

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

TESLA, INC.,
Petitioner

v.

INTELLECTUAL VENTURES II LLC.,
Patent Owner

IPR2025-00339
U.S. Patent No. 7,916,180

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

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PETITIONER'S UPDATED EXHIBIT LIST

Ex.1001	U.S. Pat. No. 7,916,180 to Olsen et al. ("the '180 patent")
Ex.1002	Prosecution History of U.S. Pat. No. 7,916,180 (U.S. Application No. 11/788,279)
Ex.1003	Declaration of Mr. Michael Guidash under 37 C.F.R. § 1.68
Ex.1004	<i>Curriculum Vitae</i> of Mr. Michael Guidash
Ex.1005	U.S. 6,611,289 to Yu et. al
Ex.1006	U.S. 7,365,780 to Miyazaki
Ex.1007	JP Application Publication No. JP2003-319231 to Matsushima (Certified English Translation + Declaration + Japanese)
Ex.1008	U.S. 2005/0128323 to Choi
Ex.1009	Eastman Kodak Company, Kodak CMOS Image Sensors White Paper (November 10, 2000) (retrieved from https://web.archive.org/web/20010611235410/http://www.kodak.com/US/plugins/acrobat/en/digital/ccd/cmos.pdf)
Ex.1010	U.S. 7,206,136 to Labaziewicz et al.
Ex.1011	U.S. 7,733,414 to Kobayashi
Ex.1012	Dave Litwiller, CCD vs. CMOS: Facts and Fiction, Photonics Spectra (January 2001)
Ex.1013	US Application Pub. No. 2004/0239771 to Habe
Ex.1014	EP Application Pub. No. EP0858208 to Weldy et al.
Ex.1015	IV's Preliminary Infringement Contentions, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1016	Texas Instruments, TC255P 336- × 244-PIXEL CCD IMAGE SENSOR (March 2003)
Ex.1017	IV's Complaint, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1018	Proposed Scheduling Order, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1019	Statistics on District Court Timing

Ex.1020	Interim Procedure for Discretionary Denials in AIA Parallel District Court Litigation, June 21, 2022
Ex.1021	Eastman Kodak Company, Solid State Image Sensors Terminology, Application Note, DS 00-001, Revision 0 (December 8, 1994) (https://web.archive.org/web/20030413064955/http://www.kodak.com/global/plugins/acrobat/en/digital/ccd/applicationNotes/terminology.pdf)
Ex.1022	US 7,830,435 to Guidash
Ex.1023	Eastman Kodak Company, Charge Coupled Device (CCD) Image Sensors, CCD Primer, MTD/PS-0218, Revision No. 1 (May 29, 2001) (https://web.archive.org/web/20030422183725/http://www.kodak.com/global/plugins/acrobat/en/digital/ccd/applicationNotes/chargeCoupledDevice.pdf)
Ex.1024	Szeliski, Image Mosaicing for Tele-Reality Applications (May 1994)
Ex.1025	Mann et al., On Being ‘Undigital’ with Digital Cameras: Extending Dynamic Range By Combining Differently Exposed Pictures (May 1995)
Ex.1026	Debevec et al., Recovering High Dynamic Range Radiance Maps from Photographs (August 3, 1997)
Ex.1027	PCT Pub. No. WO2001/010110 to Stark
Ex.1028	Yang et al., A 640 x 512 CMOS Image Sensor with Ultrawide Dynamic Range Floating-Point Pixel-Level ADC, IEEE Journal of Solid-State Circuits, VOL. 34, NO. 12 (December 1999)
Ex.1029	CCD Electronic Shutters, Interactive Java Tutorial, October 22, 2002 (https://web.archive.org/web/20021028042044/https://micro.magnet.fsu.edu/primer/java/digitalimaging/ccd/shutter/index.html)
Ex.1030	The Panorama Factory -- What is 35mm equivalent focal length (http://www.panoramafactory.com/equiv35/equiv35.html)
Ex.1031	Camera & Imaging Products Association, Guideline for Noting Digital Camera Specifications in Catalogs, October 11, 2005
Ex.1032	London etc., Photography, Eighth Edition, January 1, 2004

Ex.1033	American National Standards Institute (ANSI), ANSI/I3AIT 10.7000-2004 American National Standard for Photography - Digital Still Cameras - Guidelines for Reporting Pixel-Related Specifications, June 24, 2004
Ex.1034	Eastman Kodak Company, Shutter Operations for CCD and CMOS Image Sensors, Application Note, MTD/PS-0259, Revision 1 (October 23, 2001) (retrieved from https://web.archive.org/web/20030419002619/http://www.kodak.com/global/plugins/acrobat/en/digital/ccd/applicationNotes/ShutterOperations.pdf)
Ex.1035	RESERVED
Ex.1036	U.S. Pat. No. 4,831,403 to Ishida et al.
Ex.1037	U.S. Pat. No. 7,443,427 to Takayanagi
Ex.1038	RESERVED
Ex.1039	e2v Technologies, CCD Sensors Technical Note: Glossary of Terms (2003)
Ex.1040	Ralph E. Jacobson et al., The Manual of Photography: photographic and digital imaging, 9th Edition (2000) ("Jacobson")
Ex.1041	U.S. Pat. No. 6,215,597 to Duncan et al.
Ex.1042	O'Donnell, The Practical Use of the Exposure Triangle (retrieved from https://creativeraw.com/practical-use-exposure-triangle-explained/)
Ex.1043	U.S. Pat. No. 2,953,983 to Larson
Ex.1044-1045	RESERVED
Ex.1046	Comparison of Provisional Application No. 60/604,854 and '180 Patent Specification
Ex.1047	Provisional Application No. 60/604,854, filed on August 25, 2004
Ex.1048	Provisional Application No. 60/695,946, filed on July 1, 2005
Ex.1049	Provisional Application No. 60/795,946 filed on April 28, 2006
Ex.1050	Prosecution History of U.S. Application No. 11/212,803 (abandoned)

Ex.1051	U.S. Application No. 11/212,803 (published as US 2006/0054782)
Ex.1052	Reserved
Ex.1053	Statistics on District Court Timing (Dec. 31, 2024)
Ex.1054	WDTX 2024 Statistical Public Report, available at https://www.txwd.uscourts.gov/court-information/district-statistics/
Ex.1055	Amended Order Assigning the Business Of the Court (Judge Moses, Jan. 31, 2025)
Ex.1056	LexMachina docket report
Ex.1057	LexMachina docket report
Ex.1058	“Albright Worried Multipatent Trials Ask Too Much Of Jurors,” Law360 (Dec. 18, 2020), at https://www.law360.com/articles/1337976/albright-worriedmultipatent-trials-ask-too-much-of-jurors
Ex.1059	Bifurcation Order – Videolabs, Inc. v. Asustek Computer, Inc. 6:22-cv-00720-ADA (WDTX)
Ex.1060	Joint Claim Construction Statement, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , 1:24-cv-884-ADA, ECF No. 37 (WDTX) (March 28, 2025)
Ex.1061	“The economic contributions of Tesla to the California economy, 2018–2021,” IHS Markit (Oct. 2022), available at https://digitalassets.tesla.com/tesla-contents/image/upload/Tesla-California-Economic-Impact-Final-Report-October-2022
Ex.1062	“Tesla’s ‘American-made’ cars won’t get hit as hard by the auto tariffs,” CNN.com, https://www.cnn.com/2025/03/29/cars/american-made-cars-tesla-auto-tariffs/index.html , retrieved Apr. 14, 2025
Ex.1063	“An Assessment of the Impact of the Inter Partes Review Process under the Patent Trial and Appeal Board on the US Economy,” The Perryman Group, available at https://www.perrymangroup.com/publications/report/2021/9/23/an-assessment-of-the-potential-impact-of-expanding-inter-partes-review-ipr-under-the-america-invents-act-on-the-us-economy/

