

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES

PATENT NO. 8,339,493 PURSUANT TO 35 U.S.C. §§311-319,

37 C.F.R. §42

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LISTING OF EXHIBITS

LG-1001	U.S. Patent No. 8,339,493 (the '493 Patent)
LG-1002	Prosecution History of the '493 Patent (Prosecution History)
LG-1003	Declaration and Curriculum Vitae of W. Leo Hoarty
LG-1004	Complaint, <i>Maxell, Ltd. v. LG Electronics Inc. et al</i> , 5-23-cv-00152, E.D. Tex., filed December 29, 2023
LG-1005	Prosecution History of Reexamination Control No. 90/014,628
LG-1006	U.S. Patent No. 5,444,482 (Misawa '482)
LG-1007	U.S. Patent No. 6,292,218 (Parulski)
LG-1008	<i>Proceedings of 1997 IEEE International Symposium on Consumer Electronics</i> (Inst. Elec. & Elecs. Eng'rs Dec. 2-4, 1997)
LG-1009	T. Kurashige et al., <i>Development of MPEG Camera</i> , in <i>Proceedings of 1997 IEEE International Symposium on Consumer Electronics</i> 218-21 (Inst. Elec. & Elecs. Eng'rs 1997) (Kurashige)
LG-1010	Declaration of June Munford
LG-1011	U.S. Patent No. 7,903,162 (Juen)
LG-1012	U.S. Patent No. 6,700,607 (Misawa '607)
LG-1013	Memorandum, Interim Procedure for Discretionary Denials in AIA Post-Grant Proceedings with Parallel District Court Litigation (USPTO June 21, 2022) (Director's Guidance)
LG-1014	Federal Court Management Statistics – Profiles (Sept. 30, 2024)
LG-1015	RESERVED
LG-1016	U.S. Patent No. 6,690,881 (Tomita)
LG-1017	U.S. Patent No. 6,335,760 (Sato)
LG-1018	U.S. Patent No. 5,657,082

LG-1019 U.S. Patent No. 5,128,791

LG-1020 U.S. Patent No. 5,841,126

LG-1021 U.S. Patent No. 5,825,449

LISTING OF CHALLENGED CLAIMS

<u>Element</u>¹	<u>Claim Language</u>
Claim 5	
[5.0]	An electric camera comprising:
[5.1]	an image sensing device with a light receiving sensor having an array of pixels arranged vertically and horizontally in a grid pattern, in an N number of vertically arranged pixel lines;
[5.2]	a signal processing unit that generates image signals by processing the output signals of the image sensing device; and
[5.3]	a display unit with a display screen, that displays an image corresponding to the image signals;
[5.4]	wherein when recording an image in a static image mode, the signal processing unit generates the image signals by using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines;
[5.5]	wherein when monitoring the image in the static image mode, the signal processing unit generates the image signals by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a first distance; and
[5.6]	wherein when recording the image in a moving video mode, the signal processing unit generates the image signals by using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a second distance, where the second distance is different from the first distance.

¹ In this Petition, claim elements are sometimes referred to by the reference numerals listed in this column.

<u>Element¹</u>	<u>Claim Language</u>
Claim 6	
[6.0]	An electric camera according to the claim 5, further comprising: an image-instability detector which detects an image-instability of the electric camera; and
[6.1]	wherein when recording in the moving video mode, in order to correct the image-instability, the signal processing unit generates the image signals by changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector.
Claim 7	
[7.0]	An electric camera according to the claim 5, wherein a value of the first distance is larger than a value of the second distance.
Claim 8	
[8.0]	An electric camera according to the claim 5, wherein N is equal to or greater than a product of a fixed parameter multiplied by a number of effective scanning lines M of the display screen.
Claim 9	
[9.0]	An electric camera according to the claim 8, wherein the fixed parameter is equal to three.
Claim 10	
[10.0]	A method for operating an electric camera, wherein the electric camera includes the features of an image sensing device with a light receiving surface having an array of pixels arranged vertically and horizontally in a grid pattern with an N number of vertically arranged pixel lines, a signal processing unit that generates image signals by processing the output signals of the image sensing device, and a display unit with a display screen that displays an image corresponding to the image signals, the method comprising:

<u>Element¹</u>	<u>Claim Language</u>
[10.1]	selecting between a static image mode and a moving video mode, and when in the static image mode, selecting an operation from a list including (1) recording the image in the static image mode, and (2) monitoring the image in the static image mode;
[10.2]	upon selecting the operation of recording the image in the static image mode, using the signal processing unit to generate the image signals by using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines;
[10.3]	upon selecting the operation of monitoring the image in the static image mode, using the signal processing unit to generate the image signals by using pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines of the image sensing device to provide only pixel lines separated from one another by intervals of a given distance; and
[10.4]	upon selecting the operation of recording the image in the moving video mode, using the signal processing unit to generate the image signals by using a portion of, or the entirety of, the N number of vertically arranged pixel lines which have been mixed or culled to provide only pixel lines separated from one another by intervals of a second distance, wherein a value of the second distance is different from a value of the first distance.
Claim 11	
[11.0]	A method for operating an electric camera of claim 10, wherein when recording in the moving video mode, in order to correct image-instability, the signal processing unit generates the image signals by changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by a instability detector which detects an image-instability of the electric camera.
Claim 12	

<u>Element¹</u>	<u>Claim Language</u>
[12.0]	A method for operating an electric camera of claim 10, wherein the value of the first distance is larger than the value of the second distance.
Claim 13	
[13.0]	A method for operating an electric camera of claim 10, wherein N is equal to or greater than a product of a fixed parameter multiplied by a number of effective scanning lines M of the display screen.
Claim 14	
[14.0]	A method for operating an electric camera of claim 13, wherein the fixed parameter is equal to three.

I. INTRODUCTION

LG Electronics, Inc. and LG Electronics USA, Inc. (“Petitioner” or collectively “LG”) petitions for *Inter Partes* Review (IPR) of claims 5-14 (Challenged Claims) of U.S. Patent No. 8,339,493 (the ‘493 Patent).

II. REQUIREMENTS FOR IPR

A. Grounds for Standing

Petitioner certifies the ‘493 Patent is available for IPR. This Petition is being filed within one year of service of a complaint against LG. Petitioner is not barred or estopped from requesting review of the Challenged Claims on the below-identified grounds.

B. Challenge and Relief Requested

Petitioner requests an IPR of the Challenged Claims on Grounds 1-3 below. Mr. W. Leo Hoarty provides supporting testimony in his Declaration. LG-1003.

Ground	Claim(s)	Pre-AIA 35 U.S.C. §103
1	5-14	Misawa ‘482 in view of Parulski
2	5, 7-10, 12-14	Kurashige in view of Parulski
3	5, 7-10, 12-14	Juen in view of Misawa ‘607

Applied references are prior art on the bases below:

Reference	Effective Filing Date	Publication Date	Basis
Misawa '482	4/28/1994	8/22/1995	§102(b)
Parulski	7/16/1997	9/18/2001	§102(e)
Kurashige	N/A	10/2/1997 ²	§102(b)
Juen	9/25/1997 ³	7/7/2005	§102(e)
Misawa '607	6/4/1999	3/2/2004	§102(e)

The '493 Patent claims priority through a chain of applications to a U.S. application (U.S. Application No. 09/520,836) having a filing date of 3/8/2000, and claims priority to JP Patent Application No. 2000-006064 filed on 1/11/2000. LG-1001 code (30). Misawa '482 and Kurashige published more than one year before the earliest claimed U.S. filing date of the '493 Patent and therefore qualify as prior art under §102(b). Parulski, Juen, and Misawa '607 have effective filing dates under §102(e) before 3/8/2000—presumed to be the date of the alleged

² Kurashige has a publication date at least as early as 10/2/1997. LG-1008, 1, 7; *see* LG-1010 ¶11.

³ The effective filing date of Juen under §102(e) is as late as 9/25/1997, but Petitioner does not waive its right to argue that Juen could have an effective filing date before 9/25/1997, due to its benefit claim to U.S. Provisional Application No. 60/040,922 filed on 3/27/1997. LG-1011 code (60).

invention⁴—and therefore qualify as prior art.

C. Claim Construction

Petitioner submits the Challenged Claims do not require formal construction for the obviousness grounds in this Petition. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1361 (Fed. Cir. 2011). Petitioner may respond to any constructions Patent Owner raises or the Board adopts. *Parkervision, Inc. v. Vidal*, 88 F.4th 969, 980 (Fed. Cir. 2023); *Axonics, Inc. v. Medtronic, Inc.*, 75 F.4th 1374, 1383 (Fed. Cir. 2023).

D. Level of Ordinary Skill in the Art

A person of ordinary skill in the art (POSITA) relating to the subject matter of the '493 Patent as of alleged invention date⁵ would have had (1) a Bachelor's

⁴ In Reexamination Control No. 90/014,628, the Patent Owner asserted the '493 Patent was conceived as early as October 27, 1999. LG-1005 at 7-9, 33-37. Petitioner does not concede that the Patent Owner properly established conception and diligence and reserves the right to challenge the date of invention determined in the reexamination proceeding. Furthermore, Petitioner does not understand the Patent Owner to have asserted an invention date prior to the effective filing dates of Parulski, Juen, and Misawa '607.

⁵ See *supra* note 4 & accompanying text.

