UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SUZHOU MOJAWA INTELLIGENT ELECTRONIC CO., LTD.,
Petitioner,

v.

SHENZHEN SHOKZ CO., LTD.,
Patent Owner.

U.S. Patent No. 11,197,084

Case IPR2025-00842

PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE

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EXHIBITS

Exhibit	Description
1001	U.S. Patent No. 11,197,084
1002	File History of U.S. Patent No. 11,197,084
1003	Expert Declaration of Dr. Chris Kyriakakis
1004	CN107454492A ("Li") [Certified English Translation]
1005	CN106937222A ("Liao")[Certified English Translation]
1006	CN202931524U ("Asaka") [Certified English Translation]
1007	JP2008294872A ("Numata") [Certified English Translation]
1008	CN205356672U ("Wang") [Certified English Translation]
1009	CN205017577U ("Xu") [Certified English Translation]
1010	WO 2009/086838 ("Nielsen")
1011	US 2008/0279409 ("Hupkes")
1012	US 7,672,469 ("Dryer")
1013	US 8,515,103 ("Mei")
1014	US 2016/0080853 ("Chen")
1015	US 9,866,966 ("Lott")
1016	US 2018/0316999 ("Bellas")
1017	US 5,987,147 ("Nishimoto")
1018	JP2007189269A ("Nakada") [Certified English Translation]
1019	US 2014/0126742 ("Eggebraaten")

Exhibit	Description
1020	US 8,223,997 ("Wilson, II")
1021	US 8,111,860 ("Retchin")
1022	WO 2008/007666 ("Fujita") [Certified English Translation]
1023	US9253563 ("Fukuda")
1024	Stanley A. Gelfand, *Hearing: An Introduction to Psychological and Physiological Acoustics* (5th ed. 2010)
1025	CN107454492A ("Li") [Original]
1026	CN106937222A ("Liao")[Original]
1027	CN202931524U ("Asaka") [Original]
1028	JP2008294872A ("Numata") [Original]
1029	CN205356672U ("Wang") [Original]
1030	CN205017577U ("Xu") [Original]
1031	JP2007189269A ("Nakada") [Original]
1032	WO 2008/007666 ("Fujita") [Original]
1033	Declaration of Benjamin Mueller
1034	Excerpts of February 28, 2025 Mojawa's Objections and Responses to Shokz's First Set of Interrogatories
1035	U.S. Patent No. 10,306,351 ("Kim")
1036	*Shenzhen Shokz Co., Ltd. v. Shenzhen Wenming Technology Co., Ltd. et al.*, Case No. 1-24-cv-06717 (N.D. Ill.), June 12, 2025 Motion by Mojawa to Stay Pending Resolution of IPR

Exhibit	Description
1037	*Shenzhen Shokz Co., Ltd. v. Shenzhen Wenming Technology Co., Ltd. et al.*, Case No. 1-24-cv-06717 (N.D. Ill.), July 11, 2025 Mojawa Reply in Support of Motion to Stay Pending Resolution of IPR
1038	Northern District of Illinois Judicial Caseload Profile, https://www.uscourts.gov/sites/default/files/document/fcms_na_distprofile0331.2025.pdf
1039	Docket Navigator Judge Jorge L. Alonso Profile
1040	*Shenzhen Shokz Co., Ltd. v. Shenzhen Wenming Technology Co., Ltd. et al.*, Case No. 1-24-cv-06717 (N.D. Ill.), District Court case docket (accessed August 31, 2025)
1041	Rebuttal Expert Declaration of Dr. Chris Kyriakakis

I. INTRODUCTION

The Petition (Paper 1, "Pet.") established that the Challenged Claims, directed to features that are routine engineering change from Patent Owner's prior patents, are unpatentable. The Board found Petitioner is likely to prevail. Institution Decision (Paper 15, "ID"), 71. Patent Owner's Response (Paper 22, "POR") does not alter this conclusion.

II. CLAIM CONSTRUCTION

Patent Owner argues the claim terms have a plain and ordinary meaning. POR 9. The Board need not construe any terms to decide the issues here. *See Realtime Data LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019).

A. "elastically abutted against" (Element 1[c])

Patent Owner's "plain and ordinary" construction of the phrase "*the core housing being … elastically abutted against the protective sleeve*" (Element 1[c]) adds words that are not present in the claim. Claim 1 does not specify that "an end surface of the core housing [is] in contact with the protective sleeve under an elastic force" as proposed by Patent Owner, POR 13-14, but rather "the core housing" is elastically abutted against the protective sleeve.

Patent Owner's construction also contradicts the patent specification, which discloses that the protective sleeve elastically abuts with the core housing at locations other than an "end surface." EX1001, 13:54-58 (the annular boss 162 of

the protective sleeve 16 elastically abuts the connecting slope 24 of the core housing 20), 13:42-53, (the connecting slope 24 "[connects] the outer end surface 21 of the core housing 20 and the inner sidewall of the socket 22," and is "not on the same plane" as the outer end surface 21), 12:29-34 (disclosing an outer sidewall of one component being "abut[ted] against" the inner sidewall of another), FIG 6.

Patent Owner's suggestion that "elastically abutting" requires a waterproof relationship, POR 13, ignores the doctrine of claim differentiation. Claim 10, depending from claim 1, recites "when the core housing and the first plug end are fixed, the protective sleeve elastically abuts against the core housing to realize sealing." EX1001, 37:61-67 (claim 10). Construing "elastically abutting" to require a waterproof seal would render this additional language superfluous. *Beachcombers v. WildeWood Creative Prods., Inc.*, 31 F.3d 1154, 1162 (Fed. Cir. 1994) (rejecting "presumptively unreasonable" interpretation that would give independent claim the same scope as dependent claim).

