

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SAMSUNG ELECTRONICS CO., LTD. and
SAMSUNG ELECTRONICS AMERICA, INC.,
Petitioner,

v.

CELLECT, LLC,
Patent Owner.

IPR2020-00477
Patent 9,667,896 B2

Before JAMESON LEE, TERRENCE W. McMILLIN, and GARTH D.
BAER, *Administrative Patent Judges*.

McMILLIN, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
35 U.S.C. § 318(a)

I. INTRODUCTION

A. *Background and Summary*

Samsung Electronics Co., Ltd. and Samsung Electronics America, Inc. (“Petitioner”) filed a Petition to institute an *inter partes* review of claims 1, 5, and 21 (the “challenged claims”) of U.S. Patent No. 9,667,896 B2 (Ex. 1001, the “’896 patent”) pursuant to 35 U.S.C. § 311 *et seq.* Paper 2 (“Petition” or “Pet.”). Collect, LLC (“Patent Owner”) filed a Response. Paper 17 (“Response” or “Resp.”). Petitioner thereafter filed a Reply (Paper 20 (“Reply”)) and Patent Owner filed a Sur-reply (Paper 24 (“Sur-reply”)). Oral argument was heard on April 30, 2021, and a transcript was entered into the record (Paper 32 (“Tr.”)).

We have jurisdiction to conduct this *inter partes* review under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed herein, we determine that Petitioner has shown, by a preponderance of the evidence, that claims 1, 5, and 21 of the ’896 patent are unpatentable.

B. *Related Matters*

The parties indicate that the ’896 patent has been asserted in the following district court litigation: *Collect, LLC v. Samsung Electronics Co., Ltd. et al.*, 1-19-cv-00438 (D. Colo.). Pet. 7; Paper 4, 1.

Petitioner further identifies the following related patents and respective proceedings:¹

¹ Institution of *inter partes* review was denied in IPR2020-00472, IPR2020-00473, IPR2020-00474, IPR2020-00559, IPR2020-00560, IPR2020-00561, IPR2020-00562, IPR2020-00563, and IPR2020-00564. *Inter partes* review was instituted in IPR2020-00476 and a final written decision has been entered.

IPR2020-00477

Patent 9,667,896 B2

Patent 6,043,839; IPR2020-00472;

Patent 6,275,255 B1; IPR2020-00473;

Patent 6,982,740 B2; IPR2020-00474, *ex parte* reexamination;

Patent 9,186,052 B1; IPR2020-00475, IPR2020-00512;

Patent 9,198,565 B2; IPR2020-00476;

Patent 6,982,742 B2; IPR2020-00559, IPR2020-00560, IPR2020-00561, *ex parte* reexamination;

Patent 6,424,369; IPR2020-00562, IPR2020-00563, IPR2020-00564, *ex parte* reexamination;

Patent 6,452,626; IPR2020-00565, IPR2020-0566, IPR2020-00567, *ex parte* reexamination;

Patent 6,862,036 B2; IPR2020-00568, IPR2020-00569; and

Patent 7,002,621 B2; IPR2020-00571, IPR2020-00572, *ex parte* reexamination. Pet. 7–8.

C. The '896 Patent

The '896 patent is titled, “Reduced Area Imaging Device Incorporated Within Endoscopic Devices.” Ex. 1001, code (54). By way of background, the '896 patent explains that “endoscopic surgery has become the accepted standard for conducting many types of surgical procedures.” *Id.* at 1:42–44. Solid state imaging technology is increasingly replacing the rod lens endoscope, due to “its cost of manufacture, failure rate, and requirement to be housed within a rigid and straight housing.” *Id.* at 1:54–57. Solid state imaging technology “enables the image sensor to be placed at the distal tip of the investigating device.” *Id.* at 1:57–59. Complementary metal oxide semiconductor (CMOS) imaging devices are solid state imaging devices that “offer improved functionality and simplified system interfacing” and “can be manufactured at a fraction of the cost of other solid state imaging

technologies.” *Id.* at 1:64–67. However, despite improved CMOS imaging devices that enable a “camera on a chip” concept (*see id.* at 2:1–3:21), “a need still exists for a reduced area imaging device which can be used in even the smallest type of endoscopic instruments.” *Id.* 3:29–31.

The ’896 patent provides a wireless endoscope that “rearrange[s] the circuitry in a stacked relationship so that there is a minimum profile presented when used within a surgical instrument or other investigative device.” *Id.* at 3:35–40. In an embodiment, an imaging device may be entirely self-contained in the distal end of an endoscope. *Id.* at 9:62–64. Figure 2a, showing a cross-sectional view of an endoscope with an imaging device incorporated into the distal tip of the endoscope, and Figure 2b, showing a partially exploded perspective view of the distal end of the endoscope shown in Figure 2a, are reproduced below.

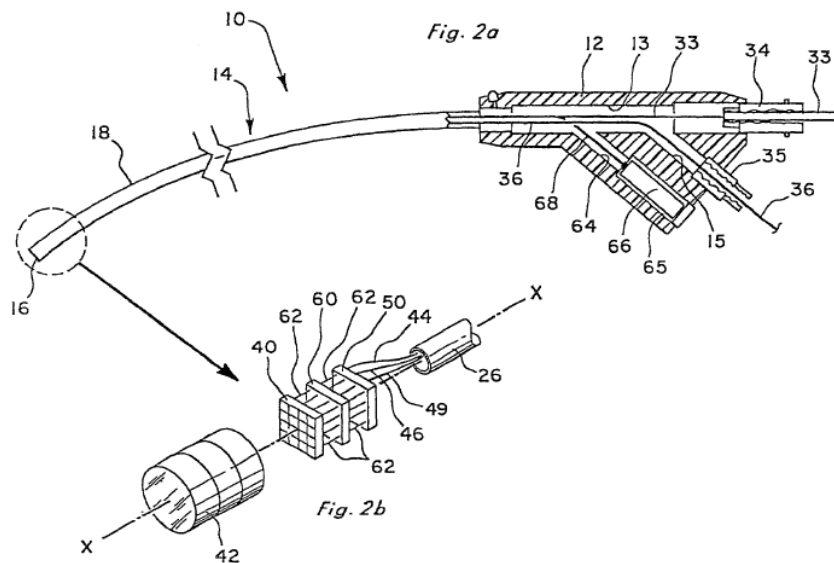


Figure 2a is a cross-sectional view of an endoscope; Figure 2b is a partially exploded perspective view of the distal end of the endoscope of Figure 2a. *Id.* at 6:61–67.

As shown in Figure 2b, an imaging device in the distal end 16 of an endoscope may include image sensor 40 electrically coupled, via pin

connectors 62, to video processing board 50 and optional supplementary board 60. *See id.* at 9:62–10:12. Image sensor 40 may be bonded to lens system 42. *Id.* at 10:26–27.

Figure 4a, reproduced below, shows a detailed schematic diagram of image sensor 40.

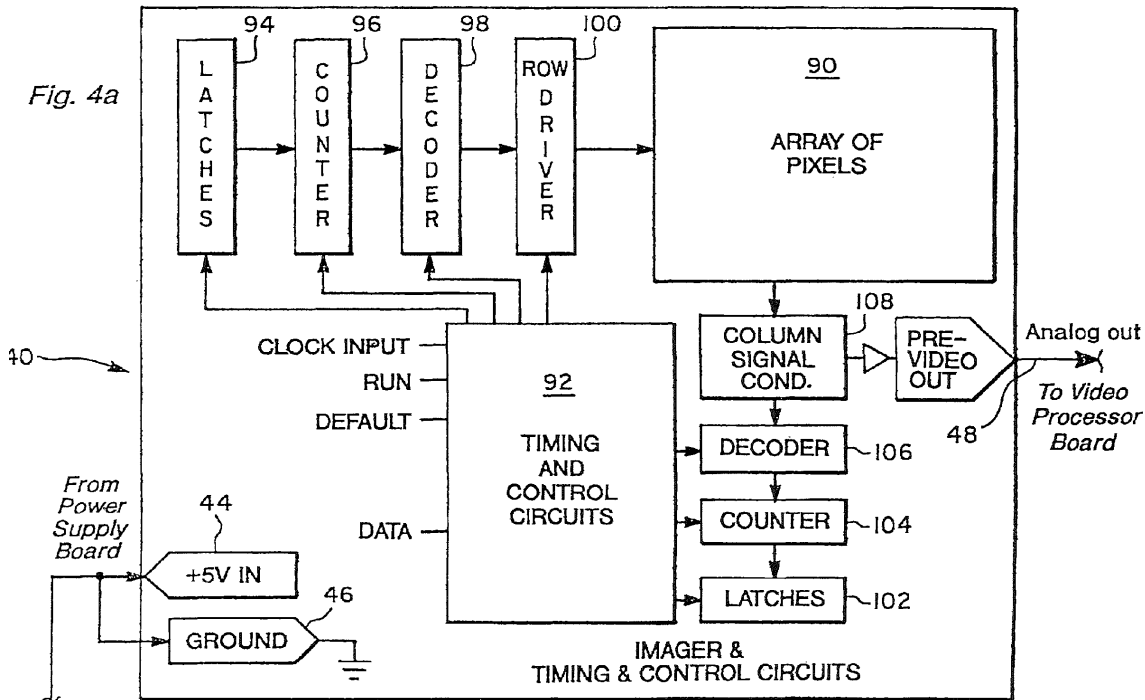


Figure 4a shows a detailed schematic diagram of image sensor 40. *Id.* at 12:40–41.

As shown in Figure 4a, image sensor 40 contains array of pixels 90 and timing and control circuits 92. *Id.* at 12:40–42. Array of pixels 90 is an active pixel group and “[e]ach pixel circuit has its own amplifier which is controlled by the timing and control circuitry.” *Id.* 12:45–64.

D. Challenged Claims

Petitioner challenges claims 1, 5, and 21 of the ’896 patent. Pet. 1. Of the challenged claims, claims 1 and 21 are independent. Ex. 1001,

Claim 1 is illustrative of the challenged claims, and recites:

1. An imaging device comprising:

a housing;

an image sensor mounted in said housing, said image sensor including a first circuit board having a length and a width thereto, wherein said length and width of said first circuit board define a first plane, said first circuit board including an array of CMOS pixels thereon, wherein a plurality of CMOS pixels within said array of CMOS pixels each include an amplifier, said first circuit board further including timing and control circuitry thereon, said timing and control circuitry being coupled to said array of CMOS pixels, said image sensor producing a pre-video signal, wherein the image sensor is generally square shape along the first plane;

a second circuit board mounted in said housing, said second circuit board being electrically coupled to said first circuit board, said second circuit board having a length and a width thereto, wherein said length and width of said second circuit board define a second plane, said second circuit board including circuitry thereon to convert said pre-video signal to a post-video signal, said second circuit board being offset from said first circuit board, said second plane of said second circuit board being substantially parallel to said first plane of said first circuit board;

a lens mounted in said housing, said lens being integral with said imaging device, said lens focusing images on said array of CMOS pixels of said image sensor;

a video screen, said video screen being electrically coupled to said second circuit board, said video screen receiving said post-video signal and displaying images from said post-video signal; and

a power supply mounted in said housing, said power supply being electrically coupled to said first circuit board to provide power to said array of CMOS pixels and said timing and control circuitry, said power supply also being electrically coupled to said second circuit board to provide power thereto;

wherein, a largest dimension of said second circuit board along said second plane is greater than a largest dimension of said image sensor along said first plane.

Id. at 21:51–22:26.

E. Prior Art and Asserted Ground

Petitioner challenges claims 1, 5, and 21 of the ‘896 patent based on the following ground:

Claims Challenged	35 U.S.C. §	References
1, 5, 21	103	Wakabayashi, ² Ackland ³

Pet. 11. Petitioner relies on the Declarations of Dr. Dean P. Neikirk (Ex. 1004 (“Neikirk Decl.”); Ex. 1086 (“Neikirk Reply Decl.”)), in support of the contentions in the Petition. Patent Owner relies on the Declaration of Michael Lebby, Ph.D. (Ex. 2088 (“Lebby Decl.”) in support of its contentions.