Ex.1064	'180 Patent Assignment Recordation
Ex.1065	"Tesla's California Footprint," https://www.tesla.com/blog/teslas-california-footprint (retrieved Apr. 25, 2025)
Ex.1066	"FAQs for Interim Processes for PTAB Workload Management," available at https://www.uspto.gov/patents/ptab/faqs/interim-processes-workload-management (retrieved May 13, 2025).
Ex.1067	Notice of <i>Sotera</i> Plus Stipulation for Defendant Tesla, Inc., <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , 1:24-cv-884-ADA, ECF No. 56 (WDTX) (May 20, 2025)
Ex.1068	Exhibit 7 to IV's Preliminary Infringement Contentions, <i>Intellectual Ventures II, LLC v. Tesla, Inc.</i> , No. 6:24-cv-188-ADA (WDTX)
Ex.1069 (New)	Supplemental Declaration of R. Michael Guidash under 37 C.F.R. § 1.68
Ex.1070 (New)	Deposition of Eli Saber Transcript, IPR2025-00339 (December 8, 2025)

I. INTRODUCTION

In its Patent Owner's Response ("POR"), Intellectual Ventures ("IV") attempts to avoid the prior art by improperly importing extraneous limitations into the claims and mischaracterizing the prior art. It also alleges priority unsupported by the record.

For Grounds 1 and 2, IV's arguments rest on its improper claim constructions and mischaracterizations of the prior art. The Board should reject IV's arguments. Moreover, Grounds 1 and 2 render the claims obvious even under IV's improper constructions. The challenged claims are unpatentable under both the proper constructions and IV's improper constructions.

For Ground 3, IV's claim of priority support contradicts the record, and IV's attempt to exclude Labaziewicz (Ex. 1010) as prior art should be rejected. IV's arguments also depend on improper claim constructions and disregard the teaching of prior art. The Board should reject them and find the challenged claims unpatentable.

II. CLAIM CONSTRUCTION

IV seeks to import unsupported limitations into the claims to avoid the prior art. The Board should reject IV's constructions. Ex.1069, ¶¶2-36.

A. *"simultaneous data acquisition"* (claims 1 and 22)

IV first argues that *"simultaneous data acquisition"* should be construed

according to its plain and ordinary meaning. POR, 14-15. Petitioner agrees.

But then IV seeks to exclude “nearly simultaneous” from the plain and ordinary meaning. POR, 15-16, 22. This is a distraction. IV appears to suggest that Petitioner’s grounds depend on a “nearly simultaneous” timing. IV is wrong. To the contrary, Petitioner’s grounds demonstrate data acquisition “at the same time” (Pet., 23, 86), which is admitted by IV to be within the scope of “*simultaneous data acquisition*.” POR, 15.

Furthermore, IV’s attempt at exclusion is internally inconsistent and contradicts the specification.

First, IV concedes that the term “*simultaneous data acquisition*” encompasses “some *overlap* in the data acquisition windows” (POR, 15), confirming that “*simultaneous*” does not require perfect temporal identity. Further, IV equates “nearly simultaneous” with “close in time” (POR, 15), the same concept its expert uses for “*simultaneous*.” Ex.1070, 26:3–7 (Dr. Saber explaining that “simultaneously” is “as close in time as engineeringly possible”); Ex.1069, ¶6.

Second, the specification expressly includes “approximately simultaneously” within the scope of an embodiment of “simultaneous acquisition.” FIG. 5 describes “**simultaneous acquisition...under an embodiment**,” which includes step 508 providing that “the image of the second camera channel...is captured **approximately simultaneously** with the image of the first camera channel.”

Ex.1001, FIG. 5, 9:13-24. A POSITA would understand “nearly simultaneous” conveys the same concept as “approximately simultaneous[],” and falls within the scope of “*simultaneous*.” Ex.1069, ¶¶7-8.

Third, IV argues that the specification lists “simultaneous” and “nearly simultaneous” as alternatives. POR, 15. However, these are *not* mutually exclusive alternatives. Both the '180 patent and IV's own expert confirm that “nearly simultaneous” is within “*simultaneous*,” as discussed above. Ex.1001, FIG. 5, 9:13-24; Ex.1070, 26:3–7; Ex.1069, ¶9. IV's reliance on *Johnson & Johnston, Eagle Pharms. Inc.* and *PSC Computer Prods.* is inapposite, because those cases address mutually exclusive alternatives, which is not at issue here. POR, 15-16.

B. “during a frame” (claim 22)

Petitioner's Construction	IV's Construction
“during a period of time when data for an image frame is acquired” (Pet. 7)	“at some point between the beginning and the end of the exposure interval during which an image sensor captures a single image” (POR, 16-18)

IV's attempt to import “between the beginning and the end of the exposure interval” (POR, 18) should be rejected. Ex.1069, ¶¶10-21.

First, IV's construction contradicts the specification. The phrase “*during a frame*” refers to the time period during which data of the frame is acquired, not merely the “**exposure interval**.” Equating “*during a frame*” to “exposure interval” contradicts the specification's recognition that “frame rate” (which inversely relates

to the frame period) and “integration time” are separate parameters. Ex.1001, 7:24-25 (“parameters of the image sensor electrical operation (e.g., **integration time**, **frame rate**, etc.”), 3:57-60; Ex.1003, ¶50 (explaining “exposure time in digital cameras is also referred to as integration time”); Ex.1069, ¶11.

Further, a frame period is for acquiring **digital data** of a frame and thus includes the readout period for generating that digital data, and is not limited to merely exposure. Ex.1001, 20:19-20 (“The **data** from all sensors can be **digitally** combined to provide a much greater dynamic range within one frame of digital camera data”). Exposure merely accumulates charges; it does not generate digital data that could be acquired, as required by the claim language. Ex.1003, ¶¶51-55; Ex.1069, ¶12 (citing limitation [22.4] which confirms that digital data is acquired during the frame for combination).

The specification confirms that the time period for acquiring data of the frame involves a read-out process that includes analog and digital processing, in addition to exposure. *See e.g.*, Ex.1001, 17:32-34 (“After being exposed...the pixels[] are **read out**.”); 22:58-59 (underlying device technologies include “mixed **analog and digital**”); FIG. 12 (illustrating “[c]olumn logic [that] **reads the signals** from the pixels” (11:8-11), “**Analog Signal Logic**...optimized for gain, noise, dynamic range, linearity, etc.” (11:22-25)). Ex.1069, ¶13.

IV provides no basis in the specification to limit “*during a frame*” to only an

“exposure interval.” The specification never mentions an “exposure interval,” let alone suggests that “*during a frame*” is limited to such an “exposure interval.” IV’s proposed limitation also contradicts a POSITA’s knowledge that “frame period” is defined as “the time lapsed between *successive image readouts*,” which includes the time for both exposure and readout. Ex.1021, 20. This is confirmed by the ’180 specification: “[a]fter...exposure time...the pixels[] are **read out**.” Ex.1001, 17:32-34. Ex.1069, ¶¶ 14-17 (citing Ex.2010, 8:17-37, 9:1-2, 10:9-11; Ex.2008, 3, FIGS. 13-14 illustrating that “frame time” includes time for integration and readout).

