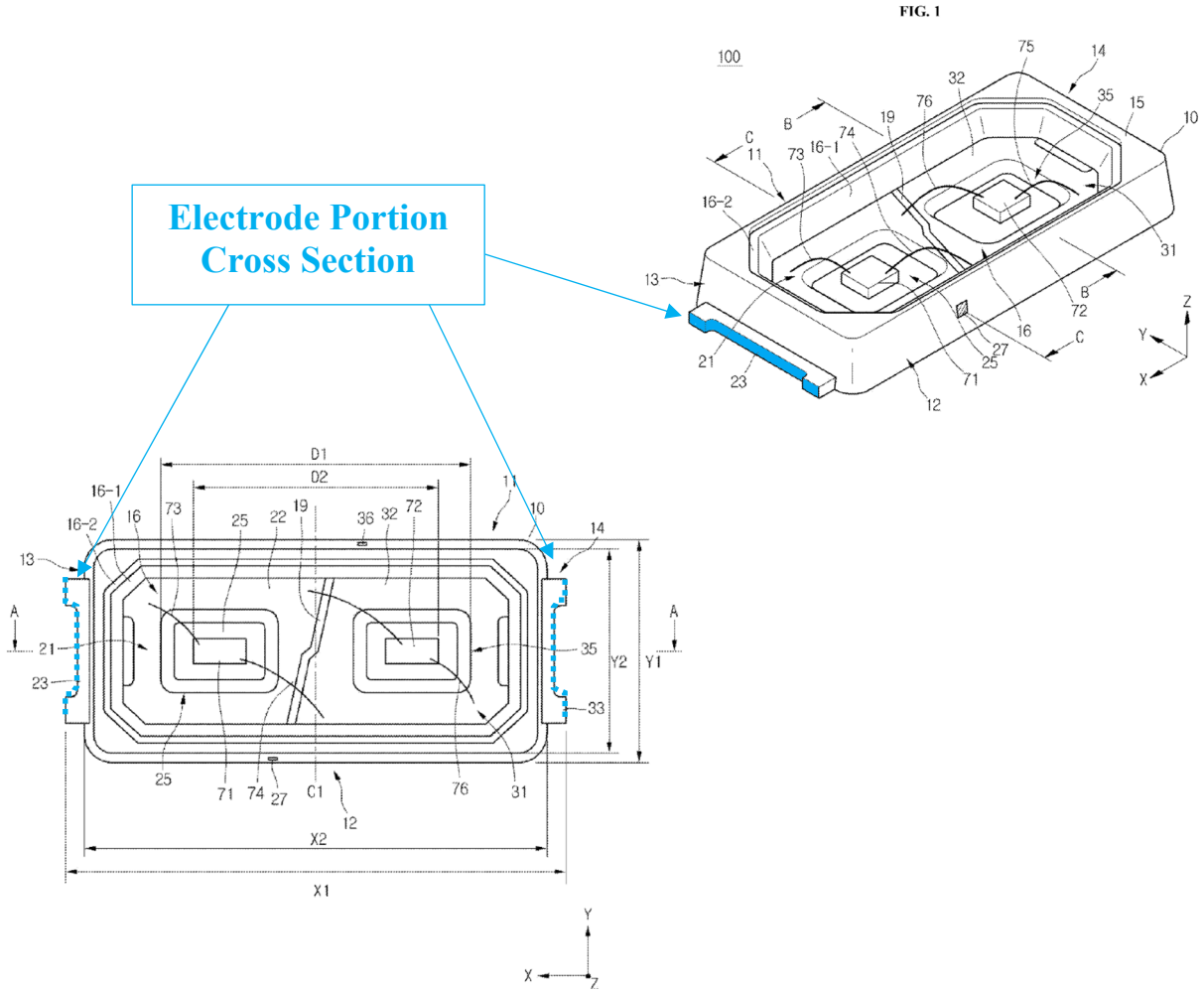
FIG. 2



g) Kim Discloses Claim 1's "Electrode Portion Cross Section"

Although 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 (Ex-1003 at § 9.1.1.7). Kim discloses "wherein the at least one electrode portion further comprises an electrode portion cross section" as shown in FIGs. 1 & 2.

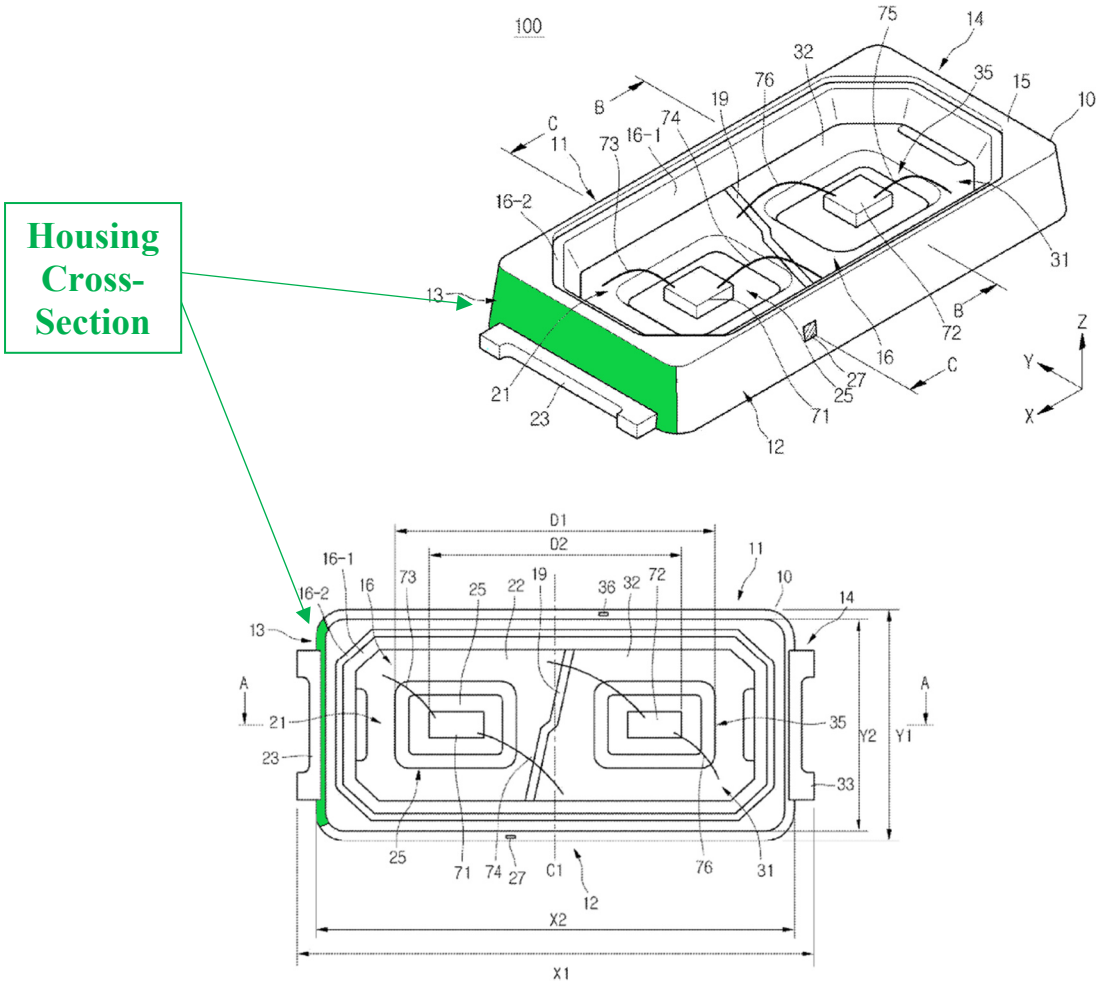
Kim FIGs. 1 and 2 (Annotated)



h) Kim Discloses Claim 1's "Housing Cross Section"

Kim discloses "wherein the resin housing comprises at least one housing cross section" (Ex-1003 at § 9.1.1.8). An example cross section is shown of "third sidewall 13" of "body 10" in Kim FIGs. 1 & 2, below, but as may be appreciated, additional cross sections could also be drawn on "first sidewall 11," "second sidewall 12," and/or "fourth sidewall 14."

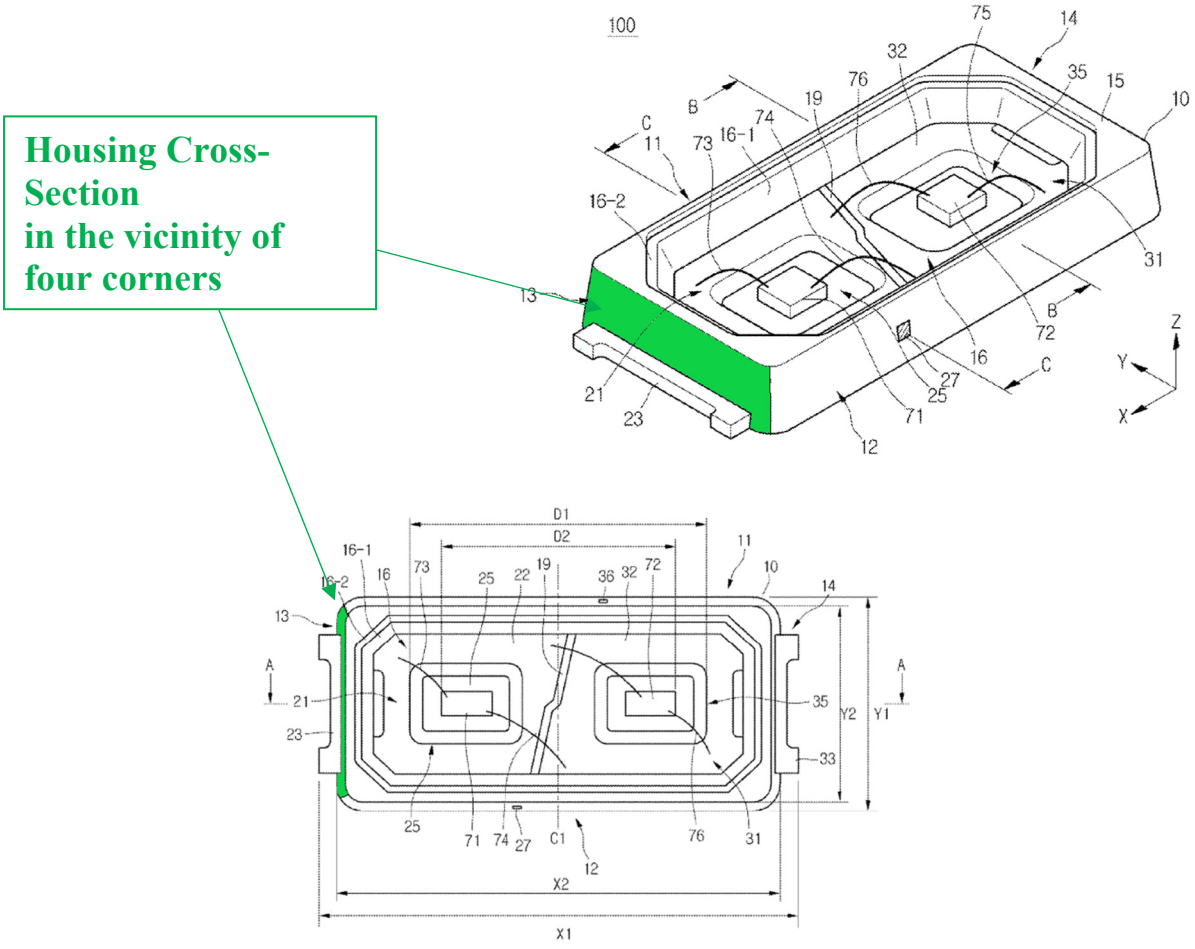
Kim FIGs. 1 & 2 Annotated



i) Kim Discloses Claim 1's "Four Corners" Limitation

Kim discloses "wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing" as shown in Figures 1-2 (*See* Ex-1003 at § 9.1.1.9). One housing cross-section is shown below. It will be appreciated that any number of cross sections can be drawn through Kim's body 10 (*e.g.*, "housing") that satisfies the claim limitation. Further, this labeling is consistent with Patent Owner's infringement contentions (*See* Ex-1025 at pp. 19-20).

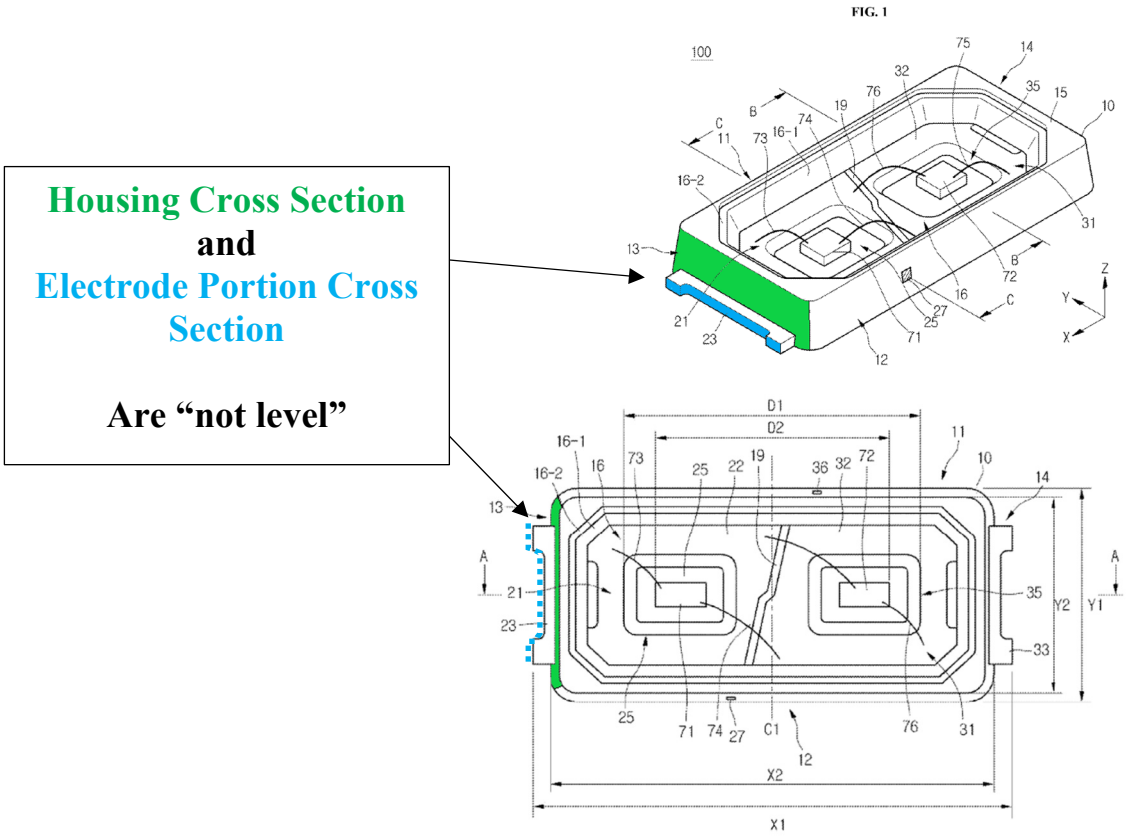
Kim FIGs. 1 & 2 Annotated



j) Kim Discloses Claim 1's "Not Level" Limitation

Kim discloses "wherein the at least one housing cross section is not level with the electrode portion cross section" as shown in FIG. 1 & 2 (Ex-1003 at § 9.1.1.10). The 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 cross section.

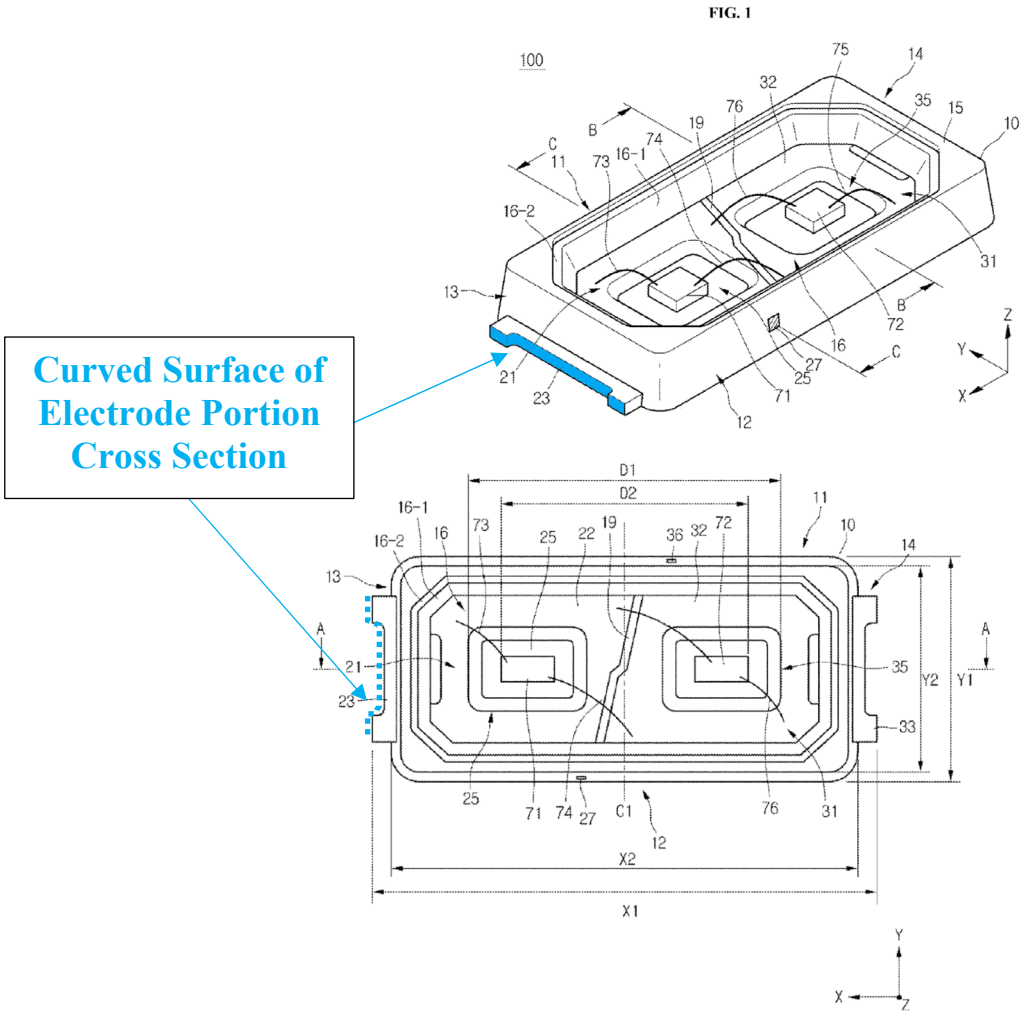
Kim FIGs. 1 and 2 (Annotated)



2. Kim Anticipates Claim 2

Kim discloses "wherein the electrode portion cross section comprises at least one curved surface" via its "first/second lead parts 23, 33" of "lead frames 21, 23" as shown in FIG. 1 & 2 (Ex-1004 at FIGs. 1-2; Ex-1003 at § 9.1.2).

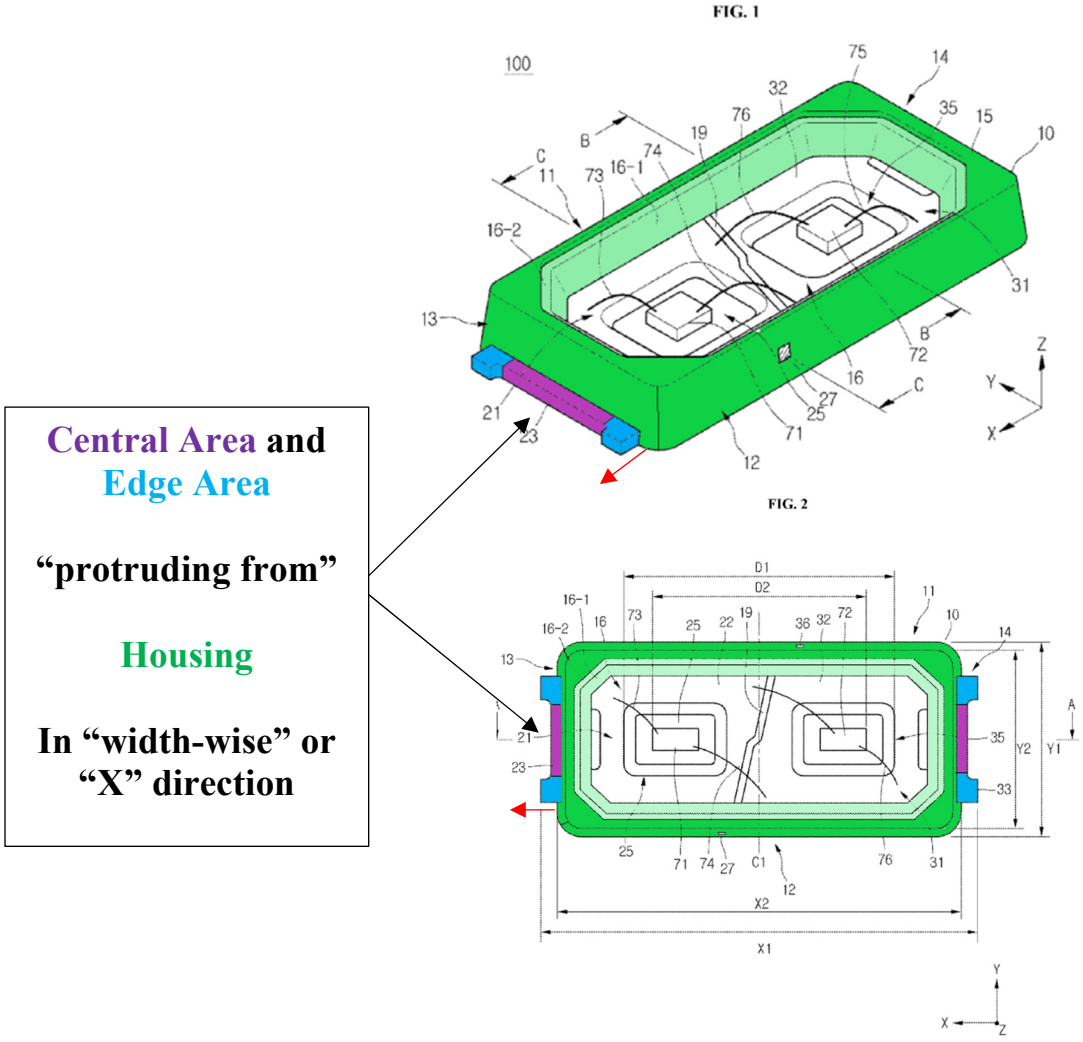
Kim FIGs. 1 and 2 (Annotated)



3. Kim Anticipates Claim 5

Kim discloses "the central area and the at least one edge area protrude from the housing in the width-wise" (*e.g.*, "x") "direction" (Ex-1004 at [0074]-[0075]; *See* Ex-1003 at § 9.1.3), as shown in FIG. 1 & 2.

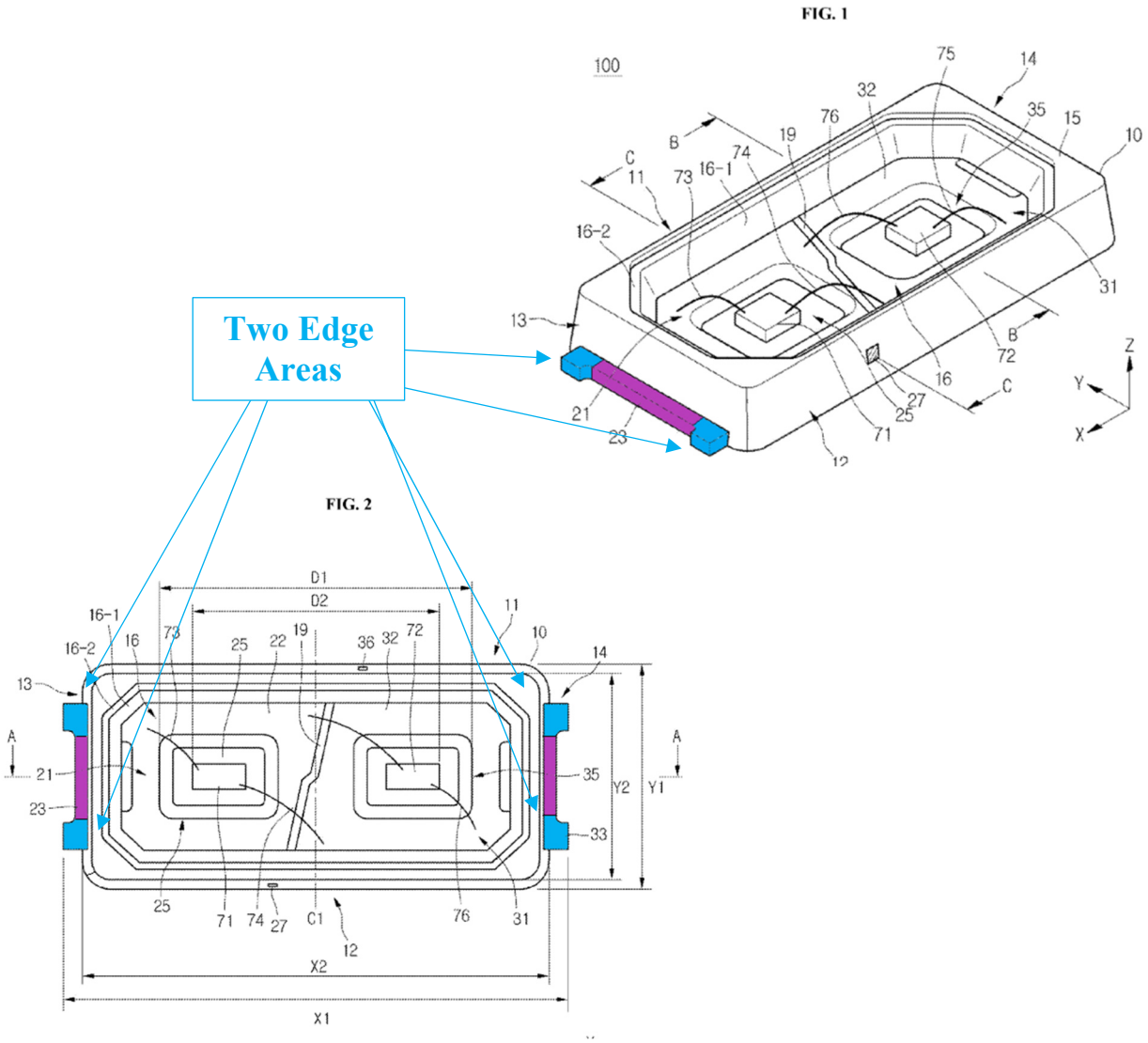
Kim FIGs. 1 and 2 (Annotated)



4. Kim Anticipates Claim 6

Kim discloses "the at least one edge area comprises two edge areas," as each of first/second lead parts 23/33 have two protruding edge areas as shown in FIG. 1 & 2 (Ex-1004 at FIG. 1-2; Ex-1003 at § 9.1.4).

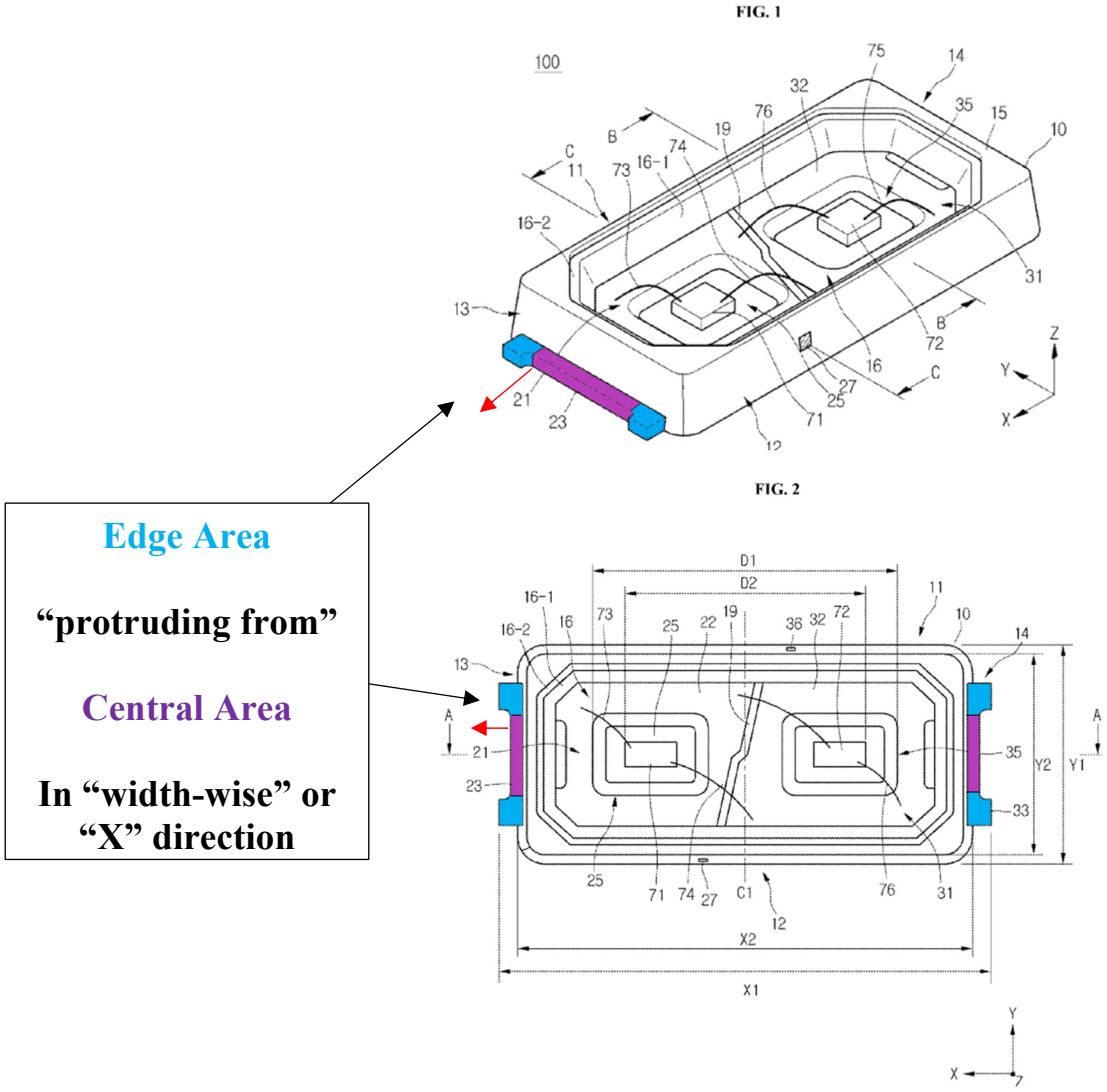
Kim FIGs. 1 and 2 (Annotated)



5. Kim Anticipates Claim 7

Kim discloses "the two edge areas protrude from central area in the widthwise direction" or "x" direction as shown in FIG. 1 & 2 (Ex-1003 at § 9.1.5).