Degree (or a similar Master's Degree, or higher degree) in computer science, electrical engineering, computer engineering, or a related field or equivalent work experience, and (2) one to two years of practical experience in the field of digital image processing, digital cameras, electronic imaging, or a related field. LG-1003

¶25. Additional education or industry experience may compensate for a deficit in one of the other aspects of the requirements stated above. *Id.*

III. THE '493 PATENT

A. Technology Background and the Admitted Prior Art

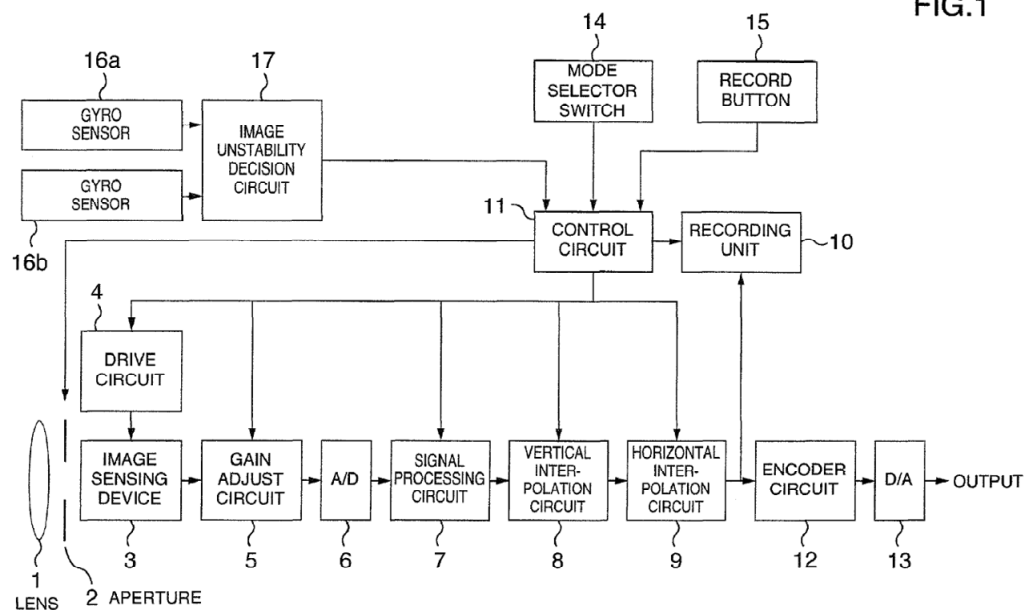
According to the '493 Patent, at the time of the alleged invention, electric cameras using solid-state image sensors were available. LG-1001, 1:23-29; LG-1003 ¶55. Such cameras included both (1) video cameras for taking moving images that also had a still image taking function and (2) digital still cameras for taking still images that also had a moving image taking function. LG-1001, 1:23-29; LG-1003 ¶55. When photographing a still image, a camera user would need to monitor the image, and thus the camera would have to generate signals that conform to a display. LG-1001, 2:5-9; *see id.*, 2:26-32; LG-1003 ¶55. Moreover, prior art cameras could mix vertically adjoining pixels inside or outside an image sensing device to generate a quantity of scanning lines that match a display, such as a television monitor. *See* LG-1001, 1:30-34, 1:45-50, 2:46-53.

B. Brief Description of the '493 Patent

The '493 Patent is directed to “[a]n electric camera includ[ing] an image

sensing device.” *Id.*, 1 code (57). As shown in Figure 1 below, to capture a moving video or a static image, an image sensing device 3, e.g., a charged-coupled device (CCD), converts received light into an electric signal. *Id.*, 3:41-43, 4:34-37, 4:64-67, 7:27-30, 7:65-66; LG-1003 ¶56. A mode selector switch 14 selects between a moving video mode and a static image mode. LG-1001, 4:64-66, 7:27-30.

FIG.1



Id. fig.1.

In an embodiment of the moving video mode, the image sensing device mixes four pixels to reduce a number output signals from the image sensing device to conform to the number of effective scanning lines of a television system. *Id.*, 4:66-5:9, 5:56-60; LG-1003 ¶57. In response to operation of a record button, a recording unit records the signals in a Moving Picture Expert Group (MPEG) format.

LG-1001, 7:4-8; *see* LG-1003 ¶57.

In an embodiment of the static image mode, for monitoring an angle of view for the electric camera, the image sensing device mixes five pixels to reduce a number output signals from the image sensing device to conform to the number of effective scanning lines of the television system. LG-1001, 7:40-45, 7:60-62; LG-1003 ¶58. For recording the static image, all pixels are read out independently from the image sensing device, and the recording unit records signals in a Joint Photographic Expert Group (JPEG) format. LG-1001, 8:51-58, 9:3-15; LG-1003 ¶59.

For recording the moving video and monitoring the static image, the '493 Patent describes in lieu of mixing, the number of lines of output signals could be reduced by a culling operation. LG-1001, 10:9-12; *see* LG-1003 ¶60.

C. Prosecution History

As-filed claims 1-5, 7-11, and 13-16 correspond to issued claims 1-14 of the '493 Patent. LG-1002, 235-40. In response to claim rejections and formal objections by the U.S. Patent and Trademark Office (Office), the applicant amended the claims to address the claim objections, canceled claims 6 and 12, and filed a terminal disclaimer with respect to U.S. Patent No. 6,756,616. *Id.*, 123-25, 130-34, 140-48, 159-61, 161-65. The Office subsequently allowed the claims with examiner's amendments to the claims. *Id.*, 111-13.

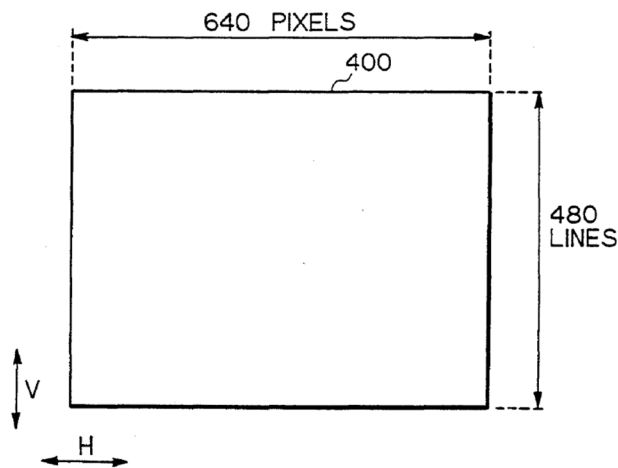
IV. THE CHALLENGED CLAIMS ARE UNPATENTABLE

A. [GROUND 1] - Misawa '482-Parulski Renders Obvious Claims 5-14.

1. Misawa '482 Overview

Misawa '482 discloses a digital electronic camera including (1) an optical lens for forming the optical image of an object to be captured and (2) an image sensor for producing pixel signals associated with the optical image. LG-1006, 2:36-44, 2:55-61. As illustrated in Figure 4A below, the image sensor includes a photosensitive array with 640 pixels extending in a horizontal direction and 480 horizontal lines extending in a vertical direction. *Id.*, 3:30-34; LG-1003 ¶62.

Fig. 4A

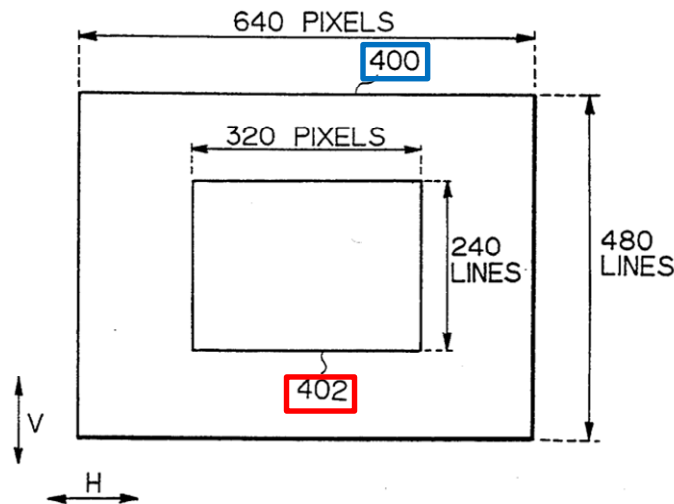


LG-1006, fig.4A.

Misawa '482's camera operates in a still picture mode and a movie picture mode. *Id.*, 5:54-6:5, 6:15-38. In the still picture mode, a read-out processor reads

out image data corresponding to an entire area of the imaging field of the image sensor. *Id.*, 7:1-7, 8:60-9:8; LG-1003 ¶63. In the movie picture mode, the read-out processor reads out part of the image data corresponding to part of an imaging field of the image sensor corresponding to a smaller **area 402** in an **image frame 400** shown in Figure 4B below. LG-1006, 7:8-13; LG-1003 ¶64. The image frame 400 (640-pixel by 480-pixel) and the area 402 (320-pixel by 240-pixel) have a 4:3 aspect ratio. LG-1006, 7:13-15; LG-1003 ¶64.

Fig. 4B



LG-1006 fig.4B (annotated).

2. Parulski Overview

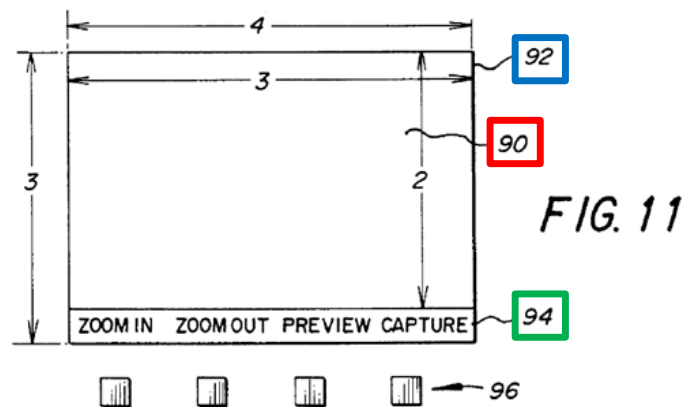
Parulski discloses a camera including (1) a liquid crystal display (LCD) with a resolution of 312 pixels by 240 pixels and (2) an image sensor (e.g., having 512 lines with 768 pixels per line) for producing images processed by a preview mode

processing circuit that generates “relatively low resolution, spatially subsampled digital image data” for directly driving the “relatively low resolution” LCD. LG-1007, 3:23-26, 4:37-46, 5:49-52, 8:11-12; LG-1003 ¶65.

