

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SONY CORPRATION,
Petitioner,

v.

OPTIMUM IMAGING TECHNOLOGIES, LLC,
Patent Owner.

IPR2024-00923
Patent 10,873,685 B2

Before JOHN F. HORVATH, GARTH D. BAER, and
RUSSELL E. CASS, *Administrative Patent Judges*.

HORVATH, *Administrative Patent Judge*.

DECISION
Granting Institution of *Inter Partes* Review
35 U.S.C. § 314

I. INTRODUCTION

A. Background and Summary

Sony Corporation (“Petitioner”) filed a Petition requesting *inter partes* review of claims 1–19 and 22–30 (“the challenged claims”) of U.S. Patent No. 10,873,685 B2 (Ex. 1001, “the ’685 patent”). Paper 2 (“Pet.”), 3. Optimum Imaging Technologies, LLC (“Patent Owner”) filed a Preliminary Response. Paper 7 (“Prelim. Resp.”). We have jurisdiction and authority under 35 U.S.C. §§ 6, 314 and 37 C.F.R. § 42.4.

Upon consideration of the Petition and Preliminary Response, we are persuaded that Petitioner has demonstrated a reasonable likelihood that it would prevail in showing the unpatentability of at least one challenged claim of the ’685 patent. Accordingly, we institute *inter partes* review of all challenged claims on all grounds raised.

B. Real Parties-in-Interest

Petitioner identifies itself as the real party-in-interest. Pet., xiii. Patent Owner identifies itself as the real party-in-interest. Paper 5, 1; Paper 6, 1.

C. Related Matters

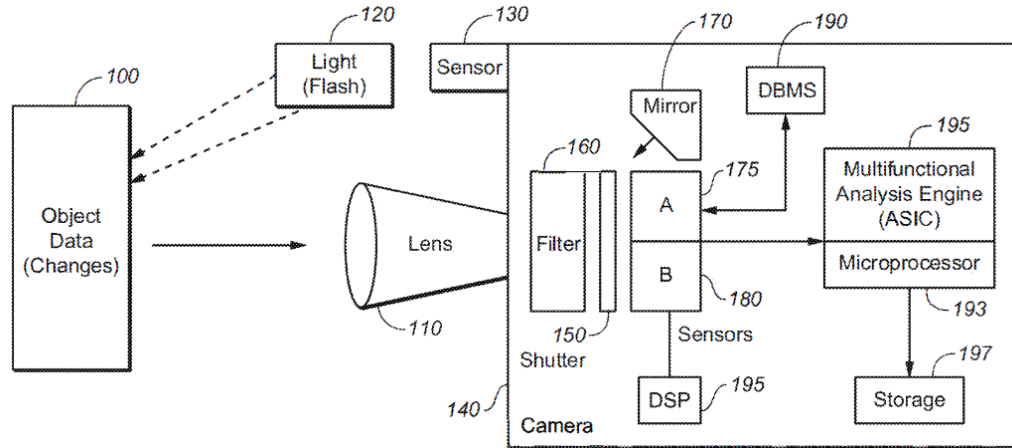
Petitioner and Patent Owner identify numerous related patents, patent applications, *inter partes* reviews, and district court proceedings that can affect or be affected by this proceeding, including *Optimum Imaging Techs., LLC v. Sony Corp.*, 4:23-cv-00928 (EDTX) (the “district court proceeding”). See Pet., xiv; Paper 5, 2; Paper 6, 2.

D. The ’685 Patent

The ’685 patent is directed toward an apparatus for “optical image collection, electronic organization and optimization of digital data using integrated circuits and software” with applications in “still and video

photography” as well as in “copying and scanning technologies.” Ex. 1001, 1:27–33. The apparatus provides “electronic methods to optimize optical processing, the digital capture of light and post-capture image organization.” *Id.* at 1:18–21.

Figure 1 of the patent is reproduced below.



The figure “illustrates the overall structure of the system.” *Id.* at 31:26.

Digital camera 140 includes, *inter alia*, lens 110, sensors 175/180, DBMS 190,¹ digital signal processor (DSP) 195, microprocessor 193, ASIC (application specific integrated circuit) 195, and storage 197. *Id.* at 31:32–45, Fig. 1. Light from object 100 is focused by lens 110 onto at least one of the sensors 175/180. *Id.* at 31:33–35. The sensors are connected to ASIC 195 and/or microprocessor 193, which “process the [recorded] image and controls the camera.” *Id.* at 31:40–43. “The digital image data is passed from the digital sensor to either the ASIC or microprocessor and then stored in memory.” *Id.* at 31:43–45.

¹ Although Figure 1 identifies element 190 as a DBMS or database management system, the patent identifies element 190 as a database. *See* Ex. 1001, 31:39.

The patent explains that every optical “lens with a unique optical formula will have specific aberrations, the corrections for which will be accessible in a database.” *Id.* at 11:24–26. Thus, when taking a picture, the camera “identifies a specific lens and refers to a database that matches the lens type with [its] specific aberrations.” *Id.* at 10:60–62. “After a specific lens type is identified (500) and a database is referenced (510), the lens type is matched with the specific optical aberrations (520)” and the DSP acts as a “digital filter [that] applies a correction to specific optical aberrations (530).” *Id.* at 32:21–25, Fig. 5. The digital filter “employ[s] the DSP hardware as well as specific software.” *Id.* at 32:45–47. It can make an image sharper, for example, by obtaining its frequency spectrum via Fast Fourier Transform (FFT), “differentiating the frequency spectrum,” and emphasizing the sharper, higher frequency components “by limiting the low frequency, as in a high pass filter.” *Id.* at 32:56–64.

This sequence of lens aberration correction steps is shown in Figure 7, which is reproduced below.

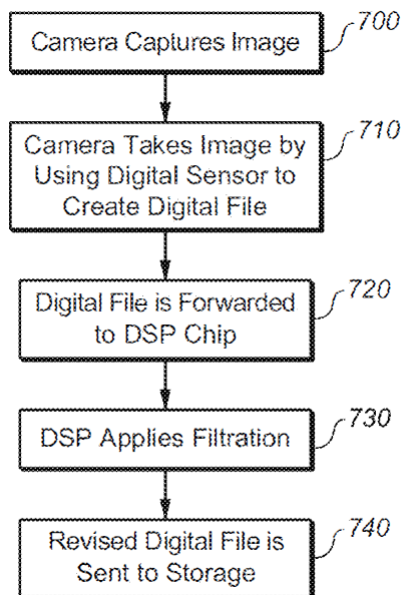


Figure 7 “is a flow chart of the process of digital image capture, processing, and storage.” *Id.* at 30:33–34. The camera “uses a digital sensor to create a digital file (710), the digital file is forwarded to the digital signal processor . . . (720),” which “applies the filtration (730) to correct the optical aberrations from the lenses,” and “[t]he revised digital file is then sent to storage (740).” *Id.* at 32:39–44.