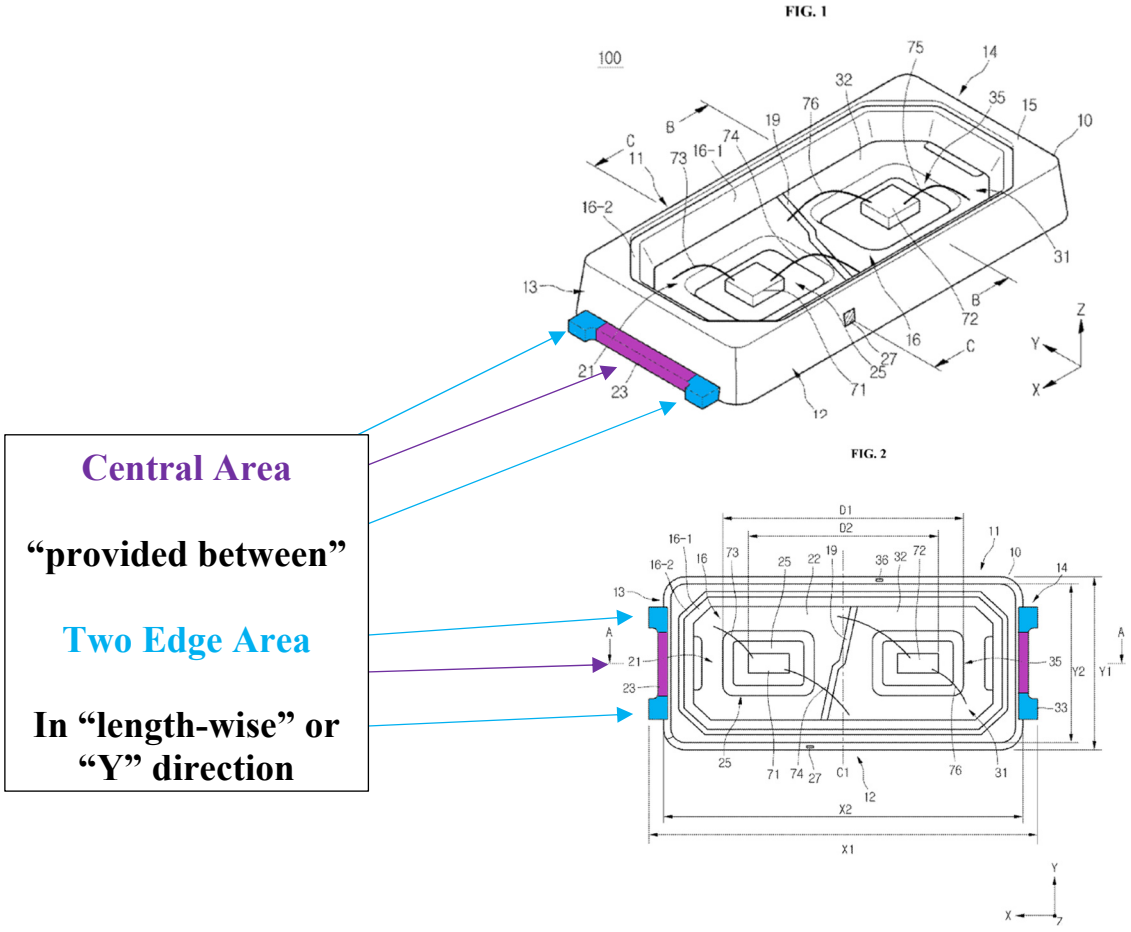
Kim FIGs. 1 and 2 (Annotated)



6. Kim Anticipates Claim 8

Kim discloses "the central area is provided between the two edge areas along the length-wise" (*e.g.*, "y") "direction" as shown in FIG. 1 & 2 (Ex-1003 at § 9.1.6).

Kim FIGs. 1 and 2 (Annotated)

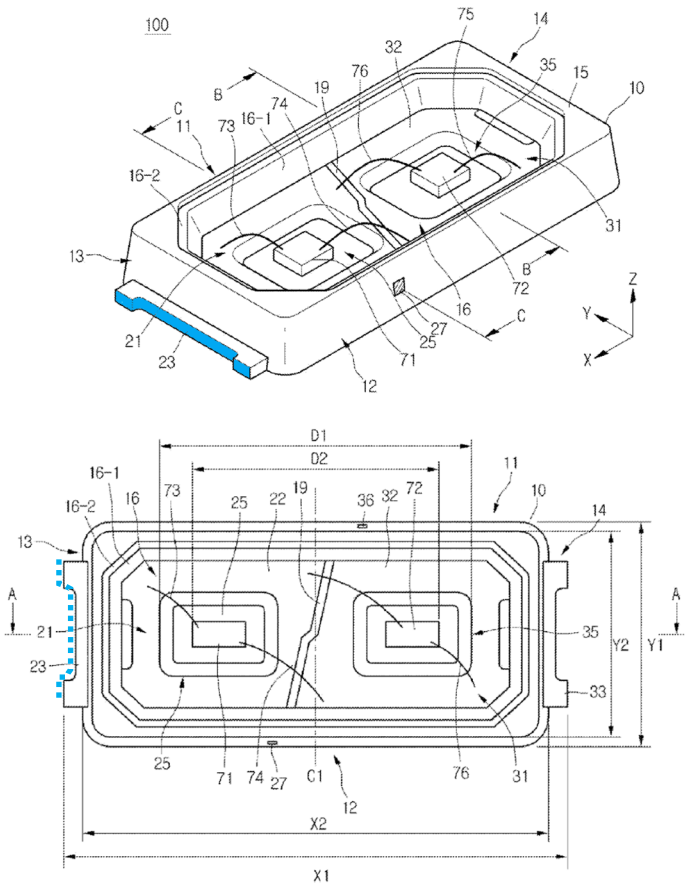


7. Kim Anticipates Claim 9

Kim discloses "the electrode portion cross section corresponds to at least a portion of an outer surface of the wing portion" as shown in FIG. 1 & 2 (Ex-1004 at FIGs. 1-2; Ex-1003 at § 9.1.7).

Kim FIGs. 1 and 2 (Annotated)

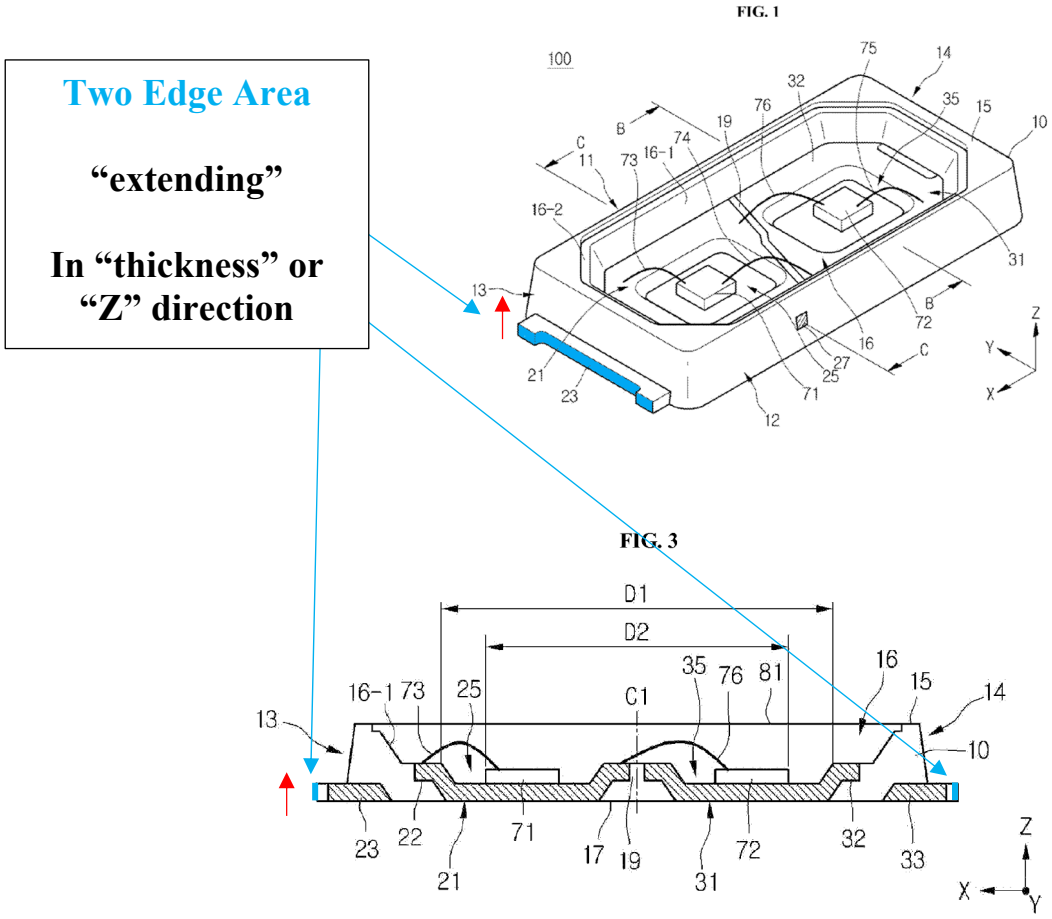
FIG. 1



8. Kim Anticipates Claim 10

Kim discloses "the electrode portion cross section extends in a thickness" (*e.g.*, "z") "direction of the at least one electrode portion" as shown in FIG. 1 & 3 (Ex-1003 at § 9.1.8).

Kim FIGs. 1 and 3 (Annotated)



9. Kim Anticipates Claim 11

Kim anticipates claim 11 (*See* Ex-1003 at § 9.1.9). Kim discloses claim 11's "preamble," "electrode portion," and "resin housing" limitations for the reasons as described above with reference to the corresponding limitations in claim 1 (*See supra* §§ XI(A)(1)(a)-(c); *see also* Ex-1003 at §§ 9.1.9.1-9.1.9.4).

a) Kim Discloses Claim 11's "Central Area" Limitations

Kim discloses "wherein the wing portion comprises: a central area protruding from the housing in a first direction" (*e.g.*, "x") "away from the housing" via the

structure of its first/second lead parts 23 having a central area that protrudes from body 10 (Ex-1004 at [0074]-[0075]), as shown in FIGs. 1 & 2 (Ex-1003 at § 9.1.9.4).

Kim FIGs. 1 and 2 (Annotated)

Central Area

"protruding"

In "first" or "X" direction away from

Housing

FIG. 1

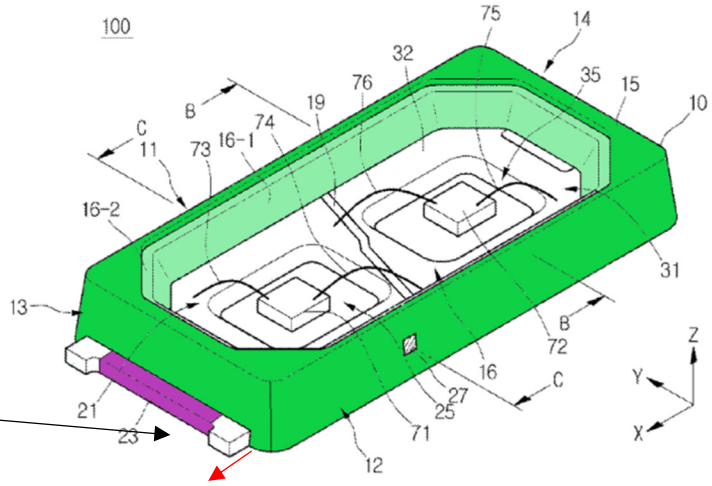
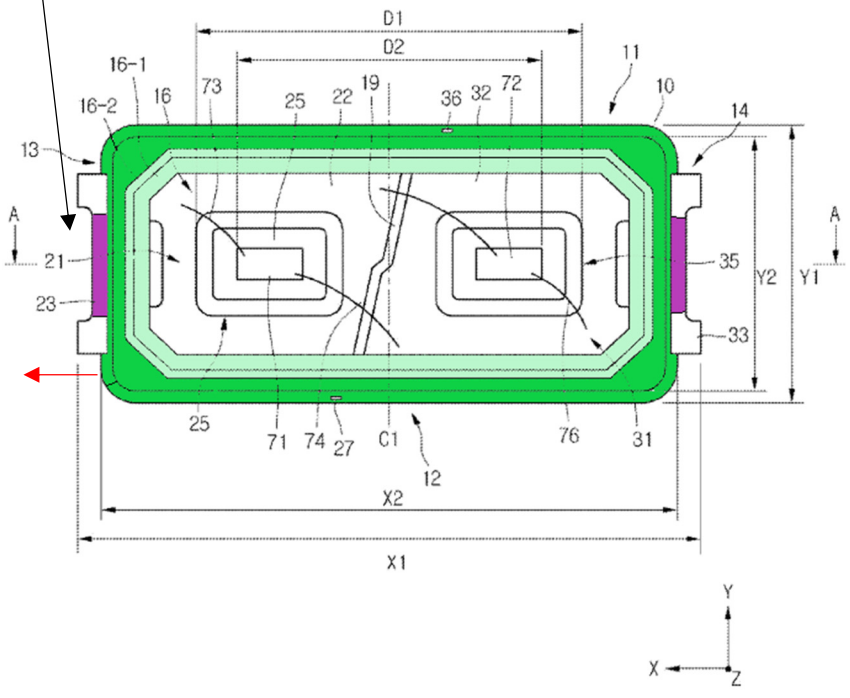


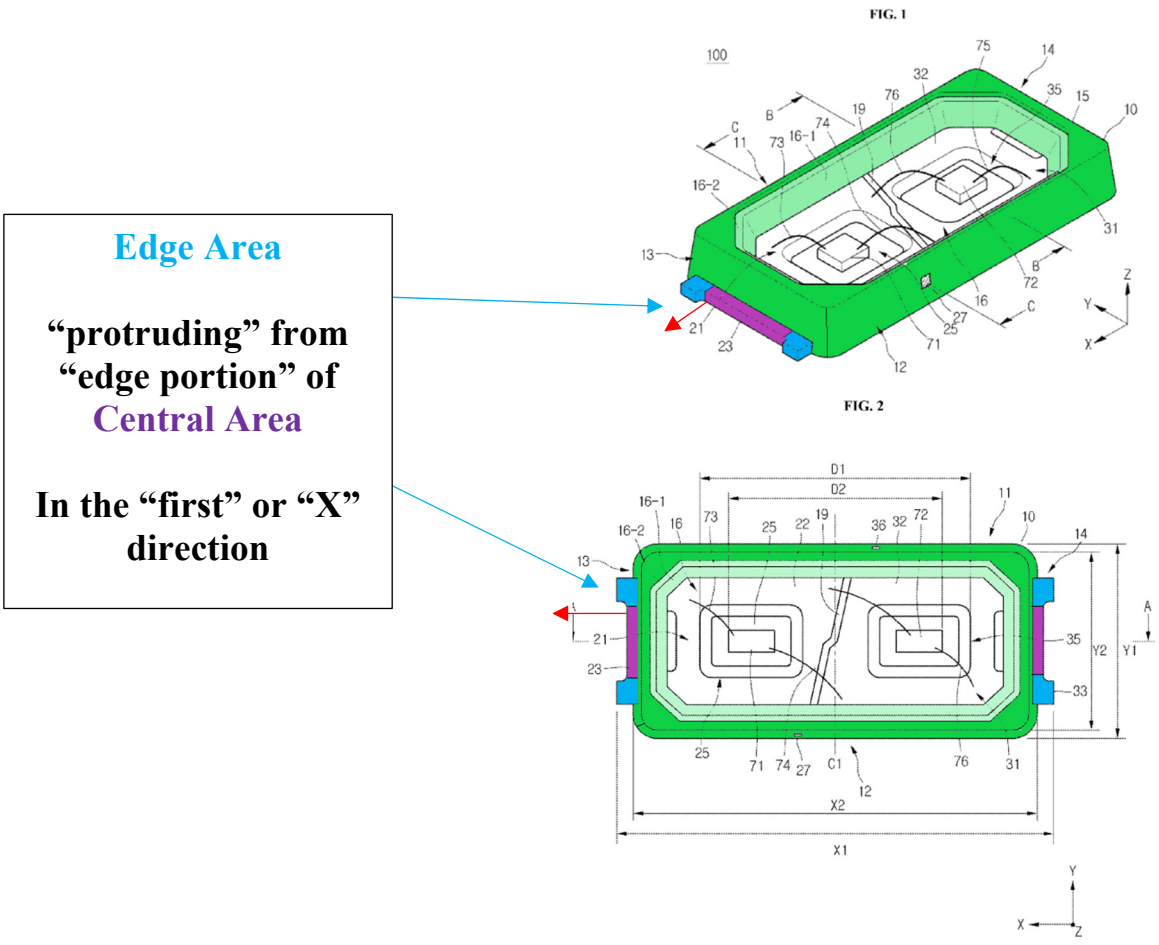
FIG. 2



b) Kim Discloses Claim 11's "Edge Area" Limitation

Kim discloses "and at least one edge area protruding from an edge portion of the central area, in the first direction" (*e.g.*, "x" direction) via the structure of its first/second lead parts 23 having edge areas that protrude from edges of the central area (Ex-1004 at [0074]-[0075]), as shown in FIGs. 1 & 2 (Ex-1003 at § 9.1.9.5).

Kim FIGs. 1 and 2 (Annotated)

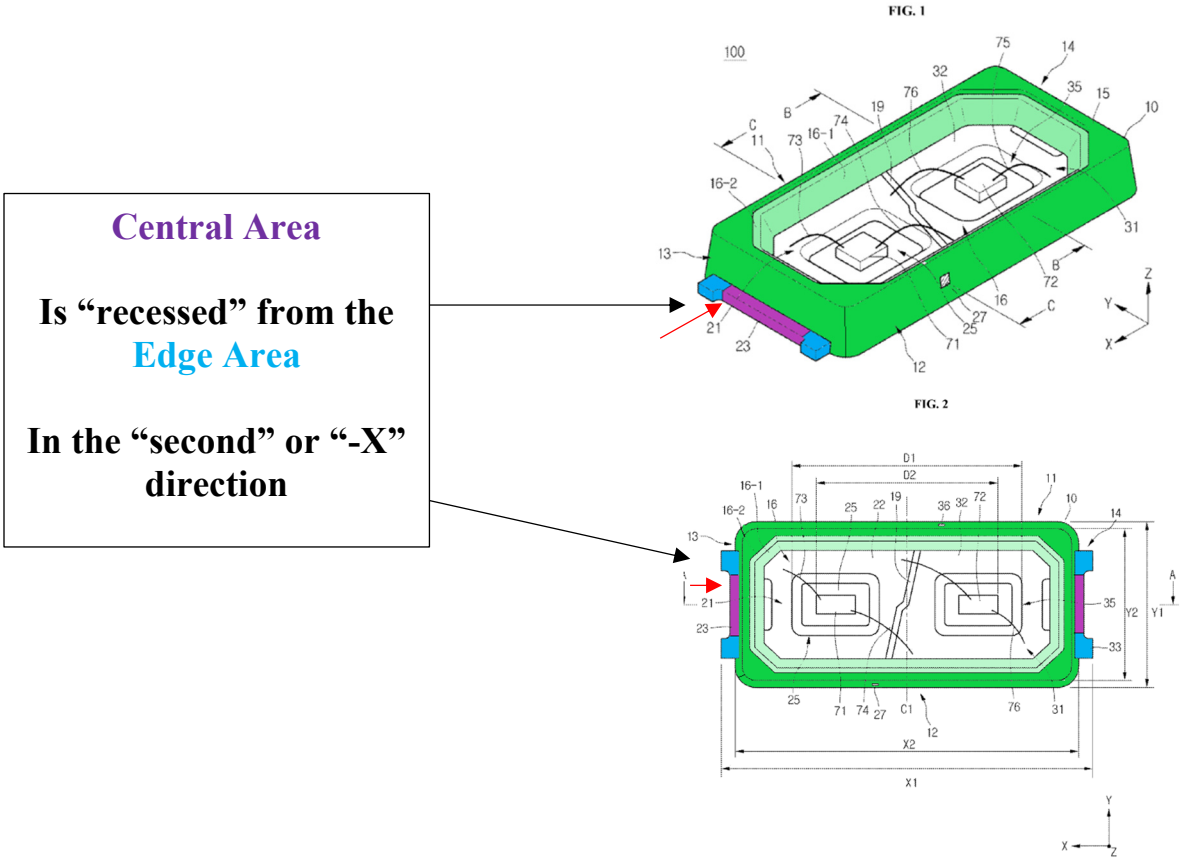


c) Kim Discloses Claim 11's "Recessed" Limitation

Kim discloses "wherein the central area is recessed from the at least one edge area in a second direction" (*e.g.*, "-x") "opposite from the first direction" (x) "toward

the housing" via the structure of its first/second lead parts 23 having a central area recessed from the at least one edge area in the x-direction (Ex-1004 at [0074]-[0075]), as shown in FIGs. 1 & 2 (Ex-1003 at § 9.1.9.6).

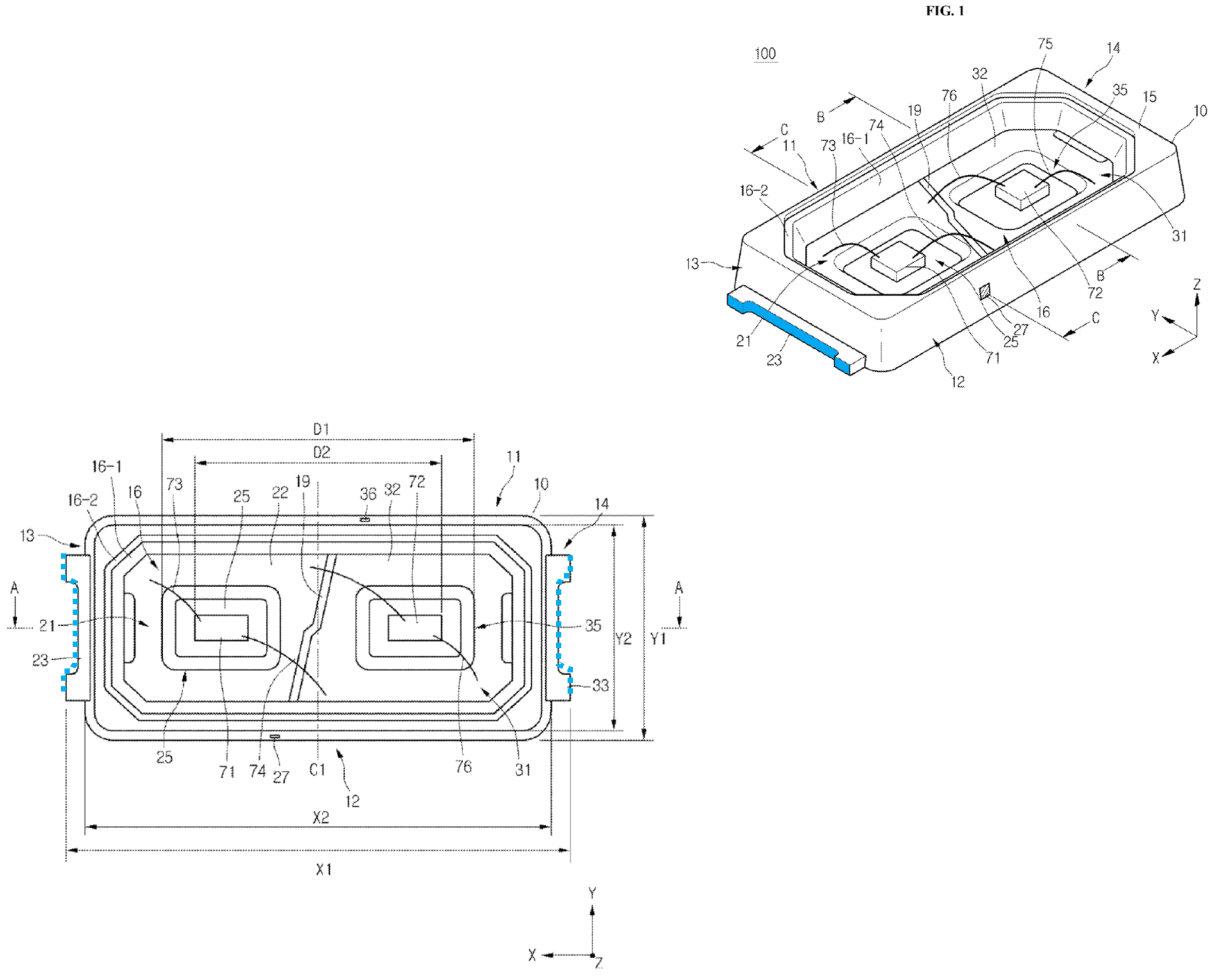
Kim FIGs. 1 and 2 (Annotated)



d) Kim Discloses the "Electrode Portion Cross Section" Limitation

Kim discloses "wherein the at least one electrode portion further comprises an electrode portion cross section" as shown in FIG. 1-2 (Ex-1003 at § 9.1.9.7; *see also* § XI(A)(1)(g), *supra*).

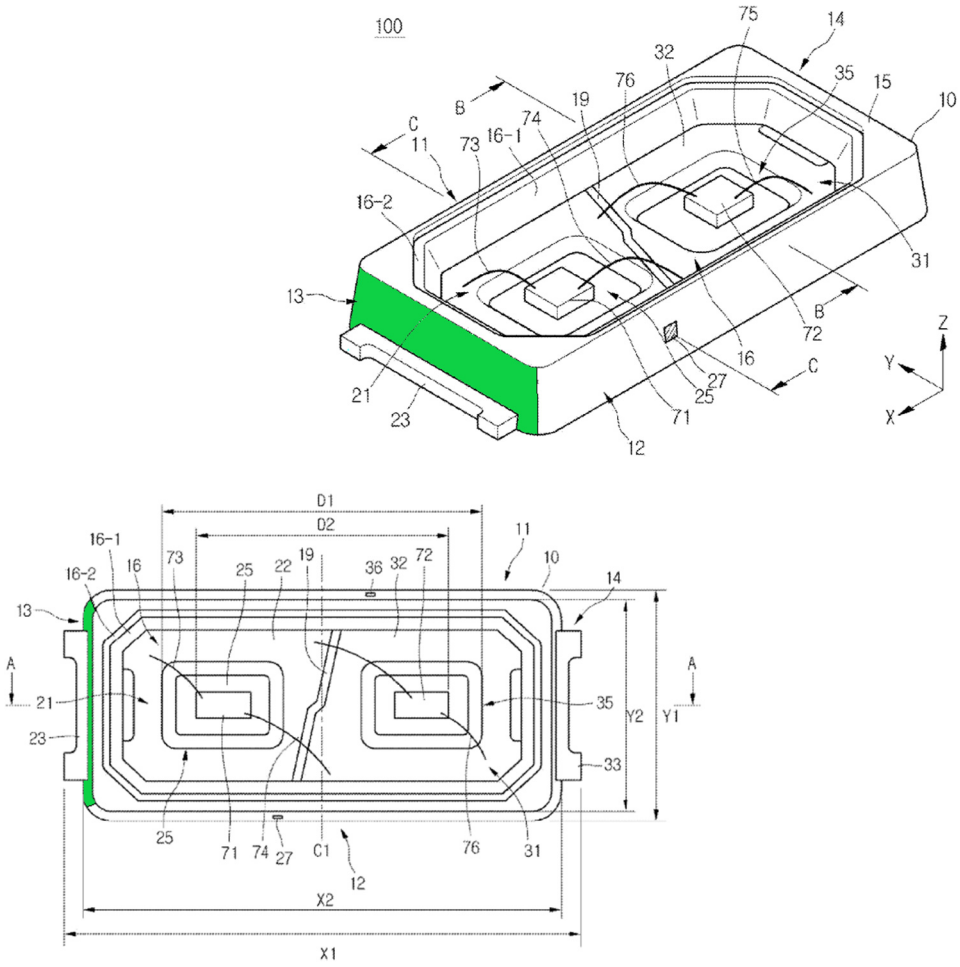
Kim FIGs. 1 and 2 (Annotated)



e) Kim Discloses Claim 11's "Housing Cross Section" Limitation

Kim discloses "wherein the resin housing comprises at least one housing cross section" as shown in FIG. 1-2 (Ex-1003 at § 9.1.9.8; *See also* § XI(A)(1)(h), *supra*).

