

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ACCELIGHT TECHNOLOGIES, INC.,
Petitioner,

v.

APPLIED OPTOELECTRONICS, INC.
Patent Owner.

IPR2025-01567
U.S. Patent No. 10,379,301

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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I. INTRODUCTION

Patent Owner's Response is predicated on a fundamental mischaracterization of both the Petition and the July 31, 2025 Memorandum issued by Acting Director Stewart ("Stewart Memorandum"). Contrary to Patent Owner's assertions, the Petition does not rely on "general knowledge" to supply missing claim limitations or otherwise fill gaps in the prior art. Rather, the Petition appropriately relies on expert testimony to explain why the challenged claims would have been obvious to a person of ordinary skill in the art ("POSITA"), including the motivations to combine the teachings of the cited prior-art references.

Patent Owner's arguments improperly suggest that the prior art must disclose every claim element *ipsis verbis* and that expert testimony explaining what a POSITA would have understood from the express disclosures of the prior art is somehow prohibited by the Stewart Memorandum. Neither proposition is correct. The Petition maps every claim limitation to express prior-art disclosures and uses expert testimony only for its proper purpose—namely, to explain the prior-art disclosures and the motivations of a POSITA.

Patent Owner's remaining contentions are also meritless. They consist largely of unsupported attorney arguments that are neither grounded in the cited prior art, nor supported by any expert testimony, and therefore provide no basis to undermine the Petition's obviousness showings.

II. THE STEWART MEMORANDUM’S RESTRICTIONS ON THE USE OF “GENERAL KNOWLEDGE” DOES NOT APPLY HERE

Patent Owner repeatedly invokes the July 31, 2025 Memorandum from Acting Director Stewart (Exhibit 2008) to argue that “general knowledge” cannot supply a “missing claim limitation” in an IPR. *See, e.g.*, POR, 18, 21, 24, 26, 27, 33, 37, 38. This argument misreads both the Petition and the Memorandum.

A. Expert Testimony Explaining Obviousness Is Not “Supplying” a Missing Limitation

Patent Owner conflates two distinct things: using expert testimony to *explain* obviousness under § 103, and using “general knowledge” as a *substitute* for prior art. These are not the same. The Stewart Memorandum targets the latter, i.e., IPR petitions that rely solely on expert opinion, common sense, or applicant-admitted prior art to supply an element found nowhere in any cited reference. Ex. 2008, 1. Obviousness challenges inherently require explaining how a POSITA would have understood a prior art reference’s disclosure as teaching a claim limitation and why a POSITA would have been motivated to combine cited references—these are not prohibited by the Memorandum. *Id.* at 1-2 (citing *Unification Techs. LLC, v. Micron Tech. Inc.*, 2024 WL 3738401, at *7 (Fed. Cir. Aug. 9, 2024) (affirming use of general knowledge in an IPR in the form of expert testimony and AAPA to demonstrate how a skilled artisan would have understood a prior art reference’s disclosure as teaching a claim limitation)). If expert testimony could never be used

to explain prior-art disclosures or provide a motivation to combine, no § 103 case could ever succeed. The Stewart Memorandum cannot reasonably be read to have that effect.

B. The Petition Does Not Rely on “General Knowledge” to Supply Missing Limitations

Contrary to Patent Owner’s assertions, the Petition does not use “general knowledge” through expert testimony to plug holes in the prior art. Rather, **the Petition maps every claim limitation to specific disclosures in the prior art references (Kim, Ho, and Lee)**, and expert testimony only explains what a POSITA would have understood from such disclosures or why combining them would have been obvious. *See, e.g.*, Pet., 22, 24-26, 31, 57, 64-65. The Petition does not use expert testimony to supply missing claim elements. Therefore, the Stewart Memorandum’s specific prohibitions on the use of expert testimony in an IPR are not applicable here.

III. CLAIM CONSTRUCTION IS NECESSARY TO ADDRESS PATENT OWNER’S POSITIONS

Patent Owner challenges only the meaning of “carrier” in its Response, but contends that construction of that term is not needed to decide the Petition. POR, 11-13. Petitioner agrees that “carrier” may be immaterial to the arguments in the Petition because challenged claims 1-4 are unpatentable under both Patent Owner’s plain meaning construction and Petitioner’s construction presented in the district court

(“supporting structure that is contained within the multichannel parallel optical receiving device”). Nonetheless, Patent Owner’s additional claim construction positions for “wire bonding,” “disposed in an end of the carrier,” and “disposed on” merit the Board’s attention and resolution. Contrary to Patent Owner’s argument, Petitioner’s proposed constructions for these terms are not “new” or “improper”; rather, they are necessary to resolve the issues and arguments presented by Patent Owner in its opposition to Grounds 1 and 2. Moreover, Petitioner’s claim construction positions were previously presented in the Petition (Paper 1) and in Petitioner’s Preliminary Reply (Paper 13), so Patent Owner has had ample opportunity to respond to Petitioner’s claim construction positions. Pet., 25-26 (“bonding wire”), 27 and 60 (“disposed in an end of the carrier”), 28-29 and 61-62 (“disposed on”); Paper 13, 1-3.

