

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC.,
Petitioner,

v.

IMMERVISION, INC.,
Patent Owner.

Case IPR2023-00472
Patent 10,795,120

**PETITIONER'S REPLY TO
PATENT OWNER'S RESPONSE**

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PETITIONER'S EXHIBIT LIST

EX1001	U.S. Patent No. 10,795,120
EX1002	File History for U.S. Patent No. 10,795,120
EX1003	Expert Declaration of Dr. David Kessler
EX1004	S. Thibault, J. Parent, H. Zhang, and P. Roulet, <i>Design, fabrication and test of miniature plastic panomorph lenses with 180° field of view</i> , Proceedings of SPIE, 2014 (“Thibault”)
EX1005	U.S. Patent Pub. No. 2010/0194853 to Matsusaka <i>et al.</i> (“Matsusaka”)
EX1006	Korean Patent No. 100677055B1 to Kim (“Kim”)
EX1007	Certified translation of Korean Patent No. 100677055B1 to Kim
EX1008	Complaint from <i>ImmerVision, Inc. v. Apple, Inc.</i> , Case No. 1:21-cv-01570 (D. Del.)
EX1009	Declaration of Patrick Franzen
EX1010	U.S. Patent No. 9,091,843 to Hudyma <i>et al.</i>
EX1011	Rebiai et al., “Image Distortion from Zoom Lenses: Modeling and Digital Correction,” 1992 IBC International Broadcasting Convention (July 1992) (“Rebiai”)
EX1012	“Fish Eye Lens” by K Miyamoto (Feb. 19, 1964) (“Miyamoto”)
EX1013	Zeljko Andreic, “Simple 180° field-of-view F-theta all-sky camera,” SPIE Proc. 1500 (Oct. 1, 1991) (“Andreic”)

EX1014	Abed Kassim et al., “Optical Performance of axial gradient and aspheric surface lenses: study and analysis,” SPIE’s 1994 International Symposium on Optics, Imaging, and Instrumentation, Vol. 2263 (Sept. 30, 1994) (“Kassim”)
EX1015	Susan Houde-Walter, “Recent Progress In Gradient-Index Optics,” SPIE Proc. 0935 (Apr. 8, 1988) (“Houde-Walter”)
EX1016	Paul K. Manhart et al., “Fundamentals of macro axial gradient index optical design and engineering,” SPIE Opt. Eng. 36(6), 1607-1621 (June 1997) (“Manhart”)
EX1017	U.S. Patent No. 5,686,957 to Baker (“Baker”)
EX1018	Zemax Output for Matsusaka’s Example 19
EX1019	Zemax Output for Kim’s First Embodiment
EX1020	Vidal, “Interim Procedure for Discretionary Denials in AIA Post Grant Proceedings with Parallel District Court Litigation” (USPTO, June 2021)
EX1021	<i>Curriculum Vitae</i> of Dr. David Kessler
EX1022	Joint Proposed Scheduling Order from <i>ImmerVision, Inc. v. Apple, Inc.</i> , Case No. 1:21-cv-01570 (D. Del.)
EX1023	Supplemental Declaration of Dr. David Kessler
EX1024	Joint Claim Construction Brief, <i>ImmerVision, Inc. v. Apple, Inc.</i> , Case No. 1:21-cv-01733 (D. Del.)

In its Patent Owner Response (“POR”), Immervision focuses all of its arguments on a single limitation of independent claim 1. *See generally* Paper 10. Specifically, Immervision presents a new claim construction of limitation [1e] and argues that the Petition—filed months before Immervision advanced this construction—fails because it does not map the prior art to this new construction. As the Federal Circuit and Board have rightly recognized, the Petition could not have anticipated and therefore need not have preemptively addressed Immervision’s new construction. This procedural burden Immervision seeks to place on the Petition simply does not exist.

On the substance of this new construction, Immervision’s arguments fail for at least two reasons. First, the claim construction is inconsistent with the intrinsic record and makes little technical sense. Regardless of its exact outer boundaries, limitation [1e] should at least encompass the teachings of both FIGS. 6 and 7. Thus, the Petition’s mapping of the prior art to the ’120 Patent’s relevant teachings with respect to FIG. 7 was justified and proper.

Second, Immervision makes no effort to actually distinguish the prior art from limitation [1e] under its new construction, which it cannot. Even if Immervision’s flawed construction were adopted (which it should not be), at least two of the grounds advanced in the petition nonetheless teach limitation [1e] under this new construction. For example, Immervision argues that the Petition “provides no

evidence regarding a location of any particular magnification zone in Thibault,” and therefore fails because Thibault cannot be evaluated with respect to Immervision’s new construction. *See* Paper 10, 25-27. Not only does this argument completely mischaracterize the Petition, Immervision admits that one need only “place the line at the appropriate height on Thibault’s Fig. 6 to identify the low and high resolution zones,” and compare Thibault’s Fig. 6 to Thibault’s Fig. 7 to evaluate the new construction. *See id.* In other words, all of the evidence was already submitted with the Petition in Thibault, and Immervision disingenuously seeks to duck that evidence through its unsupportable procedural arguments. Such efforts should not be countenanced.