Petitioner shows that Element 1[c] would be known or suggested even under Patent Owner's proposed construction. No construction of this phrase is warranted. *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

B. "the control circuit or the battery driving the earphone core to vibrate" (Element 1[d])

Patent Owner belatedly seeks dismissal of the IPR, arguing Petitioner's claim construction in the IPR contradicts what it proposed in the parallel district court proceeding. POR 82-84. Patent Owner already presented, and the Director already ruled on, discretionary denial issues. *See* Paper 9 (Patent Owner Discretionary Denial Brief); Paper 14 (Director's Decision referring petition to panel for "merits and other non-discretionary considerations"). The Board should decline Patent Owner's invitation to revisit these issues. *See Savant Techs. LLC v. Feit Electric Co., Inc.*, IPR2024-01357, Paper 69 at 8-10 (PTAB April 9, 2026) (authority to grant discretionary relief resides exclusively with Director).

Patent Owner's contradictory claim construction argument is incorrect. Petitioner argued both in the district court and in the Petition that Element 1[d] should have a plain and ordinary meaning. *Compare* EX2023, 17-20 ("or" should be given its "plain meaning") *with* Pet. 6-7 (claim terms other than claim 5 "should be construed according to their plain and ordinary meaning"). In the district court, Petitioner sought a construction of Element 1[d] as being "either the control circuit or the battery, but not both, driving the earphone core to vibrate," EX2023, 17, to refute Patent Owner's construction that would permit both the control circuit and battery to drive the earphone core. *See id*., 19.

Patent Owner erroneously relies upon incomplete deposition testimony of Dr. Kyriakakis (Petitioner's technical expert) to support its "contradictory" construction argument. Dr. Kyriakakis's testimony, however, confirms Petitioner's construction of Element 1[d] was faithfully applied. *Compare* Petition 35-37; EX1003, ¶136 *with* EX2021, 65:3-71:14, 66:3-19, 67:4-10, 69:14-70:7, 70:9-71:14, 68:22-69:6 (explaining that Li's control circuit drives the earphone core to generate sound, while the battery powers the components). Dr. Kyriakakis further explained that, while Li's control circuit drives the earphone core, Element 1[d] does not exclude both a control circuit and a battery in the claimed loudspeaker apparatus. EX2021, 70:9-71:14 (explaining that the battery powers components, but does not drive acoustics). This is consistent with Petitioner's claim construction in the district court.

Patent Owner's request to dismiss the Petition should be rejected. Unlike *Revvo Techs., Inc. v. Cerebrum Sensor Techs., Inc.*, IPR2025-00632, Paper 20 (Director Nov. 3, 2025) (precedential), Petitioner did not adopt Patent Owner's claim construction or apply a broader construction in the IPR. Rather, Petitioner applied the same construction. The reasoning in *Tesla, Inc. v. Intellectual Ventures II LLC*, IPR2025-00340, Paper 18 (Director Nov. 5, 2025) (informative), is applicable here. There, the petitioner proposed a "plain and ordinary meaning" for a term it argued was indefinite during litigation. *Id*., 2. The Director indicated that

an explanation for the different positions may be sufficient "if Petitioner had shown that, notwithstanding the alleged indefiniteness of the claim term, an ordinarily skilled artisan would understand that the asserted art satisfies the claim limitation." *Id*., 3-4. That is the situation here, as Patent Owner concedes Li discloses Element 1[d] under either construction.

III. GROUND 1: LI-FUJITA RENDERS CLAIM 1 OBVIOUS

A. The Li-Fujita Combination is Proper

Patent Owner wrongly attempts to create a "deterrence" to combining Li (EX1004) and Fujita (EX1022) by narrowly reading the references, while ignoring the capabilities of a POSITA.

The goal of bone conduction earphone design is maximizing vibration transfer while maintaining user comfort. EX1041 (Kyriakakis Reply Decl.), ¶5. Li provides a structural framework for a "bone conduction earphone" with a flexible/bendable ear hook. EX1004, ¶¶[0003]-[0005]. Fujita is directed to "efficiently" transmitting vibrations to the user's skin. EX1022, ¶¶[0007]-[0008]. Fujita teaches that a convex vibration transmitting part is preferred for making secure contact with the skin, thereby achieving the "most effective vibration transmission." EX1022, ¶¶[0032]-[0034].

A POSITA seeking to optimize Li would naturally consider Fujita's structure to achieve effective vibration transmission. Integrating Fujita's convex

contact surface into Li's housing—which is designed for users to "hang. . .on their ears" (EX1004, ¶[0025])—is a predictable improvement that addresses the known challenge of maintaining efficient acoustic coupling in wearable devices. EX1022, ¶¶[0032]-[0034].

1. Li's Elastic Materials and Internal Structures Resolve the Technical Challenges for Waterproofing

Patent Owner argues that Fujita's speaker requires an "open gap" to vibrate, which would negate the waterproofing required by Li. POR 15-22. This wrongly presumes that (1) the purported "open gap" is indeed an open area in the design, and (2) a POSITA would be incapable of implementing basic sealing techniques, such as suggested by Li. EX1041, ¶¶8, 9.

Patent Owner argues that a putative "gap between cushion (16) and casing (2) is needed to allow and accommodate the vibration motion of the cushion." POR 18. This is at odds with Fujita's disclosure, which (1) never states the term "gap" in relation to any structure, much less the cushion 16, and (2) contemplates a fixed and rigid fit of the cushion 16 between the positioning hole and boss to reduce secondary vibration. EX1022, ¶[0028]. A POSITA would have understood that any "gap" is filled with a rubber gasket or stopper to reduce secondary vibration, and that such gasket/stopper would be watertight. EX1041, ¶8.