E. Illustrative Claim

Claims 1, 6, and 14 are independent, and claims 2–5, 7–13, and 15–30 depend directly or indirectly from them. Ex. 1001, 38:36–42:21. Claim 1, which is illustrative of the challenged claims, is reproduced below.

1. A digital imaging system for correcting optical images aberrations in a digital video, comprising:

a digital video camera including in-camera software, an optical lens mechanism, at least one digital sensor for capturing the digital video, an integrated circuit including;

a digital signal processor configured to access a database management system including a plurality of optical image aberration corrections, and

a memory storage sub-system;

wherein the optical lens mechanism is a zoom lens or a fixed focal length lens;

wherein the integrated circuit uses the in-camera software to identify at least one optical image aberration and

to correct the at least one optical image aberration in at least one frame of the digital video using at least one of the plurality of optical image aberration corrections in the database;

wherein the video is captured by the at least one digital sensor and is forwarded to the digital signal processor;

wherein the video image file with the at least one optical image aberration is corrected by applying digital filtration using the digital signal processor; and

wherein the corrected video consisting of the digital data optimized from the at least one optical image aberration that are corrected from the original video image is stored in the memory storage sub-system.

Id. at 38:36–61.

F. Evidence

Reference		Effective Date	Exhibit
Watanabe	US 2005/0280877 A1	Dec. 22, 2005	1005
Kishida	JP 2004-343358 A	Dec. 2, 2004	1007
Kita	JP 2004-328506 A	Nov. 18, 2004	1008
Takane	US 2003/0223007 A1	Dec. 4, 2003	1009
Hisamatsu	JP 1994-319106 A	Nov. 15, 1994	1010
Turner	US 2004/0264918 A1	Dec. 30, 2004	1011
Liege	US 8,559,743 B2	Oct. 15, 2013	1012

Petitioner also relies upon the Declaration of Leonard Laub. Ex. 1003.

G. Asserted Grounds

Petitioner asserts the challenged claims are unpatentable on the following grounds:

Ground	Claims	35 U.S.C. §	References
1	1, 2, 5–7, 11, 12, 14, 15, 17, 27, 29	103	Watanabe
2	3, 13, 19	103	Watanabe, Kishida
3	4, 8, 9, 16	103	Watanabe, Kita
4	10, 18, 28, 30	103	Watanabe, Takane
5	22, 23, 25	103	Watanabe, Hisamatsu
6	24	103	Watanabe, Turner
7	26	103	Watanabe, Liege
8	1, 2, 6, 7, 10, 12, 14, 15, 17, 18, 27, 28, 30	103	Takane, Watanabe

II. ANALYSIS

A. Discretionary Denial

We have discretion to deny any petition for *inter partes* review. *See* 35 U.S.C §§ 314(a), 325(d) (“In determining whether to institute or order a proceeding under . . . chapter 31, the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office.”); *SAS Inst. Inc. v. Iancu*, 584 U.S. 357, 366 (2018) (“[Section] 314(a) invests the Director with discretion on the question whether to institute review” (emphasis omitted)); *Cuozzo Speed Techs., LLC v. Lee*, 579 U.S. 261, 273 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”);

1. Request for §314(a) Denial

Patent Owner requests denial pursuant to 35 U.S.C. § 314(a) in view of the related district court proceeding. Prelim. Resp. 2–9. In exercising our discretion to deny review under § 314(a), the Board may consider “events in other proceedings related to the same patent.” Consolidated Trial Practice Guide November 2019² at 58. In doing so, the Board considers and balances several factors affecting system efficiency, fairness, and patent quality. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (PTAB Mar. 20, 2020) (precedential) (“*Fintiv*”). The Director has provided guidance on applying the *Fintiv* factors. *Interim Procedure for Discretionary Denials in*

² Available at <https://www.uspto.gov/TrialPracticeGuideConsolidated>.

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AIA Post-Grant Proceedings with Parallel District Court Litigation (June 21, 2022) (“Fintiv Memo”).³

Petitioner has provided Patent Owner with a so-called *Sotera*⁴ stipulation, stating “if IPR Nos. IPR2024-00923-00925, & 01046 are instituted, Sony will not pursue ‘any ground that [Sony] raised or reasonable could have raised’ during the IPRS in the related district court proceeding, *Optimum Imaging Technologies LLC v. Sony Corporation*, 4:23-cv-00928 (EDTX).” Ex. 1077, 1. Per the Director’s guidance, “the PTAB will not discretionarily deny institution in view of parallel district court litigation where a petitioner presents a stipulation not to pursue in a parallel proceeding the same grounds or any grounds that could have reasonably been raised before the PTAB.” Fintiv Memo, 3.

Accordingly, we deny Patent Owner’s request for discretionary denial under § 314(a) in view of Petitioner’s *Sotera* stipulation.

2. Request for §325(d) Denial

Patent Owner requests discretionary denial, presumably pursuant to 35 U.S.C. § 325(d), in view of the Office’s previous consideration of requests *for inter partes* review of related patents and the Examiner’s previous consideration of those requests and the references they relied on during prosecution of the ’685 patent. Prelim. Resp. 11–14.

The Board has set forth a two-part framework to consider whether to exercise discretion to deny institution under § 325(d):

³ Available at https://www.uspto.gov/sites/default/files/documents/interim_proc_discretionary_denials_aia_parallel_district_court_litigation_memo_20220621_.pdf.

⁴ *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 at 18–19 (PTAB, Dec. 1, 2020) (precedential).

(1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office; and (2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential). The Board considers *Becton, Dickinson*⁵ factors (a), (b), and (d) to determine whether “the same or substantially the same art or arguments previously were presented to the Office,” and if so, considers factors (c), (e), and (f) to determine “whether the petitioner has demonstrated a material error by the Office.” *Id.* at 10.