A. “Bonding Wire” Should Be Given its Plain and Ordinary Meaning as an Electrical Wire Interconnecting Two Components

“Bonding wire” should be given its plain and ordinary meaning as an electrical wire interconnecting two components. Nothing in the ’301 patent or its prosecution history provides a special definition of “bonding wire,” and Patent Owner’s expert offers none that departs from the plain meaning. While Patent Owner criticizes Petitioner’s plain meaning construction as “unreasonable,” nowhere does Patent Owner explain why Petitioner’s plain meaning construction is incorrect or offer an alternative construction. *See* POR, 17. Contrary to Patent Owner’s assertion, the

Board did not narrowly define “bonding wire” in a prior IPR. *Contra* POR, 16-17. Rather, the Board simply found that Soldano—asserted as anticipatory in the prior IPR—did not “expressly or inherently” disclose wire bonding when describing an electrical connection. Ex. 2010, 8. “Bonding wire” should be given its plain and ordinary meaning as an electrical wire interconnecting two components.

B. The Specification and Claim Language Support Construing “Disposed In” to Mean “Disposed At” an End of the Carrier

Although claim 1 recites that the connector is “disposed in an end of the carrier,” Ex. 1001, 4:63-64, the ensuing language in claim 1 recites that the connector is connected to an input end of the AWG, *id.* at 5:2-4. Considering these two limitations together, a POSITA would have understood that the optical fiber connector is connected to the AWG *at* an end of the carrier, which the Petition clearly shows. Pet., 26-30, 60-63. This interpretation is fully supported by the ’301 patent. Ex. 1001, 3:9-14 (“An optical fiber connector 4 may be disposed at **another end of the carrier 8**. ...An input end 61 of the arrayed waveguide grating 6 may be **connected to** the optical fiber connector 4[.]”) (emphases added). Petitioner’s construction thus reconciles the two inconsistent limitations in claim 1—one requiring the connector to be disposed “in” the end of the carrier, and another requiring the connector to be connected to the AWG. Ex. 1003, ¶73 (Petitioner’s expert explaining that “disposed in an end of the carrier” does not mean that the connector is coupled directly to the end of the carrier; rather, it means that the

connector is disposed at an end region of the carrier).

While Patent Owner criticizes Petitioner's construction as "a clear deviation from the plain meaning of claim 1," neither Patent Owner nor its expert provides clarification of the contradictory language in claim 1 or offer an alternative construction. Ex. 2011, ¶86; POR, 19-21. In its Preliminary Response, however, Patent Owner implicitly acknowledged that interpreting "in" to mean "inside" or "within" the carrier is technically nonsensical and thus urged "in" to mean "on." POPR, 22-23. But neither the specification nor the prosecution history supports "on"; rather, the specification supports Petitioner's construction of "in" as "at" the end of the carrier, as Petitioner's expert explained. Ex. 1003, ¶73.

C. "Disposed on" Allows Indirect Placement of the AWG on the Carrier

Patent Owner misconstrues claim 1 as requiring direct placement of the AWG on the carrier. When direct placement is intended, claim 1 expressly states that: "the optoelectronic diodes and the light receiving chip are *disposed directly on* the same top surface of the end of the carrier." Ex. 1001, 4:59-62 (emphasis added). But no such "directly" qualifier appears for the AWG. *Id.* at 4:65-67. That distinction is deliberate: during prosecution, Patent Owner amended "on" to "directly on" for the optoelectronic diodes and light receiving chip to distinguish prior art, but made no such amendment for the AWG. Ex. 1002, 174. Notably, the amendment was compelled by the examiner's finding that "on" permits intervening elements, e.g., "a

book stacked on another book stacked on a table is still ‘on the surface of [the] table’” despite the intervening book, which Patent Owner did not specifically dispute and instead amended the claim to recite “directly on” for the diodes and the light receiving chip (but not the AWG). Ex. 1002, 155-56, 174.

Courts likewise construe “on” to include indirect placement with intervening elements. *Bridgelux, Inc. v. Cree, Inc.*, No. C 06-6495, 2008 WL 3843072, at *10-12 (N.D. Cal. Aug. 15, 2008) (construing “on” as “positioned indirectly or directly above,” just as a package is “on” the table even if there was a tablecloth); *Nitride Semiconductors Co., Ltd. v. Lite-On Tech. Corp.*, No. W-21-CV-00183, 2022 WL 17347782, at *5, 7 (W.D. Tex. Nov. 30, 2022) (plain meaning of “formed on” is “formed directly or indirectly above”). Nor should a direct placement limitation be imported from a preferred embodiment into the claims. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

Thus, “disposed on” should be construed to allow both direct and indirect placement of the AWG on the carrier.

