UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

BROADCOM LIMITED,

Petitioner,

v.

INVENSAS CORPORATION,

Patent Owner.

IPR2017-00424
Patent No. 7,671,474

PATENT OWNER PRELIMINARY RESPONSE PURSUANT TO 37 C.F.R. § 42.107

LIST OF EXHIBITS

EXHIBIT	DESCRIPTION
Ex. 2001	CHARLES A. HARPER, ELECTRONIC PACKAGING AND INTERCONNECTION HANDBOOK Chapters 6, 8 (4th ed. 2005)
Ex. 2002	WEBSTER'S II NEW COLLEGE DICTIONARY 621 (2001)

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Patent Owner Invensas Corporation ("Patent Owner") provides the following preliminary response to the Petition ("Petition") filed by Broadcom Limited ("Petitioner") on January 31, 2016, requesting *inter partes* review of claims 1-11 of U.S. Patent No. 7,671,474 ("the '474 Patent"). For at least the reasons set forth below, Patent Owner requests that the Board deny *inter partes* review as to all grounds presented in the Petition.

I. INTRODUCTION

The Petition is deficient because the single allegedly anticipatory reference and the patchwork of references on which Petitioner relies to argue obviousness fail to teach or suggest multiple limitations of the claimed invention and, in fact, differ markedly from the invention claimed by the '474 Patent.

The claims of the '474 Patent (Ex. 1001) are directed to a novel integrated circuit package configuration that reduces package size and manufacturing cost, while improving connections with other electronic components. *E.g.*, Ex. 1001 at 1:26-2:5. Significantly, the claimed invention is suited to be applied with Quad Flat No-lead (QFN) packages. *Id.* at 5:23-24; *cf. id.* at 5:26-27 (structural modifications are necessary otherwise). QFNs are notable because they advantageously offer a lower cost, higher density, and more reliable package over other types of packages. *See, e.g.*, Ex. 1003 at 1:11-2:10, 5:13-6:6. For example, compared with Quad Flat Pack (QFP) packages (discussed further below), QFNs are compact in size and

feature downward-facing contact pads. Similarly, QFNs are not constrained by strict size ratios, and feature an exposed die attach pad to act as a heat sink for integrated circuitry within the package.

The Petition's mix-and-match anticipation and obviousness analyses entirely ignore these and other fundamental differences between QFNs and other package types. Indeed, despite alleging six grounds of unpatentability spanning over 70 pages, Petitioner failed to mention these package types *even once*, let alone explain their significance, differences or articulate a basis for combining their features. The Declaration of Dr. Madhavan Swaminathan ("Swaminathan Declaration") (Ex. 1007) is similarly devoid of any such discussion. Rather, the Swaminathan Declaration simply repeats the statements of the Petition, almost verbatim. *Tempur Sealy Int'l, Inc. v. Select Comfort Corp.*, IPR2014-01419, Paper 7, at 7 (PTAB Feb. 17, 2015). Such conclusory testimony should be given no weight. *See* 37 C.F.R. § 42.65(a) (opinion testimony that does not disclose underlying facts or data "is entitled to little or no weight"); *see also Kinetic Techs. Inc. v. Skyworks Sols., Inc.*, IPR2014-00529, Paper 8, at 14-15 (PTAB Sept. 23, 2014) ("Merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value."). Contrary to Petitioner's implicit suggestion that one of skill in the art would combine patents discussing any form of packaging, differences between package types are significant and would strongly discourage a

person of ordinary skill in the art from making the combinations proposed in the Petition.

Petitioner's analysis of the cited documents is also lacking. To reach its conclusion on anticipation, Petitioner proposes an erroneous and overbroad claim construction for the term "lateral part." Petitioner's construction is contrary to both the plain meaning of the claims, as well as the teachings in the '474 Patent specification. Petitioner proposes this erroneous claim construction because Miks (Ex. 1004)—Petitioner's only allegedly anticipatory reference—exclusively discloses the use of wire bonds for making connections between components rather than the use of lateral parts that are integral to and extending from the claimed strip. But Petitioner's proposed construction is contrary to the plain language of the specification, which distinguishes a wire bond (between the strip and contact pad) from both a direct link (such as a lateral part) and an indirect connection (via the electronic carrier or printed circuit board). In other words, one may connect the strip to a contact pad via a lateral part, a wire bond, or an indirect connection. Thus, contrary to Petitioner's proposed construction, the "lateral part" cannot be said to be any "electrical connection." Instead, the "lateral part" should be construed under its ordinary meaning or, alternatively, as a "part extending from the side."

Accordingly, Petitioner's anticipation argument (Ground 2) fails because Miks does not disclose a "strip having at least one lateral part that is connected to a

single contact pad," required by the only independent claim 1. Instead, Miks teaches the use of bonding wires to connect with contact pads. *See, e.g.*, Ex. 1001 at 1:52-2:5 (resistance and inductance are reduced with a direct link to rather than bonding wires). Indeed, Petitioner concedes by asserting Ground 3 that Miks fails to teach a "lateral part." Even if the bonding wires of Miks were "lateral parts" (they are not), the strip of Miks would be connected to ***two*** contact pads in ***different*** rows of contact pads via wiring 56b and 56d, contrary to claim 1's requirement that the lateral part be connected to a ***single*** contact pad. As a result, Ground 2 should be denied because the Petition fails, on its face, to show how "each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987).

Petitioner's primary obviousness reference, Nobuitsu (Ex. 1002), fares no better. Significantly, as described further below, many of Nobuitsu's deficiencies result from the fact that Nobuitsu is directed to a QFP package—an ***entirely different type of package*** than the QFN disclosed in the '474 Patent. For example, because Nobuitsu discloses a QFP, it fails to teach or suggest features found in QFNs such as "a plurality of contact pads…each contact pad having a top surface and a bottom surface," as required by independent claim 1. Unlike the contact pads of the '474 Patent (which are exposed on the side and bottom surfaces of the QFN's exterior),

Nobuitsu's "inner leads (3)" (as identified by Petitioner) are within the molded plastic perimeter of the QFP package, and therefore are not in direct contact with external circuitry. Furthermore, Petitioner admits that Nobuitsu does not disclose exposed bottom surfaces of the contact pads, die attach pad, and strip. *See* Pet. 30, 66 (discussing Grounds 1 and 4). But one of skill in the art would not be motivated to combine teachings specific to QFPs (Nobuitsu) with those directed to other dissimilar package types, such as QFNs (Miks). As such, Nobuitsu is deficient and the Petition should be denied as to Grounds 1 and 3.

The patchwork of secondary references on which Petitioner relies to argue obviousness also fails to teach or suggest multiple limitations of the challenged claims. Grounds 4, 5 and 6 rely on combinations of Nobuitsu, McLellan (Ex. 1003), Miks, Tatt (Ex. 1005), and Chen (Ex. 1010) in an attempt to show dependent claims 5, 6 and 11 are obvious. However, as noted above, the Petition is facially deficient as to Grounds 1, 2 and 3 because Petitioner has not carried its burden as to independent claim 1. It is axiomatic that a claim that depends from a patentable base claim is itself patentable such that dependent claims 5, 6 and 11 are patentable and the Petition should be denied as to Grounds 4, 5 and 6.

As discussed, Petitioner fails to offer any evidence supporting a motivation to combine the various package types discussed in its cited documents, instead relying on a recitation of *KSR* buzzwords, hindsight reasoning, and an expert declaration

that mirrors the flawed attorney arguments in the Petition itself. With no evidence to support a motivation to combine, Petitioner's obviousness grounds rely instead on forced combinations of dissimilar references that discuss distinct types of semiconductor packages. As a result, Petitioner cherry picks different features and assembles the pieces together in a manner that would meet the claim limitations using '474 Patent as a roadmap. This improper use of hindsight to combine the cited documents does not render the challenged claims unpatentable. *See Ortho-McNeil Pharma., Inc. v. Mylan Labs., Inc.*, 520 F.3d 1358, 1364 (Fed. Cir. 2008) (criticizing invalidity expert who "simply retraced the path of the inventor with hindsight" rather than considering "teachings, suggestions…or motivations…that ar[o]se before the time of invention as the [35 U.S.C. § 103(a)] requires").

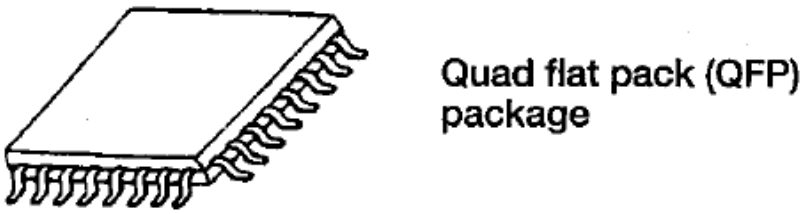
Because Petitioner has not shown a reasonable likelihood of prevailing on any proposed ground under 35 U.S.C. § 314, the Petition should be denied.

II. OVERVIEW OF THE '474 PATENT

The '474 Patent is titled "Integrated Circuit Package Device with Improved Bond Pad Connections, a Lead-Frame and an Electronic Device," and is directed to a novel semiconductor device package having a die attach pad, a plurality of contact pads, at least two tie bars, a semiconductor die, and at least one strip disposed between the die attach pad and a corresponding row of contact pads, the strip having

at least one lateral part that is connected to a single contact pad of the contact pads in the row. Ex. 1001 at Abstract.

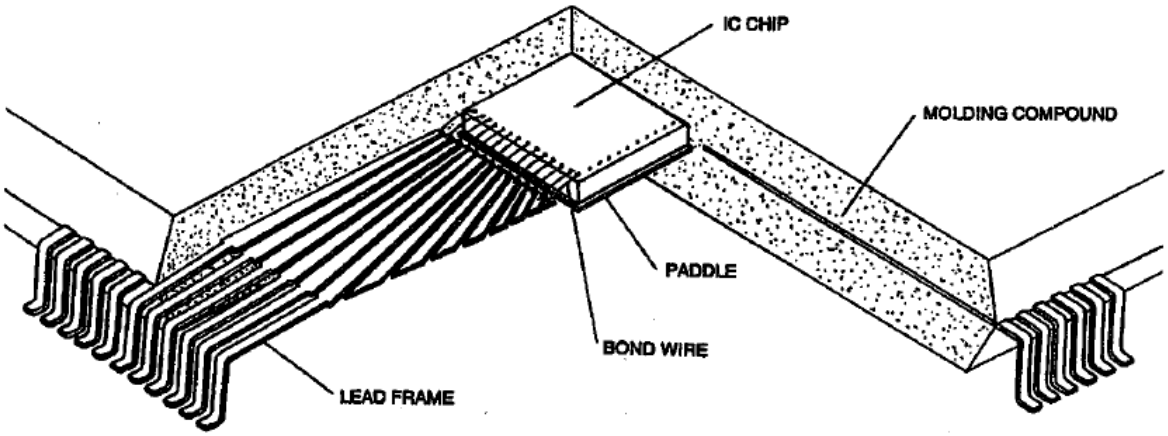
By way of background, there are several types of semiconductor packages. As of 2000, the second-most popular package type was the QFP package. Ex. 2001 at 6.3. QFPs "evolved to fill the needs for high lead counts," and can accommodate up to 376 separate leads. Ex. 2001 at 6.13. QFPs are characterized by their distinctive "gull wing leads on all four sides," which extend laterally out of the package. Ex. 2001 at 6.13.



Ex. 2001 at 6.11, Fig. 6.5

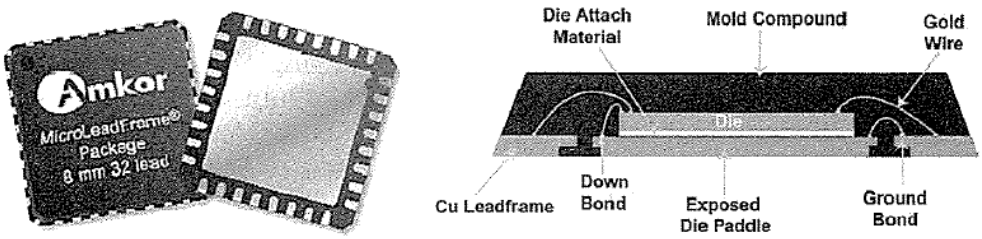
During QFP fabrication, after the chip has been wire-bonded to the lead frame, a resin is molded ***around*** the lead frame-chip subassembly, effectively sealing and encapsulating the chip, inner leads, and lead frame within a molded plastic compound. Ex. 2001 at 6.13. Significantly, QFPs are generally designed to have no exposed surfaces. Indeed, as noted by McLellan (Ex. 1003), "[o]ne important quality measure for an integrated circuit is reliability. In a QFP, a significant failure mode is the delamination of the mold compound from the back of a die pad…[which]

introduces moisture into the package and causes moisture-related failures," *e.g.*, short circuits. Ex. 1003 at 1:48-53.