Patent Owner argues the same art—Watanabe, Kishida, and Kita—was previously presented to the Office in IPR2020-01321, IPR2020-01322, and the examination of the ’685 patent. Prelim. Resp. 11–14. Patent Owner further argues the rationales for relying on “Watanabe as a primary reference” and “Kishida and Kita as secondary references” in the previous IPRs was substantially the same as Petitioner’s rationale for relying on that art in this proceeding. *Id.* Petitioner argues Patent Owner’s request fails under step 1 of *Advanced Bionics* “because the Office never considered the patentability of the Challenged Claims over the art or arguments in Grounds 2–8.” Pet. 74.

We find Patent Owner has satisfied step 1 of *Advanced Bionics* because Watanabe, Kishida, and Kita were previously presented to the

⁵ *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential as to § III.C.5, first para.).

Office, both in the prior IPRs and in the prosecution of the '685 patent.⁶

Consequently, we proceed to step 2 of *Advanced Bionics* and consider *Becton, Dickenson* factors (c), (e), and (f) to determine “whether the petitioner has demonstrated a material error by the Office.” *Advanced Bionics*, Paper 6 at 10. Factor (c) “focuses on the record developed by the Office in previously reviewing art or arguments” and informs “the petitioner’s showing under factors (e) and (f).” *Id.* Factor (e) considers whether the petitioner has sufficiently shown how the Office erred in its prior consideration of the prior art and factor (f) considers the extent to which the facts and evidence in the Petition warrant reconsideration of the prior art. *Becton, Dickenson*, Paper 8 at 24–25.

Patent Owner argues “[t]he examiner expressly referred to Watanabe in the Notice of Allowance” of the '685 patent and “identified specific independent claim limitations that were not in the prior art.” Prelim. Resp. 13 (citing Ex. 1002, 1572–1575). Petitioner argues the Examiner never “meaningfully addressed” Watanabe because she “did not use Watanabe in a claim rejection.” Pet. 75–76. Petitioner further argues the Examiner erred in allowing the claims of the '685 patent because she “did not identify or explain a *particular* claim limitation that Watanabe purportedly failed to disclose,” did not “recognize the pertinence of Watanabe’s disclosure,” and allowed claims that Ground 1 of the Petition demonstrates are obvious over Watanabe. *Id.* at 76–77.

⁶ Patent Owner, however, has not shown that the same or substantially the same arguments were previously presented to the Office because Patent Owner has provided no evidence to support that bare contention. *See* Prelim. Resp. 12–13.

We agree with Petitioner. The Office’s *record* of its previous consideration of Watanabe, Kishida, and Kita and the merits of the challenges presented in IPR2020-01321 or IPR2020-01322 (involving different claims in different, but related, patents) is limited. In denying IPR2020-01321 and IPR2020-01322, the Office stated, without elaboration, that its review of the merits in those proceedings did not “outweigh the other *Fintiv* factors favoring denial of institution,” such as the imminent trial date of a related district court proceeding. *See Canon Inc. v. Optimum Imaging Techs. LLC*, IPR2020-01321, Paper 10 at 5, 11 (PTAB Mar. 1, 2021); *Canon Inc. v. Optimum Imaging Techs. LLC* IPR2020-01322, Paper 9 at 5–6, 11 (PTAB Mar. 1, 2021). But there is no discussion of the actual merits, e.g., whether Canon had shown that one or more claims were likely unpatentable over Watanabe alone or in combination with Kishida or Kita. *Id.*

In allowing the claims of the ’685 patent, evidence of the Examiner’s consideration of IPR2020-01321, IPR2020-01322, and the Watanabe, Kishida, and Kita references is largely limited to an initialized information disclosure statement identifying those documents. Ex. 1002, 1632–1637. Although it is true, as Patent Owner contends, that in allowing the ’685 patent’s claims the Examiner identified Watanabe as one of seven pieces of “closest art of record,” the Examiner’s reasons for allowance was limited to (a) separately characterizing the teachings of those seven references, (b) stating without analysis that they “alone or in combination fail[] to provide the . . . limitations [] in the amended independent claims,” and (c) summarizing the independent claims of the ’685 patent. *Id.* at 1570–1576.

In such cases, i.e., when “the record of the Office’s previous consideration of the art is not well developed or silent . . . a petitioner may

show the Office erred by overlooking something persuasive under factors (e) and (f).” *Advanced Bionics* at 10. For the reasons discussed below, Petitioner demonstrates a reasonable likelihood of showing at least some of the challenged claims are unpatentable over Watanabe. Therefore, the Petition as a whole presents sufficient evidence that the Examiner erred in not rejecting those claims over Watanabe.

Accordingly, for the reasons discussed above, we decline to exercise our discretion to deny institution under 35 U.S.C. § 325(d).

B. Level of Ordinary Skill in the Art

Petitioner identifies a person of ordinary skill in the art (“POSITA”) at the time of the invention as someone that would have had “a bachelor’s degree in electrical engineering, physics, or a related field, with at least two years of industry experience and/or research, both concerning digital camera system design and image processing.” Pet. 7 (citing Ex. 1003 ¶ 54). Patent Owner disputes this, arguing the district court has already found a POSITA would have had “an electrical engineering degree and three years of relevant experience” and that this definition “should be adopted for purposes of institution.” Prelim. Resp. 14 (quoting Ex. 1027, 6). Patent Owner further argues that—should we adopt the district court’s definition—Petitioner’s declarant “is not qualified to offer expert testimony” in this proceeding because he “does not have a degree in electrical engineering.” *Id.* (citing Ex. 1004, 6).

“[T]he level of skill in the art is a prism or lens through which a judge, jury, or the Board views the prior art and the claimed invention.” *Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). The Board may consider such factors as the types of problems encountered in the art, prior art solutions to those problems, the rapidity with which innovations are made,

the sophistication of the technology, and the educational level of workers in the field when determining the level of skill in the art. *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995).

As noted above, the '685 patent describes a system for digital optical image collection, processing, and organization, which applies to “any imaging system that includes interactions between optics, digital image sensors, post-capture integrated circuits and digital storage components.” Ex. 1001, 1:18–31. Artisans and inventors in such fields are not limited to electrical engineers. They include physicists and others with sufficient knowledge of the physics of optical, electronic, and opto-electronic devices. Indeed, many of the pioneering inventions needed to understand the operation of a digital camera were made by physicists, including the inventions of the transistor,⁷ the integrated circuit (IC),⁸ the digital computer,⁹ and the charge-coupled device (CCD).¹⁰ For at least these reasons, we find Petitioner’s assessment of the level of skill in the art to be reasonable and commensurate with the problems and solutions disclosed in the prior art. *In re GPAC Inc.*, 57 F.3d at 1579.