For at least these reasons, Immervision’s arguments should be dismissed and claims 1-7 of the ’120 Patent (the Challenged Claims) should be found unpatentable.

I. IMMERSION SEEKS TO IMPOSE A PROCEDURAL BURDEN ON THE PETITION THAT THE FEDERAL CIRCUIT AND BOARD HAVE RIGHTLY REJECTED

Limitation [1e] of claim 1 of the ’120 Patent recites:

a non-linear targeted resolution to intentionally create a zone in an image captured by the miniature wide-angle optical apparatus with a lower or higher object to image magnification compared to linear targeted resolution, the lower or higher object to image magnification being used to compensate, at least in part, for a lower image quality due

to at least one of a drop of relative illumination or a drop of MTF in a zone of the image.

EX1001, 7:19-8:2.

Petitioner had no notice of, and therefore could not reasonably have anticipated and preemptively addressed, Immervision's proposed construction of limitation [1e]. The Petition was filed on January 18, 2023. It was not until March 15, 2023 that Immervision for the first time identified for and provided briefing on the construction of limitation [1e] in the parallel district court litigation. EX1022, 19. Immervision then identified this limitation for construction in its POPR dated May 5, 2023, and argued for the construction in its POR dated October 27, 2023. *See* Paper 5, 10-13; Paper 10, 4-10, 14-17. Thus, all of Immervision's identification and briefing of this construction occurred months *after* the Petition was filed.

After presenting its new claim construction, Immervision goes on to argue that the Petition has not presented sufficient evidence to prove that the new construction is taught in the prior art. *See* Paper 10, 25-27, 28-31, 32-35. Yet, at no point does Immervision actually argue—much less attempt to prove through the presentation of objective evidence—that any of Thibault, Matsusaka, or Kim fail to anticipate or render obvious the claims. In fact, Immervision's expert, Dr. Lebby, makes no attempt to perform any technical analysis (*e.g.*, through the creation of Zemax models like those created by Dr. Kessler) of the lenses proposed by Thibault,

Matsusaka, and Kim. Having uprooted and shifted the goal post after the ball was already kicked, Immervision seeks to declare victory from an allegedly missed shot.

Immervision’s argument, however, disingenuously seeks to place a burden on the Petition that is logically unjust and legally unsupportable. The Federal Circuit has held on numerous occasions that a Petitioner should be permitted an opportunity to address new claim constructions in its Reply. *See Axonics Inc. v. Medtronic*, 75 F.4th 1374, 1380-82 (Fed. Cir. Aug. 7, 2023) (“There is no rule, for example, requiring a petition to describe all possible or reasonable claim constructions and to present invalidity theories under those constructions. . . . [W]e have continued to recognize that a petitioner is entitled under the APA to respond to new claim construction arguments made by a patent owner”); *Hamilton Beach Brands, Inc. v. freal Foods LLC*, 908 F.3d 1328 (Fed. Cir. 2018) (holding that a petitioner is entitled to respond to a new claim construction); *Apple Inc. v. Andrea Elec. Corp.*, 949 F.3d 697, 705-07 (Fed. Cir. 2020) (“we have regularly held, the petitioner in an *inter partes* review proceeding may introduce new evidence after the petition stage if the evidence is a legitimate reply to evidence introduced by the patent owner” (quotations omitted)).

II. IMMERSION'S PROPOSED CONSTRUCTION SHOULD BE REJECTED

Patent Owner's proposed construction should be rejected because it is inconsistent with the intrinsic record by unjustifiably reading embodiments out of the claim that the claim language and its own prosecution arguments clearly sought to include. In essence, Immersion seeks to exclude the '120 Patent's teachings with respect to FIG. 7 as "a separate and different approach" than the approach allegedly claimed. *See* Paper 10, 19-23. This is simply untrue, as the Applicants own statements during prosecution prove.

While the outer boundaries of limitation [1e] are difficult if not impossible to parse for the purposes of assessing infringement for the reasons Apple has argued in district court (*see* EX1024¹, 55-76), for purposes of assessing patentability in this proceeding, it is plain that the limitation should at least encompass the teachings of both FIG. 6 and FIG. 7 of the '120 Patent. And because the prior art disclose the relevant features of at least FIG. 7 for the reasons set forth in the Petition, the claims are unpatentable over Grounds 1-3.

¹ On June 2, 2023, the parties filed a "Joint Claim Construction Brief" that included all of the claim construction briefing they had exchanged in the preceding months. *See generally* EX1024.