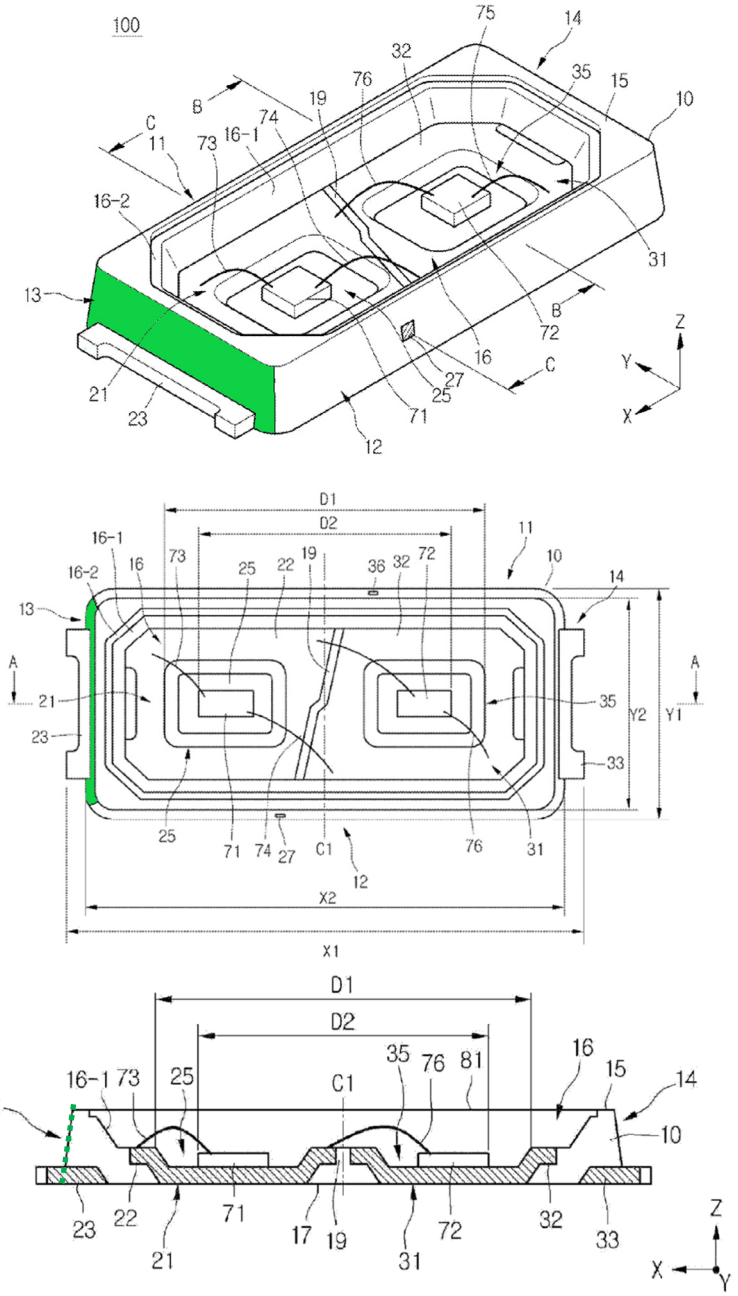
Kim FIGs. 1 and 2 (Annotated)



f) Kim Discloses the "Housing Corner" Limitation

Kim discloses "wherein the at least one housing cross section is located in a vicinity of a corner of the resin housing" as shown in FIG. 1-3 (Ex-1003 at § 9.1.9.9).

Kim FIGs. 1 and 2 (Annotated)

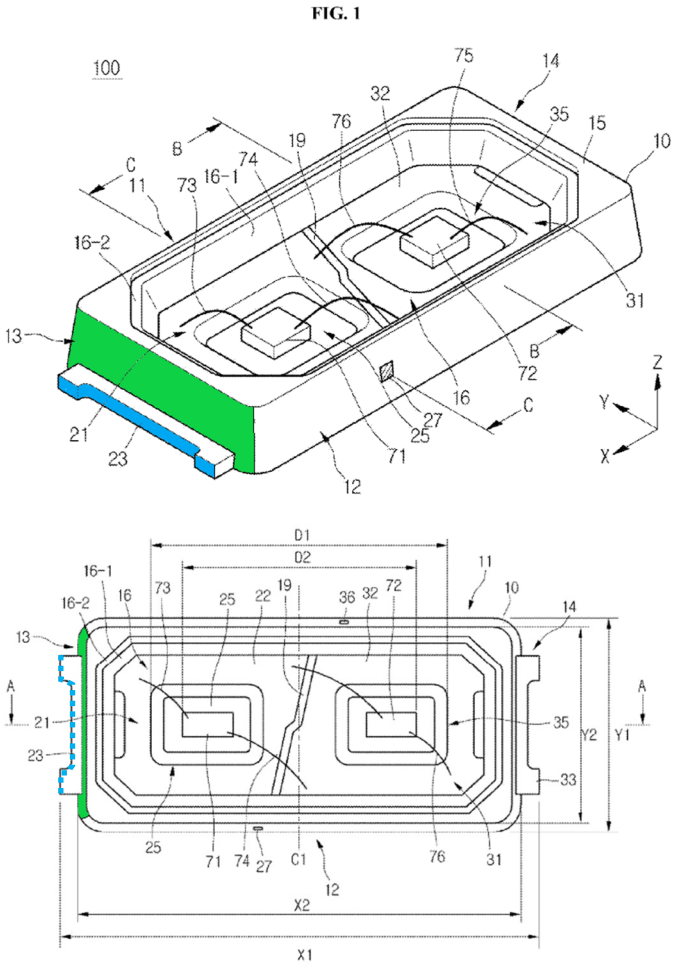


g) Kim Discloses the "Not Level" Limitation

Kim discloses "wherein the at least one housing cross section is not level with the electrode portion cross section" as shown in FIG. 1-3 (Ex-1003 at 9.1.9.10). The

housing cross-section is on an angle along the face of the body 10 and is in-line with or level with the electrode portion cross section (*Id.*).

Kim FIGs. 1 and 2 (Annotated)



h) Kim Discloses Claim 11's "Edge Areas Protrude" Limitation

Kim discloses "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" via the two respective areas of first/second lead parts 23, 33 that each protrude in the "x-

direction" from the respective central areas of first/second lead parts 23, 33, as shown in FIG. 1 & 2 (Ex-1003 at §§ 9.1.9.11-9.1.9.12).

Kim FIGs. 1 and 2 (Annotated)

FIG. 1

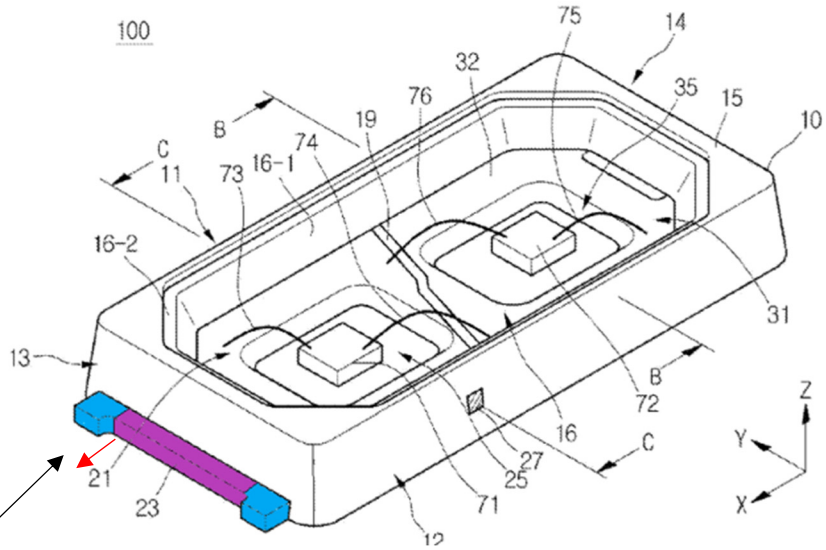
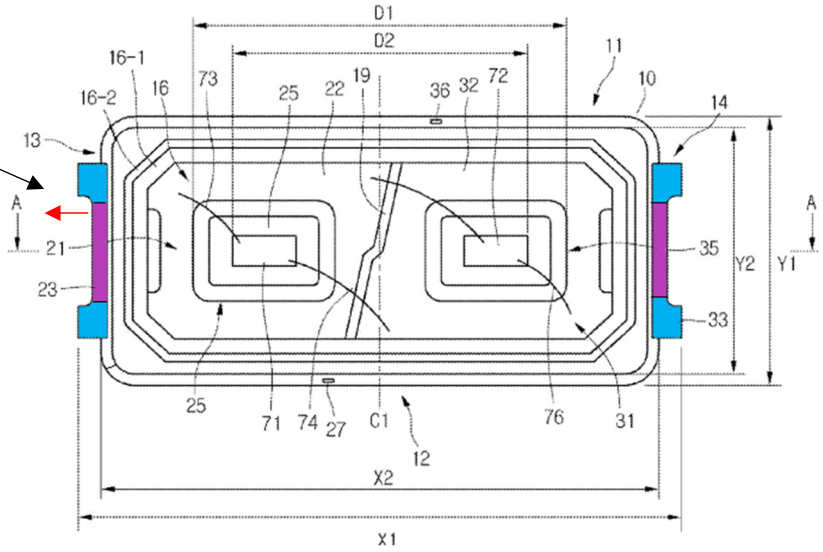


FIG. 2



Two Edge Areas

"protruding from"

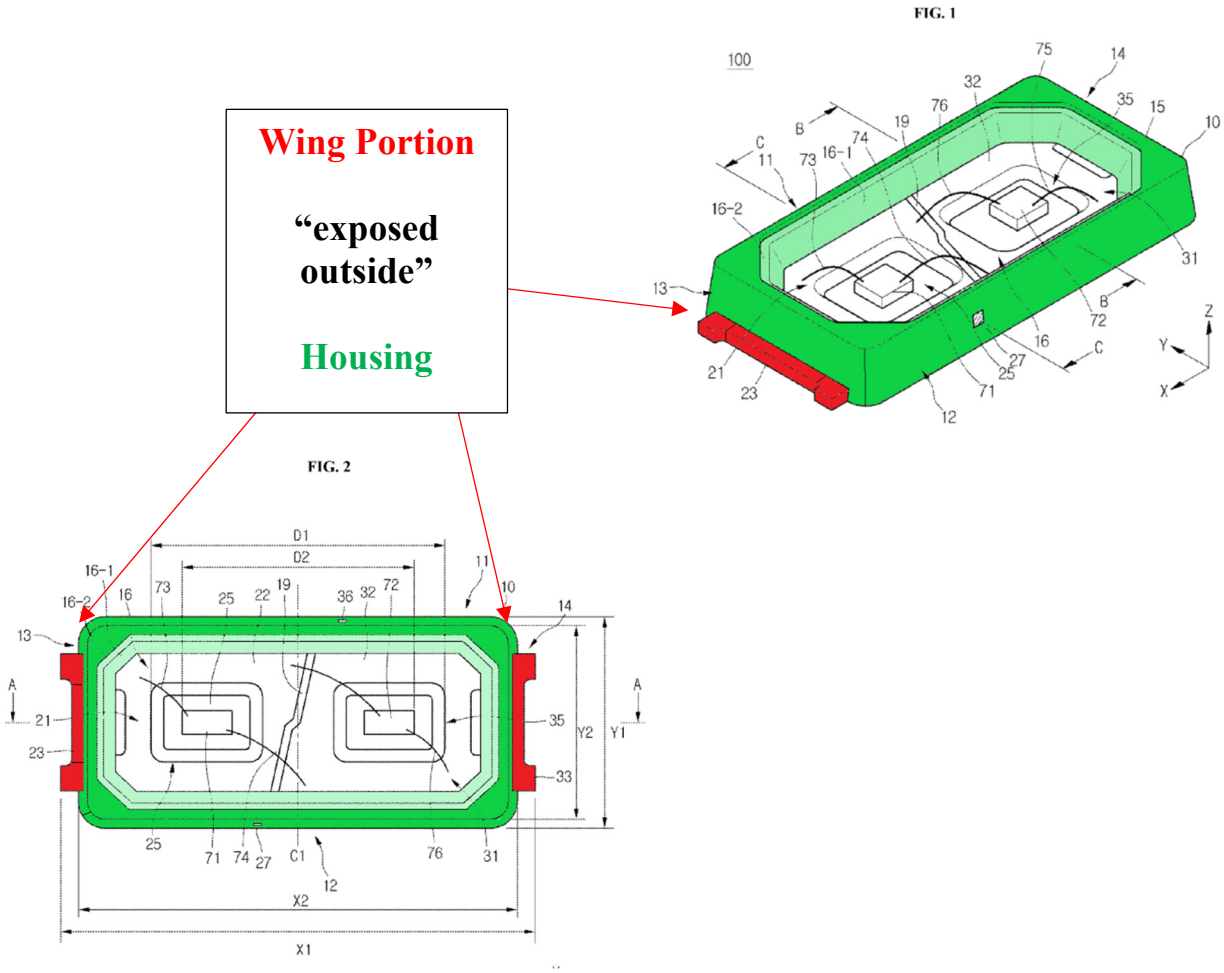
Central Area

In "first" or "X" direction

10. Kim Anticipates Claim 12

Kim anticipates claim 12 because Kim discloses "wherein the wing portion" (*e.g.*, first/second lead parts 23, 33) "is exposed outside the resin housing," (*e.g.*, "body 10") (Ex-1004 at [0074]-[0075]), as shown in FIG. 1 (Ex-1003 at § 9.1.10).

Kim FIGs. 1 and 2 (Annotated)



11. Kim Anticipates Claim 13

Kim anticipates claim 13 because Kim discloses "wherein the wing portion comprises two edge areas," via its first/second lead parts 23, 33 each having two

respective edge areas as shown in blue in FIG. 1 & 2 (Ex-1004 at FIGs. 1-2; Ex-1003 at § 9.1.11).

Kim FIGs. 1 and 2 (Annotated)

FIG. 1

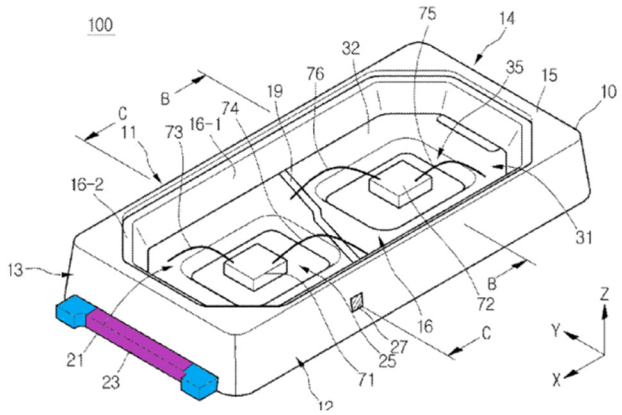
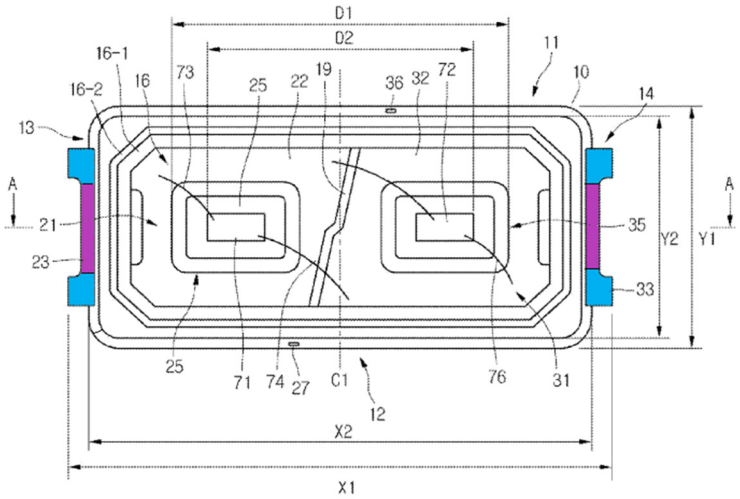


FIG. 2

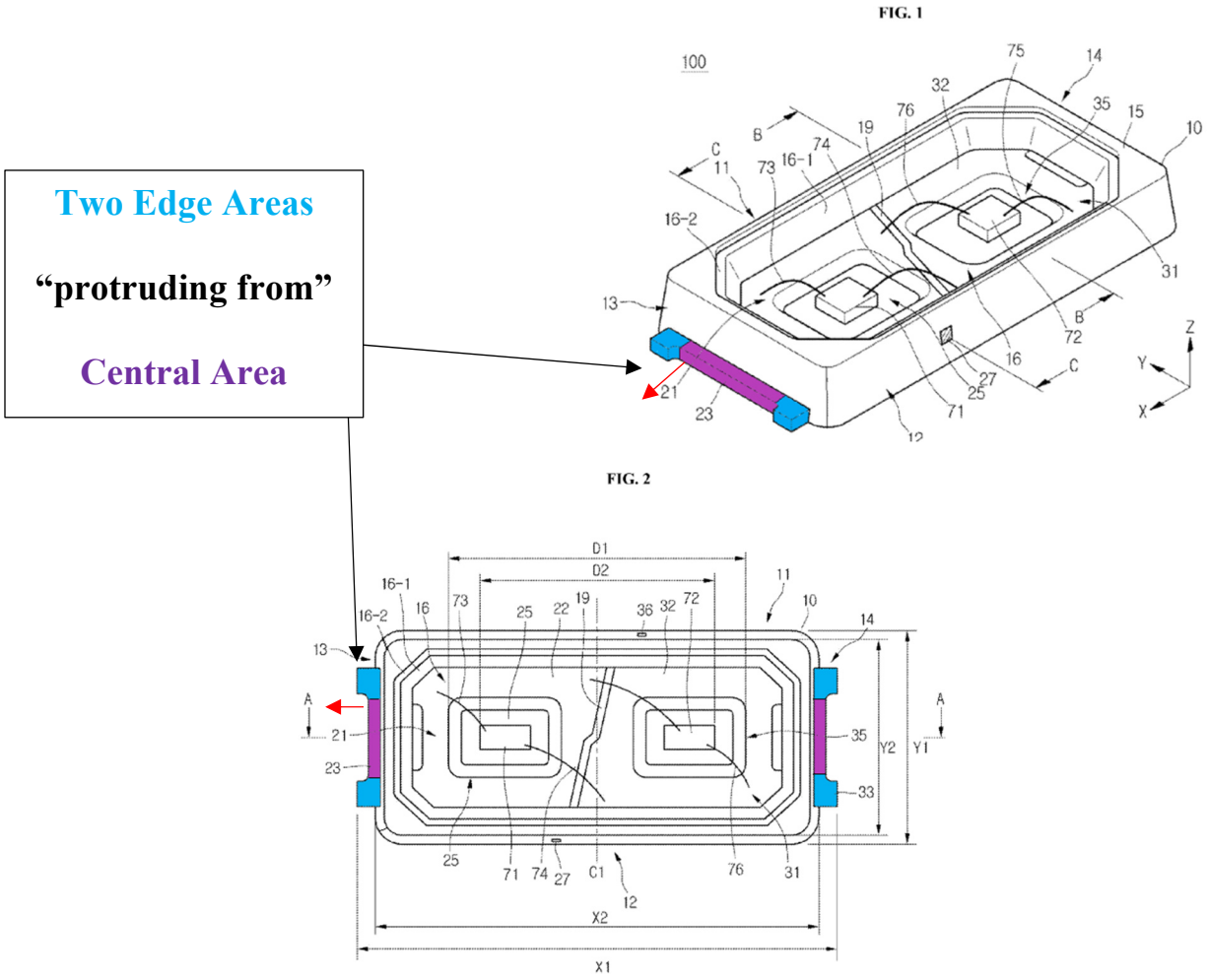


12. Kim Anticipates Claim 14

Kim anticipates claim 14 because Kim discloses "wherein the two edge areas protrude from central area," via its first/second lead parts 23, 33 each having two respective edge areas [blue] that each protrude from respective central portions of

via first/second lead parts 23, 33 [purple], as shown in FIG. 1 & 2 (Ex-1004 at FIGs. 1-2; Ex-1003 at § 9.1.12).

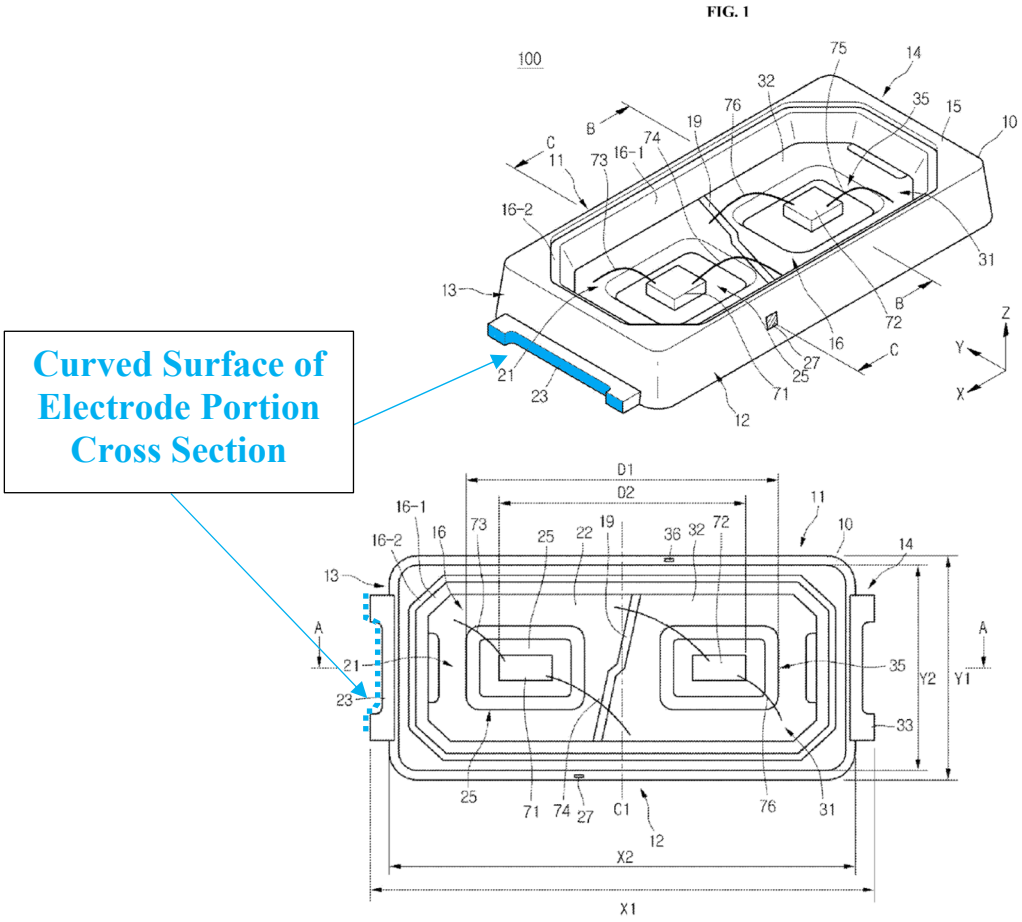
Kim FIGs. 1 and 2 (Annotated)



13. Kim Anticipates Claim 15

Kim anticipates claim 15 because Kim discloses "wherein the at least one electrode portion cross section comprises a curved surface" as shown on the cross section located on the outer surface of first lead part 23 in FIG. 1 & 2 (Ex-1003 at § 9.1.13).

Kim FIGs. 1 and 2 (Annotated)



14. Kim Anticipates Claim 16

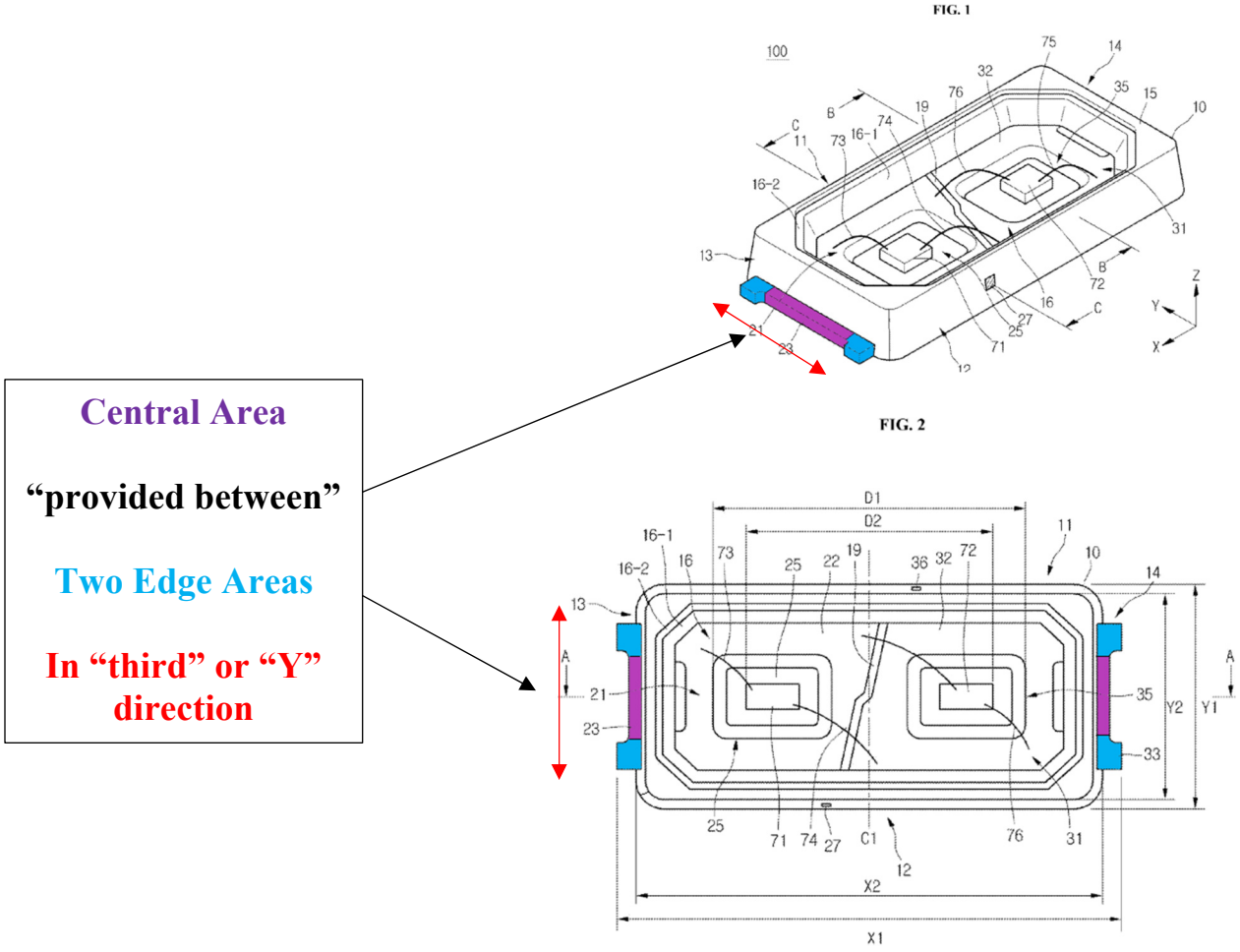
Kim anticipates claim 16 because Kim discloses "wherein the at least one electrode portion further comprises a conductive layer" (Ex-1003 at § 9.1.13). Kim describes that the lead frames 21, 31 may be "metallic" (Ex-1004 at [0067]) and metals are conductive (Ex-1003 at ¶¶ 155-156). Kim further explains that the lead frames 21, 31 may "include a single metallic layer of a multi-layer metallic layer" (Ex-1004 at [0067]). In addition, Kim provides that the lead frames 21, 31 may

include a "plating layer" laminated in a copper material that may be "formed in at least one layer" (*Id*.).

15. Kim Anticipates Claim 20

Kim anticipates claim 20 because Kim discloses "wherein the central area is provided between the two edge area along a third direction" (*e.g*., "y-direction") substantially perpendicular to the first and second direction" (*e.g*., x and -x directions) via the central area of its first/second lead parts 23, 33, as shown in FIG. 1-2 (Ex-1004 at FIGs. 1-2; Ex-1003 at § 9.1.15).