II. ANALYSIS

A. Legal Standards

A patent claim is unpatentable if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person

² U.S. Patent 5,903,706, filed Aug. 22, 1995, issued May 11, 1999 (Ex. 1027).

³ U.S. Patent 5,835,141, filed July 3, 1996, issued Nov. 10, 1998 (Ex. 1006).

having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of ordinary skill in the art; and (4) where in evidence, objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Consideration of the Graham factors “helps inform the ultimate obviousness determination.” *Apple Inc. v. Samsung Elecs. Co.*, 839 F.3d 1034, 1048 (Fed. Cir. 2016) (en banc).

“In an [*inter partes* review], the petitioner has the burden from the onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring *inter partes* review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden of persuasion never shifts to Patent Owner. See *Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (discussing the burden of proof in *inter partes* review).

B. Level of Ordinary Skill in the Art

Petitioner contends that a person of ordinary skill would have possessed the following:

a minimum of a Bachelor’s degree in Electrical Engineering, Physics, or a related field, and approximately two years of professional experience in the field of imaging devices. Additional graduate education could substitute for professional experience, or significant experience in the field could substitute for formal education.

Patent Owner contends that a person of ordinary skill would have possessed the following:

Bachelor’s degree in Electrical Engineering, Physics, or a related field, and approximately **three** years of professional experience in the field of **visible optical** imaging devices.

Resp. 18–19 (citing Ex. 2088 (Lebby Decl.), ¶ 40) (emphasis added). The contentions of the parties are similar. Petitioner argues, “[a]ny differences between the experts’ definitions of a POSITA [person of skill in the art] do not impact the obviousness of the Challenged Claims.” Reply 1 n.1. Patent Owner does not argue to the contrary.

We adopt Petitioner’s articulation of the level of ordinary skill in the art because it is consistent with the disclosure of the ’896 patent, but delete the qualifier “a minimum of” for the level of education, to keep that level from being vague and extending to a range that includes the skill level of an expert. Thus, we regard the level of ordinary skill as being at the level of a person with “a Bachelor’s degree in Electrical Engineering, Physics, or a related field, and approximately two years of professional experience in the field of imaging devices.” Further, we find that the prior art of record reflects the level of skill in the art at the time of the invention. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). However, the findings in this decision would not be different under the Patent Owner’s articulation of the level of ordinary skill in the art.

C. Claim Construction

Claim construction in this proceeding is governed by 37 C.F.R. § 42.100 (b), which provides:

In an *inter partes* review proceeding, a claim of a patent, or a claim proposed in a motion to amend under §42.121, shall be construed 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), including construing the claim 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.

Under the standard set forth in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–19 (Fed. Cir. 2005) (en banc), claim terms are given their ordinary and customary meaning, as would have been understood by a person of ordinary skill in the art at the time of the invention, in light of the language of the claims, the specification, and the prosecution history of record. *See Thorner v. Sony Comput. Ent. Am. LLC*, 669 F.3d 1362, 1365–66 (Fed. Cir. 2012). There is a “heavy presumption,” however, that a claim term carries its ordinary and customary meaning. *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002) (citation omitted).

We are also guided by the principle that we only construe claim terms if, and to the extent that, it is necessary for the purpose of the proceeding. *See, e.g., Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011) (“[C]laim terms need only be construed ‘to the extent necessary to resolve the controversy.’”) (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

Neither party has proposed an express construction for any claim term and both parties interpret the claim terms according to their plain and ordinary meaning consistent with the specification. Pet. 17; Resp. 18. We determine we need not construe any claims terms and apply the plain and ordinary meaning consistent with the specification to the claim terms.

D. Asserted Obviousness of Claims 1, 5, and 21

Petitioner challenges claims 1, 5, and 21 as obvious over Wakabayashi and Ackland. Pet. 19–73. Wakabayashi and Ackland are summarized below.

1. Wakabayashi (Ex. 1027)

Wakabayashi was filed on August 22, 1995, and issued on May 11, 1999. Ex. 1027, codes (22), (45). The earliest priority date claimed for the '896 patent is based on the filing date of parent U.S. Patent Application No. 08/944,322, which is October 6, 1997. Ex. 1001, code (63). Therefore, Wakabayashi is prior art to the '896 patent under at least 35 U.S.C. § 102(e). Patent Owner does not contest the prior art status of Wakabayashi. *See generally* Resp.

Wakabayashi is titled, “Imager Apparatus with Rotatable Camera Head.” Ex. 1027, code (54). Wakabayashi is directed to “a portable imager apparatus which includes a video camera as an imager unit, a direct-view type flat display as an electronic view finder or display, and a semiconductor memory or video tape recorder (VTR) as a storage or recording unit.” *Id.* at 1:5–9.

Figure 3, showing a cross-sectional view of an imager apparatus, is reproduced below.

FIG. 3

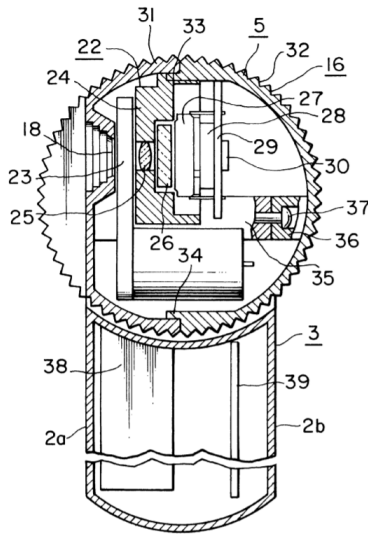


Figure 3 is a cross-sectional view of an imager apparatus. *Id.* at 5:48–49.

As shown in Figure 3, camera case 16, formed with imaging hole 18, contains video camera 22, which includes shutter 23, lens case 24, lens 25, quartz filter 26, imager device 27, mounting plate 28, and camera circuit board 29. *Id.* at 5:49–58.

2. *Ackland (Ex. 1006)*

Ackland was filed on July 3, 1996, and issued on November 10, 1998. Ex. 1006, codes (22), (45). The earliest priority date claimed for the '896 patent is based on the filing date of parent U.S. Patent Application No. 08/944,322, which is October 6, 1997. Ex. 1001, code (63). Therefore, Ackland is prior art to the '896 patent under at least 35 U.S.C. § 102(e). Patent Owner does not contest the prior art status of Ackland. *See generally* Resp.

Ackland is titled “Single-Polysilicon CMOS Active Pixel Image Sensor.” Ex. 1006, code (54). Ackland is directed to a “[a] CMOS active pixel characterized by a single layer of polysilicon for forming the photo

gate and the transfer gate . . . , a method for operating the pixel, and pixel arrays based on such a pixel.” *Id.* at 2:19–22. Ackland describes an array of pixels arranged in first and second groups representing a row and column, respectively. *Id.* at 2:46–50. A first common conductor conducts control signals for the first group, while a second common conductor selectively transmits, to output nodes, electronic data signals that correspond to portions of an image to be converted. *Id.* at 2:50–55.

Figure 6, showing an active pixel image sensor, is reproduced below.

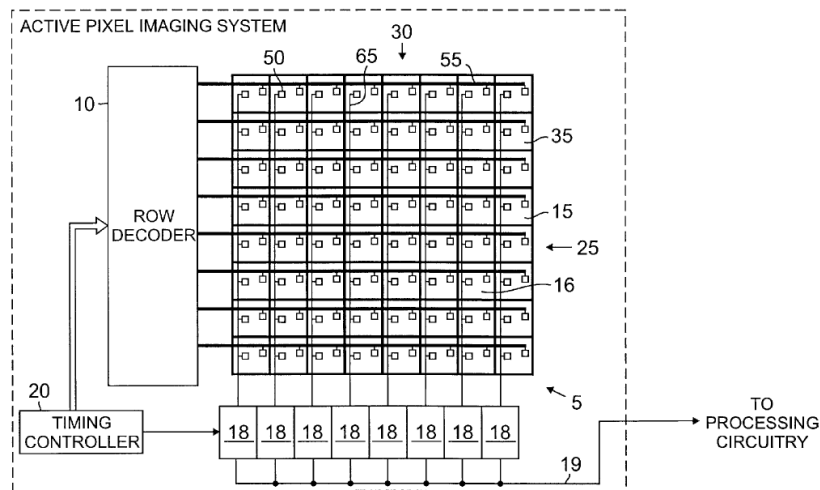


FIG. 6

Figure 6 shows an active pixel image sensor. *Id.* at 3:6–7.

The Figure 6 embodiment, which may be used as a solid-state camera, includes “array 5 of active pixels, a row decoder 10 and a plurality of output amplifiers 18.” *Id.* at 7:62–65. A common conductor 55 serves as a control line for each row 25 of pixels. *Id.* at 8:10–11. A common conductor 65 serves as an output line to a particular amplifier 18 for each column 30 of pixels. *Id.* at 8:18–20. “A timing controller 20 provides timing signals to the row decoder 10.” *Id.* at 8:24–25. In response to the timing signals, “the decoder 10 sequentially activates each row 25 of active pixels 35 via the

control lines 55 to detect light intensity and to generate corresponding output voltage signals during each frame interval.” *Id.* at 8:25–29. “The voltage signals generated by the activated row 35 are simultaneously provided to the corresponding amplifiers 18 via the column output line 65.” *Id.* at 8:45–48.

3. Objective Evidence of Nonobviousness

Patent Owner argues that there is strong objective evidence that the challenged claims are non-obvious. Resp. 52–60. Petitioner argues that Patent Owner’s “arguments fail to provide the necessary nexus between the Challenged Claims and [Patent Owner]’s secondary considerations arguments, let alone evidence of the secondary indicia themselves.” Reply 24. As explained below, Patent Owner has not identified any commercial product that is within the scope of the challenged claims. *See* Tr. 64–67. Patent Owner also has not established that the evidence it submits relates to the inventions claimed in the ’896 patent. *See id.* at 64–78. Without such proof, we consider this evidence, but adjudge it is entitled to little or no weight in determining whether the challenged claims are non-obvious.

For objective indicia of nonobviousness to be accorded substantial weight, its proponent must establish a nexus between the evidence and the merits of the claimed invention. *ClassCo, Inc., v. Apple, Inc.*, 838 F.3d 1214, 1220 (Fed. Cir. 2016). “[T]here is no nexus unless the evidence presented is ‘reasonably commensurate with the scope of the claims.’” *Id.* (quoting *Rambus Inc. v. Rea*, 731 F.3d 1248, 1257 (Fed. Cir. 2013)). A patentee is entitled to a presumption of nexus “when the patentee shows that the asserted objective evidence is tied to a specific product and that product ‘embodies the claimed features, and is coextensive with them.’” *Fox Factory, Inc. v. SRAM, LLC*, 944 F.3d 1366, 1373 (Fed. Cir. 2019) (quoting

Polaris Indus., Inc. v. Arctic Cat, Inc., 882 F.3d 1056, 1072 (Fed. Cir. 2018) (quoting *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000))). “[T]he purpose of the coextensiveness requirement is to ensure that nexus is only presumed when the product tied to the evidence of secondary considerations ‘is the invention disclosed and claimed.’” *Id.* at 1374 (quoting *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988)). “[T]he degree of correspondence between a product and the patent claim falls along a spectrum. At one end of the spectrum lies perfect or near perfect correspondence. At the other end lies no or very little correspondence.” *Id.* “A patent claim is not coextensive with a product that includes a ‘critical’ unclaimed feature that is claimed by a different patent and that materially impacts the product’s functionality.” *Id.* at 1375.

Patent Owner does not provide an analysis demonstrating that its evidence or products are coextensive (or nearly coextensive) with the challenged claims. *See* Resp. 52–60; Sur-reply 23–25; *see also* Tr. 64–67. We, therefore, find that a presumption of nexus is inappropriate.