A. Immervision's Current Construction Is Inconsistent with the Intrinsic Record

Taken in combination with the prosecution history, Immervision's evolving view on the scope of limitation [1e] proves the difficulty in parsing the outer boundaries of the claim language it drafted. Indeed, in its own briefing, Immervision admits that the wording of limitation [1e] "may not be the perfect word choice" and "may not be the most articulate way to phrase the claim." EX1024, 65, 78. It is no wonder then that Immervision's explanations and understanding of its own invention have changed as time has gone on and it has been forced to adapt the scope of its claims in response to invalidity arguments.

Immervision's current position is that, "in some instances, a lens designer can tolerate low relative illumination or MTF in a region of an image if increased resolution allows more details from the region to be obtained." Paper 10, 4; *see also* EX1024 ("The '120 Patent recognizes . . . to enhance the resolution in certain regions of the image such that the benefit gained by adding pixels to that zone outweighs any further detriment to the relative illumination."). Thus, under Immervision's newly articulated construction and supportive briefing, the first clause of limitation [1e] "merely indicates the existence of a magnification zone"—which it admits was prior art—and the second clause "explains, *inter alia*, where the

created zones are placed in the apparatus – *i.e.*, in locations within the FOV corresponding to the relative illumination or MTF drop.” Paper 10, 15.

Importantly, Immervision also argues for the first time that, under this construction, FIG. 7 of the ’120 Patent is “a separate and different approach” than the approach allegedly claimed, and therefore should be excluded from the scope of the claim language. *See* Paper 10, 19-23; EX1023, ¶19. However, such a preclusive construction is inconsistent with the claim language, the specification, and the prosecution history. *See* EX1012, ¶¶13-20.

Specifically, during original prosecution of the ’120 Patent, the Applicant argued that claim 1 is supported by both FIGS. 6 and 7, as well as the supporting description for those figures in the specification. *See* EX1002, 27 (“Support for the further amendments to claim 1 can be found, for example, ***at least in original Figs. 6 and 7***, and in the original specification at paragraphs [0040]-[0041].”²); *see also* EX1023, ¶19. This demonstrates a clear understanding and intention for the language of independent claim 1 to at least encompass the embodiments disclosed in each of FIGS. 6 and 7. The inconsistency between Applicant’s arguments during prosecution and Immervision’s current position not only undermines the credibility

² Emphasis added throughout, unless otherwise noted.

of the current position, but also clearly demonstrates why Apple could not have predicted Immervision's new claim construction when preparing the Petition.

Furthermore, in pressing for an exclusive focus on FIG. 6, Immervision also argues that, “[u]nlike Fig. 6, which is tied to Figs. 4-5, the ‘120 Patent does not align Fig. 7 with any illustrated relative illumination or MTF plot.” Paper 10, 21. However, the specification of the ‘120 Patent describes that “the exact values of the relative illumination [illustrated in FIG. 4] with respect to the field of view vary between each embodiment of the present invention, but the overall shape . . . *is present in all families of miniature wide-angle lenses according to the present invention.*” EX1001, 5:57-65. The ‘120 Patent provides a similar description of the MTF curve shown in FIG. 5. EX1001, 6:1-8. Thus, the ‘120 Patent makes clear that “the overall shape” of the relative illumination curve of FIG. 4 and the MTF curve of FIG. 5 are intended to apply all embodiments—including FIG. 7. EX1023, ¶20.

Indeed, the full language of independent claim 1 demonstrates that the Applicant intended to cover both of FIGS. 6 and 7. See EX1023, ¶¶16-17. Limitation [1e] recites that “the *lower or higher* object to image magnification being used to compensate, at least in part, for a lower image quality due to at least one of a drop of relative illumination or a drop of MTF in a zone of the image.” EX1001, 7:23-8:2. FIG. 6 describes itself as covering a case of “a zone where the resolution is *higher*,” which means there are “more pixels of the sensors used to image a given

angle of the object space” and this is alleged to “compensate[] for the lower image quality in this zone either due to the lower relative illumination or the lower MTF.” EX1001, 6:19-27. However, FIG. 6 does not describe or otherwise support a case where a lower object to image magnification would provide this compensation. EX1023, ¶16.

Immervision and their expert, Dr. Lebby, ignore this fact and attempt to construe the claims in a way that focuses exclusively on higher object to image magnification and all but reads lower object to image magnification out of the claims. However, with respect to FIG. 7, the '120 Patent describes that “downward curve between maximum value 712 and position 714 allows the lens system to have a higher relative illumination value toward the edge of the field of view by having *a lower object to image magnification ratio in that region.*” EX1001, 6:35-41. In other words, the '120 Patent describes that FIG. 7 is an embodiment in which the lens system itself is alleged to compensate for a lower relative illumination that would normally exist in a “usual” wide angle lens system. EX1023, ¶¶13, 15-16. Thus, the '120 Patent purports that FIG. 7 is one example where a lower object to image magnification is used to compensate, at least in part, for a lower image quality due to a drop of relative illumination. EX1023, ¶15.