Second, IV’s construction contradicts the testimony of its own expert, who acknowledges that data acquisition includes more than just exposure. Ex.1070, 20:13-17, 21:13-22:21 (Dr. Saber explaining data acquisition includes collecting analog data and “**converting it to digital**.”), 67:1-4 (“[W]hen you collect the data on those CCD arrays, **you have to read it out**; otherwise, what’s the point of collecting it.”); 64:1-4 (“[T]he data acquisition is...the integration time **plus**...the pushing of the data to the backplane or wherever...to do the data acquisition”); 64:14-20 (reproduced below):

Q. Any other steps are part of the data acquisition process?

A. I mean, obviously you may have some amplifications or filtering techniques are embedded into the design. You know, conversion, let's say, from analog to digital. I mean, there are some, you know, steps in the process there.

Third, Petitioner's construction properly encompasses the period for acquiring data for the frame, consistent with the specification, IV's own expert's testimony, and the knowledge in the art. Ex.1069, ¶¶19-20.

IV acknowledges that “*during*” imparts a temporal requirement,” and argues that this is important under the doctrine of claim differentiation, where claim 22 explicitly recites “*during a frame*” while claim 1 does not. POR, 18, n.4. Petitioner's construction reflects this distinction because it keeps the term “*during*” and therefore imparts a temporal requirement to claim 22, which does not apply to claim 1.

The Board should adopt Petitioner's proposed construction.

C. “*independently controlling simultaneous data acquisition...during a frame*” (claim 22)

IV's construction incorporates its improper construction of “*during a frame*” introducing “exposure interval,” and fails for this reason alone. IV's construction also fails because it (i) mischaracterizes the Petition; (ii) misrepresents the Board's interpretation; and (iii) incorrectly further narrows the claim term to one example of

integration time control (“rolling mode”) while excluding another example (“snap-shot mode”). Ex.1069, ¶¶22-36.

Petitioner's Proposed Construction	IV's Proposed Construction
Plain and ordinary meaning	“independent simultaneous data acquisition [must] be controlled at some point between the beginning and the end of the exposure interval during which the image sensors capture a single image” POR, 18-19.

1. IV mischaracterizes the Petition.

IV argues that the Petition “erroneously equates” the phrase “during a frame” with “for a frame” to remove a temporal requirement. POR, 18. This is incorrect.

The Petition did not substitute “for” in place of “during” to remove a temporal requirement. Rather, the Petition’s proposed construction, “**during a period of time** when data for an image frame is acquired,” expressly includes a temporal requirement. Pet. 7; Ex.1003, ¶¶71-72; Ex.1069, ¶24.

The Petition’s proposed construction uses “data **for** an image frame” for clarity relative to the ’180 patent’s description of “frame” as a physical component (Ex.1001, 22:8-9). *See*, Pet., 8. To the extent IV suggests that using “for” removes a temporal requirement—it does not—Petitioner further clarifies by proposing an alternative construction: “during a period of time when **data of an image frame** is acquired.” *See* Ex.1001, 20:19-21 (“[t]he data from all sensors can be digitally combined to provide a much greater dynamic range within **one frame of digital**

camera data.”); Ex.1069, ¶25.

2. IV’s assertion that the Board’s interpretation confuses “during” with “for” is misplaced.

The Board found that “*during a frame*” modifies “data acquisition with each of the first and second channels, such that it is the data acquisition which occurs **during a frame.**” ID, 20. IV’s assertion that this rewrites the term by replacing “during” with “for” (POR, 19-20) is baseless. The Board did not substitute any term; it expressly used “**during** a frame,” which imposes a temporal requirement. IV’s argument should be rejected. Ex.1069, ¶¶26-27 (citing Ex.1070, 59:10-12, 71:5-6 where Dr. Saber uses “during a frame” to modify data acquisition).

3. IV’s requirement of integration time control under rolling mode should be rejected.

IV asserts that claim 22 requires integration time control under “rolling mode.” POR, 20, 8. This assertion fails because it imports a specific example from the specification, and excludes other disclosed alternatives. Ex.1069, ¶¶28-36.

First, IV limits the term to only one example, integration time control, while excluding other aspects of data acquisition such as readout including analog/digital conversion/processing. This is improper. *Medrad, Inc. v. MRI Devices Corp.*, 401 F.3d 1313, 1320 (Fed. Cir. 2005) (“A claim construction that does not encompass a disclosed embodiment is rarely, if ever, correct.”). IV provides no support from the specification that the term is limited to only integration time control while excluding

the other aspects.

Second, IV further narrows the claim by requiring integration time control be performed in a “rolling mode.” POR, 8, 20. This contradicts the '180 patent, which states, “[t]he integration time control can be executed (depending on readout configuration) according to a number of techniques, *for example, rolling mode and/or snap-shot mode* to name a few.” Ex.1001, 20:48-51. The specification lists “rolling mode” and “snap-shot mode” as *alternatives* using “*and/or*,” and does not suggest excluding one or the other.” IV’s attempt to require one while excluding the other should be rejected. *Medrad*, 401 F.3d at 1320. IV provides no support, either from the '180 patent or any contemporaneous references, that the claim is limited to one mode while excluding the other. Ex.1069, ¶30.

Thus, IV’s construction should be rejected. To the extent that the term requires construction, the Board should construe it as “independently controlling simultaneous data acquisition” “*during a frame*,” where “*during a frame*” is construed under Petitioner’s proposed construction and modifies the term “data acquisition.” Ex.1069, ¶31.

III. GROUND 1: MATSUSHIMA AND YU RENDER THE CHALLENGED CLAIMS OBVIOUS.

A. Matsushima discloses “*simultaneous data acquisition*” (limitations [1.2.2] and [22.3]).

1. IV’s requirement for the prior art to use identical claim language should be rejected.

IV’s assertion that Matsushima fails to disclose¹ “*simultaneous data acquisition*” because it lacks the word “simultaneously” (POR, 28) is legally incorrect. Prior art need not use identical claim language because “the reference need not satisfy an *ipsissimis verbis* test.” *In re Gleave*, 560 F.3d 1331, 1334 (Fed. Cir. 2009). Matsushima teaches simultaneous acquisition as understood by a POSITA. III.A.2; *Sundance, Inc. v. DeMonte Fabricating Ltd.*, 550 F.3d 1356, 1361 n.3 (Fed. Cir. 2008); Ex.1069, ¶¶34-41, 46 (citing Ex.2020, ¶¶87, 150 and explaining that Dr. Saber’s supporting statements are inconsistent with his claim the ’180 patent is entitled to priority from the ’854 Provisional).

¹ IV also asserts that “the petition has failed to establish Matsushima...inherently discloses simultaneous data acquisition.” POR, 28. The Petition does not argue inherency.

2. Matsushima's dual-channel system discloses and renders obvious "*simultaneous data acquisition*."

a. IV's arguments rely on improperly imported requirements.

IV asserts that Matsushima does not disclose simultaneous data acquisition, because its timing signal control is for "the timing of the **retrieval of information from the CCDs, rather than the acquisition of data by each CCD.**" POR, 31. IV's argument fails, because it improperly narrows the claim language "*simultaneous data acquisition*" to exclude "retrieval of information from the CCDs." Ex.1069, ¶¶38-40.