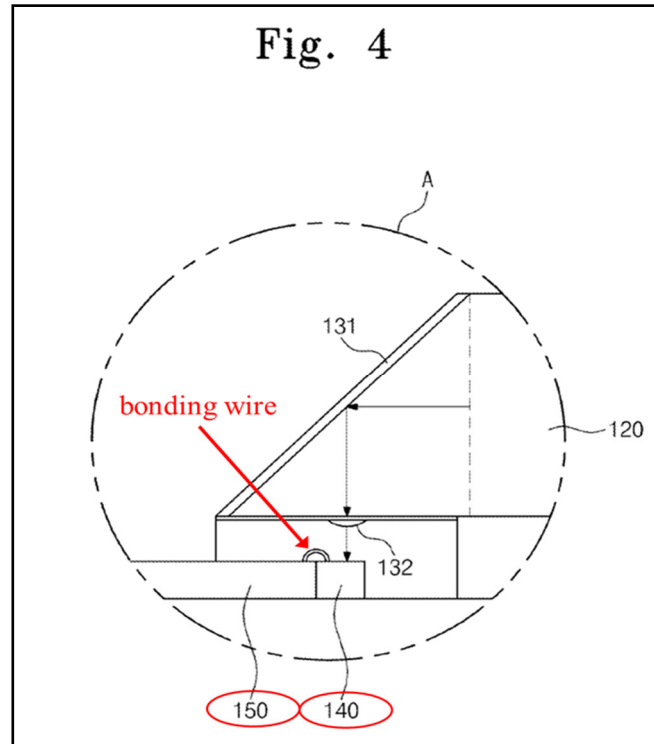
IV. GROUND I: KIM RENDERS CLAIMS 1-4 OBVIOUS

A. Kim Discloses “Bonding Wire”

Patent Owner incorrectly asserts that Kim does not disclose “bonding wire.” POR, 15-19. But Kim discloses that optoelectronic diode 140 and light receiving chip 150 are “electrically connected,” Ex. 1004, ¶[0029], and Kim’s Figure 4 shows

a wire connecting those components, which Petitioner's expert testified is a bonding wire. Ex. 1003, ¶72. This meets the plain meaning of "bonding wire" as an electrical wire interconnecting two components.

Although Patent Owner argues that "[n]either Figure 4 of Kim nor any part of the specification actually identifies a bonding wire[,]" Patent Owner has not provided any expert testimony to refute Petitioner's expert's testimony that Figure 4 of Kim (depicted below) shows wire bonding. Ex. 1003, ¶72 (Petitioner's expert testifying that Kim's Figure 4 shows wire bonding). To the contrary, **Patent Owner's expert admits the electrical interconnection shown in Kim's Figure 4 "could be taken as a bonding wire."** Ex. 2011, ¶82. Thus, Kim's Figure 4, together with Kim's disclosure that "[t]he pre-amplifier 150 is electrically connected to an end of the photodetector 140," sufficiently discloses wire bonding between optoelectronic diode 140 and light receiving chip 150. Ex. 1004, Fig. 4, ¶[0029]; *In re Meng*, 492 F.2d 843, 847 (C.C.P.A. 1974) (a drawing may render an invention obvious).



Pet., 26 (annotated Fig. 4 of Kim, showing an optoelectronic diode 140 wire-bonded to light receiving chip 150)

The Board's analysis of Soldano—a separate prior-art reference asserted in a separate IPR—is inapposite for two independent reasons. First, Soldano was applied as an anticipatory reference, which requires that every claim limitation appear explicitly or inherently in a single reference; Kim, by contrast, is applied as an obviousness reference under § 103, which imposes no such requirement and does not demand *ipsis verbis* disclosure of any claim limitation. Incorporation of the anticipation standard into the obviousness inquiry would conflate two legally distinct analyses. Second, unlike Soldano, Kim includes a drawing (Figure 4) depicting wire bonding between the optoelectronic diode and the light-receiving chip. Thus,

applying the Board’s Soldano reasoning here would compare distinct references under an incorrect legal standard.

In summary, Kim’s Figure 4, together with Kim’s disclosure that optoelectronic diode 140 and light receiving chip 150 are “electrically connected,” discloses the limitation “the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire” of claim 1. Ex. 1004, ¶[0029], Fig. 4; Ex. 1003, ¶72.

B. Kim Discloses an “Optical Fiber Connector Disposed in an End of the Carrier”

Patent Owner argues that Kim’s optical connector 110 is “above” the carrier 180/280 and not “in an end of” it. POR, 19-21. But as discussed in Section III.B, above, the ’301 patent’s own specification supports reading “disposed in an end” as “disposed at an end region.” Patent Owner’s rigid reading would invalidate its own patent claims: first, the ’301 patent’s specification expressly teaches positioning the connector at an end of the carrier, Ex. 1001, 3:9-14; and second, claim 1 recites that the connector is connected to the input end of the AWG—not physically to the carrier, *id.* at 5:2-4 (claim 1).