Moreover, Li discloses a housing with an "elastic coating layer" (1132 or 122) made of "silicone" or "rubber." EX1004, ¶¶[0028], [0058]. This elastic layer is a waterproof diaphragm. EX1041, ¶9. The silicone layer would be extended over the interface between the housing and the vibrating speaker, to maintain a "watertight" seal while allowing Fujita's speaker to vibrate freely. *Id*. This modification involves routine application of Li's teachings (silicone/rubber) to a standard engineering challenge. *Id*.

Li further discloses an internal "waterproof lining board" (143) in "elastic contact" with the inner walls to protect electronic components. EX1004, ¶[0071], Fig. 14. This internal redundancy demonstrates that Li's design is intended to be resilient, and minor mechanical adaptations required to house a Fujita-style speaker would not "deter" a POSITA in managing internal moisture protection. EX1041, ¶10.

Nor do Fujita's vibration mechanism and the convex contact surface require an unsealed air gap, as argued by Patent Owner. POR 17-22. A POSITA would also have modified Fujita's structural "hinge" (25a, 25b) with waterproof seals, to seal any "gap" between cushion (16) and casing (2) to integrate into Li's waterproofed system, as routine engineering. EX1041, ¶11.

2. Li's Leakage-Cancellation Teachings Negate Patent Owner's Leakage Concerns

Patent Owner argues the combination results in "unacceptable sound leakage" (POR 22-23), which ignores Li's design addressing sound leakage. Li discloses "strip-shaped sound holes" (1151) positioned on the housing to "interfere with the sound leakage waves" and "reduce the sound leakage." EX1004, ¶¶[0050]-[0051]. Li's acoustic architecture manages and cancels leakage through phase interference. *Id*. A POSITA would mitigate any incidental leakage resulting from an optimized speaker (like Fujita's) by using Li's sound-hole and acoustic-cavity techniques. EX1041, ¶12. Patent Owner's argument that a POSITA would be "deterred" by sound leakage ignores Li's teachings.

The Li-Fujita combination is a straightforward marriage between a wearable framework and an optimized acoustic transmitter. Patent Owner's arguments regarding waterproofing and leakage presume a POSITA would have engaged in a rote "cut-and-paste" exercise, while ignoring Li's teachings of elastic materials and acoustic cancellation.

B. Claim 1: An Ear Hook With First and Second Plug Ends (Element 1[a]) Would Have Been Obvious

1. Li Does Not Teach Away From an Ear Hook With First and Second Plug Ends

Patent Owner argues Li teaches away from adding a plug at each end of connecting component 113. *See* POR 27-36. Nothing in Patent Owner's Response

should disturb the Board finding Li does not "criticize, discredit, or otherwise discourage" using a plug to connect a housing to connecting component 113. *See* ID 47-48, quoting *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1327 (Fed. Cir. 2009).

(a) Structural Stability and Integrity Concerns Do Not Negate Obviousness

Adding first and second plug ends to Li's ear hook is not "in contradiction to" or "incompatible with" Li's disclosure as Patent Owner argues. POR 27-29, 33-36. Li discloses "a variety of ways to connect components in a bone conduction earphone but does not appear to 'criticize, discredit, or otherwise discourage' any of those ways." ID 48 (citing*, e.g.*, EX1004, ¶¶ 29, 35, 44–45, 58–59, Figs. 2, 9; EX1003, ¶¶ 57, 117, 121).

Patent Owner wrongly argues that "[i]nterchangeability is inconsistent with Li's adhesive-based or locked plug connections." POR 33-35. Li discloses that these connections are "optional[]," EX1004, ¶60, and do not render Li incompatible with interchangeability. EX1041, ¶14; EX2021, 79:2-18. Just the opposite is true. EX1004, ¶59 (plug in portion 123 facilitates later wiring); *id*. Li also discloses locked plug connection, which can be made with reversible or removable structure such as a wedge or pin. EX1004, ¶[0061]; EX1041, ¶14. But these types of connections are not incompatible with interchangeability. EX1041,

¶14. "Interchangeability" is one of several reasons (e.g., simplified manufacturing and reduced costs) for adopting the modular construction achieved with first and second plug ends (*see* Pet. 25-30; EX1041, ¶14)—which are not addressed by Patent Owner.

(b) Waterproofing Concerns Do Not Negate Motivation to Include Plug Ends

Patent Owner raises "waterproofing concerns" to argue against the obviousness of modifying Li to include first and second plug ends. POR 30-33. This argument overlooks a "given course of action often has simultaneous advantages and disadvantages, and this does not necessarily obviate motivation to combine." *Medichem, S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed Cir. 2006).

Patent Owner argues against the modification it made to transition from Li's arrangement to the arrangement claimed in the '084 patent. "Waterproofing concerns" did not deter Patent Owner from adopting the claimed modular arrangement. *See* Pet. 27 (citing EX1001, 11:66–12:11, 16:29–40; EX1003, ¶119). Nor would it have deterred a POSITA, familiar with waterproofing techniques, including using elastomeric sealing materials between adjoining components. EX1041, ¶15. A POSITA would have been motivated to modify Li's ear hook to include first and second plug ends to achieve the benefits of modularity, including those disclosed by Li, namely "simplifying the structure, … facilitating later

wiring, and reducing costs," EX1004, ¶[0059], notwithstanding risk of water infiltration. EX1041, ¶15.

2. A POSITA Would Have Been Motivated to Modify Li to Include First and Second Plug Ends

Patent Owner's criticism of modular prior art references, POR 35-41, fails to address "whether a skilled artisan would have been motivated to combine Li's teachings with the skilled artisan's knowledge about the benefits of modular component design." ID 51 (citing *Koninklijke Philips N.V. v. Google LLC*, 948 F.3d 1330, 1338 (Fed. Cir. 2020)). Nor does Patent Owner explain away the reasoning to modify Li to add a plug at each end of connecting component 113, i.e., to obtain the well-known benefits of modular component design. ID 47.