Accordingly, at this stage of the proceeding, we adopt as our own Petitioner’s description of a person skilled in the art. We further find Petitioner’s declarant, who (a) has a bachelor’s degree in physics as well as post-graduate education in physics and optics, (b) is a member of the Optical Society of America and the Institute of Electrical and Electronic Engineers,

⁷ Julius Edgar Lilienfeld (field-effect transistor) John Bardeen, Walter Brattain, William Shockley (point-contact transistor), William Shockley (bipolar transistor).

⁸ Robert Noyce (monolithic integrated circuit)

⁹ John Atanasoff and Clifford Berry (electronic digital computer)

¹⁰ George Smith and Willard Boyle (charge-coupled device)

and (c) has extensive work experience in signal processing, imaging systems, optical information recording, and electro-optical system design and manufacturing, is at least a person having ordinary skill in the art. Ex. 1004, 5–6. He is therefore competent to provide testimony in this proceeding.

C. Claim Construction

In *inter partes* reviews, we interpret a claim “using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. 282(b).” 37 C.F.R. § 42.100(b) (2019). Under this standard, a claim is construed “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” *Id.* However, only claim terms which are in controversy need to be construed and only to the extent necessary to resolve the controversy. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017).

Petitioner argues the following terms or phrases require construction: “vignetting” and “uses the in-camera software to identify at least one optical image aberration” (the “identifying aberration” limitation). Pet. 7–8. Patent Owner agrees with Petitioner’s construction of “vignetting” and argues the identifying aberration limitation need not be construed because no patentability arguments rely on the precise meaning of this term. Prelim. Resp. 15–16.

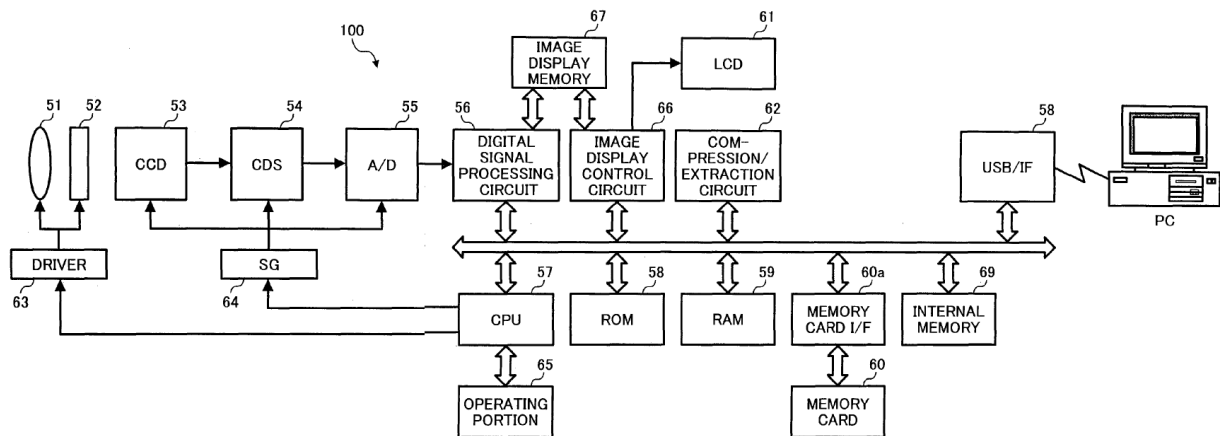
At this stage of the proceeding, we decline to construe either of Petitioner’s proposed terms because their precise meaning is not needed to resolve the parties’ disputes. We discuss below the meaning of other terms whose meanings are inherently disputed by the parties’ competing patentability contentions in the context of those competing contentions.

D. Obviousness over Watanabe

Petitioner contends claims 1, 2, 5–7, 11, 12, 14, 15, 17, 27, and 29 would have been obvious over Watanabe. Pet. 9–39. Patent Owner contends Petitioner fails to demonstrate that Watanabe teaches or suggests a digital video camera, a database, a DBMS, an IC, a DSP that accesses a DBMS, a DSP that performs digital filtration and, for claim 29, instructions to correct curvature of field aberrations. Prelim. Resp. 24–40. At this stage of the proceeding, we find Petitioner demonstrates a reasonable likelihood of showing at least one of the challenged claims is obvious over Watanabe for the reasons discussed below.

1. Watanabe

Watanabe discloses “an image processing system capable of automatically and simply executing an image process such as distortion aberration correction or peripheral light intensity correction.” Ex. 1005 ¶ 2. This can be done, for example, in digital camera 100, illustrated in Figures 1A and 1B, whose combination is reproduced below.



The Figure above is a composite image of Watanabe’s Figures 1A and 1B. It is a schematic illustration of digital camera 100 having, *inter alia*, lens 51,

charge-coupled device 53, A/D (analog-to-digital) converter 55, DSP 56, CPU 57, ROM 58, and RAM 59. *Id.* ¶ 35, Figs. 1A, 1B.

Light passing through lens 51 is focused on CCD 53, which converts the light into an analog electrical signal that is subsequently converted into a digital signal by A/D converter 55. *Id.* ¶ 37, Figs. 1A, 1B. The digital signal is sent to DSP 56, which “executes various processes, correction and a data process for image compressing/extracting.” *Id.* ¶ 38. CPU 57 “controls operation of each part of the digital still camera” by way of a control program stored in ROM 58 that includes a “photographing” and an “image processing” program. *Id.* ¶ 42, Fig. 4. The two programs are complimentary, with the “photographing” program sending image data and processing information to the “image processing” program when image processing information is available. *Id.* ¶¶ 60–63, Fig. 4. The “image processing” program allows “distortion aberration correction or peripheral light intensity correction [to] be executed automatically and simply according to the process information added to the image data.” *Id.* ¶ 64.

A high-level illustration of how the “image processing” program uses image processing information to generate a corrected image is illustrated in Figure 3, which is reproduced below.