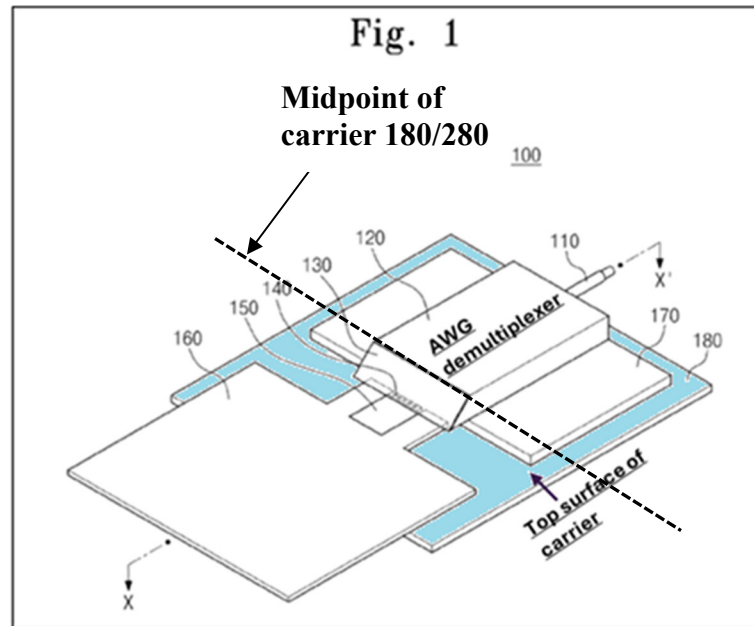
Patent Owner’s assertion that a POSITA would not understand “disposed in an end of the carrier” to mean “disposed at an end region” is unsupported by any explanation from Patent Owner’s expert on how “in the end” can be reconciled with

the specification of the '301 patent. *See* Ex. 2011, ¶86. Petitioner's expert's testimony, by contrast, explains how a POSITA would have understood this claim language consistent with the '301 patent's own disclosure and the surrounding language of claim 1. Ex. 1003, ¶73.

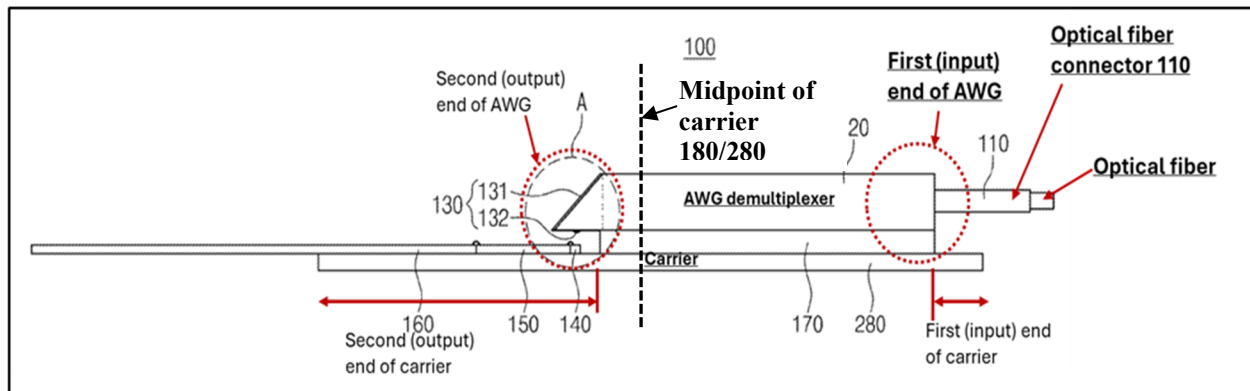
Kim's Figure 3 shows optical connector 110 *at* one end of carrier 180/280, coupled with an input end of AWG 120. Ex. 1004, ¶[0023], Fig. 3. Therefore, Kim meets the "optical fiber connector disposed in an end of the carrier" limitation of claim 1.

C. Kim Discloses that the AWG is Indirectly Disposed on the Top Surface of the Carrier at its Midpoint

As discussed in Section III.C, above, claim 1 does not require direct placement of the AWG on the carrier; rather, indirect placement of the AWG on the carrier is within the meaning and scope of claim 1. The Petition shows that Kim's AWG 120 is *indirectly* disposed on the top surface of carrier 180/280 via supporting part 170, and the top surface (on which the AWG is disposed) defines the midpoint of the carrier. Pet., 28-29. That is, the top surface on which the AWG is disposed is at a midpoint of the carrier. *Id.*; Ex. 1004, Figs. 1 and 3 (annotated below); Ex. 1003, ¶74.



Pet., 29 (annotated Fig. 1 of Kim, showing that AWG 120 is indirectly disposed on a **top surface** of carrier 180/280 that defines a midpoint of the carrier) (annotation added to show midpoint of carrier)



Pet., 29 (annotated Fig. 3 of Kim, showing that AWG 120 is indirectly disposed on a top surface of carrier 180/280 that defines a midpoint of the carrier) (annotation added to show midpoint of carrier)

Kim therefore discloses the AWG “disposed on a top surface of the carrier that defines a midpoint of the carrier” limitation.

D. Kim Renders Claim 2 Obvious

Patent Owner argues that Kim does not disclose claim 2 because Kim’s photodetectors (optoelectronic diodes) 140 and pre-amplifier (light-receiving chip) 150 are not directly disposed on circuit board 160, rather they are disposed on the adjoining carrier 180/280. POR, 25-26. But as the Petition explains, it would have been obvious to a POSITA to position photodetectors 140 and pre-amplifier 150 on the adjoining printed circuit board 160 to reduce the overall size of the carrier and module, consistent with the well-known trend toward smaller, more compact optoelectronic devices. Pet., 34-35; Ex. 1003, ¶¶80, 81. This is a proper obviousness argument based on Kim’s express teachings regarding photodetectors 140, pre-amplifier 150, and circuit board 160 positioned on carrier 180/280. Pet., 36 (showing annotated Figures 2 and 3 of Kim). Dr. Lebby’s expert testimony does not “supply” a missing limitation through general knowledge; rather, it explains why a POSITA, exercising ordinary skill, would have reasonably been able to reposition photodetectors 140 and pre-amplifier 150 on the printed circuit board 160 and would have been motivated to do so to make the module more compact. Ex. 1003, ¶81. Indeed, other prior-art references (e.g., Ho and Lee) expressly teach mounting of photodetectors and pre-amplifiers on circuit boards (instead of directly on a top