However, “[a] finding that a presumption of nexus is inappropriate does not end the inquiry into secondary considerations.” *Fox Factory*, 944 F.3d at 1375. “To the contrary, the patent owner is still afforded an opportunity to prove nexus by showing that the evidence of secondary considerations is the ‘direct result of the unique characteristics of the claimed invention.’” *Id.* at 1373–74 (quoting *In re Huang*, 100 F.3d 135, 140 (Fed. Cir. 1996)). “Where the offered secondary consideration actually results from something other than what is both claimed and *novel* in the claim, there is no nexus to the merits of the claimed invention,” meaning that “there must be a nexus to some aspect of the claim not already in the prior

art.” *In re Kao*, 639 F.3d 1057, 1068–69 (Fed. Cir. 2011) (emphasis in original). On the other hand, there is no requirement that “objective evidence must be tied exclusively to claim elements that are not disclosed in a particular prior art reference in order for that evidence to carry substantial weight.” *WBIP, LLC v. Kohler Co.*, 829 F.3d 1317, 1331 (Fed. Cir. 2016). A patent owner may show, for example, “that it is the claimed combination as a whole that serves as a nexus for the objective evidence; proof of nexus is not limited to only when objective evidence is tied to the supposedly ‘new’ feature(s).” *Id.* Ultimately, the fact finder must weigh the secondary-considerations evidence presented in the context of whether the claimed invention as a whole would have been obvious to a skilled artisan. *Id.* at 1331–32.

Under the heading “Commercial Success and Licensing,” Patent Owner argues, “the fact that companies have taken a license to the ’896 Patent is powerful evidence of non-obviousness” and “Patent Owner and its parent, Micro-Imaging Solutions has licensed its patented reduced are [sic] imaging device to several companies including: Gyrus Group PLC, Cook Inc., Cook Medical Technologies LLC, Coopersurgical, Inc., Ethicon Endo-Surgery, Inc., Fujikura Ltd., Microtek Medical, Inc., Endosee Corp., Karl Storz Imaging, Inc., and Voyage Medical Inc.” Resp. 54. Petitioner argues that Patent Owner “fails to show that the ’896 patent is licensed or practiced.” Reply 25. Patent Owner does not indicate which of the above-identified entities, or how many, have taken a license to the ’896 patent. *See* Resp. 54. The only support that Patent Owner cites for this argument of “Commercial Success and Licensing” or that the listed companies have

licensed the '896 patent is Exhibit 2074.⁴ *Id.* Exhibit 2074 is unexplained by Patent Owner with regard to its nature, source, origin, and authorship, and does not identify or refer to any specific licensed patent.⁵ Exhibit 2074 does not refer to the '896 patent and provides no proof that the '896 patent has been licensed to any of the listed companies.⁶ Ex. 2074, 1. The only listed company mentioned in Exhibit 2074 is Fukijara Ltd. and the only reference to it states, "2013: Exclusive license with Fukijara Ltd. (Japan) for re-usable and disposable medical fields." *Id.* Patent Owner provides no argument or evidence that would show that this license, which occurred in 2013 before the application for the '896 patent was filed in 2015 or issued in

⁴ It is unclear what Exhibit 2074 is or what basis exists to rely upon it or admit it into evidence. The Federal Rules of Evidence apply to this proceeding. 37 C.F.R. § 42.62 (a). Patent Owner provides no explanation of Exhibit 2074 or support for relying upon it or admitting it into the record. *See* Resp. 54; *see also* Tr. 67–69. At oral argument, Patent Owner's counsel provided his "understanding" that Exhibit 2074 is a printout from the Patent Owner's website. Tr. 67:6–13. Patent Owner has not established any basis for allowing Exhibit 2074 into the record or provided any explanation as to why we should rely on it. Nonetheless, we consider Exhibit 2074, but accord it little or no evidentiary value.

⁵ Patent Owner has not provided any specific evidence of any license to the '896 patent. No license agreement has been entered into evidence, nor is there any evidence of the terms of any license to the '896 patent. For example, there is no evidence as to the amount of royalties, if any. If the licenses were royalty free or the royalty was quite low, the license may not indicate that the subject matter of the license was significant (and could indicate the opposite). In addition, the geographic or temporal scope of the licenses are not in evidence. Without any information of, at least, the key terms of the licenses, we find that Exhibit 2074 is entitled to little or no weight.

⁶ Patent Owner argues ten companies are licensed. Pet. 54. Exhibit 2074 refers to nine licenses but describes the licensees in such general and vague terms that no specific companies can be identified (except for Fukijara Ltd.). Patent Owner provides no explanation. *See* Pet. 54.

2017 (Ex. 1001, codes (22), (45)), relates to the '896 patent or the invention claimed or described in the '896 patent. *See* Pet. 54. And, if the license under the '896 patent to Fukijara Ltd. was exclusive, this would contradict Patent Owner's statement that the other listed companies are also licensed to the '896 patent.⁷ Further, there is no evidence that Patent Owner, a licensee, or anyone else made a product that was within the scope of the claims of the '896 patent and was a commercial success. Based on this record, we find there is insufficient evidence to show that the invention of the challenged claims of the '896 patent has been a commercial success or is licensed.

Under the heading "Recognition of a Problem and Long Felt but Unresolved Need," Patent Owner argues that "[a]lthough there existed endoscopic devices, there was a pressing need for smaller, more cost effective endoscope [sic]" and

Industry publications such as Orthopaedic Product News in July 2007 recognized the contribution to the art by Patent Owner's reduced area imaging device as incorporated in an endoscope that addressed a long felt need for a smaller imaging device in endoscopes. In particular, Orthopaedic Product News recognized Patent Owner's incorporating a reduced area CMOS imaging device, as recited in the Challenged Claims.

Resp. 54. Patent Owner bases this argument on the need for a "smaller, more cost effective and reliable endoscope," a "reduced area imaging device as incorporated in an endoscope," and "a long felt need for a smaller imaging device in endoscopes." However, the challenged claims are directed broadly to "imaging device[s]" and are not directed to endoscopes

⁷ Exhibit 2074 describes seven licenses as exclusive or co-exclusive without any explanation as to how multiple licenses can be properly described in this way. Patent Owner provides no explanation. *See* Resp. 54.

and there are no claim limitations directly relating to size or cost of the claimed devices. Even assuming that there was a long felt but unresolved need for a smaller and more cost-effective endoscope, Patent Owner has not shown a nexus to the claimed invention and none can be presumed.

Assuming that the article is referring to a product of Patent Owner, Patent Owner has not shown that the product is “coextensive” with any challenged claim from the perspective of satisfaction of a long felt but unresolved need. *See Fox Factory*, 944 F.3d at 1373.

The only evidence submitted in support of this argument is Exhibit 2089. Exhibit 2089 is an article from an industry publication that refers to CMOS sensors built into endoscopes. *See Ex. 2089, 2* (“A Denver-based company has developed and patented high resolution, sturdy and inexpensive CMOS sensors (Complimentary Metal Oxide Semiconductors) that are actually built into the distal tip of arthroscopes, as well as other commonly used endoscopes.”). There is no argument or evidence establishing that these CMOS sensors are within the scope of the challenged claims or relate to the invention of the ’896 patent. Petitioner argues that Patent Owner’s “allegations of long-felt need ([Resp.] 54-55) are not tied to the Challenged Claims as [Patent Owner] fails to demonstrate the alleged need was solved by any novel, claimed aspect of the alleged invention.” Reply 25–26.

For numerous reasons, Patent Owner’s assertion that the claimed invention of the ’869 patent satisfied a long felt but unresolved need is not supported by the evidence of record. Establishing a long felt need requires objective evidence that the invention has provided a long awaited, widely accepted, and promptly adopted solution to a problem extant in the art, or that others had tried but failed to solve that problem. *In re Mixon*, 470 F.2d

First, Patent Owner does not explain why the referenced Denver-based company in the news article is the Patent Owner. Second, Patent Owner does not explain whether the referenced tips of arthroscopes and endoscopes with a built-in CMOS sensor make use of the claimed invention of the '869 patent, and if so, which claims. Third, Patent Owner does not indicate whether any significant features are included in the referenced tips of arthroscopes and endoscopes, which are not recited in any claim of the '869 patent. Fourth, Patent Owner does not explain how long a pressing need existed for a smaller, more cost effective and reliable endoscope. Fifth, Patent Owner has not identified any prompt adoption of the claimed invention by anyone. Sixth, Patent Owner has not identified any specific prior failed attempts to resolve the alleged need. Seventh, a single article is not demonstration of widespread recognition by those with ordinary skill in the art that there was a problem without a solution in the industry.

Based on this record, we find no evidence that the invention of the challenged claims of the '896 patent was made in response to a recognized problem or solved a long felt but unresolved need.

Under the heading "Industry Skepticism," Patent Owner argues that, "[a]s noted in the prosecution history, at the time of the invention the industry was skeptical regarding the use of CMOS imagers in the medical imaging application on it [sic] was recognized at the time that CMOS imager quality, was compared to CCD imagers that were widely used in devices at the time, was meaningfully lower than available with CCD imager devices." Resp. 56. The only evidence cited in support of this argument is a declaration from one of the listed inventors of the '896 patent, Jeffrey L. Adair (*see* Ex. 1001, code (72)), from March, 1999. *See* Ex. 1003, 83–89.

This declaration was not filed during prosecution of the application for the '896 patent (US Patent Appl. No. 14/941,040, filed on Nov. 13, 2015 (*see* Ex. 1001, codes (21) (22)), but in support of a distantly related application (US Patent Appl. No. 09/175,685, filed on Oct. 20, 1998 (*see id.* at code (63); Ex. 1003, 1). This declaration was filed in support of claims that were much different in scope than the claims of the '896 patent. *See* Ex. 1003, 84 (“I have also read and am familiar with the new claims appearing in the Preliminary Amendment date March 8, 1999) [Ex. 1003, 72–78] and the Supplemental Preliminary Amendment dated March 24, 1999 [*id.* at 79–81].” Petitioner argues that Patent Owner’s “allegations of industry skepticism lack any nexus to the Challenged Claims as the industry skepticism [Patent Owner] cites has to do with ‘CMOS in medical applications’—an unclaimed application—and image quality of CMOS sensors, which again are not novel.” Reply 26. Patent Owner provides no evidence of industry skepticism regarding the invention claimed in the '896 patent. *See* Resp. 56–57; *see also* Tr. 96:6–17 (Patent Owner’s counsel acknowledging the challenged claims are not limited to medical imaging applications and “that’s not what the claims say in this proceeding”). Based on this record, we find no evidence that there was industry skepticism related to the invention of the challenged claims of the '896 patent.

Under the heading, “Unexpected Results,” Patent Owner argues, “[d]uring prosecution of a related reduced area imaging device application, the inventor Jeffrey Adair submitted a declaration noting the unexpected results achieved by this claimed reduced area imaging device.” Resp. 57. The Adair declaration referred to is the same declaration discussed in the preceding paragraph, Exhibit 1003, 83–89. *See* Resp. 58. Again, this declaration was filed in support of claims that were much different in scope

than the claims of the '896 patent. In the Response, Patent Owner quotes this paragraph from the declaration:

During our testing of the devices claimed in this invention, we discovered an unknown, but very important advantage that our device has over CCD imagers. This advantage is the capability of our device to reject radio frequency interference (RFI) which is emitted by electrosurgical generators used during surgery. . . . CCD devices cannot be used near an electrical surgical generator without requiring significant shielding for the CCD device. . . . Even when such shielding is incorporated, RFI levels are only brought to a reasonable level which may still result in an obstructed view of the surgical area. After testing several types of CMOS configurations, we concluded that **remoting processing circuitry from the CMOS imager and timing and control circuits eliminated the need for shielding**. In other words, we found that this configuration was not susceptible to RFI.

