

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NIKON CORPORATION, PANASONIC ENTERTAINMENT &
COMMUNICATION CO., LTD., OLYMPUS CORPORATION, OM DIGITAL
SOLUTIONS CORPORATION, FUJIFILM NORTH AMERICA
CORPORATION, FUJIFILM CORPORATION,

Petitioners

v.

OPTIMUM IMAGING TECHNOLOGIES LLC,

Patent Owner

Case IPR2024-01372

Patent No. 8,451,339

PATENT OWNER PRELIMINARY RESPONSE

Mail Stop PATENT BOARD
Patent Trial and Appeal Board
United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

<u>PATENT OWNER'S LIST OF EXHIBITS</u>	
EX. 2001	Claim Construction Memorandum Opinion and Order, <i>Optimum Imaging Technologies LLC v. Canon Inc.</i> , No. 2:19-cv-00246, Dkt. 88 (E.D. Tex. June 11, 2020)
EX. 2002	Institution Decision, IPR2020-01322, Paper 9 (PTAB Mar. 1, 2021)
EX. 2003	Patent Owner Preliminary Response, IPR2024-00925, Paper 8 (PTAB Sep. 20, 2024)
EX. 2004	Scheduling Order, <i>Optimum Imaging Technologies LLC v. Nikon Corp.</i> , No. 4:23-cv-00923, Dkt. 37 (E.D. Tex. Oct. 2, 2024)

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I. INTRODUCTION

Patent Owner respectfully submits this Patent Owner Preliminary Response (“POPR”) to request the Board deny institution. Petitioners challenge claims 1-5 and 14-18 of Patent No. 8,451,339 (“the ‘339 Patent”). Petition at 2. Petitioners’ arguments fail for at least three reasons.¹

First, instituting this IPR would not be a good use of the Board’s resources in view of related proceedings involving the ‘339 Patent.

Second, the proposed modifications are replete with hindsight bias. Petitioners fail to meet their burden to establish obviousness.

Third, even with the modifications, the proposed combinations have many deficiencies and do not meet the limitations of the challenged claims.

II. THE TIMING OF RELATED PROCEEDINGS SHOWS THAT INSTITUTING THIS IPR WOULD NOT BE AN EFFICIENT USE OF THE BOARD’S RESOURCES

As reflected in Patent Owner’s Updated Mandatory Notices (Paper 7), the ‘339 Patent is involved in multiple parallel district court proceedings and has been challenged by a different petitioner in each of IPR2020-01322 (institution denied), IPR2024-00925 (pending), and IPR2025-00462 (pending).

¹ This POPR briefly addresses the challenged independent claims of the ‘339 Patent.

Patent Owner reserves all rights to address all grounds and all claims.

The district court scheduling order set a final pretrial conference for October 29, 2025. EX. 2004 at 6. This conference will occur long before a final written decision would be expected in this IPR in April 2026. Following a court ordered reduction of asserted claims, Patent Owner now asserts claims 1-4, 6-7, 10, and 14-15 of the '339 Patent in the parallel district court proceedings.² Independent claim 6 and dependent claims 7 and 10 of the '339 Patent are not challenged in any IPR and will necessarily be evaluated by the district court. It is not efficient to evaluate validity in both forums. Instituting this IPR would not be a good use of the Board's resources. The validity of the '339 Patent should be evaluated in district court.³

IPR2020-01322 involving the same claims 1-5 and 14-18 and the same primary reference Niikawa was denied institution because the Board found that the

² Patent Owner previously asserted claims 1-18 of the '339 Patent in the parallel district court proceedings.

³ Based on current law/policy, Patent Owner understands that a *Sotera*-style stipulation precludes discretionary denial under *Fintiv*. See, e.g., Former Director Vidal, Memorandum, 'Interim Procedure for Discretionary Denials in AIA PostGrant Proceedings with Parallel District Court Litigation' dated June 21, 2022. If there is an intervening change in law/policy, Patent Owner will seek authorization for supplemental briefing to address the *Fintiv* factors in detail.

merits did not outweigh the other *Fintiv* factors favoring denial. EX. 2002 at 11. As in the prior IPR2020-01322, the merits of this IPR do not justify institution.

IPR2024-00925 involving the same claims 1-5 and 14-18, but different grounds, was instituted on November 18, 2024. A final written decision in IPR2024-00925 will be entered long before a final written decision would be expected in this IPR in April 2026. Because the validity of the same claims of the ‘339 Patent will already be evaluated by the Board in IPR2024-00925, instituting this IPR would not be a good use of the Board’s resources. Moreover, as discussed above, the validity of the ‘339 Patent should be evaluated in district court.

Instituting this IPR would be extremely burdensome for the parties and the Board. Patent Owner should not be forced to repeatedly defend the validity of the ‘339 Patent in multiple IPRs, as well as in district court.⁴

⁴ Based on current law/policy, Patent Owner understands that multiple petitions filed by different parties without a “significant relationship” may preclude discretionary denial under *General Plastic*. See, e.g., *Videndum Production v. Rotolight*, IPR2023-01218, Paper 12 at 6 (PTAB Apr. 19, 2024). If there is an intervening change in law/policy or in facts/circumstances, Patent Owner will seek authorization for supplemental briefing to address the *General Plastic* factors and relevant facts/circumstances in detail.