surface of the carrier). For example, Ho expressly teaches mounting photodetectors 236 and TIAs 274 (the light receiving chip) on a mounting bar 272, which is a circuit board. Pet., 66 (citing Ex. 1005, ¶¶[0044]-[0046]; Ex. 1003, ¶115). Lee additionally teaches the possibility of mounting its photodiodes on a PLC (planar lightwave circuit) or a mounting board placed on the PLC. *Id.* (citing Ex. 1006, ¶[0013], Fig. 1). Thus, Ho and Lee support relocation of Kim's photodetectors 140 and pre-amplifier 150 to the adjoining printed circuit board 160.

Importantly, Dr. Lebby's testimony that a POSITA would have been motivated to reposition photodetectors 140 and pre-amplifier 150 directly onto adjoining printed circuit board 160 to reduce module size (Ex. 1003, ¶¶80-81) is consistent with — and merely extends — Kim's own stated design philosophy of consolidating components to reduce structural complexity and alignment steps. Ex. 1005, ¶¶[0026]-[0027], [0036]-[0037]. Indeed, repositioning of Kim's already-disclosed elements 140/150 onto the adjoining circuit board 160 is nothing but the routine rearrangement of known parts, not the introduction of a new one. *In re Japikse*, 181 F.2d 1019, 1023 (C.C.P.A. 1950).

E. Kim Renders Claim 4 Obvious

Patent Owner argues that Kim fails to disclose claim 4 because Kim discloses an AWG demultiplexer with an inclined top surface cut at a 45-degree angle rather than 42 degrees. POR, 26-27. But the disclosed 45 degrees is mathematically close

to the claimed 42 degrees. This proximity alone establishes a *prima facie* case of obviousness—courts have consistently held that where, as here, a claimed value does not overlap with, but is *close to*, a prior art value, obviousness is established absent a showing of criticality or unexpected results. Pet., 38-39 (citing, among other cases, *In re Brandt*, 886 F.3d 1171, 1177 (Fed. Cir. 2018); *In re Dreyfus*, 73 F.2d 931, 934 (C.C.P.A. 1934); *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 783 (Fed. Cir. 1985)). The '301 patent makes no showing that the claimed 42-degree angle is critical or generates new or unexpected results. Ex. 1003, ¶83.

Furthermore, the interior angle of the inclined top surface of the AWG is a result-effective variable that affects the reflection of light onto the photodetectors, and optimization of such a variable is squarely within the skills of a POSITA. Ex. 1003, ¶85; Pet., 39-41. A POSITA would have known how to adjust Kim's 45-degree angle through routine experimentation to arrive at 42 degrees to effectively reflect light onto the photodetectors and have minimal signal losses. Ex. 1003, ¶86.

Thus, Kim's express disclosure that an end portion of optical device 130 "may be cut at an angle of 45 degrees," which is close to the claimed 42 degrees—and not the "general knowledge" of a POSITA—renders claim 4 obvious. Ex. 1004, ¶[0034]; Ex. 1003, ¶87.

V. GROUND 2: HO IN VIEW OF LEE RENDERS CLAIMS 1-4 OBVIOUS

A. Ho in View of Lee Discloses “an Arrayed Waveguide Grating Further Disposed on a Top Surface of the Carrier That Defines a Midpoint of the Carrier”

Patent Owner’s arguments that Lee’s PLC 110 is “not an AWG chip” and that Lee’s PLC 110 is disposed on “sub-mount 140 and lens array 200” instead of a substrate miss the mark because the Petition relies on Ho’s disclosure of AWG demultiplexer 235 disposed on Ho’s carrier 238 (instead of Lee’s PLC 110). Pet., 61-63; *contra* POR, 28-29.

1. The Petition relies on Ho—not Lee—for the disclosure of an AWG demultiplexer disposed on a carrier

The Petition unambiguously states that Ho discloses an AWG demultiplexer 235, which is mounted on a carrier 238. Pet., 61 (“Ho discloses an AWG demultiplexer 235 in ROSA 230. In Ho modified in view of Lee, AWG 235 would have been mounted on a sub-mount disposed on a top surface of [Ho’s] carrier 238 that defines a midpoint of the carrier.”) (citations omitted). Patent Owner’s attack on Lee’s PLC 110—arguing it is not an AWG and is not disposed on a substrate—is a red herring that does not address the arguments in the Petition.