Resp. 57–58 (quoting Ex. 1003, 85–86). This passage makes clear that the unexpected result (“the capability of our device to reject radio frequency interference (RFI)”) was attributed by the inventor to “remoting processing circuitry from the CMOS imager and timing and control circuits.” This “remoting” feature was explicitly recited in all the claims that were pending in that application. *See* Ex. 1003, 86 (“This feature of remoting the processing circuitry is recited in all of the independent claims” and “Independent claims 1, 6, and 24 claim this particular feature of the invention wherein the processing circuitry is remotod from a co-planar pixel array and timing and control circuitry.”).⁸

⁸ For example, pending claim 24 recited, “An endoscope comprising: a tubular portion . . . a CMOS image sensor positioned at said distal end of said tubular portion . . . a control box *remote* from said tubular portion and coupled to said CMOS image sensor, said control box including circuitry means for receiving a pre-video signal form said CMOS image sensor, and

There are numerous reasons to question Patent Owner’s argument relating to alleged unexpected results. The asserted unexpected result is “the capability of our device to reject radio frequency interference (RFI) which is emitted by electrosurgical generators used during surgery.” Resp. 57 (citing Ex. 1003 (Adair Declaration), 85–86). However, none of the imaging devices claimed is incorporated in a medical surgical device such as an endoscope. Thus, the unexpected result, even if true, is not commensurate in scope with what has been claimed. “In order to establish unexpected results for a claimed invention, objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.” *In re Clemens*, 622 F.2d 1029, 1035 (CCPA 1980) (citations omitted).

Further, to establish a showing of unexpected results, Patent Owner has to compare the claimed invention with the closest prior art. *In re Fracalossi*, 681 F.2d 792, 794 (CCPA 1982); *In re Fenn*, 639 F.2d 762, 763 (CCPA 1981). Patent Owner has not shown that the closest prior art is a CCD imager. According to Patent Owner, CMOS technology and CCD technology are very different from each other. Resp. 10–18. On that basis,

for converting said pre-video signal to a post-video signal which may be received by a standard video device” Ex. 1003, 76–78 (emphasis added). None of the challenged claims of the ’896 patent are directed to an endoscope with a remote control box feature or a device with any similar feature. *See* Ex. 1001, 21:51–22:26 (claim 1), 22:36–37 (claim 5), 25:18–26:28 (claim 21). Accordingly, the challenged claims cover devices in which the processing circuitry (the circuitry for converting the pre-video signal to a post-video signal) is near (rather than remote from) the image sensor. *See, e.g.*, Ex. 1001, 6:61–67, 8:62–10:46, Figs. 2a, 2b (disclosing an embodiment in which all the imaging circuitry is placed in distal end 16 of the endoscope and video processing board 50 is placed near and directly behind image sensor 40).

it would appear that a closer prior art than a CCD device would be a CMOS imager such as that disclosed in Ackland, or WO 95/34988, Published December 21, 1995 (“Swift” (Ex. 1005)), or US. Pat. 5,919,130, filed March 17, 1997 (“Monroe” (Ex. 1007)).⁹

Additionally, Dr. Neikirk provides contrary testimony. Dr. Neikirk states that the alleged discovery is not unexpected but, rather, predictable.

Ex. 1004 ¶ 189. Dr. Neikirk explains as follows:

[A]s the declaration notes, they were using endoscopic cameras around an “electrosurgical generator” that was used to “cut or cauterize” tissue. ’839 File History, 85. It would have been understood by a person of ordinary skill in the art that such an electrosurgical generator would create a large amount of electromagnetic (“EM”) radiation. Moreover, while the declaration does not clearly state how many wires were in the CCD system at issue, a person of ordinary skill in the art would have understood that such EM radiation would cause radio frequency interference (“RFI”) in a system, and would have a more significant adverse effect on a system with more wires than a system with fewer wires. It was also known that a CCD sensor could have many more wires than a CMOS sensor. For example, according to the declaration, the prior art CCD sensor identified in the declaration (“Pelchy”) includes “a large number of transmission wires 33 which interconnect the circuit boards placed perpendicular to the pixel array with an external processor 13.” ’839 File History, 92. Thus, in a CCD sensor with many wires, the radio frequency interference would have a relatively large effect on the quality of images produced by the image sensor. On the other hand, CMOS sensors require only a few wires to connect to the pixel array, and thus interference created in a CMOS image sensor would be much smaller than in such CCD arrangement.

⁹ Swift and Monroe are cited in the Petition to show CMOS sensor configurations already known in the art. Pet. 26.

Ex. 1004 ¶ 189. This testimony is not rebutted by Patent Owner's expert, Dr. Lebby, or any other evidence. Patent Owner does not identify any testimony of Dr. Lebby conveying that it would have been unexpected to one of ordinary skill in the art that a CMOS sensor with remotely located processing circuitry would have no need for RFI shielding.

Dr. Neikirk's testimony is rational and we credit his testimony over the testimony of Patent Owner's inventor who provides no explanation as to why it was unexpected that, as compared to CCD devices, a CMOS imager with remotely located processing circuitry requires no RFI shielding.

For the foregoing reasons, Patent Owner has not established that the alleged unexpected result truly would have been unexpected to one with ordinary skill in the art. Even assuming the alleged unexpected result truly would have been unexpected to one of ordinary skill in the art, Patent Owner has not shown sufficient nexus between the unexpected result and the claimed invention. Based on this record, we are not persuaded of any unexpected results related to the invention of the challenged claims of the '896 patent.

Under the heading "Industry Praise," Patent Owner argues that "[p]roducts embodying the invention claimed reduced area imaging device have received industry praise" and "Patent Owner's endoscopes, which embodied the claimed features of the reduced area imaging device, including a CMOS pixel array and separated image processing circuitry, was thus praised by other[s] for the innovative and non-obvious features claimed in the Challenged Claims." Resp. 58–59. As noted above, the record in this proceeding contains no evidence that establishes that any product embodying the invention claimed in the '896 patent was ever made (or praised.) The only evidence Patent Owner offers in support of its "Industry

Praise” argument is Exhibit 2090, that Patent Owner contends shows it, “won the Orthopedics This Week’s 2016 Sports Medicine Technology for its ‘Distally mounted CMOS Sensor for disposable/reusable and rigid/flexible scopes’ which features the claimed reduced area imaging device.” Resp. 58. Clearly, this award constitutes praise of Patent Owner’s products, but that does not translate into praise of the invention of the ’896 patent without some showing that the praised products are within the scope of the claims of the ’896 patent. Patent Owner makes no argument and submits no evidence to show that the products that won the award were within the scope of any invention claimed in the ’896 patent. *Id.* at 58–59. And, we can discern no basis for concluding from Exhibit 2090 that the products that won the award embody the invention of the challenged claims. Petitioner argues that Patent Owner’s “alleged industry praise ([Resp.] 58-59) also lacks the requisite nexus as it too is directed to the unclaimed feature of disposability of endoscope tips.” Reply 26. We agree that the alleged praise is directed to features not recited in the challenged claims (“Distally mounted CMOS Sensor for disposable/reusable and rigid/flexible scopes”) and there is no nexus established between the industry praise and the invention of the challenged claims. Ex. 2090. Based on this record, we find no evidence establishing that the invention claimed in the ’896 patent received any industry praise.

Under the heading, “Proceeding Contrary To Accepted Wisdom,” Patent Owner argues:

Prior to the ’896 Patent, the accepted wisdom in the art was that CMOS imagers should be implemented in an on-chip integration manner. Dr. Eric Fossum spearheaded the development of the CMOS camera on a chip design efforts. Fossum’s design would enable full realization of the benefits of

a CMOS imager boasting numerous benefits over the dominant CCD image sensor. For example, the CMOS camera on a chip would enable designers to “make a camera small and cheap enough to open vast new markets for everything from dolls that “see” to rear-bumper cameras that would help drivers back up.” Ex. 1060. However, Patent Owner recognized that a need still existed for a reduced area imaging device which could be used in even smaller devices, such as endoscopic instruments, in order to view areas that are particularly difficult to access, and to further minimize patient trauma by an even smaller diameter invasive instrument. As a result, the ’896 Patent describes and claims a reduced area imaging device which took advantage of Fossum’s revolutionary “camera on a chip” technology, but rearranged the circuitry to separate out circuitry so that a further minimum profile could be achieved.

Resp. 59–60.

Patent Owner’s argument is excessively vague. The meaning of “accepted wisdom in the art” is unclear and not sufficiently defined. We do not know whether Patent Owner means that (1) one with ordinary skill in the art would have recognized a CMOS imager in a multi-chip implementation to be inoperative or unworkable and thus would not have considered it, or (2) substantial focus and effort existed at the time to develop a “camera-on-a-chip” design for CMOS imagers which was perceived to be better than a multi-chip configuration for CMOS imagers.

Between the two, only the first possibly can serve as an objective indicia of nonobviousness, and only if the “accepted wisdom in the art” turns out to be incorrect. The second simply is not an objective indicia of nonobviousness. Because the argument appears in Patent Owner’s discussion of objective indicia of nonobviousness, we discuss Patent Owner’s argument from the perspective of the first noted meaning.

Patent Owner does not cite to any expert testimony that supports the position that a CMOS imager in a multi-chip configuration was inoperative or unworkable. In fact, the record evidence is to the contrary. WO 95/34988, published December 21, 1995 (“Swift” (Ex. 1005)) and US. Pat. 5,919,130, filed March 17, 1997 (“Monroe” (Ex. 1007))¹⁰ are examples of prior-art disclosures of CMOS imagers with multi-chip configuration. Petitioner’s expert, Dr. Niekirk, specifically identifies such examples. Ex. 1004 ¶ 40. The record evidence does not support Patent Owner’s assertion that the accepted wisdom in the art was that CMOS imagers should be implemented in an on-chip integration manner. We do not find that to be so.

Also, Patent Owner appears to have ignored basic skills or fundamental engineering principles that would have been known to one with ordinary skill in the art, e.g., off-loading some components to another chip or another circuit board would decrease the required size for the containing chip or circuit board. Dr. Niekirk testifies that “a person of ordinary skill would have known that components could be placed on a number of circuit boards and arranged in any number of different “planes” based on the design needs and intended applications of a given device.” Ex. 1004 ¶ 40. Patent Owner does not identify any contrary testimony from its expert, Dr. Lebby. We credit this testimony from Dr. Niekirk.

Based on this record, we find Patent Owner’s argument that the challenged claims relate to an invention that was contrary to accepted wisdom in the art is weak and entitled to little weight.

¹⁰ Swift and Monroe are cited in the Petition to show CMOS sensor configurations already known in the art. Pet. 27–29.

In summary, we find that the evidence proffered by Patent Owner in an effort to establish that there is objective evidence of the non-obviousness of the invention claimed in the '896 patent is weak and has not been shown to relate to the specific inventions recited in the challenged claims. However, we have considered all the proffered evidence of objective indicia of nonobviousness relied upon by Patent Owner in our determination as to obviousness.

*4. Motivation to Combine the Relevant Teachings of
Wakabayashi and Ackland*

We find the Petition provides articulated reasoning with rational underpinning that a skilled artisan would have had a motivation to combine the relevant teachings of the Wakabayashi and Ackland. *See* Pet. 33–36. As shown in the Petition, Petitioner’s combination of the relevant teachings of Wakabayashi and Ackland is supported by Wakabayashi’s disclosure of the use of “solid-state imager devices” (*see* Ex. 1027, 9:11–12, 12:48–49) and Ackland’s teaching that CMOS pixel arrays are solid state image sensors (*see* Ex. 1006, 1:34–35) and “may be used as a solid state camera” (*see id.* at 7:64). And, Petitioner’s expert, Dr. Neikirk, testifies that a CMOS based imager is a solid state imager. Ex. 1004, ¶ 43. Patent Owner does not present any contrary evidence or argument. Thus, there exists non-contradicted evidence that the disclosure of a “solid state imager device” in Wakabayashi would teach or suggest to an ordinarily skilled artisan CMOS imagers such as are disclosed in Ackland.

Petitioner contends that, in the “Background of the Invention” section of the '896 patent, it is acknowledged that “CMOS image sensors and readout circuitry for operating such sensors, as disclosed in Ackland, were well known in the art.” *Id.* at 33 (citing Ex. 1001, 2:11–18, 2:27–36).

Petitioner also argues that, in the '896 patent, several important advantages to CMOS sensor imagers were identified and that these advantages would have motivated a skilled artisan to implement CMOS image sensors as disclosed in Ackland into the imager apparatus of Wakabayashi.