As explained in the Petition, data acquisition includes **retrieval** from the CCDs and subsequent processing, not just exposure of the CCDs. Pet. 25. Matsushima's synchronized control of retrieval from the CCDs and processing along two data capture paths discloses and renders obvious "*simultaneous data acquisition*." Pet. 25 (explaining that Matsushima's data capture paths include analog and digital processing of outputs from CCDs to provide the digital data of the frame); *see also* II.B.

b. IV's attempt to recast Matsushima's "synchronous" capture as merely operating under a "common clock signal" should be rejected.

As explained in the Petition, Matsushima describes performing simultaneous data acquisition of the same subject during a frame where control circuits are "driven synchronously by timing signals," Pet., 24. In the imaging context, "driven

synchronously” by a timing signal generating circuit (TG) denotes aligned frame timing between channels to capture the two channels in synchronization, which discloses and renders obvious “*simultaneous data acquisition*” from two channels during a frame. Pet. 24; Ex.1003, ¶¶97; Ex.1069, ¶¶41-43.

IV’s attempt to recast “synchronous” as merely “a common clock signal” (POR, 31) fails, because it divorces the term from the image capture paths that Matsushima actually describes, where the TG coordinates the image capture paths (drive, CDS, A/D) across channels. Ex.1007, Fig. 1 (showing separate paths and TG), [0027]; Pet., 21-24.

c. IV’s mischaracterization of Matsushima as providing sequentially captured images is wrong.

IV asserts that Matsushima’s disclosure is of “sequential capturing of images.” POR, 29. This is illogical in the context of Matsushima’s design and should be rejected. Ex.1069, ¶¶44-46.

As explained by Mr. Guidash, IV’s “sequential capturing of images” theory is illogical in the context of Matsushima’s design. Matsushima includes two independent channels with separate analog and digital data processing paths (including distinct CDS and ADC circuits), to capture a second image that is a scaled-up image of the first image for providing a high-quality composite image. Ex.1007, FIG. 1, [0021]; Pet. 21-24; Ex.1003, ¶¶95-116. Capturing these images

sequentially, rather than at the same time, would squander the investment in these separate circuits with no benefit. Further, sequential capture would degrade image quality by introducing motion artifacts because any subject or camera movement between shot times may cause misalignment and artifacts. Ex.1069, ¶45 (citing Ex.1008, [0069], [0074], [0082]).

3. Matsushima renders obvious “*simultaneous data acquisition.*”

IV's assertion that the Petition provides only a conclusory obviousness assertion for obviousness (POR, 33) mischaracterizes the Petition. Ex.1069, ¶¶46-

The Petition does not rely on a bare, unsupported assertion of obviousness. Pet. 21-30. Rather, it explains, through citation to Matsushima's figures and description, that Matsushima's system simultaneously acquires data from multiple channels during a frame. *Id.*

Even if Matsushima did not expressly disclose “simultaneous” acquisition (which it does), a POSITA would understand that Matsushima's disclosure, including its multi-channel architecture, synchronous control of channels, and capturing two images that are scaled versions of the same scene, renders obvious simultaneous acquisition during a frame. Ex.1069, ¶49 (explaining it was well-known to perform simultaneous data acquisition in Matsushima's imaging system having a multi-channel architecture, such that the captured images have “no time

difference” to eliminate the need for “compensating for errors caused by the time difference.”); Ex.1008, [0069] (describing the well-known technique to capture images “**simultaneously**”); Ex.1014, 5:14-16 (describing multiple channels “**simultaneously** capture light information from the same scene”).

Accordingly, IV’s assertion that the obviousness ground fails for lack of a labeled explanation is unfounded, and ignores the Petition’s substantive, record-based showing.

B. Matsushima and Yu render obvious “*during a frame*” (limitation [22.3]).

1. IV’s arguments fail because they rest on improperly imported requirements.

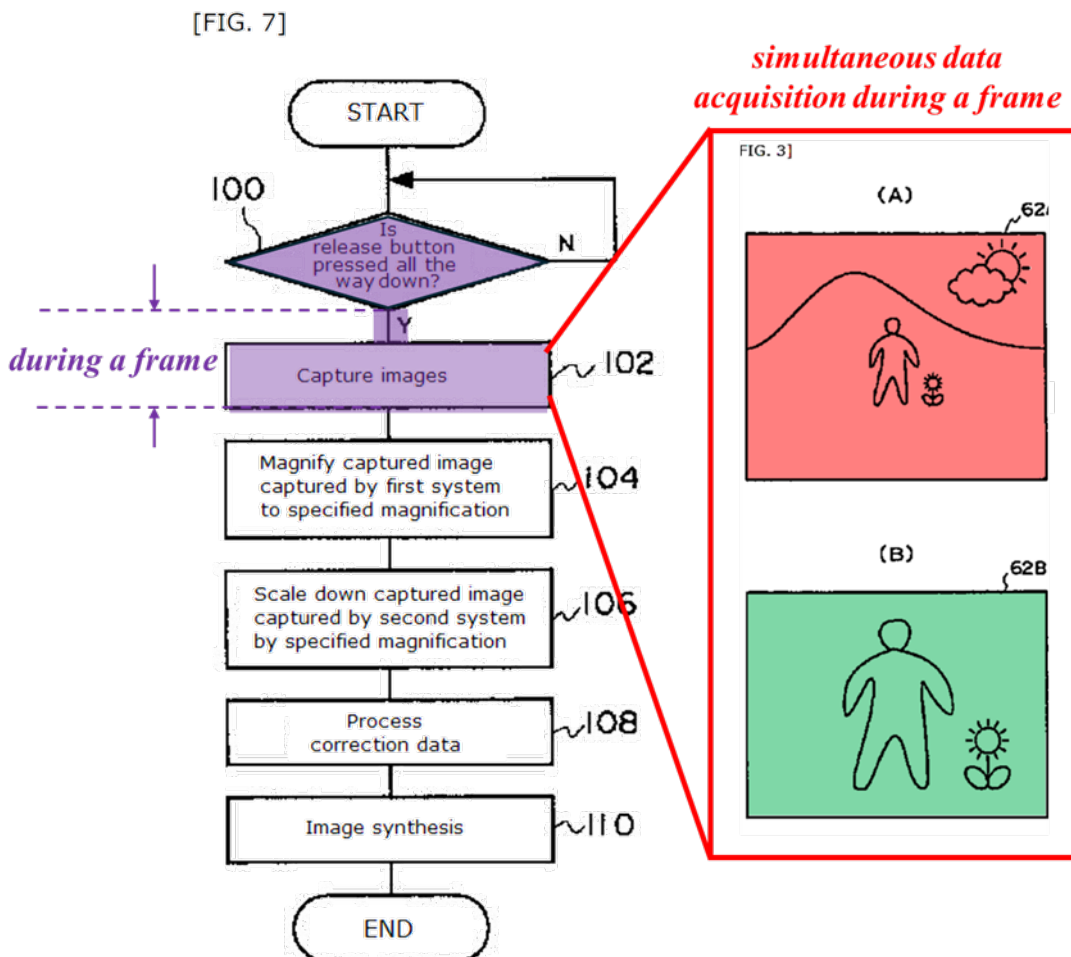
IV asserts that Matsushima’s teaching (control of lenses and apertures (POR, 36), timing signals (POR, 37), control of the channels after the release button is pressed (POR, 37), CDS and ADC circuits (POR, 38), integration time (POR, 40)) and Yu’s teaching (on-sensor exposure time control (POR, 41-42)) do not disclose “*during a frame*.” But each argument depends on its improper requirement of “at some point between the beginning and the end of the exposure interval” (POR, 34-36), and should be rejected for this reason alone. Ex.1069, ¶¶51-53 (explaining that a POSITA would understand that “*during a frame*” encompasses control of data acquisition ***associated with*** each channel, whereas IV’s arguments incorrectly rely on an improper physical inclusion requirement into “***with each of the first and***

second channels.”).