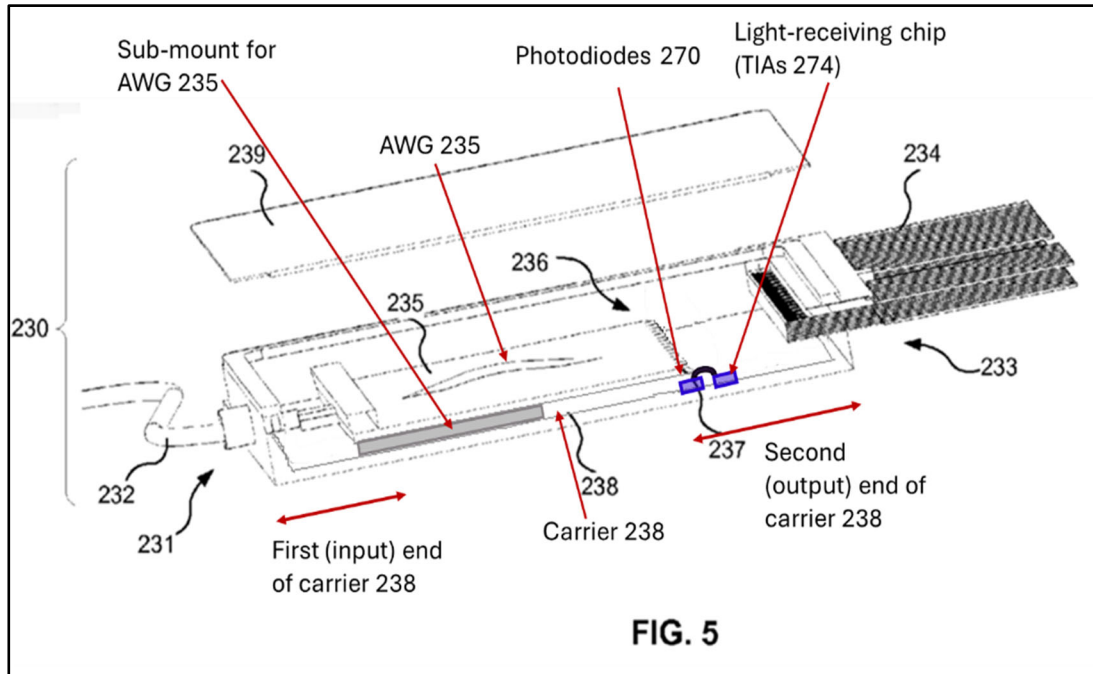
Patent Owner is also wrong on the merits. Lee explicitly states that one application of the PLC is a demultiplexer comprising an arrayed waveguide grating (AWG). Ex. 1006, ¶¶[0008]-[0009]; Pet., 46. Patent Owner’s argument that Lee only

shows a “fiber array” embodiment ignores Lee’s express disclosure of AWG applications.

Patent Owner’s separate argument that the “AWG in Lee is not disposed on the top surface of the carrier” also fails because the Petition relies on Ho’s disclosure of a carrier 238 on which Ho’s AWG 235 is mounted. Pet., 61 (“In Ho modified in view of Lee, AWG 235 would have been mounted on a sub-mount disposed on a top surface of carrier 238 that defines a midpoint of the carrier.”) (citations omitted).

As shown in the modified Figure 5 of Ho (reproduced below from the Petition), Ho’s AWG 235 is mounted on a sub-mount, which sits on carrier 238, thus placing AWG 235 indirectly on the top surface of the carrier at its midpoint.¹ Pet. 62; Ex. 1003 ¶109.

¹ Patent Owner also argues there is no way to mount AWG 235 on carrier 238 “in a way that defines a midpoint of the carrier at the output end of Ho’s AWG 235.” POR, 30. But claim 1 does not require that; instead, claim 1 simply recites that the AWG “is disposed on a top surface of the carrier that defines a midpoint of the carrier.” Figure 5 of Ho (modified in view of Lee) shows that the surface on which AWG 235 is mounted at a midpoint of carrier 238.



Pet., 62 (Figure 5 of Ho modified in view of Lee, showing AWG 235 indirectly disposed on a top surface of carrier 238 at a midpoint of the carrier)

Patent Owner's ancillary objection that indirect mounting of AWG 235 on carrier 238 fails the "disposed on" limitation is wrong because claim 1 does not require direct placement of the AWG on the carrier. *See* Section III.C, above. The Petition shows that Ho's AWG 235 is disposed *indirectly* on the top surface of carrier 238 and the top surface (on which the AWG is disposed) defines the midpoint of the carrier. Pet., 61-63. Thus, Ho in View of Lee discloses the limitation "an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier" of claim 1. Patent Owner's contrary arguments are incorrect, irrelevant, and an improper attempt to rewrite the claim.