IPR2025-00462 involving the same claims 1-5 and 14-18 and the same grounds was recently filed, with no justification for the delay in filing that petition. The complaints in the parallel district court proceedings were filed in October 2023. The petitioner-defendants in IPR2025-00462 and in this IPR are not being efficient. For at least the reasons discussed above, instituting this IPR would not be a good use of the Board's resources and the validity of the '339 Patent should be evaluated in district court.

III. THE '339 PATENT CLAIMS NOVEL AND NON-OBVIOUS SYSTEMS FOR CORRECTING ABERRATIONS IN A DIGITAL CAMERA

The '339 Patent claims systems that perform in-camera aberration correction using novel and non-obvious combinations of hardware and software. EX. 1001 at Abstract (“A system is disclosed for the automated correction of optical and digital aberrations in a digital imaging system.”)

“Though every major advance in photography has solved an important problem, there are still remaining photographic problems to be solved in order to meet the goals of *optimizing optical imaging quality* while *increasing simplicity and efficiency* and *lowering cost*.” EX. 1001 at 3:13-17 (emphasis added).

“The present system dramatically improves image quality. This digital imaging system eliminates, or minimizes, post-production processes. In addition, the system presents substantial cost savings as well as time savings relative to

existing digital imaging systems because of the automation of integrated in-camera optical and digital corrections of aberrations.” EX. 1001 at 7:14-20.

To achieve the advantages described in the specification, the independent claims of the ’339 Patent recite, *inter alia*, “a digital camera mechanism”, “system software”, “a microprocessor”, “a digital signal processor”, and “a database management system.”

As claimed, the microprocessor uses system software to identify at least one optical aberration, which is corrected using the digital signal processor. Thus, the system can identify the specific aberrations and the specific solution for each aberration.

As explained in the ’339 Patent, “[t]his in-camera corrective feature provides a powerful tool to rapidly manipulate an image without using post-production editing software tools.” EX. 1001 at 16:5-8.

The ’339 Patent includes 18 claims. Exemplary independent claims 1 and 14 are set forth below:

Claim 1	
1[pre]	A digital imaging system for correcting optical image aberrations comprising:

1[a]	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor, system software, a database management system and a memory storage sub-system;
1[b]	wherein the optical lens mechanism is a fixed focal length lens;
1[c]	wherein a microprocessor uses system software to identify at least one optical aberration by accessing the database;
1[d]	wherein the microprocessor uses the database to identify at least one algorithm to use to correct the at least one optical aberration;
1[e]	wherein when the image file is captured by the digital sensor the digital file is forwarded to the digital signal processor;
1[f]	wherein the image file with the at least one optical aberration is corrected by applying digital filtration by using at least one algorithm in the digital signal processor; and
1[g]	wherein the modified digital file consisting of the digital data optimized from the at least one optical aberration that are corrected from the original optical image is stored in memory.
Claim 14	
14[pre]	A digital imaging system for correcting image aberrations comprising:

14[a]	a digital camera mechanism, an optical lens mechanism, a digital sensor, a microprocessor, a digital signal processor, system software, a database management system and a memory storage sub-system;
14[b]	wherein the optical lens mechanism is a zoom lens;
14[c]	wherein the zoom lens changes focal length positions;
14[d]	wherein when the image file is captured by the digital sensor the file is forwarded to the digital signal processor and to memory;
14[e]	wherein the microprocessor uses system software to access the database to identify at least one optical aberration in the image file at any focal length of a zoom lens configuration;
14[f]	wherein the microprocessor accesses the database to obtain at least one filtration correction algorithm to the optical aberrations and forwards the at least one filtration algorithms to the digital signal processor;
14[g]	wherein the image file is forwarded to the digital signal processor which applies at least one filtration algorithm to optimize the image and corrects the at least one optical aberration at the specific focal length in the zoom lens configuration; and
14[h]	wherein the modified image file consisting of the digital data optimized from the at least one optical aberration of a specific focal length of the

	zoom lens that are corrected from the original optical image is stored in memory.
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A. PERSON OF ORDINARY SKILL IN THE ART (“POSA”) WAS PREVIOUSLY DEFINED BY THE DISTRICT COURT

Petitioners propose a POSA would have had “a bachelor’s degree in electrical engineering, physics, or a related field, with at least two years of industry experience and/or research, both concerning digital camera system design and image processing.” Petition at 7.

The district court found that a POSA would have had “an electrical engineering degree and three years of relevant experience.” EX. 2001 at 6.

Patent Owner submits that the district court’s definition of a POSA should be adopted for purposes of determining whether to institute. Patent Owner reserves all rights regarding the correct definition of a POSA.

B. CLAIM CONSTRUCTION

Petitioners identify no terms or phrases for construction. Petition at 7. Patent Owner reserves all rights regarding the correct claim constructions.