Parulski discloses a still image mode for capturing a still image from the image sensor and a motion mode for producing a preview image prior to capturing the still image. LG-1007, 1:9-13, 2:25-31, 3:45-47, 6:27-31; LG-1003 ¶66. In the motion mode, Parulski implements a line-skipping process in which a fast dump structure eliminates some vertically arranged lines of image charge from the image sensor prior to read out from the image sensor. LG-1007, 6:32-34; LG-1003 ¶67. Parulski describes various line-skipping patterns, including (1) eliminating two or more consecutive lines for every one or more lines read out from the image sensor, LG-1007 at 6:38-43; (2) alternately eliminating two or four consecutive lines for every pair of lines read out from the image sensor, *id.* at 6:45-50; *see id.* fig.7; and (3) eliminating one pair of lines for every four pairs of lines read out from the image sensor, *id.* at 10:5-10. LG-1003 ¶68.

Parulski describes that after reading out lines from the image sensor using a line-skipping process, those lines are displayed on the LCD. LG-1007, 7:41-61. For example, after the line-skipping process in which two or four lines are alternately skipped is applied to the 512 lines of the image sensor, the read-out lines are displayed using only 204 of the LCD’s approximately 240 lines of pixels, with

approximately 36 lines being either masked behind a bezel or behind displayed status information. *Id.*, 7:41-48. As shown in Figure 11 of Parulski below, the line-skipping process maps pixels from an image sensor having a 3:2 aspect ratio to an **area 90** on an **LCD 92** having a 4:3 aspect ratio, with this mapping process leaving a **status area 94** available for other purposes. *Id.*, 7:48-54.



Id. fig.11 (annotated).

3. Misawa '482-Parulski Combination

As a general matter, a POSITA would have found it predictable to combine the teachings of Misawa '482 and Parulski because both pertain to digital cameras and describe digital cameras can be used for recording movies and still images.

LG-1006, 1:9-14; LG-1007, 1:9-13; LG-1003 ¶79. A POSITA would have been motivated to (1) replace Misawa '482's 640-pixel by 480-pixel image sensor with Parulski's 768-pixel by 512-pixel image sensor, (2) add an LCD, as taught in Parulski, to Misawa '482's camera and use a motion mode, as taught in Parulski, for previewing on the LCD an image to be captured in a still image mode, and (3) use

a line-skipping process as taught in Parulski to obtain the movie picture image generated in Misawa '482's movie picture mode. LG-1003 ¶80.

First, a POSITA would have been motivated to replace Misawa '482's image sensor with Parulski's higher resolution image sensor to improve the quality of images obtained from the image sensor and improve the quality of these images when displayed on a high-resolution display or printed on a high-quality printer. LG-1007, 5:5-7; LG-1003 ¶81. Moreover, a POSITA would have been motivated to replace Misawa '482's 4:3 aspect ratio image sensor with Parulski's 3:2 aspect ratio image sensor so the aspect ratio of the image sensor would match the aspect ratios of the standard 35-millimeter film format and standard 4-inch by 6-inch still prints. LG-1007, 5:57-62; LG-1003 ¶82. This modification would have had a reasonable expectation of success because both Misawa '482's and Parulski's image sensors are CCDs, and thus operate under the same principles, and because Parulski's image sensor, as substituted in Misawa '482, would have been used for the same purpose as taught in Parulski—to record images. LG-1006, 3:17-19; LG-1007, 3:38-47, 5:49-53; LG-1003 ¶83.

Second, a POSITA would have been motivated to add an LCD, as taught in Parulski, into Misawa '482's digital camera so the LCD could (1) preview an image to be captured in Misawa '482's still picture mode without using complex circuitry, (2) play back previously recorded images without an external monitor, and

(3) provide status information or a reconfigurable push-button menu to the user.

LG-1003 ¶¶84-85; *see* LG-1007, 1:27-34, 2:24-53, 3:33-38, 7:41-48; LG-1006, 1:33-39. A POSITA would have likewise been motivated to use a preview mode processing circuit and a line-skipping process, as taught in Parulski, to achieve “a relatively less complex digital image processing technique” and “a higher data rate” in the motion mode, to avoid unnecessarily producing high-resolution imagery for the LCD, and to enable more rapid processing of image data. LG-1007, 4:61-5:1, 5:15-24; LG-1003 ¶¶86-87. And because Parulski teaches using an image sensor having more vertically arranged lines (e.g., 512 lines) than the images for monitoring (e.g., 204 lines), a POSITA would have been motivated to use a line-skipping process to eliminate some lines from the image sensor to form monitoring images. LG-1007, 5:49-52, 7:41-48; LG-1003 ¶88. Parulski teaches using its LCD and its motion mode in a digital camera that captures still imagery, and thus incorporating an LCD and a motion mode into Misawa ’482’s camera would have had a reasonable expectation of success. LG-1007, 3:29-33; LG-1006, 1:9-14, 1:54-58; LG-1003 ¶89.

Third, a POSITA would have been motivated to use a line-skipping process, as taught in Parulski, to generate the movie picture image in Misawa ’482’s movie picture mode to reduce geometric distortions from obtaining a 4:3 aspect ratio movie picture image from Parulski’s 3:2 aspect ratio image sensor, to preserve

visual information captured by the image sensor, and to reduce storage requirements for the movie picture image. LG-1003 ¶¶90-91; *see* LG-1007, 6:45-50, 7:33-40. And because Misawa '482 and Parulski both teach image sensors have more vertically arranged lines (480 lines, as taught in Misawa '482, and 512 lines, as taught in Parulski) than the movie picture images (240 lines, as taught in Misawa '482), a POSITA would have been motivated to use a line-skipping process to eliminate some lines from the image sensor to form the movie picture images. LG-1006, 7:13-15; LG-1007, 5:49-52, 7:41-48; LG-1003 ¶92. These modifications would have had a reasonable expectation of success as Parulski teaches using its line-skipping mode with an image sensor like the one taught in Misawa '482 to achieve an aspect ratio akin to the aspect ratio of the 320-pixel by 240-pixel movie picture obtained in Misawa '482. LG-1003 ¶93.

4. Claim 5

[5.0]

To the extent the preamble is limiting, Misawa '482-Parulski renders obvious this element. LG-1003 ¶94. Misawa '482 discloses a “digital electronic camera 1.” LG-1006, 2:36-44. Parulski likewise discloses an electronic camera. LG-1007, 1:9-13.

[5.1]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶¶95-96. Misawa '482's image sensor produces pixel signals associated with the optical

image (e.g., “*an image sensing device with a light receiving sensor*”). LG-1006, 2:55-61. The array of the image sensor has 640 pixels extending in a horizontal line and 480 horizontal lines extending in a vertical direction (e.g., “*an array of pixels arranged vertically and horizontally in a grid pattern, in an N number of vertically arranged pixel lines*”). *Id.*, 3:30-34.

A POSITA would have also been motivated to use Parulski’s 768-pixel by 512-pixel image sensor in place of Misawa ’482’s 640-pixel by 480-pixel image sensor. LG-1003 ¶96; *see supra* Section IV.A.3. Parulski discloses an image sensor including an array of pixels arranged in rows and columns and identifies an image sensor having approximately 512 lines with approximately 768 pixels per line. LG-1007, 5:39-41, 5:49-52.

[5.2]

Misawa ’482-Parulski renders obvious this element. LG-1003 ¶¶97-98. Misawa ’482 discloses its digital camera includes an image signal processor adapted for processing the pixel signals produced by the image sensor to develop image signals representative of the optical image captured, an analog-to-digital converter (ADC) for converting the output from the image signal processor into image data containing corresponding digital values, a frame memory for temporarily storing therein the image data, and a control processor adapted to compress the image data stored in frame memory to record in an optical disk and to control the

overall operations of the digital camera. LG-1006, 2:55-3:2; *see also id.* 3:39-4:15, 6:7-14, 6:38-41, 6:48-54, 6:66-67, 7:49-55, 7:66-8:1, 9:4-5; LG-1003 ¶¶97. A POSITA would have understood Misawa '482 has *a signal processing unit*—including the image signal processor, ADC, frame memory, and control processor—that *generates image signals by processing output signals of an image sensing device*. LG-1003 ¶¶97-98.

[5.3]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶¶99-102. Misawa '482 discloses capturing an object, recording data representative of still and movie images in a data recording medium, and visualizing the recorded data on an image monitor such as a TV monitor device. LG-1006, 1:9-39.

To the extent Misawa '482 does not disclose a display unit with a display screen as part of its camera, Parulski discloses that its image sensor produces images processed by the preview mode processing circuit to generate low resolution, spatially subsampled digital image data to directly drive an LCD that is part of Parulski's camera. LG-1007, 3:23-26, 4:37-46; LG-1003 ¶¶100-01. Based on Parulski's teachings, a POSITA would have been motivated to modify Misawa '482 to include an LCD as a monitor device and to include a preview mode processing circuit that generates image data to drive the LCD. LG-1003 ¶¶102; *see* LG-1007, 2:24-53, 3:33-38; *supra* Section IV.A.3.