2. The combination of Ho and Lee does not render Ho unsatisfactory for its intended purpose

Patent Owner incorrectly characterizes Ho's intended purpose as "minimiz[ing] the size and complexity of the connections," and then argues that providing a sub-mount on Ho's carrier 238 to elevate AWG 235 would "change the principal operation" of Ho by introducing such sub-mount. POR, 30-31. Patent Owner misreads Ho. Ho's core purpose is achieving **high coupling efficiency** between the AWG outputs and the photodetectors—space savings are a secondary benefit, not the intended purpose of Ho. Pet., 47-49; Ex. 1003, ¶¶92-94. Ho expressly states that the direct coupling approach is designed to achieve "a coupling efficiency of 95% or greater" and a high alignment tolerance. Ex. 1005, ¶[0044]; *see also id.* at ¶¶[0006], [0056]. The proposed modification of Ho in view of Lee—which elevates the AWG on a sub-mount and places photodiodes beneath the angled surface of the AWG to directly couple demultiplexed light reflected off the angled surface with the photodiodes—is a simpler and more compact means of achieving Ho's objective: efficient, low-loss optical coupling between the AWG outputs and the photodiodes. Pet., 46-50; Ex. 1003, ¶¶92-94. A POSITA would have recognized that incorporating Lee's teachings into Ho's AWG improves, rather than undermines, Ho's coupling efficiency goal by eliminating Ho's complex passive alignment and by providing a controlled reflection path that precisely directs light onto the

photodiodes. Ex. 1003, ¶¶94-96 (citing Ex. 1005, ¶¶[0047]-[0055]). The combination is not undesirable simply because it adds a sub-mount, nor does it render Ho unsatisfactory for its stated purpose of improving direct coupling efficiency. *See* Pet., 47-49, 65.

3. The Petition does not provide contradictory motivations to combine Ho and Lee

Patent Owner also mischaracterizes the Petition's stated rationale for mounting Ho's photodiodes 270 and TIAs 274 directly on carrier 238, and argues that elevating Ho's AWG 235 on a sub-mount contradicts the purported motivation to reduce sub-mounts for the photodiodes and TIAs. POR, 30-31. As stated in the Petition, Lee teaches mounting its photodiodes and TIAs directly on a substrate. Pet., 54 (citing Ex. 1006, Fig. 2). Based on Lee's disclosure, it would have been obvious to a POSITA to mount Ho's photodiodes 270 and TIAs 274 directly on Ho's carrier 238, which is similar to Lee's substrate. *Id.* The Petition acknowledges that this arrangement taught by Lee would reduce the number of sub-mounts on Ho's carrier and reduce manufacturing costs and complexities. *Id.* But the primary motivation for mounting photodiodes 270 and TIAs 274 directly on carrier 238 stems from Lee's teachings, not the "general knowledge" of a POSITA. *Id.* Nor does the mounting of photodiodes 270 and TIAs 274 directly on carrier 238 contradict the mounting of AWG 235 on a sub-mount because the main purpose of the combination of Ho and

Although Patent Owner argues that the Ho-Lee combination does not meet the “in the end” limitation, neither Patent Owner nor its expert provided an alternative construction of “in the end”—one that differs from Petitioner’s and remains consistent with the ’301 patent’s specification and claims.

C. Use of Lee’s Angled AWG Does Not Change Ho’s Principle of Operation

First, Patent Owner argues that there would have been “no meaningful motivation” to modify Ho in view of Lee’s 45-degree angled AWG surface because Ho teaches its own method of coupling an AWG to photodetectors. POR, 34. But the direct coupling technique of Lee is more effective and reliable than the passive alignment technique outlined in Ho, and therefore a POSITA would have been motivated to combine the teachings of Ho and Lee to improve direct coupling efficiency. Pet., 46-50. Moreover, to establish obviousness, “[i]t’s not necessary to show that a combination is ‘the *best* option, only that it be a *suitable* option.’” *Intel Corp. v. Qualcomm Inc.*, 21 F.4th 784, 800 (Fed. Cir. 2021) (citation omitted; emphases in original); *Intel Corp. v. PACT XPP Schweiz AG*, 61 F.4th 1373, 1381 (Fed. Cir. 2023) (showing “‘improvement’ in a categorical sense” is not required to establish obviousness). Because the combination of Ho and Lee is at least a suitable option, if not the best option, a POSITA would have been motivated to try it. Ex. 1003, ¶94.

Second, Patent Owner argues incorrectly that use of Lee's lens array would change Ho's principle of operation, which is direct coupling without any intermediate optical components, such as lenses or fiber arrays. POR, 34-35. Patent Owner misreads the Petition. **The Petition proposes using Lee's angled-surface reflection technique, not Lee's lens array.** Pet., 52-55. Modification of Ho in view Lee simply entails 1) polishing the output end of Ho's AWG 235 to have an angled/inclined surface, and 2) elevating AWG 235 off carrier 238 to make space for photodetectors 236 underneath the output end of the AWG. *Id.* Nowhere does the Petition require using Lee's lens array in the Ho-Lee combination. Importantly, Patent Owner has provided no expert testimony that Lee's lens array is required for the Ho-Lee combination to work. Nor is "absolute predictability of success" required for an obviousness combination; a POSITA would have had a "reasonable expectation of success" based on Lee's disclosure to try the Ho-Lee combination. *In re Kubin*, 561 F. 3d 1351, 1360 (Fed. Cir. 2009) (citation omitted).