2. Matsushima teaches “*during a frame*,” even under IV’s flawed construction.

a. Matsushima teaches “*during a frame*” under the proper construction.

As shown in the Petition and annotated FIGS. 3 and 7 of Matsushima below, Matsushima discloses or renders obvious “*during a frame*” under the proper construction proposed by Petitioner. II.B and II.C; Pet. 21-30.



Ex.1007, FIGS. 3 and 7, annotated; Pet. 23, 25; Ex.1069, ¶54.

Specifically, the period between the end of block 100 (release button confirmation) and the end of block 102 (providing captured images) corresponds to “*during a frame*.” During this period, data of a frame (FIG. 3) is simultaneously acquired by each of the two image capture paths of Matsushima, which are independently controlled by “CPU 30 together with integration circuits 60A and 60B, Timing Generator (TG) 28, CCD drive circuits 20A and 20B, correlated double sampling (CDS) circuits 22A and 22B, and analog-to-digital (A/D) converters 24A and 24B.” Pet., 25-26. Further, Matsushima’s electronic shutter control is the same type of “integration time control” described in the ’180 patent. Both describe controlling a switch to govern per-sensor charge accumulation time during the capture of a single frame. Ex.1007, [0024]; Ex.1001, 20:34-51; Ex.1069, ¶55.

Matsushima teaches “*during a frame*” under the proper construction.

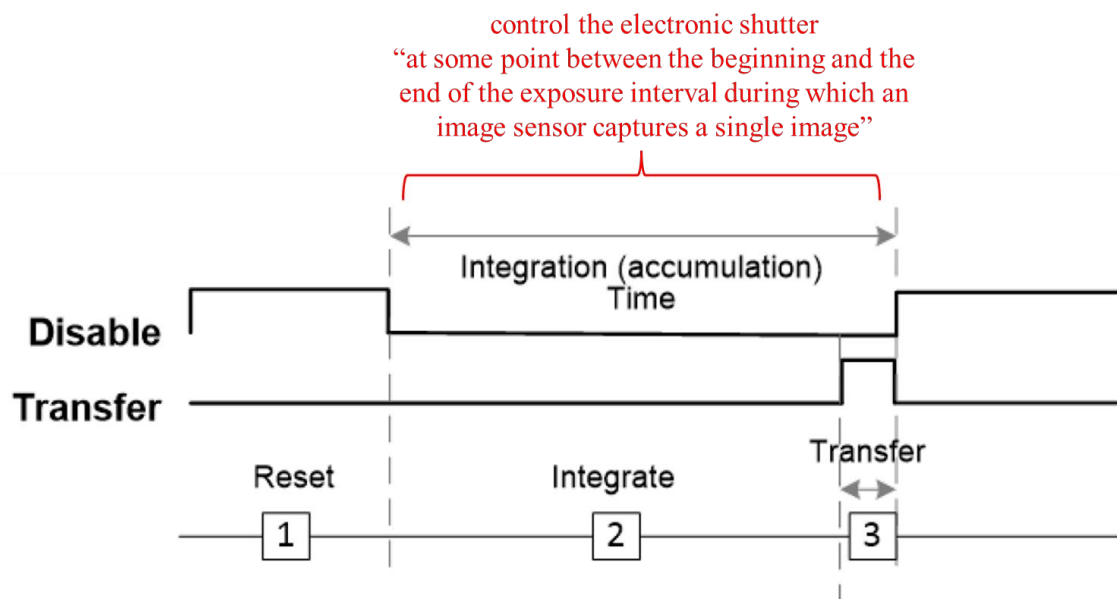
b. Matsushima teaches “*during a frame*” even under IV’s flawed construction.

Matsushima’s description of controlling electronic shutters teaches “*during a frame*” even under IV’s flawed construction requiring “at some point between the beginning and the end of the exposure interval” (POR, 18). Ex.1069, ¶¶57-61.

As shown in the Petition, Matsushima describes independently controlling integration times using electronic shutters (“shutter drain via a shutter gate”). Pet., 26; Ex.1007, [0024]. As Mr. Guidash explains, this control using shutter gate pulses includes (i) switching/keeping the shutter gate off to allow charges to accumulate

and be transferred for readout, and (ii) switching/keeping the shutter gate on to end the charge accumulation by sweeping newly generated charges to the shutter drain. Ex.1003, ¶¶50-55 (citing Ex.1034, 2); Ex.1069, ¶58.

As shown in the illustration provided by Mr. Guidash below, in Matsushima's electronic shutter control, at least (i) keeping the shutter gate off (shown by the Disable signal); and (ii) controlling the transfer of the accumulated charges (shown by the Transfer signal) are performed “at some point between the beginning and the end of the exposure interval” as required by IV. Ex.1003, ¶53; Ex.1069, ¶59.



Ex.1003, ¶53, annotated; Ex.1069, ¶59.

Thus, Matsushima teaches “*during a frame*” even under IV’s flawed construction.

C. Matsushima and Yu render obvious “*independently controlling*” (limitation [22.3]) and “*independent control*” (limitation [1.2.2]).

As shown in the Petition, Matsushima and Yu render obvious “*independently controlling*” because (i) Matsushima itself discloses or renders obvious “*independently controlling*,” (Pet. 25-30) or (ii) alternatively, Matsushima combined with Yu renders obvious “*independently controlling*.” Pet. 30-34. IV’s arguments regarding Matsushima fail, because they mischaracterize Matsushima as requiring “a common exposure time” for two independent systems (POR, 43). III.C.1; Ex.1069, ¶¶62-76. Further, IV’s arguments regarding Matsushima combined with Yu fail, because (i) IV does not dispute that Yu discloses “*independently controlling*,” and (ii) its combination arguments conflict with the prior art teaching and a POSITA’s knowledge and misrepresent Petition’s combination. III.C.2; Ex.1069, ¶¶78-89.

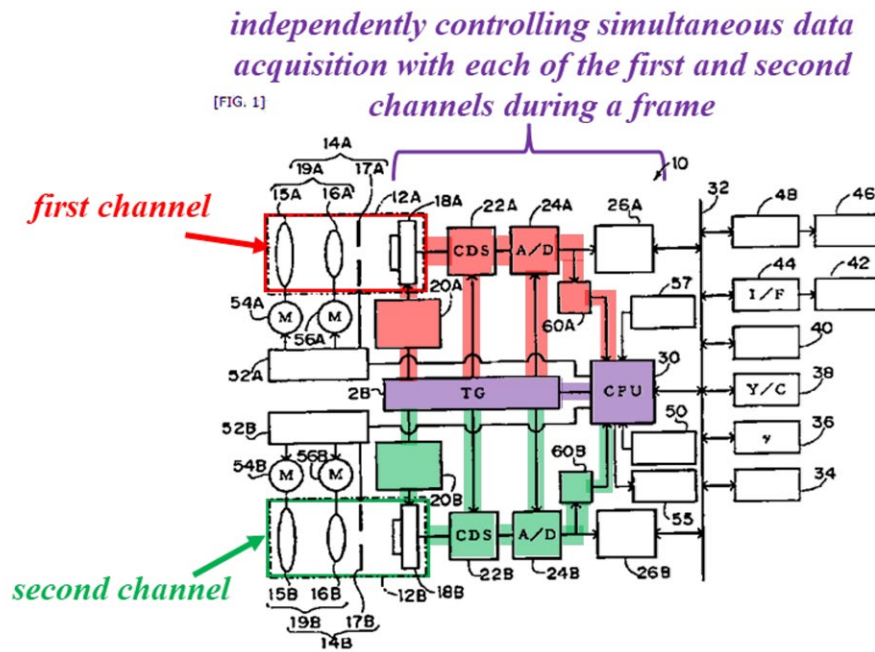
1. Matsushima itself discloses “*independently controlling*.”

a. IV does not contest that Matsushima teaches using an electronic shutter per sensor for independent imaging systems, as shown in the Petition.