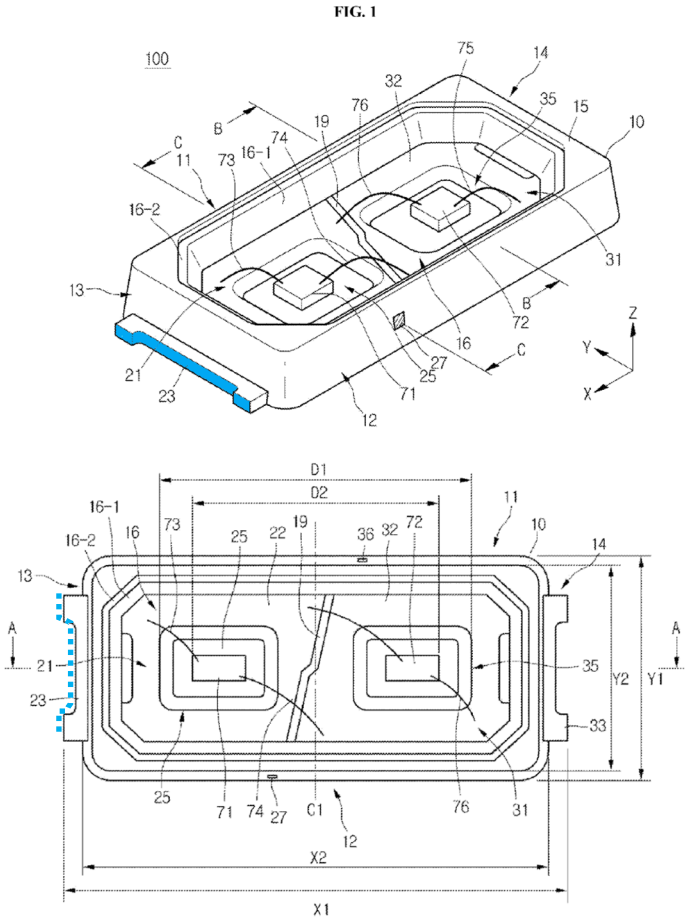
Kim FIGs. 1 and 2 (Annotated)



16. Kim Anticipates Claim 21

Kim anticipates claim 21 because Kim discloses "wherein the electrode portion cross section corresponds to at least a portion of an outer surface of the wing portion" via the electrode cross section being on the outer surface first/second lead parts 23, 33 ("wing portion"), as shown in FIGs. 1-2 (Ex-1004 at FIGs. 1-2; Ex-1003 at § 9.1.16).

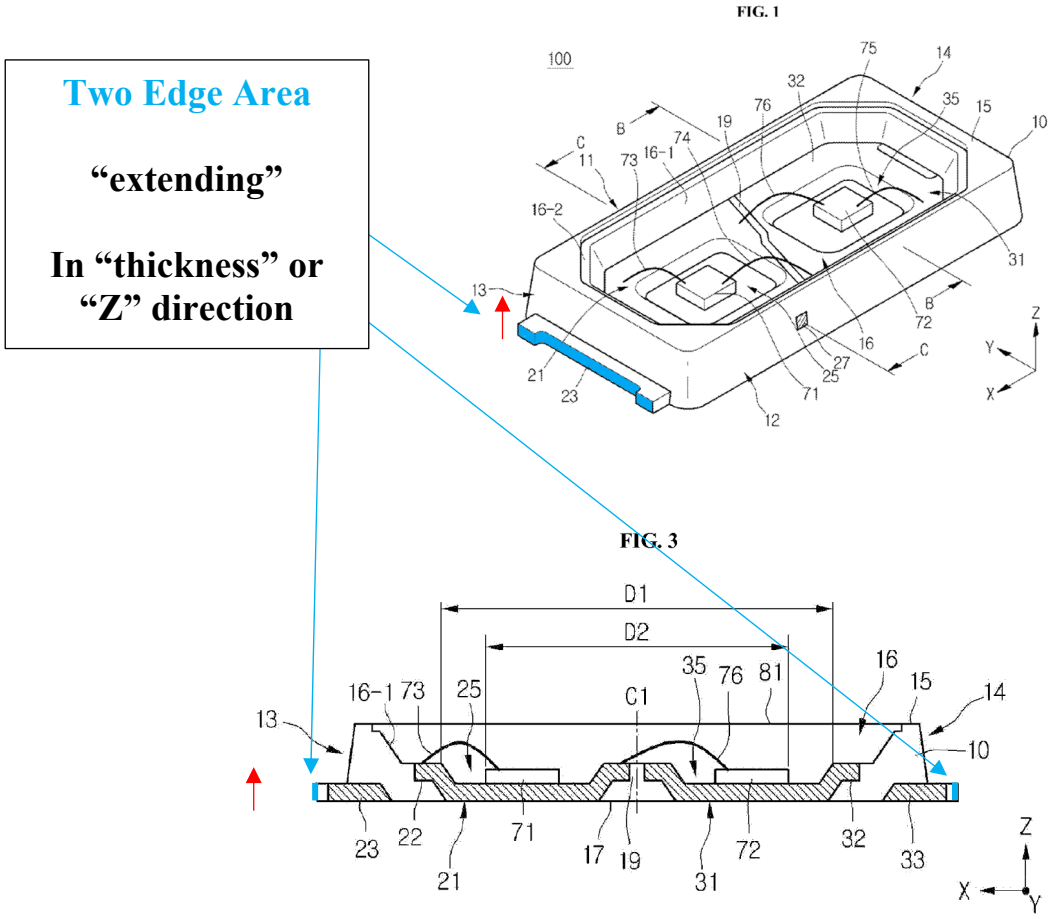
Kim FIGs. 1 and 2 (Annotated)



17. Kim Anticipates Claim 22

Kim discloses "the electrode portion cross section extends in a thickness direction of the at least one electrode portion" via the cross sections of the outer surface of first/second lead parts 23, 33 extending in the "z-direction," as shown in in FIG. 1 & 3 (Ex-1003 at § 9.1.17).

Kim FIGs. 1 and 3 (Annotated)



B. GROUND 2: Anticipation by Kobayakawa

For Ground 1, the prior art consists of Kobayakawa (Ex-1005). The challenged claims are claims 1, 5-14, 16, and 20-22.

1. Kobayakawa Anticipates Claim 1

Kobayakawa anticipates claim 1 (Ex-1003 at 9.2.1).

a) Kobayakawa Discloses Claim 1's Preamble

Kobayakawa discloses a "light emitting device" whether or not the preamble

is a limitation (*See* Ex-1003 at § 9.2.1.1). Kobayakawa is entitled "semiconductor light-emitting device" (Ex-1005 at Cover). Kobayakawa discloses a "semiconductor light-emitting device" in FIGs. 1-5 (Ex-1005 at 1:47-50; 2:37-38; FIGs. 1-5).

b) Kobayakawa Discloses Claim 1's "Electrode Portion"

Kobayakawa discloses a "lead frame 1" is an electrode connected to the LED chip 2 (Ex-1005 at 2:39-46; 3:9-10), which is the claimed "at least one electrode portion" as shown in FIGs. 1 & 2 (Ex-1003 at § 9.1.1.2).

Kobayakawa FIGs. 1-3 (Annotated)

Fig.1

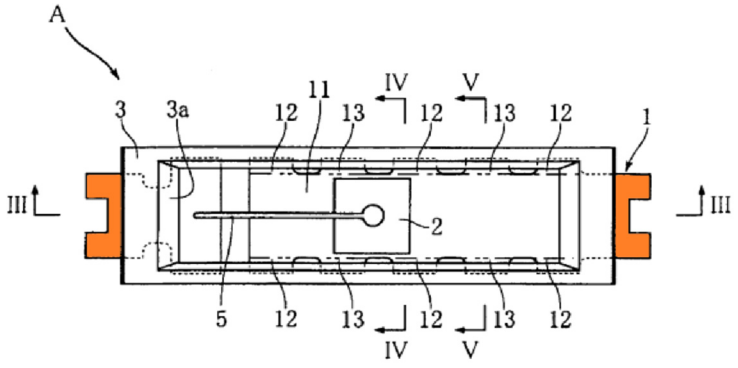


Fig.2

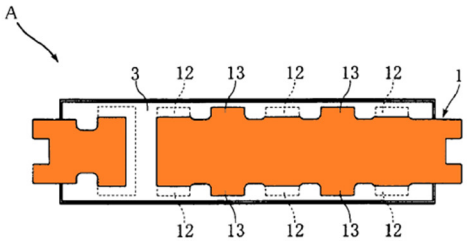
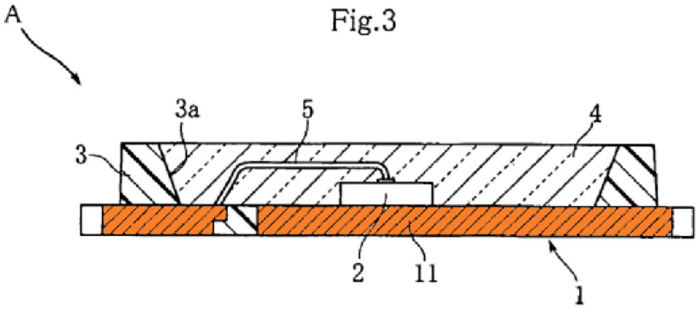


Fig.3



c) Kobayakawa Discloses Claim 1's Claimed "Resin Housing"

Kobayakawa discloses a "case 3" (Ex-1005 at 2:40-41; 3:21-29) that comprises the claimed "resin housing containing a reflective material and covering a portion of said at least one electrode portion" (Ex-1003 at § 9.2.1.3). As an example, Kobayakawa discloses that the case is "made of a white resin" (Ex-1005 at 3:21) such that "[t]the inner surfaces of the case 3 serve as a reflector 3 a that tapers downward. The reflector 3 upwardly reflects light which is emitted laterally from the LED chip 2" (Ex-1005 at 3:21-29). Thus, since the resin is "white" (which reflects all wavelengths of visible light) and "upwardly reflects light," case 3 contains a reflective material (Ex-1003 at § 9.2.1.3). As shown in Kobayakawa FIG. 3, case 3 (*e.g.*, housing) covers a portion of lead frame 1 (*e.g.*, a portion of the claimed electrode).

Kobayakawa FIGs. 1-3 (Annotated)

Fig.1

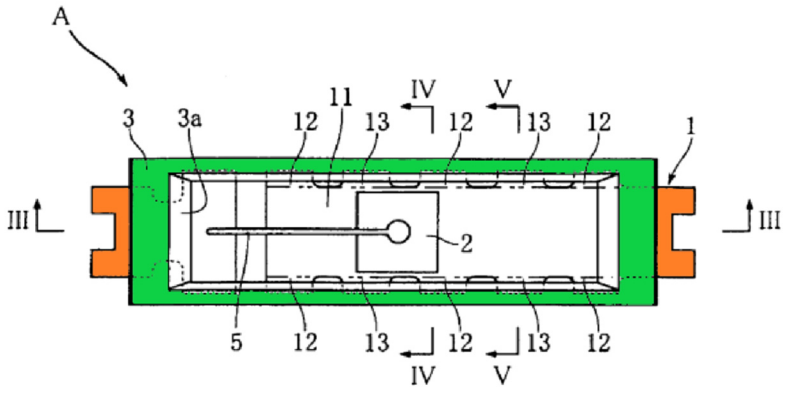


Fig.2

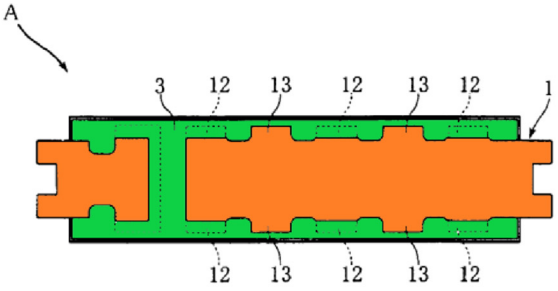
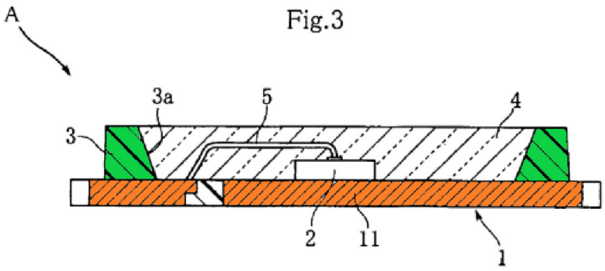


Fig.3

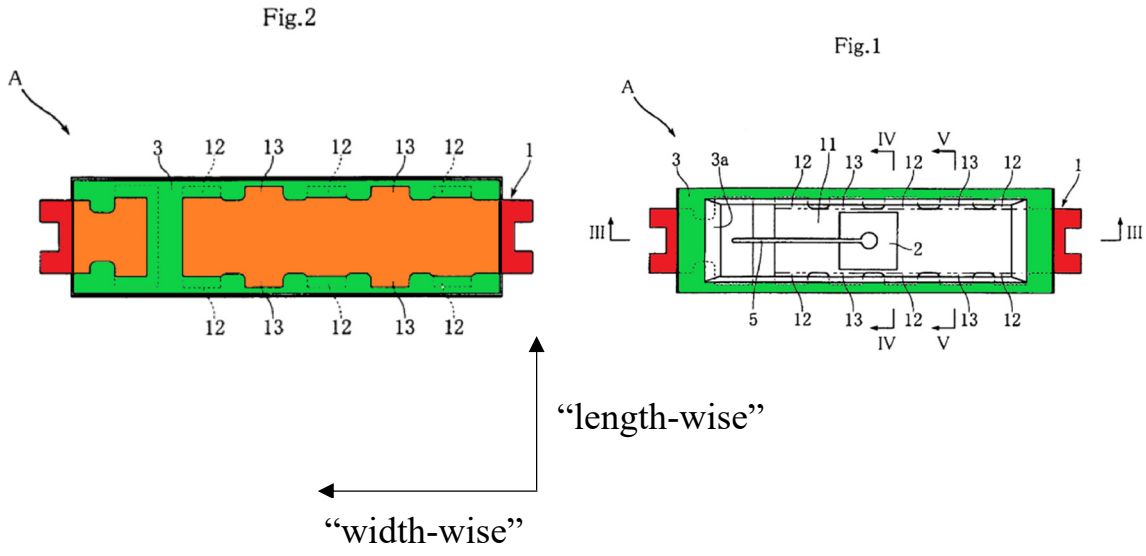


d) Kobayakawa Discloses Claim 1's "Wing Portion"

Kobayakawa discloses "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" (Ex-1003 at § 9.2.1.4). Kobayakawa discloses that "the lead frame 1 is exposed out of the case

3" (Ex-1005 at 2:40-41), which corresponds to "a wing portion which is exposed outside of the resin housing." As shown in FIG. 1, Kobayakawa 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 (Ex-1005 at FIG. 1-2).

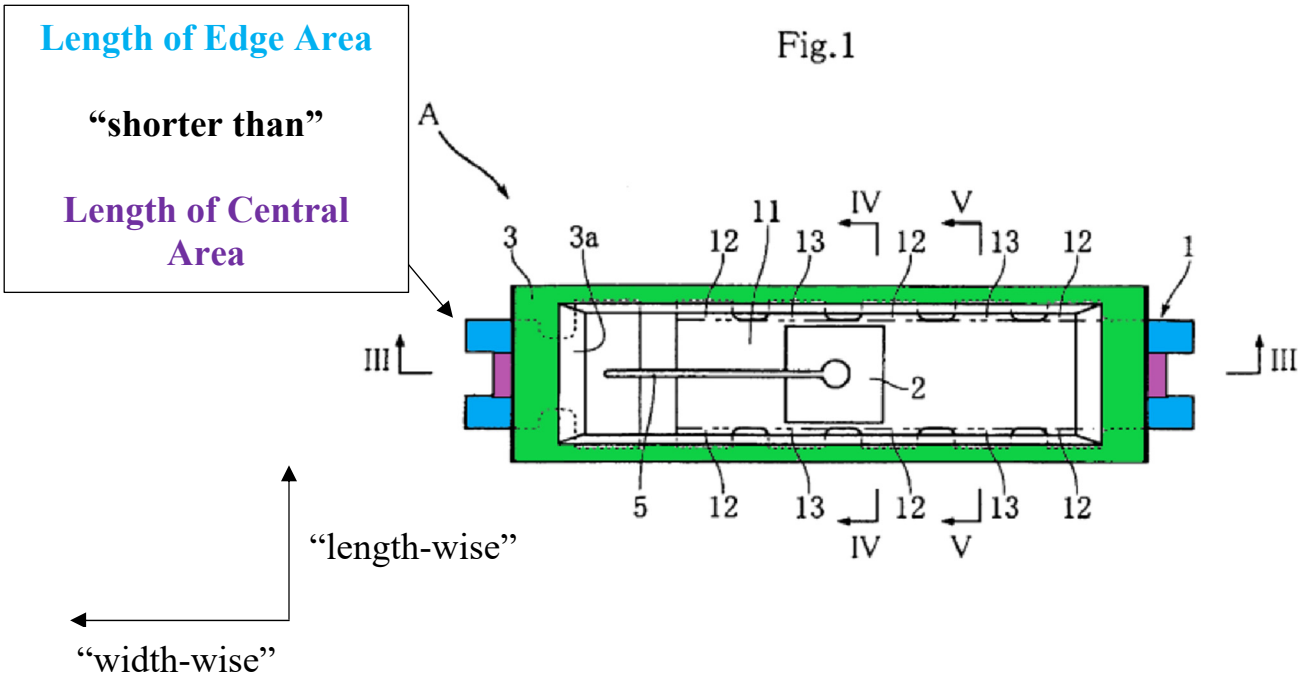
Kobayakawa FIGs. 1 and 2 (Annotated)



e) Kobayakawa Discloses Claim 1's "Central Area and Edge"

Kobayakawa discloses that the lead frame 1 (*e.g.*, electrode portion) 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" as shown in FIG. 1 (Ex-1005 at FIG. 1-2; Ex-1003 at § 9.2.1.5).

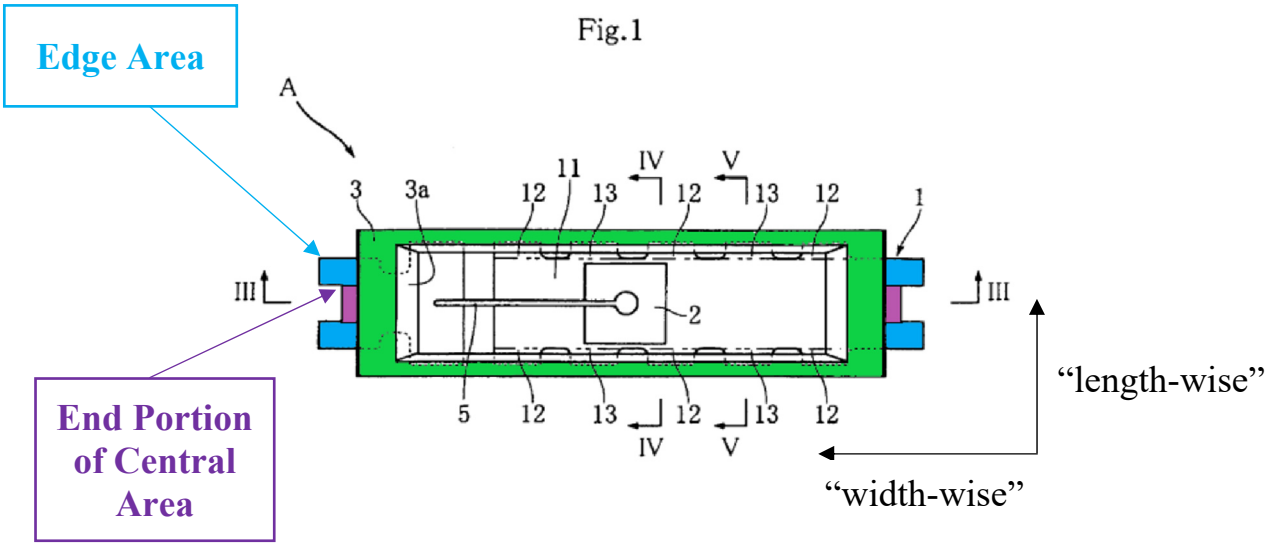
Kobayakawa FIG. 1 (Annotated)



f) Kobayakawa Discloses Claim 1's "Edge Area Protrudes"

Kobayakawa discloses lead frame 1 which has an "at least one edge area [that] protrudes in the width-wise direction from an end portion of the central area" as shown in FIG. 1 (Ex-1005 at FIG. 1-2; Ex-1003 at § 9.2.1.6).

Kobayakawa FIG. 1 (Annotated)



g) Kobayakawa Discloses Claim 1's "Electrode Portion Cross Section"

Kobayakawa discloses "wherein the at least one electrode portion further comprises an electrode portion cross section," for example via cross-section on the edge of lead frame 1 as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.1.7). Although one electrode cross-section is drawn below, it will be appreciated that many cross sections can be drawn through the electrode.

Kobayakawa FIGs. 1 and 3 (Annotated)

Fig.1

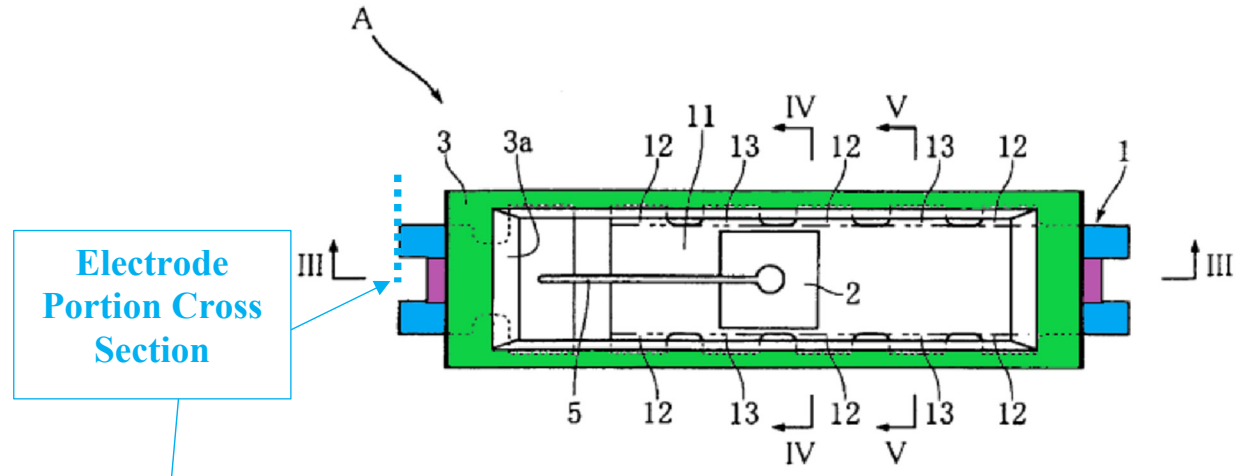
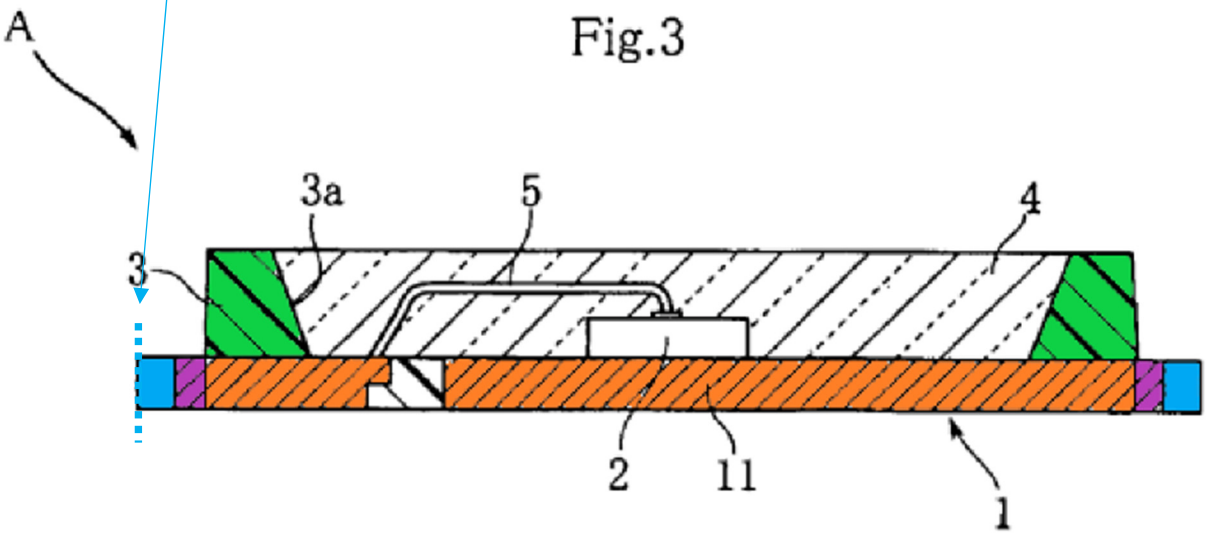


Fig.3

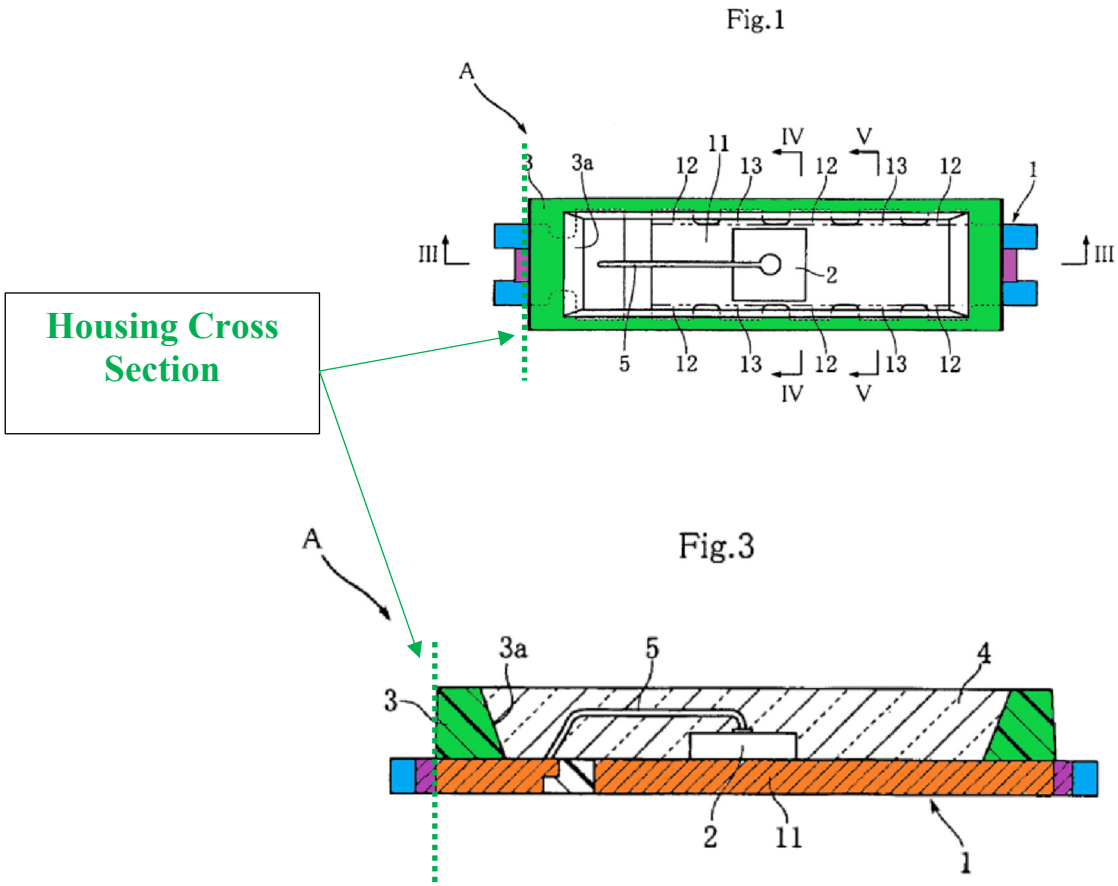


h) Kobayakawa Discloses Claim 1's "Housing Cross Section"

Kobayakawa discloses "wherein the resin housing comprises at least one housing cross section," for example via a cross-section on the edge of case 3 as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.1.8). Although one housing cross-

section is drawn below, it will be appreciated that many cross sections can be drawn through the housing.