[5.4]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶¶103-10. As discussed above, Misawa '482 discloses an image sensor, or a POSITA would have been motivated to use Parulski's 768-pixel by 512-pixel image sensor in place of Misawa '482's 640-pixel by 480-pixel image sensor. *Id.* ¶103; *see supra* Section IV.A.4.[5.1]. As taught in Misawa '482, in response to a user depressing a shutter button member of a shutter release button mechanism to the position corresponding to the still picture mode, a mode selector selects the still picture mode to cause the reading processor to select a frame transfer mode for reading charges from the image sensor to record the still picture in the optical disk (e.g., "*when recording an image in a static image mode, the signal processing unit generates the image signals*"). LG-1006, 1:59-68, 3:2-13, 4:9-14, 5:9-5:16, 5:54-6:5, 6:23-65, 11:1-10; LG-1003 ¶¶104-07. In the frame transfer mode and the still picture mode, the still image is recorded by reading out image data corresponding to an entire area of the imaging field of the image sensor (e.g., "*generat[ing] the image signals by using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines*"). LG-1006, 6:48-54, 7:1-7, 8:60-9:8; LG-1003 ¶108.

Alternatively, Parulski discloses a still mode for producing a still image in which all rows of image pixel charges corresponding to each line are progressively

read out during a single scan. LG-1007, 6:27-31. A POSITA would have been motivated to use a still mode as taught in Parulski, e.g., with Misawa '482's or Parulski's image sensor, so that a high-resolution still image could be produced for display on a high-resolution display. LG-1003 ¶109; *see supra* Sections IV.A.3, IV.A.4.[5.1]. This combination would have had a reasonable expectation of success because Parulski confirms that its image sensor can be driven such that all rows of pixels are read and because Misawa '482 and Parulski's image sensors and still picture modes have similar functions and purposes. LG-1007, 6:23-31, 7:1-7, 8:60-9:8; LG-1007, 1:9-13, 3:29-33, 4:35-40, 6:27-31; LG-1003 ¶110.

[5.5]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶¶111-17. In Parulski, a multiplexer selects image data from the preview mode processing circuit to drive the LCD. LG-1007, 4:33-34, 4:56-60, fig.2; LG-1003 ¶¶111-12. Moreover, Parulski describes that in the motion mode, the preview mode processing circuit produces a preview image prior to capture of the still image from the image sensing device and then storage of signals indicative of the still image on a memory card (e.g., "*when monitoring the image in the static image mode, the signal processing unit generates the image signals*"). LG-1007, 1:9-13, 2:25-31, 3:40-47, 9:26-41. A POSITA would have been motivated to modify Misawa '482, based on the teachings of Parulski, to include a motion mode for monitoring a still

image to be captured and to use a line-skipping process in this motion mode (e.g., “*generates the image signals by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines*”). See *supra* Section IV.A.3.

Moreover, a POSITA would have been motivated, based on the teachings of Parulski, to select any line-skipping pattern that involves cyclically or alternately skipping one or more consecutive lines for every one or more consecutive lines that are read (e.g., “*only include pixel lines separated from one another by intervals of a first distance*”). LG-1003 ¶113. To drive the display in the motion mode, Parulski implements a line-skipping process that, as discussed above, can involve (1) eliminating some lines, LG-1007, 6:32-34, (2) cyclically eliminating two or more consecutive vertically arranged lines of image charge from the image sensor for every one or more vertically arranged lines of image charge transferred to the horizontal register, *id.*, 6:38-43, (3) alternately eliminating two or four consecutive lines of image charge for every pair of lines of image charge that are transferred to the horizontal register, *id.*, 6:45-50, or (4) cyclically eliminating one pair of lines for every four pairs of lines read out from the image sensor, *id.*, 10:5-10. See *supra* Section IV.A.2; LG-1003 ¶114. Parulski therefore teaches both cyclically skipping the same number of lines and alternately skipping by a first number of lines or a second number of lines. LG-1003 ¶114; LG-1007, 6:38-43, 6:45-50, 10:5-10. Also within the scope of Parulski’s teachings is the concept of reading one, two, or more

consecutive lines between skipped lines. LG-1007, 6:38-43 (one or more read lines); *id.* 6:45-50, 10:5-10 (two read lines).

A POSITA would have been motivated to select a line-skipping pattern based on the use case of the imagery and the processing specifications for that imagery. LG-1003 ¶115; *see supra* Section IV.A.3; *infra* Section IV.A.4.[5.6]. Such a selection would have had a reasonable expectation of success, at least because a POSITA would have known how to adapt hardware and software to vary the precise number of skipped lines and read lines. LG-1003 ¶¶116-17; *see* LG-1007 2:24-39 (describing that the motion preview mode involves “a relatively more simple digital image processing technique”). Based on Parulski’s teachings, a POSITA would have known to use a line-skipping process that involves cyclically skipping one or more consecutive lines for every one or more consecutive lines that are read. LG-1003 ¶118; *see infra* Section IV.A.4.[5.6].

[5.6]

Misawa ’482-Parulski renders obvious this element. LG-1003 ¶¶119-31. Misawa ’482’s movie picture mode generates a movie picture image. LG-1006, 7:8-15; *see supra* Section IV.A.1. In response to the user depressing the shutter button member of the shutter release button mechanism to the position corresponding to the movie picture mode, the mode selector selects the movie picture mode to cause the reading processor to select a field transfer mode for reading charges from

the image sensor to record the movie picture in the optical disk (e.g., “*when recording the image in a moving video mode, the signal processing unit generates the image signals*”). LG-1006, 1:59-68, 3:2-7, 4:9-14, 5:9-5:16, 5:54-6:5, 6:23-65, 11:1-10; LG-1003 ¶¶119-120; *see supra* Section IV.A.4.[5.4].

Moreover, Misawa '482 teaches that in the field transfer mode and the movie picture mode, pixel signals are transferred from the image sensor on an interlaced field transfer basis. LG-1006, 1:68-2:4; *see id.*, 6:44-58, 9:27-34. A POSITA would have understood that this transfer of signals in the interlaced field transfer basis would have involved generating a field of lines in which every other line of the image sensor is read and thus would have involved *generating image signals by using a portion of, or the entirety of, pixel lines which have been culled from the 480 pixel lines of the image sensor.*⁶ LG-1003 ¶121; LG-1006, 3:30-38,

⁶ Although Misawa '482 discloses that the movie picture image has a resolution of 320 pixels by 240 pixels corresponding to the smaller area 402, LG-1006, 3:30-38, 7:8-15, Misawa '482 describes that this 320-pixel by 240-pixel area corresponds to a part of image data read out from the frame memory, *id.* at 6:66-7:1, 7:7-15. This operation of reading out image data *from the frame memory* is separate from the operation of transferring electric charges *from the image sensor* on an interlaced field transfer basis, *id.* at 6:48-49, 6:54-58, 6:66-7:1, 7:7-15,

6:44-58, 9:27-34.

To the extent Misawa '482 does not disclose “*generating the image signals by using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines,*” Misawa '482-Parulski renders obvious this feature. LG-1003 ¶¶122-31. Misawa '482 teaches the movie picture image read out from the frame memory has a 4:3 aspect ratio and a reduced resolution relative to the resolution of the image sensor. LG-1006, 3:30-38, 7:8-15, figs.4A-4B; LG-1003 ¶122. Parulski teaches using its line-skipping process so that a greater portion of an image sensor's 3:2 aspect ratio image can be displayed as an image having a reduced resolution and having a 4:3 aspect ratio and so that this displayed image has fewer geometric distortions. *See* LG-1007, 6:45-50, 7:8-11, 7:33-40; LG-1003 ¶123. A POSITA would have been motivated to combine Misawa '482 and Parulski to use a line-skipping process to generate a 4:3 aspect ratio movie picture from the 3:2 aspect ratio image sensor. LG-1003 ¶124; *see supra* Section IV.A.3. A POSITA would have been motivated,

and this Petition asserts that this latter operation involves *generating image signals by using a portion of, or the entirety of, pixel lines which have been culled from the N number of vertically arranged pixel lines of the image sensing device.* LG-1003 ¶121.

based on the teachings of Parulski, to select any line-skipping pattern that involves cyclically or alternately skipping one or more consecutive lines for every one or more consecutive lines that are read (e.g., “*only include pixel lines separated from one another by intervals of a second distance*”). LG-1003 ¶124; *see supra* Section IV.A.4.[5.5].

A POSITA would have additionally found it predictable for *the second distance* (for recording the image in the moving video mode) *to be different from the first distance* (for monitoring the image in the static image mode) and would have been motivated to use different skipping patterns in line-skipping processes for recording the image in the movie video mode and for monitoring the image in the static image mode. LG-1003 ¶125. A POSITA would have been motivated to select the distances for monitoring a still image and capturing a movie picture so that the culled number of lines more closely approximates the desired number of lines, e.g., for the portion of the display for monitoring or for the movie picture. *Id.* Because Misawa ’482 and Parulski teach a desired number of lines for monitoring (204 lines, as taught in Parulski) is fewer than a desired number of lines for recording the movie picture (240 lines, as taught in Misawa ’482, or 256 lines—one half of the number of lines of Parulski’s image sensor—as Misawa ’482 and Parulski suggest when considered together), a POSITA would have been motivated to eliminate more lines for monitoring images and eliminate fewer lines for movie picture

images. LG-1007, 7:41-48; LG-1006, 7:13-15; LG-1003 ¶126. A POSITA additionally would have been motivated to select a smaller first distance for recording the movie picture and a larger second distance for monitoring to improve the image quality of the recorded movie picture, to avoid unnecessary processing for the low-quality imagery to be displayed during monitoring, and to reserve space on the display for status and operational information for the user during monitoring, as Parulski discloses. LG-1003 ¶127. And selecting a smaller first distance and a larger second distance would have had a reasonable expectation of success, as a POSITA would have understood that well-known mathematical operations could be used for selecting a distance that culls vertically arranged lines in a manner that closely approximates the desired number of lines. *Id.* ¶128.