The Petition explains that Matsushima teaches independent control of integration time of each sensor. Pet., 25-30 (citing Ex.1007, FIG. 1, [0024]-[0027], [0034]-[0035]; Ex.1003, ¶¶98-101; *see also* Ex.1069, ¶¶63-76.

IV does not dispute that (i) Matsushima teaches **an electronic shutter on each sensor**; and (ii) FIG. 1 of Matsushima (reproduced below) illustrates **independent**

imaging systems 12A and 12B and **distinct** paths for controlling the integration time of an individual sensor **distinct** from the other sensor, as shown in the Petition. Pet. 25-30; Ex.1003, ¶¶98-101.

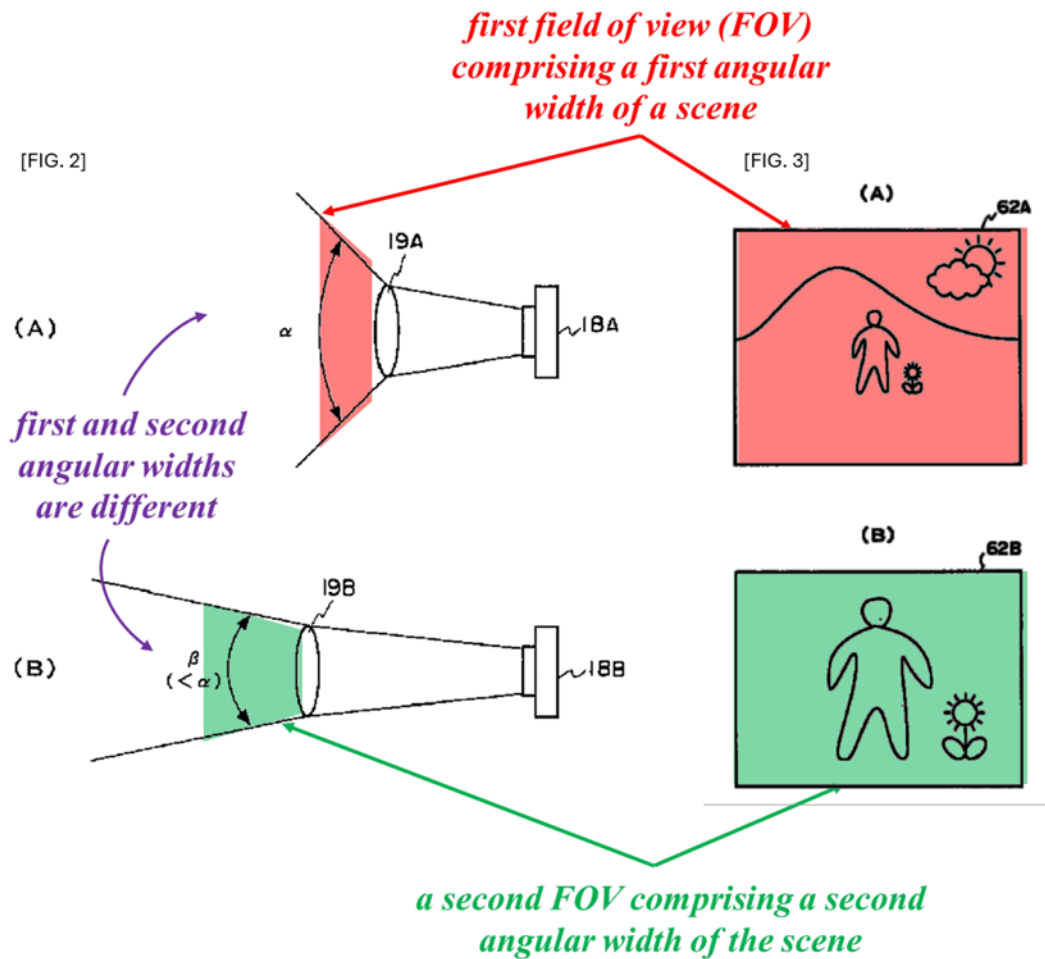


Ex.1007, FIG. 1, annotated; Ex.1003, ¶98.

b. Matsushima teaches different integration times for independent imaging systems having different FOV.

IV does not directly contest the Petition's analysis that Matsushima teaches different integration times for the independent imaging systems. Pet. 27-29 (citing Ex.1007, [0034], Ex.1014, FIG. 1a-1c, 5:13-20; Ex.1009, 9; Ex.1024, 3; Ex.1025, 7, FIG. 8; Ex.1026, 3); Ex.1003, ¶¶100-102. As shown in annotated FIGS. 2-3 of Matsushima below, Matsushima teaches that sensors imaging different fields of view (FOVs) receive different subject luminance, leading to different integration

times. Pet. 20, 27; Ex.1069, ¶¶65-67.



Ex.1007, FIGS. 2 and 3, annotated; Ex.1003, ¶92.

IV likewise does not dispute the well-known principle, confirmed by multiple references and Mr. Guidash, that different integration times are used for different subject luminance for optimal performance. Pet. 28-29 (citing Ex.1014, FIG. 1a-1c,

5:13-20; Ex.1009, 9; Ex.1024, 3; Ex.1025, 7, FIG. 8; Ex.1026, 3); Ex.1003, ¶¶100-102.

Instead, IV mischaracterizes Matsushima's disclosure and a POSITA's knowledge of the art. These mischaracterizations are addressed next.

i. IV mischaracterizes Matsushima as applying a common exposure time.

IV argues that Matsushima lacks “independent” control, based on its characterization that Matsushima describes “a common exposure time.” POR, 43. This is incorrect. Ex.1069, ¶¶68-73.

Matsushima expressly states that “each sensor” has its own accumulation-time control: “CCD 18A and CCD 18B **each** have a shutter drain via a shutter gate.... the CCDs 18 have a so-called electronic shutter function that controls the accumulation time (shutter speed) of the charge accumulated by **each** sensor.” Ex.1007, [0024]; Pet., 26; Ex.1003, ¶98. Further, there is no dispute that CCDs 18A and 18B belong to “two independent imaging systems” with distinct control paths. Pet., 12; Ex.1003, ¶¶87-90; Ex.1007, [0017], Fig. 1; Ex.1069, ¶69.

Matsushima further explains that these independent imaging systems have their own “appropriate aperture **values**,” and that each system's “**aperture value and shutter speed** are determined” based on its imaging EV value. Pet., 27-29; Ex.1007, [0032], [0034]. This confirms that each system has its own exposure, controlled by its aperture and shutter speed. Ex.1003, ¶102; Ex.1069, ¶70.