Ex. 2001 at 6.17, Fig. 6.9

QFNs "emerged to reduce the cost and enhance the electrical and thermal performance of leadless packages." Ex. 2001 at 6.14. Although QFNs were not as widely used as QFPs at first—QFNs made up only 0.3% of the market in 2000—QFNs were projected to gain market share at a rate ten times greater than QFPs. Ex. 2001 at 6.3 (projected average annual growth rate from 2002-2007 for QFNs was 55.0%, compared with 5.5% for QFPs). QFNs typically range in size from 3x3 mm to 12x12 mm, Ex. 2001 at 6.14, and are fabricated by molding *only one side* of the lead frame, leaving the other side of the package exposed, allowing for an additional step called "back etching" to occur. Ex. 2001 at 6.16; Ex. 1003 at 2:33-37 (discussing exposed bottom surfaces of QFNs). An example of a QFN is shown below:

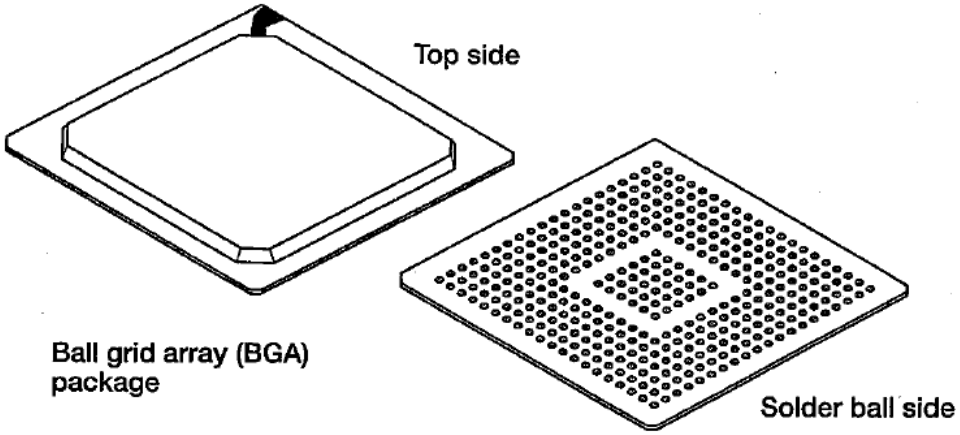


Ex. 2001 at 6.14, Fig. 6.7

In addition to QFPs and QFNs, other package types are used in industry, each of which have unique designs and considerations. For example, Chip Scale Packages (CSPs) can take the form of a QFN or QFP, but differ from both in size and design. Notably, CSPs are only slightly larger than the chip itself, with a maximum size of 1.2 times the area of the chip. Ex. 2001 at 6.54; *id.* at 8.32-33. Unlike CSPs, QFNs are not constrained by strict size ratios. *Cf. id.* But, CSPs having a QFN structure also generally feature an exposed die attach pad to act as a heat sink for integrated circuit within the package. *See*, *e.g.*, *id.* at 8.35, 8.45-46.

As another example, Chen teaches a package that employs both Lead On Chip (LOC) and Ball Grid Array (BGA) technology, Ex. 1010 at 14-20, which is different from QFNs, QFPs, and CSPs. LOCs use two chips, which are bonded to mating leads of each chip's lead frame via bonding wires, after which the whole assembly is filled and wrapped with molding epoxy to form a complete semiconductor package component. *See*, *e.g.*, Ex. 1010 at 1:24-46. BGAs typically use one or more chips that are adhered and mounted on a substrate, and subsequently bonded with an array of solder balls located on the bottom of the substrate. *See*, *e.g.*, Ex. 1010 at 1:48-2:5.

BGAs typically range in size from 7 mm^2 to 50 mm^2, and are advantageous due to their high I/O (contact pad) counts and high performance capabilities. Ex. 2001 at 6.14.



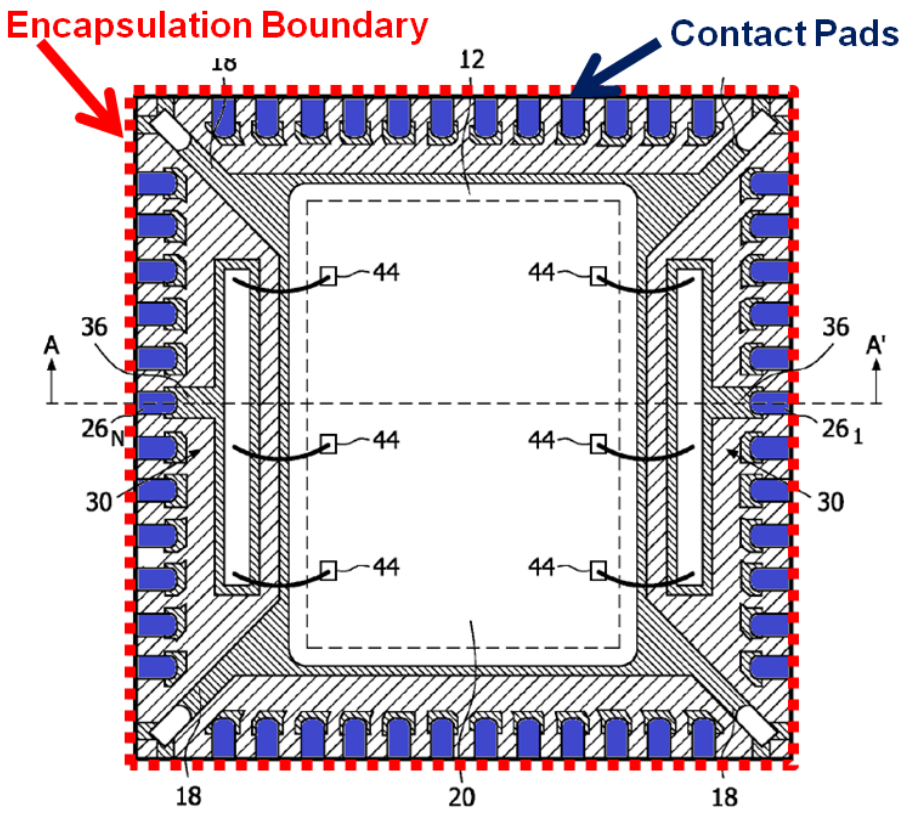
Ex. 2001 at 6.11, Fig. 6.5

The differences between these package types are significant. For example, QFNs are distinguished by their compact appearance, with exposed contact pads on the bottom of the package (as opposed to leads extending laterally from the sides of a QFP package). *See* Ex. 2001 at 6.14. While QFNs are smaller and less expensive than QFPs, QFPs can accommodate substantially more leads than QFNs. Ex. 2001 at 6.13-14. Likewise, while QFNs necessarily (and optimally) have certain exposed surfaces, Ex. 2001 at 6.14, a QFP likely would fail entirely if its surfaces were altered so as to expose the interior of the package, Ex. 1003 at 1:48-53. Moreover, QFPs are manufactured differently than QFNs. Specifically, QFPs are "encapsulated in resin both at the top and the bottom of the semiconductor die," *i.e.*, QFPs are molded on

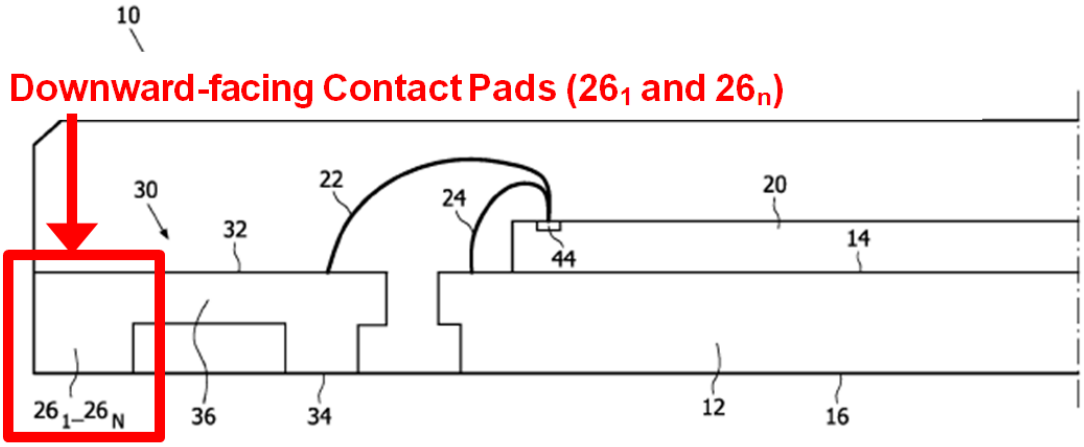
two sides rather than just one. Ex. 1003 at 43-45. Similar differences exist between these packages BGAs and LOCs.

Although numerous package types exist, the invention of the ’474 Patent is specifically concerned with improving QFN-type packages.[1] Ex. 1001 at 5:23-26 (“[T]he invention is suited to be applied with so-called QFN…packages.”). Notably, each figure in the ’474 Patent depicts a QFN, as evidenced by the downward-facing contact pads (26_1 and 26_n) that remain within the encapsulation boundary, and lack of protruding, lateral, outer leads. *See* Fig. 2; *see also* Figs. 1, 3.

[1] Although the ’474 Patent states that it is “conceivable” to apply the invention to QFPs, a person of ordinary skill would have been discouraged from making such modifications. For example, such an application would, at minimum, require alterations to the package design such that “the additional contact pad will be an additional lead that extends from a corner of the package.” Ex. 1001 at 5:26-29.



'474 Patent at Fig. 1 (annotated)



'474 Patent at Fig. 2 (annotated)

The '474 Patent marked a significant advancement in making QFNs more compact, inexpensive, and effective. The '474 Patent accomplishes these objectives primarily through the use of a unique and novel configuration of a "strip having at

least one lateral part that is connected to at least one of the contact pads in the row…. [W]ith a plurality of electrical connections…between selected ones of the bond pads…and corresponding ones of the contact pads…."[2] Ex. 1001 at 3:26-34.

Earlier QFNs were undesirably large, making it difficult for such packages to be integrated into the compact, handheld electronics being developed in the mid-2000s, *e.g.*, mobile phones, digital cameras. Ex. 1001 at 1:59-61; *see also id*. at 1:21-

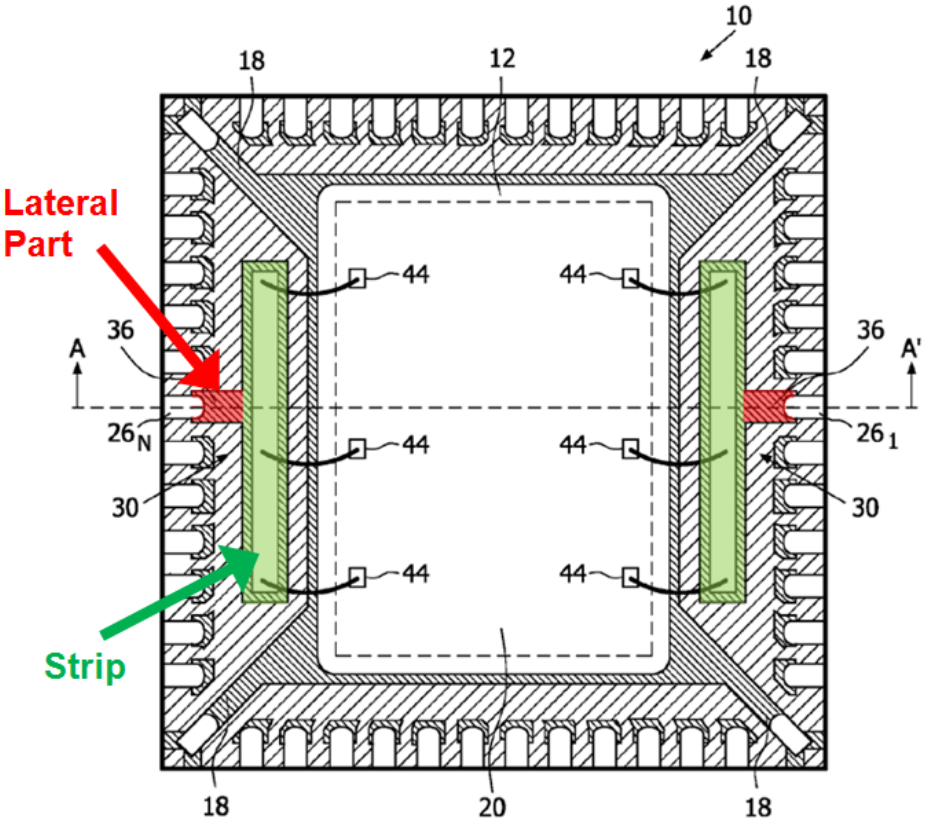
[2] Petitioner argues that European claim drafting conventions should bind the Board's interpretation of the '474 Patent because Patent Owner purportedly "invok[ed] this rubric" by using the claim term "characterized in that…" in claim 1. Under Petitioner's logic, the majority of claim 1 should be viewed as impliedly admitted prior art. Petitioner is wrong. Petitioner cites no law in support of this proposition. Under U.S. law, the format of such claims—*i.e.*, *Jepson*-type claims—requires use of "a phrase such as 'wherein the improvement comprises.'" 37 C.F.R. § 1.75(e)(2). The '474 Patent does not use this terminology, and therefore does not admit to any claim limitations being prior art. *See, e.g.*, *Micron Tech., Inc. v. Tessera, Inc.*, 440 F. Supp. 2d 591, 596-97 (E.D. Tex. 2006) ("The phrase 'characterized by' without more, is insufficient to satisfy Rule § 1.75(e)(2) because it fails to communicate that the subsequent language comprises an improvement over the previously stated elements or steps of prior art.").

25 (discussing McLellan and noting that "[t]here is an ever-increasing need for smaller packages, since they are cheaper to produce and enable…more functions within a pre-determined volume of an electronic device"). According to the '474 Patent, "[p]ackage size is mainly determined by the number of contact pads and the mutual distance between them…." *Id.* at 2:6-7. For example, the '474 Patent describes prior versions of QFNs—which did not contain the novel features of the '474 Patent—as accommodating 56 contact pads in a 7x7 mm package. *Id*. at 1:43-51. However, after implementing the novel features of the '474 Patent, QFNs with 48 contact pads could be accommodated in a 6x6 mm package. *Id.* Thus, the '474 Patent provides an package "that has a smaller size" and is "cheaper to produce." *Id.* at 1:16-32 and 3:41-55.

The invention of the '474 Patent also improves the functioning of the package itself. In many applications, bond pads require a low ohmic connection to the corresponding electrical signal in the outside world. For example, mobile phones and digital cameras require such a connection in order to efficiently use power from a battery. *Id.* at 1:53-65. In earlier QFNs, bond pads that required low ohmic connections were commonly connected to the outside world by contact pads in various locations around the package. *Id.* To connect these contact pads with matching low ohmic bond pads, long bonding wires were used which increased resistance and inductance. *Id.* The '474 Patent solved this problem. Through the strip

configuration, the length of wire required for such QFNs decreased, which decreased resistance and inductance in the package resulting in improved efficiency and functionality. *Id.* at 1:65-2:5 and 2:25-37.