Based on Misawa '482-Parulski, a POSITA would have been motivated and found predictable (for the reasons discussed above) several different combinations of values for the first distance and the second distance. *Id.* ¶¶129-32. For example, one predictable combination would involve culling 204 lines for monitoring, as expressly taught in Parulski, and culling 240 lines for recording the movie picture, as expressly taught in Misawa '482. *Id.* ¶129; *see supra* Sections IV.A.1-3.

Another predictable combination would involve using a line-skipping process to cull 170 lines for monitoring by skipping two lines for every one line read out—a line-skipping pattern expressly taught in Parulski and thus expressly

motivated by Parulski's teachings—and culling 256 lines for the movie picture by skipping one line for every one line read out—a line-skipping pattern that a POSITA would have known to use in view of the numerous variations of line-skipping patterns expressly taught in Parulski or in view of the interlaced field transfer method taught in Misawa '482. LG-1006, 3:30-38, 6:44-58, 9:27-34; LG-1007, 6:32-34, 6:38-43, 6:45-50, 10:5-10; LG-1003 ¶¶130-31; *see supra* Section IV.A.2. Indeed, in this combination, a POSITA would have been motivated to use a read-one-skip-one line-skipping pattern in order to obtain a movie picture with one half of the vertical and horizontal pixel dimensions of the image sensor, a proportion that Misawa '482 expressly teaches by describing that its movie picture image has a resolution of 320 pixels by 240 pixels while its image sensor has a resolution of 640 pixels by 480 pixels. LG-1006, 3:30-38, 7:8-15, figs.4A-4B; LG-1003 ¶132.

5. Claim 6

[6.0]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶133.

Misawa '482 discloses a movement sensor, e.g., a piezo-electric gyroscopic transducer, that senses how the camera physically moves and produces corresponding electric signals that represent an unintentional movement or vibration of the camera body. LG-1006, 4:60-5:8.

[6.1]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶¶134-35.

Misawa '482 describes that correction data generated by a correction processor includes correction values to shift an area corresponding to the portion of the imaging field of the image sensor used for capturing the movie (e.g., “*when recording in the moving video mode, in order to correct the image-instability, the signal processing unit generates the image signals*”). LG-1006, 8:7-24, 9:49-10:2. In particular, in response to a movement signal generated by the movement sensor, the correction processor generates the correction data to compensate for blur due to camera movement when the camera is used to capture a movie, and the correction data is generated based on camera movement with both horizontal and vertical components (e.g., “*by changing the pixel lines used, and the portion of the pixel lines used, according to an amount of image-instability detected by the instability detector*”). *Id.*, 8:10-21. A POSITA would have understood that by shifting the area in response to movement with both horizontal and vertical components, Misawa '482's correction processor changes the pixel lines used and the portion of the pixel lines used. LG-1003 ¶135.

6. Claim 7

[7.0]

See supra Section IV.A.4.[5.6]; LG-1003 ¶136.

7. Claim 8

[8.0]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶137. A

POSITA would have been motivated to use Parulski's 768-pixel by 512-pixel image sensor and Parulski's 312-pixel by 240-pixel LCD. *See supra* Sections IV.A.3, IV.A.4.[5.1], [5.3]. A POSITA would have understood that Parulski's number of vertically arranged lines on its image sensing device (512 lines) is greater than a product of the number of scanning lines of its display (240 lines) and a fixed parameter, i.e., any parameter less than 512 divided by 240 (2.133). LG-1003 ¶137.

8. Claim 9

[9.0]

Misawa '482-Parulski renders obvious this element. *Id.* ¶¶138-40. Although the number of vertically arranged lines on Parulski's image sensing device (512 lines) is less than three times a product of the number of scanning lines of its LCD (240 lines), a POSITA would have been motivated to use a lower resolution display screen that would satisfy this limitation. LG-1003 ¶139; *see Gardner v. TEC Syst., Inc.*, 725 F.2d 1338 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830 (1984) (holding that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed invention and where a device having the claimed relative dimensions would not perform differently than the prior art, the claimed invention was not patentably distinct from the prior art). A POSITA would have been motivated to use a display with a smaller resolution, e.g., any display with fewer than 170.7 vertically arranged lines, so that the digital

camera could be more compact and so that the display would be less expensive.

LG-1003 ¶140. Such a modification would have been straightforward, as it would have involved a simple substitution of a display with a fewer number of scanning lines without any change to the function or purpose of the display. *Id.*; LG-1007, 2:31-35.

9. Claim 10

[10.0]

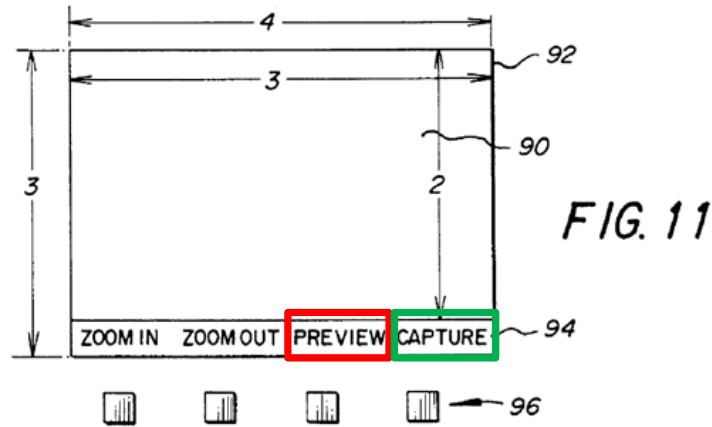
See supra Sections IV.A.4.[5.0]-[5.3]; LG-1003 ¶141.

[10.1]

Misawa '482-Parulski renders obvious this element. LG-1003 ¶¶142-46. For example, in Misawa '482, the user selects between the still picture mode and the movie picture mode by pressing the shutter button member to different positions, and the mode selector in turn selects between the still picture mode and the movie picture mode based on the position to which the user depresses the shutter button member. LG-1006, 5:23-37, 5:54-6:5, 6:15-38; LG-1003 ¶¶142-43. The user depresses the shutter button member to the position corresponding to the still picture mode to cause the mode selector to select the still picture mode to record the still picture. LG-1006, 5:54-6:5, 6:15-38; LG-1003 ¶143.

Parulski teaches *when in the static image mode, selecting an operation from a list including recording an image in a static image mode and monitoring an image in the static image mode*. Parulski discloses a user control section having user

control buttons, including a preview button and a capture button. LG-1007, 3:25-33. The user turns on the camera using a power switch by depressing zoom buttons or a preview button, then composes the picture by repositioning the camera while observing the display image. *Id.*, 3:29-36. As shown in Figure 11 of Parulski below, Parulski's status area 94 shows text indicating the functions of reconfigurable control buttons 96, including a "PREVIEW" function and a "CAPTURE" function. *Id.*, 7:48-53. A user depresses the capture button corresponding to the "CAPTURE" text to cause a processor of the camera to capture (i.e., record) the still image. *Id.*, 3:37-40, 3:60-67, 9:26-28. Based on the teachings of Parulski, a POSITA would have understood that a user depresses the *preview* button described with the accompanying text "PREVIEW" to cause the preview mode processing circuit and the multiplexer to select a *preview* function that corresponds to the preview mode (i.e., the motion mode) for presenting preview images on the LCD described throughout Parulski. *Id.*, 4:33-34, 4:56-60, fig.2; *see id.*, 3:29-36; LG-1003 ¶144.



LG-1007 fig.11 (annotated).

Based on the teachings of Parulski, a POSITA would have been motivated to modify Misawa '482 to include Parulski's preview button and to include the "PREVIEW" and "CAPTURE" text on the LCD corresponding to the preview button and a capture button (e.g., Misawa '482's shutter button member 74). LG-1003 ¶145. A POSITA would have been motivated to make this modification to improve user handling of the camera and to provide status information to the user. *Id.* ¶146; *see* LG-1007, 2:19-21, 7:43-48. A POSITA would have had a reasonable expectation of success because Misawa '482 already contemplated user interface buttons on its camera, e.g., the shutter release button, and because Parulski teaches using its buttons and its LCD—including the status area—in a digital camera akin to Misawa '482's camera. LG-1003 ¶146; *see* LG-1007, 3:25-33; *supra* Section IV.A.3.

[10.2]

See supra Sections IV.A.4.[5.4], IV.A.9.[10.1]; LG-1003 ¶147.

[10.3]

See supra Sections IV.A.4.[5.5], IV.A.9.[10.1]; LG-1003 ¶148.

[10.4]

See supra Sections IV.A.4.[5.6], IV.A.9.[10.1]; LG-1003 ¶149.

10. Claim 11

[11.0]

See supra Sections IV.A.5.[6.0]-[6.1]; LG-1003 ¶150.

11. Claim 12

[12.0]

See supra Section IV.A.6.[7.0]; LG-1003 ¶151.

12. Claim 13

[13.0]

See supra Section IV.A.7.[8.0]; LG-1003 ¶152.