IV. GROUND 1(A) BASED ON NIIKAWA FAILS

In Ground 1(a), Petitioners challenge independent claim 1. Petition at 3. Petitioners’ analysis for Ground 1(a) fails for at least three reasons.

First, Petitioners argue that Niikawa’s shading ROM 153 corresponds to the claimed “database”. *See, e.g.*, Petition at 26. Independent claim 1 recites limitations involving the “database.” *See, e.g.*, claim 1[c] and 1[d]. Petitioners fail to show that Niikawa’s shading ROM 153 is updatable. In IPR2024-00925, Patent Owner made clear that the recited “database” in the ‘339 Patent is updatable which amounts to prosecution history disclaimer. EX. 2003 at 28-29; *CUPP Computing AS v. Trend Micro Inc.*, 53 F.4th 1376, 1383 (Fed. Cir. 2022)(“To be clear, a disclaimer in an IPR proceeding is binding in later proceedings, whether before the PTO or in court.”).⁵ The ‘339 Patent explains that the updatable database is a “particularly important” feature to both the manufacturer and the user when, for example, a new lens is used. EX. 1001 at 28:39-42. Moreover, a POSA would have understood that Niikawa’s shading ROM 153 is read-only memory that is “prepared in advance” and not updatable. EX. 1005 at Abstract (“A plurality of

⁵ Patent Owner made similar arguments in the preliminary response in IPR2024-00923 addressing related Patent No. 10,873,685, which was filed before the petition in this IPR. Petitioners admit they were aware of the preliminary response in IPR2024-00923 on the day it was filed. IPR2024-01220, Paper 1 at 77-78 (PTAB Aug. 29, 2024). Petitioners had fair notice and opportunity to address the “database” claim limitations in the petition in this IPR.

correction tables for use in shading correction are prepared in advance in a shading ROM of the digital camera.”).

Second, Petitioners argue that Niikawa’s shading correction circuit 123, which is a hardware circuit, corresponds to the claimed “digital signal processor”. Petition at 24. However, as conceded by Petitioners, Niikawa distinguishes a hardware circuit from a processor in the context of that disclosure. Petition at 24-25. As such, Petitioners fail to establish that Niikawa’s shading correction circuit 123 discloses the claimed “digital signal processor.”

Third, Petitioners argue that a POSA would be motivated to replace Niikawa’s shading correction circuit 123 with a processor. Petition at 25. Niikawa’s shading correction circuit 123 performs a simple multiplication operation. There is no reason a POSA would have been motivated to use a processor, at greater cost and requiring more processing power, to perform simple multiplication. Petitioners are using hindsight bias. Petitioners argue that this would have been a “simple substitution” of known components, but Petitioners identify no reason a POSA would perform this substitution. Petitioners cite to the expert declaration (EX. 1003 at ¶113) which opined a POSA wanting to change the functionality “would have used a processor instead of the functionally fixed shading correction circuit” but neither Petitioners nor their expert identify any change in functionality of Niikawa’s shading correction circuit 123 that would

prompt the substitution of a processor. A POSA understanding the limited processing power/battery life of a camera, and mindful of cost constraints, would not have been motivated to make this substitution.

V. GROUND 1(B) BASED ON NIIKAWA + ENOMOTO FAILS

In Ground 1(b), Petitioners challenge independent claims 1 and 14. Petition at 3. Petitioners’ analysis for Ground 1(b) fails for at least six additional reasons.

First, Petitioners analyze both Grounds 1(a) and 1(b) in a single section V.A. Petitioners do not separately analyze each ground. Petitioners also do not clearly identify whether they propose combining Niikawa (unmodified) or Niikawa (modified) with Enomoto. This lack of particularity puts the burden on Patent Owner to decipher Petitioners’ arguments for each claim limitation and makes it difficult to understand which features of which references in which combination Petitioners are relying on when assessing *each claim as a whole*.⁶ The Federal Circuit has emphasized the particularity requirements of § 312(a)(3) as being “of the utmost importance.” *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821

⁶ This is also true for Ground 2(a) based on Niikawa + Ito and Ground 2(b) based on Niikawa + Enomoto + Ito which are analyzed in a single section V.B. Grounds 2(a) and 2(b) challenge only dependent claims and refer back to the analysis in section V.A.

F.3d 1359, 1369 (Fed. Cir. 2016). “Unlike district court litigation—where parties have greater freedom to revise and develop their arguments over time and in response to newly discovered material—the expedited nature of IPRs bring with it an obligation for petitioners to make their case in their petition to institute.” *Id.* Consistent with the Federal Circuit caselaw, the Consolidated Trial Practice Guide emphasizes the importance to “focus on concise, well-organized, easy-to-follow arguments supported by readily identifiable evidence of record.” Patent Trial and Appeal Board Consolidated Trial Practice Guide (November 2019) at 39. It is improper to put the burden on Patent Owner to respond to any and all possible arguments given the lack of particularity in Petitioners’ analysis in section V.A. Because of the lack of particularity, Petitioners fail to meet their burden.