Central to the '474 Patent is the claimed "strip." The '474 Patent describes the "strip 30" as having "at least one lateral part 36," as shown in Figure 1 (below), and states that "[v]ia lateral part 36, these connections are directly linked to a corresponding contact pad (in FIG. 1 contact pad 26_1 and 26_n respectively). This means that bond pads 44 at various locations on the semiconductor die 20 are directly connected to one contact pad only, which bond pads otherwise would have to be connected to several contact pads in a corresponding row." *Id.* at 3:42-53.



’474 Patent at Fig. 1 (annotated)

Referencing Figure 2, the ’474 Patent further states that the lateral part (36) “is half-etched and that there is a ***direct link*** to a corresponding contact pad. It is conceivable however to apply a ***wire bond*** between the strip and the corresponding contact pad, ***instead of a direct link***. ***Furthermore***, it is possible to make an ***indirect connection*** via the electronic carrier or printed circuit board.” *Id.* at 4:10-16 (emphasis added).

III. SUMMARY OF THE DOCUMENTS CITED IN THE PETITION

A. PRIMARY DOCUMENTS

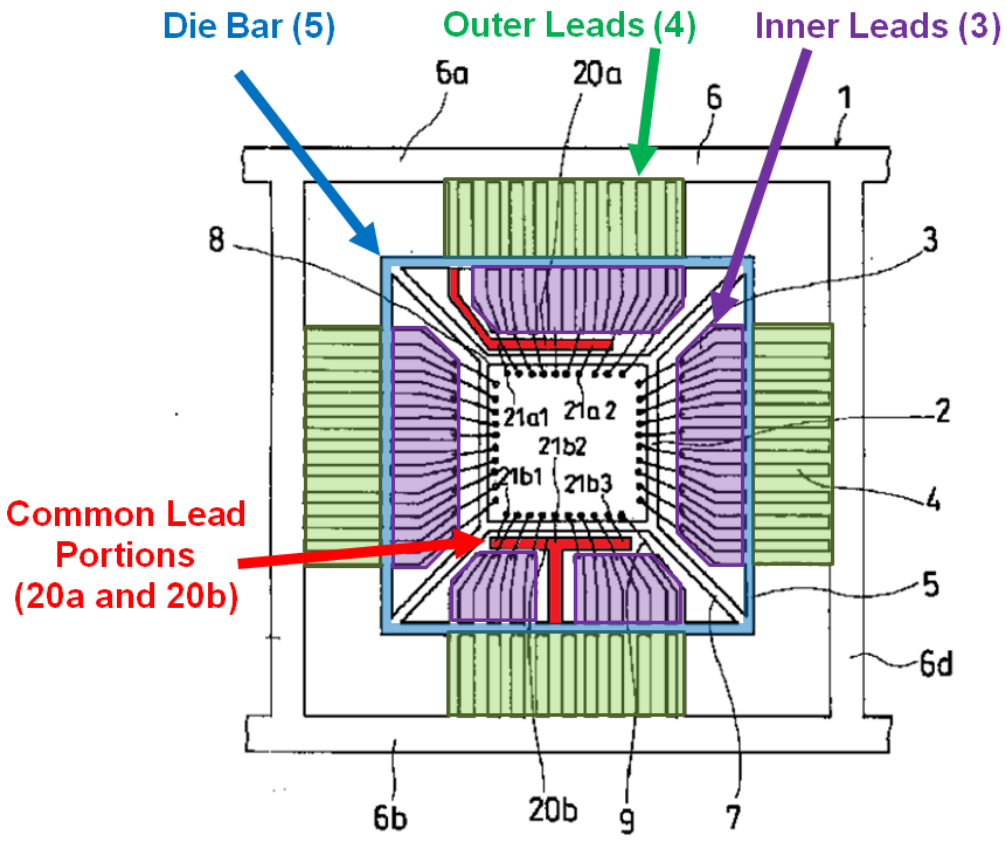
1. Japanese Patent Publication No. H08-279584 (“Nobuitsu”)

Petitioner contends that Nobuitsu in combination with one or more of McLellan, Miks, Tatt, and Chen render claims 1-11 obvious.

Whereas the ’474 Patent is concerned with reducing package size and cost, and improving device functionality, Nobuitsu’s purportedly novel lead frame package was created to “alleviate limitation of the number of bonding wires or limitation about a positional relationship of the bonding pads, on the occasion of connecting a common inner lead and a plurality of bonding pads through the bonding wires,” Ex. 1002 at 3, (57)[Abstract], to “avoid disconnection caused by meltdown of a bonding wire and to realize a high-speed operation of a semiconductor chip….” *Id*. at 7, [0003]. Unlike the QFN described in the ’474 Patent, Nobuitsu’s package is

a QFP, as is clear from the laterally extending leads depicted in Figures 1-3. *See, e.g.*, Ex. 1002 at Figs. 1-3.

Referring to Figure 1, Nobuitsu discloses a lead frame (1), die pad (2), inner leads (3), outer leads (4), die bar (5), a profile member (6), and four pieces of die pad supports (7). The only two conductive elements disclosed by Nobuitsu to be proximate to the bonding pad are common lead portions (20a and 20b) and inner leads (3). *Id.* at 10-11, [0016]. Notably, following encapsulation of the semiconductor die, Nobuitsu's *inner* leads (3) remain within the molded plastic of the package, while *outer* leads (4) extend laterally out from the sides of the insulating resin. *See id*. at Fig. 1. Nobuitsu also discloses "rod-shaped common lead portions 20a, 20b, which extend in nearly parallel to a straight line on which leading ends of the inner leads 3 are lined up." *Id.* at 11, [0017]. Bonding pads (21a1 and 21a2) can be connected to a common lead portion (20a), and bonding pads (21b1, 21b2, and 21b3) can be connected to common lead portion (20b). *Id.* at 11-12, [0017]-[0018]. Significantly, Nobuitsu's inner leads (3), outer leads (4), die pad supports (7), and common lead portions (20a and 20b) are depicted only as bare outlines without any disclosure of the shape, profile, or spatial characteristics of those components. *See id*. at Figs. 1-3.



Nobuitsu at Fig. 1 (annotated)

Petitioner suggests that "the alleged point of novelty of the '474 patent [is a] configuration [that] 'reduces the number of contact pads,'" Pet. at 34, and that "Nobuitsu discloses this same concept." *Id.* Not so. Nowhere does Nobuitsu disclose a reduction or consolidation of numbers of contact pads. Rather, Nobuitsu's Figure 1 teaches just the opposite—"collecting a plurality of bonding wires into one thick inner lead," *id.* at 12-13 [0020], which can "easily connect [to] the respective bonding pads…." *Id.* Thus, even with Nobutisu's common lead portions (20a and 20b), there is no change in the number of contact pads, *i.e.*, the pads still exist but remain unconnected. *E.g.*, Ex. 1002 at Fig. 1. Likewise, rather than disclosing a

reduction of pads due to the presence of the common lead portions (20a and 20b), Nobuitsu teaches that common lead portions are used "to effectively prevent disconnection caused by meltdown of the bonding wire… [and to] decrease noise." Ex. 1002 at 13, [0020]; *see also id.* at 7 [0003, 0005, 0006].

Additionally, as discussed in further detail below, Nobuitsu does not teach or suggest at least the following limitations: "a plurality of contact pads…each contact pad having a top surface and a bottom surface," (Limitation 1[C]); "at least two tie bars…having a top surface and a bottom surface" (Limitation 1[D]); and "the strip having at least one lateral part that is connected to a single contact pad of the contact pads in said row" (Limitation 1[H]), among other limitations.

2. U.S. Patent No. 6,798,046 to Miks ("Miks")

Petitioner contends that Miks anticipates claims 1-4 and 7-10, and renders obvious claims 1-5 and 7-11 in combination with one or more of Nobuitsu, McLellan, Tatt, and Chen.

Whereas the '474 Patent is concerned with improving package size, cost, and functionality, Miks is concerned with minimizing package failure, particularly with regard to enhancing bonding strength of the leads. *See, e.g.*, Ex. 1004 1:52-2:54 ("[E]nhanced bonding strength tends to substantially eliminate occurrences of delamination…such as the inadvertent dislodging of the distal ends…from the sealing part thereby maintaining the overall integrity of the semiconductor

package."). To accomplish this objective, Miks discloses a CSP having a QFN structure with "vertically downset inner leads" and an "isolated ring structure disposed along the peripheral edge between the peripheral edge and the inner ends of the leads." Ex. 1004 at 2:8-18. The ring structure is not directly connected to any of the leads (22). *See, e.g.*, *id.* at Fig. 4. Rather, Miks exclusively discloses the use of conductive wires (56) to provide electrical connections between components. *See id.* at 7:9-47. "The ring structure is electrically connected to the semiconductor chip and an inner end of at least one of the leads." *Id*. at 2:18-20. Miks describes the "vertically downset inner leads" as "the inner ends being offset from the distal ends" that advantageously "enhance the bonding strength of the leads with respect the overall semiconductor package" to alleviate delamination. *Id.* at 2:21-33. Significantly, tie bars (20) are depicted in a top-down view, depicting only bare outlines without any disclosure of the shape or spatial characteristics of those components. *See id.* at Figs. 1-4.

Miks details the fabrication process for the disclosed semiconductor package. Figures 1 and 2 of Miks depict a lead frame that is "initially provided in a method of fabricating a semiconductor package…." Ex. 1004 at 3:35-37. As the process continues, as depicted in Figure 3, Miks describes how a nonconductive connector is attached to the lead frame, and how certain temporary connecting bars are removed. *See* Ex. 1004 at 5:29-64. In the final stages of fabrication, as depicted in

Figures 4-7, Miks discloses the downsetting of certain features, the attachment of the semiconductor chip, and the addition of conductive wires which electrically connect the semiconductor chip, ring structure, input/output pads, and leads. *See generally* Ex. 1004 at 5:65-8:3. Of note, the ring structure of Miks is set such that, after the frame and die are encapsulated and sealed, the bottom surface of the ring structure is <u>not</u> exposed. *E.g.*, Ex. 1004 at 5:65-6:9; *see also id.* at 8:4-23 (describing encapsulation).

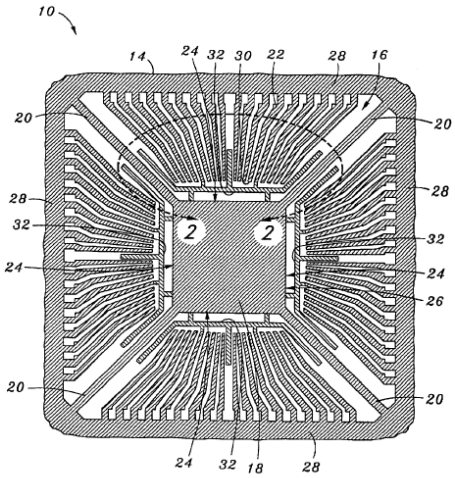


FIG. 1

Miks at Fig. 1

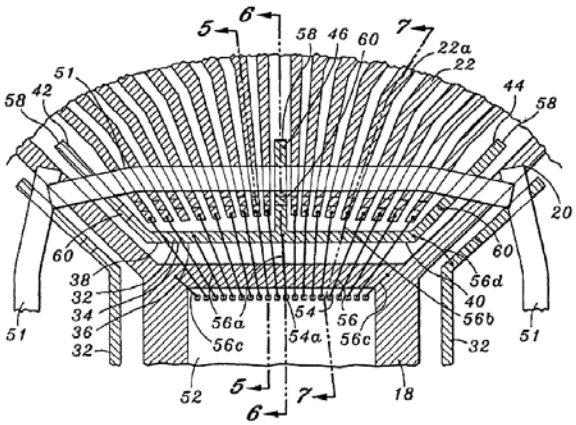


FIG. 4

Miks at Fig. 4

As discussed in further detail below, Miks does not teach at least "the strip having at least one lateral part that is connected to a single contact pad of the contact pads in said row" (Limitation 1[H]).

B. SECONDARY DOCUMENTS

1. U.S. Patent No. 6,229,200 to McLellan et al. ("McLellan")

Petitioner relies on McLellan as a secondary reference in combination with Nobuitsu, Tatt, Miks, and/or Chen in asserting that claims 1-11 would have been obvious. Pet. at 19-43, 62-66, and 69-71 (Grounds 1, 4, and 6). McLellan is directed to a QFN, unlike Nobuitsu (QFP) and Chen (BGA and LOC). Indeed, the very teaching that Petitioner relies on from McLellan is distinctive of QFNs, *i.e.*, exposed bottom sides of the die attach pad and leads. *See*, *e.g.*, Pet. 30-31, 41; *see also* Ex. 1003 at Figs. 4a, 4b, 8a, and 8b.