Knowledge of a POSITA may be relied upon to establish obviousness. *See* ID 47-48 (citing *Philips*, 948 F.3d at 1337–38); *see also Randall Mfg. v. Rea*, 733 F.3d 1355, 1362 (Fed. Cir. 2013) (POSITA's knowledge is "'part of the store of public knowledge that must be consulted"). A POSITA's knowledge regarding modular construction provided a "reason to combine the known elements in the fashion claimed by the patent at issue." *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (2007); *see also Randall*, 733 F.3d at 1356, 1362.

The choice to locate modular connections at the two ends of the ear hook is not "arbitrary" as Patent Owner argues. POR 27-28. A POSITA would have

understood there to be finite places to locate modular connections in a loudspeaker apparatus to best achieve the benefits of modular construction, among which are the ends of the ear hook. EX1041, ¶16.

In a bone-conduction earphone, the ear hook mechanically supports the core housing (containing the speaker) and the circuit housing (containing the battery or control circuit). These two junctions are the natural points for modular separation because they are where the ear hook interfaces with the functional modules. EX1041, ¶¶17-18. A POSITA, seeking to gain the well-known benefits of modular design (e.g., simplified manufacturing, component replacement, cost reduction), would recognize that adding plug ends at these two interfaces is an obvious and predictable solution, not an inventive leap. Pet. 25-26; EX2021, 63:1-12; EX1041, ¶17; *KSR*, 550 U.S. at 421.

Patent Owner's argument that the Petition's reference to the modular prior art contravenes 37 C.F.R. § 42.104(b)(4) and the reasoning in the July 31, 2025 Director Memo, POR 41-44, misses the mark. The Board has already determined Petitioner complied with Rule 42.104. ID 20. The modular prior art cited in the Petition are prior art patents and, therefore, fall outside of the definition of "general knowledge" in the Memo. *See* July 31, 2025 Director Memo 1. The Petition is consistent with the Director's Memo because it uses the modular prior art and

expert testimony to demonstrate knowledge of a POSITA and support a motivation to combine. *See* July 31, 2025 Director Memo 1; ID 21-24, 49-52.

3. No Secondary Considerations of Nonobviousness

Patent Owner provided no evidence of secondary considerations of nonobviousness, much less any evidence directed to ear hook plug ends. Patent Owner's hindsight argument, *see* POR 29, is undercut by the absence of such evidence. *See* ID 52; *see also Cheese Sys., Inc. v. Tetra Pak Cheese & Powder Sys., Inc*., 725 F.3d 1341, 1352 (Fed. Cir. 2013).

C. Claim 1: Li Discloses the Core Housing Being Elastically Abutted Against the Protective Sleeve (Element [1c])

Patent Owner incorrectly argues "there is nothing in Li to suggest that Li's elastic coating layer 122 is elastically compressed against the housing 111 ('***elastically*** abut')." POR 44-50. As the Board found, Li teaches a housing "elastically abutted against the protective sleeve." ID 58, 62 (citing EX1003, ¶¶131-133; EX1004, ¶[0058], FIGS. 2, 3, 5, 9, 10; Pet. 33-35). "[T]he second elastic coating layer 122 is a silicone layer" and "can also be a rubber layer or a latex layer, or a composite material layer including silicone" (EX1004, ¶[0058]; EX1003, ¶132), which is protective waterproof covering. *See* EX1003, ¶127.

Li discloses the second elastic coating layer 122 abuts a housing when "'plug-in portions 123 are respectively connected and fixed to the first housings 111 of the two ear hook assemblies 11.'" ID 59 (quoting EX1004, ¶[0058] and

citing EX1004, Figs. 2, 3, 5, 9, 10). The Board found "Li's Figure 10 (reproduced below) shows second elastic coating layer 122 with end portions extending over each plug-in portion 123 and abutting first housing 111 or third housing 114 (or both) when plug-in hole 1111 in first housing 111 receives plug-in portion 123." ID 59; EX1001, FIG. 10. Patent Owner asks the Board to disregard what is taught by Li's figures (Pet. 47), but in doing so ignores that "[a] reference may be read for all that it teaches." *In re Mouttet*, 686 F.3d 1322, 1331 (Fed. Cir. 2012).

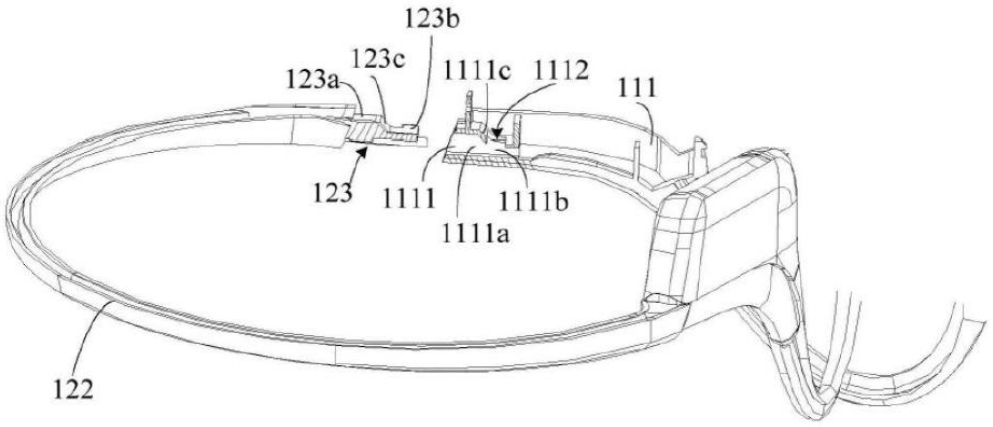


Figure 10

EX1004, FIG. 10

The second elastic coating layer 122 elastically deforms when abutting the housing. EX1041, ¶21. Li discloses the plug-in portion 123 and the plug-in hole 1111 are configured for a "tight fit" between them so that "the rear hook can be effectively connected to the ear hook." EX1004, ¶¶[0063]-[0064]; EX1041, ¶21. Li discloses the plug-in portion 123 fully occupies the plug-in hole 1111 when inserted. EX1004, FIG. 10 (annotated below). A POSITA would understand that

the second elastic coating layer 122 compresses against the end of plug-in hole 1111 of housing 111 to effect the tight fit therebetween and account for ordinary engineering tolerances. EX1041, ¶21.