For at least these reasons, Immervision’s attempt to exclude FIG. 7 from the scope of independent claim 1 should be rejected, and limitation [1e] should be read

to at least encompass the embodiments of FIGS. 6 and 7 of the '120 Patent, consistent with the approach taken in the Petition.

B. The Construction Advocated By Immervision Also Makes Little Technical Sense, Whereas the Petition's Approach Is Consistent with the '120 Patent's Purported Benefits

As Dr. Kessler explains, Immervision's attempt to focus exclusively of FIG. 6 makes little technical sense. EX1023, ¶14. Immervision's expert, Dr. Lebby, claims that "a POSA can tolerate the low relative illumination at the edges of this lens because the lens is projecting that area of the image onto more pixels," and he cites to column 6, lines 19-27 of the '120 Patent for support. EX2001, ¶60. However, this portion of the '120 Patent simply explains that, "[i]n the zone where the resolution is higher, there are more pixels of the sensors used to image a given angle of the object space," and that "having more pixels in this zone . . . compensates for the lower image quality in this zone." EX1001, 6:19-24. According to Dr. Kessler, the '120 Patent appears to suggest that this compensation occurs because the "final resulting image can then be processed to create a resulting image with constant image quality across the whole field of view." EX1023, ¶14 (citing EX1001, 6:24-27). Assuming for the sake of argument this is true, it is not the lens that compensates for the lower image quality—as apparently shown in FIGS. 4 and 5, the image quality remains low in the image—it is the processing of the image data

after it is captured by the sensor that compensates for the lower image quality. EX1023, ¶14.

This is why Dr. Kessler focused on FIG. 7 during his original analysis. *See* EX1023, ¶¶15-18. With respect to FIG. 7, the '120 Patent describes how the shape and position of the targeted resolution curve of the lens system itself can directly alter the relative illumination and MTF of the image and therefore provides “the best image quality on the lens and camera system” by creating “more balanced relative illumination” and “more balanced MTF.” EX1023, ¶15 (citing EX1001, 6:28-61). As the '120 Patent explains in its background, “[i]n wide-angle lenses, the relative illumination is usually maximum in the center and drops continuously toward the edge of the field of view,” and “the image MTF is usually maximum in the center and drops continuously toward the edge of the field of view.” EX1001, 1:53-2:3. Thus, FIG. 7 purports to show a method by which the lens system itself “compensates” for the drop in relative illumination or MTF experienced in these usual wide-angle lenses based on the shape and position of the targeted resolution curve. EX1023, ¶15.

Dr. Kessler utilized the explicit teachings of the '120 Patent to identify the characteristics of the targeted resolution curve presented in FIG. 7 that allegedly “more balanced relative illumination” and “more balanced MTF,” which included the shape of the targeted resolution curve after its absolute maximum within the field

of view (FOV). EX1023, ¶¶17-18. This is consistent with Immervision's opening position on the construction of this term, where it attempted to explain that physical characteristics of the "claimed lens" itself "applies [a] type of correction" to account for the "undesirable amounts of relative illumination and/or MTF." EX1024, 69-70. Dr. Kessler continues to stand by this original analysis, and under it, the Grounds set forth in the Petition continue to render the Challenged Claims anticipated or obvious. EX1023, ¶17.

For at least these reasons, Immervision's attempts to contort the construction of limitation [1e] in response to the current invalidity challenges should be dismissed. All of Immervision's remaining arguments rely upon the adoption of this construction, and therefore should also be dismissed.