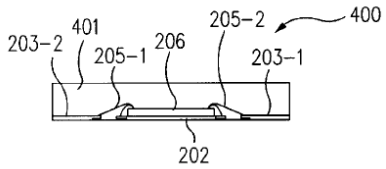


FIG. 4a

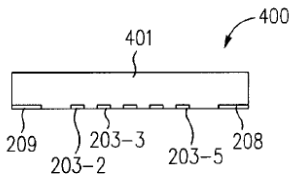


FIG. 4b

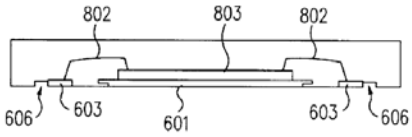


FIG. 8a

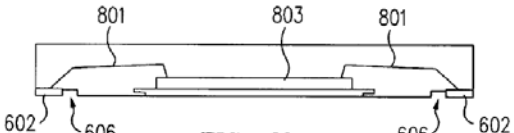


FIG. 8b

McLellan at Figs. 4a, 4b, 8a, and 8b

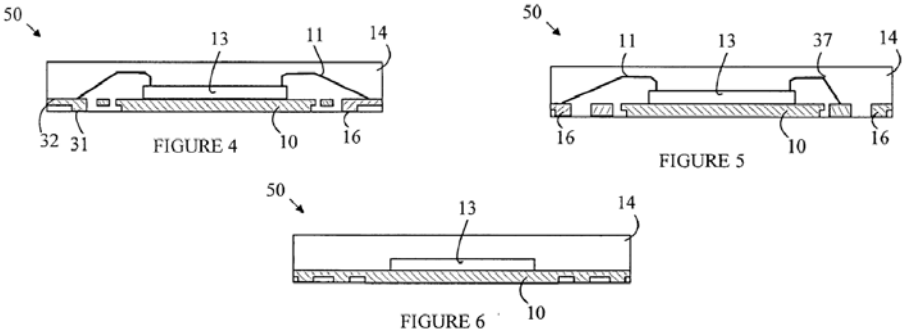
Although QFNs, QFPs, BGAs, and LOCs are all types of integrated circuit packages, a person of ordinary skill would have been discouraged from combining these package types due to significant differences in size, structure, and fabrication processes. Indeed, McLellan expressly criticizes QFPs for their susceptibility to defects, size and thickness limitations, unreliability due to moisture, poor thermal

performance, and high cost. Ex. 1003 at 1:19-2:8. Further, McLellan states that QFNs are superior to QFPs, *id.* at 5:21-26, thereby further discouraging any combination between package types.

As such, Petitioner's purported combination of Nobuitsu and McLellan (let alone Tatt, Miks, and/or Chen) is deficient, as Petitioner fails to address these differences, and further fails to provide any evidence or rationale in support of its purported motivation to combine.

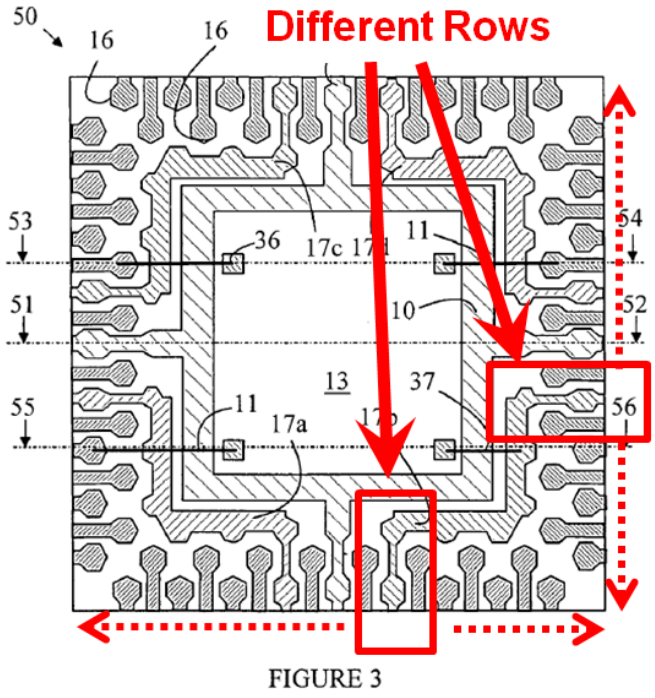
2. U.S. Published Application No. 2005/0006735 to an Tatt et al. ("Tatt")

Petitioner relies on Tatt as a secondary reference in combination with Nobuitsu, McLellan, and Miks in asserting that claims 5 and 6 would have been obvious. Pet. at 62-68 (Grounds 4-5). Tatt is directed to a QFN, unlike Nobuitsu (QFP). Indeed, the very teaching that Petitioner relies on from Tatt is distinctive of QFNs, *i.e.*, exposed bottom sides of the die attach pad and leads. *See*, *e.g.*, Pet. 65-66 (discussing claim 6).



Tatt at Figs. 4-6

With respect to claim 5, Petitioner concedes that Nobuitsu "does not disclose a strip comprising lateral 'parts' (plural) connected to 'two contact pads' in a corresponding row." Pet. at 62. Instead, Petitioner contends Tatt "discloses a strip (17b) having two lateral parts, with each lateral part connected to a contact pad, such that the strip is connected to two contact pads." Pet. at 63. Tatt, however, fails to teach lateral parts connected to two contact pads in "a corresponding row"—*i.e.*, the ***same*** row of contact pads. Ex. 1005 at Fig. 3. Instead, Tatt teaches lateral parts connected to two contact pads in ***adjacent and different*** rows of contact pads. Ex. 1005 at Fig. 3.



Tatt at Fig. 3 (annotated)

Moreover, as discussed below, Petitioner provides no evidence or rationale in support of its purported motivation to combine Nobuitsu with Tatt (let alone

McLellan), particularly in light of the fundamental differences between QFPs and QFNs. As such, Petitioner's purported combination is deficient.

3. U.S. Patent No. 6,077,724 to Chen ("Chen")

Petitioner relies on Chen as a secondary reference in combination with Nobuitsu, McLellan, and Miks in asserting that claim 11 would have been obvious. Pet. at 69-71 (Ground 6). Chen is directed to a semiconductor package and fabrication method using a combination of BGA and LOC techniques. Ex. 1010 at 2:14-20. Chen is unlike Nobuitsu (QFP), McLellan (QFN), and Miks (QFN), with which it would purportedly have been obvious to combine. Petitioner contends that "a person of ordinary skill would have been motivated to modify the package of Nobuitsu to include exactly fifty contact pads in order to utilize the package in connection with a 'single chip package component (such as 4 MB DRAM IC)' having 'fifty leads,' as taught by Chen." As discussed below, Petitioner provides no evidence or rationale in support of its purported motivation to combine Nobuitsu with Chen (let alone McLellan and Miks), particularly in light of the fundamental differences between BGAs, LOCs, QFPs, and QFNs.

IV. LEVEL OF ORDINARY SKILL IN THE ART

Because no issue raised by this Preliminary Response depends on the proper definition of the person of ordinary skill, Patent Owner does not propose a definition

here. Patent Owner reserves the right to present a contrary definition in the event trial is instituted.

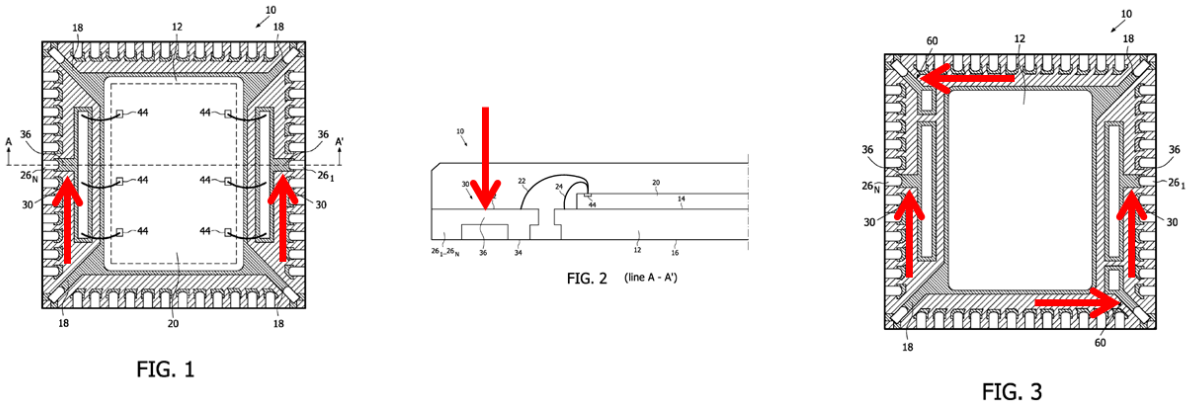
V. CLAIM CONSTRUCTION

In *inter partes* review, claim terms in an unexpired patent are construed according to their broadest reasonable interpretation in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016). Under that standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249,1257 (Fed. Cir. 2007).

Petitioner argues that under a broadest reasonable construction, the phrase "lateral part" means "an ***electrical connection*** between the strip and a corresponding contact pad." Pet. at 17 (emphasis added). Petitioner's proposed construction is wrong for two reasons—first, it ignores the structural term "lateral" as that term is used in the specification; and second, it ignores the '474 Patent's disclosure that the "lateral part" and a wire bond or indirect connection are alternatives that do not describe the same part.

First, Petitioner's construction ignores (and is contrary to) the plain language of the claim, which recites: "the strip having at least one lateral part that is connected to a single contact pad." Ex. 1001 at cl. 1. The '474 Patent teaches that "[e]ach strip

30 comprises at least one lateral part 36 that is connected to at least one of the contact pads in the row (in FIG. 1 pads 26_n and 26_1 respectively)." Ex. 1001 at 3:42-44. The '474 Patent further teaches that "FIG. 2 shows the lateral part 36 in more detail. It can be seen that this part is half-etched and that there is a direct link to a corresponding contact pad." Ex. 1001 at 4:10-12. Figures 1-3 depict the lateral part 36 of the strip extending from a side of the strip to establish this direct link to a contact pad:



'474 Patent, Figs. 1-3 (annotated)

The '474 Patent's disclosure of the "lateral part" is clear, therefore this term does not require construction and should be given its ordinary meaning. Alternatively, to the extent a construction is required, "lateral part" means "part extending from the side." *See, e.g., Am. Permahedge, Inc. v. Barcana, Inc.*, 105 F.3d 1441 (Fed. Cir. 1997) (construing "extending laterally" to mean "extending from the side with no limitations on the angle"); *see also, e.g.*, Ex. 2002 ("lateral" means "[o]f, pertaining to, or located at or on the side").

Second, and more significantly, Petitioner's construction ignores the '474 Patent's disclosure that the "lateral part" is an alternative to a wire bond or an indirect connection, rather than a genus encompassing all three types of connections (lateral part, wire bond or indirect connection). Petitioner cites to several passages in the '474 Patent that discuss the "lateral part" of the strip. As Petitioner notes, the specification teaches that this direct link, or lateral part, is ***not*** a required element of each disclosed embodiment in the '474 Patent: "[i]t is conceivable however to apply a wire bond between the strip and the corresponding contact pad, ***instead of*** a direct link. Furthermore, it is possible to make an indirect connection via the electronic carrier or printed circuit board." Ex. 1001 at 4:12-16 (emphasis added). However, in these additional embodiments, the specification makes clear that the wire bond or indirect connection is not the "lateral part" of the strip, but an alternative to the lateral part of the strip. ***Thus, one may connect the strip to a contact pad via a lateral part, a wire bond, or an indirect connection.*** The claimed invention, however, requires a "lateral part" and should be interpreted accordingly.

For these reasons, a "lateral part" should be construed under its ordinary meaning. Alternatively, if a construction is required, "lateral part" should be construed to mean "part extending from the side."

VI. BROADCOM'S PETITION FAILS TO DEMONSTRATE A REASONABLE LIKELIHOOD THAT ANY CLAIM OF THE '474 PATENT IS ANTICIPATED

A. GROUND 2: THE PETITION FAILS TO DEMONSTRATE THAT CLAIM 1 IS ANTICIPATED BY MIKS

Petitioner's Ground 2 alleges that claims 1-4 and 7-10 are anticipated by Miks. Claims 2, 4 and 7-10 depend from claim 1, and claim 3 depends from claim 2. To prevail on this ground, Petitioner must show that Miks discloses every element of these claims. "A claim is anticipated only if each and every element is found within a single prior art reference, arranged as claimed." *VirnetX, Inc. v. Cisco Sys., Inc.*, 767 F.3d 1308, 1323 (Fed. Cir. 2014). Because Petitioners fail to show that Miks discloses (either expressly or inherently) several elements of claim 1, the Petition fails to demonstrate how "all of the limitations [are] arranged or combined in the same way as recited in the claim," *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1371 (Fed. Cir. 2008), and therefore fails to show that claims 1-4 and 7-10 are anticipated.

1. Limitation 1[D]: Miks does not disclose "at least two tie bars for supporting the die attach pad until the singulation of the package during manufacturing thereof, the tie bars having a top surface and a bottom surface and extending from the die attach pad towards a corner of the package"

Limitation 1[D] recites "at least two tie bars for supporting the die attach pad until the singulation of the package during manufacturing thereof, the tie bars having a top surface and a bottom surface and extending from the die attach pad towards a

corner of the package." Thus, all of the claims challenged under Ground 2 require that the tie bars have "a top surface and a bottom surface."

Petitioner has failed to show that Miks discloses this limitation. Petitioner relies on Figure 1 of Miks for the disclosure that the claimed tie bars have "a top surface and a bottom surface." Pet. at 47. Miks discloses tie bars (20), however, these tie bars are not shown to have "a top surface and a bottom surface" as required by independent claim 1. Indeed, Miks offers ***no*** description of the spatial characteristics of the tie bars, nor are any surfaces disclosed whatsoever, let alone both top *and* bottom surfaces. *See, e.g.*, Ex. 1004 at Figs. 1-4. Therefore, the Petition fails to specify clearly what structure is relied upon to disclose the claimed top and bottom surfaces. *See Blue Calypso, LLC v. Groupon, Inc.*, 815 F.3d 1331, 1353 (Fed. Cir. 2016) ("A prior art reference cannot anticipate unless it discloses within the four corners of the document not only all of the limitations claimed but also all of the limitations *arranged or combined in the same way as recited in the claim*." (emphasis added) (quotations omitted)); *Enplas Display Device Corp. v. Seoul Semiconductor Co., Ltd.*, No. 13-CV-05038 NC, 2016 WL 454065, at *6 (N.D. Cal. Feb. 5, 2016) (denying summary judgment of invalidity based on inherent anticipation where a prior art reference did not necessarily disclose the precise spatial configuration of components claimed by the patent).