Second, Petitioners equate Niikawa’s general controller 150 and Enomoto’s CPU of image processing apparatus 14. Petition at 34-35. Petitioners mischaracterize the disclosure of Enomoto. With respect to FIG. 1, Enomoto discloses a scanner 12, an image processing apparatus 14 (connected to display device 20, keyboard 18a, and mouse 18b), and a printer 16. EX. 1008 at 9:66-10:22. ***A POSA would have understood that the Enomoto’s image processing apparatus 14 is an exemplary desktop computer, not a digital camera.*** In the context of Enomoto, the scanner is the “image reading apparatus” and the printer is the “image recording apparatus”. EX. 1008 at 1:62-2:4. Petitioners fail to establish

that Niikawa's general controller 150 would have the same processing power and capability as the CPU of image processing apparatus 14, a desktop computer.

Third, Petitioners argue that Enomoto's disclosure relates to in-camera aberration correction. Petition at 15-16. Petitioners again mischaracterize Enomoto's disclosure. Enomoto explains that various image reading means can be used in place of the scanner 12, including for example, a digital camera. EX. 1008 at 11:35-52 (referring to "image reading means" that supply image data into the image processing apparatus 14). ***There is no disclosure in Enomoto of a digital camera performing the functionality of the image processing unit 14.*** The image reading apparatus (scanner) 12 and the image processing unit 14 are separate devices. The image reading apparatus (scanner) 12 does not have the functionality on which Petitioners rely. Enomoto does not disclose in-camera aberration correction. Instead, Enomoto highlights one of the problems the '339 Patent was designed to avoid. The prior art was heavily dependent on CPU-intensive processes, including post-production programs on an external computer like Photoshop. *See, e.g.*, EX. 1001 at 6:36-43.

Fourth, Petitioners do not address the components of Enomoto's imaging processing unit 14 or explain how they relate to or would otherwise be implemented in Niikawa's digital camera. With respect to FIG. 2 of Enomoto, there are several internal components of Enomoto's image processing unit 14

related to image processing, including aberration correcting part 56. EX. 1008 at 11:66-12:7. Petitioners also do not address the components of aberration correcting part 56 or explain how they relate to or would otherwise be implemented in Niikawa's digital camera. FIG. 3 of Enomoto shows internal components of aberration correcting part 56, including the coordinates transforming section 56A and the enlarging/contracting section 56b. Petitioners fail to explain **how** the components of Enomoto actually work or **why** a POSA would have been motivated to incorporate the teachings of Enomoto in Niikawa's digital camera. For at least these reasons, Petitioners fail to establish a POSA would have combined the teachings of Niikawa and Enomoto or that a POSA would have been able to do so with a reasonable expectation of success.

Fifth, Petitioners argue that a POSA would have been motivated to modify the programs stored in Niikawa's ROM 151 and the correction tables stored in Niikawa's shading ROM 153 based on the teachings of Enomoto. Petition at 35. Petitioners further argue that the Enomoto's correction coefficients could be stored in the modified shading ROM 153 and applied by Niikawa's "shading corrector" multiplication operation. See Petition at 39. Enomoto expressly discloses that if aberrations are corrected separately, "much time is required to perform mathematical operations and, in addition, mathematical operations for interpolation must be performed several times, which may lead to image deterioration." EX.

1008 at 15:17-24. Thus, a POSA reading Enomoto would not have been motivated to perform separate multiplication operations. Petitioners also do not explain how their proposed combination would correct aberrations simultaneously as taught by Enomoto. For at least these reasons, Petitioners' proposed combination of Niikawa and Enomoto fails.

Sixth, Enomoto does not disclose correction coefficients like Niikawa. In Enomoto, the lens characteristics (alleged correction coefficients) are used by the coordinates transforming section 56A and the enlarging/contracting section 56b to calculate an offset in the pixel positions of R and B from the reference color G. EX. 1008 at 15:56-16:10. The way the alleged correction coefficients are used in Enomoto is completely different than in Niikawa. For example, Enomoto explains that section 56A uses the lens characteristics to “calculate[] the offsets Δr and Δb ... from i_g , the pixel position of image data G, at i_r and i_b , respectively, ... as well as the offset D of i_g .” EX. 1008 at 16:18-36; FIG. 3. Then, “ Δr and D are added to i_r ” and “ Δb and D are added to i_b ” and “D is added to i_g ”. EX. 1008 at 16:37-48. With these calculations, the corrections of the R and B images are performed with reference to the G image. EX. 1008 at 16:49-56. Then, section 56B performs image scaling by using interpolation. EX. 1008 at 16:47-65. Again, Petitioners do not explain **how** the components of Enomoto actually work or **why** a POSA would have been motivated to incorporate the teachings of Enomoto in Niikawa's digital

camera. The calculations taught by Enomoto are inapposite to the simple multiplication operation taught by Niikawa. Petitioners do not explain how the alleged correction coefficients are used in Enomoto's aberration correcting part 56. Petitioners also do not explain how Enomoto's calculations would be incorporated into Niikawa's digital camera. Again, Enomoto's processes are performed by imaging processing apparatus 14, a desktop computer. Enomoto does not disclose in-camera aberration correction.