III. EVEN UNDER IMMERVISION'S NEW CLAIM CONSTRUCTION, GROUNDS 1 AND 2 DISCLOSE LIMITATION [1E]

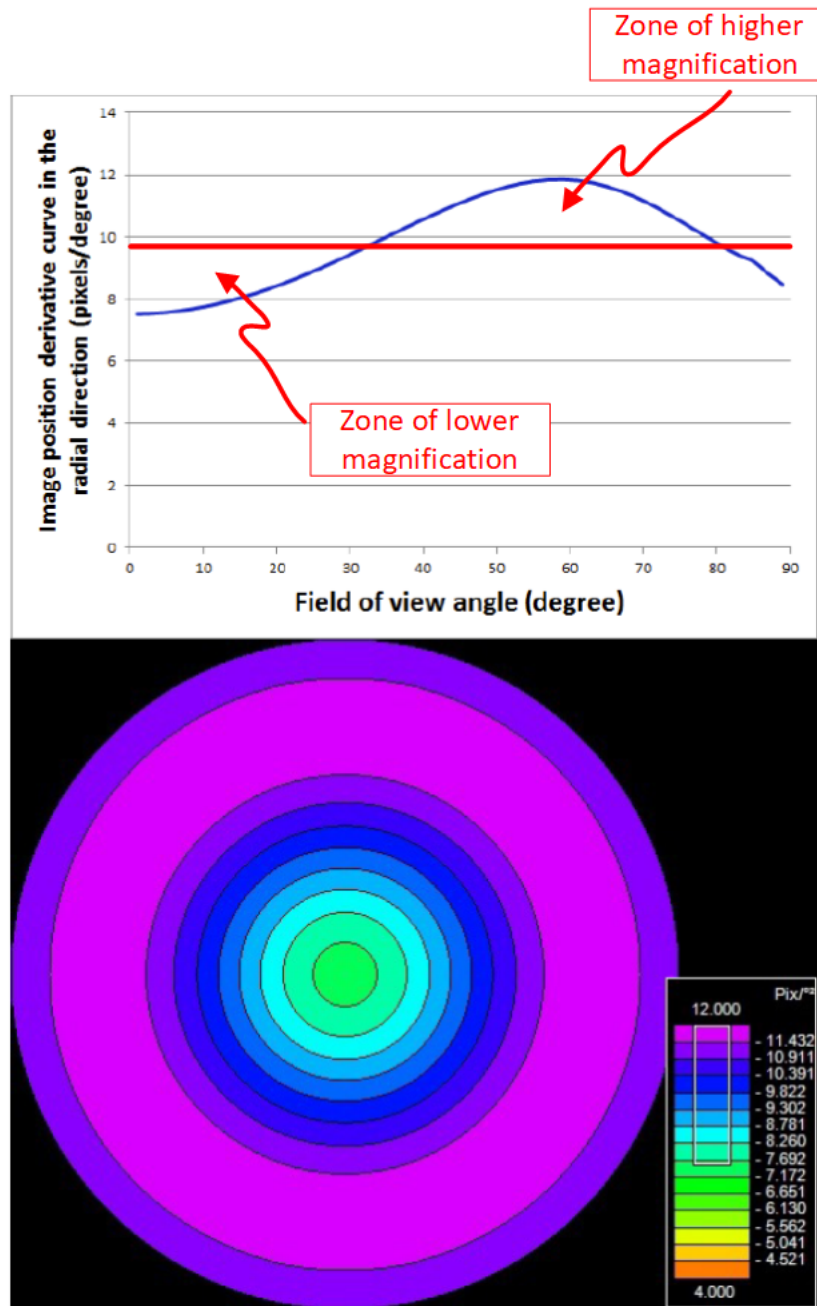
Even if the Board were to accept Immervision's new construction, at least Grounds 1 and 2 still teach the claims under this new construction. Even assuming, *arguendo*, that Immervision's new construction should be given any weight, Dr. Kessler explains in his supplemental declaration how, at least Grounds 1 and 2 still render limitation [1e] anticipated or obvious. *See* EX1023, ¶¶21-33. Thus, under at least Grounds 1 and 2, the Challenged Claims should be found unpatentable under any construction at issue in this proceeding.

A. Thibault's Zone of Increased Magnification Is Located Within the Field of View at a Position Where the Relative Illumination is Lower

Immervision's only argument with respect to the Petition's Thibault ground is that "Petitioner has not identified any magnification zones in Thibault's resolution curve," and thus "one cannot determine whether those zones are properly located to compensate for the drop in relative illumination experienced by Thibault's lens." Paper 10, 24-27. This is directly contradicted by the Petition and Dr. Kessler's original declaration.

In his original declaration, Dr. Kessler explained that, "[i]n Figure 6, the zone shown in magenta has the highest number of pixels per degree associated with it." EX1003, ¶87; *see also* Petition, 17 (citing same). Dr. Kessler further explained that, "[c]ollectively, Figure 6 shows an increase in the number of pixels in various zones of the resulting image." *Id.* Thus, the zone shown in magenta in the bottom of FIG. 6 is a zone of increased magnification. EX1023, ¶22. The surfacic resolution over the full circular panomorph image shown at the bottom of FIG. 6 is simply another way to visualize the location of the zones of magnification, as opposed to the method that Dr. Lebby proposes in paragraphs 57-58 of his declaration. *Id.* Thus, contrary to Immervision's assertion, the Petition and Dr. Kessler explicitly identified a zone of increased magnification (*i.e.*, the zone shown in magenta in the top portion of FIG. 6). *See* Paper 2, 16-17, 25-32; EX1003, ¶¶87, 117-124.