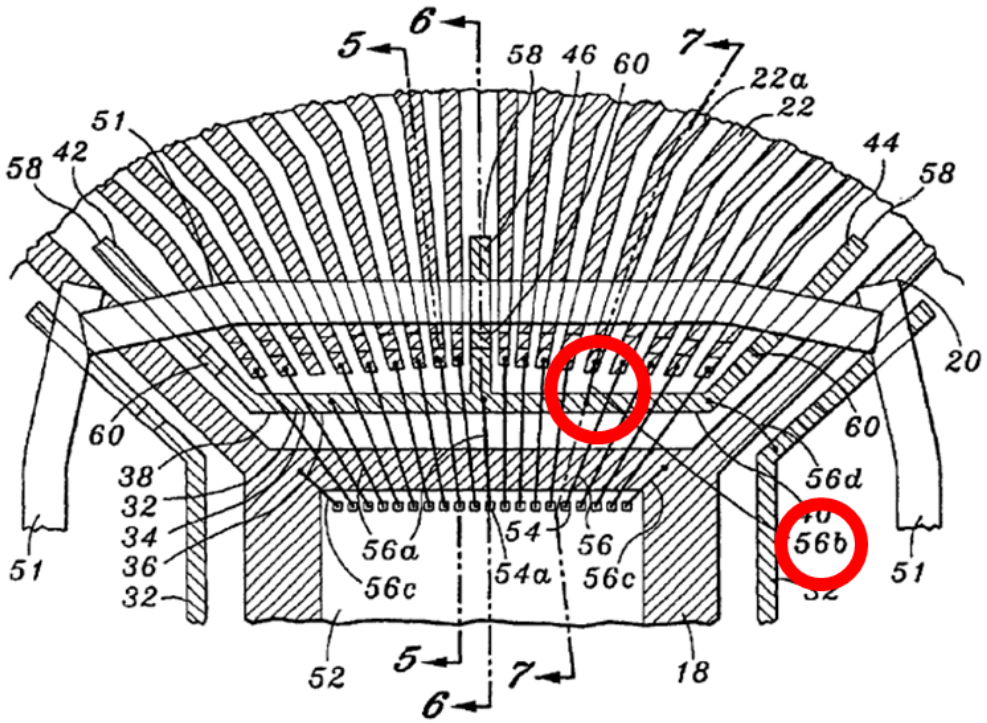
Petitioner cites to the Swaminathan Declaration for support, however the cited portions of the declaration are entirely devoid of any supporting evidence and should be given no weight. *See* 37 C.F.R. § 42.65(a); *Johns Manville Corp. v. Knauf Insulation, Inc.*, IPR2015-01633, Paper 10, at 13 (PTAB Jan. 4, 2016) ("Nothing in the Federal Rules of Evidence, which are applicable to IPRs (37 C.F.R. § 42.62(a)), or Federal Circuit jurisprudence, requires a fact finder to credit unsupported assertions of an expert witness."); *General Elec. Co. v. TAS Energy Inc.*, IPR2014-00163, Paper 11, at 11 (PTAB May 13, 2014) (giving an expert's "statements little weight" when their "Declaration does not disclose sufficiently the underlying facts or data forming the basis for the opinion").

It is well established that Petitioner must identify "with particularity, each claim challenged, the grounds on which the challenge to each claim is based, and the evidence that supports the grounds for the challenge to each claim." 35 U.S.C. § 312(a)(3). Because Petitioner has not identified with particularity where "a top surface and a bottom surface" is present in Miks, Ground 2 must fail.

2. Limitation 1[H]: Miks does not disclose "the strip having at least one lateral part that is connected to a single contact pad of the contact pads in said row"

Limitation 1[H] requires "the strip having at least one lateral part that is connected to a single contact pad of the contact pads in said row."

Referring to Figures 1 and 4-7, Petitioner argues that Miks discloses one strip (ring structure element (32)) having at least one "electrical connection" (wiring element (56b)) that is connected to a single contact pad (element (22a)). Pet. at 51-52. Miks describes element (56b) as a "conductive wire" that is "used to connect the ring structure 32 to the inner end top surface 78 of lead 22a." *See*, *e.g.*, Ex. 1004 at 7:24-26, Fig. 4.



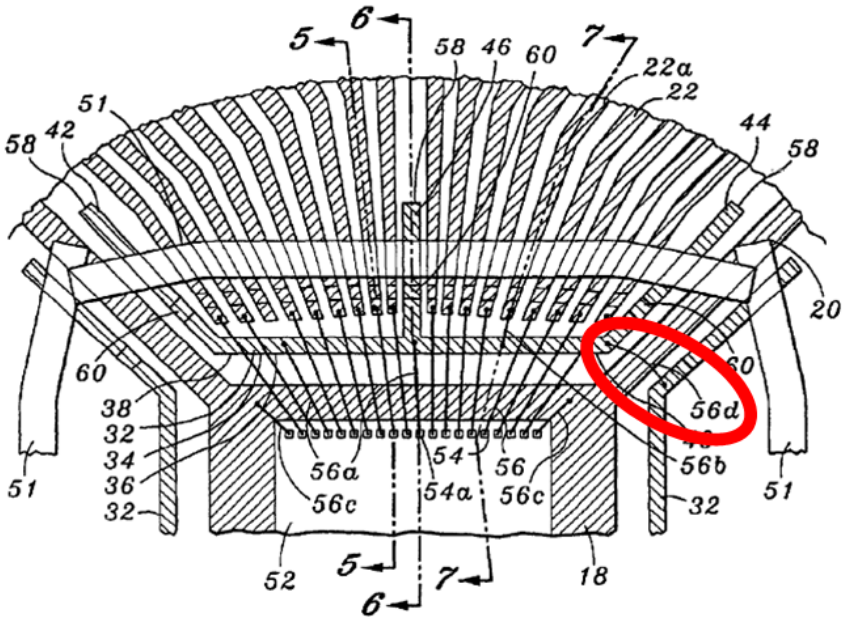
Miks at Fig. 4 (annotated)

Claim 1 requires a "***lateral part*** that is connected to a single contact pad of the contact pads in said row…." Ex. 1001 at 6:27-28 (emphasis added). As discussed above, the "lateral part" of claim 1 should be construed under its ordinary meaning or, alternatively, to mean "part extending from the side." *See*, *supra*, Section V.

Contrary to Petitioner's assertion, the specification makes clear that wiring is not a "lateral part," and, accordingly, Miks does not disclose the claimed "lateral part." [3]

Even if wiring element (56b) were a "lateral part" (it is not), claim 1 requires the strip to be "disposed between the die attach pad and a corresponding row of contact pads" and "connected to a ***single*** contact pad of the contact pads in said row." Ex. 1001 at 6:25-28 (emphasis added). Ring structure (32) of Miks is connected to contact pad (22a) in a first row of contact pads via wiring (56b) ***and*** a second ring structure (32) via wiring (56d), which presumably connects to at least one contact pad in a second row of contact pads.

[3] To the extent Petitioner contends that one of "stub portions 42, 44 or 46" directly connects to a single contact pad such that it could be considered a "lateral part," Petitioner is incorrect. Miks teaches that "stub portions" form a part of the "isolated ring structure 22" that is "electrically isolated in nature from the chip mounting pad 18, the leads 22, the tie bars 20, and any other portion of the frame 14." Ex. 1004 at Col. 4:29-41; 5:51-56.



Miks at Fig. 4 (annotated)

Accordingly, Miks does not teach a "strip having at least one lateral part that is connected to a ***single*** contact pad of the contact pads in said row."

3. Dependent on Claim 1, the Petition Fails to Demonstrate that Claims 2-4 and 7-10 are Anticipated by Miks

Claims 2-4 and 7-10 are dependent on claim 1 and not anticipated by Miks at least for failing to meet every limitation of claim 1. "'A claim in dependent form shall be construed to incorporate by reference all the limitations of the claim to which it refers.' Therefore, if a dependent claim depends upon an independent claim that is held valid, the dependent claim must also be valid as at least one of its elements necessarily is not anticipated by the prior art." *Carnegie Mellon Univ. v. Marvell Tech. Group, Ltd.*, Civil No. 09-0290, 2011 WL 4527353, at *5 (W.D. Pa. Sept. 28, 2011) (quoting 35 U.S.C. § 112(d)); *accord Supernus Pharma. Inc. v. Actavis Inc.*,

Civil No. 12-4740, 2016 WL 527838, at *42 (D.N.J. Feb. 5, 2016) ("The dependent claims likewise are valid, as they depend upon an independent claim that is valid.").

VII. BROADCOM'S PETITION FAILS TO DEMONSTRATE A REASONABLE LIKELIHOOD THAT ANY CLAIM OF THE '474 PATENT IS OBVIOUS

For at least two independent reasons, Petitioners have failed to show a reasonable likelihood that any of asserted claims are unpatentable under any of Grounds 1 and 3-6. First, the Petition fails, for at least several elements in each asserted claim to provide articulated reasoning supported by evidence to show how these elements are allegedly taught or suggested by the Petitioner's cited documents. Second, Petitioner fails to provide any articulated reasoning supported by evidence to combine its cited documents other than the equally conclusory (and often identical) arguments contained in the Swaminathan Declaration.

To present a *prima facie* case of obviousness over multiple references, Petitioners must "show[] some objective teaching in the prior art or some general knowledge in the art that would have led one of ordinary skill to combine the relevant teachings of the references to arrive at the claimed invention." *Torrent Pharm. Ltd. v. Merck Frosst Canada & Co.*, IPR2014-00559, Paper 8, at 9 (PTAB Oct. 1, 2014); *see also In re Nuvasive, Inc.*, 842 F.3d 1376, 1382 (Fed. Cir. 2016)("Although identifying a motivation to combine 'need not become [a] rigid and mandatory formula[],' *KSR*, 550 U.S. at 419, [ ] the PTAB must articulate a reason why a

PHOSITA would combine the prior art references.")(emphasis omitted); *Genetics Inst., LLC v. Novartis Vaccines and Diagnostics, Inc.*, 655 F.3d 1291, 1304 (Fed. Cir. 2011) ("KSR…acknowledged the importance of identifying a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does.") (internal quotation marks omitted).

"An inference of nonobviousness is especially strong where the prior art's teachings undermine the very reason being proffered as to why a person of ordinary skill would have combined the known elements." *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009). Here, because the packaging technologies in the cited documents are so different, Petitioner fails to provide that teaching to support its proposed combinations.

Even if the technologies were related, as explained in *KSR*, obviousness cannot be sustained by "mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR, Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007); *Cisco Sys., Inc. v. C-Cation Techs., LLC*, IPR2014-00454, Paper 12, at 13 (PTAB Aug. 29, 2014). The regulations require that a petition for *inter partes* review must include "a detailed explanation of the significance of the evidence," 37 C.F.R.

§ 42.22(a)(2), and "specify where each element of the claim is found in the prior art patents or printed publications relied upon," 37 C.F.R. § 42.104(b)(4).

Disregarding these requirements, the Petition is replete with conclusory statements unsupported by evidence, and the Petition fails to include any evidence for a number of claim limitations other than often identical conclusory statements in the Swaminathan Declaration. As will be discussed further below, each Ground often follows this pattern: (1) conclusory statements, unsupported by evidence, that the cited references disclose various elements of the claim at issue; (2) citations, without explanation, to isolated portions of the cited references; and (3) conclusory arguments, citing only an identical and unsupported portion of the Swaminathan Declaration, that the elements would have been obvious in that Ground. But such conclusory analysis is insufficient, and the Board has rejected similarly structured petitions. *See Shopkick, Inc. v. Novitaz, Inc.*, IPR2015-00277, -00278, Paper 7, at 19 (May 29, 2015) (denying institution for failing to "provide a substantive analysis of why or how a person of ordinary skill in the art would have modified the prior art to render the claims obvious" where the "Petitioner merely quotes each limitation in claim 1 and, following each quoted limitation, asserts that, individually, [the relied on prior art] discloses the limitation…. Petitioner then provides quotes from the particular reference"); *Google Inc. v. Everymd.com LLC*, IPR2014-00347, Paper 9, at 19 (PTAB May 22, 2014) (denying institution because "[t]o the extent that

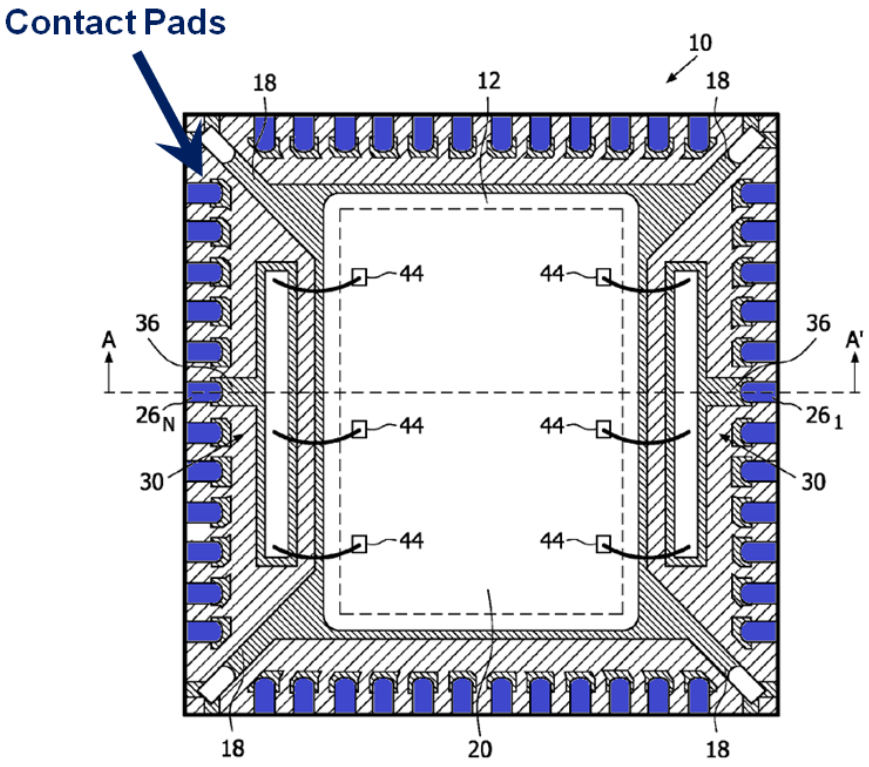
Petitioners assert that the brief summary, and quotations, citations, and reproduced figures from Shah qualify as argument, they do not: (1) specify sufficiently where each element of independent claim 1 is found in Shah, and (2) constitute a detailed explanation of the significance of the quotations, citations, and figures from Shah").