13. Claim 14

[14.0]

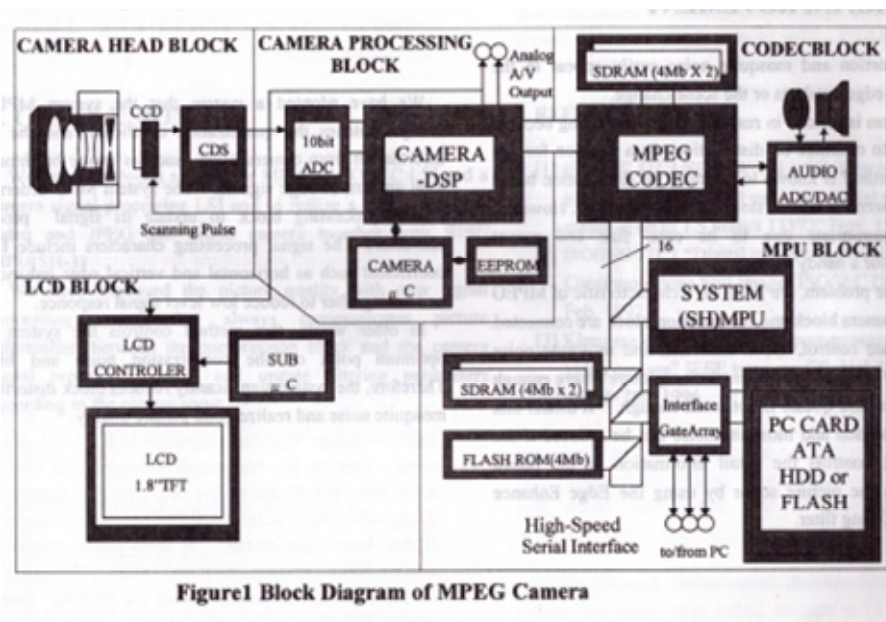
See supra Section IV.A.8.[9.0]; LG-1003 ¶153.

**B. [GROUND 2] - Kurashige-Parulski Renders Obvious
Claims 5, 7-10, and 12-14.**

1. Kurashige Overview

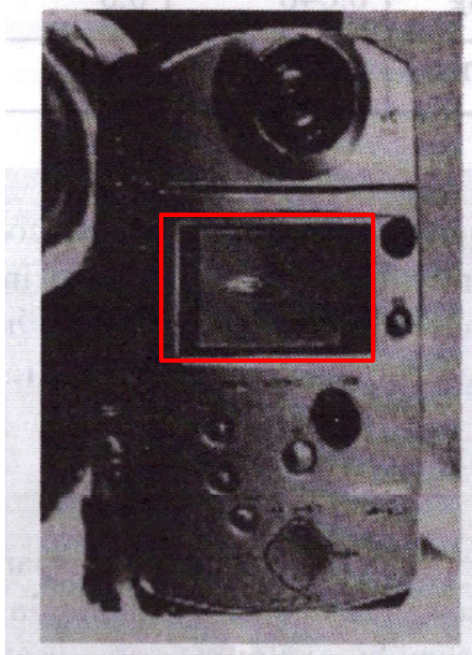
Kurashige describes a “digital camera to record MPEG-1 video and JPEG still video.” LG-1009, 1 Abstract. As shown in the block diagram and the table below, Kurashige describes (1) a camera head block including a 720-pixel by 480-

pixel CCD image sensor, (2) a camera processing block that receives data from the camera head block, includes scanning circuits for both a still picture (JPEG) mode and a moving picture (MPEG) mode, drives the image sensor in a non-line-mixed readout in the JPEG mode to produce 704-pixel by 480-pixel still picture imagery, and drives the image sensor in a line-mixed readout in the MPEG mode to produce 352-pixel by 240-pixel motion picture imagery, and (3) an LCD block that has an 279-pixel by 220-pixel LCD and that receives data from the camera processing block. *Id.* 1 Abstract, 1 tbl.1, 2 §§2.1-2.2; LG-1003 ¶¶70-71.



LG-1009, 2 fig.1. The LCD block includes an LCD “to monitor recording image.”

Id., 2 §2.5. This LCD is, as shown in the picture below, a **rectangular LCD**. *Id.*, 1.



Id. (annotated).

Table1:Major Specification	
size	83(W) x 143.5(H) x 56(D) mm
weight	385g 540g (Buttery &HDD include)
motion picture	MPEG1(352*240) , IBP / 30fps
still picture	JPEG(704*480)
Audio	MPEG-1 layer II
Interface	NTSC analog video PC-CARD (ATA HDD) Hi-Speed Serial (original protocol)
File Format	MS-DOS compatible
Recording capacity	20minute(MPEG system) 3000 photo (260MB HDD) 4hours digital audio
LCD	1.8" TFT (279*220)
PC Adapters	ISA, ECP, SCSI (option)

(home page: <http://www.mpegcam.net>)

Id., 1 tbl.1.

2. Parulski Overview

See supra Section IV.A.2.

3. Kurashige-Parulski Combination

A POSITA would have been motivated to modify Kurashige to use a line-skipping process, as taught in Parulski, or a line-mixing process, as taught in Kurashige, to obtain the imagery presented on Kurashige's LCD for monitoring the recording of still images and to obtain the imagery for capturing the motion picture using Kurashige's camera. LG-1003 ¶154. A POSITA would have been motivated to do so to reduce geometric distortions and preserve visual information captured using the image sensor in the resulting monitoring and motion picture images—which have aspect ratios that do not match the 3:2 aspect ratio of Kurashige's image sensor. *Id.*; see LG-1007, 6:45-50, 7:33-40. Moreover, because the image sensor has more vertically arranged lines (480 lines, as taught in Kurashige) than the images formed in monitoring (fewer than 220 lines, as taught in Kurashige, or 204 lines, as taught in Parulski) and in motion picture recording (240 lines, as taught in Kurashige), a POSITA would have been motivated to use a line-skipping process to eliminate or mix some vertically arranged lines from the image sensor in forming the monitoring images and forming the motion picture images. LG-1003 ¶155. A POSITA would have understood to select a quantity of lines eliminated for every one or more lines of image charges that is read or a quantity of lines cyclically mixed to generate lines suitable for the monitoring and motion picture images. *Id.* ¶156; see LG-1007, 4:42-46, 6:38-45.

Such modifications would have had a reasonable expectation of success.

LG-1003 ¶157. Kurashige teaches using output signals from a CCD-type image sensor to capture a monitoring image and a motion picture image, and Parulski similarly teaches implementing line-skipping processes to generate output signals from a CCD-type image sensor. LG-1009, 1 tbl.1, 2 §§2.1-2.2, 2.5, 2 fig.1; LG-1007, 5:49-52, 6:15-18, 6:38-45; LG-1003 ¶157. Moreover, both Kurashige and Parulski pertain to digital cameras, and thus a POSITA would have found it predictable to implement teachings from Parulski into Kurashige. LG-1007, 1:9-13; LG-1009, 1 Abstract; LG-1003 ¶157.

4. Claim 5

[5.0]

To the extent the preamble is limiting, Kurashige-Parulski renders obvious this element. LG-1003 ¶158. Kurashige discloses a digital camera. LG-1009, 1 Abstract. As does Parulski. LG-1007, 1:9-13.

[5.1]

Kurashige-Parulski renders obvious this element. LG-1003 ¶¶159-62. Kurashige's image sensor is a "720*480 Inter Line CCD" (e.g., "*an image sensing device with a light receiving sensor*"). LG-1009, 2 §2.1; LG-1003 ¶159. A POSITA would have understood that the 720-pixel by 480-pixel dimensions of the image sensor disclosed in Kurashige indicate that the image sensor has *an array of pixels arranged vertically and horizontally in a grid pattern*, with a horizontal pixel

dimension being 720 pixels and a vertical pixel dimension being 480 pixels. LG-1003 ¶160. Kurashige's image sensor therefore has 480 vertically arranged pixel lines. *Id.*

Alternatively, a POSITA would have been motivated, based on the teachings of Parulski, to configure Kurashige's image sensor to have *an array of pixels arranged vertically and horizontally in a grid pattern, in an N number of vertically arranged pixel lines*. *Id.* ¶161. Parulski teaches that its image sensor can be a CCD and includes a two-dimensional array of pixels arranged in rows and columns. LG-1007, 5:39-41, 49-52. A POSITA would have been motivated to arrange the pixels of Kurashige's image sensor in the form of an array, as taught in Parulski, so that the captured information could be more easily mapped onto an image area for rectangular LCDs (such as Kurashige's rectangular display) or for an image area for rectangular photographic prints. LG-1003 ¶161; *see* LG-1007, 6:57-62, 7:48-51. Such an arrangement would have had a reasonable expectation of success, as Kurashige's image sensor is a CCD and a two-dimensional arrangement of pixels, as taught in Parulski, is a conventional arrangement for CCDs. LG-1003 ¶162; *see* LG-1007, 5:39-41, 5:49-52.

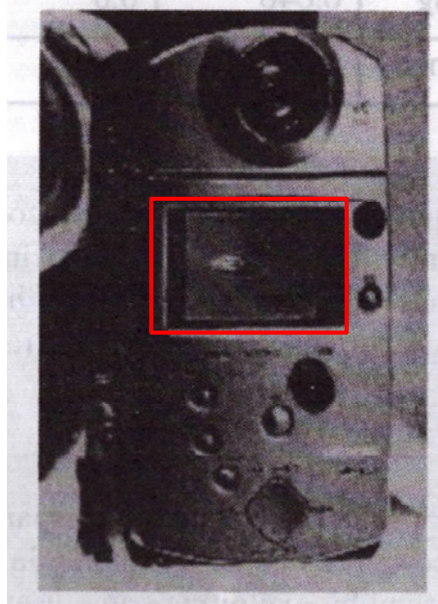
[5.2]

Kurashige-Parulski renders obvious this element. LG-1003 ¶¶163-64. Kurashige's camera processor block outputs pictures in the motion picture mode or