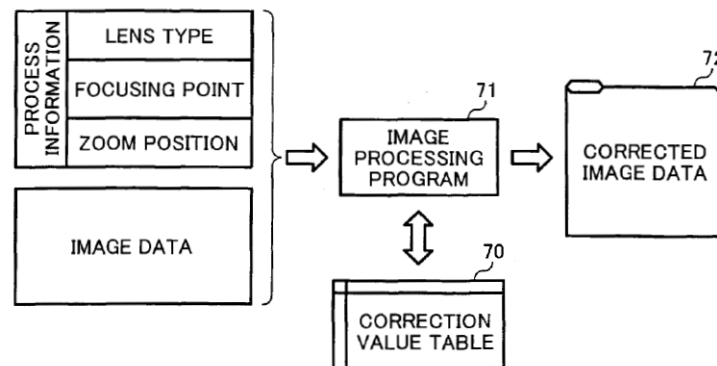


Figure 3 illustrates image processing program 71 generating corrected image

data 72 from image data and image process information. *Id.*, Fig. 3. The image process information includes lens type, focusing point, and zoom position. *Id.* ¶ 47, Fig. 3. Correction value table 70 contains “distortion aberration correction values and peripheral light intensity correction values in accordance with focusing points and zoom positions . . . on a lens to lens basis.” *Id.* CPU 57, executing the image correction program, “determines a table according to a lens type and determines correction values according to a focusing point and a zoom position, and [corrected] image data 72 is obtained in compliance with the correction values.” *Id.* ¶ 47.

2. Claim 1

a) digital imaging system/video camera

Claim 1 recites a digital imaging system for correcting optical image aberrations in a digital video, comprising a digital video camera including in-camera software. Ex. 1001, 38:36–38.

Petitioner contends Watanabe teaches a digital video camera because its CCD captures images at a sampling rate optimized for an NTSC (National Television System Committee) video signal. Pet. 12 (citing Ex. 1005 ¶¶ 35, 37, Figs. 1A, 1B; Ex. 1003 ¶¶ 142–147). Alternatively, Petitioner contends a person skilled in the art would have found it obvious to apply Watanabe’s aberration correction technique to videos obtained by a digital video camera because such a person would have known that “digital video comprises successive digitized images (called frames) with aberrations correctable the same way aberrations could be corrected in a still image.” *Id.* at 12–13 (citing Ex. 1003 ¶¶ 148–49). Petitioner contends Watanabe’s camera includes in-camera software “because it ‘stores programs’ in read-only memory (‘ROM’).” *Id.* at 13–14 (citing ¶¶ 39, 42, Fig. 1B).

Patent Owner argues Watanabe does not disclose a digital video

camera because it “repeatedly refers to a ‘digital still camera’” and never refers to MPEG (Motion Pictures Expert Group). Prelim. Resp. 25. Patent Owner further argues Watanabe’s disclosure of sampling CCD data at a multiple of an NTSC signal’s sub-carrier frequency “merely discloses a possible sampling rate/frequency of a fast A/D converter” sampling a single image rather than sampling multiple images per second. *Id.* at 29–30. Lastly, Patent Owner argues a person skilled in the art would not have found it obvious to use Watanabe’s aberration correction technique to correct digital video because doing so would have required additional functionality not disclosed in Watanabe such as “accommodating a changing of the focusing point and the zoom position for subjects” in a digital video. *Id.* at 30. This would result in “different [process information] for each frame” and would be too “time-consuming and power-consuming.” *Id.* at 31.

At this stage of the proceeding, Petitioner demonstrates a reasonable likelihood of showing Watanabe teaches or suggests a digital video camera recording digital video. As Mr. Laub explains, SMPTE (Society of Motion Picture and Television Engineers) Standard 244M, released in 1995, describes a “video digital interface for systems operating according to the . . . NTSC standard . . . sampled at four times color subcarrier frequency,” which closely matches Watanabe’s disclosure of its CCD sampling data at “an integral multiple of [the] sub-carrier frequency of an NTSC signal.” Ex. 1003 ¶¶ 144–147 (quoting Ex. 1015 § 1.1; Ex. 1005 ¶ 37). Moreover, as Mr. Laub further explains, at the time of Watanabe’s filing, it was known that digital cameras could capture both still and video images. *Id.* ¶ 148 (citing Ex. 1041, 2:45–49).

b) optical lens mechanism

Claim 1 further requires the digital imaging system to include an optical lens mechanism, wherein the optical lens mechanism is a zoom lens or a fixed focal length lens. Ex. 1001, 38:36–39, 38:45–46. Petitioner contends Watanabe discloses an optical lens mechanism that is a zoom lens because it discloses “correcting distortion ‘based on . . . zoom position for each lens.’” Pet. 14 (citing/quoting Ex. 1005 ¶¶ 35, 36, 47, 49, Figs. 1A, 3). Patent Owner does not dispute this contention, with which we preliminarily agree. Prelim. Resp. 17–40.

c) digital sensor

Claim 1 further requires the digital imaging system to include at least one digital sensor for capturing the digital video. Ex. 1001, 38:36–40. Petitioner contends Watanabe discloses a digital sensor in the form of a CCD whose analog output is converted to digital via an A/D converter. Pet. 14 (citing Ex. 1005 ¶¶ 35, 37, Fig. 1A; Ex. 1003 ¶ 154). Petitioner further argues Watanabe’s CCD is a “digital” sensor because the ’685 patent identifies CCDs as digital sensors even though they output an analog signal. *Id.* (citing Ex. 1001, 18:11–15). Patent Owner does not dispute Petitioner’s contentions, with which we preliminarily agree. Prelim. Resp. 17–40.

d) integrated circuit

Claim 1 further requires the digital imaging system to include an integrated circuit including a digital signal processor configured to access a database management system including a plurality of optical image aberration corrections. Ex. 1001, 38:36–43.

Although both parties contend this term should be construed to have its ordinary and customary meaning, the parties’ respective contentions inherently dispute that meaning. Petitioner’s contentions inherently construe

the term to mean an IC that includes a DSP, where the IC is configured to access a DBMS. Pet. 15–21. Petitioner contends claim 14 supports this interpretation. *Id.* at 18. Patent Owner’s contentions inherently construe the term to mean an IC that includes a DSP, where the DSP is configured to access a DBMS. Prelim. Resp. 34–36. Patent Owner provides no support for this interpretation. *Id.*

At this stage of the proceeding, we preliminarily agree with Petitioner’s interpretation. As discussed below, claim 1 requires “the integrated circuit [to] use[] the in-camera software to identify at least one optical image aberration and to correct the at least one optical image aberration in at least one frame of the digital video using at least one of the plurality of optical image aberration corrections in the database.” Ex. 1001, 38:47–52. This is consistent with claim 14, which also requires a digital camera having “an integrated circuit including a digital signal processor configured to access a database management system,” wherein “the integrated circuit uses system software to access the database to identify at least one optical aberration in at least one frame of the video.”¹¹ *Id.* at 40:36–39. Thus, it is the IC that accesses the DBMS, not the DSP. Given this preliminary construction, we reject Patent Owner’s contention that “Petitioner fails to establish that Watanabe discloses or renders obvious ‘a digital signal processor configured to access a database management system’” because the claims do not require the DSP to access a DBMS. Prelim. Resp. 34.