Lastly, as discussed above with respect to Ground 1(a), Petitioners fail to show that Niikawa's shading ROM 153, even if modified based on Enomoto, is updatable. *Contra* Petition at 38. Independent claims 1 and 14 recite limitations involving the "database". *See, e.g.*, claim 1[c], 1[d], 14[e], and 14[f]. Patent Owner made clear that the recited "database" is updatable. *See infra*.

VI. GROUND 3 BASED ON MATSUTANI + SHIOMI FAILS

In Ground 3, Petitioners challenge independent claims 1 and 14. Petition at 4. For at least the reasons discussed below, Ground 3 fails.

A. A POSA WOULD NOT HAVE BEEN MOTIVATED TO COMBINE MATSUTANI AND SHIOMI AS PROPOSED

Petitioners argue a POSA would have combined Matsutani and Shiomi because they "both disclose using correction coefficients from a database". Petition at 69, 76. Petitioners state that a POSA would have understood that Shiomi's

correction coefficients could be applied in Matsutani's Formula 1. Petition at 76.

Petitioners' argument is belied by the facts.

Matsutani discloses filter coefficient data $\gamma(m,n)$ that is used in a convolution operation (Formula 1) performed by filtering unit 30₂. Matsutani's Formula 1 is used to correct curvature aberration on a pixel-by-pixel basis. EX. 1006 at [0046].

$$CP(i, j) = \sum_{m=0}^4 \sum_{n=0}^4 \gamma(m, n) \times P(i-2+m, j-2+n) / K \dots (1)$$

EX. 1006 at [0043].

Shiomi is directed at correcting chromatic aberration when there is a color misalignment in the red, blue, and green colors. EX. 1011 at [0005], [00020].

Shiomi explains the size of the image due to the red component is greater than the size of the image due to the green component; and the size of the image due to the blue component is smaller than the size of the image due to the green component.

Id. Shiomi teaches the use of a correction coefficient K_B for blue light and a correction coefficient K_R for red light.

A POSA would not incorporate Shiomi's correction techniques into Matsutani's filtering unit 30₂. Matsutani's Formula 1 is used by filtering unit 30₂ for correcting curvature aberration, not chromatic aberration. EX. 1006 at [0046].

Matsutani teaches different processing units related to RGB color components, for example, a “pixel interpolation and gamma correction processing unit 30₃” and a “color space conversion and color suppression processing unit 30₄”. EX. 1006 at [0033], [0036], [0037]. Therefore, Matsutani’s filtering unit 30₂ would not have corrected for color misalignment.

Moreover, the way the correction coefficients are used in Shiomi is completely different than in Matsutani. A POSA would not have applied Shiomi’s correction coefficients in Matsutani’s Formula 1, which is used to calculate the output value for the pixel of interest. As detailed below in the next section, Shiomi discloses extensive calculations for correcting color misalignment. In Shiomi, the correction coefficients K_B and K_R are only used for intermediate calculations to determine the amount of deviation of the image forming position of blue/red light with respect to the image forming position of green light in each of the X and Y directions. The subsequent calculations determine the pixel value that is used for further processing. Shiomi’s extensive calculations are inapposite to Matsutani’s Formula 1 calculation.

Petitioners do not address the extensive calculations disclosed in Shiomi or explain how they would be incorporated into Matsutani’s Formula 1. Petitioners do not otherwise address how filtering unit 30₂ would be capable of performing these extensive calculations before or after calculating the output value for the pixel of

interest using Formula 1. Moreover, these extensive calculations would require significant processing power and significant time. A POSA reading Matsutani, which emphasizes the need for reduced processing speed (*e.g.*, EX. 1006 at [0006]) would not be motivated to incorporate the correction methods of Shiomi.

Furthermore, Matsutani does **NOT** “explicitly suggest[] using Shiomi for its aberration correction techniques.” *Contra* Petition at 69. In the prior art section, Matsutani identifies Shiomi as disclosing techniques for correcting aberrations. EX. 1006 at [0003]. Matsutani also identifies spatial filters can alternatively be used “as a means of correcting [] aberrations.” EX. 1006 at [0004]. Matsutani clearly focuses its disclosure on the use of spatial filters, not the techniques in Shiomi. *See, e.g.*, EX. 1006 at [0006]. Shiomi does not use spatial filters.

Given the detailed and extensive calculations in Shiomi, Petitioners do not establish how a passing reference to Shiomi in the prior art section suggests that combining these references is “obvious to try with a reasonable expectation of success.” *Contra* Petition at 69. Petitioners misplace reliance on alleging “obvious to try” as this is not the correct standard to rely on here because Petitioners do not identify a finite number of identified, predictable solutions. *See KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (S. Ct. 2007). Petitioners do not explain how incorporating Shiomi’s techniques would have been within the ordinary skill of a POSA or done with a reasonable expectation of success.

For at least these reasons, Ground 3 fails.