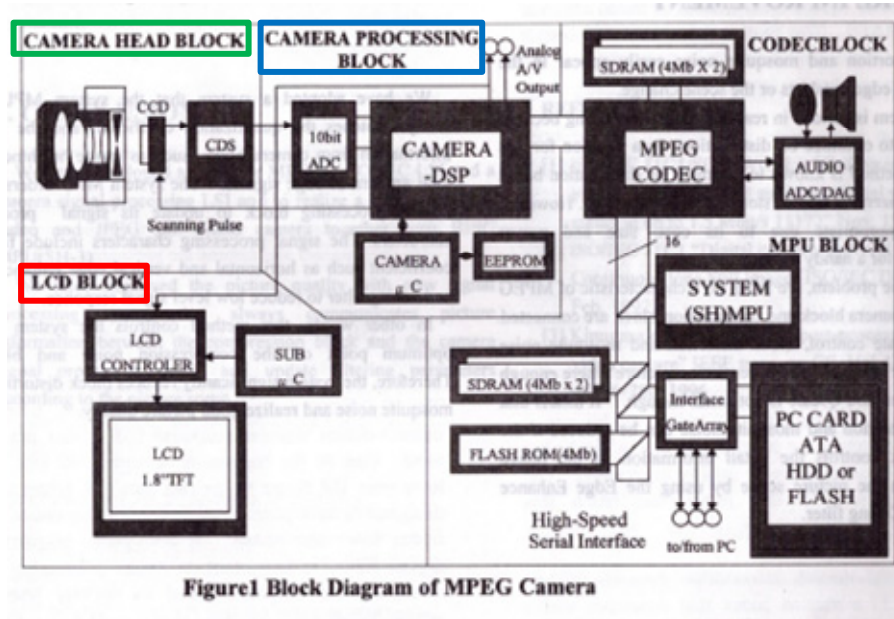
pictures in a still picture mode. LG-1009, 2 §2.2. As shown in Figure 1 of Kurashige, a CDS (a correlated double sampling block) receives output signals generated by the CCD, and then the camera processing block receives the output signals of the CDS. *Id.*, 2 fig.1; LG-1003 ¶163. The camera processing block includes CCD scanning circuits for capturing the pictures in the MPEG mode and the JPEG mode, and a POSITA would have understood that these scanning circuits produce scanning pulses for driving the scanning process of the CCD. LG-1009, 2 §2.2, 2 fig.1; LG-1003 ¶164. In this regard, a POSITA would have understood that Kurashige has *a signal processing unit*, including the CDS and the camera processing block, *that generates image signals by processing the output signals of the image sensing device*. LG-1003 ¶164.

[5.3]

Kurashige-Parulski renders obvious this element. LG-1003 ¶¶165-66. As shown in the figure below, Kurashige's camera includes a 1.8-inch thin-film-transistor **LCD** (e.g., "*a display unit with a display screen*") that has a resolution of 279 pixels by 220 pixels. LG-1009, 1 tbl.1, 2 §2.5; LG-1003 ¶165.



LG-1009, 1 (annotated). Kurashige describes that this LCD “is used to monitor recording image, and [to] playback image.” *Id.*, 2 §2.5. As shown in the block diagram below, the **LCD block** of Kurashige’s camera—which includes an LCD controller and an LCD—receives signals from the **camera processing block**, which in turn receives signals generated by the **camera head block** that includes the CCD. *Id.*, 2 fig.1; LG-1003 ¶166. A POSITA would have understood that the LCD *displays an image corresponding to image signals generated by the signal processing unit*, which includes Kurashige’s camera processing block. LG-1003 ¶166; *see supra* Section IV.B.4.[5.2].



LG-1009, 2 fig.1 (annotated).

[5.4]

Kurashige-Parulski renders obvious this element. LG-1003 ¶¶167-70. For example, a user operates Kurashige's camera so that a readout mode for the CCD scanning circuits is selected to generate a still picture in the JPEG format (e.g., *"when recording an image in a static image mode a signal processing unit generates image signals"*). LG-1009, 1 tbl.1, 2 §2.2; LG-1003 ¶167.

A POSITA would have been motivated, based on the teachings of Parulski, to modify Kurashige's camera to generate the image signals by *using all signal charges accumulated in all N number of vertically arranged pixel lines of the image sensing device, to provide N pixel lines*. LG-1003 ¶168. The still picture produced using Kurashige's camera has a resolution of 704 pixels by 480 pixels, while

Kurashige's image sensor has a resolution of 720 pixels by 480 pixels. LG-1009, 1 tbl.1. Parulski describes that in its still mode for producing a still image, all rows of image pixel charge corresponding to each line are progressively read out during a single scan. LG-1007, 6:27-31.

A POSITA would have been motivated to modify Kurashige to produce a still image in this manner to obtain a 3:2 aspect ratio image consistent with the aspect ratio of traditional still photography prints produced from the 35-mm film format. *Id.*, 5:4-7; LG-1003 ¶169. This modification would also be desirable to improve the quality of images obtained from the image sensor and improve the quality of these images when displayed on a high-resolution display or printed on a high-quality printer. LG-1007, 4:35-37, 5:49-52; LG-1003 ¶169.

And this modification would have had a reasonable expectation of success because Kurashige's and Parulski's image sensors and still image modes have the same purpose of capturing still images. LG-1009, 1 Abstract, 1 tbl.1, 2 §2.2; LG-1007, 1:9-13, 3:29-33; LG-1003 ¶170. A POSITA would have understood that Kurashige's device, as modified, would include a 720-pixel by 480-pixel image sensor that produces a 720-pixel by 480-pixel still image. LG-1003 ¶170.

[5.5]

Kurashige-Parulski renders obvious this element. LG-1003 ¶¶171-75. Kurashige's "LCD is used to monitor recording image." LG-1009, 2.5. A POSITA

would have understood that Kurashige's camera uses its 720-pixel by 480-pixel image sensor to produce image signals to drive its lower-resolution 279-pixel by 220-pixel LCD (e.g., "*when monitoring the image in the static image mode, the signal processing unit generates the image signals*"). LG-1003 ¶171; *see* LG-1009, 1 tbl.1, 2 §2.5, 2 fig.1; *supra* Sections IV.B.4.[5.1], [5.3].

Because a POSITA would have been motivated to use a line-skipping or a line-mixing process to eliminate or mix some of the 480 vertically arranged lines from the image sensor to form a monitoring image with fewer lines (fewer than 220 lines, as taught in Kurashige, or 204 lines, as taught in Parulski), a POSITA would have been motivated to modify Kurashige to include a motion mode for monitoring a still image to be captured and to use a line-skipping or a line-mixing process in this motion mode (e.g., "*generates the image signals by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines*"). LG-1003 ¶172; *see supra* Section IV.B.3. Moreover, a POSITA would have selected any line-skipping or line-mixing pattern that involves cyclically or alternately skipping one or more consecutive lines for every one or more consecutive lines that are read or that involves cyclically mixing two or more consecutive lines (e.g., "*only include pixel lines separated from one another by intervals of a first distance*"). LG-1003 ¶173; *see infra* Section IV.B.4.[5.6].

Additionally, to the extent Kurashige does not disclose "*when monitoring*

the image in the static image mode, the signal processing unit generates the image signals,” a POSITA would have been motivated to add to Kurashige a motion mode as taught in Parulski. LG-1003 ¶174. A POSITA would have been motivated to include a motion mode so that a preview of the still image to be captured in Kurashige could be presented to the user without using complex circuitry. *Id.*; see LG-1007, 1:27-34, 2:24-53. Parulski teaches using its motion mode in a digital camera that captures still imagery, and thus incorporating a motion mode into Kurashige’s camera—which itself is a digital camera and is used for monitoring—would have had a reasonable expectation of success. LG-1009, 1 Abstract, 2 §2.5; LG-1007, 3:29-33; LG-1003 ¶175.

[5.6]

Kurashige-Parulski renders obvious this element. LG-1003 ¶¶176-81. Kurashige’s CCD scanning circuits are used in the motion picture mode to produce a motion picture (e.g., “*when recording the image in a moving video mode, the signal processing unit generates image signals*”). LG-1009, 1 tbl.1, 2 §2.2.

Kurashige teaches that its motion picture has a 352-pixel by 240-pixel resolution that is less than the 720-pixel by 480-pixel resolution of its image sensor. *Id.*, 1 tbl.1, 2 §§2.1-2.2. A POSITA would have been motivated to use a line-skipping process, as taught in Parulski, or a line-mixing process, as taught in Kurashige, for producing Kurashige’s 240-line motion picture image from signals

generated by the 480-line image sensor (e.g., “*generat[ing] the image signals by using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines*”). LG-1003 ¶177; *see supra* Section IV.B.3. A POSITA would have selected any line-skipping pattern that involves cyclically or alternately skipping one or more consecutive lines for every one or more consecutive lines that are read or line-mixing pattern that involves cyclically mixing two or more consecutive lines (e.g., “*only include pixel lines separated from one another by intervals of a second distance*”). LG-1003 ¶177; *see supra* Section IV.B.4.[5.5].

A POSITA would additionally would have been motivated to use different skipping patterns in line-skipping processes or different mixing patterns in line-mixing processes for recording the image in the motion picture mode and for monitoring the image in the still image mode (e.g., “*where the second distance is different from the first distance*”). LG-1003 ¶178. A POSITA would have been motivated to select the distances for monitoring a still image and capturing a movie picture so that the resultant number of lines—e.g., the culled number of lines or number of lines resulting from mixing—more closely approximates the desired number of lines, e.g., for the portion of the display for monitoring or for the movie picture. *Id.* ¶179. Because Kurashige and Parulski teach a desired number of lines for monitoring (204 lines in Parulski) that is fewer than a desired number of lines for

recording a motion picture (240 lines in Kurashige), a POSITA would have been motivated to eliminate or mix more lines for monitoring images and eliminate or mix fewer lines for movie picture images. LG-1009, 1 tbl.1; LG-1007, 7:41-48; LG-1003 ¶179. A POSITA would have selected a smaller first distance for recording the movie picture and a larger second distance for monitoring to improve the image quality of the recorded movie picture, to avoid unnecessary processing for the low-quality imagery to be displayed during monitoring, and to reserve space on the display for status and operational information for the user during monitoring. LG-1003 ¶180. Selecting a smaller first distance and a larger second distance would have had a reasonable expectation of success, as a POSITA would have understood that well-known mathematical operations could be used for selecting a distance that culls or mixes lines in a manner that closely approximates the desired number of lines. *Id.*

A POSITA would have been motivated and found predictable (for the reasons discussed above) several different combinations of values for the first distance and the second distance. For example, one predictable combination would involve obtaining 204 lines for monitoring, as expressly taught in Parulski, and obtaining 240 lines for recording the movie picture, as expressly taught in Kurashige. *Id.* ¶181; *see supra* Sections IV.B.1-3. Another predictable combination would involve obtaining 170 lines for monitoring (e.g., by skipping two lines for every one

line read out, as taught in Parulski) and obtaining 256 lines for the movie picture (e.g., by skipping one line for every one line read out, which a POSITA would have known to use in view of the numerous variations of line-skipping patterns taught in Parulski, or by mixing 512 lines into 256 lines for the movie picture as taught in Kurashige). LG-1007, 6:32-34, 6:38-43, 6:45-50, 10:5-10; LG-1009, 2 §§2.1-2.2; LG-1003 ¶181; *see supra* Section IV.A.2. Indeed, in this combination, a POSITA would have used a read-one-skip-one line-skipping pattern or mix-two line-mixing pattern to obtain a movie picture with one half of the lines of the image sensor, a proportion that Kurashige teaches by describing that its movie picture image has 240 lines while its image sensor has 480 lines. LG-1009, 1 tbl.1; LG-1003 ¶181.