Petitioner contends that Wakabayashi and Ackland are in the same art ("solid state image sensors for use in cameras") and are analogous art to the '869 patent. *Id.* at 33–34. And, Petitioner argues that Wakabayashi and Ackland are both reasonably pertinent to problems identified in the '896 patent. *Id.* at 34. The Petition states:

In addition, Wakabayashi and Ackland are also reasonably pertinent to the alleged problem(s) identified in the '896 of arranging the circuitry of image sensor, including to minimize the size of the device and to be "low cost." *E.g.*, '896, 3:35- 43; Wakabayashi, Abstract, 2:37-39, 3:40-44, 14:6-10; Ackland, 2:10-15; Neikirk, ¶93. Moreover, the '896's stated goals of producing a "very small" or "low cost" imaging device were well known objectives that a POSITA designing imaging devices would have been aware of. *E.g.*, '896, 3:40-58; Wakabayashi, Abstract; Ackland, 2:10-15; Neikirk, ¶94. For example, Wakabayashi is explicitly directed to a device where the video camera unit is "reduced in size and weight." Wakabayashi, Abstract. It was also well-known that "[f]itting of the components into the available space" while maintaining "orientation of the components relative to one another," including "placement" of circuitry on "various layers" arranged "stackwise," is a common design consideration for portable devices, and a POSITA would have found it routine, straightforward and advantageous to rearrange the components as needed to create a smaller overall device. PCB Design, 1984, 15, 20; *KSR*, 127 S.Ct. at 1731; Neikirk, ¶94.

Id. And, Petitioner argues that it would have been "routine, straightforward, and advantageous" to apply Ackland's teachings to Wakabayashi's imager apparatus. The Petition states:

In light of the above, a POSITA would have found it routine, straightforward and advantageous to apply Ackland's known teachings of an array of CMOS active pixels in an image sensor outputting a pre-video signal in implementing Wakabayashi's imager apparatus, and would have known that such a combination (yielding the claimed limitations) would predictably work and provide the expected functionality. Neikirk, ¶¶84-97. In addition, [. . .] a POSITA would have found it routine, straightforward and advantageous to locate the circuitry to convert the pre-video signal, as taught by Ackland, to a post-video signal on Wakabayashi's circuit board 39, and would have known that such a design choice (yielding the claimed limitations) would predictably work and provide the expected functionality. Neikirk, ¶¶74-77, 97.

Id. at 35–36.

We determine that Petitioner's showing as to motivation to combine the relevant teachings of Wakabayashi and Ackland is well-supported including by specific language found in these two cited references. We have considered Patent Owner's arguments relating to the motivation to combine the relevant teachings of Wakabayashi and Ackland and discuss them in our detailed element-by-element analysis of the challenged claims that follows. On balance, we find Petitioner's arguments and evidence on motivation to combine to be much better supported and more persuasive than Patent Owner's contrary arguments.

5. Element-by-Element Analysis of Claims 1, 5, and 21

Petitioner contends that claims 1, 5, and 21 of the '896 patent would have been obvious in view of a combination of the teachings of Wakabayashi and Ackland. Pet. 17–71. Patent Owner argues that Petitioner has not shown that the cited art teaches or suggests limitations of independent claims 1 and 21 and that Petitioner has failed to show that a skilled artisan would have been motivated to combine Wakabayashi and

Ackland. Resp. 23–52. Our analysis of the arguments of the parties and the evidence follows.

Claim 1

1[pre] An imaging device comprising:

Petitioner does not take a position as to whether the preamble of claim 1 of the '896 patent is limiting but contends that Wakabayashi teaches an imaging device. Pet. 36 (“To the extent the preamble is limiting, Wakabayashi discloses an imaging device (e.g., ‘a portable imager apparatus’).”) (citing Ex. 1004 (Neikirk Decl.) ¶¶ 98–99). Patent Owner does not discuss the preamble of claim 1 in its Response. *See generally* Resp.

We determine that the preamble of claim 1 is not limiting because a structurally complete invention is recited in the body of claim 1 and the preamble only states the purpose or intended use of the invention. *Rowe v. Dror*, 112 F.3d 473, 478 (Fed. Cir. 1997) (“where a patentee defines a structurally complete invention in the claim body and uses the preamble only to state a purpose or intended use for the invention, the preamble is not a claim limitation”). However, we also agree with Petitioner that Wakabayashi discloses an imaging device. Wakabayashi states: “[t]he present invention relates to a portable imager apparatus which includes a video camera as an imager unit” Ex. 1027, 1:6–7.

1[a] a housing

Petitioner relies on Wakabayashi for teaching a housing. Pet. 37–39 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 100–102). The Petition states: “Wakabayashi discloses a housing of the imager apparatus formed by the ‘housing 3’ (including the ‘front panel 2a’ and ‘rear panel 2b’), ‘camera case 16,’ and ‘battery-cover 11.’ These components collectively form the

housing, as depicted in Figs. 1, 2 and 5.” Pet. 37. In its Response, Patent Owner refers to the “housing of the apparatus” in discussing the teachings of Wakabayashi. Resp. 19. In its Preliminary Response, Patent Owner acknowledges, “Wakabayashi plainly describes a ‘housing’ element of an imager apparatus 1, and labels the ‘housing’ element as element ‘3’ in its Figures.” Prelim. Resp. 49 (citing Ex. 1027, 4:44–51, Fig. 1). We find Wakabayashi teaches this limitation.

*1[b] an image sensor mounted in said housing,
said image sensor including a first circuit board
having a length and a width thereto, wherein said
length and width of said first circuit board define a
first plane, said first circuit board including an
array of CMOS pixels thereon*

Petitioner relies on a combination of Wakabayashi and Ackland as teaching this limitation. Pet. 39–44 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 107–110). Wakabayashi is relied upon for teaching “an image sensor mounted in said housing, said image sensor including a first circuit board having a length and a width thereto, wherein said length and width of said circuit board define a first plane.” *Id.* at 39–42. Petitioner asserts:

Wakabayashi discloses an image sensor including a “solid-state” “imager device 27” (an image sensor chip) mounted on a “circuit board 29” (a first circuit board having a length and width that define a first plane) as depicted in Fig. 7. *E.g.*, Wakabayashi, 5:56-59, 6:46-48, 9:10-14, Fig. 7. “Imager device 27” and “circuit board 29” are soldered onto “mounting plate 28,” which is “fixed” “to the camera case 16”—thus, the image sensor is mounted in the housing as depicted in Figs. 3 and 7. Wakabayashi, 5:62-65, 6:46- 48, Fig. 3, Fig. 7.

Id. at 40. Petitioner also provides annotated versions of Figures 3 and 7 of Wakabayashi (reproduced below).

“housing”



Id. at 44. Annotated Figure 6 depicts an array of CMOS pixels (shown in green in the annotated figure). Ex. 1006, 7:59–8:8.

With regard to combining the relevant teachings of Wakabayashi and Ackland, the Petition states:

While Wakabayashi discloses that the image sensor uses a “solid-state imager device” and a “circuit for driving the solid-state imager device” to “generate[] an opto-electrically converted signal” (Wakabayashi, 9:11-15), Wakabayashi does not expressly state that its “imager device 27 [] electrically connected to the camera circuit board 29” includes an array of CMOS pixels. Ackland expressly provides this additional implementation detail for “an imaging system...used as a solid-state camera.” *E.g.*, Ackland, 7:62-63. Specifically, Ackland teaches that the “imaging system” includes a “CMOS...pixel array” for receiving images thereon. Ackland, 1:35-38. . . . a POSITA would have been motivated to apply Ackland’s known teachings of an array of CMOS active pixels in an image sensor in implementing Wakabayashi’s “imager device 27 [] electrically connected to the camera circuit board 29.”

Pet. 42–43 (alterations in original). We find Petitioner’s reasons for combining these teachings from the cited art to be well-supported and reasonable.

Patent Owner argues that “[i]t is undisputed that Wakabayashi does not disclose a CMOS image sensor” and that a skilled artisan would interpret Wakabayashi as disclosing a circuit board including an array of CCD pixels.

Resp. 21. The Response states:

As explained in the accompanying declaration of Dr. Michael Lebby, a POSITA would understand Wakabayashi to be a CCD device, as Wakabayashi refers to a solid-state imager and describes a conventional CCD device design used in 1995 (when Wakabayashi was filed), for several reasons. *Lebby Decl.*, ¶¶ 100- 103, 107, 108, 119. Therefore, Wakabayashi

refers to a solid-state imager and describes a conventional CCD device design used in 1995 (when Wakabayashi was filed).

Id. As can be seen, this passage refers to “several reasons” why “a POSITA would understand Wakabayashi to be a CCD device” and cites the Lebby Declaration (Exhibit 2088) but does not state any such reason. This is an improper incorporation by reference. *See* 37 C.F.R. § 42.6(a)(3) (“Arguments must not be incorporated by reference from one document into another.”). And, this passage is a mischaracterization of the cited Lebby Declaration. The Lebby Declaration states, “Wakabayashi merely discloses the use of a solid-state imager and shows an architecture that would have been understood to use CCD, MOS, or CID image sensors” and:

Additionally, a POSITA would understand the design architecture in Wakabayashi, including imager device 27, mounting plate 28, camera circuit board 29, off-chip driving circuitry and synchronization signals, was intended to use a CCD, MOS, or CID imaging device. These off-chip design features were hallmarks of a CCD, MOS and CID devices.

Ex. 2088, ¶¶ 100, 102. Contrary to what is stated in the Response, Dr. Lebby’s Declaration does not state that “a POSITA would understand Wakabayashi to be a CCD device” but instead states Wakabayashi discloses the use of CCD, MOS, and CID image sensors.¹¹

¹¹ Patent Owner relies on this argument (“a POSITA would understand that the portable digital camera disclosed in Wakabayashi to be a CCD sensor device”) later in its Response and cites the same paragraphs of the Lebby Declaration in support. *See* Resp. 26 (cited in support of an argument that “to incorporate Ackland’s CMOS camera-on-a-chip sensor would fundamentally change Wakabayashi’s principle of operation as a CCD imaging device”). We reject all of Patent Owner’s arguments that rely on Patent Owner establishing that Wakabayashi is limited to disclosing CCD sensors.

Even if Wakabayashi is construed to suggest the use of a circuit board including an array of CCD pixels as Patent Owner asserts, by using broader language (“solid-state imager device” (*see* Ex. 1027, 9:11–12, 12:48–49)), Wakabayashi explicitly teaches something broader that reasonably includes a circuit board including an array of CMOS pixels. We determine that Patent Owner fails in its attempt to establish that this broader explicit description of the imager in Wakabayashi should be limited to CCD sensors. Petitioner’s argument in support of reading this term to include CMOS sensors is more than reasonable and we find it is clearly supported by the literal and plain meaning of Wakabayashi.

And, Ackland explicitly states a “class of solid state image sensors is a CMOS active pixel array.” Ex. 1006, 1:34–35. Petitioner’s combination of the relevant teachings of Wakabayashi and Ackland is supported by Wakabayashi’s disclosure of the use of “solid-state imager devices” (*see* Ex. 1027, 9:11–12, 12:48–49) and Ackland’s teaching that CMOS pixel arrays are solid state image sensors (*see* Ex. 1006, 1:34–35) and “may be used as a solid state camera” (*see id.* at 7:64). Patent Owner acknowledges that, “Ackland describes the physical and chemical structure of a CMOS active pixel, particularly a single-polysilicon CMOS active pixel, and a method of operating such a CMOS active pixel.” Resp. 22. These clear and related teachings of the cited art support Petitioner’s contentions regarding this limitation. We find the combination of the CMOS sensors of Ackland with the imaging apparatus of Wakabayashi to be the combination of familiar elements according to known methods that yields predictable results. *See KSR*, 550 U.S. at 416 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”).