1. Detailed description of correcting color misalignment as taught by Shiomi.

As mentioned above, Shiomi teaches extensive calculations for correcting color misalignment. The way the correction coefficients K_B and K_R are used in Shiomi is completely different than in Matsutani. A POSA would not have been motivated to use Shiomi's correction coefficients in Matsutani's Formula 1. Moreover, a POSA would not have been motivated to incorporate Shiomi's calculations into Matsutani's filtering unit 30₂.

Shiomi discloses correction coefficients K_B and K_R for blue and red colors, respectively, to correct for color misalignment. EX. 1011 at [0007], [0021]. The values of K_B and K_R are set in internal registers K_1 and K_2 , respectively. EX. 1011 at [0021]. Data representing a central position on the coordinate axes are set in the C_X and C_Y registers, respectively. *Id.* Start addresses in the X and Y directions are set in the X_1 and Y_1 registers, respectively. EX. 1011 at [0022].

For example, with respect to blue light in the X direction, “the value of the C_X register is subtracted from the value of the X_1 register, and the resulting value is

divided by the value of the register $K_1 \dots$ [and] is set in the X_2 register.” EX. 1011 at [0023].⁷

“[T]he integer part of the value of the X_2 register is set in the X_3 register.”

Id.

“[T]he value of the X_3 register is subtracted from the value of the X_2 register, and the result is set in the X_2 register.” *Id.*

Thus, “the integer part of the amount of deviation of the image forming position of blue light with respect to the image forming position of green light is set in the X_3 register, and the decimal part is set in the X_2 register.” *Id.*

If the value of the X_2 register is between -0.5 and +0.5, the value of the X_3 register and the value of the C_X register are added together and the result is set in the X_3 register.

If the value of the X_2 register is not between -0.5 and +0.5, it is determined whether the value is negative or positive:

- If the value of the X_2 register is negative, 1 is subtracted from the value of the X_3 register and the value of the C_X register added to the value of the X_3 register.

⁷ K_1 is the register “in which the value of the aberration correction coefficient $K_B(a,b)$ for blue light is set.” *Id.*

- If the value of the X_2 register is positive, 1 is added to the value of the X_3 register and the value of the C_X register is added to value of the X_3 register, and the result is set in the X_3 register.

A similar process is performed with respect to blue light in the Y direction. EX. 1011 at [0023]. These processes are also performed with respect to red light in the X and Y directions. EX. 1011 at [0025].

Ultimately, the value of $M_G(X_1, Y_1)$ is set in an A register. EX. 1011 at [0023].⁸ The value of $M_B(X_3, Y_3)$ is set in a B register and the value of $M_R(X_3, Y_3)$ is set in a C register. EX. 1011 at [0024], [0027].

Then, the calculation $a_1 \times A + b_1 \times B + c_1 \times C$ is executed, with green, blue and red mixing proportions set to a_1 , b_1 and c_1 , and the luminance output at the position of address X_1 , Y_1 (with green light as a reference) is set in a D_Y register. EX. 1011 at [0028].

The calculation $a_2 \times A + b_2 \times B + c_2 \times C$ is executed, with green, blue and red mixing proportions set to a_2 , b_2 and c_2 , and the color difference output (red - luminance) at the position having the address X_1 , Y_1 is set in a D_{R-Y} register. EX. 1011 at [0028].

⁸ Using the start addresses S and P stored in the X_1 and Y_1 register, respectively.

The calculation $a_3 \times A + b_3 \times B + c_3 \times C$ is executed, with green, blue and red mixing proportions set to a_3 , b_3 and c_3 , and the color difference output (blue - luminance) at the position having the address X_1 , Y_1 is set in a D_{B-Y} register. EX. 1011 at [0028].

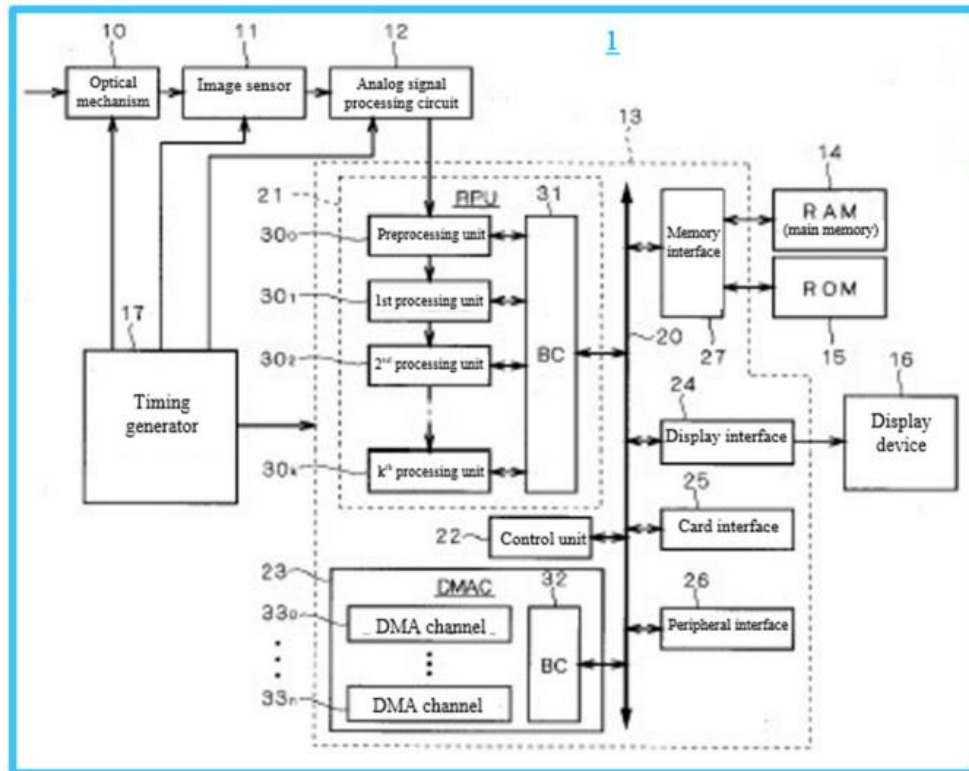
Ultimately, the values of D_Y , D_{R-Y} , and D_{B-Y} are transferred to the D/A converters 15, 16 and 17, 20 respectively, and are output as analog outputs Y, R-Y, and B-Y in accordance with a predetermined timing. EX. 1011 at [0028].