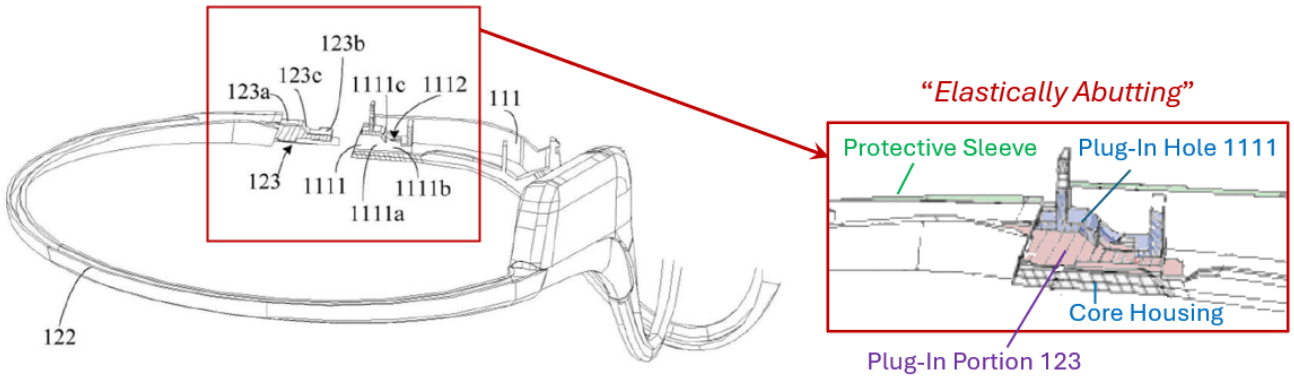


Figure 10

EX1004, FIG. 10 (annotated)

The Li-Fujita combination follows the same elastically abutting relationship described in the '084 patent. EX1041, ¶22. The annular abutting surface 161 and annular boss 162 of the protective sleeve 16 are in interfering relationship with the core housing 20 such that the sleeve is compressed when it elastically abuts against the core housing (EX1001, 13:54-58), which is the same way the Li-Fujita combination would elastically deform. EX1041, ¶¶21-22.

Patent Owner mischaracterizes the modification of Li's ear hook to include first and second plug ends by arguing "once the connecting component 113 is segmented to accommodate the plug ends, any purported abutting—elastic or otherwise—would be between the ends of the elastic coating layer, and not against

the core housing." POR 50-52. Li's housing (third housing 114) elastically abuts against the protective sleeve (second elastic coating layer 122), and it would be obvious to replicate the same plug-in portion 123 design at the first plug in location (Element 1[a])—to "yield the core housing (Li's second and fourth housing 112, 115) being fixed to the first plug end *and elastically abutted against the protective sleeve* over Li's connecting component 113 (*ear hook*)." Pet. 34; EX1003, ¶132.

IV. GROUNDS 2–5 DEMONSTRATE OBVIOUSNESS OF THE CHALLENGED DEPENDENT CLAIMS

A. Petitioner Showed Claims 12 and 13 Are Not Patentable

Patent Owner argues the Petition does not identify a deficiency in the Li-Fujita combination that would prompt a combination with Fukuda for claims 12-13 (POR 53-54). But the Petition explains that such a combination would improve the speaker in the Li-Fujita earphones with Fukuda's vibration mechanism to achieve an efficient, high-quality sound and simple construction. *See e.g.,* Pet 42-45 (citing EX1003, ¶¶146-150).

Both the Li-Fujita-Fukuda combination and the Li-Fujita combination render claims 12-13 obvious. The Li-Fujita combination discloses elements [12a], [12b] and [13a], and a POSITA would have been motivated to combine them. The Board should consider the Li-Fujita combination as part of Ground 2 with respect to these claims. *See Polygroup Ltd. MCO v. Willis Elec. Co.*, 759 F. App'x 934, 942-943 (Fed. Cir. Mar. 28, 2019).

B. A POSITA Would Have Incorporated Fukuda's Modular Driver into Li to Render Claim 14 Unpatentable

Contrary to Patent Owner's argument (POR 54-55), the Petition identifies specific Fukuda structures corresponding to each element of claim 14. For element [14a], the Petition maps Fukuda's "voice coil 13" and "magnetic circuit system" (comprising center pole 12, yoke 11, and magnets 14) to the claimed "earphone core" and "magnetic circuit system," and explains how a POSITA would replace Fujita's piezoelectric element with Fukuda's modular driver unit. Pet. 50-51. For element [14b], the Petition provides a geometric analysis, explaining that the "axis" of Fukuda's coil is perpendicular to its "radial plane" (EX1023, Figure 1). The Petition identifies the "normal line" defined by the contact surface of Fujita's housing panel (cushion 16), and it explains that because Fujita's contact surface is angled and "non-planar," the axis of the substituted Fukuda driver would predictably "not be parallel to the normal line" of the Fujita housing. Pet. 51-54.