As explained by Mr. Guidash, IV's "single common exposure time" theory is illogical in the context of Matsushima's design. Matsushima includes separate EV measurements and separate integration circuits 60A and 60B (Pet., 14; Ex.1003, ¶¶87-90; Ex.1007, [0017], Fig. 1), which only serve a purpose if each system uses its own exposure time. Using a single shutter speed would render these circuits pointless and merely increase cost, size, power, and complexity with no benefits. Ex.1069, ¶71.

IV's theory also conflicts with its own "a common exposure time" argument. POR, 43. Because exposure depends on both aperture and integration time, Ex.1003 ¶44, a single integration time combined with different apertures in Matsushima (Ex.1007, [0032]) would produce different, not the same, exposures. Ex.1003, ¶44; Ex.1069, ¶72.

The Board should reject IV's interpretation, because it is incompatible with Matsushima's explicit disclosure, inconsistent with a POSITA's understanding, and internally contradictory.

ii. IV mischaracterizes Matsushima's image synthesis as requiring a common exposure time.

IV argues that Matsushima does not teach different exposure times, reasoning that (i) Matsushima does not describe specific techniques for synthesizing images with different exposures, and (ii) the prior art recognizes the challenge of achieving

a natural boundary. POR, 48. These arguments conflict with both Matsushima and a POSITA's general knowledge, and should be rejected. Ex.1069, ¶¶74-76

First, Matsushima's correction data method prevents an unnatural boundary when combining images of different exposures. Pet. 36; Ex.1003, ¶121; Ex.1007, [0050]-[0069], Figs. 4–7. As explained by Mr. Guidash, Matsushima's method does not require images of the same exposure; applying the method when combining images of different exposures provides the same result: “the image data between A and B [the boundary] is almost continuous,” thereby producing a natural boundary. Ex.1069, ¶75.

Second, IV asserts that “Petitioner's reading of Matsushima is inconsistent with the state of the art” recognizing unnatural boundary concerns. POR, 51. However, a POSITA knew how and would have eliminated exposure artifacts when combining images of different exposures. IV's own supporting reference (Ex.2012, 1) confirms this. Ex.2012, 1 (describing established techniques for eliminating exposure artifacts when combining images of different exposures); Ex.1069, ¶76.

2. It would have been obvious to combine Matsushima with Yu.

IV does not dispute that Yu discloses “*independently controlling*” or that the Matsushima-Yu combination renders it obvious. Rather, IV argues that the combination would not have been obvious. POR, 53-58. IV is wrong. Ex.1069, ¶¶77-

82.

a. *Yu's independent control techniques are compatible with Matsushima.*

IV does not dispute that Yu's independent control techniques are compatible with Matsushima. Instead, IV states that Yu's technique of combining "a plurality of spatially aligned pixels...to expand the dynamic range" stands in contrast to "Matsushima's technique for image synthesis." POR, 56. This misrepresents the combination, contradicts a POSITA's knowledge, and should be rejected. Ex.1069, ¶78.

As explained in the Petition, a POSITA would have been motivated to apply, in Matsushima's multi-channel digital camera, Yu's teaching of independent control (e.g., of exposure time, gain control, and/or offset control) for each channel, because doing so would provide the benefits of an improved combined image from the independently captured images. Pet. 32. The benefits include "increase[d] overall dynamic range" (Ex.1005, 9:19-27), and improved sharpness with "more scene objects are sharper than in any of the input images" (Ex.1014, 5:24-25). Pet. 32. This motivation to improve image quality by combining images captured under independent control applies regardless of whether the images have the same FOV as in Yu or capture different regions of the scene. Ex.1069, ¶79 (citing Ex.1014, FIG. 3, claim 1 (describing combining images from multiple channels without restricting their FOVs); Ex.1008, FIG. 2, [0020]-[0031]).

IV argues that Yu's "dynamic range extension technique" of combining "spatially aligned pixels captured by different sensors" cannot be applied to Matsushima, because Matsushima lacks spatially aligned pixels. POR, 57. **First**, this argument is misplaced, because the combination applies Yu's independent control applied in Matsushima's system, and does not require bodily incorporation of Yu's specific techniques for combining the images. *See* Pet., 34-37, 57-59 (analysis of limitations [22.4] and [1.2.3] based on Matsushima's teaching of image synthesis). **Second**, IV's assertion that Matsushima lacks "spatially aligned pixels" for improving dynamic range (POR, 57) is incorrect, because techniques for combining images with different exposures, including the step to align pixels spatially, were well-known. Pet. 29; Ex.1003, ¶102 (explaining that it was well-known that improved image characteristics, including broad dynamic range, are achieved by combining images 62A and 62B having different integration times of a scene, citing Ex.1014, FIG. 1a-1c, 5:13-20; Ex.1009, 9; Ex.1024, 3; Ex.1025, 7, FIG. 8; Ex.1026, 3); Ex.1069, ¶¶80-81 (explaining that global and local alignment of images to provide spatially aligned pixels were well-known, citing Ex.1014, 7:57-8:2).

IV's argument should be rejected.

b. *The combination of Matsushima and Yu does not destroy the purpose of Matsushima.*

IV asserts that the Matsushima-Yu combination would "would defeat the

primary purpose of Matsushima” because combining images of different exposures will introduce an unnatural boundary. POR, 58. This mischaracterizes the prior art and the combination, and should be rejected. Ex.1069, ¶¶83-89.

First, the combination of Matsushima and Yu does not destroy the purpose of Matsushima. Ex.1069, ¶84. Specifically, Matsushima’s correction data method prevents an unnatural boundary when combining images of different exposures. As explained by Mr. Guidash, Matsushima’s method does not require images of the same exposure; applying it when combining images of different exposures provides the same result: “the image data between A and B [the boundary] is almost continuous” (Ex.1007, [0057]), thereby producing a natural boundary. Pet. 36-37; Ex.1003, ¶¶121-122; Ex.1069, ¶84.

Second, IV’s reliance on *DePuy* and *Gordon* to argue that obviousness fails where a modification renders a device inoperable or changes its principle of operation is misplaced. POR, 58-59. Here, the combination neither renders the camera with its compositing approach inoperable, nor alters Matsushima’s principle of operation (capture wide-angle and telephoto views, align/scale, and composite to produce a synthesized image free of boundary artifacts). Pet. 33-34; Ex.1003, ¶¶112-114; Ex.1069, ¶85.

IV overlooks that Matsushima itself discloses combining images of different exposures and expressly teaches techniques to resolve the unnatural boundary

artifact. Pet. 36-37; Ex.1003, ¶¶121-122; Ex. 1007, [0050]-[0051]. Applying Yu's independent control in Matsushima's camera system would not introduce an "unnatural boundary" as IV asserted. In fact, Yu's teaching of independent control (e.g., exposure time, gain, and offset) for each channel does not create an unavoidable artifact; rather, it enables a POSITA to capture optimized inputs for dynamic range and sharpness. The combination therefore preserves Matsushima's intended purpose and enhances image quality, consistent with the predictable benefits identified in the Petition. Pet. 33-34; Ex.1003, ¶¶112-114; Ex.1069, ¶86.

Third, IV asserts that the challenge of unnatural boundaries for synthesizing images would have discouraged a POSITA from combining the teachings of Matsushima and Yu. POR, 58-59. However, a POSITA knew how and would have eliminated exposure artifacts when combining images of different exposures. IV's own supporting reference (Ex.2012, 1) confirms this. Ex.2012, 1 (describing established techniques for eliminating exposure artifacts when combining images of different exposures); Ex.1069, ¶87. The presence of potential artifacts does not "defeat the purpose," because standard processing steps to remove those artifacts were well-known. Ex.2012, 1; Ex.1069, ¶87.