Kobayakawa FIGs. 1 and 3 (Annotated)

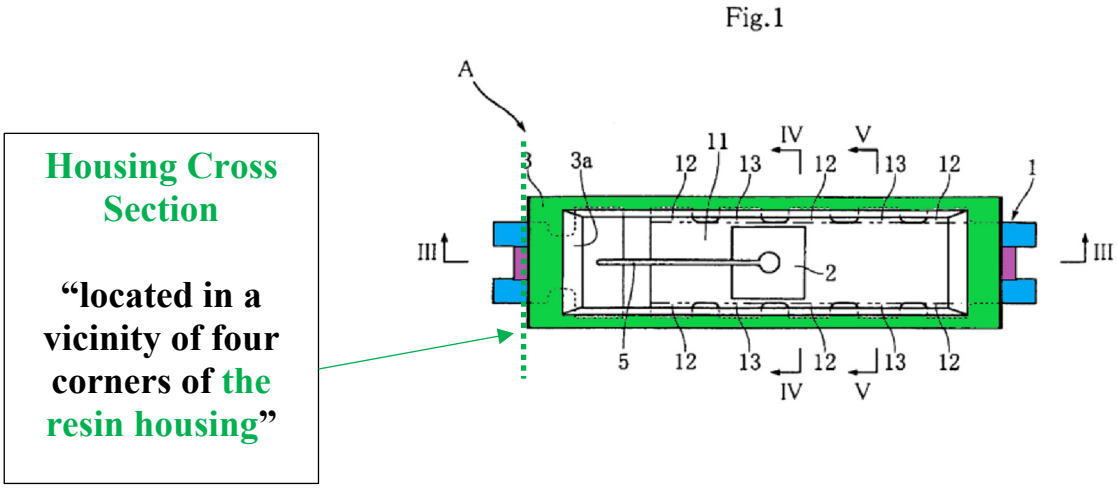


i) Kobayakawa Discloses Claim 1's "Four Corners" Limitation

Kobayakawa discloses "wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing," for example via cross-section on the edge of case 3 as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.1.9). Although one housing cross-section is drawn below, it will be appreciated

that many cross sections can be drawn through the housing all which are in the vicinity of the four corners for the resin housing.

Kobayakawa FIG. 1 (Annotated)

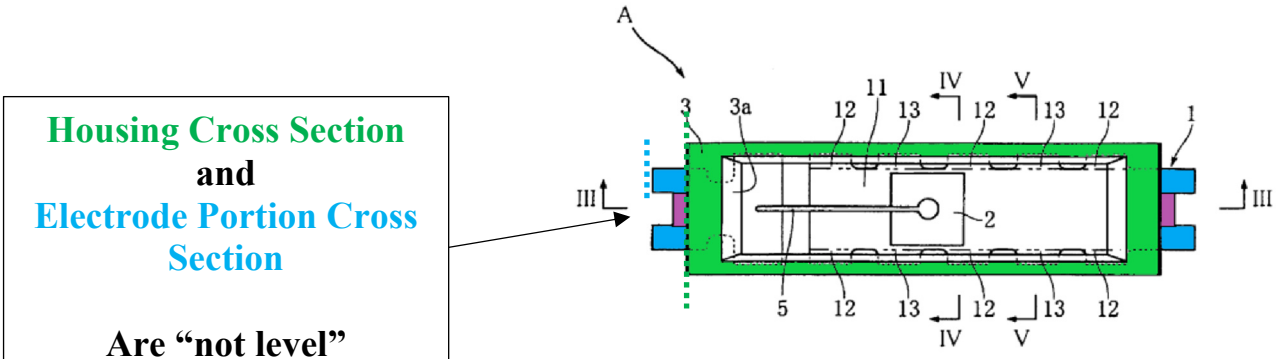


j) Kobayakawa Discloses Claim 1's "Not Level" Limitation

Kobayakawa discloses "wherein the at least one housing cross section is not level with the electrode portion cross section" as shown in FIG. 1 (Ex-1003 at § 9.2.1.10). 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 (Ex-1005 at FIGs. 1-2).

Kobayakawa FIGs. 1 and 3 (Annotated)

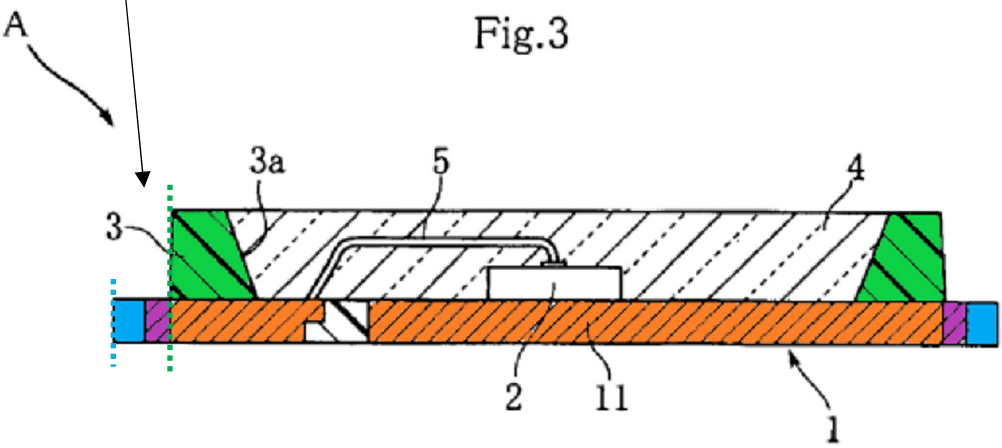
Fig.1



Housing Cross Section and Electrode Portion Cross Section

Are "not level"

Fig.3

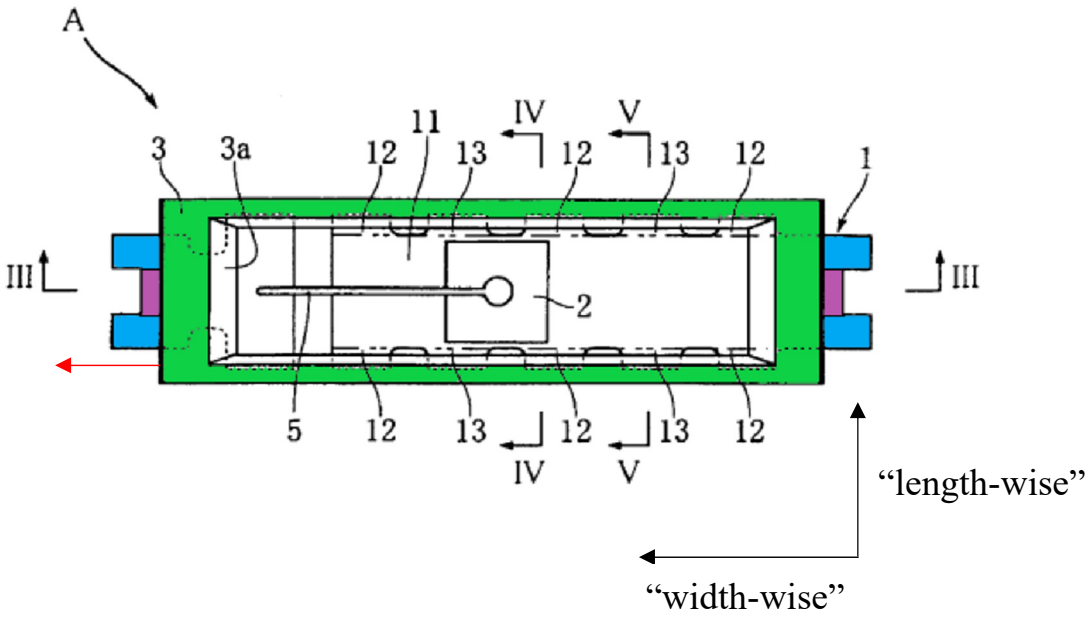


2. Kobayakawa Anticipates Claim 5

Kobayakawa discloses "the central area and the at least one edge area protrude from the housing in the width-wise direction" (Ex-1005 at 2:40-41; *See* Ex-1003 at § 9.2.2), as shown in FIG. 1.

Kobayakawa FIG. 1 (Annotated)

Fig.1

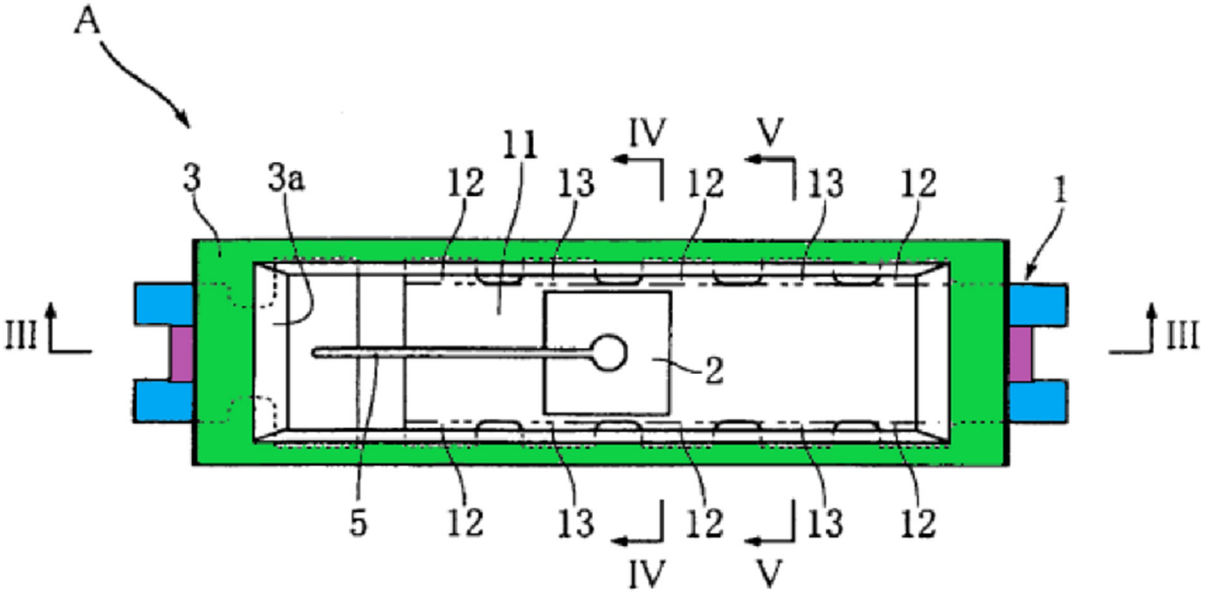


3. Kobayakawa Anticipates Claim 6

Kobayakawa discloses "the at least one edge area comprises two edge areas" via the two edge areas [blue] of lead frame 1 that protrude from case 3, as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.3).

Kobayakawa FIG. 1 (Annotated)

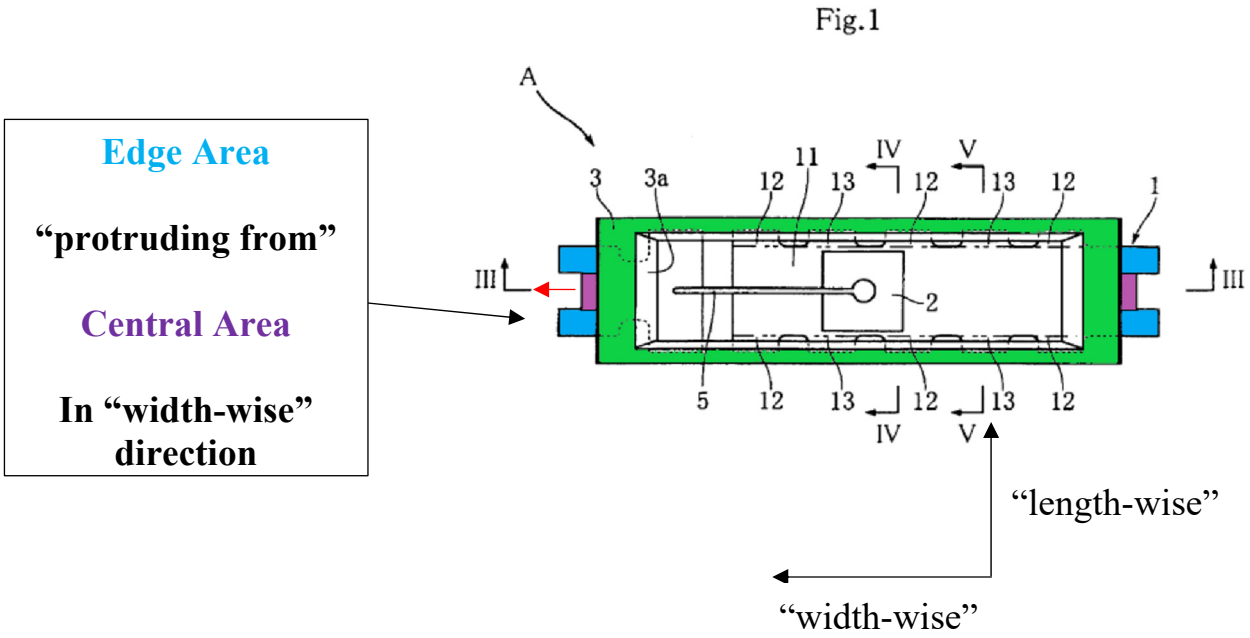
Fig.1



4. Kobayakawa Anticipates Claim 7

Kobayakawa discloses "the two edge areas protrude from central area in the widthwise direction" via the edge areas and central area of lead frame 1, as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at§ 9.2.4).

Kobayakawa FIG. 1 (Annotated)

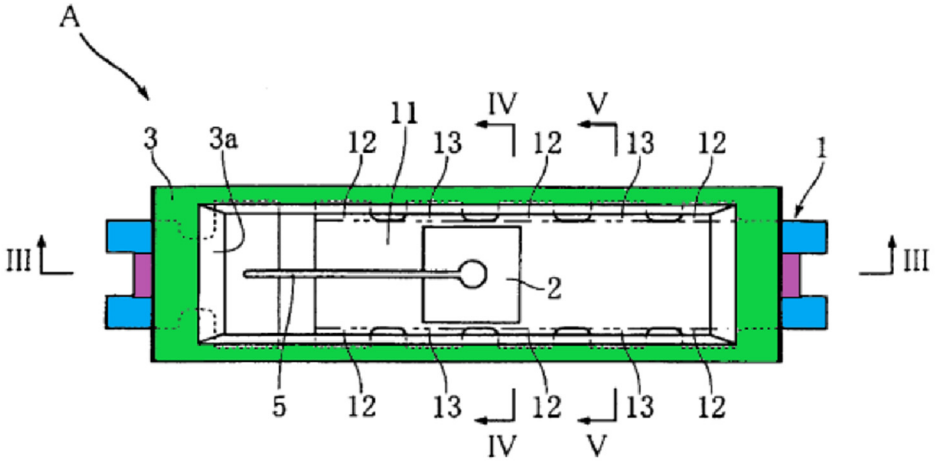


5. Kobayakawa Anticipates Claim 8

Kobayakawa discloses "the central area is provided between the two edge areas along the length-wise direction" via the edge areas and central area of lead frame 1, as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.5).

Kobayakawa FIG. 1 (Annotated)

Fig.1

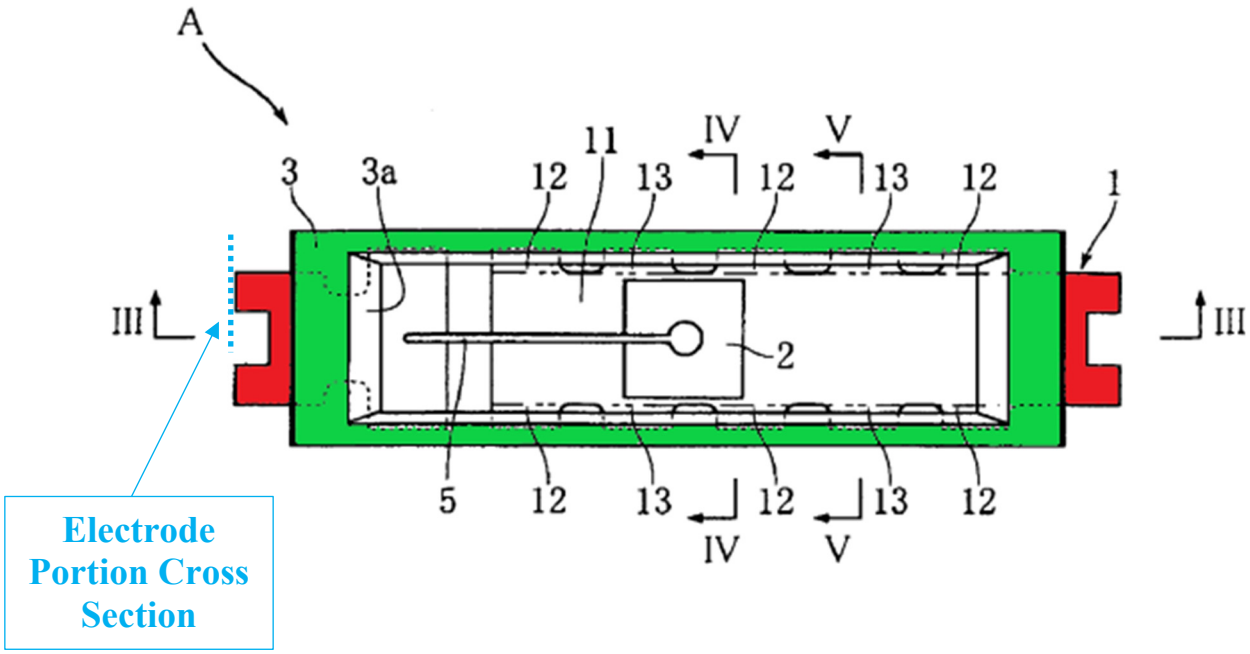


6. Kobayakawa Anticipates Claim 9

Kobayakawa discloses "the electrode portion cross section corresponds to at least a portion of an outer surface of the wing portion" as shown in the cross section on lead frame 1, for example in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.6).

Kobayakawa FIG. 1 (Annotated)

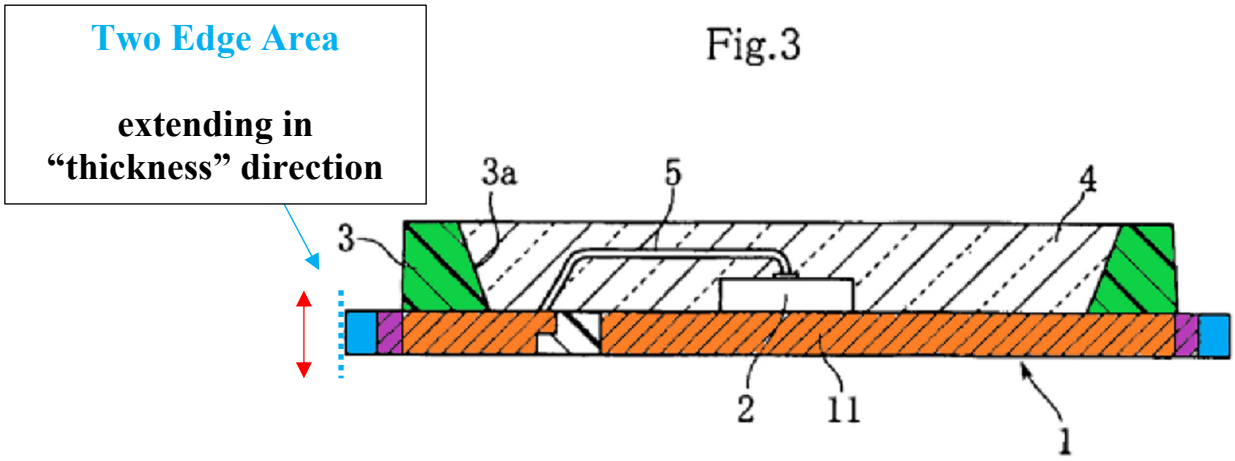
Fig.1



7. Kobayakawa Anticipates Claim 10

Kobayakawa discloses "the electrode portion cross section extends in a thickness direction of the at least one electrode portion" as shown in the cross section on lead frame 1, for example in FIGs. 1 & 3 (Ex-1005 at FIGs. 1-3; Ex-1003 at § 9.2.7).

Kobayakawa FIG. 3 (Annotated)



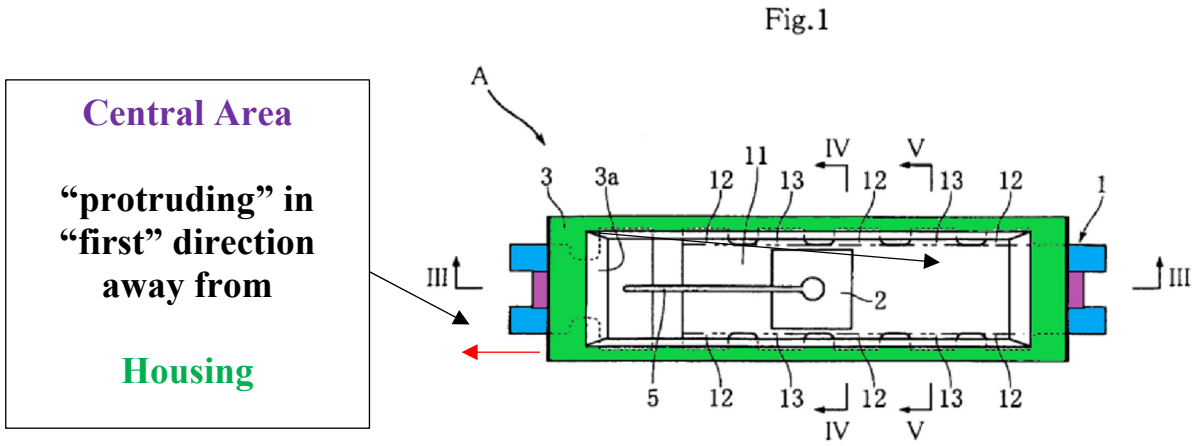
8. Kobayakawa Anticipates Claim 11

Kobaykawa anticipates claim 11 (Ex-1003 at § 9.2.8). Kobaykawa discloses claim 11's "preamble," "electrode portion," and "resin housing" limitations for the reasons as described above with reference to the corresponding limitations in claim 1 (*See supra* §§ XI(B)(1)(a)-(c); *see also* Ex-1003 at §§ 9.2.8.1-9.2.8.3).

a) Kobayakawa Discloses Claim 11's "Central Area"

Kobayakawa discloses "wherein the wing portion comprises: a central area protruding from the housing in a first direction away from the housing" via the central area of "the lead frame 1," which is exposed out of the case 3" (Ex-1005 at 2:40-41, FIG. 1-2; Ex-1003 at § 9.2.8.4), for example as shown in FIG. 1.

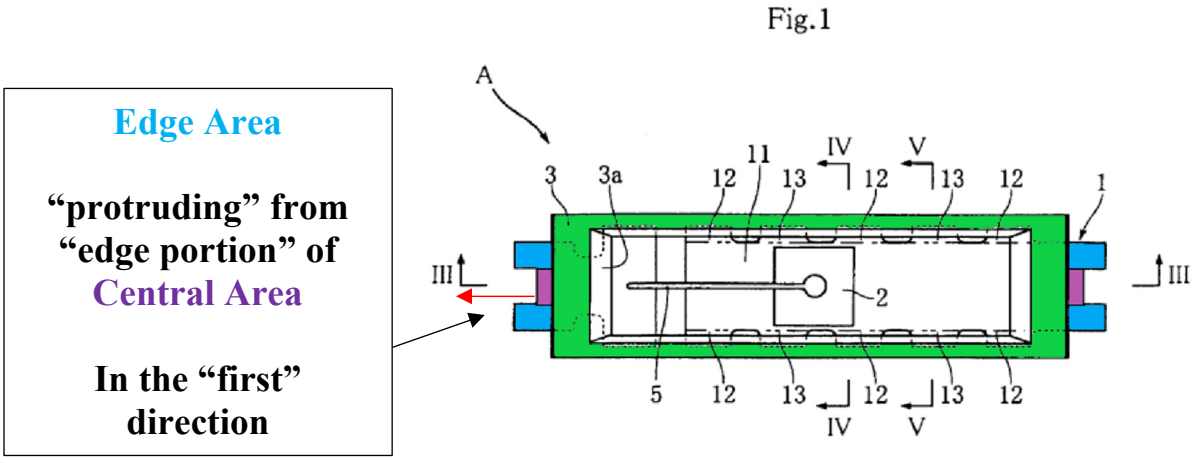
Kobayakawa FIG. 1 (Annotated)



b) Kobayakawa Discloses Claim 11's "Edge Area"

Kobayakawa discloses "and at least one edge area protruding from an edge portion of the central area, in the first direction" as shown in FIG. 1 (Ex-1005 at FIG. 1-2; Ex-1003 at § 9.2.8.5).

Kobayakawa FIG. 1 (Annotated)



c) Kobayakawa Discloses Claim 11's "Recessed" Limitation

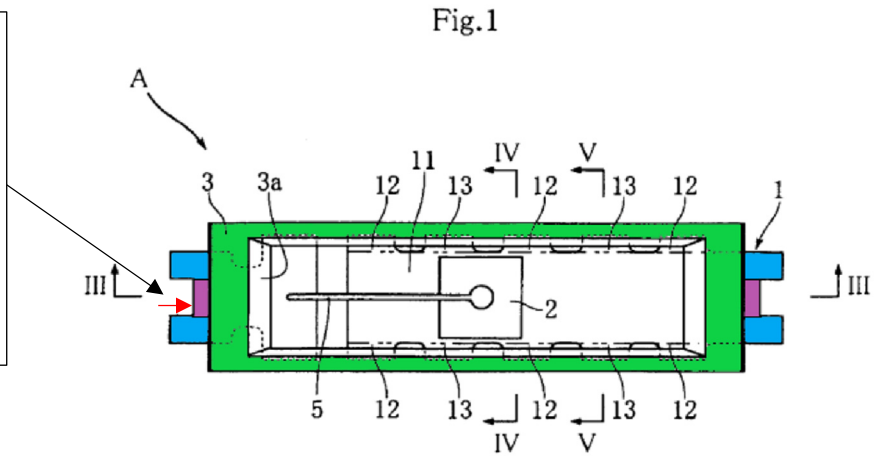
Kobayakawa discloses "wherein the central area is recessed from the at least one edge area in a second direction opposite from the first direction toward the housing" via the recessed central area of exposed lead frame 1 relative to the edge areas of exposed lead frame, for example as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.8.6).

Kobayakawa FIG. 1 (Annotated)

Central Area

Is "recessed" from the Edge Area

In the "second" direction



d) Kobayakawa Discloses Claim 11's "Electrode Portion Cross Section"

Kobayakawa discloses "wherein the at least one electrode portion further comprises an electrode portion cross section," for example via cross-section on the edge of lead frame 1 as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.8.7; *See also* § XI(B)(1)(g)).

e) Kobayakawa Discloses Claim 11's "Housing Cross Section"

Kobayakawa discloses "wherein the resin housing comprises at least one housing cross section," for example via cross-section on the edge of case 3 as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.8.8; *See also* § XI(B)(1)(h)).

f) Kobayakawa Discloses Clam 11's "Housing Corner" Limitation

Kobayakawa discloses "wherein the at least one housing cross section is located in a vicinity of a corner of the resin housing," for example via cross-section on the edge of case 3 as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.8.9; *See also* § XI(B)(1)(i)).

g) Kobayakawa Discloses Claim 11's "Not Level" Limitation

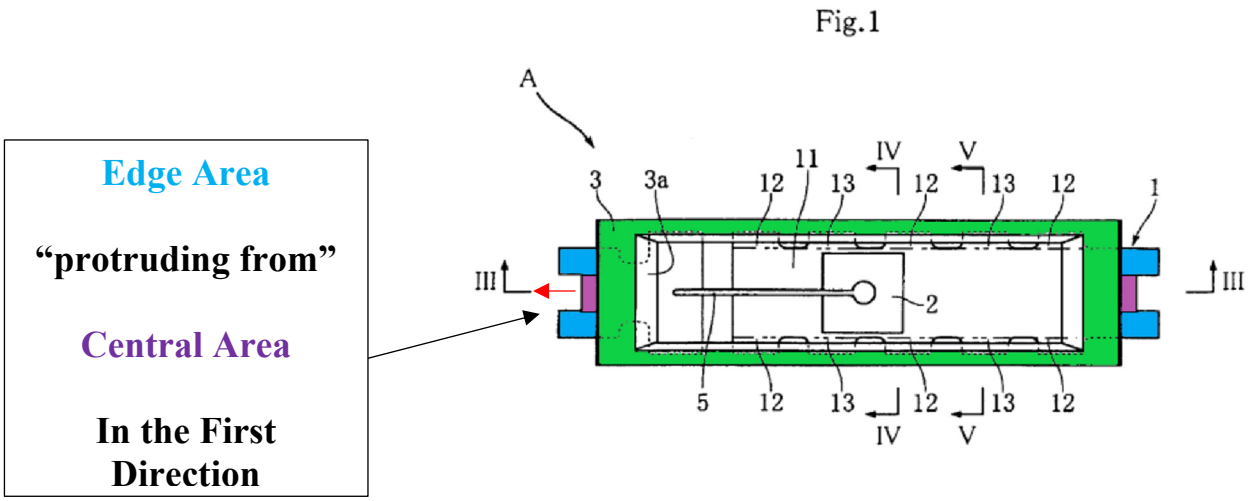
Kobayakawa discloses "wherein the at least one housing cross section is not level with the electrode portion cross section" as shown in FIG. 1 (Ex-1003 at § 9.2.8.10). The housing cross-section is on case 3 and is not in line with or level with the electrode portion cross section on lead frame 1 (Ex-1005 at FIGs. 1-2; *See also* § XI(B)(1)(j)).

h) Kobayakawa Discloses Claim 11's "Edge Areas Protrude" Limitation

Kobayakawa discloses "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" via the multiple edge portions of lead frame 1 that protrude from the central area of lead frame 1, for example as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at §§ 9.2.8.11-9.2.8.12).