Patent Owner argues precise assembly details for the combination are required, while ignoring how Fukuda's teachings would be considered. Fukuda's magnetic driver is an "independent unit," "simple in construction," and is intended for use in various devices. EX1023, 3:23-28. A POSITA, motivated by the desire to produce efficient, high-quality sound at reduced manufacturing cost, would have placed Fukuda's unitary driver within Fujita's housing, with expectation of

success. EX1041, ¶23. Patent Owner ignores the ability of a POSITA to place a standard magnetic transducer (Fukuda) into a known speaker housing (Fujita) to improve contact geometry.

C. Fukuda's Magnetic Driver is Compatible with Fujita's Acoustic Interface and Provides Predictable Benefits

1. Fujita Teaches a Convex Contact Interface

Patent Owner argues (POR 55–63) that linear vibration of Fukuda's magnetic driver would "destroy" the "key benefit" of Fujita's speaker, which Patent Owner claims requires rotational or hinged vibration. Fujita's primary objective, however, is "efficiently" transmitting vibration to the user by ensuring "accurate contact with the face." EX1022, ¶¶[0007]-[0008]. Fujita's "convex vibration transmitting part" (cushion 16) provides such contact by minimizing vibration loss at the contact point. S*ee* EX1022, ¶¶[0008], [0032]-[0034], and [0037].

This convex geometry provides an improved acoustic interface whether the internal driver moves linearly or rotationally. EX1041, ¶¶24-27. Contrary to Patent Owner's argument, substituting Fukuda's magnetic driver for Fujita's piezoelectric element would not "destroy" the benefit of the convex contact surface; rather, it would provide a cost-effective and leakage-resistant method of driving that contact surface. *See* EX1023, 3:23-28; EX1041, ¶¶26, 27.

Fujita's convex interface provides acoustic benefits whether the driving force is rotational (Fujita's piezoelectric implementation) or linear (Fukuda's magnetic driver). EX1041, ¶27. For certain frequencies, a linear piston-like motion of a magnetic driver provides more consistent amplitude control and lower distortion as compared to a rotational drive of a piezo driver. *Id*. The Li-Fujita combination maintains Fujita's beneficial convex interface. *Id*.

2. Adaptation to Driver Motion Involves Routine Engineering

Patent Owner argues the combination would be "ineffective" because linear and rotational motions are incompatible. POR 63. It ignores the modular nature of Fukuda's unitary driver, which is readily incorporated into a bone conduction device. EX1023, 3:23-28.

Any modification to internal mounting structures of the Li/Fujita housing to accommodate the vertical axis of Fukuda's magnetic circuit would have been trivial. EX1041, ¶29. Fukuda's vertically-aligned coil and magnets provide a compact footprint compatible with Li's housing structure. *Id*. The transition from a "hinge-like" drive to a "piston-like" drive is a matter of design choice using known components for their established functions. *Id*.

A POSITA would have recognized that accommodating differences in the convex surface's displacement profile between linear and rotational drivers—e.g., uniform amplitude across the surface vs. amplified displacement at the vertex—as

within the routine optimization that occurs when substituting one known driver type for another. *Id*. The convex interface remains effective in both scenarios, and any frequency-response differences can be adjusted through conventional driver tuning (e.g., coil mass, magnet strength, or suspension stiffness). *Id*.

3. Motivation to Use Fukuda's Driver Includes Efficient Performance and Reduced Cost

Patent Owner wrongly argues there is no reason to substitute "Fujita's piezoelectric element 2 with Fukuda's magnetic driver." POR 61. The Petition provides ample rationale, including that Fukuda's driver offers "efficient, high-quality sound" and low manufacturing cost. Pet. 42-43. In consumer electronics, magnetic speaker drivers offer easier frequency tuning and higher fidelity as compared to piezoelectric drivers. EX1041, ¶30.

The motivation to integrate Fukuda's driver into Li's wearable, consumer-oriented framework responds to the need for mass-producible, high-fidelity bone conduction devices. *Id*. Ground 2 is based on a reasoned engineering synthesis underpinning the combination of advantageous interface (Fujita) and driver (Fukuda) arrangements for the wearable platform (Li).

D. Motivation to Combine Fukuda's Magnetic System with Li-Fujita

Patent Owner argues that the references fail to support a motivation to replace Fujita's piezoelectric driver. POR 63-67. This ignores Liao, Xu, Nielsen, and Nakada's teachings, which demonstrate an industry-wide drive to optimize

magnetic circuit systems to improve sound quality, construction, efficiency, and reduce cost.

1. Liao Discloses Technical Objectives for Optimizing Sound Quality Through Magnetic Materials

Patent Owner argues that Liao (EX1005) does not provide any "piezo-to-magnet" comparison (POR 63-67), but it ignores Liao's express teachings that, in bone conduction speaker design, "high-density permanent magnets... can achieve better sound quality." EX1005, ¶[0053]. A POSITA, seeking to improve "sound quality" of bone conduction earphones (such as Li), would have considered specific magnetic circuit designs to achieve that goal. EX1005, ¶¶[0052]-[0053]. And, a POSITA would have chosen Fukuda's magnetic driver over a piezoelectric one to improve sound quality and enhance fidelity. EX1041, ¶31.

2. Xu, Nielsen, and Nakada Establish Industry-Wide Motivation to Optimize Magnetic Circuits for High Sensitivity and Efficiency

Patent Owner wrongly contends that Xu (EX1009), Nielsen (EX1010), and Nakada (EX1018) are irrelevant because they describe improvements over prior magnetic systems rather than piezoelectric systems. Pet. 64-65. These references establish that magnetic circuit technology was the subject of intense optimization to solve problems like "low sensitivity" (EX1009, ¶¶[0002]-[0003]), reduced distortion (EX1010, 9:20-29), "weak" electromagnetic force, and "low output efficiency" (EX1018, ¶¶[0003]-[0004]).