Patent Owner argues that “Petitioner’s proposed modification to incorporate Ackland’s CMOS sensor would nevertheless make Wakabayashi’s imaging apparatus unsuitable for its intended purpose as a portable digital camera for taking videos and photographs.” Resp. 29. Patent Owner argues that a skilled artisan would understand that CMOS image sensors would not be suitable for the type of compact digital camera disclosed in Wakabayashi because “CMOS image sensors, at [the time the invention of the ’896 patent was made], produced images having high noise levels corresponding to poor image quality.” *Id.* at 30. Specifically, according to Patent Owner, CMOS image sensors at the time of the invention “produced images having high noise levels corresponding to poor image quality.” *Id.* (citing Exhibits 1060, 2060, 2063). But relatively poorer quality as compared to other technologies at the time does not mean or equate to inability to produce an image. Patent Owner does not assert that CMOS image sensors are incapable of producing an image, i.e., a picture or photograph. Exhibits 1060 and 2063 indicate that CMOS image sensors do produce images, just not as good, at the time, as CCD devices. Ex. 1060, 55; Ex. 2063, 1–2. Exhibit 2060 indicates that CMOS image sensors do produce images but include “annoying little dots or scratches on photos.” Ex. 2060, 3–4. Even the testimony of Patent Owner’s expert, Dr. Lebby, confirms that CMOS image sensors at the time of the invention were used for taking pictures. Ex. 2088 ¶ 106 (“[A]doption of CMOS sensors in 1997 were limited to applications where the quality of the image was less important . . .”).

Patent Owner further asserts:

The unsuitability of CMOS image sensors for digital cameras is confirmed by a review of all major digital cameras

released in 1997, which showed all digital cameras having CCD sensors and not CMOS sensors. *See* Ex. 2052 (showing a timeline of digital cameras released in 1997). This review even identified a digital camera, Casio QV-700, which has a swiveling lens similar to that of Wakabayashi, that has a CCD sensor.

Resp. 31. However, that argument is weak and unpersuasive. That all major digital cameras released in 1997 used CCD sensors and not CMOS sensors, even if true, does not mean CMOS sensors are incapable of being used for taking a picture or photograph. As noted above, Exhibits 1060, 2060, and 2063, as well as the testimony of Patent Owner's expert Dr. Lebby, all indicate that CMOS sensors were capable of producing an image, i.e., a picture or photograph. For commercial products, it is understandable that sensors producing higher quality image would be preferred. But that does not mean sensors outputting a lower quality image are incapable of producing a picture or photograph.

In any event, Patent Owner does not point to any description in Wakabayashi that specifies a minimum level of image quality that must be obtained by Wakabayashi's imaging apparatus. Even if it did, a prior art reference must be considered for everything it teaches by way of technology and is not limited to the particular invention it is describing and attempting to protect. *EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907 (Fed. Cir. 1985); *In re Heck*, 699 F.2d 1331, 1333 (Fed. Cir. 1983). Thus, suitability for the intended purpose of taking a picture or photograph does not require producing an image of very high quality. The claims of the '896 patent also do not require any particular level of image quality.

For the foregoing reasons, Petitioner's stated rationale for using Ackland's CMOS imager as Wakabayashi's solid-state imager is not

undermined by Patent Owner's argument that a CMOS imager is unsuitable for the intended purpose of Wakabayashi's imaging device.

Patent Owner argues that, "because modifying the CMOS sensor of Ackland to accommodate the off-chip design of Wakabayashi would render Ackland inoperable for its intended purpose of producing an image sensor with an 'on-chip' design, a person of ordinary skill in the art would not have been motivated to pursue the combination." Resp. 34. Patent Owner's argument is misplaced and unpersuasive. First, in Petitioner's proposed combination as discussed above, the entirety of what are shown in Ackland's Figure 6, labeled as "ACTIVE PIXEL IMAGING SYSTEM" and enclosed in dashed lines, is adopted for use as Wakabayashi's imager device 27, which is on one chip and substrate. Petitioner has not proposed to leave anything off or drop anything from what are shown in Ackland's Figure 6. Second, Ackland does not describe or refer to "on chip" or "single chip" with respect to its circuits, certainly not the "processing circuitry" absent from Figure 6. Ackland also does not describe that the intended purpose for the CMOS imager is to have it integrated on the same chip as the processing circuitry.

The evidence does not support Patent Owner's contention that Ackland's "processing circuitry" is required to be on the same chip as the circuits shown in Ackland's Figure 6 for Ackland's CMOS sensor to work. The evidence also does not support Patent Owner's contention that the intended purpose of CMOS image sensors, such as that disclosed by Ackland, would be to integrate all of its circuitry and components on a single semiconductor chip or one plane.

Further, Patent Owner's argument fails to take into account the disadvantages of CCD imagers as compared to CMOS imagers with

separately located processing circuitry. For instance, in the Patent Owner Response, Patent Owner notes that for a CCD pixel array, the entire CCD array must be driven to achieve the output of a single pixel. *Id.* at 13. And, Patent Owner describes an “Achilles’ heel” of CCD imagers:

CCD imagers generally used a bucket brigade design of pixel array (illustrated below) that has since been described to be its own “Achilles’ heel.” [Ex. 2053] at 1. (“The Achilles’ heel of CCDs is fundamental to the CCD operating principle—the need for nearly perfect charge transfer.”). To read out a CCD array, a single line “is scanned out from the horizontal shift register onto a capacitor which converts each charge packet to a voltage for subsequent amplification and buffering.” Ex. 2050 at 2. In other words, CCD array readout is “a process of repeated lateral transfer of charge in a MOS electrode-based analog shift-register, where “photo-generated signals are read after they are shifted into appropriate positions. Ex. 2056 at 1:52–56. This shifting process “requires high fidelity and low loss,” further requiring “[a] specialized semiconductor fabrication process . . . to obtain these characteristics.” *Id.* at 1:56–58. Higher voltages also are needed to drive the charge from each pixel through the entire array to read out the image data. Ex. 2036 at 9; Ex. 2063 at 3; Ex. 2004 at 4.

Id. at 13–14. During oral hearing, counsel for Patent Owner also acknowledged that a CCD imager performs destructive readout which is not the case for CMOS imagers. Tr. 15:1–18. Even Dr. Lebby, Patent Owner’s expert, has testified to advantages of CMOS imagers not tied to complete integration of all associated components, i.e., lower power requirements, increased resistance to radio frequency interference (RFI) and electromagnetic interference (EMI), and flexible readout of the signal charge without destroying the accumulated charge. Ex. 2088 ¶¶ 77, 83. Thus, a CMOS imager at the time was known to be better than a CCD

imager in some ways even one with separately located processing circuitry.

As noted above, Petitioner asserts that the lower costs of CMOS imagers would have motivated a POSITA to combine Ackland's CMOS imagers – instead of CCD imagers – with Wakabayashi's solid state imager apparatus to produce a low cost imaging device. Pet. 33–34 (citing Ex. 1060; Ex. 1004 ¶ 89, 92–94). Patent Owner, in response, presents persuasive rebuttal, noting that replacing the CCD array with a CMOS array would not yield much cost savings, and that the majority of those savings are actually brought about by incorporating all the relevant timing, control and image processing circuitry onto a single chip, rather than on multiple circuit boards. Resp. 42–43 (citing Ex. 1060, 54; Ex. 2060, 3). Petitioner replies that the cost advantage of CMOS imagers “is not entirely due to adding circuitry to the chip” but also because CMOS “fabrication facilities by this point in time were very standardized” and unlike CCD manufacturing, did not require new investment. Reply 13–14 (citing Ex. 2076, 193:7–194:20, 44:6–47:10; Ex. 2088 ¶ 78; Ex. 1086 ¶ 35–36). Patent Owner points out that this argument does not rebut or even address Patent Owner's assertion that utilizing a camera-on-a-chip design provides the vast majority of cost savings while using CMOS instead of CCD yields a minimal amount of such savings. Sur-Reply 21–22.

Patent Owner's arguments and corresponding evidence have created substantial doubt as to Petitioner's stated motivation to combine teachings based on reduced cost. We are not persuaded by Petitioner that reduced cost would have been a motivation for one with ordinary skill in the art to combine Wakabayashi and Ackland in the manner proposed by Petitioner. However, Petitioner has no need for that stated motivation or reason to

combine. As discussed above, Petitioner provides ample and sufficient motivation and suggestion to combine by identifying that Wakabayashi teaches the use of a “solid state imager,” and that Ackland specifically describes that its device is for use in a “solid state camera,” where it is not in dispute that a CMOS imager is a solid state imager.

Considering all the arguments of the parties on this issue and the related evidence, we find that the cited art teaches this limitation.

1[c] wherein a plurality of CMOS pixels within said array of CMOS pixels each include an amplifier

Petitioner relies on Ackland for teaching this limitation. Pet. 44–46 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 111–113). Ackland states, “active pixel 35 further includes . . . an amplifier formed by a voltage follower-transistor 125 . . . Typically, the active pixel 35 will be one of a plurality of such active pixels forming an array.” Ex. 1006, 3:22–29. And, we note that in the “Background of the Invention,” section of the ’896 patent, it is acknowledged that CMOS imagers with an amplifier at each pixel site had been previously developed. Ex. 1001, 2:1–5. We find that Ackland teaches this limitation.

1[d] said first circuit board further including timing and control circuitry thereon, said timing and control circuitry being coupled to said array of CMOS pixels

Petitioner relies on a combination of Wakabayashi and Ackland for teaching this limitation. Pet. 46–48 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 114–118). With regard to Wakabayashi, Petitioner relies on the disclosure of circuit board 29. Pet 46; *see also* annotated Figs. 3 and 7 (reproduced above). With regard to Ackland, the Petition states:

Ackland discloses said image sensor (e.g., “active pixel imaging system”) including timing and control circuitry (e.g., “timing controller 20”), said timing and control circuitry being coupled to said array of CMOS pixels (e.g., “timing controller 20” coupled to the “CMOS...pixel array” through “row decoder 10” in the “exemplary active pixel image sensor” shown in Fig. 6).

Id. With regard to the combination of Wakabayashi and Ackland, the Petition states:

While Wakabayashi does not detail the timing and control circuitry of its “imager device 27 [] electrically connected to the camera circuit board 29,” Ackland describes circuitry including a “timing controller 20 provid[ing] timing signals” that control the imaging system “to achieve a desired frame rate.” Ackland, 8:24- 34. As shown in Figure 6, the timing controller 20 is coupled to the CMOS pixel array for timing and control of the pixels. Neikirk, ¶¶ 115-117.

Id. at 46–47. Patent Owner does not argue this limitation. *See generally* Resp. We find that the combination proposed by Petitioner, i.e., including Ackland’s CMOS imager in Wakabayashi, teaches this limitation.

1[e] said image sensor producing a pre-video signal

Petitioner relies on Ackland’s CMOS pixel array for teaching this limitation. Pet. 48–49 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 119–121). As cited by Petitioner, Ackland states:

The output voltage signals generated by the activated row 35 are simultaneously provided to the corresponding amplifiers 18 via the column output line 65. Output signals from the amplifiers 18 are provided to the common output line 19 in serial fashion based on timing control signals from the timing control 20. The output signals are routed to suitable processing circuitry, not shown.

Ex. 1006, 8:44–51, *see also* Fig. 6. Patent Owner does not argue this limitation. *See generally* Resp. Ackland supports Petitioner’s contention regarding this limitation. We find Ackland’s pixel array teaches this limitation.

1[f] wherein the image sensor is generally square shape along the first plane

Petitioner relies on Wakabayashi for teaching this limitation. Pet. 49–50 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 122–124). The Petition states, “‘imager device 27 [] electrically connected to the camera circuit board 29 by soldering’ is generally square shaped along the first plane as illustrated in Fig. 7.” *Id.* at 49. Imager device 27 in Figure 7 of Wakabayashi is depicted as generally square in shape. Patent Owner does not argue this limitation. *See generally* Resp. We find that Wakabayashi teaches this limitation.