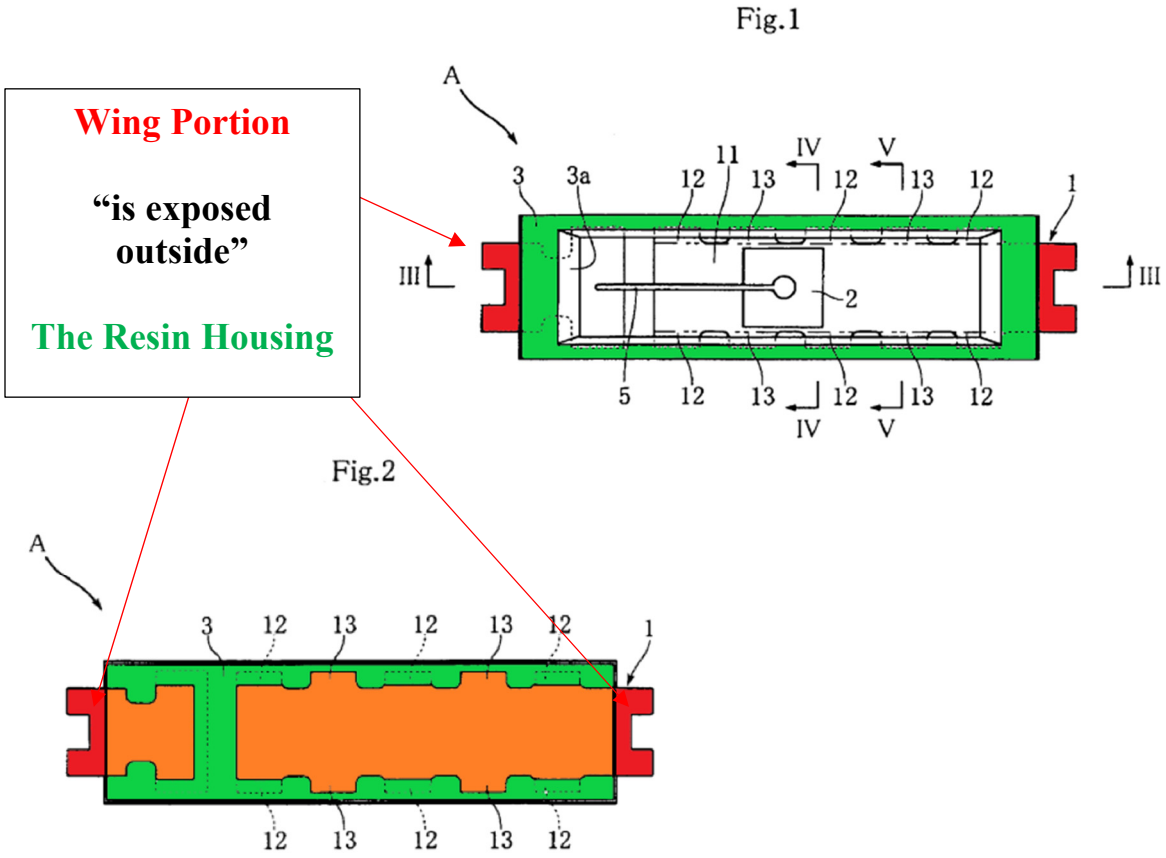
Kobayakawa FIG. 1 (Annotated)



9. Kobayakawa Anticipates Claim 12

Kobayakawa anticipates claim 12 because Kobayakawa discloses that "the lead frame 1 is exposed out of the case 3" (Ex-1005 at 2:40-41) which corresponds to the "the wing portion [being] exposed the resin housing" as shown in FIG. 1 (Ex-1003 at § 9.2.9).

Kobayakawa FIGs. 1 and 3 (Annotated)

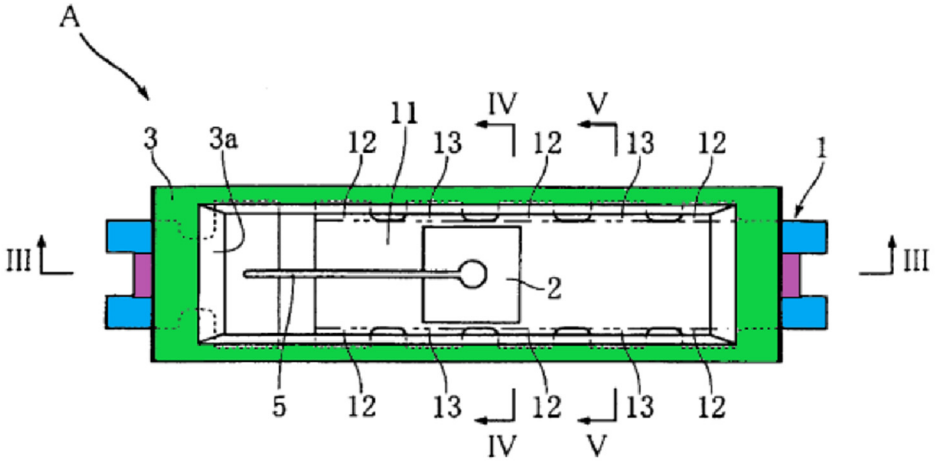


10.Kobayakawa Anticipates Claim 13

Kobayakawa anticipates claim 13 because Kobayakawa discloses "wherein the wing portion comprises two edge areas," via its lead frame 1 having two respective edge areas [blue as shown in FIG. 1 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.10).

Kobayakawa FIG. 1 (Annotated)

Fig.1

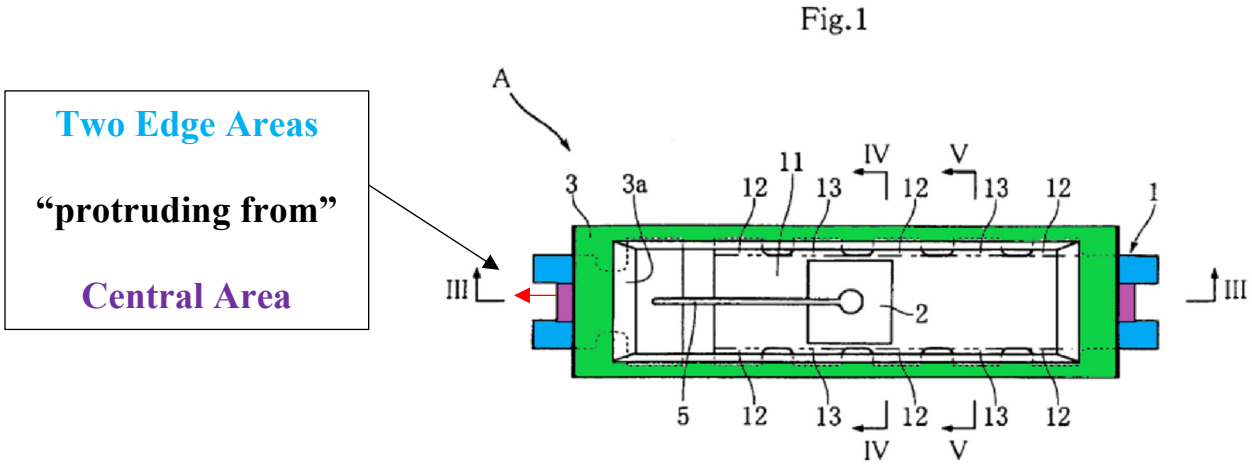


11. Kobayakawa Anticipates Claim 14

Kobayakawa anticipates claim 14 because Kobayakawa discloses "wherein the two edge areas protrude from central area," via lead frame 1 having two respective edge areas that each protrude from central portion lead frame 1, as shown in FIGs. 1 & 2 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.11).

Kobayakawa FIG. 1 (Annotated)

Fig.1



12. Kobayakawa Anticipates Claim 16

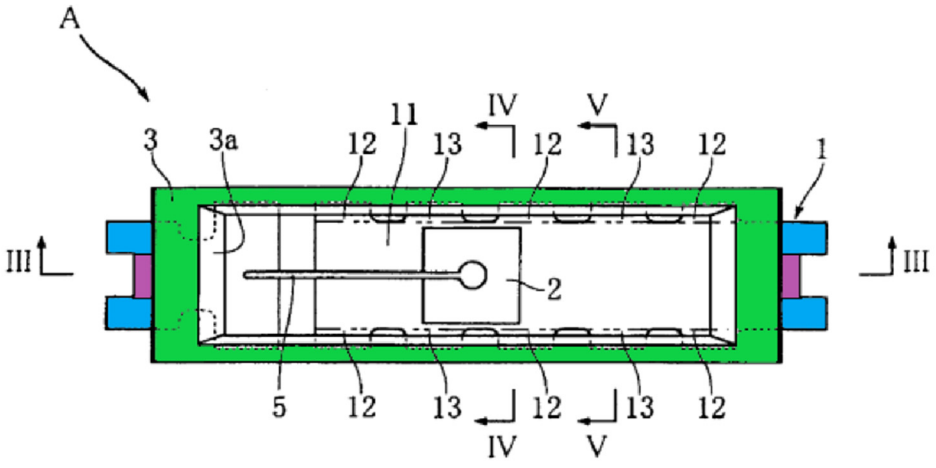
Kobayakawa anticipates claim 16 because Kobayakawa discloses "wherein the at least one electrode portion further comprises a conductive layer" (Ex-1003 at § 9.2.12). Kobayakawa describes that the lead frame 1 or "at least one electrode portion" is "made of Cu, Ni, or an alloy containing Cu and/or Ni" (Ex-1005 at 2:39-41), which are conductive materials and correspond to a conductive layer (*Id.*).

13. Kobayakawa Anticipates Claim 20

Kobayakawa anticipates claim 20 because Kobayakawa discloses "wherein the central area is provided between the two edge area along a third direction substantially perpendicular to the first and second direction" via the central area of its lead frame 1, as shown in FIG. 1-2 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.13).

Kobayakawa FIG. 1 (Annotated)

Fig.1

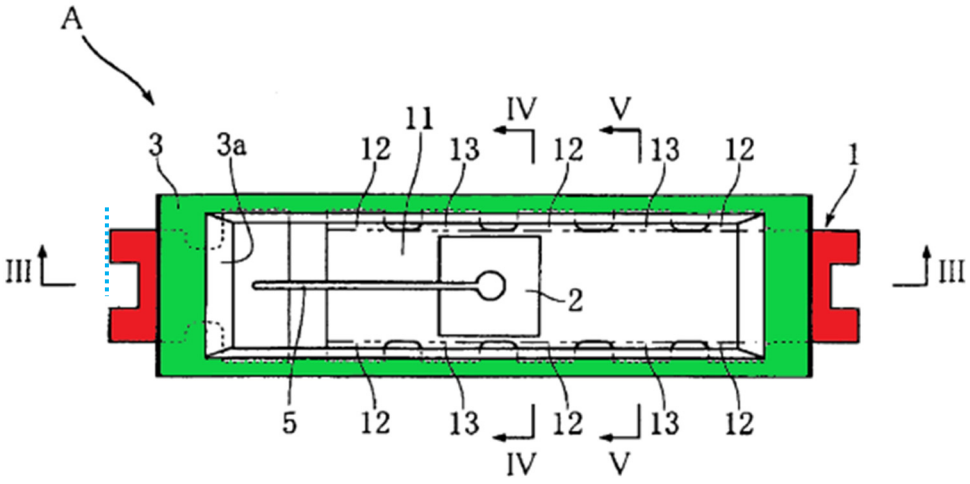


14. Kobayakawa Anticipates Claim 21

Kobayakawa anticipates claim 21 because Kobayakawa discloses "wherein the electrode portion cross section corresponds to at least a portion of an outer surface of the wing portion" via the electrode cross section being on the outer surface lead frame 1 ("wing portion"), as shown in FIGs. 1-2 (Ex-1005 at FIGs. 1-2; Ex-1003 at § 9.2.14).

Kobayakawa FIG. 1 (Annotated)

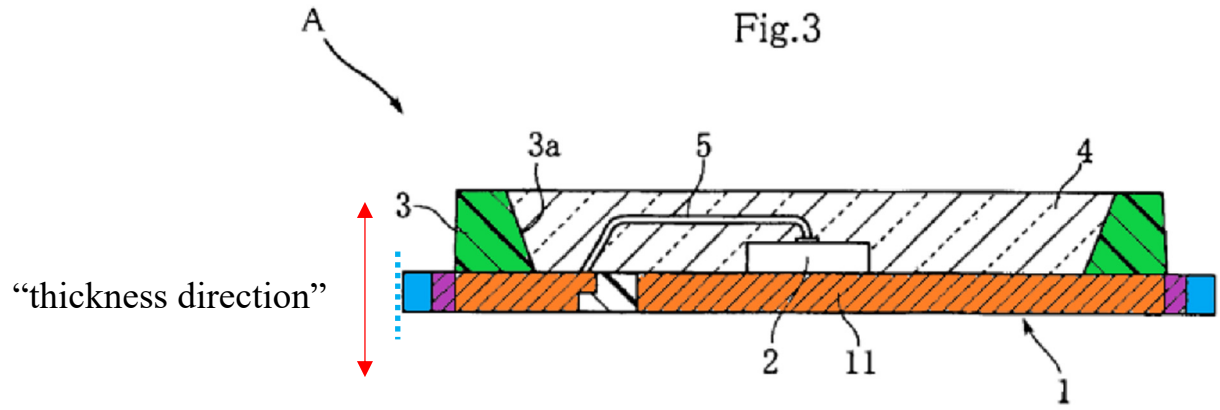
Fig.1



15. Kobayakawa Anticipates Claim 22

Kobayakawa discloses "the electrode portion cross section extends in a thickness direction of the at least one electrode portion" as shown in the cross section on lead frame 1, for example in FIGs. 1 & 3 (Ex-1005 at FIGs. 1-3; Ex-1003 at § 9.2.15).

Kobayakawa FIG. (Annotated)



C. GROUND 3: Anticipation by Hayashi

For Ground 1, the prior art consists of Hayashi (Ex-1006). The challenged claims are claims 1, 2, 5-16, and 20-22.

1. Claim 1

Hayashi anticipates claim 1 (Ex-1003 at § 9.3.1).

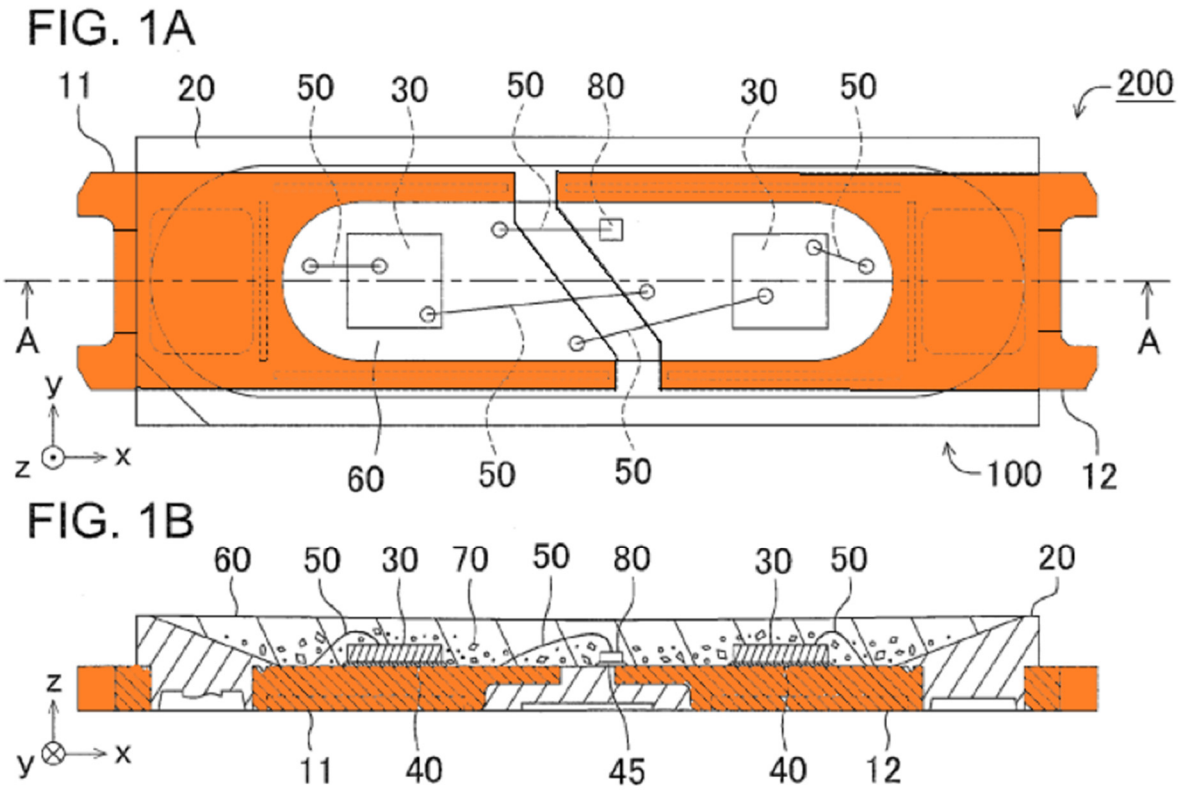
a) Preamble

Hayashi discloses a "light emitting device" whether or not the preamble is a limitation. Hayashi discloses a "light emitting device" (*See* Ex-1003 at § 9.3.1.1; Ex-1006 at [0006], [0008]-[0014]; FIGs. 1A-B, 2A-D).

b) Hayashi Discloses Claim 1's "Electrode Portion"

Hayashi discloses "lead-frames 11, 12" that each "conduct electricity and can be connected with the light emitting elements" (Ex-1006 at [0047]-[0048]) that are the claimed "at least one electrode portion" as shown in FIG. 1A-1B (Ex-1003 at § 9.3.1.2).

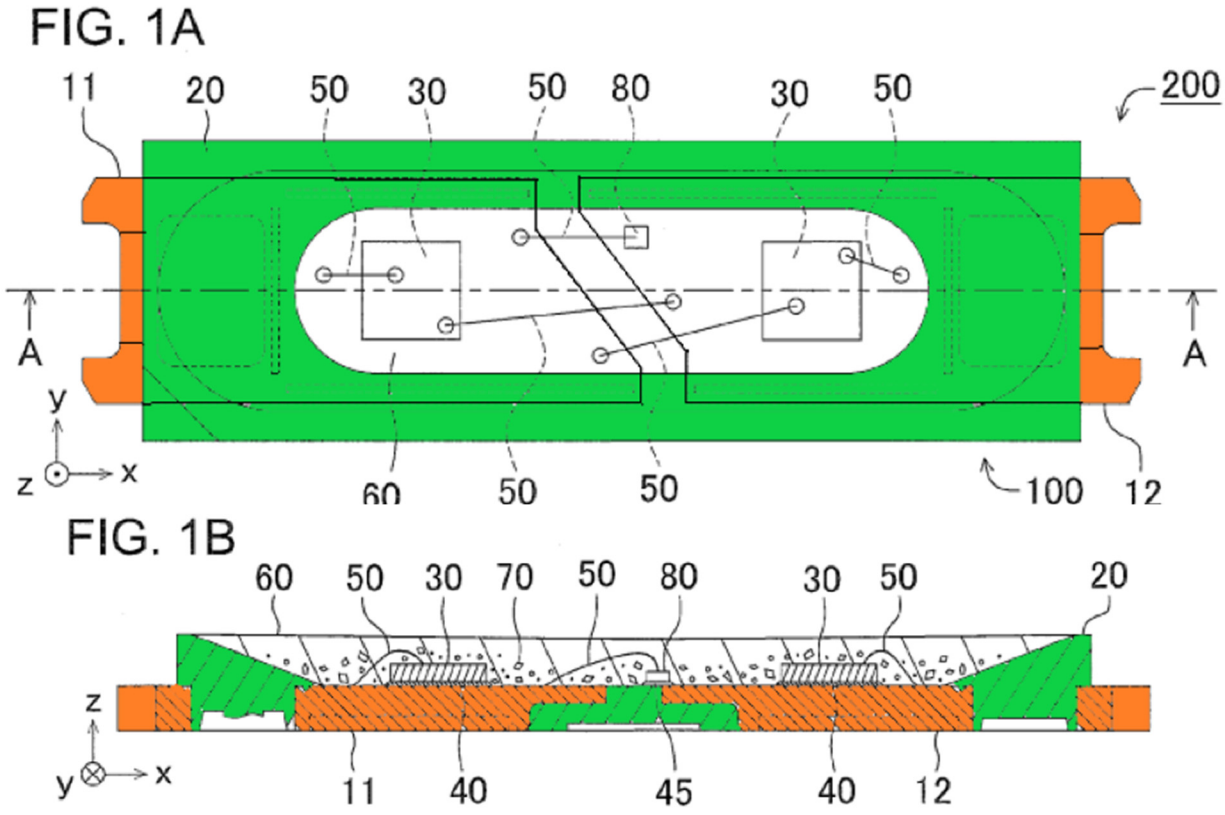
Hayashi FIGs. 1A and 1B (Annotated)



c) Hayashi Discloses Claim 1's "Resin Housing"

Hayashi discloses a "molded resin 20" that comprises the claimed "a resin housing containing a reflective material and covering a portion of said at least one electrode portion" (Ex-1003 at § 9.3.1.3). Hayashi describes that "molded resin 20 covers part (or all) of both sides (lateral surfaces) of the lead-frames 11, 12 (Ex-1006 at [0025]). Hayashi discloses molded resin 20 covering part of the lead frames 11, 12 (*e.g.*, "at least one electrode portion") in FIG. 1A-1B (Ex-1006 at FIG. 1A-1B).

Hayashi FIGs. 1A and 1B (Annotated)



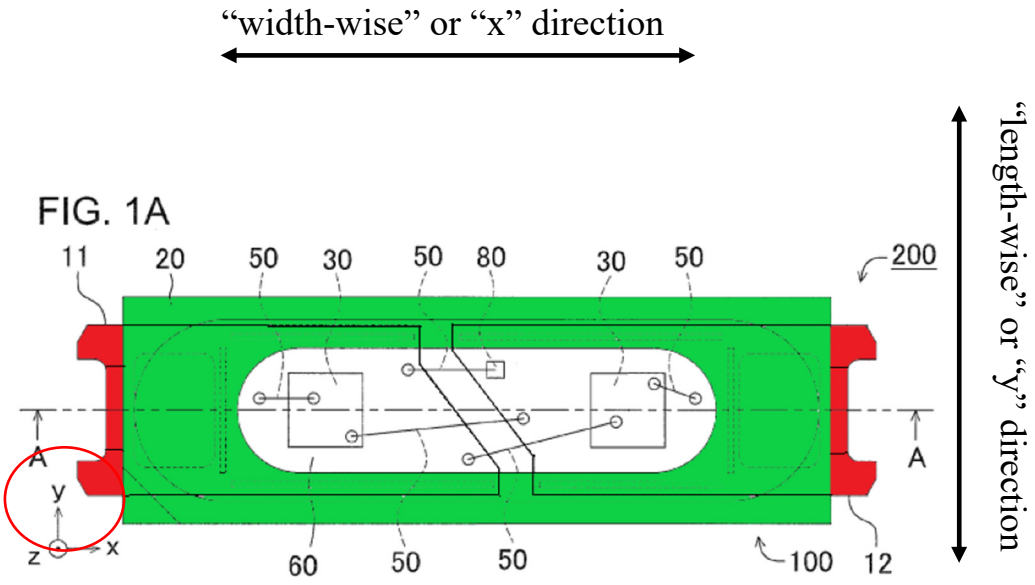
Hayashi explains that molded resin 20 can be made of any of a "base material (matrix)" (Ex-1006 at [0050]) and that molded resin 20 is shaped to reflect light emitted by the LED outward (*e.g.*, up) from the LED package (Ex-1006 at [0045]). Hayashi also provides that "particulate or fiber fillers and pigments such as glass, silica, titanium oxide, magnesium oxide, magnesium carbonate, magnesium hydroxide, calcium carbonate, calcium hydroxide, calcium silicate, magnesium silicate, wollastonite, mica, zinc oxide, barium titanate, calcium titanate, aluminum borate, aluminum oxide, silicon carbide, antimony oxide, zinc stannate, zinc borate,

iron oxide, chrome oxide, manganese oxide, and carbon black can be mixed into the base material" (Ex-1006 at [0050]). These materials include reflective materials (Ex-1003 at ¶¶206); for example, the '742 patent describes zinc oxide as an example of a reflecting material (Ex-1001 at 4:65-5:4).

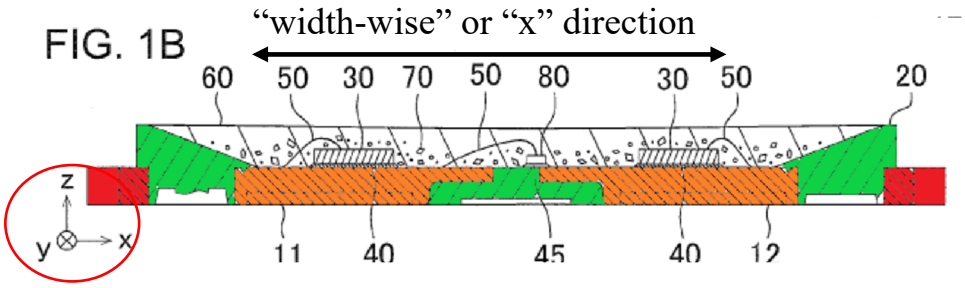
d) Hayashi Discloses Claim 1's "Wing Portion"

Hayashi discloses "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" (Ex-1003 at § 9.3.1.4; *See* Ex-1006 at [0022]-[0024]; FIG. 1A-1B). As shown in Figures 1A-B, Hayashi lead frame portions 11, 12 each correspond to the claimed "wing portion" as the are exposed outside molded resin 20 an extend along the edge of the edge of molded resin 20 (i.e., the "y-direction") and protrude from molded resin 20 in a direction substantially perpendicular to the edge of molded resin 20 (*i.e.*, the "x-direction") (Ex-1006 at FIG. 1A-B).

Hayashi FIGs. 1A (Annotated)



Hayashi FIGs. 1B (Annotated)

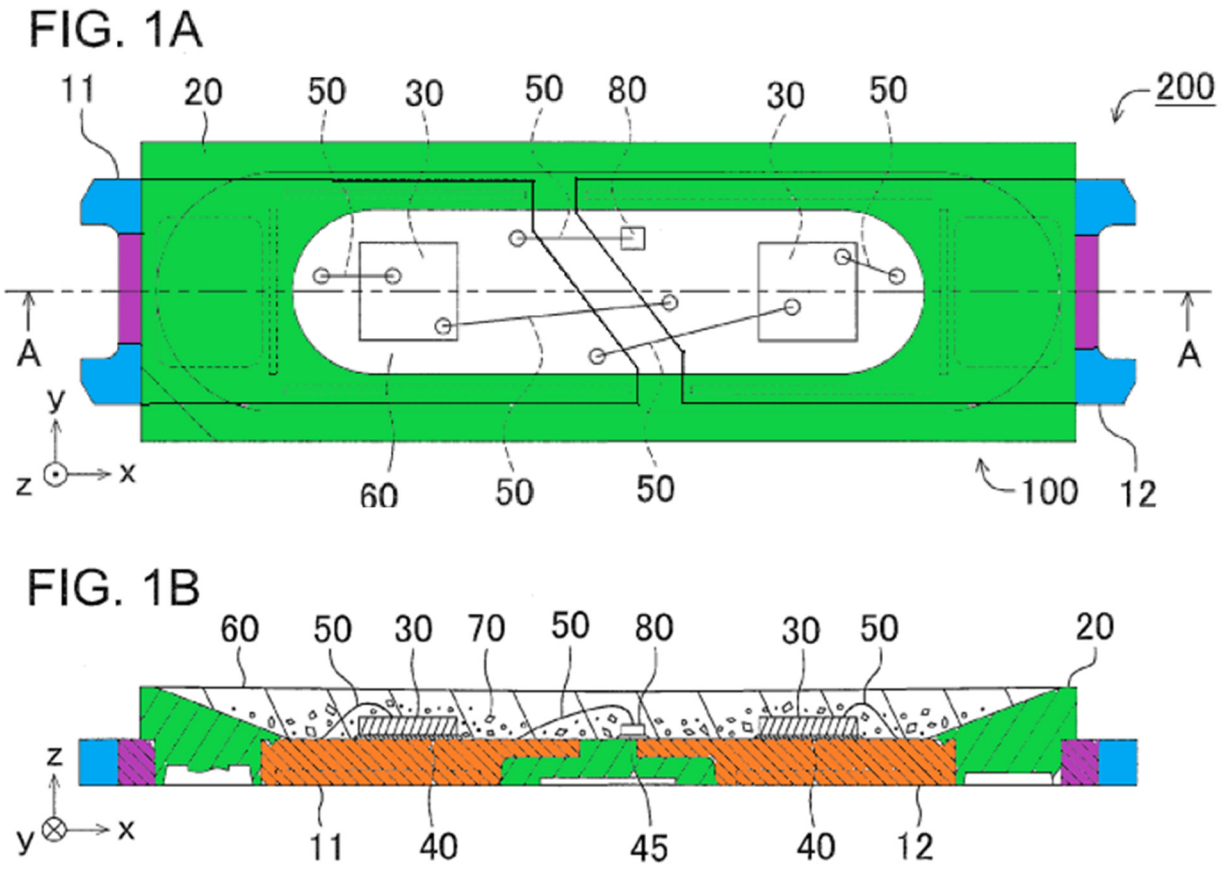


e) Hayashi Discloses Claim 1's "Central Area and Edge"

Hayashi discloses that the lead frames 11, 12 (*e.g.*, electrode portion) each have a wing portion having a "central area" and "at least one edge area having a length in the length-wise direction," (*i.e.*, the "y-direction" of Hayashi) "shorter than that of

the central area" as shown in Figure 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.1.5).