These references would have motivated a POSITA to use a magnetic, rather than piezo, driver. That the art was actively perfecting magnetic circuits for sensitivity and fidelity provides very "relevant reasoning" for incorporating Fukuda's modular, high-efficiency magnetic driver into the Li-Fujita framework. EX1041, ¶32.

3. Fukuda's Modular Design Offers Independent Benefits

Patent Owner argues that Fukuda's benefits are tied to its system "as a whole." POR 65-67. However, Fukuda's modular driver is optimized for low manufacturing cost and "minimized sound leakage," which align with the consumer-electronic objectives of the Li headset. EX1023, 3:23-28; EX1041, ¶33. The substitution of Fukuda's modular driver for Fujita's therefore involves the routine application of a highly-refined component to a wearable platform to achieve predictable improvements in manufacturing and acoustic performance. *Id*.

E. Ground 4: The Li-Fujita-Numata Combination Renders Claims 7-10 Obvious

Patent Owner's argument that the Petition's Li-Fujita-Numata combination "results in a permanently unusable device," POR 67-73, is incorrect. The possibility that a Numata plug may permit the earphone to be installed upside down does not render the device "permanently' unusable. EX1041, ¶35. Unremarkably, a POSITA would have flipped the component around, with an understanding that known techniques would simplify assembly of both the left and

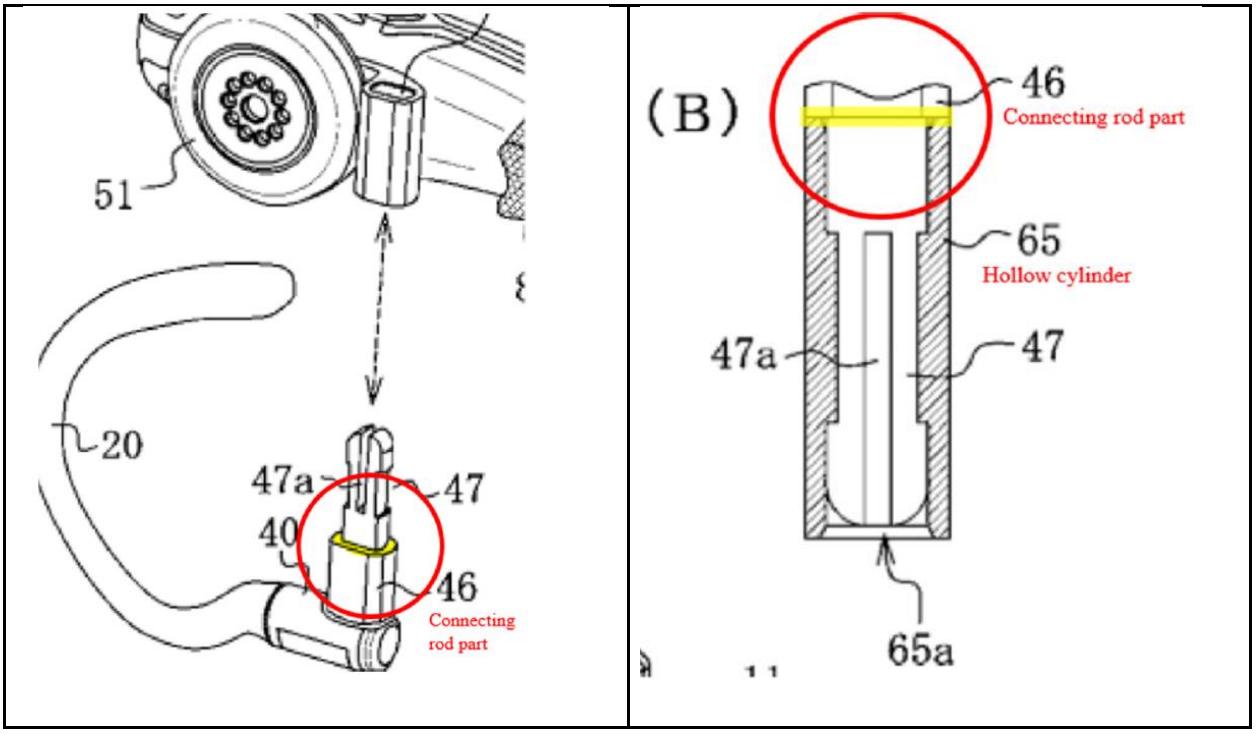
the right earphone. *Id*. A POSITA would have recognized that manufacturing errors can be prevented through routine engineering, such as by simple keying or asymmetric geometries design to prevent reverse insertion. *Id*. Any purported installation risk is neither insurmountable nor sufficient to discourage the combination, especially given the undisputed benefits of secure fit and wear resistance. EX1041, ¶37; *see Uber Techs., Inc. v. X One, Inc.,* 957 F.3d 1334, 1341 (Fed. Cir. 2020) (references need not be physically combinable for prior art teachings as a whole to render claims obvious).

Notwithstanding Patent Owner 's hypothetical concern, the teachings of Li-Fujita-Numata would be combined given the benefits of secure fit and improved wear resistance. EX1003, ¶¶219-221. The possibility of mis-installation is a trade-off for achieving the benefits of Numata's plug end. *See Medichem*, 437 F.3d at 1165; EX1041, ¶37.

Patent Owner's argument that a POSITA would not have combined Numata with Li-Fujita because Numata's plugs do not provide electrical connectivity to Li's housing overly restricts Numata's teachings. Numata's plugs would provide electrical connectivity in multiple ways. EX1041, ¶38. The hypothetical wiring problems identified by Patent Owner, *see* POR 73-75, would have been avoided by multiple known techniques for providing electrical connections via plug and socket portions. EX1041, ¶38.