1[g] a second circuit board mounted in said housing, said second circuit board being electrically coupled to said first circuit board, said second circuit board having a length and a width thereto, wherein said length and width of said second circuit board define a second plane, said second circuit board including circuitry thereon to convert said pre-video signal to a post-video signal, said second circuit board being offset from said first circuit board, said second plane of said second circuit board being substantially parallel to said first plane of said first circuit board

Petitioner relies on Wakabayashi for teaching or suggesting this limitation. Pet. 50–57 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 125–135). With regard to the recited “second circuit board mounted in said housing,” Petitioner points to the “circuit board 39” disclosed in Wakabayashi. *Id.*, *see also* Ex. 1027, 6:21–22 (“circuit board 39 is disposed in the housing 3”), Fig. 5. With regard to the recited “second circuit board being electrically

coupled to said first circuit board,” Petitioner points to “flexible board 51” disclosed in Wakabayashi. *Id.*, *see also* Ex. 1027, 6:34–37 (“The flexible board 51 has one end connected to the camera circuit board 29 by soldering and the other end connected to a connector 52 on the circuit board 39.”), Fig. 7. With regard to the recited “said second circuit board having a length and a width thereto, wherein said length and width of said second circuit board define a second plane . . . said second circuit board being offset from said first circuit board, said second plane of said second circuit board being substantially parallel to said first plane of said first circuit board,” the Petition states:

Wakabayashi also discloses that “circuit board 39,” as illustrated in Fig. 5, has a length and a width that define a second plane. Figs. 3 and 7, further illustrate that this plane is substantially parallel to the first plane defined by the length and width of “circuit board 29.” Wakabayashi further discloses that the “circuit board 39” is offset from “circuit board 29.”

Id. at 53. In support, the Petition includes annotated versions of Figures 3, 5, and 7 (reproduced below).

FIG. 3

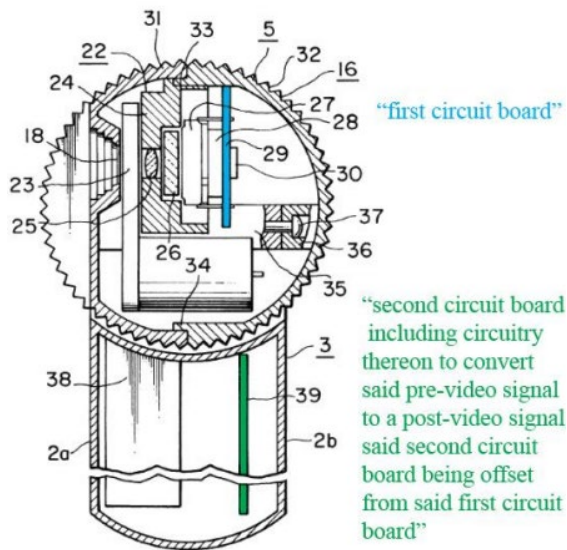


FIG. 5

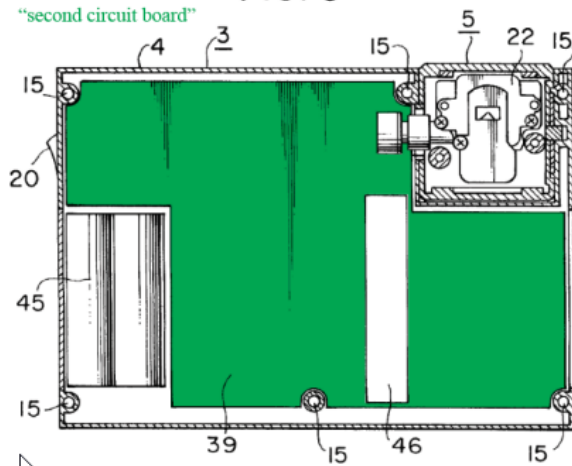
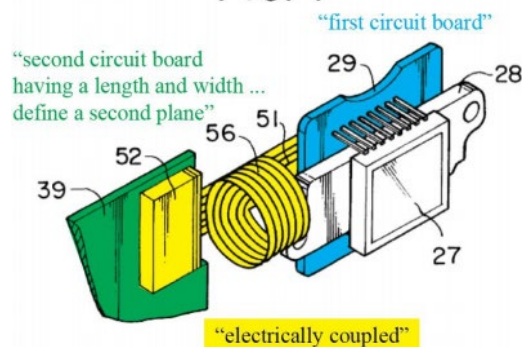


FIG. 7



Id. at 53–55. Annotated Figures 3, 5, and 7 depict “circuit board 39” and support Petitioner’s contentions regarding its physical arrangement and relation to “circuit board 29.”

With regard to the recited “said second circuit board including circuitry thereon to convert said pre-video signal to a post-video signal,” Petitioner points to the “camera signal processing circuit” disclosed in *Wakabayashi*. *Id.* at 50–55, *see also* Ex. 1027, 9:14–18 (“The camera circuit 102, which includes a camera signal processing circuit, a synchronization signal generator circuit, and so on, generates a video signal 103 in a television signal format from the opto-electrically converted signal 101.”). The Petition states:

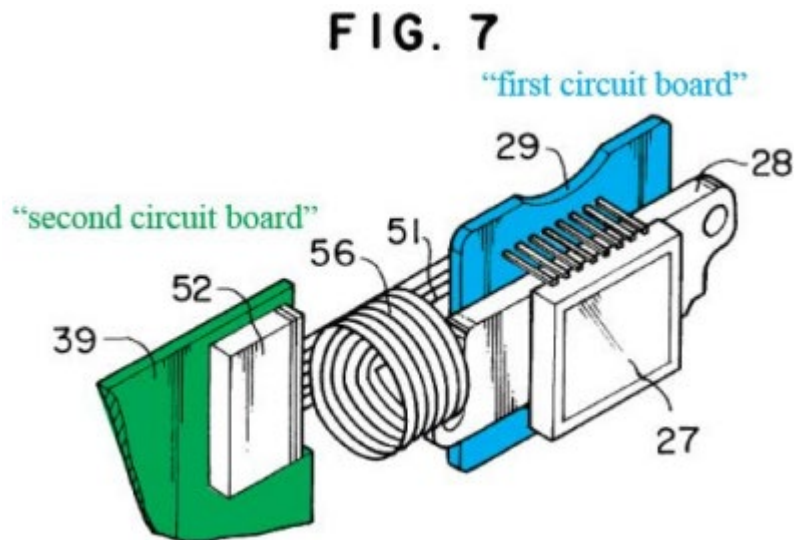
A POSITA would have been motivated and found it obvious and straightforward to locate the processing circuitry to convert the pre-video signal to a post-video signal on Wakabayashi's "circuit board 39 [which] includes a signal processing circuit..., a driver circuit..., a system circuit, a power supply circuit, and so on" because it is the larger of two circuit boards in the imager apparatus and there is more space where circuit board 39 is mounted than in the camera head where circuit board 29 is mounted. *E.g.*, Wakabayashi, 6:5-10, 9:15-19, Figs. 3, 5; Neikirk, ¶74. Furthermore, by mounting this processing circuitry on circuit board 39 instead of circuit board 29, the size of circuit board 29 is advantageously reduced and the video camera unit that rotates is made smaller. *E.g.*, Wakabayashi, Abstract, 2:37- 39, 3:40-44, 14:6-10, Figs. 3, 5; Neikirk, ¶74. Wakabayashi teaches one objective is to make "the video camera unit... small," "composed of minimally necessary parts," and "compact to realize a reduction in weight of [the]...rotating mechanism," so that "less strength is required" for the "rotatable joining portion" to "join the video camera with the housing" portion of the imager apparatus. *E.g.*, Wakabayashi, Abstract, 2:37-39, 3:40-44, 14:6-10. Neikirk, ¶74. Placement of the processing circuitry on circuit board 39 furthers this objective. Neikirk, ¶74.

Pet. 26–27.

We agree with Petitioner that a skilled artisan would have found that it would be advantageous in order to reduce the size of the video camera unit of Wakabayashi by placing the circuitry to convert said pre-video signal to a post-video signal on a separate, second board. The Petition further provides that "[t]he number of circuit boards and configuration of circuitry across the circuit boards was a well-known engineering consideration guided by the dimensions of the intended housing" and "[e]ven with respect to circuitry to convert pre-video signals to post-video signals, it was a well-known engineering consideration to move the circuitry from a circuit board directly attached to the image sensor chip to one that is remote to the image sensor

chip.” *Id.* at 27–28. Patent Owner acknowledges that Wakabayashi, “expressly discloses an off-chip circuit design and architecture in which multiple imaging components are located on circuit boards separate from the image sensor.” Resp. 21. Wakabayashi supports Petitioner’s contentions as to this limitation.

Patent Owner argues that the combination of Wakabayashi and Ackland fails to disclose timing and control circuitry on a first circuit board and circuitry to convert pre-video signals to post-video signals on a second circuit board as recited in claim 1. Resp. 45. Specifically, Patent Owner argues that Wakabayashi teaches off-chip circuitry and that “Ackland’s CMOS image sensor teaches . . . an on-chip design architecture including the pixel array, timing control and signal processing on-chip.” Resp. 46. However, as discussed above, Wakabayashi clearly and indisputably teaches a two circuit board architecture in an imaging device. *See* Pet. 63 (showing Ex. 1027, Fig. 7 (annotated) (reproduced below)).



Annotated Figure 7 of Wakabayashi depicts first circuit board 29 (blue) and second circuit board 39 (green). And, Ackland just as clearly and indisputably teaches “timing controller” circuitry on a first board with the

pixel array and “processing circuitry” elsewhere. *See* Pet. 49 (showing Ex. 1006, Fig. 6 (annotated) (reproduced below)).

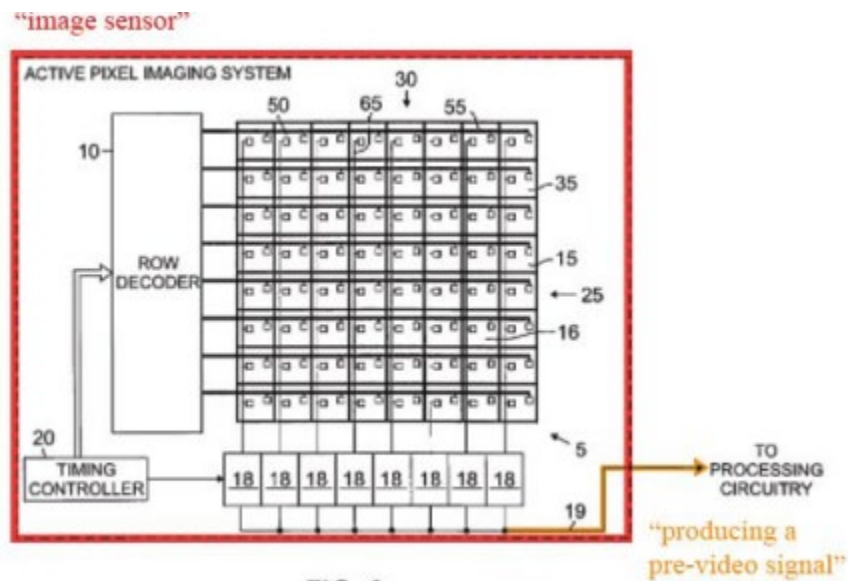


FIG. 6

Annotated Figure 6 of Ackland depicts the “timing controller” circuitry and the “processing circuitry” in separate locations. And, Ackland states, “[o]utput signals from the amplifiers 18 are provided to the common output line 19 in serial fashion based on timing control signals from the timing control 20. The output signals are routed to suitable processing circuitry, not shown.” Ex. 1006, 8:48–52. In light of these explicit teachings, we find Petitioner’s argument that a combination of Wakabayashi and Ackland teaches this limitation to be well-supported and Patent Owner’s contrary argument to be non-persuasive.

1[h] a lens mounted in said housing, said lens being integral with said imaging device, said lens focusing images on said array of CMOS pixels of said image sensor

Petitioner relies on Wakabayashi for teaching this limitation. Pet. 56–57 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 131–135). Petitioner points to “lens 25” disclosed in Wakabayashi. *Id.* The Petition states:

Wakabayashi discloses a “lens 25” in a “lens case 24” which is “secured” to the “mounting plate 28” “with a screw.” Wakabayashi, 5:56-61, 6:11-19. As discussed [above], “mounting plate 28.....is fixed to the camera case 16.” Wakabayashi, 5:62- 65. Thus, lens 25 is integral with Wakabayashi’s imager apparatus. Neikirk, ¶¶132-133. Wakabayashi further explains that “lens 25” is used to “focus[]” an “image.....on the imager device 27.”