¹¹ The parties do not address whether claim 1 and claim 14 should be construed differently with respect to this limitation. *See* Pet. 18; PO Resp. 35. They may do so during trial.

Petitioner contends Watanabe’s camera includes DSP 56 and CPU 57 and a person skilled in the art would have found it obvious to integrate these components in a single IC because doing so was well-known and an obvious design choice. Pet. 15–17 (citing Ex. 1005 ¶¶ 35, 38, Fig. 1B; Ex. 1003 ¶¶ 159–169, 267–73; Ex. 1018, 4:2–9; Ex. 1019, 1-1, 1-2, 1-6:1-8, 2-1:2-3, 4-2; Ex. 1020, 1; Ex. 1021, 1009–10). Petitioner argues the combination would have been obvious because “a single IC combining one or more CPU[s] and DSP[s] provided several benefits over using discrete components” including reducing “system size, power consumption, and cost” and increasing “system performance by facilitating optimized task partitioning between DSP[s] and other processors, provid[ing] fast communication and efficient memory sharing between DSP[s] and other processor cores, and reduc[ing] processing delay compared to implementations [using] discrete components.” *Id.* at 16 (citing Ex. 1003 ¶ 167; Ex. 1019, 1-1, 1-2, 1-6:1-8, 2-1:2-3, 4-2). Petitioner further contends a person skilled in the art would have had a reasonable expectation of successfully combining a DSP and CPU in a single IC because such ICs were “known and used for video processing” and within the level of skill in the art. *Id.* at 17 (citing Ex. 1003 ¶¶ 168–69).

Patent Owner argues Petitioner’s proposed combination suffers from hindsight bias. Prelim. Resp. 39. Patent Owner contends Watanabe’s DSP 56 and CPU 57 “serve different purposes and perform multiple different functions” and that CPU 57 does more than just control DSP 56, it “also controls each part of the system according to the photographing program.” *Id.* Patent Owner further contends that although “integration may ‘provide fast communication and efficient memory sharing’ for the operation of [DSP] 56 . . . the overall efficiency of the camera would be reduced as []

CPU [57] would still be required to control other functions within the camera.” *Id.*

At this stage of the proceeding, we find Petitioner articulates sufficient reasoning with rational underpinnings to combine Watanabe’s DSP 56 and CPU 57 in a single IC. It was known to do this. *See* Ex. 1019, 1–2 (disclosing a single IC integrating a master processor with general-purpose processing capabilities, four parallel DSP processors, memory (SRAM), and a memory controller). Patent Owner does not dispute this. Instead, Patent Owner argues, without supporting evidence, that integrating Watanabe’s DSP and CPU would make Watanabe’s system less efficient rather than more efficient. Prelim. Resp. 39–40. We do not find this argument credible or persuasive.

Petitioner contends Watanabe’s IC (DSP 56 and CPU 57) is configured to access a DBMS that includes a plurality of optical image aberration corrections because CPU 57 runs a control program “to ‘contol[] each part’ of the camera including ‘a correction process on image data’” and Watanabe’s camera includes tables 70 having “distortion aberration correction values and peripheral light intensity correction values.” Pet. 18–19 (citing/quoting Ex. 1005 ¶¶ 42, 47, 48, 49, Figs. 3, 4; Ex. 1003 ¶¶ 172–73, 177). Petitioner contends Watanabe’s tables 70 are a database because “a database may be viewed as one or more tables of information.” *Id.* at 18 (quoting Ex. 1022, 2:8–12). Petitioner contends Watanabe’s control program is a DBMS “because it is software that retrieves image correction data” from tables 70. *Id.* at 19 (citing Ex. 1005 ¶¶ 42, 47, 49, Fig. 3; Ex. 1003 ¶¶ 177–78).

Patent Owner contends Watanabe’s tables 70 are not a database because they are not “updatable” and “[t]he ’685 Patent explains that the

updatable database is a ‘particularly important’ feature” of the invention. Prelim. Resp. 36–37. But claim 1 recites a “database” not an “updatable database” and it is improper to read embodiments from the Specification into the claims. *See Philips v. AWH Corp.*, 415 F.3d 1303, 1323 (2005) (“[A]lthough the specification often describes very specific embodiments of the invention, we have repeatedly warned against confining the claims to those embodiments.”).

Patent Owner further contends Petitioner fails to demonstrate that Watanabe’s control program is a DBMS because Petitioner defines a DBMS as “software used to create, store, retrieve, change, manipulate, sort, format and print . . . information in a database” but fails to demonstrate that Watanabe’s control program performs each of these functions. Prelim. Resp. 37–38.

At this stage of the proceeding, we find Petitioner’s contentions are sufficient to demonstrate a reasonable likelihood of success in showing Watanabe teaches an IC configured to *access* a DBMS, which is all our preliminary construction of claim 1 requires. As Petitioner points out, claim 1’s digital imaging system does not require a component that “comprise[s] a DBMS.” Pet. 18. Rather, it requires an “IC ‘including a DSP’ [that] is ‘*configured to access*’ a DBMS.” *Id.* (emphasis added). Petitioner sufficiently demonstrates that Watanabe’s IC (DSP 56 and CPU 57) is *configured to access* a DBMS because when executing “image processing software [it] retrieves image correction data from . . . tables 70.” *Id.* at 19–20 (citing Ex. 1005 ¶¶ 38, 42, 47–49, 60–62, Figs. 1A, 1B, 3; Ex. 1003 ¶¶ 178, 180–81).