Because the Petition fails to provide articulated reasoning supported by evidence for several limitations in the asserted claims, the Petition is unsupported and should be denied.

A. GROUND 1: THE PETITION FAILS TO DEMONSTRATE THAT CLAIMS 1-4 AND 7-10 ARE OBVIOUS OVER NOBUITSU IN VIEW OF MCLELLAN

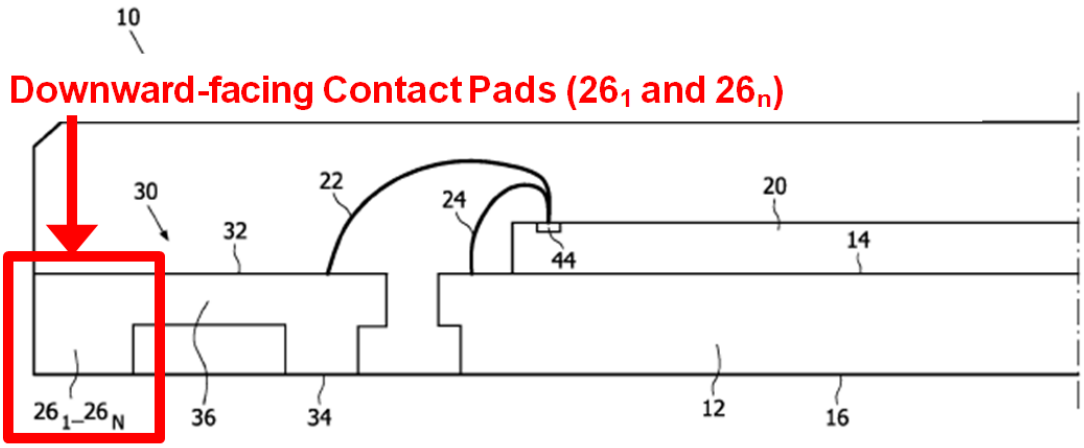
1. Limitation 1[C]: Nobuitsu does not teach "a plurality of contact pads…each contact pad having a top surface and a bottom surface"

Petitioner incorrectly argues that Nobuitsu teaches "a plurality of ***contact pads*** provided in at least four rows that correspond to the rectangular shape of the package, each contact pad having a top surface and a bottom surface" as required by claim 1. Pet. at 21-22. The '474 Patent teaches that contact pads (26_1-26_n) are organized in four rows, as depicted in Figure 1:



’474 Patent at Fig. 1

Significantly, the contact pads (26_1-26_n) disclosed in the ’474 Patent do not extend laterally beyond the perimeter of the package, *i.e.*, the encapsulation. *See* Ex. 1001 at Figs. 1-3. Rather, as Figure 2 shows, the contact pads are confined within the encapsulation boundary, and are exposed only on the side and bottom of the package. *Id.*



'474 Patent at Fig. 2 (annotated)

This design is the hallmark of a QFN—exposed, bottom-facing ***contact pads*** that fit within the confines of the package resin and connect directly to circuitry outside the package. *See supra* Section II.

In contrast, however, Nobuitsu describes a QFP. A QFP does not include exposed, bottom-facing contact pads required by the QFN, and are readily distinguishable by gull-wing ***outer wire leads*** that extend laterally from the sides of the package resin. *See supra* Section II.

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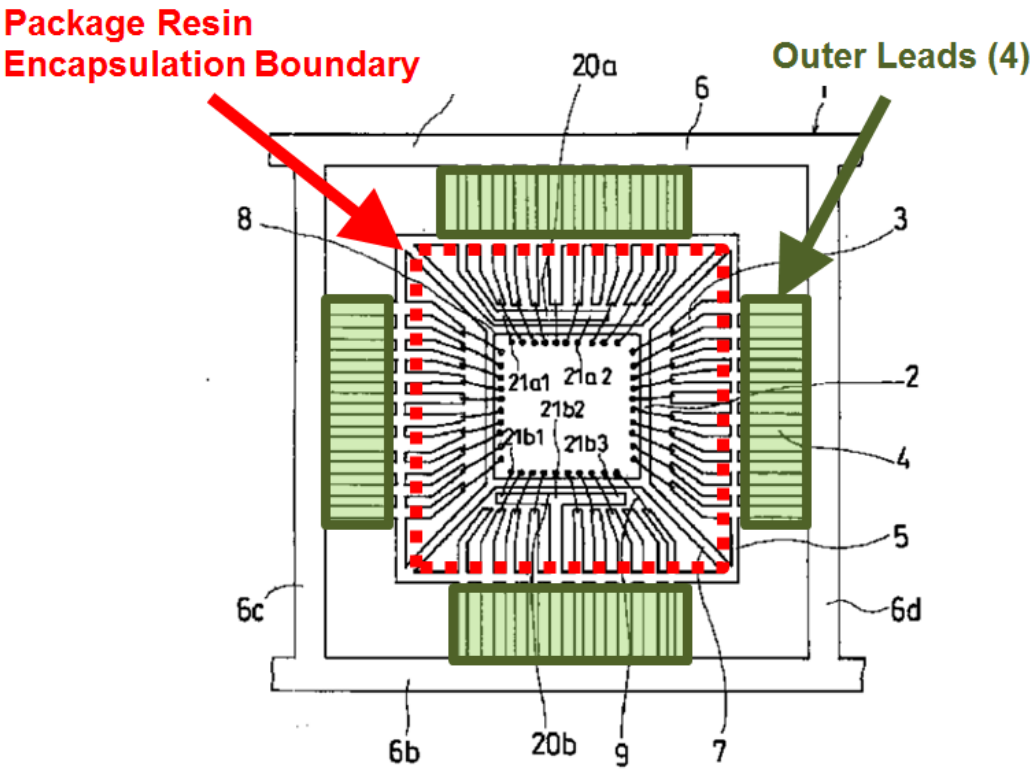


Nobuitsu at Fig. 1 (annotated)

Indeed, QFPs are designed to have ***no exposed surfaces*** because any opening in the bi-molded encapsulant creates a risk of moisture-related failures, such as short circuits. *See, e.g.*, Ex. 1003 at 1:48-53. With only outer wire leads, Nobuitsu fails to disclose the "contact pads" claimed by the '474 Patent.

Even if the "contact pads" claimed by the '474 Patent included laterally extending leads such as those in a QFP (which it does not), the Petitioner's reliance on Nobuitsu in insufficient. To support its argument, Petitioners assert that the "contact pads" of the '474 Patent are met by "[c]ontact pads (3) in Nobuitsu." Pet. at 21-22. But Nobuitsu teaches that element (3) corresponds to *inner* leads, which

are encapsulated in molded plastic and do not have a direct connection to circuitry outside of the package. *See* Ex. 1002 at Fig. 1. Instead, as Nobuitsu teaches, inner leads (3) connect to outer leads (4) through die bar (5). *See, e.g.*, Ex. 1002 at 11, [0016]. Thus, were there an analogous "contact pad" in a QFP (which there is not), it would be the outer leads (4) not the inner leads (3).

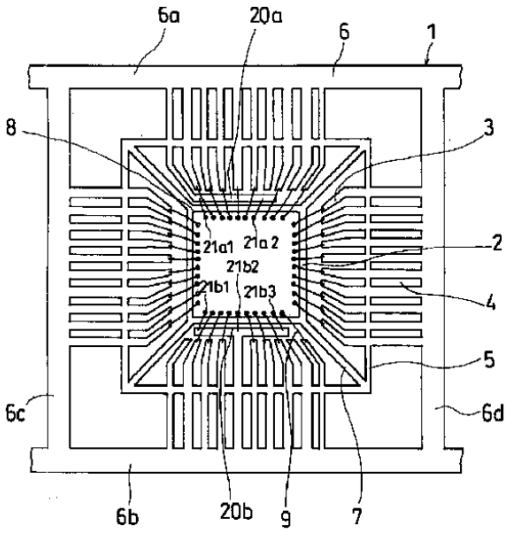
Further, Nobuitsu does not teach the claimed "top surface and a bottom surface" of the "contact pad." Petitioner identifies Figures 1 and 2 of Nobuitsu to satisfy this element, however neither Figure suggests any spatial characteristics of the contact pads. *See* Pet. at 22. Significantly, Petitioner does not rely on McClellan to make up for any of these deficiencies, nor does Petitioner's reliance on Figure 2 of Nobuitsu cure the defects of Figure 1. *See Clorox Co. v. Auto-Kaps, LLC*, IPR2016-00821, Paper 8, at 14-15 (PTAB Aug. 25, 2016) (declining to institute inter partes review on obviousness grounds where the Petition cited no evidence that a reference disclosed the shape of the structure required by the claim). Petitioner's only supporting evidence is the Swaminathan Declaration, but the cited portions of the declaration are entirely devoid of any supporting evidence and should be given no weight. *See* 37 C.F.R. § 42.65(a); *Johns Manville*, IPR2015-01633, Paper 10, at 13 ("Nothing in the Federal Rules of Evidence, which are applicable to IPRs (37 C.F.R. § 42.62(a)), or Federal Circuit jurisprudence, requires a fact finder to credit unsupported assertions of an expert witness."); *General Elec.*, IPR2014-00163,

Paper 11, at 11 (giving an expert's "statements little weight" when their "Declaration does not disclose sufficiently the underlying facts or data forming the basis for the opinion").

2. Limitation 1[D]: Nobuitsu does not teach "at least two tie bars for supporting the die attach pad until the singulation of the package during manufacturing thereof, the tie bars having a top surface and a bottom surface and extending from the die attach pad towards a corner of the package"

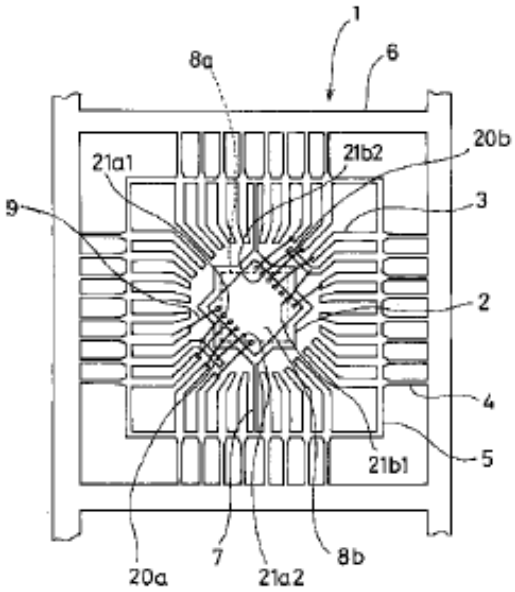
The Petition also fails to show that Nobuitsu teaches "at least two tie bars…having a top surface and a bottom surface…," as required by Limitation 1[D]. Specifically, Petitioner fails to provide any reasoning supported by evidence that Figure 1 of Nobuitsu discloses "a top surface and a bottom surface" of the claimed tie bars. Nobuitsu does include die pad supports (7), but these supports are not shown to have "a top surface and a bottom surface." Indeed, Nobuitsu does not describe any spatial or surface characteristics of the supports (7). *See Clorox Co.*, IPR2016-00821, Paper 8, at 14-15.

【図１】



Nobuitsu at Fig. 1

【図２】



Nobuitsu at Fig. 2

Petitioner's reliance on Figure 2 of Nobuitsu does not resolve this deficiency. Figure 2, like Figure 1, discloses die pad supports (7) without any description or disclosure of "a top surface and a bottom surface."

Notably, Petitioner does not rely on McLellan to make up for these deficiencies. Instead, Petitioner cites to the Swaminathan Declaration for support. However, the cited portions of the declaration are entirely devoid of any supporting evidence and should be given no weight. *See* 37 C.F.R. § 42.65(a); *Johns Manville*, IPR2015-01633, Paper 10, at 13 ("Nothing in the Federal Rules of Evidence, which are applicable to IPRs (37 C.F.R. § 42.62(a)), or Federal Circuit jurisprudence, requires a fact finder to credit unsupported assertions of an expert witness."); *General Elec.*, IPR2014-00163, Paper 11, at 11 (giving an expert's "statements little

weight" when their "Declaration does not disclose sufficiently the underlying facts or data forming the basis for the opinion").

3. Limitation 1[G]: Nobuitsu in view of McLellan fails to teach "an encapsulation encapsulating the semiconductor die, the top surface of the die attach pad, the electrical connections, the top surface of the tie bars and the top surface of the contact pad, and leaving the bottom surface of the die attach pad and the bottom surface of the contact pads exposed"

Petitioner contends that Nobuitsu in view of McLellan teaches "an encapsulation encapsulating the semiconductor die, the top surface of the die attach pad, the electrical connections, the top surface of the tie bars and the top surface of the contact pad, and leaving the bottom surface of the die attach pad and the bottom surface of the contact pads exposed, " as required by Claim 1.