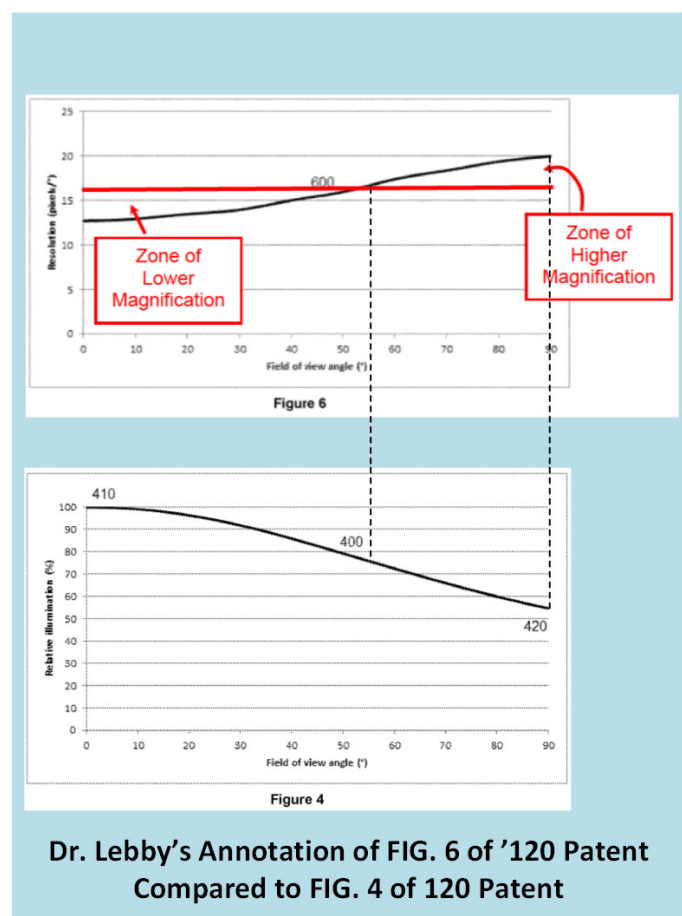
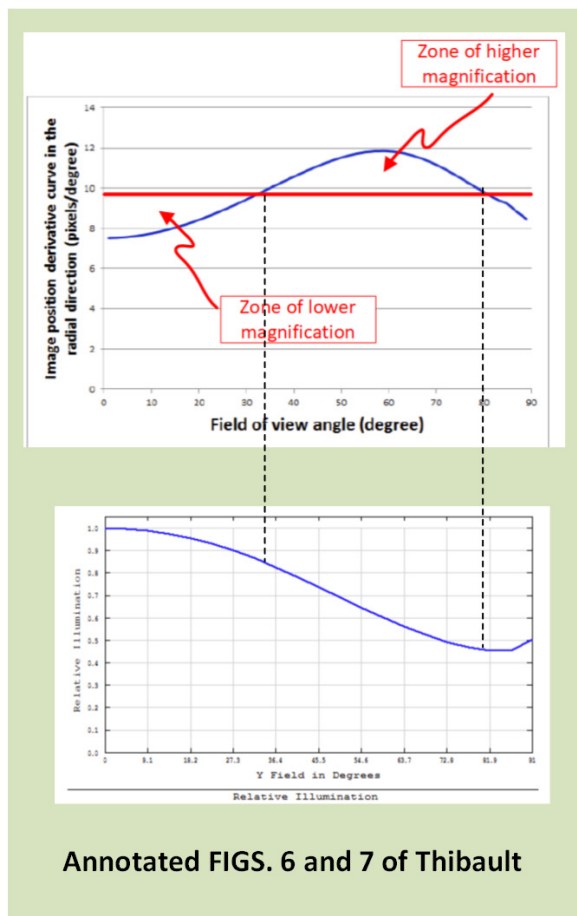
Immervision goes on to argue that “Dr. Kessler would have only needed to place the line at the appropriate height on Thibault’s Fig. 6 to identify the low and high resolution zones.” Paper 10, 26. As Dr. Kessler explains in his supplemental declaration, applying this simple methodology to Thibault’s FIG. 6 confirms his earlier assertion about the location of a zone of increased magnification in Thibault’s lens, and also proves that Immervision’s new construction is anticipated (or at least rendered obvious) by Thibault’s lens. EX1023, ¶¶23-24.



Annotated FIG. 6 of EX1004

As shown above, Dr. Kessler applied Immervision's simple horizontal line method to the image position derivative curve shown at the top of FIG. 6, and this confirms that the magenta zone that the Petition and Dr. Kessler identified at the

outset is a zone of higher magnification. EX1023, ¶24. This zone of higher magnification is also located within the FOV corresponding to a relative illumination or MTF drop, under Immervision's new construction. As Dr. Kessler explains, the zone of higher magnification in Thibault's lens is positioned where the relative illumination curve is lower, just as Dr. Lebby argues it is for the '120 Patent. EX1023, ¶25 (citing EX2001, ¶¶57-60).