We note, as well, that the Specification contains neither the phrase “database management system” nor its acronym DBMS. The DBMS

acronym does appear in Figure 1 (element 190) and Figure 35 (steps 3510 and 3520). Ex. 1001, Figs. 1, 35. However, only element 190 is part of a digital video camera, as step 3510 refers to an “External Computer DBMS” and step 3520 refers to a “DBMS in [a] Distributed Network.” *Id.*

Moreover, the Specification refers to each of these elements as a “database” rather than a DBMS. *Id.* at 31:39–40 (referring to “database (190)”), 38:15–18 (referring to “an external computer database (3510)” and “the database of a distributed network (3520)”). Thus, we preliminarily construe claim 1 to require an IC configured to access a database rather than an IC configured to access an actual database management system. This construction provides an antecedent basis to “the database” recited in a later limitation, which requires the IC to use software to identify and correct an optical image aberration “using at least one of the plurality of optical image aberration corrections in the database.” *Id.* at 38:47–52. The parties may further address this construction during the trial.

Petitioner contends Watanabe’s IC (DSP 56 and CPU 57) is configured to access “a plurality of optical image aberration corrections” because it “accesses a database (tables 70 . . .) that provides distortion aberration and peripheral light intensity corrections.” Pet. 21 (citing Ex. 1005 ¶¶ 47, 49; Ex. 1003 ¶ 187). Although Patent Owner disputes whether tables 70 constitute a database and argues claim 1 requires the DSP to access the DBMS/database as discussed above, Patent Owner does not dispute that Watanabe’s tables 70 store optical image aberration corrections. Prelim. Resp. 34–37. We agree that tables 70 store optical image aberration corrections that are accessed by Watanabe’s IC.

e) memory-storage sub-system

Claim 1 further requires the digital video camera to include a memory storage sub-system. Ex. 1001, 38:38–44. Petitioner contends Watanabe teaches this limitation by disclosing ROM 58, which “stores programs and data,” RAM 59, which “temporarily stores data,” and “memory card 10 and built-in memory 19,” which “store image data in ‘an image data file.’” Pet. 21 (citing Ex. 1005 ¶¶ 35, 42; Ex. 1003 ¶¶ 188–89). Patent Owner does not dispute these contentions, with which we preliminarily agree. *See* Prelim. Resp. 17–40.

f) identify and correct optical image aberration

Claim 1 further requires the IC to use “in-camera software to identify at least one optical image aberration and to correct the at least one optical image aberration in at least one frame of the digital video using at least one of the plurality of optical image aberration corrections in the database.” Ex. 1001, 38:47–52.

Petitioner contends a person skilled in the art “would have understood that a ‘frame of the digital video’ . . . means a still image, while a video is a sequence of still images played at a frame rate (frames per second).” Pet. 23 (citing Ex. 1013, 5:3–9; Ex. 1003 ¶ 194). Petitioner contends Watanabe discloses identifying an optical image aberration in a frame/image because the CPU in its IC “runs software . . . that identifies an optical image aberration correction—and therefore also identifies ‘at least one optical image aberration’—by database lookup based on the lens type” and adds the correction information “to image data based on the lens used to capture the image.” *Id.* at 22–23 (citing Ex. 1005 ¶¶ 46–47; Ex. 1003 ¶¶ 192–105). Patent Owner does not dispute these contentions, with which we preliminarily agree. *See* Prelim. Resp. 17–40.

g) video capture and forwarding

Claim 1 further requires the digital video to be “captured by the at least one digital sensor and [to be] forwarded to the digital signal processor.” Ex. 1001, 38:53–54. Petitioner contends Watanabe discloses this limitation because its CCD captures video data, which is digitized by its A/D converter and sent to DSP 56. Pet. 24 (citing Ex. 1005 ¶¶ 37, 38, 61, 62, Figs. 1A, 1B; Ex. 1003 ¶¶ 196–97). In doing so, Petitioner refers back to its digital sensor analysis (Pet. § VI.B.2.b), which in turn refers back to its digital video camera analysis (Pet. § VI.B.2.a) to support its contention that Watanabe’s CCD is a digital sensor that captures a digital video signal. *Id.* at 12–14, 24. Patent Owner does not dispute these specific contentions, but as discussed above, disputes whether Watanabe records digital video. *See* § II.C.2.a, *supra*. At this stage of the proceeding, we find Petitioner demonstrates a reasonable likelihood of showing Watanabe teaches or suggests recording digital video for the reasons discussed above, as well as a CCD that captures and forwards the images that make up a digital video to a DSP. *Id.*

h) digital filtration

Claim 1 further requires the digital “video image file with the at least one optical image aberration [to be] corrected by applying a digital filtration using the digital signal processor.” Ex. 1001, 38:55–57.

Petitioner interprets the recited “video image file” to be a file containing “at least one frame of the digital video” whose optical image aberration is identified for correction by the IC. Pet. 24. Patent Owner does not dispute this interpretation, with which we preliminarily agree. *See* Prelim. Resp. 17–40. Petitioner contends Watanabe discloses this limitation because DSP 56 under CPU 57’s control “corrects optical image aberrations in video images . . . by applying corrections from the database” tables 70.

Id. at 24–25 (citing Ex. 1005 ¶¶ 38, 42, 49, 59–62, Figs. 1A, 1B, 3; Ex. 1003 ¶¶ 202–204). Petitioner contends DSP 56 uses “digital filtration” to correct the image aberrations because a digital filter is a “computational process or algorithm by which a sampled signal or sequence of numbers . . . is transformed into a second sequence of numbers” and DSP 56 “numerically processes the image” it receives from CCD 53 and A/D converter 55. *Id.* at 25 (citing Ex. 1028, 193; Ex. 1003 ¶¶ 98–111). Petitioner further contends the ’685 patent describes “digital filtration” in a similar manner by identifying “data interpolation as [an] example of ‘digital filtration.’” *Id.* (citing Ex. 1001, 15:36–39).

Patent Owner argues “Watanabe does not disclose [DSP] 56 executing aberration correction,” but instead “expressly discloses that ‘CPU 57 executes . . . a correction process on image data.’” Prelim. Resp. 32 (quoting Ex. 1005 ¶ 42). Patent Owner further argues that a person skilled in the art reading Watanabe would have understood that:

it is the CPU 57 that executes aberration correction, not [DSP] 56. Watanabe relies heavily on CPU 57 which has more functionality and in turn, requires more processing power, than [DSP] 56. Watanabe’s heavy dependence on the CPU 57 is contrary to the claimed inventions of the ’685 Patent that efficiently distribute[s] the workload by using the digital signal processor for specific functions.