IV asserts, "the Petition failed to introduce any evidence...the alleged benefits of the combination outweighed the disadvantages." POR, 59. But this argument mischaracterizes the Matsushima-Yu combination. As discussed above, the

combination does not introduce the alleged disadvantage of an unnatural boundary. Matsushima itself teaches techniques for providing a natural boundary for combining images of different exposures. Yu's independent control of exposure time, gain, and offset does not create unavoidable artifacts. Ex.1069, ¶88. There is no need for any weighing of benefits against disadvantages because the asserted disadvantage does not exist. Ex.1069, ¶88.

IV's argument should be rejected.

IV. GROUND 2: MATSUSHIMA, YU, AND WELDY RENDER OBVIOUS CLAIMS 28 AND 30.

IV does not dispute that Matsushima, Yu, and Weldy render obvious the limitations of claims 28 and 30. POR, 20. IV's arguments for claims 28 and 30 rely entirely on its erroneous arguments for claim 22 in Ground 1. POR, 20. IV's argument fails for the same reasons shown in Section III. Ex.1069, ¶90.

V. GROUND 3: CHOI, LABAZIEWICZ, AND YU RENDER OBVIOUS CLAIMS 22-23, 28, AND 30.

A. Labaziewicz is prior art.

IV argues that Labaziewicz (Ex.1010) is not prior art because it was filed (February 18, 2005) after the August 24, 2004 filing date of U.S. Provisional Application No. 60/604,854 (Ex.1047). POR, 60. IV's arguments contradicts the record and should be rejected. Ex.1069, ¶¶91-96.

1. No written description exists in the '854 provisional for providing multiple channels having different FOVs.

IV asserts, “the Provisional Application **inherently disclosed** multiple channels with different fields of view” because it discloses lens with different focal lengths. POR, 62. IV is wrong. A focal length alone does **not** determine an FOV. Ex.1069, ¶¶92-96.

As shown in Jacobson's FIG. 4.13 (Ex.1040), FOV depends on both the focal length (f) and sensor size (K representing the diagonal of the sensor format). Pet. 16; Ex.1003, ¶89.

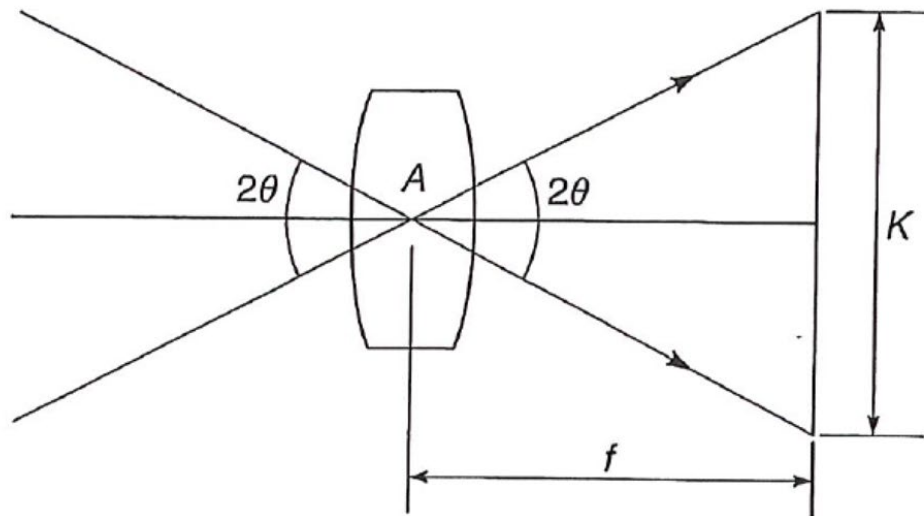


Figure 4.13 Field (angle) of view (FOV) of a lens related to format dimension

Ex.1040, FIG. 4.13.

The well-known relationship is $FOV = 2\arctan \frac{K}{2f}$. Thus, two channels

with different focal lengths (f_1 and f_2) can have the same FOV if their respective sensor diagonals (K_1 and K_2) satisfy:

$$\frac{K_1}{f_1} = \frac{K_2}{f_2}.$$

Ex.1069, ¶¶94.

Thus, the mere disclosure of different focal lengths does not “necessarily” result in different FOVs. Ex.1069, ¶¶95-96 (citing Ex.1001, 3:49-51; Ex.2020, ¶40; Ex.1047, FIG. 5, 12:1-15). Inherency requires necessity, not possibility. *In re Robertson*, 169 F.3d 743, 745, (Fed. Cir. 1999).

2. No written description exists in the '854 provisional for multiple sensors.

IV argues, the '854 provisional discloses multiple sensors because “each array (210A - 210D) also comprises a sensor.” POR, 63. This is incorrect. Ex.1069, ¶¶97-100.

The provisional states that a *single* image sensor 210 includes “several higher order features including multiple arrays (210A-210D)” (Ex.1047, 4), confirming that it describes a single sensor, not multiple. Ex.1069, ¶98.

IV's assertions contradict the '180 patent and its own expert's testimony. The '180 patent distinguishes multiple arrays on one sensor from multiple sensors. Ex.1001, 9:43-51 (describing that an imager die includes “multiple arrays” on a single chip); 2:54-56 (FIG. 9 expressly refers to “separate arrays on one image

sensor”). IV’s expert acknowledged this distinction, testifying that “Figure 7 refers to an image sensor versus claim 22 claims a first image sensor and a second image sensor.” Ex.1070, 98:3–8; 99:22–100:5; Ex.1069, ¶99.

Accordingly, IV’s assertion that arrays 210A–210D in a single sensor disclose multiple sensors should be rejected.

B. Choi, Labaziewicz, and Yu renders obvious independently controlling simultaneous data acquisition “*during a frame*” (limitation [22.3]).

IV’s argument that Ground 3 is deficient is solely based on IV’s errant assertion that Yu does not disclose limitation [22.3] of claim 22 reciting “*independently controlling simultaneous data acquisition with each of the first and second channels during a frame.*” As shown at Section III, IV’s arguments are solely based on its improper requirements for integration time control under rolling mode, and should be rejected. Ex.1069, ¶¶101-103.

Furthermore, Choi’s description of acquisition of background image and subject image during the time period for data capture of a frame teaches “*during a frame.*” Pet. 86-87; Ex.1003, ¶¶232-233; Ex.1008, FIG. 2, [0069]; Ex.1069, ¶102.

Thus, Choi, Labaziewicz, and Yu renders obvious independently controlling simultaneous data acquisition “*during a frame.*”

VI. CONCLUSION

The Challenged Claims are unpatentable.

Respectfully submitted,

Dated: January 9, 2026
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VII. CERTIFICATE OF WORD COUNT

Under 37 C.F.R. § 42.24, the undersigned attorney for the Petitioner, declares that the argument section of this Reply (§§I-VI) has 5,595 words, according to the word count tool in Microsoft Word™.

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

TESLA, INC.
Petitioner

§ Petition for *Inter Partes* Review
§
§ U.S. Patent No. 9,232,180
§

CERTIFICATE OF SERVICE

The undersigned certifies, under 37 C.F.R. §§ 42.105 and 42.6, that service was made on the Patent Owner as detailed below.

Date of service January 9, 2026

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