Petitioners do not address the extensive calculations taught by Shiomi to explain how Shiomi actually works. Petitioners fail to establish that a POSA would have been motivated to combine Matsutani and Shiomi as proposed.

B. EVEN IF COMBINED, PETITIONERS FAIL TO SHOW THE INDEPENDENT CLAIMS WOULD HAVE BEEN OBVIOUS

Petitioners fail to establish that their proposed combination meets the limitations of the independent claims. As discussed below, Petitioners' analysis ignores how Matsutani and Shiomi actually work.

Petitioners' annotated FIG. 1 shows Matsutani's digital camera 1 including control unit 22 and RPU 21. Petitioners allege that the CPU in control unit 22 corresponds to the claimed "microprocessor" and that RPU 21 corresponds to the claimed "digital signal processor". Petition at 61-62.



Petition at 59.

Matsutani was designed to solve the problem of aberration correction dependent on pixel position. EX. 1006 at [0006]. Matsutani teaches the use of filtering unit 30₂ in RPU 21 to perform a convolution operation in which each pixel is multiplied by the filter coefficients and the results are summed. EX. 1006 at [0035].

DMAC 23 reads out from main memory 14 the filter coefficient data corresponding to the filter range of 5x5 pixels and DMAC 23 transfers the filter coefficient data to RPU 21. EX. 1006 at [0045]. FIG. 4 below shows filter

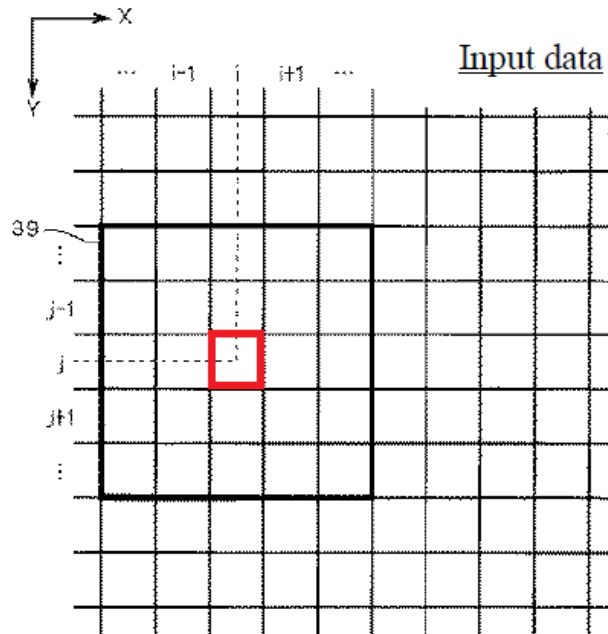
coefficient data 42 including filter coefficients $\gamma(0,0)$, $\gamma(0,1)$, ..., $\gamma(4,4)$ for 25 points (5x5).

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$\gamma(0,0)$	$\gamma(0,1)$	$\gamma(0,2)$	$\gamma(0,3)$	$\gamma(0,4)$
$\gamma(1,0)$	$\gamma(1,1)$	$\gamma(1,2)$	$\gamma(1,3)$	$\gamma(1,4)$
$\gamma(2,0)$	$\gamma(2,1)$	$\gamma(2,2)$	$\gamma(2,3)$	$\gamma(2,4)$
$\gamma(3,0)$	$\gamma(3,1)$	$\gamma(3,2)$	$\gamma(3,3)$	$\gamma(3,4)$
$\gamma(4,0)$	$\gamma(4,1)$	$\gamma(4,2)$	$\gamma(4,3)$	$\gamma(4,4)$

EX. 1006, FIG. 4

Within RPU 21, the filter coefficient data is transferred from the bus control circuit 31 to filtering unit 30₂ for a pixel of interest. EX. 1006 at [0045]-[0046], FIG. 2. The filter coefficient data for the pixel of interest is stored in the coefficient register 40. EX. 1006 at [0045]. Annotated FIG. 5 below shows the filter range 39 of 5x5 pixels and the pixel of interest (i,j) outlined in red. EX. 1006 at [0042].