Id. at 33 (emphasis omitted). Acknowledging Petitioner’s reliance on Watanabe’s disclosure that DSP 56 “executes various process[es], correction and a data process for image compressing/extracting,” Patent Owner argues this “does not disclose that [DSP] 56 performs aberration correction” and does not “disclose that [DSP] 56 obtains correction values from tables 70.” *Id.* (quoting Ex. 1005 ¶ 38). Instead, Patent Owner argues, this discloses

DSP 56 performs other types of corrections, such as gamma corrections. *Id.* at 34.

At this stage of the proceeding, Petitioner demonstrates a reasonable likelihood of showing Watanabe's DSP 56 performs aberration correction under control of CPU 57 using the aberration correction values obtained from tables 70. Watanabe discloses DSP 56 receives image data from CCD 53 and A/D converter 55 and performs various processes on the image data, including a correction process. Ex. 1005 ¶ 38, Figs. 1A, 1B. Watanabe further discloses CPU 57 retrieves image correction parameters from tables 70 and controls each part of the digital camera, including DSP 56, while executing an image processing program. *Id.* ¶¶ 47, 59. Mr. Laub testifies that it is Watanabe's DSP 56 that uses the image correction parameters to "correct[] optical image aberrations in video images." Ex. 1003 ¶ 204. At this stage of the proceeding, we find this testimony credible.

i) video storage

Lastly, claim 1 requires the "corrected video consisting of the digital data optimized from the at least one optical image aberration that are corrected from the original video image [to be] stored in the memory storage sub-system." Ex. 1001, 38:58–61. Petitioner contends Watanabe discloses this limitation by disclosing CPU 57 records aberration corrected image data on memory card 60. Pet. 26 (citing Ex. 1005 ¶¶ 58, 63, Figs. 1B, 3; Ex. 1003 ¶ 207). Patent Owner does not dispute this contention, with which we preliminarily agree. Prelim. Resp. 17–40.

j) Conclusion regarding claim 1

For the reasons discussed above, we find at this stage of the proceeding, Petitioner demonstrates a reasonable likelihood of showing Watanabe teaches or suggests all of the limitations recited in claim 1 and

that Petitioner articulates sufficient reasoning with rational underpinning to combine Watanabe's DSP 56 and CPU 57 in an IC and to apply Watanabe's teachings in a digital video camera or digital camera capable of taking videos. According, we find Petitioner demonstrates a reasonable likelihood of showing claim 1 is unpatentable as obvious over Watanabe.

3. *Claim 2*

Claim 2 depends from claim 1, and requires the optical image aberrations to "include at least one of spherical, comatic, lens distortion, astigmatism, curvature of field, pin cushion, barrel distortion, chromatic aberrations, scattered light, and/or flare types of optical image aberrations." Ex. 1001, 38:62–67. Petitioner argues claim 2 requires only one of the listed optical image aberrations and Watanabe discloses "correcting 'curvature aberration' . . . and lens distortion." Pet. 27 (citing Ex. 1005 ¶ 6; Ex. 1003 ¶¶ 210–11; quoting Ex. 1006 ¶ 7). Patent Owner does not dispute these contentions, and we agree that Watanabe discloses identifying and correcting lens distortion. *See* Prelim. Resp. 7–40.

4. *Claim 29*

Claim 29 depends from claim 1, and requires the system of claim 1 to include "machine readable instructions for the system to correct for curvature of field aberrations." Ex. 1001, 42:16–18.

Petitioner, referring to its analysis of claim 2, contends Watanabe discloses such instructions. Pet. 39 (citing Ex. 1006 ¶ 7; Ex. 1003 ¶ 315). Patent Owner contends Petitioner fails to demonstrate that Watanabe's system corrects for curvature of field aberration due to an erroneous translation of Watanabe's Japanese application. Prelim. Resp. 40. Patent Owner contends Petitioner's translation differs from the translations filed as the US and EPO applications, which correctly refer to "distortion aberration

correction” rather than to “curvature aberration correction.” *Id.* (citing Ex. 1005 ¶ 46; Ex. 1006 (¶ 8); Ex. 2004, 10:10–11).

At this stage of the proceeding, we agree with Patent Owner. The ’685 patent identifies five specific Seidel aberrations, “spherical aberration, distortion (barrel distortion and pin cushion distortion), comatic aberration, astigmatism, and curvature of field.” Ex. 1001, 3:45–48. Claim 2 recites these five separately. *Id.* at 38:62–67. Thus, at this stage of the proceeding, we interpret “lens distortion” aberration to be different from “curvature of field” aberration. We note that Watanabe’s Japanese, US, and EPO applications consistently refer to correcting two types of image defects: distortion aberration and peripheral light intensity aberration. *See* Ex. 1005 ¶¶ 2, 9, 32, 46–50, 53, 55, 56, 64, 71, 80, 86–93, 96); Ex. 1006 ¶¶ 1, 3–5 and 7–10; Ex. 2004 ¶¶ 1, 4, 5, 7–10). Although Petitioner’s translation of the Japanese application refers to a “curvature aberration correction,” it does so only once. Ex. 1006 ¶ 7. Moreover, even there, it describes the correction in the context of correcting “information related to lens characteristics (that is, information related to distortion).” *Id.* Elsewhere, Petitioner’s translation consistently refers to “distortion,” “distortion aberration,” or “distortion correction.” *Id.* ¶¶ 1, 3–5 and 7–10.

Accordingly, at this stage of the proceeding, we interpret Watanabe’s Japanese application as disclosing only “lens distortion” correction, not “curvature of field” correction as recited in claim 29.

E. Remaining Challenges

Because we find Petitioner has demonstrated a reasonable likelihood of showing at least one challenged claim is unpatentable as obvious over Watanabe, we need not review all of Petitioner’s challenges. *See* 35 U.S.C. § 314(a) (“The Director may not authorize an inter partes review to be

instituted unless . . . there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.”).

III. CONCLUSION

We have reviewed the Petition and Patent Owner’s Preliminary Response, and have considered all of the evidence and arguments presented by Petitioner and Patent Owner. We find, at this stage of the proceeding, Petitioner has demonstrated a reasonable likelihood of showing at least one claim of the ’685 patent is unpatentable. Accordingly, we institute *inter partes* review of all claims on all grounds raised in the Petition.

The Board has not yet made a final determination with respect to any claim construction issue, priority issue, or the patentability of any challenged claim.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 314, an *inter partes* review is instituted on all challenged claims on all grounds; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial commencing on the entry date of this Decision.

IPR2024-00923
Patent 10,873,685 B2
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