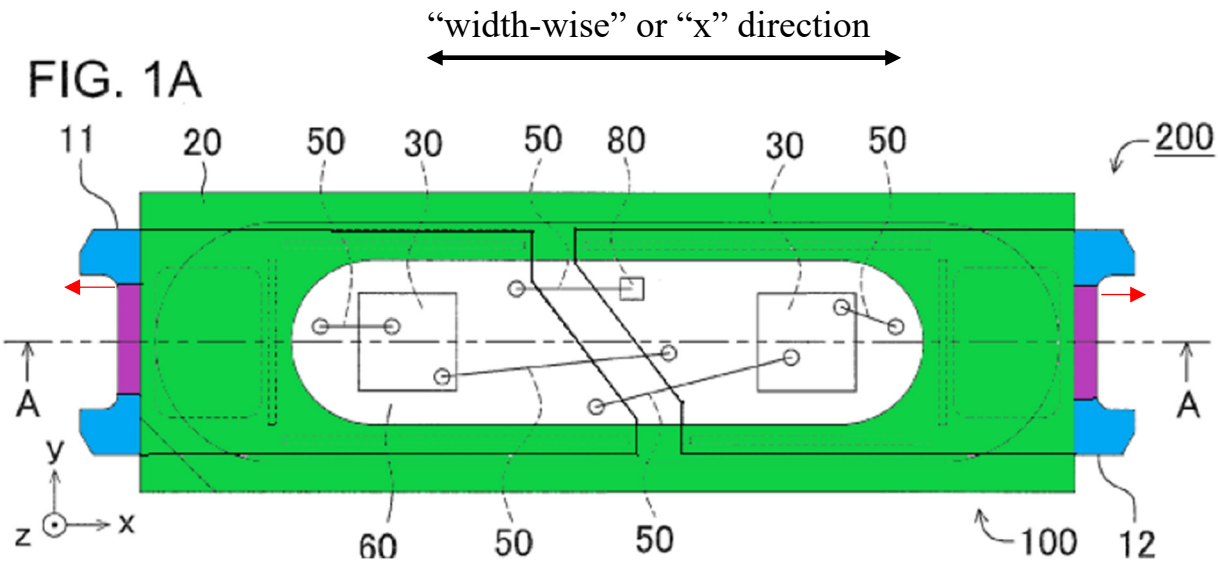
Hayashi FIGs. 1A and 1B (Annotated)



f) Hayashi Discloses Claim 1's "Edge Area Protrudes"

Hayashi discloses that lead frames 11, 12 each have "edge area that protrudes in the width-wise direction," which is the "x-direction" from an end portion of the central area" as shown in FIGs. 1A-1B (Ex-1006 at FIG. 1A-B; Ex-1003 at § 9.3.1.6).

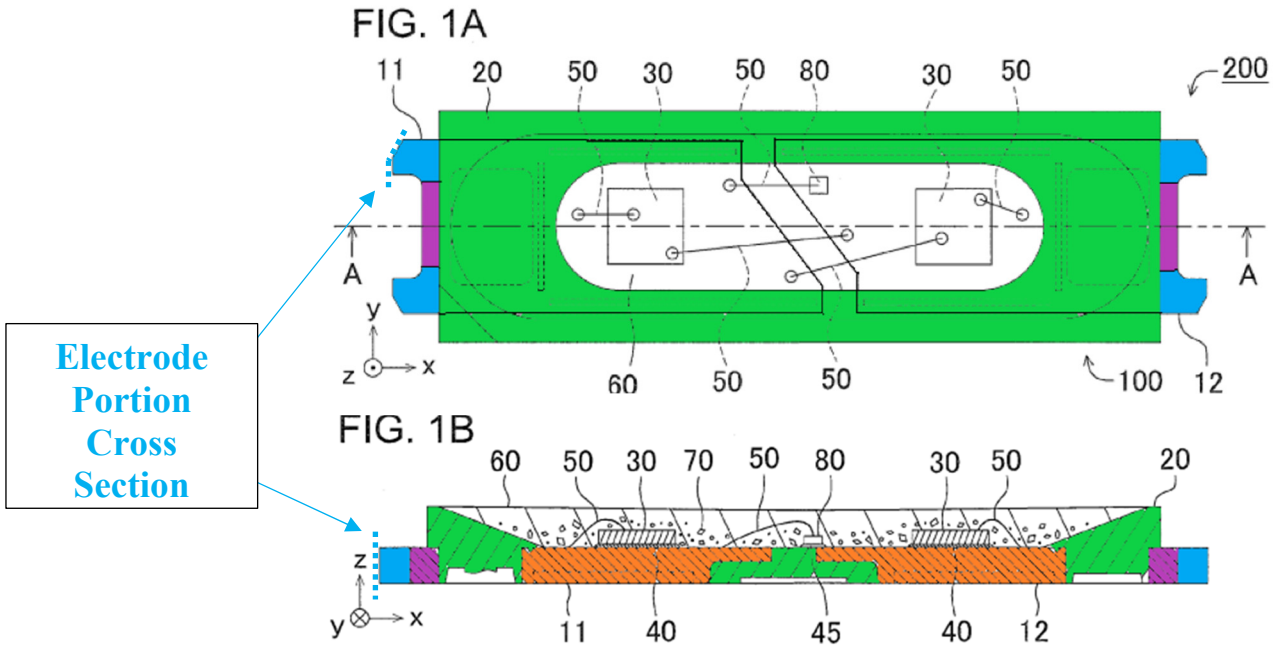
Hayashi FIG. 1A (Annotated)



g) Hayashi Discloses Claim 1's "Electrode Portion Cross Section"

Hayashi discloses "wherein the at least one electrode portion further comprises an electrode portion cross section," for example via cross-section on the edge of lead-frame 11 as shown in FIG. 1A (Ex-1006 at FIGs. 1A-B; Ex-1003 at § 9.3.1.7). Although one housing cross-section is drawn below, it will be appreciated that many cross sections can be drawn through the housing.

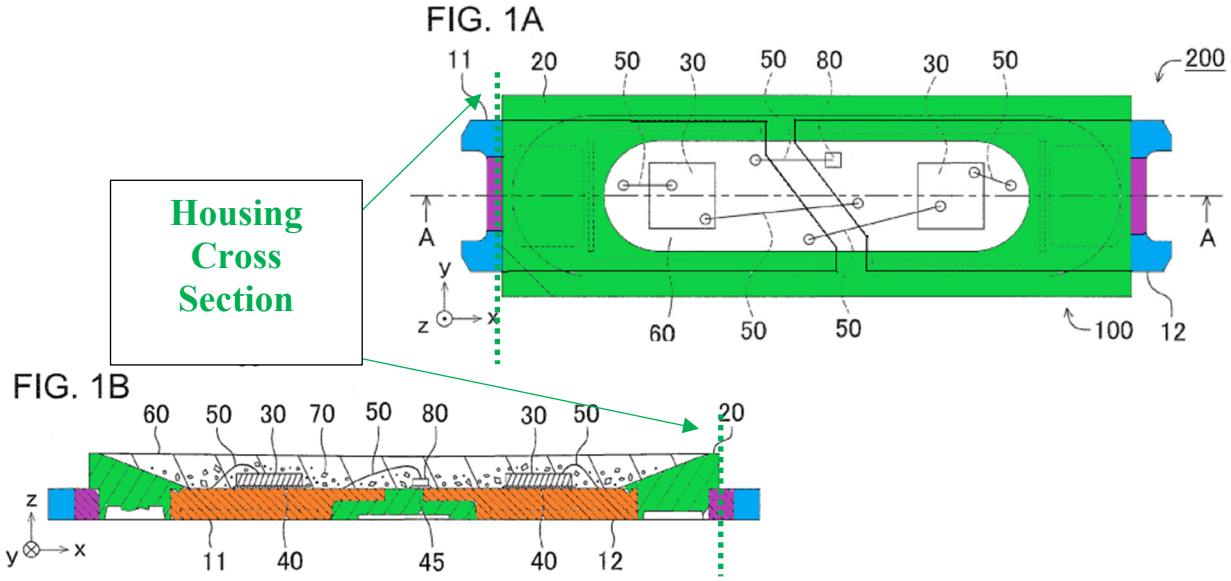
Hayashi FIGs. 1A and 1B (Annotated)



h) Hayashi Discloses Claim 1's "Housing Cross Section"

Hayashi discloses "wherein the resin housing comprises at least one housing cross section," for example via a cross-section on the edge of molded resin 20 as shown in FIG. 1A (Ex-1006 at FIGs. 1A-B; Ex-1003 at § 9.3.1.8). Although one housing cross-section is drawn below, it will be appreciated that many cross sections can be drawn through the housing.

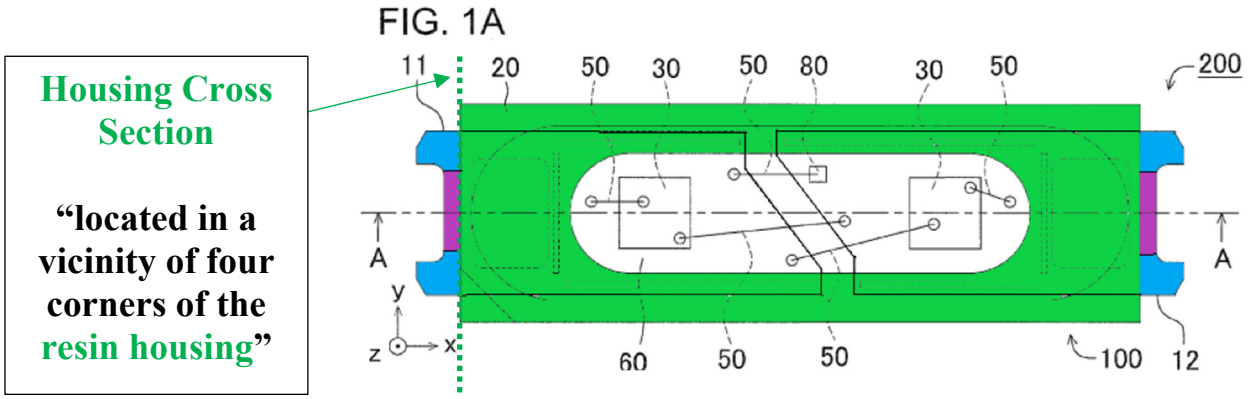
Hayashi FIGs. 1A and 1B (Annotated)



i) Hayashi Discloses Claim 1's "Four Corners" Limitation

Hayashi discloses "wherein the at least one housing cross section is located in a vicinity of four corners of the resin housing," for example via housing cross-section on the edge of molded resin 20 as shown in FIG. 1A, above (Ex-1006 at FIGs. 1A; Ex-1003 at § 9.3.1.9). Although one housing cross-section is drawn below, it will be appreciated that many cross sections can be drawn through the housing all which are in the vicinity of the four corners for the resin housing.

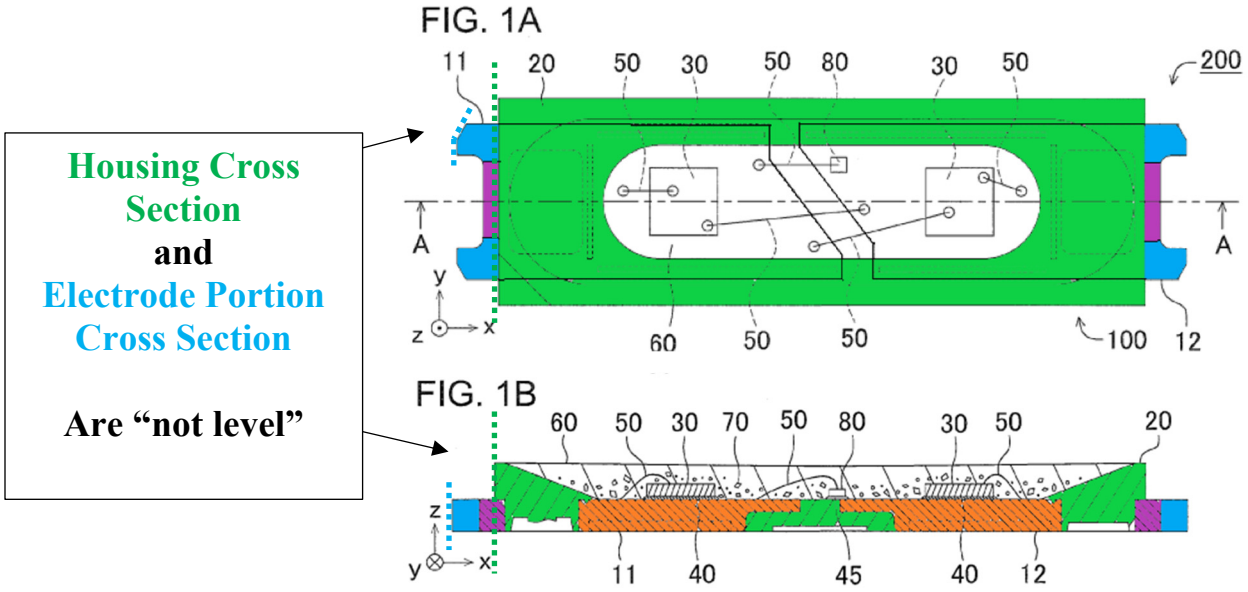
Hayashi FIG. 1A (Annotated)



j) Hayashi Discloses Claim 1's "Not Level" Limitation

Hayashi discloses "wherein the at least one housing cross section is not level with the electrode portion cross section" as shown in FIG. 1A (Ex-1003 at § 9.3.1.10). The housing cross-section is on molded 20 and is not in line with or level with the electrode portion cross section on lead frame 11 (Ex-1006 at FIGs. 1-2).

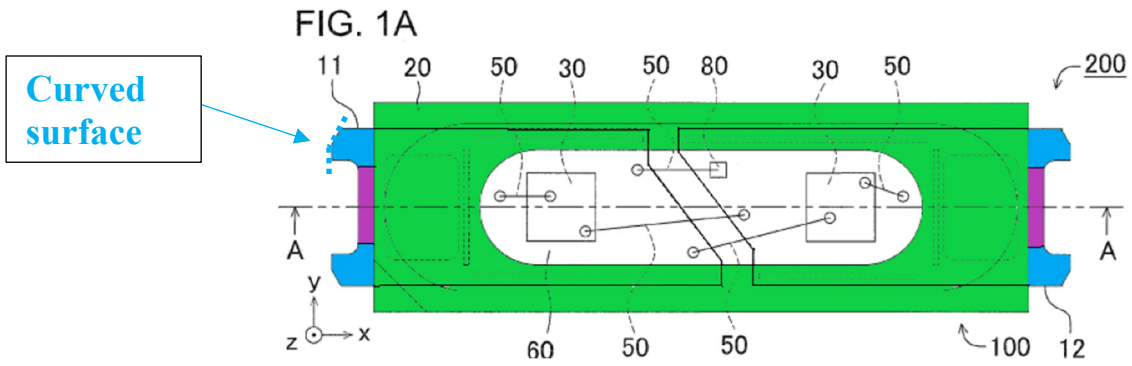
Hayashi FIGs. 1A and 1B (Annotated)



2. Hayashi Anticipates Claim 2

Hayashi discloses "wherein the electrode portion cross section comprises at least one curved surface" via the shape of its lead-frames 11, 12 that extend outside of molded resin 20 (Ex-1004 at FIGs. 1A-B; Ex-1003 at § 9.3.2).

Hayashi FIG. 1A (Annotated)



3. Hayashi Anticipates Claim 5

Hayashi discloses "the central area and the at least one edge area protrude from the housing in the width-wise direction" via its lead frames 11, 12, which include edge areas protruding from the housing in the "x-direction" (*i.e.*, width-wise direction) as shown in Figure 1A-B (Ex-1006 at FIG. 1A-B; Ex-1003 at § 9.3.3).

Hayashi FIGs. 1A and 1B (Annotated)

"width-wise" or "x" direction

FIG. 1A

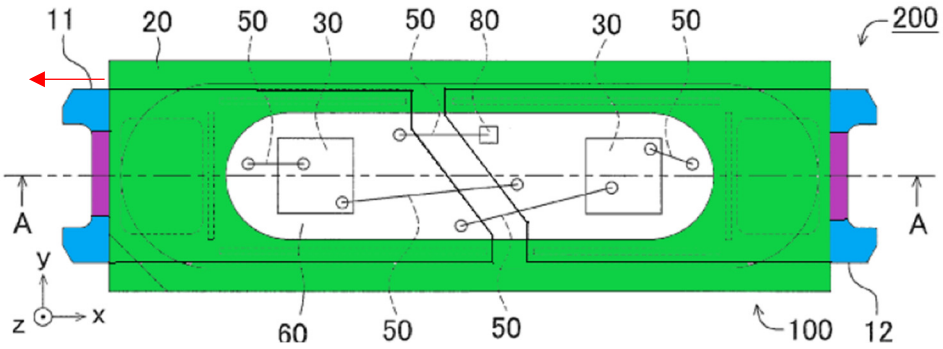
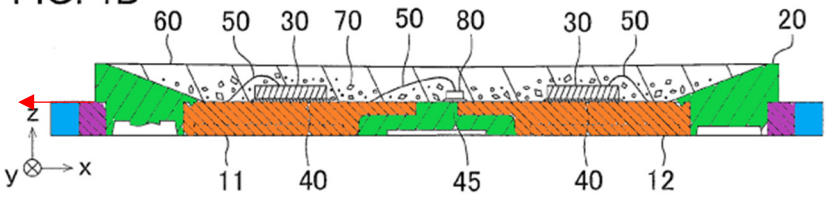


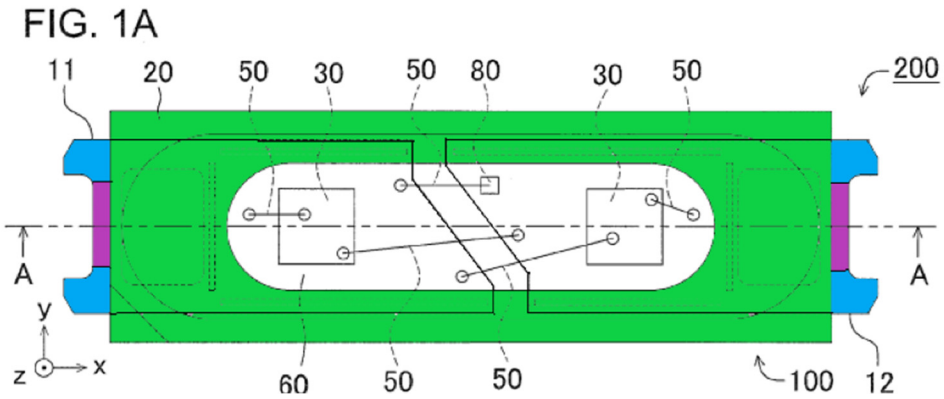
FIG. 1B



4. Hayashi Anticipates Claim 6

Hayashi discloses "the at least one edge area comprises two edge areas," as each of lead-frames 11, 12 have two protruding edge areas as shown in FIG. 1A (Ex-1004 at FIG. 1A; Ex-1003 at § 9.3.4).

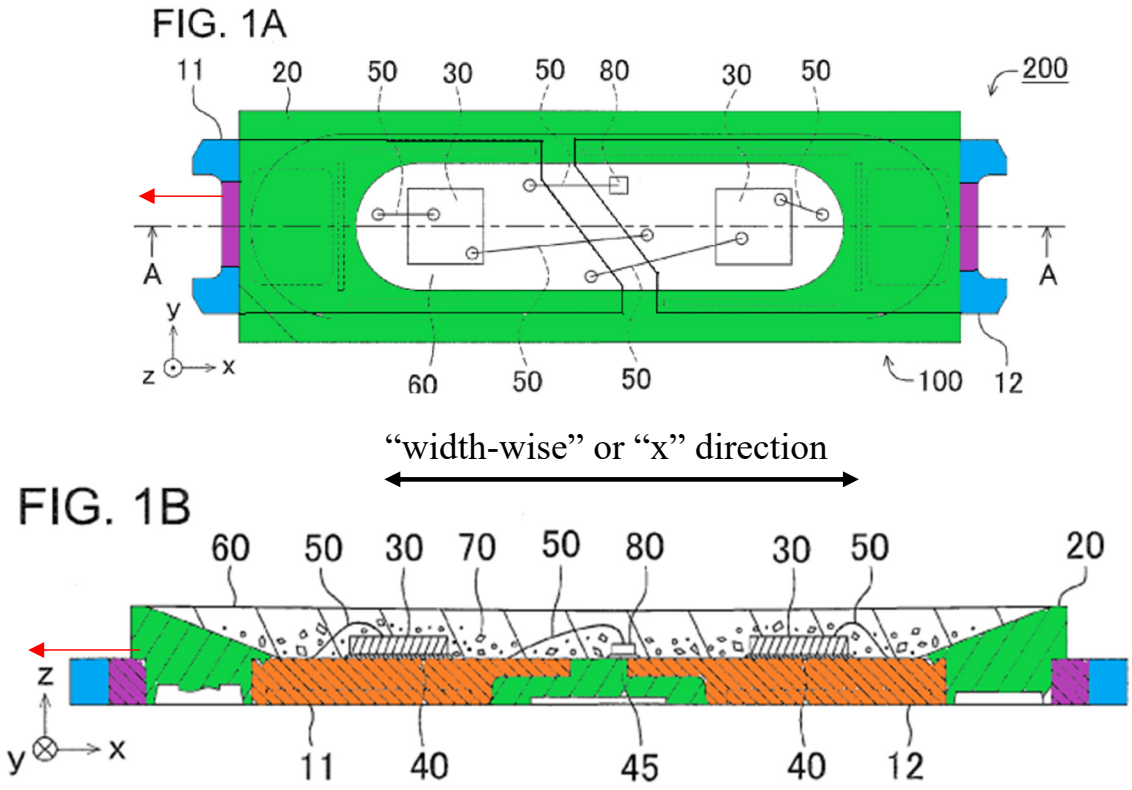
Hayashi FIG. 1A(Annotated)



5. Hayashi Anticipates Claim 7

Hayashi discloses "the two edge areas protrude from central area in the widthwise direction" since the edge areas of lead-frames 11, 12 protrude from the respective central areas in the x-direction (*i.e.*, widthwise direction), as shown in Figures 1A-B (Ex-1006 at FIGs. 1A-B; Ex-1003 at § 9.3.5).

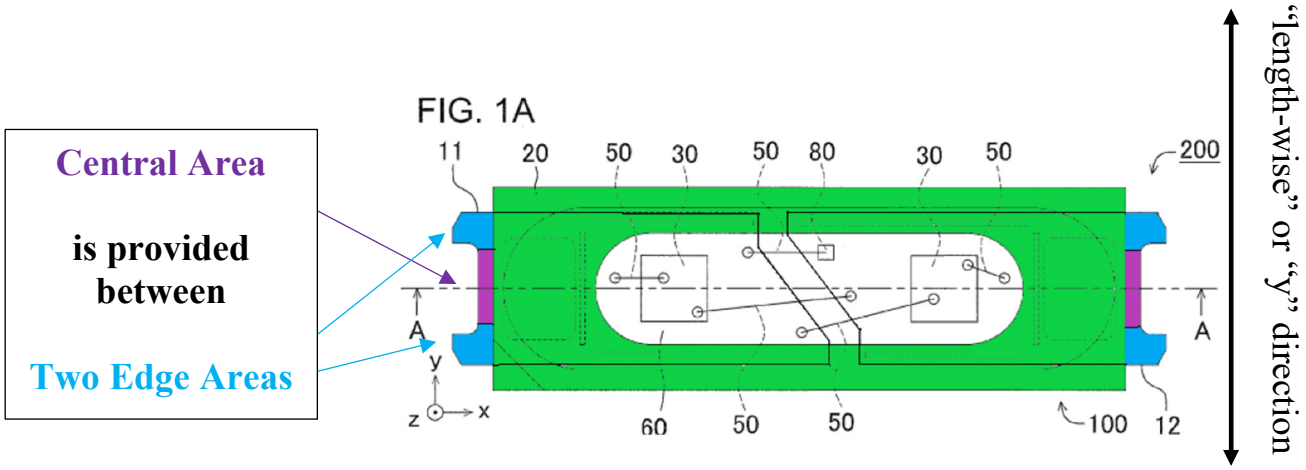
Hayashi FIGs. 1A and 1B (Annotated)



6. Hayashi Anticipates Claim 8

Hayashi discloses "the central area is provided between the two edge areas along the length-wise direction" since the respective central areas of lead-frames 11, 12 are provided between the respective edge areas in the y-direction (*i.e.*, lengthwise direction), as shown in Figures 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.6).

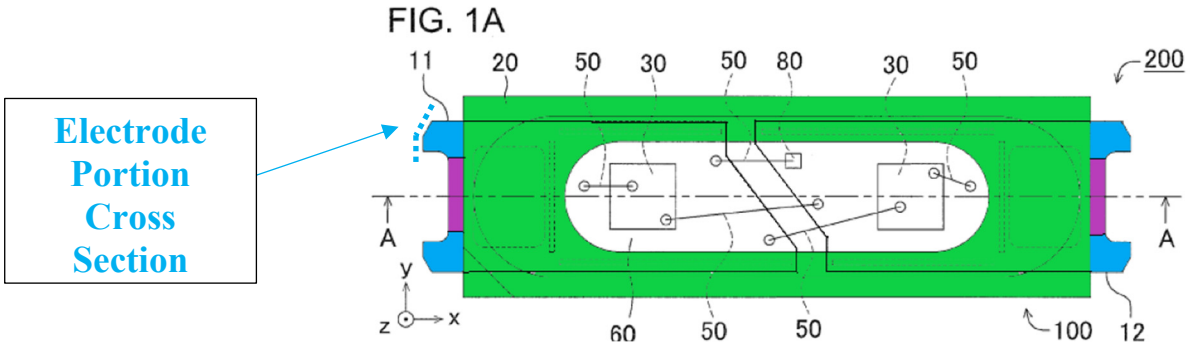
Hayashi FIG. 1A (Annotated)



7. Hayashi Anticipates Claim 9

Hayashi discloses "the electrode portion cross section corresponds to at least a portion of an outer surface of the wing portion" as shown in FIG. 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.7).

Hayashi FIG. 1A (Annotated)

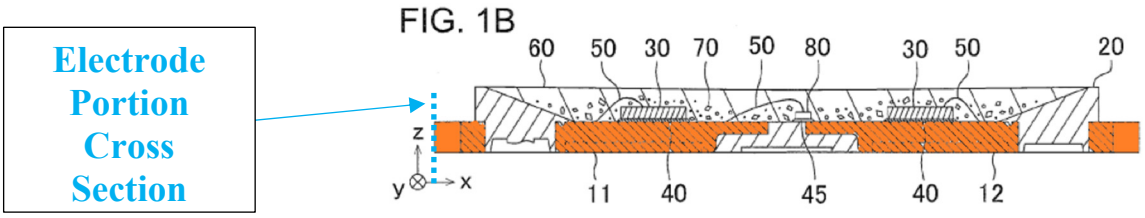


8. Hayashi Anticipates Claim 10

Hayashi discloses "the electrode portion cross section extends in a thickness

direction" via the cross-section extending in the "z-direction" along lead-frames 11, 12, as shown in FIGs. 1A-1B (Ex-1006 at FIGs. 1A-B; Ex-1003 at § 9.3.8).