Petitioner concedes, however, that Nobuitsu does not disclose "leaving the bottom surface of the die attach pad and the bottom surface of the contact pads exposed," Pet. at 62, while contending "[o]ne of ordinary skill would have been motivated to modify the package of Nobuitsu and make it more efficient by leaving the bottom surface of its die attach pad and the bottom surface of its contact pads exposed, as taught by McLellan." Pet. at 30-31. But Petitioner fails to specify ***how*** or ***why*** a person of ordinary skill "would have been motivated to alter the device of Nobuitsu…as taught by McLellan." *Id.* Moreover, Petitioner provides no explanation of how a person of ordinary skill would make the package of Nobuitsu

"more efficient" using the teachings of McLellan. Indeed, as discussed above, Petitioner fails to identify any motivation to combine the two wholly unrelated packaging technologies of Nobuitsu and McLellan. Specifically, Nobuitsu relates to QFPs, whereas McLellan relates to QFNs. Although QFPs and QFNs are both types of integrated circuit packages, a person of ordinary skill would have understood that, due to significant differences in size, structure, and fabrication processes, aspects of the two package types could not be combined so readily, as suggested by Petitioner.

Indeed, McLellan identifies numerous problems with QFPs, including susceptibility to defects, Ex. 1003 at 1:19-32, size limitations, *id.* at 1:33-42, thickness limitations, *id.* at 1:43-48, unreliability due to moisture, *id*. at 1:49-53 (*e.g.*, short circuits), poor thermal performance, *id.* at 1:54-63, and high cost, *id.* at 1:64-2:8 (QFNs "cost only 10% to 20% of a comparable QFP package."). McLellan then discusses how QFNs are superior to QFPs, thereby discouraging a person of skill in the art from attempting a combination of the two designs. *See, e.g.*, Ex. 1003 at 5:21-26 (QFNs eliminate costs of trimming or forming leads); 5:36-40 ("[T]he thermal performance…is expected to be much higher than conventional QFP packages."); 5:40-42 ("[T]he delamination problem of a conventional QFP package is avoided."); 5:41-46 ("[H]igh reliability can be further enhanced [in QFNs.]"); 5:58-59 (a QFN "not only reduces material cost but provides additional thermal performance also."); 5:63-65 ("[QFNs] provide[] electrical performance superior to a conventional QFP

package."); 6:53 ("[V]ery high pin density can be achieved."). Notably, Nobuitsu does not even mention QFNs.

Petitioner does not provide any explanation for these critical differences or supporting evidence for its contention that one of skill in the art would be motivated to combine the QFP of Nobuitsu with the QFN of McLellen. For example, Limitation 1[G] requires "the bottom surface of the die attach pad and the bottom surface of the contact pads [to be] exposed." Petitioner admits that Nobuitsu does not disclose these exposed bottom surfaces, but purports only that a person of ordinary skill would have been motivated to "make [the package of Nobuitsu] more efficient" by combining it with the package of McLellan. Pet. at 31. This vague statement is hardly sufficient to qualify as evidence that one of skill in the art would have been motivated to make the combination. As noted above, Nobuitsu is concerned with reliability issues relating to internal bonding wire connections, including issues with meltdown caused by high power consumption and cross connections of bonding wires between inner leads and bonding pads. Ex. 1002 at 6-8, [0002-0006]. In contrast, McLellan is concerned with reliability issues caused by exterior delamination and thermal performance. Ex. 1003 at 1:48-63. Importantly, McLellan is also concerned with making a "low cost" and "high density" package. Ex. 1003 at 1:64-2:10. Indeed, McLellan teaches a package having inner and outer rows of leads so that "very high pin density can be achieved." Ex. 1003 at 6:38-53.

Thus, the cited documents provide no rationale supporting Petitioner's "efficiency" contention.

Rather, a person of ordinary skill would have understood McLellan to teach away from such a combination. *See*, *e.g.*, *KSR*, 550 U.S. at 416 ("[W]hen the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious."). As noted above, were one to rely on McLellan's teaching of exposed bottom surfaces to alter Nobuitsu's QFP (as suggested by Petitioner), moisture and environmental factors (*e.g.*, short circuits) would prevent the device from functioning. *See*, *e.g.*, Ex. 1003 at 1:48-53 ("One important quality measure for an integrated circuit package is reliability. In a QFP, a significant failure mode is the delamination of the mold compound from the back of a die pad. Delamination introduces moisture into the package and causes moisture-related failures."). As such, a person of ordinary skill would not have understood how to remove the bottom surfaces of Nobuitsu's QFP without destroying the functionality of the device. Thus, one of ordinary skill would have been discouraged from combining Nobuitsu with McLellan based on the express teachings in McLellan. *See*, *e.g.*, *RTIC Coolers, LLC v. YETI Coolers, LLC*, IPR2016-01430, Paper 9, at 14-15 (PTAB Jan. 18, 2017) (denying institution where the petitioner has "picked and chosen from among the various components…to arrive at a design of the type Lundblade specifically criticizes. This is the epitome

of hindsight."); *Depuy Synthes Sales, Inc. v. Acantha LLC*, IPR2016-00329, Paper 12 at 15-16 (PTAB June 3, 2016) (denying institution and finding that references teach away where the combination would render one reference inoperable for its intended purpose).

The only evidence the Petition purports to cite are the conclusory, unsupported statements of Dr. Swaminathan, Ex. 1007, ¶77-79, which are almost identical to the conclusory attorney argument in the Petition at 30-31. *See, e.g.*, *Kinetic Techs.*, IPR2014-00529, Paper 8 at 14-15 ("Merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced probative value."). The only support in the Swaminathan Declaration for the conclusion that a person of skill in the art would have "been motivated to modify the package of Nobuitsu and made it more efficient" is Dr. Swaminathan's own "opinion." Ex. 1007, ¶79. An expert's own experience, without more, has been determined insufficient by the Board. *Marvell Semiconductor, Inc. v. Intellectual Ventures I LLC*, IPR2014-00547, Paper 17, at 13 (PTAB Dec. 3, 2014) (holding that an expert did not apply "the proper test for obviousness" when he "used his own present skill and knowledge as a reference point" instead of "tak[ing] into account what would have been obvious to a person of ordinary skill" at the time the invention was made). Dr. Swaminathan does not explain why his experience in the field

supports his conclusion. Nor does Dr. Swaminathan cite to any intrinsic or extrinsic evidence. *See General Elec.*, IPR2014-00163, Paper 11, at 11.

With no motivation to combine, Petitioner's selection and combination of dissimilar references uses the '474 patent as a roadmap to cherry pick different features from the different references and put the pieces together in a manner that would meet the claim limitations. This improper use of hindsight to combine Nobuitsu with McLellan does not render claims 1-4 and 7-10 unpatentable. *See Ortho-McNeil Pharm.*, 520 F.3d at 1364.

4. Limitation 1[H]: Nobuitsu does not teach "the strip having at least one lateral part that is connected to a single contact pad of the contact pads in said row"

Petitioner acknowledges that claim 1 requires the strip to be connected to a single contact pad in the row of contact pads, and contends that Nobuitsu alone discloses at least one strip (elements 20a and 20b) having a lateral part that is connected to a single contact pad (element 3). Pet. at 31-36 (citing Ex. 1002 at Figs. 1-2; 6, [0001]; 8, [0007]; 10-16 [0016-0027]).

As an initial matter, Petitioner's argument is consistent with Patent Owner's proposed construction of "lateral part"—*i.e.*, the term should be construed under its plain and ordinary meaning or, alternatively, to mean "part extending from the side." Specifically, Petitioner relies on a "direct physical contact" between the strip (elements 20a and 20b) and inner leads (3). Pet. at 32.

Notwithstanding Petitioner's use of the proper construction of "lateral part," Petitioner fails to specify the location of the "direct physical contact," or where the "lateral part," is taught in Nobuitsu. Indeed, Nobuitsu teaches only two conductive elements located proximate to the bonding pad: common lead portions (20a and 20b) and inner leads (3). *See*, *e.g.*, Ex. 1002 at 10-11, [0016]. Petitioner identifies common lead portions (20a and 20b) as corresponding to the claimed "strip," Pet. at 31, and inner leads (3) as corresponding to the claimed "contact pads." *Id*. But neither the common lead portions (20a and 20b) or inner leads (3) are identified, or could be identified, as the claimed "***lateral part*** [of the strip] that is connected ***to*** a single contact pad." Ex. 1001 at 6:26-28.

Petitioner's reliance on Figure 2 of Nobuitsu does not resolve this deficiency. Figure 2, like Figure 1, teaches only two conductive elements—common lead portions (20a and 20b) and inner leads (3). Ex. 1002 at 15, [0025].

Failing to identify a "lateral part" in Nobuitsu, and failing to identify any disclosure in McLellan, Petitioner's only evidence to support its argument is the Swaminathan Declaration. However, Dr. Swaminathan's opinion is offered "without a cogent supporting explanation," *Tempur Sealy*, IPR2014-01419, Paper 7, at 7. Instead, Dr. Swaminathan recites almost verbatim Petitioner's arguments, *compare* Ex. 1007, ¶¶ 80-88 *with* Pet. at 31-36, which fails to disclose any facts or underlying

rationale. Such conclusory testimony, should be given no weight. *See* 37 C.F.R. § 42.65(a).

5. Dependent on Claim 1, the Petition Fails to Demonstrate that Claims 2-4 and 7-10 are Rendered Obvious over Nobuitsu in View of McLellan

The Petition fails to demonstrate that claim 1 is made obvious by Nobuitsu in view of McLellan. Claim 1 is therefore patentable. Claims 2-4 and 7-10 depend from patentable independent claim 1. Accordingly, the Petition similarly fails to show that claims 2-4 and 7-10 are unpatentable over Nobuitsu in view of McLellan. *Carnegie Mellon Univ*, 2011 WL 4527353, at *5.

B. GROUND 3: THE PETITION FAILS TO DEMONSTRATE THAT CLAIMS 1-4 AND 7-10 ARE UNPATENTABLE OVER MIKS IN VIEW OF NOBUITSU

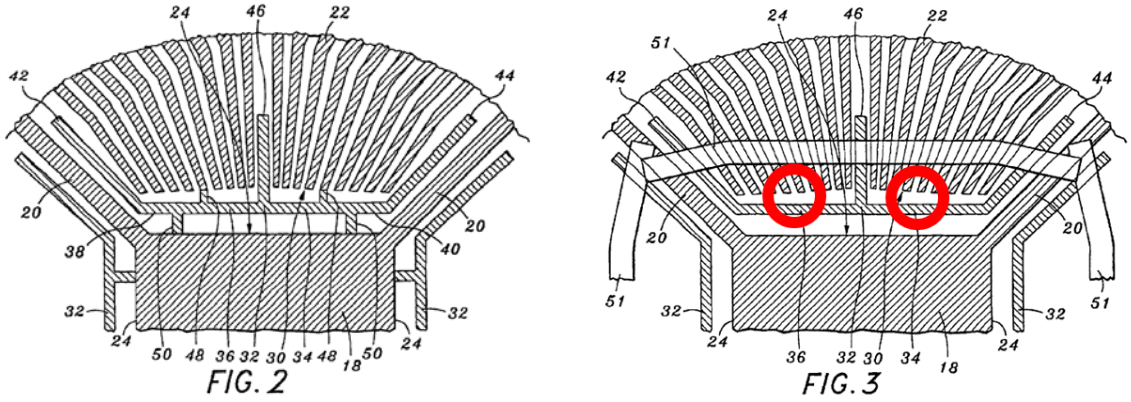
1. Limitation 1[H]: The Petition Lacks Articulated Reasoning Supported by Evidence to Combine Miks and Nobuitsu

Petitioner asserts that Claims 1-4 and 7-10 are obvious over Miks in view of Nobuitsu "if the Board does not consider part 56b of Miks [to be] a 'lateral part.'" Pet. at 60. Accordingly, Ground 3 is Petitioner's alternative argument to Ground 2 should the Board fail to adopt Petitioner's unsupportable construction of "lateral part." As discussed above, Miks discloses wiring element (56b) that is "used to connect the ring structure 32 to the inner end top surface 78 of lead 22a." *See*, *e.g.*, Ex. 1004 at 7:24-26, Fig. 4. This wiring element is not the claimed "lateral part," according to a proper construction.

At the center of Petitioner's alternative argument is its assertion that "[t]o the extent that wire (56b) is not a lateral part of strip (32), it would have been a matter of ***obvious engineering choice*** to make wire (56b) integral to strip (32)," as taught by Nobuitsu." Pet. at 61. Petitioner's conclusion that a person of ordinary skill would have redesigned the wiring (56b) of Miks to form a lateral part of the strip that directly connects to the contact pads is belied by the fact that the strip of Miks already includes three "stub portions," none of which are directly connected to a contact pad in the corresponding row of contact pads. *See, e.g.*, Ex. 1004 at Figs. 1, 4. Indeed, Miks teaches that the "stub portions" form a part of the "isolated ring structure 22" that is "electrically isolated in nature from the chip mounting pad 18, the leads 22, the tie bars 20, and any other portion of the frame 14." Ex. 1004 at Col. 4:29-41; 5:51-56.

Had Miks sought to exercise an "obvious engineering choice," Miks would have disclosed some teaching that at least one of these lateral parts could be extended to directly connect to a contact pad. Rather, Miks teaches away from such a conversion of wire (56b) into an integral connection with strip (32). *See, e.g., id*. The disclosure of Miks details several successive steps, and intermediate products, involved in the fabrication of a final, singulated and encapsulated semiconductor package. The initial lead frame (10) is depicted in Figures 1 and 2. Of note, in this initial lead frame, Miks discloses that "[t]wo pairs of ***temporary connecting bars 48,***

50 are utilized to support the ring structure 32 within the frame 14 and to maintain the ring structure 32 in fixed relation to the chip mounting pad 18 and the leads 22….” *Id.* at 4:50-54 (emphasis added). Temporary connecting bars (48 and 50) are integral, conductive, lateral connections between leads (22) and ring structure (32). *See id.* at 5:4-11 (“[T]he ring structure 32 and temporary connecting bars 48, 50… [and] chip mounting pad 18, the tie bars 20, and the leads 22…are formed from a contiguous sheet of material of the lead frame 10….”). Rather than preserve these temporary connections, Miks teaches the temporary connections are to be removed to create the “***isolated*** ring structure”: “[t]he method further provides for removing the temporary connecting bars 48, 50.” Ex. 1004 5:51-64.