Numata teaches or suggests the elements of claims 9 and 10. Patent Owner ignores the claim language in its reliance on Figure 6 of the '084 patent. POR 75-78. Claim 9 requires the inserting portion of the plug end to be *partially inserted* into the socket, and the exposed part of the inserting portion to have an annular surface "spaced apart" from the outer end surface of the core housing. EX1001, 37:55-60 (claim 9). Claim 10 depends from claim 9 and adds, "when the core housing and the first plug end are fixed." EX1001, 37:61–67. Figure 6 shows the plug end *completely* plugged and fixed within the socket (claim 10), not *partially inserted* into the socket (claim 9). EX1041, ¶40; EX1001, 12:44-13:6 (plug end 14 "fixed" to core housing 20 once hooks 143 pass stopping block 23 and elastically restore to be stuck on stopping block 23).

When the Numata plug is partially inserted into a socket, the yellow highlighted surface of the connecting rod part 46 (i.e., the exposed portion) is arranged in a stepped manner forming an annular table surface that is close to, and spaced apart from, the outer end surface of the hollow cylinder 65 (i.e., the core housing). Pet. 95-97 (citing, *e.g.*, EX1007, Figs. 9 and 8(B) (excerpt) (annotated) (shown below)); EX1041, ¶41. Even when the Numata plug is fixed to the socket as in FIG. 8(b), the yellow highlighted surface would be "spaced apart" from the outer end surface of the hollow cylinder 65 (i.e., the core housing), e.g., to accommodate typical manufacturing tolerances and permit reliable installation. *Id*.



EX1007, FIGS. 9, 8(B)

Finally, Patent Owner's argument that Li-Fujita-Numata does not disclose element 10[b], POR 78-79, is predicated upon an overly restrictive reading of the references. Li teaches an arrangement comprising a protective sleeve that elastically abuts against the core housing to realize sealing. Pet. 99-101; EX1003, ¶¶251-253; *see also* §III.C. Li's teachings of a protective sleeve interacting with elastic coating layer 1132 over the core housing to realizes even further sealing. EX1041, ¶42.

F. Ground 5: The Li-Fujita-Wang-Xu-Nielsen Combination Renders Claims 16–20 Obvious

Patent Owner wrongly argues that the Petition lacks "feature-by-feature showing" of the obviousness of claims 16-19. POR 79-81. The Petition explains

that each claim element is disclosed or suggested. Pet. 101-117. Patent Owner does not dispute that such elements are present.

Patent Owner instead relies on a hyper technical argument that "the Petition has failed to articulate any deficiency in the Li-Fujita-Wang-Xu combination against claims 16-19 that would prompt a POSITA to seek their further combination with Nielsen." POR 79-81. In other words, Patent Owner argues that the headings should control over the evidence and argument presented. However, as shown in the Petition, claims 16-19 would have been obvious in view of the Li-Fujita-Wang-Xu combination.

Claims 17-20 depend from claim 16, and are logically related to each other in that they add additional features related to a magnetic circuit component in the earphone core. EX1001, 38:38-39:8. The Petition explains that a POSITA would have looked to each of Wang, Xu, and Nielsen "to improve the Li-Fujita earphone magnetic circuit system with a strong, efficient magnetic field." Pet. 101-104. The Li-Fujita-Wang-Xu-Nielsen combination applied in claim 20 is compatible with the application of prior art to claims 16-19. Because the Petition explains why claims 16-19 are not patentable, the Board should evaluate the obviousness of these claims as part of Ground 5. *See Polygroup*, 759 F. App'x at 942-943.

Patent Owner's argument that a POSITA would not have replaced Fujita's piezoelectric driver with a linear magnetic driver as taught by Wang, Xu, and

Nielsen should be rejected for the same reasons discussed above in §§ IV.C and IV.D. It would have been well within the abilities of a POSITA to make such a modification, motivated by the efficient performance and cost benefits of a magnetic driver.

V. CONCLUSION

All Challenged Claims should be found unpatentable and canceled.

Respectfully submitted,

/Wesley O. Mueller/

Wesley O. Mueller, Reg. No. 33,976
Leydig, Voit & Mayer, Ltd.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6745
Telephone: (312) 616-5600
Facsimile: (312) 616-5700
Email: wmueller@leydig.com

Date: May 18, 2026

CERTIFICATE OF WORD COUNT COMPLIANCE

Pursuant to 37 C.F.R. § 42.24 (d), I hereby certify that this Reply complies with the type-volume limits of 37 C.F.R. § 42.24(a)(1)(i). As calculated by the word count feature of the word-processing system used to prepare this Reply, it contains 5,394 words, excluding the parts of this Reply that are exempted by 37 C.F.R. § 42.24(a) (including a table of contents, a table of authorities, mandatory notices under 37 C.F.R. § 42.8, a certificate of service or word count, and appendix of exhibits or claim listing).

/Wesley O. Mueller/

Wesley O. Mueller, Reg. No. 33,976
Leydig, Voit & Mayer, Ltd.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6745
Telephone: (312) 616-5600
Facsimile: (312) 616-5700
Email: wmueller@leydig.com

CERTIFICATE OF SERVICE

I hereby certify that, on May 18, 2026, a true and correct copy of this Petitioner's Reply to Patent Owner's Response, including all exhibits thereto, was served via electronic mail upon the following email address(es):

Perkins-Service-Mojawa-Shokz-IPRs@perkinscoie.com

Date: May 18, 2026

/Wesley O. Mueller/

Wesley O. Mueller, Reg. No. 33,976
Leydig, Voit & Mayer, Ltd.
Two Prudential Plaza, Suite 4900
180 North Stetson Avenue
Chicago, Illinois 60601-6745
Telephone: (312) 616-5600
Facsimile: (312) 616-5700
Email: wmueller@leydig.com