EX. 1006, FIG. 5 (annotation added)

The convolution calculator 41 uses the filter coefficient data to perform a convolution operation to calculate the output value for the pixel of interest. EX. 1006 at [0042]-[0046]. Matsutani's Formula 1 is shown below.

$$CP(i, j) = \sum_{m=0}^4 \sum_{n=0}^4 \gamma(m, n) \times P(i-2+m, j-2+n) / K \quad \dots(1)$$

EX. 1006 at [0043].

Petitioners fail to establish that the CPU of control unit 22, the alleged microprocessor, satisfies the limitations of the independent claims. See, e.g., claim 1[c], 1[d], 14[e], 14[f]. The relied upon embodiment of Matsutani expressly discloses that DMAC 23 reads out filter coefficient data corresponding to the filter

range and transfers that data to RPU 21. EX. 1006 at [0045].⁹ Petitioners do not identify DMAC 23 as corresponding to any of the claimed components.

Additionally, Matsutani explains that DMAC 23 includes bus control circuit 32 and DMA channels 33_{0-n}. EX. 1006 at [0028]. When DMAC 23 receives a DMA transfer request, a DMA channel is assigned to the DMA transfer request, and the bus control circuit 32 acquires the bus 20. *Id.* The bus control circuit 32 then executes a DMA transfer using the assigned DMA channel. After the DMA transfer is completed, the bus control circuit 32 returns control of the bus 20 to the control unit 22. *Id.*

Therefore, when DMAC 23 transfers the filter coefficient data to RPU 21, the bus control circuit 32 has control of the bus 20. Thus, data transfer is under the control of DMAC 23, not control unit 22. *See* EX. 1006 at [0028].

Petitioners also misplace reliance on Shiomi. Petitioners argue that “Shiomi also discloses the required limitations” because “Shiomi discloses the microprocessor accesses tables (a database) to obtain aberration correction

⁹ In Matsutani’s second embodiment, the filtering unit 30₂ includes a coefficient calculation circuit 50 that calculates the filter coefficients. EX. 1006 at [0052]. The second embodiment also fails to satisfy the limitations of the challenged independent claims.

coefficients.” Petition at 76 (citing EX. 1011 at [0021]). Petitioners do not identify a component of Shiomi that corresponds to the claimed “microprocessor” or to Matsutani’s CPU in control unit 22, the alleged microprocessor. Also, the cited paragraph 21 of Shiomi discusses steps 200-205 of FIG. 6(a) and this disclosure fails to support Petitioners’ argument that Shiomi discloses a microprocessor as recited in the independent claims.

Ultimately, Petitioners fail to establish that Matsutani, alone or in combination with Shiomi, satisfies the independent claim limitations. For at least these additional reasons, Ground 3 fails.

VII. CONCLUSION

For at least the reasons set forth herein, Patent Owner respectfully requests that institution be denied.

Respectfully submitted,

Date: January 28, 2025

By: /s/ Thomas M. Dunham

Thomas M. Dunham

Reg. No. 39,965

Cherian LLP

1901 L Street NW, Suite 700

Washington, D.C. 20036

(202) 838-1567

ATTORNEY FOR PATENT OWNER,
OPTIMUM IMAGING TECHNOLOGIES
LLC

CERTIFICATE OF COMPLIANCE

This Patent Owner Preliminary Response (“POPR”) consists of 5,509 words, which is no more than 14,000 words, excluding table of contents, table of authorities, certificate of service, this certificate, or table of exhibits. The POPR complies with the type-volume as mandated in 37 C.F.R. § 42.24. In preparing this certificate, counsel has relied on the word count of the word-processing system used to prepare the paper (Microsoft Word).

Respectfully submitted,

Date: January 28, 2025

By: /s/ Thomas M. Dunham

Thomas M. Dunham

Reg. No. 39,965

Cherian LLP

1901 L Street NW, Suite 700

Washington, D.C. 20036

(202) 838-1567

ATTORNEY FOR PATENT OWNER,
OPTIMUM IMAGING TECHNOLOGIES
LLC

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned hereby certifies the PATENT OWNER PRELIMINARY RESPONSE and all exhibits thereto were served on the undersigned date via email, as authorized by Petitioners, at the following email addresses:

OIT-685Patent-IPR@morganlewis.com

mwjohnson@jonesday.com

kbdavis@jonesday.com

msblackman@jonesday.com

jodonnell@jonesday.com

anakamoto@orrick.com

TVPPTABDocket@orrick.com

jasino@wigin.com

tlandman@wigin.com

Respectfully submitted,

Date: January 28, 2025

By: /s/ Thomas M. Dunham

Thomas M. Dunham

Reg. No. 39,965

Cherian LLP

1901 L Street NW, Suite 700

Washington, D.C. 20036

(202) 838-1567

ATTORNEY FOR PATENT OWNER,
OPTIMUM IMAGING TECHNOLOGIES
LLC