Hayashi FIG. 1B (Annotated)



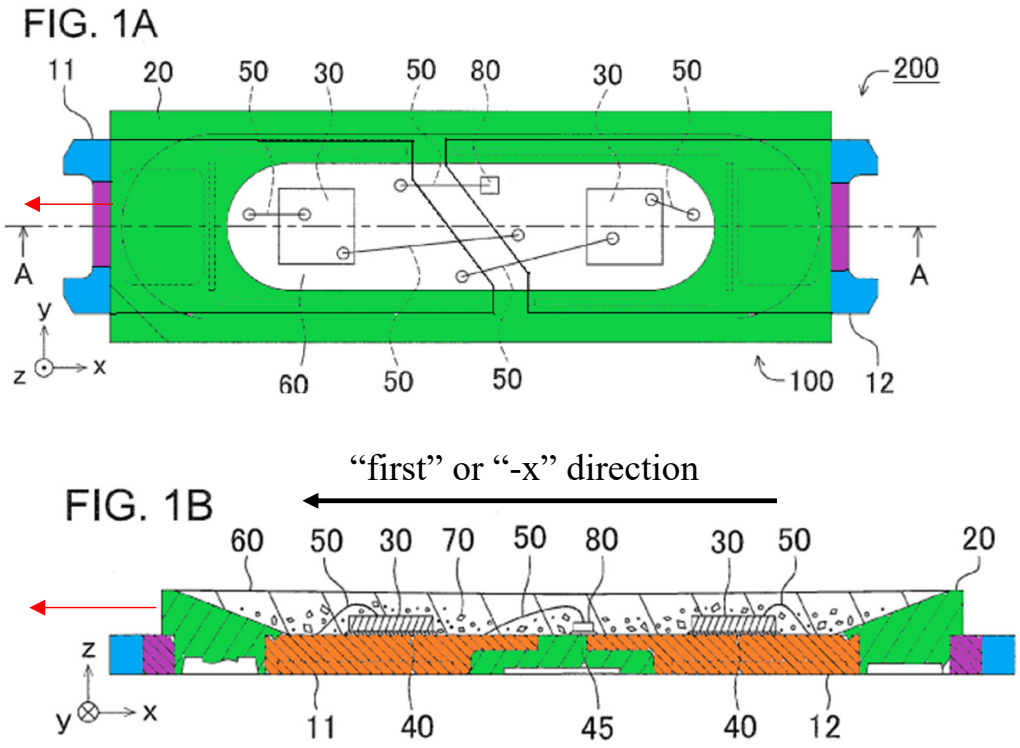
9. Hayashi Anticipates Claim 11

Hayashi anticipates claim 11 (Ex-1003 at § 9.3.9). Hayashi discloses claim 11's "preamble," "electrode portion," and "resin housing" limitations for the reasons as described above with reference to the corresponding limitations in claim 1 (*See supra* §§ XI(C)(1)(a)-(c); *see also* Ex-1003 at §§ 9.3.9.1-9.3.9.3).

a) Hayashi Discloses Claim 11's "Central Area" Limitations

Hayashi discloses "wherein the wing portion comprises: a central area protruding from the housing in a first direction," via its lead-frames 11, 12 that extend from molded resin 20 (*i.e.*, the "wing portion") having a central areas that protrudes from the molded resin 20 in the x-direction ("first direction away from the housing"), as shown in Figure 1A-B (Ex-1006 at FIG. 1A-B; Ex-1003 at § 9.3.9.4).

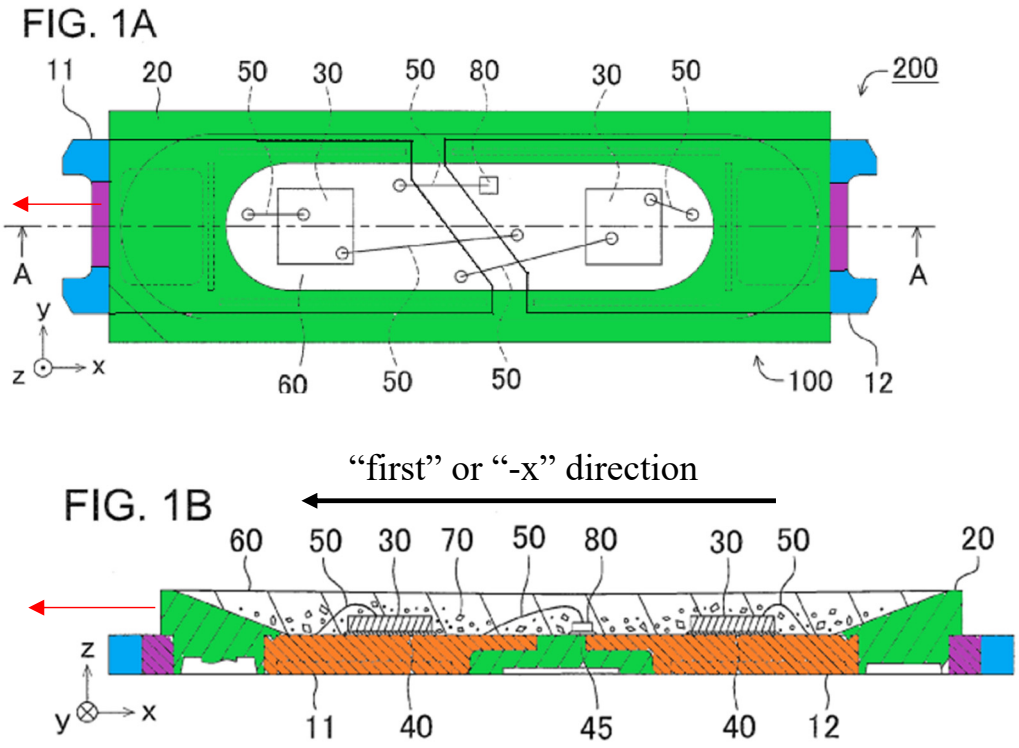
Hayashi FIGs. 1A and 1B (Annotated)



b) Hayashi Discloses Claim 11's "Edge Area" Limitation

Hayashi discloses "and at least one edge area protruding from an edge portion of the central area, in the first direction" via its 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, as shown in FIG. 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.9.5).

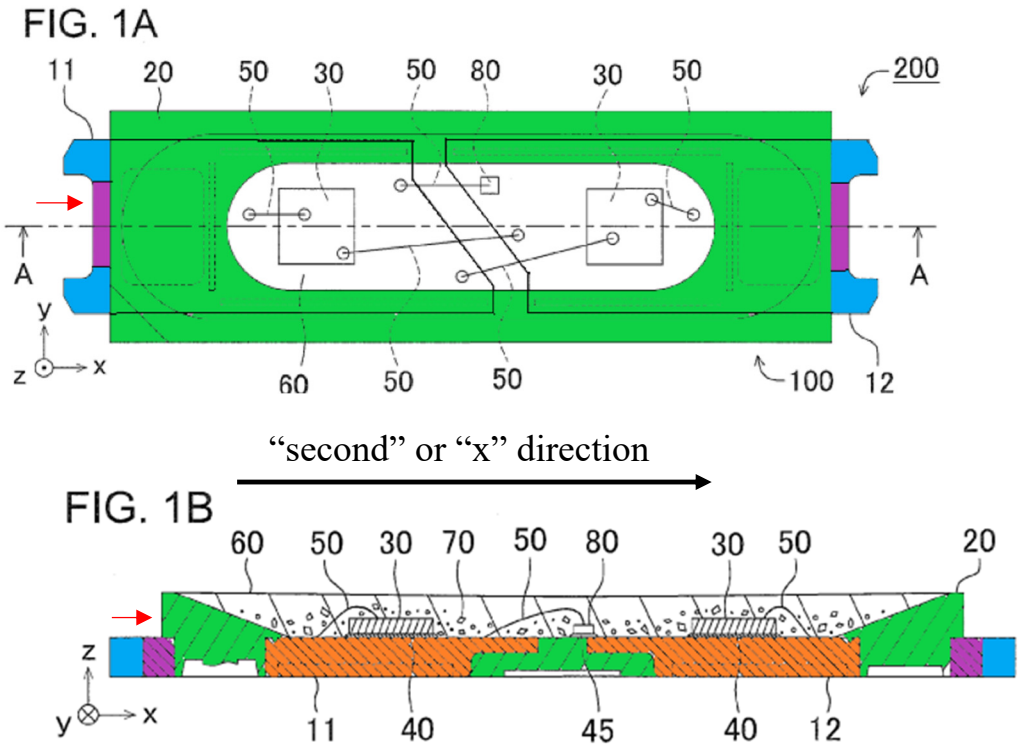
Hayashi FIGs. 1A and 1B (Annotated)



c) Hayashi Discloses Claim 11's "Recessed" Limitation

Hayashi discloses "wherein the central area is recessed from the at least one edge area in a second direction" via its lead-frames 11, 12 having respective central areas that are recessed in the "x-direction" towards from molded resin 20 (*i.e.*, second direction) from the respective edge areas of lead-frames 11, 12, as shown in FIG. 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.9.6).

Hayashi FIGs. 1A and 1B (Annotated)



d) Hayashi Discloses the "Electrode Portion Cross Section" Limitation

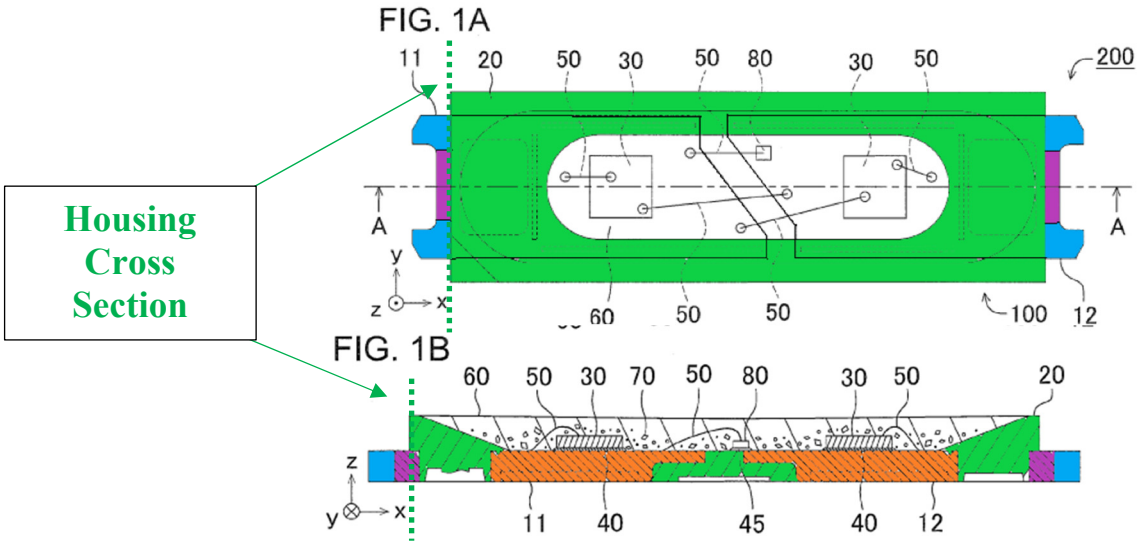
Hayashi discloses "wherein the at least one electrode portion further comprises an electrode portion cross section," for example via cross-section on the edge of lead-frame 11 as shown in FIG. 1A (Ex-1006 at FIGs. 1A-B; Ex-1003 at § 9.3.9.7; *See* § XI(C)(1)(g), *supra*).

e) Hayashi Discloses Claim 11's "Housing Cross Section" Limitation

Hayashi discloses "wherein the resin housing comprises at least one housing cross section," for example via a cross-section on the edge of molded resin 20 as

shown in FIG. 1A (Ex-1006 at FIGs. 1A-B; Ex-1003 at § 9.3.9.8; *See* § XI(C)(1)(h), *supra*).

Hayashi FIGs. 1A and 1B (Annotated)



f) Hayashi Discloses the "Housing Corner" Limitation

Hayashi discloses "wherein the at least one housing cross section is located in a vicinity of a comer of the resin housing," for example via housing cross-section on the edge of molded resin 20 as shown in FIG. 1A, above (Ex-1006 at FIGs. 1A; Ex-1003 at § 9.3.9.9; *See* § XI(C)(1)(i), *supra*).

g) Hayashi Discloses the "Not Level" Limitation

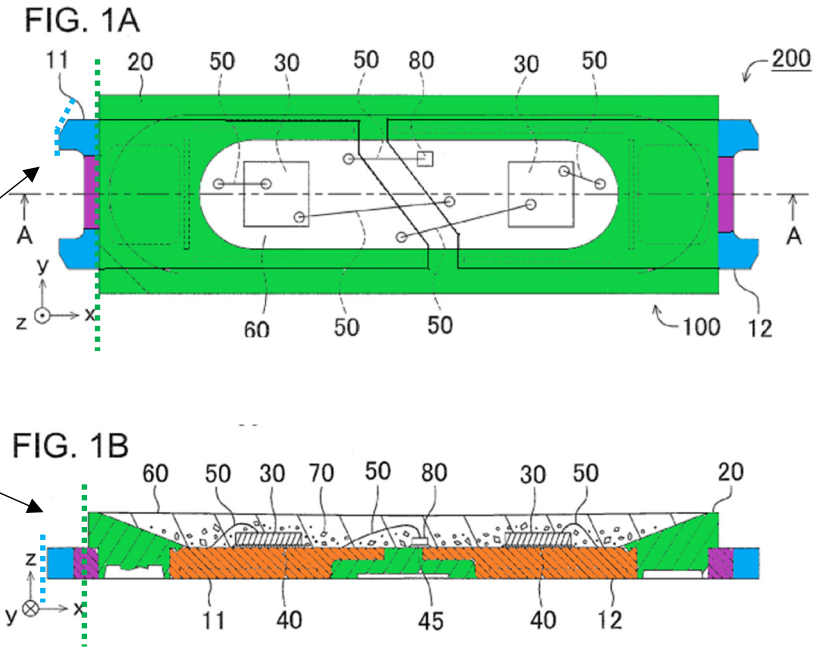
Hayashi discloses "wherein the at least one housing cross section is not level with the electrode portion cross section" as shown in FIG. 1A (Ex-1003 at § 9.3.9.10). The housing cross-section is on molded 20 and is not in line with or level with the

electrode portion cross section on lead frame 11 (Ex-1006 at FIGs. 1-2).

Hayashi FIGs. 1A and 1B (Annotated)

Housing Cross Section and Electrode Portion Cross Section

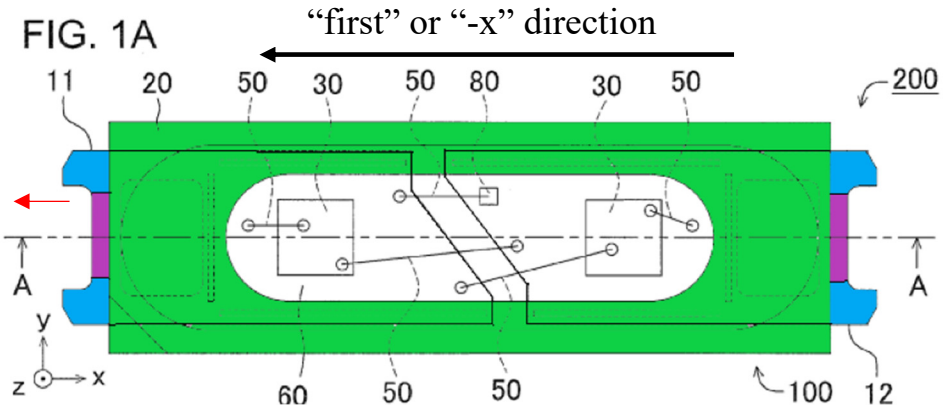
Are "not level"



h) Hayashi Discloses Claim 11's "Edge Areas Protrude" Limitation

Hayashi discloses "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" via its lead-frames 11, 12 each having two respective edge areas that protrude from respective central areas in the "x-direction" away from molded resin 20 (*i.e.*, the "first direction"), as shown in FIG. 1A (Ex-1006 at FIG. 1A; Ex-1003 at §§ 9.3.9.11-9.3.9-12).

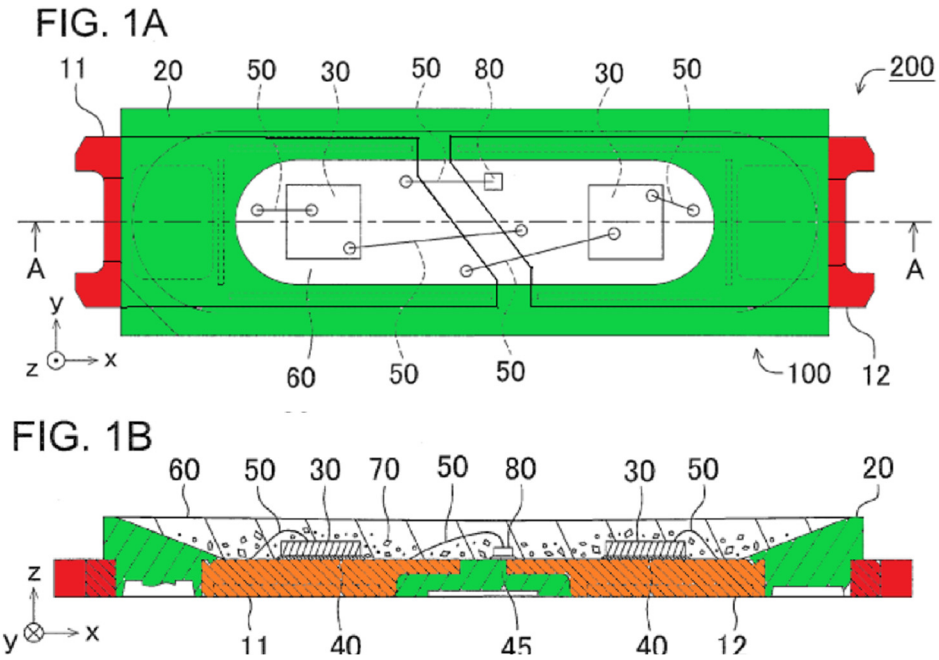
Hayashi FIG. 1A (Annotated)



10. Hayashi Anticipates Claim 12

Hayashi anticipates claim 12 because Hayashi discloses "wherein the wing portion is exposed outside the resin housing," via the portions of lead-frames 11, 12 that are exposed outside molded resin 20, as shown in FIGs. 1A-B (Ex-1006 at FIG. 1A-B; Ex-1003 at § 9.3.10).

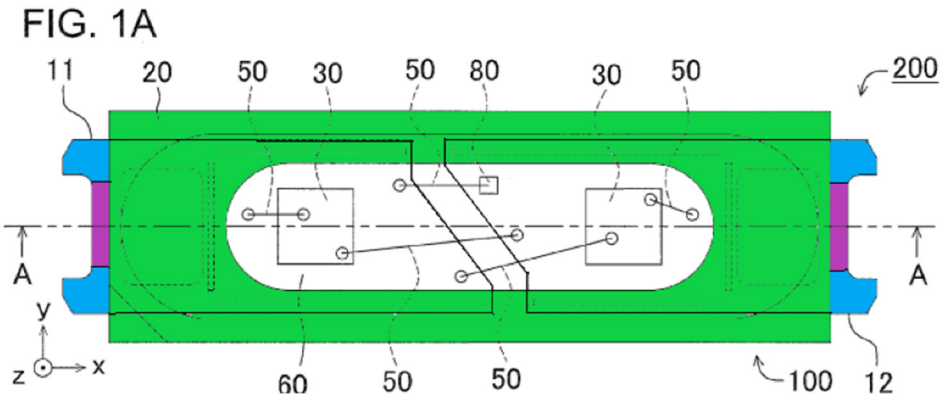
Hayashi FIGs. 1A and 1B (Annotated)



11. Hayashi Anticipates Claim 13

Hayashi anticipates claim 13 because Hayashi discloses "wherein the wing portion comprises two edge areas," via each of lead-frames 11, 12 having portions that are exposed outside molded resin 20 (*i.e.*, "wing portion(s)") having two respective edge areas, as shown in FIG. 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.11).

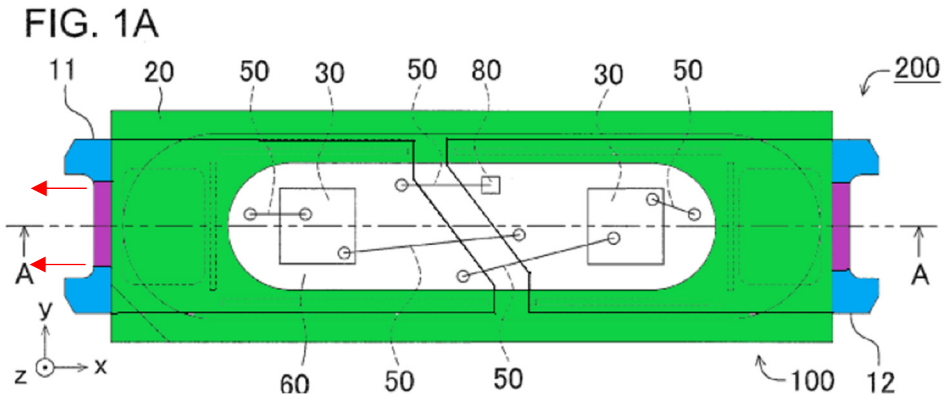
Hayashi FIG. 1A (Annotated)



12. Hayashi Anticipates Claim 14

Hayashi anticipates claim 14 because Hayashi discloses "wherein the two edge areas protrude from central area" via the respective edge areas of lead-frames 11, 12 protruding from the respective central areas lead-frames 11, 12, as shown in FIG. 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.12).

Hayashi FIG. 1A (Annotated)



13. Hayashi Anticipates Claim 15

Hayashi anticipates claim 15 because Hayashi discloses "wherein the at least one electrode portion cross section comprises a curved surface" as described with reference to Claim 2 above (*See* § XI(C)(2), *supra*; *see also* Ex-1003 at § 9.3.13).

14. Hayashi Anticipates Claim 16

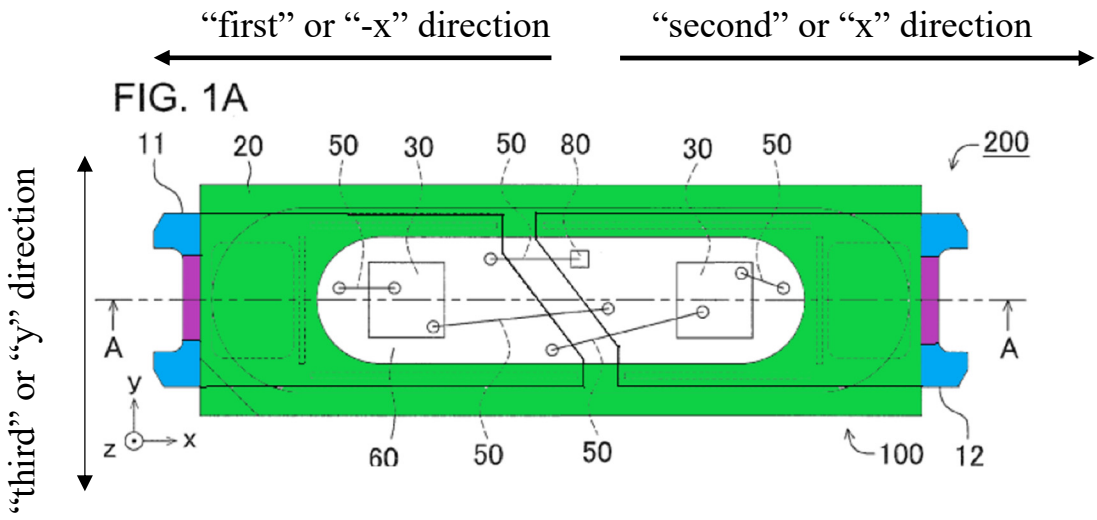
Hayashi anticipates claim 16 because Hayashi discloses "wherein the at least one electrode portion further comprises a conductive layer" (Ex-1003 at § 9.3.14). Hayashi describes that the lead frames 11, 12 may be "metals" that "conduct electricity" (Ex-1006 [0048]). Hayashi explains that the lead frames 21, 31 may be "metals such as copper, aluminum, gold, silver, tungsten, iron (steel), nickel, cobalt, molybdenum, alloys of those metals including copper-iron alloy, and phosphor bronze can be used when processed in sheet metal form by various methods. In addition, metal plating or light reflecting thin-film can be established on the lead-frame surface with materials such as silver, aluminum, rhodium, gold, copper, and alloys of those metals" (*Id.*). The underlying metal material and/or metal plating applied to lead-frames 11, 12 are conductive layers (Ex-1003 at ¶ 239).

15. Hayashi Anticipates Claim 20

Hayashi anticipates claim 20 because Hayashi discloses "wherein the central

area is provided between the two edge areas along a third direction substantially perpendicular to the first direction" via the respective central areas of lead-frames 11, 12 being provided between the two respective edge areas in the "y-direction" (*i.e.*, "third direction") that is substantially perpendicular to the "y-direction" (*i.e.*, "second direction"), as shown in FIG. 1A (Ex-1006 at FIG. 1A; Ex-1003 at § 9.3.15).

Hayashi FIG. 1A (Annotated)



16. Hayashi Anticipates Claim 21

Hayashi anticipates claim 21 because Hayashi discloses "wherein the electrode portion cross section corresponds to at least a portion of an outer surface of the wing portion" as described above with reference to claim 9 (S*ee* § XI(C)(7), *supra*; *see also* Ex-1003 at § 9.3.16).

17. Hayashi Anticipates Claim 22

Hayashi anticipates claim 22 because Hayashi discloses "the electrode portion cross section extends in a thickness direction of the at least one electrode portion" as described above with reference to claim 10 (S*ee* § XI(C)(8), *supra*; *see also* Ex-1003 at § 9.3.17)

D. GROUND 4: Obviousness Kobayakawa in view of Kim or Hayashi

For Ground 4, claims 2 and 15 are the challenged claims. Although Kobayakawa discloses all of the limitations of claims 1 and 11 (*See* §§ XI(B)(1)&(8), *supra*), it does not explicitly disclose that its the electrode portion cross section comprises at least one curved surface. Although the exposed portion of Kobayakawa's lead frame 1 are generally "U-shaped" (Ex-1005 at FIGs. 1-2), they do not comprise a curved surface and electrode portion cross section comprises at least one curved surface.

However, as Dr. Lebby testifies, each of Kobayakawa, Kim, and Hayashi disclose an electrode portion protruding from the housing that is generally "U-shaped" (Ex-1003 at §§ 9.1 & 9.3; Ex-1004 at FIG. 2; Ex-1005 at FIG. 1; Ex-1006 at FIG. 1A). It is a mere design choice that a portion of the U-shaped electrodes in Kim and Hayashi have curved surfaces, while the U-shape electrode of Kobayakawa has only flat surfaces (*See* Ex-1003 at § 9.4). Having a curved surface on some portion of an exposed electrode is not inventive and it would have been obvious to modify

the lead frame 1 of Kobayakawa to have a curved surface, for example to ease manufacturing and/or to better mate with a corresponding electrical connection (Ex-1003 ¶¶ 245-247). Therefore, claims 2 and 15 are obvious over Kobayakawa in view of Kim or Hayashi (Ex-1003 at ¶ 247).

E. GROUND 5: Obviousness over Kim, Kobayakawa, and/or Hayashi in view of Ordinary Level of Skill in the Art

Although Grounds 1-3 (which are incorporated by reference into this Ground 4) are presented as novelty grounds, to the extent that any aspect(s) of the challenged claims is found to be novel over Kim, Kobayakawa, and/or Hayashi, given the substantial similarities between the structure of the prior art and the claimed structure of the ’742 patent, as Dr. Lebby testifies, such differences would be inconsequential and would not provide any technical benefit in view of the prior art and the ordinary level of skill in the art/a POSITA’s common knowledge (*See* Ex-1003 at ¶§ 9.5). Thus, claims 1, 2, 5-16, and 20-22 are obvious over Kim, Kobayakawa, and/or Hayashi (Ex-1003 at ¶ 250).

XII. SECONDARY CONSIDERATIONS

Petitioner is not aware of any secondary considerations that would overcome the strong showing of obviousness provided by the Petition. Further, any attempt by Patent Owner to rely on alleged secondary considerations cannot overcome the showing of obviousness detailed above. *Tokai Corp. v. Easton Enters., Inc.*, 632

F.3d 1358, 1370 (Fed. Cir. 2011).

XIII. CONCLUSION

Petitioner respectfully requests that the *inter partes* review of the '742 patent be instituted, as the Petition establishes a reasonable likelihood of prevailing with respect to the Challenged Claims. Petitioner respectfully requests cancellation of the Challenged Claims.

Respectfully submitted,

FLASTER GREENBERG P.C.

Date: May 31, 2024

By: */Joseph R. Klinicki/*

Joseph R. Klinicki (Reg. No. 68,505)
1717 Arch Street, Suite 3300
Philadelphia, PA 19103
Telephone: 215-587-5687
Facsimile: 215-279-9394
joseph.klinicki@flastergreenberg.com

Counsel for Petitioners

Certificate Of Service

Pursuant to 37 C.F.R. §§ 42.6 and 42.106, the undersigned certifies that a true and correct copy of the foregoing Petition for *Inter Partes Review* of U.S. Patent No. 9,905,742, together with Petitioner's exhibits identified in the above Table of Exhibits, and Petitioner's Powers of Attorney, have been served on the Patent Owner via Federal Express's overnight delivery service, a means at least as fast and reliable as Priority Mail Express, on the below date, at the following correspondence address of record for the '742 patent:

Attn: SUGHRUE MION, PLLC
2000 PENNSYLVANIA AVENUE, N.W.
SUITE 9000
WASHINGTON, DC 20006

Respectfully submitted,

FLASTER GREENBERG P.C.

Date: May 31, 2024

By: */Joseph R. Klinicki /*

Joseph R. Klinicki (Reg. No. 68,505)
1717 Arch Street, Suite 3300
Philadelphia, PA 19103
Telephone: 215-587-5687
Facsimile: 215-279-9394
joseph.klinicki@flastergreenberg.com

Counsel for Petitioner