Miks at Figs. 2 and 3 (annotated)

Accordingly, Miks teaches away from using the claimed “lateral parts.” *See, e.g.*, *KSR*, 550 U.S. at 416; *RTIC Coolers*, IPR2016-01430, Paper 9, at 14-15; *Depuy Synthes Sales*, IPR2016-00329, Paper 12 at 15-16.

By combining Miks with Nobuitsu, Petitioner seeks to reintroduce lateral connections which Miks expressly teaches should be removed. Rather than being a "matter of obvious engineering choice" as suggested by Petitioner, Pet. at 61, a person of skill in the art following Miks would be discouraged from adding otherwise temporary connections into the permanent design of Nobuitsu.[4]

Further, Petitioner fails to establish that a person of ordinary skill would have been motivated to combine these two references in a manner that meets the limitations of claim 1-4 and 7-10. As discussed, Nobuitsu is concerned with reliability issues relating to internal bonding wire connections in QFPs. Ex. 1002 at 7, [0003]. Miks, however, is concerned with QFNs, and Petitioner fails to specify how or why one of skill in the art would have made the "obvious engineering choice to make the wire (56b) of Miks an integral part of the strip, as taught by Nobuitsu." Pet. at 61. Petitioner fails to identify any motivation to combine two wholly

[4] Petitioner's citation to *In re Larson*, 340 F.2d 965 (CCPA 1965) is inapposite. Pet. 61-62. *Larson* stands for the proposition that, where several parts "are rigidly secured together as a single unit…the use of a one piece construction…would be merely a matter of obvious engineering choice." *Larson*, at 967-68. Significantly, *Larson* did not involve the situation present here—*i.e.*, one reference expressly discourages a proposed modification.

unrelated packaging technologies. Indeed, Petitioners' only support for its conclusion is the Swaminathan Declaration, but Dr. Swaminathan merely repeats the same unsupported attorney argument of the Petition "without a cogent supporting explanation." *Tempur Sealy*, IPR2014-01419, Paper 7, at 7; *compare* Ex. 1007, ¶¶139-141 *with* Pet. at 61. Such conclusory testimony should be given no weight. *See* 37 C.F.R. § 42.65(a).

Rather, Petitioner's selection and combination of dissimilar references uses the '474 Patent as a roadmap to cherry pick different features from the different references and put the pieces together in a manner that would meet the claim limitations. This improper use of hindsight to combine Miks with Nobuitsu does not render claims 1-4 and 7-10 unpatentable. *See Ortho-McNeil Pharm.*, 520 F.3d at 1364.

2. Dependent on Claim 1, the Petition Fails to Demonstrate that Claims 2-4 and 7-10 are Rendered Obvious over Miks in View of Nobuitsu

The Petition fails to demonstrate that claim 1 is made obvious by Miks in view of Nobuitsu. Claim 1 is therefore patentable. Claims 2-4 and 7-10 depend from patentable independent claim 1. Accordingly, the Petition similarly fails to show that claims 2-4 and 7-10 are unpatentable over Miks in view of Nobuitsu. *Carnegie Mellon Univ*, 2011 WL 4527353, at *5.

C. GROUND 4: THE PETITION FAILS TO DEMONSTRATE THAT CLAIMS 5 AND 6 ARE UNPATENTABLE OVER NOBUITSU IN VIEW OF MCLELLAN AND TATT

Ground 4 of the Petition alleges that Claims 5 and 6 are of the '474 Patent are unpatentable over Nobuitsu in view of McLellan and Tatt.

As an initial matter, claims 5 and 6 depend from independent claim 1. Petitioner contends that "Nobuitsu in view of McLellan renders obvious all of the limitations of claim 1" for the reasons discussed in connection with Ground 1. Pet. at 62, 65. Tatt does not teach or suggest (and Petitioners do not argue otherwise) any element of claim 1. Accordingly, Ground 4 should be denied for the reasons stated above with respect to Ground 1 for failing to demonstrate that the base claim is rendered obvious by Nobuitsu in view of McClellan. *Carnegie Mellon Univ*, 2011 WL 4527353, at *5.

With respect to claim 5, Petitioner concedes that Nobuitsu "does not disclose a strip comprising lateral 'parts' (plural) connected to 'two contact pads' in a corresponding row,'" Pet. at 62, and contends that Tatt "discloses a strip (17b) having two lateral parts, with each lateral part connected to a contact pad, such that the strip is connected to two contact pads." Pet. at 63 (citing Ex. 1005 at Fig. 3). However, claim 5 requires "that the strip comprises lateral parts that are connected to two contact pads ***in a corresponding row***." Ex. 1001 at 6:44-45 (emphasis added). Tatt, however, fails to teach (and Petitioner does not otherwise contend) lateral parts

connected to two contact pads in "***a corresponding row***"—*i.e.*, the ***same*** row of contact pads. Ex. 1005 at Fig. 3. Instead, Tatt teaches lateral parts connected to two contact pads in ***different rows*** of contact pads. Ex. 1005 at Fig. 3.

Petitioner never identifies this distinction, but merely concludes that "[o]ne of ordinary skill in the art would have been motivated to alter the device of Nobuitsu by providing a strip with two lateral parts, so that the lateral parts could be connected to two contacts pads in a corresponding row, in order to 'reduce the effective resistance of the power paths' and to supply 'higher currents," as taught by Tatt." Pet. at 64. But Petitioner fails to specify ***how*** or ***why*** a person of ordinary skill "would have been motivated to alter the device of Nobuitsu…as taught by Tatt." *Id.* Indeed, as discussed above, Petitioner fails to identify any motivation to combine the two wholly unrelated packaging technologies of Nobuitsu and Tatt. Nobuitsu is concerned with reliability issues relating to internal bonding wire connections in QFPs, *e.g.*, Ex. 1002 at 7, [0003], while Tatt is concerned with structurally dissimilar BGAs, QFNs, and land grid array packages having inner and outer rows of contact pads to increase the number of I/O connections to the die circuitry. Ex. 1005 at Fig. 3, 7, 8, and ¶¶[0004, 0022, 0025, 0026]. Petitioner's only support for its conclusion is the Swaminathan Declaration, which merely repeats the same unsupported attorney argument of the Petition "without a cogent supporting explanation." *Tempur Sealy*, IPR2014-01419, Paper 7, at 7; *compare* Swaminathan Declaration,

Ex. 1007, ¶146 *with* Pet. at 64. Such conclusory testimony should be given no weight. *See* 37 C.F.R. § 42.65(a).

Petitioner's analysis with respect to claim 6 fares no better, as Petitioner provides no evidence to why "a person of ordinary skill in the art would have been motivated to leave the bottom surface of the strip of Nobuitsu exposed, as taught by Tatt," or how such a combination of elements would be accomplished other than the equally deficient Swaminathan Declaration. *Compare* Ex. 1007, ¶149 *with* Pet. at 65-66.

Rather, Petitioner's selection and combination of these dissimilar references uses the '474 Patent as a roadmap to cherry pick different features from the different references and put the pieces together in a manner that would meet the claim limitations. This improper use of hindsight to combine Nobuitsu with Tatt does not render claims 5 and 6 unpatentable. *See Ortho-McNeil Pharm*., 520 F.3d at 1364.

D. GROUND 5: THE PETITION FAILS TO DEMONSTRATE THAT CLAIM 5 IS UNPATENTABLE OVER MIKS IN VIEW OF NOBUITSU AND TATT

Similar to Ground 4, Ground 5 of the Petition alleges that Claim 5 of the '474 Patent is unpatentable over Miks in view of McLellan and Tatt.

As an initial matter, claim 5 depends from independent claim 1. Petitioner contends that Miks either alone or in combination with Nobuitsu, teach all of the limitations of claim 1 for the reasons discussed in connection with Grounds 2 and 3. Pet. at 66. Tatt does not teach or suggest (and Petitioners do not argue otherwise)

any element of claim 1. Accordingly, Ground 5 should be denied for the reasons stated above with respect to Grounds 2 and 3 for failing to demonstrate that the base claim is anticipated by Miks or rendered obvious by Miks in view of Nobuitsu. *Carnegie Mellon Univ*, 2011 WL 4527353, at *5.

With respect to claim 5, Petitioner concedes that Miks "does not disclose a strip comprising lateral 'parts' (plural) that are connected to 'two contact pads' in a corresponding row," Pet. at 66, and, as with Ground 4, contends Tatt "discloses a strip (17b) having two lateral parts, with each lateral part connected to a contact pad, such that the strip is connected to two contact pads." Pet. at 66. However, claim 5 requires "that the strip comprises lateral parts that are connected to two contact pads ***in a corresponding row***." Ex. 1001 at 6:44-45 (emphasis added). Again, Tatt fails to teach (and Petitioner does not otherwise contend) lateral parts connected to two contact pads in "***a corresponding row***"—*i.e.*, the ***same*** row of contact pads. Ex. 1005 at Fig. 3. Instead, Tatt teaches lateral parts connected to two contact pads in ***different rows*** of contact pads. Ex. 1005 at Fig. 3.

Petitioner never identifies this distinction, but merely concludes that "[o]ne of ordinary skill in the art would have been motivated to alter the device of Miks by providing a strip with two lateral parts, so that the lateral parts could be connected to two contacts pads in a corresponding row, in order to 'reduce the effective resistance of the power paths' and to supply 'higher currents," as taught by Tatt."

Pet. at 64. But Petitioner fails to specify ***how*** or ***why*** a person of ordinary skill "would have been motivated to alter the device of Miks…as taught by Tatt." *Id.* Petitioner's only support for its conclusion is the Swaminathan Declaration, which merely repeats the same unsupported attorney argument of the Petition "without a cogent supporting explanation." *Tempur Sealy*, IPR2014-01419, Paper 7, at 7; *compare* Ex. 1007, ¶¶150-152 *with* Pet. at 68. Such conclusory testimony should be given no weight. *See* 37 C.F.R. § 42.65(a).

Rather, Petitioner's selection and combination of these dissimilar references uses the '474 Patent as a roadmap to cherry pick different features from the different references and put the pieces together in a manner that would meet the claim limitations. This improper use of hindsight to combine Nobuitsu with Tatt does not render claims 5 and 6 unpatentable. *See Ortho-McNeil Pharm.*, 520 F.3d at 1364.

E. GROUND 6: THE PETITION FAILS TO DEMONSTRATE THAT CLAIM 11 IS UNPATENTABLE OVER NOBUITSU IN VIEW OF MCLELLAN, MIKS AND/OR CHEN

Ground 6 of the Petition alleges that Claim 11 of the '474 Patent is unpatentable over Nobuitsu in view of McLellan, Miks and/or Chen.

As an initial matter, claim 11 depends from independent claim 1. Petitioner contends that "Nobuitsu in view of McLellan renders obvious all of the limitations of claim 1" for the reasons discussed in connection with Ground 1. Pet. at 69. Chen does not teach or suggest (and Petitioners do not argue otherwise) any element of

claim 1. Accordingly, Ground 6 should be denied for the reasons stated above with respect to Ground 1 for failing to demonstrate that the base claim is rendered obvious by Nobuitsu in view of McLellan. *Carnegie Mellon Univ*, 2011 WL 4527353, at *5.

With respect to claim 11, Petitioner concedes that Nobuitsu "does not, however, disclose 'exactly fifty' contact pads," Pet. at 69, but contends "a person of ordinary skill would have been motivated to modify the package of Nobuitsu to include exactly fifty contact pads in order to utilize the package in connection with a 'single chip package component (such as 4 MB DRAM IC)' having 'fifty leads,' as taught by Chen." Pet. at 70. But Petitioner fails to specify ***how*** or ***why*** a person of ordinary skill "would have been motivated to alter the device of Nobuitsu…as taught by Chen." *Id.* Indeed, as discussed above, Petitioner fails to identify any motivation to combine the two wholly unrelated packaging technologies of Nobuitsu and Chen. Nobuitsu is concerned with reliability issues relating to internal bonding wire connections in QFPs. Ex. 1002 at 6-8, [0002-0006]. Chen, however, is concerned with LOC and BGA packages. Ex. 1010 at 2:65-67. Petitioner's only support for its conclusion is the Swaminathan Declaration, which merely repeats the same unsupported attorney argument of the Petition "without a cogent supporting explanation." *Tempur Sealy*, IPR2014-01419, Paper 7, at 7; *compare* Swaminathan Declaration, Ex. 1007, ¶¶154-157 *with* Pet. at 69-70. Such conclusory testimony should be given no weight. *See* 37 C.F.R. § 42.65(a).

Rather, Petitioner's selection and combination of dissimilar references uses the '474 Patent as a roadmap to cherry pick different features from the different references and put the pieces together in a manner that would meet the claim limitations. This improper use of hindsight to combine Nobuitsu with Chen does not render claim 11 unpatentable. *See Ortho-McNeil Pharm.*, 520 F.3d at 1364.

VIII. CONCLUSION

The Petition has not demonstrated that there is a reasonable likelihood that at least one of the challenged claims is unpatentable. For this reason, the Petition should be denied in its entirety.

Date: April 6, 2017

Respectfully submitted,

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CERTIFICATION UNDER 37 C.F.R. § 42.24(d)

I certify that the foregoing complies with the type-volume limitation of 37 C.F.R. § 42.24 and contains 13,128 words based on the word count indicated by the word-processing system used to prepare the paper, and excluding those portions exempted by §§ 42.24(a) and (b).

Date: April 6, 2017

/Christopher K. Eppich/
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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6, I hereby certify that on this 6th day of April 2017, the foregoing Patent Owner Preliminary Response Pursuant to 37 C.F.R. § 42.107 was served by email, by agreement of the parties, and Exhibits 2001–2002 were served by FedEx, a means at least as fast and reliable as Express Mail®, on the following counsel of record for Petitioners:

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