Pet. 56 (citing Ex. 1027, 2:51–54, 5:56–65, 6:11–19, Fig. 3). The cited passages and Figure 3 of Wakabayashi support Petitioner’s contention.

Patent Owner does not argue this limitation. *See generally* Resp. We find Wakabayashi teaches this limitation.

*1[i] a video screen, said video screen being
electrically coupled to said second circuit board,
said video screen receiving said post-video signal
and displaying images from said post-video signal*

Petitioner relies on Wakabayashi for teaching this limitation. Pet. 57–59 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 136–140). Petitioner points to “liquid crystal display 6” and “liquid crystal panel 38” disclosed in Wakabayashi.

Id. The Petition states:

Wakabayashi discloses a “liquid crystal display 6” having a “liquid crystal panel 38” coupled to the “circuit board 39.” E.g., Wakabayashi, 4:44-46, 6:5-10. The “circuit board 39” includes a “driver circuit for the liquid crystal panel 38.” Wakabayashi explains that the “liquid crystal display serv[es] as a display unit” to display images from the “video signal 111 [] outputted” from “circuit board 39” and “allows a user to monitor an image.”

Pet. 58 (citing Ex. 1027, Abstract, 1:6–15, 2:40–45, 4:44–46, 5:7–12, 6:5–10, 9:14–38, 10:1–7, 10:15–17, Figs. 1–3, 10, 11). The cited passages and figures of Wakabayashi support Petitioner’s contention. Patent Owner does

not argue this limitation. *See generally* Resp. We find Wakabayashi teaches this limitation.

1[j] a power supply mounted in said housing, said power supply being electrically coupled to said first circuit board to provide power to said array of CMOS pixels and said timing and control circuitry, said power supply also being electrically coupled to said second circuit board to provide power thereto

Petitioner relies on Wakabayashi for teaching this limitation. Pet. 59–61 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 141–143). Petitioner points to “battery 45 [] disposed in housing 3” disclosed in Wakabayashi. *Id.* The Petition states:

Wakabayashi discloses the portable imager apparatus is powered by “battery 45 [] disposed in...housing 3.” Wakabayashi, 6:21-27. A POSITA would have understood that, as a standalone device with a battery as the only disclosed source of power, the battery provides power to the “circuit board 29” to provide power to circuitry thereon, including the “imager device 27.” Neikirk, ¶143. Additionally, this battery provides power to the second circuit 39 board which, includes a “power supply circuit.”

Pet. 60 (citing Ex. 1027, 4:44–49, 6:7–10, 6:21–27, Fig. 5). The cited passages and Figure 5 of Wakabayashi support Petitioner’s contention. Patent Owner does not argue this limitation. *See generally* Resp. We find Wakabayashi teaches this limitation.

1[k] wherein, a largest dimension of said second circuit board along said second plane is greater than a largest dimension of said image sensor along said first plane

Petitioner relies on Wakabayashi for teaching this limitation. Pet. 61–63 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 145–146). Petitioner points to

Figures 5 and 7 of Wakabayashi as showing that the largest dimension of “circuit board 39” is greater than the largest dimension of “circuit board 29.”

Id. The Petition states:

Wakabayashi discloses that the largest dimension of “circuit board 39” is greater than the largest dimension of “circuit board 29” because [. . .] the user holds the part of the housing 3 of the camera where circuit board 39 is located in one hand, while the video camera unit where circuit imaging device 27 and circuit board 29 are located is “made small” such that it may be manipulated by a finger and thumb. Neikirk, ¶¶145-146.

Pet. 60 (citing Ex. 1027, Abstract, 3:39–45, 4:58–5:2, 7:20–24, Figs. 5, 7).

The cited passages and Figures 5 and 7 of Wakabayashi support Petitioner’s contention. Patent Owner does not argue this limitation. *See generally* Resp. We find Wakabayashi teaches this limitation.

In summary, including consideration of the evidence of nonobviousness submitted by Patent Owner, as discussed above, we determine that Petitioner’s showing that the combination of Wakabayashi and Ackland teaches all the limitations of claim 1 is sound and well-supported.

Claim 5

The imaging device of claim 1, wherein said power supply is a battery.

Petitioner relies on Wakabayashi and its showing with regard to element 1[j] as discussed above. Pet. 63 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 147–148). Patent Owner does not argue this limitation. *See generally* Resp. We find Wakabayashi teaches the power supply is a battery.

Claim 21

Petitioner relies heavily on its showing with regard to claim 1 for establishing that the combination of Wakabayashi and Ackland teaches or

suggests all the limitations of claim 21. Pet. 63–72 (citing Ex. 1004 (Neikirk Decl.) ¶¶ 149–185). Claim 21 recites:

21. An imaging device comprising:

a housing;

an image sensor mounted in said housing, said image sensor including a *planar substrate* having a length and a width thereto, wherein said length and width of said *planar substrate* define a first plane, said *planar substrate* including an array of CMOS pixels thereon, wherein a plurality of CMOS pixels within said array of 25 CMOS pixels each include an amplifier, said *planar substrate* further including timing and control circuitry thereon, said timing and control circuitry being coupled to said array of CMOS pixels, said image sensor 26 producing a pre-video signal, wherein the image sensor is generally square shape along the first plane;

a circuit board mounted in said housing, said circuit board being electrically coupled to said *planar substrate*, said circuit board having a length and a width thereto, wherein said length and width of said circuit board define a second plane, said circuit board including circuitry thereon to convert said pre-video signal to a post-video signal, said circuit board being offset from said *planar substrate*, said second plane of said circuit board being substantially parallel to said first plane of said *planar substrate*;

a lens mounted in said housing, said lens being integral with said imaging device, said lens focusing images on said array of CMOS pixels of said image sensor;

a video screen, said video screen being electrically coupled to said circuit board, said video screen receiving said post-video signal and displaying images from said post-video signal; and

a power supply mounted in said housing, said power supply being electrically coupled to said *planar substrate* to

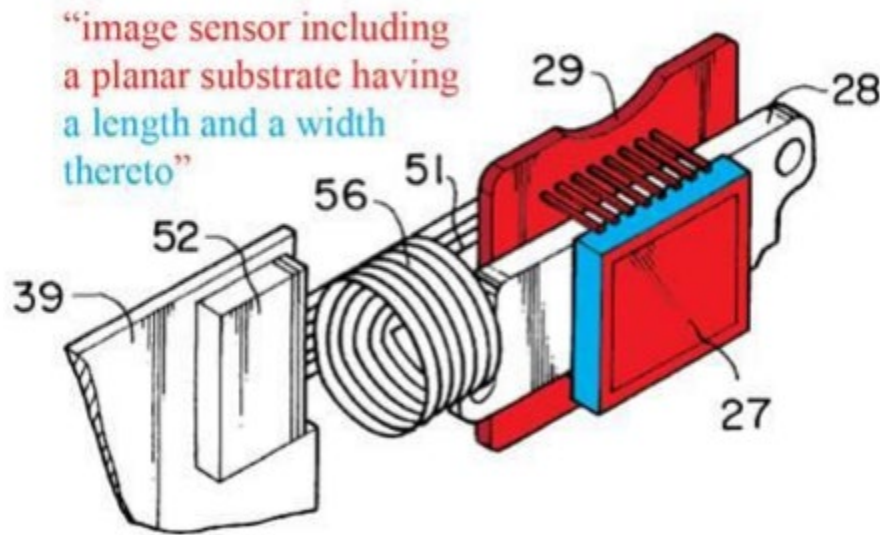
provide power to said array of CMOS pixels and said timing and control circuitry, said power supply also being electrically coupled to said circuit board to provide power thereto;

wherein a largest dimension of said second circuit board along said second plane is greater than a largest dimension of said image sensor along said first plane.

Ex. 1001, 25:18–26:28 (emphasis added). Claim 21 differs from claim 1 in that the “image sensor” of claim 21 includes a “planar substrate,” whereas the “image sensor” of claim 1 includes a “first circuit board.” As it relied upon “imager device 27” as disclosed in Wakabayashi for teaching the “first circuit board” of claim 1, Petitioner relies on the same “imager device 27” as teaching the “planar substrate” of claim 21. *See* Pet. 64–69. Thus, Petitioner’s and Patent Owner’s arguments are essentially the same as those discussed above for claim 1, and our analysis is the same, except that Petitioner now has to account for (1) a planar substrate having a length and a width defining a first plane and electrically connected to Wakabayashi’s circuit board 29, (2) the first plane being offset from and substantially parallel with a second plane defined by the length and width of Wakabayashi’s circuit board 39, and (3) the battery has to power both the planar substrate including the array of CMOS pixels and corresponding timing and control circuitry, and Wakabayashi’s circuit board 39.

Annotated Figure 7 of Wakabayashi appears on page 65 of the Petition and is reproduced below:

FIG. 7



Annotated Figure 7 of Wakabayashi shows imager device 27, a planar substrate defining a first plane, and electrically coupled to circuit board 29. Further, planar substrate is on circuit board 29, and thus the same battery that powers circuit board 29 powers planar substrate 27 including the array of CMOS pixels and corresponding timing and control circuitry. *See* Pet. 70–71.

Regarding the requirement of the first plane being offset from and substantially parallel with a second plane defined by the length and width of Wakabayashi’s circuit board 39, Petitioner asserts:

Wakabayashi discloses in Figs. 3 and 7 that the plane defined by length and width of “circuit board 39” (*see* [1.g]) is substantially parallel to the plane defined by the length and width of “imager device 27.” Wakabayashi further discloses that the “circuit board 39” is offset from “imager device 27.”

Pet. 68. With regard to battery 45 powering circuit board 39, Petitioner asserts that Wakabayashi teaches the “battery [is] coupled to ‘circuit board 39’ to power ‘driver circuit’ and to ‘power supply circuit’” that are included

on circuit board 39. Pet. 71, *see also id.* at 60 (citing Ex. 1027, 6:7–10).

Patent Owner does not provide counter arguments for these assertions.

Petitioner’s assertions are consistent with and supported by the cited evidence.

For the foregoing reasons, Petitioner’s showing that the combination of Wakabayashi and Ackland teaches or suggests all the limitations of claim 21 is sound and well-supported.

III. CONCLUSION¹²

Having considered the arguments and evidence of the parties, we determine that Petitioner has established by a preponderance of the evidence that claims 1, 5, and 21 of the ’896 patent would have been obvious in view of Wakabayashi and Ackland. The cited references teach all the elements of these claims and there existed a motivation to combine the cited references in the manner set forth in the challenged claims. Patent Owner’s arguments to the contrary are not persuasive. In light of all the arguments and evidence, we conclude that Petitioner has established that claims 1, 5, and 21 of the ’896 patent are unpatentable.

¹² Should Patent Owner wish to pursue amendment of the challenged claims in a reissue or reexamination proceeding subsequent to the issuance of this decision, we draw Patent Owner’s attention to the April 2019 *Notice Regarding Options for Amendments by Patent Owner Through Reissue or Reexamination During a Pending AIA Trial Proceeding*. See 84 Fed. Reg. 16,654 (Apr. 22, 2019). If Patent Owner chooses to file a reissue application or a request for reexamination of the challenged patent, we remind Patent Owner of its continuing obligation to notify the Board of any such related matters in updated mandatory notices. See 37 C.F.R. § 42.8(a)(3), (b)(2).

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1, 5, and 21 of the '896 patent are unpatentable.

In summary:

Claims	35 U.S.C. §	Reference(s)/Basis	Claims Shown Unpatentable	Claims Not shown Unpatentable
1, 5, 21	103	Wakabayashi, Ackland	1, 5, 21	
Overall Outcome			1, 5, 21	

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