Immervision is correct that “[c]alculating the linear resolution for Thibault would have been a straightforward exercise,” and that doing so requires nothing more than “plac[ing] the line at the appropriate height on Thibault’s Fig. 6 to identify

the low and high resolution zones.” Paper 10, 25-26. All of the evidence necessary to do so was submitted with the Petition, and both the Petition and Dr. Kessler identified the relevant zone of higher magnification through an alternative method. Thus, Immervision’s argument that the Petition and Dr. Kessler “provides no evidence regarding a location of any particular magnification zone in Thibault with respect to Thibault’s relative illumination curve” (Paper 10 at 26) is demonstrably false.

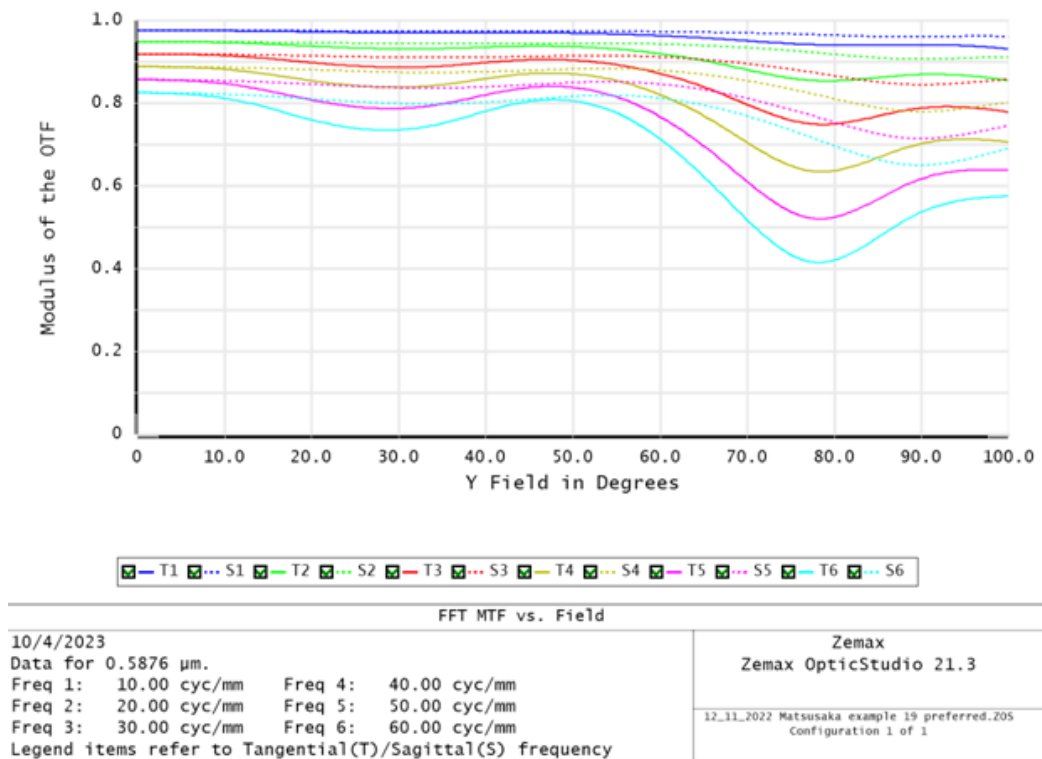
Based on the clear evidence that Immervision willfully chose to ignore and not address in its POR, Thibault’s FIGS. 6 and 7 anticipate or render obvious limitation [1e]. Based on Ground 1 alone, all of the Challenged Claims are clearly unpatentable. EX1023, ¶26.