In short, the proposed combination requires modifying the output end of Ho's AWG 235 in view of Lee's inclined surface 111 at a 45-degree angle to vertically reflect demultiplexed light onto Ho's photodetectors 236. Pet., 64-65; Ex. 1003, ¶113. This is a form of direct coupling through reflection because light travels directly from the AWG surface to the photodiode without any intermediate fiber or waveguide. Pet., 47-49. The modification does not require incorporating Lee's lens

array, nor does the Petition suggest doing so. **The proposed combination therefore achieves Ho's intended purpose of direct optical coupling without intermediate fibers, lenses, or waveguides.** *See* Pet., 65 (citing Ex. 1003, ¶113). The Petition specifically explains that Lee's direct coupling technique is a "more effective and reliable" method that "minimizes manufacturing issues and concerns associated with the low tolerance of the passive alignment process outlined in Ho." Pet., 48 (citing Ex. 1003, ¶94). Thus, the Ho-Lee combination does not alter Ho's principle of operation or intended purpose, rather it enhances Ho's direct coupling efficiency and provides a more reliable system. *Id.*

D. Ho in View of Lee Renders Claim 2 Obvious

Contrary to Patent Owner's argument, the Petition does not rely on "general knowledge" for the claim 2 limitation requiring the optoelectronic diodes and the light receiving chip to be directly disposed on the circuit board. This is because Ho expressly teaches mounting photodetectors 236 having PIN-type photodiodes 270 (i.e., the optoelectronic diodes) and TIAs 274 (i.e., the light receiving chip) on a mounting bar 272, which is a circuit board. Pet., 66 (citing Ex. 1005, ¶¶[0044]-[0046]; Ex. 1003, ¶115). Lee additionally teaches the possibility of mounting its photodiodes on a PLC (planar lightwave circuit) or a mounting board placed on the PLC. *Id.* (citing Ex. 1006, ¶[0013], Fig. 1). That is, both Ho and Lee expressly disclose mounting the optoelectronic diodes and the light receiving chip on a circuit

board. As the Petition further explains, a POSITA would have been motivated to mount Ho's photodiodes 270 and TIAs 274 on a circuit board and mount the circuit board on Ho's carrier 238—as expressly taught by Ho—to make the alignment process between the AWG outputs and the photodiodes easier and efficient. Pet., 67-68 (citing Ex. 1003, ¶116). Therefore, the Petition does not improperly rely on “general knowledge” to fill an alleged gap in the prior art; rather, the Petition relies on the express teachings of Ho and Lee and properly uses expert testimony to provide a motivation to modify Ho in view of Lee.

E. Ho in View of Lee Renders Claim 4 Obvious

The Petition's core argument for claim 4, which requires a predetermined angle of 42 degrees at the AWG output end, is rooted in explicit prior art disclosure, not “general knowledge.” Lee expressly discloses an AWG having an inclined surface 111 at a 45-degree angle. Ex. 1006, ¶[0012]. The Petition argues that 45 degrees is sufficiently close to the claimed 42 degrees to render claim 4 obvious, particularly under the well-established Federal Circuit principle that where a prior art value falls within or near a claimed range, obviousness is established absent a showing that the specific claimed value is critical or produces unexpected results. Pet., 69 (citing cases). The '301 patent makes no such showing—it never identifies 42 degrees as critical or producing superior results compared to nearby angles. *Id.* Because the gap between 45 and 42 degrees is only 3 degrees — and the '301 patent

is silent on why 42 degrees matters — a POSITA would have arrived at 42 degrees through routine optimization of a result-effective variable to improve the direct coupling of AWG outputs with the photodiodes. Pet., 69-70; Ex. 1003, ¶¶120, 121. Thus, an angle of 42 degrees is based directly on Lee’s explicit disclosure, not on any improperly imported “general knowledge.”

Furthermore, Lee expressly acknowledges that “45 degrees is the most desirable” but the angle is “not limited to 45 degrees because it is difficult to accurately polish the inclined surface in the actual implementation.” Ex. 1006, ¶[0051]. This language directly signals to a POSITA that angles near 45 degrees are within the expected and routine design range. Thus, the motivation to try angles close to 45 degrees, including 42 degrees, comes directly from Lee, not from the background knowledge of a POSITA.

VI. CONCLUSION

Patent Owner’s criticisms of the Petition’s merits are unsupported, predicated on incorrect claim constructions, or improperly rely on a requirement for *ipsis verbis* disclosure of the claim limitations in the prior art references. Patent Owner also conflates “general knowledge” with expert testimony explaining a motivation to combine/modify the cited references or what a POSITA would have understood from express disclosures in the references—neither of which is prohibited by the Stewart Memorandum. Claims 1-4 of the ’301 patent should be found unpatentable.

Dated: September 1, 2026

Respectfully submitted,

/Arpita Bhattacharyya/
Arpita Bhattacharyya, Reg. No. 63,681
Counsel for Petitioner

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

Pursuant to 37 C.F.R. § 42.24(d), the undersigned hereby certifies that the foregoing **PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE** contains 5,591 words, excluding the parts exempted under 37 C.F.R. § 42.24(c), as measured by the word-processing system used to prepare this paper.

/Arpita Bhattacharyya/

Arpita Bhattacharyya, Reg. No. 63,681
Counsel for Petitioner

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), I certify that on September 1, 2026, a copy of **PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE** was served upon the below-listed counsel by electronic mail:

Jo Dale Carothers - jcarothers@weintraub.com

Eric Caligiuri - ecaligiuri@weintraub.com

Dated: September 1, 2026

By: /Kate Rose/
Kate Rose