B. Matsusaka’s Zone of Increased Magnification Is Located Within the Field of View at a Position Where the MTF is Lower

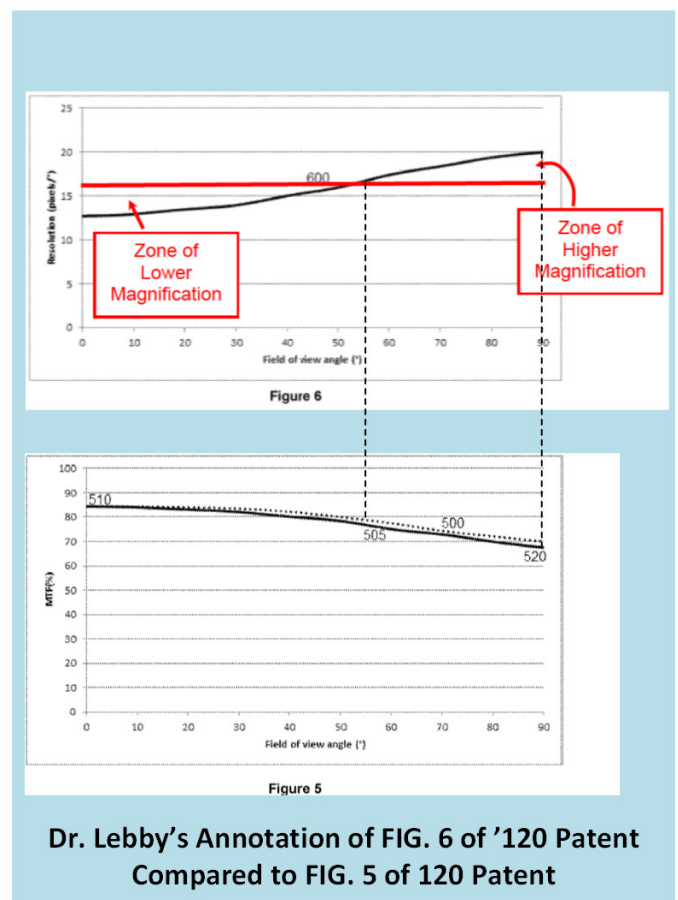
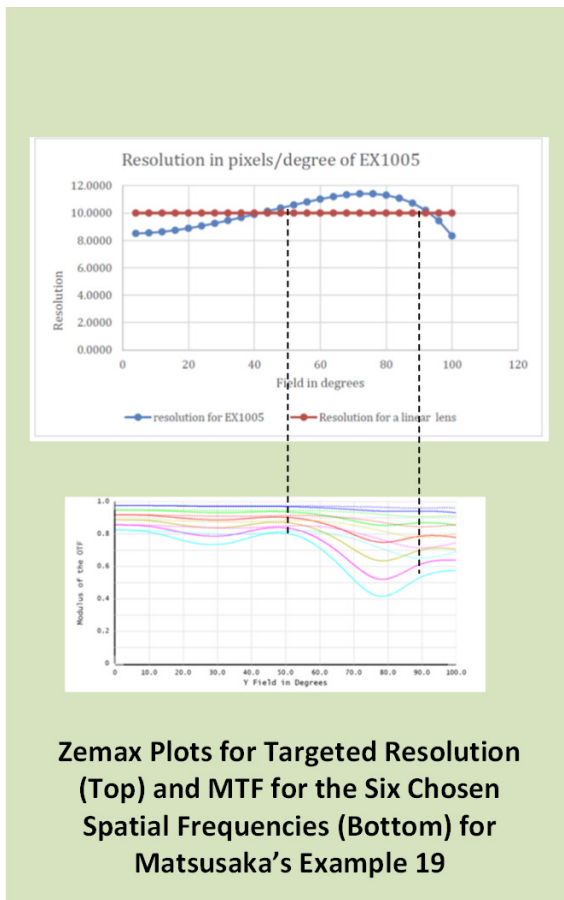
Matsusaka’s Example 19 lens similarly anticipates or renders obvious limitation [1e] under Immervision’s new construction. In his original declaration, Dr. Kessler was able to use the construction data provided by Matsusaka for Example 19 to model the lens in a program called Zemax and to evaluate various of its properties. EX1003, ¶¶94-99; EX1023, ¶27. Had Immervision or Dr. Lebbey requested Dr. Kessler’s Zemax model of Matsusaka’s Example 19 lens or

undertaken the effort of creating and analyzing their own, they would have seen that Matsusaka's Example 19 lens meets their new construction.

In his supplemental declaration, Dr. Kessler describes how he utilized his sequential Zemax model of Matsusaka's Example 19 lens to create the following plot of the MTF for Matsusaka's Example 19 lens. EX1023, ¶¶29-31.



When compared with the targeted resolution curve from Dr. Kessler's original declaration, it is clear that the zone of higher magnification aligns with a zone of lower MTF, just as Dr. Lebby argues it is for the '120 Patent. EX1023, ¶32 (citing EX2001, ¶¶57-59, 61-62).



Limitation [1e] recites “the lower or higher object to image magnification being used to compensate, at least in part, for a lower image quality due to at least one of a drop of relative illumination or a drop of MTF in a zone of the image.” EX1023, ¶33. As the Zemax plots show at left, there is a marked drop in MTF in the region corresponding to the zone of increased magnification. EX1023, ¶33. Thus, even under Immervision’s new construction, Matsusaka’s Example 19 lens anticipates or at least renders obvious the claim language. EX1023, ¶33.

IV. CONCLUSION

For the foregoing reasons, Petitioner respectfully requests that the Board issue a Final Written Decision finding the Challenged Claims unpatentable.

Respectfully submitted,

Date: January 31, 2024

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CERTIFICATION UNDER 37 CFR § 42.24

Under the provisions of 37 CFR § 42.24(d), the undersigned hereby certifies that the word count for the foregoing Petitioner Reply to Patent Owner Response totals 3,720 words, which is less than the 5,600 allowed under 37 CFR § 42.24(c)(1).

Respectfully submitted,

Date: January 31, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 CFR §§ 42.6(e)(4) and 42.205(b), the undersigned certifies that on January 31, 2024, a complete and entire copy of this Petitioner's Reply to Patent Owner's Response and accompanying exhibits were provided by email to the Patent Owner by serving the correspondence address of record as follows:

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