5. Claim 7

[7.0]

See supra Section IV.B.4.[5.6]; LG-1003 ¶182.

6. Claim 8

[8.0]

Kurashige-Parulski renders obvious this element. LG-1003 ¶183. The number of lines on Kurashige's image sensor (480 lines) is greater than a product of the number of scanning lines of Kurashige's display (220 lines) and a fixed parameter, where the fixed parameter could be any value less than 2.18. LG-1009, 1 tbl.1, 2 §2.1; LG-1003 ¶183.

7. Claim 9

[9.0]

Kurashige-Parulski renders obvious this element. LG-1003 ¶184. Although the number of lines on Kurashige's image sensor (480 lines) is less than three times a product of the number of scanning lines of its LCD (240 lines), a POSITA would have been motivated to use a lower resolution display screen that would satisfy this limitation. *Id.*; see *Gardner v. TEC Syst., Inc.*, 725 F.2d 1338 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830 (1984) (holding that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed invention and where a device having the claimed relative dimensions would not perform differently than the prior art, the claimed invention was not patentably distinct from the prior art). A POSITA would have used a display with a smaller resolution, e.g., any display with 160 or fewer lines, so that the digital camera would be more compact and so that the display would be less expensive. LG-1003 ¶184. Such a modification would have been straightforward. *Id.*; LG-1007, 2:31-35.

8. Claim 10

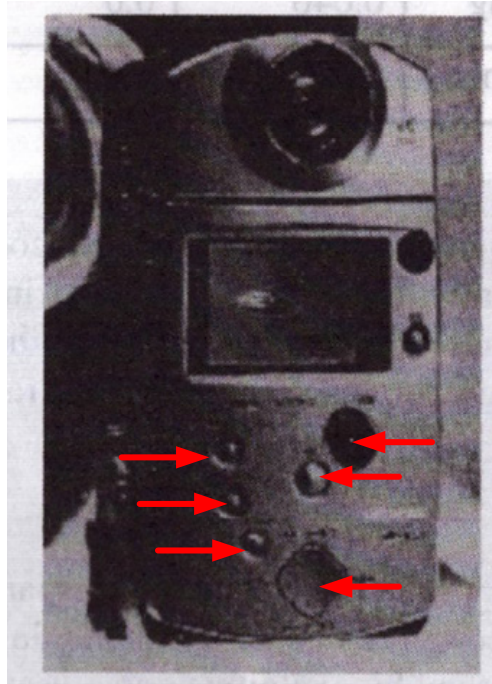
[10.0]

See supra Sections IV.B.4.[5.0]-[5.3]; LG-1003 ¶185.

[10.1]

Kurashige-Parulski renders obvious this element. LG-1003 ¶¶186-90.

Kurashige discloses both a still picture mode and motion picture mode that outputs pictures of different resolutions depending on the mode. LG-1009, 2 §2.2. A POSITA would have understood that Kurashige's camera—the MPEG Camera—involves *selecting between a static image mode* (e.g., Kurashige's still picture mode) *and a moving video mode* (e.g., Kurashige's moving picture mode). LG-1003 ¶¶186–188. For example, as shown in the figure below, Kurashige shows that its camera includes **buttons**. *Id.* ¶186; LG-1009, 1. A POSITA would have understood that a user operates these buttons to select the still picture mode or to select the motion picture mode and operates these buttons to capture an image. LG-1003 ¶187. In response to the user selecting the still picture mode, the camera processing block selects a non line-mixed readout mode to drive the CCD to output the still picture. LG-1009, 2 §2.2; LG-1003 ¶188. And in response to the user selecting the motion picture mode, the camera processing block selects a line-mixed readout mode to drive the CCD to output the motion picture. LG-1009, 2 §2.2; LG-1003 ¶188. A POSITA would alternatively have configured Kurashige's buttons to be operable by a user to select the still picture mode, to select the motion picture mode, and to capture an image, as a POSITA would have been motivated to improve the user's ability to control camera operations and user-operable buttons for digital cameras were well-understood. LG-1003 ¶189; *see* LG-1007, 2:19-21, 3:25-40, 7:43-48.



LG-1009, 1 (annotated).

Alternatively, Parulski teaches *when in the static image mode, selecting an operation from a list including recording an image in a static image mode and monitoring an image in the static image mode*. A POSITA would have modified Kurashige to include Parulski's preview button and to include the "PREVIEW" and "CAPTURE" text on the LCD corresponding to the preview button and a capture button (e.g., one of the buttons in Kurashige). LG-1003 ¶190; *see supra* Section IV.A.9.[10.1] (discussing Parulski's disclosure with respect to these features). Such a modification would improve user handling of the camera and provide status and operational information to the user. LG-1003 ¶190; *see* LG-1007, 2:19-21, 7:43-48. A POSITA would have had a reasonable expectation of success because Parulski teaches using its buttons and its LCD—including the status area—in a

digital electronic camera akin to Kurashige's camera and because Kurashige itself describes that its camera includes buttons. LG-1003 ¶190; *see* LG-1007, 3:25-33; *supra* Section IV.B.3.

[10.2]

See supra Sections IV.B.4.[5.4], IV.B.8.[10.1]; LG-1003 ¶191.

[10.3]

See supra Sections IV.B.4.[5.5], IV.B.8.[10.1]; LG-1003 ¶192.

[10.4]

See supra Sections IV.B.4.[5.6], IV.B.8.[10.1]; LG-1003 ¶193.

9. Claim 12

[12.0]

See supra Section IV.B.5.[7.0]; LG-1003 ¶194.

10. Claim 13

[13.0]

See supra Section IV.B.6.[8.0]; LG-1003 ¶195.

11. Claim 14

[14.0]

See supra Section IV.B.7.[9.0]; LG-1003 ¶196.

C. [GROUND 3] - Juen-Misawa '607 Renders Obvious Claims 5, 7-10, and 12-14.

1. Juen Overview

Referring to Figure 1 below, Juen discloses an electronic camera 100

including an imaging means 1 that images an object and converts that image into image information. LG-1011, 3:32-35. A pixel density conversion means 2 converts this image information to a pixel density suitable for a display screen's scan format. *Id.*, 3:35-38. A moving image recording means 3 records the output of the imaging means 1 as a series of moving images, and a still image recording means 4 records the output of the imaging means 1 as a still image. *Id.*, 3:38-44; LG-1003 ¶72. Juen describes that a display screen displays image information captured by the imaging means 1 and converted by the pixel density conversion means 2 to a pixel density compatible with the display screen. LG-1011, 3:45-49.

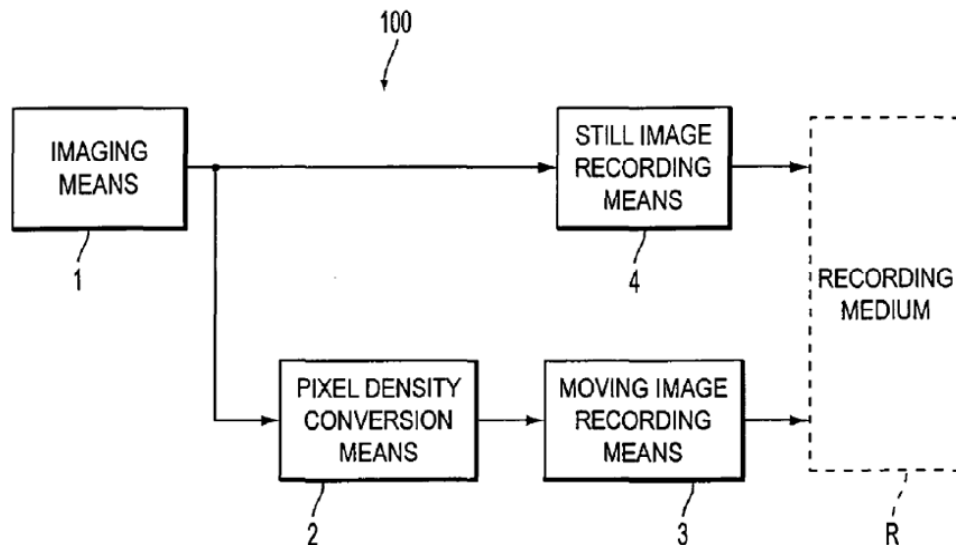


FIG. 1

Id. fig.1.

Figure 8 of Juen below shows the **electronic camera 100** including the display screen 25. *Id.*, 3:1-2, 45-49, 5:58-62. Juen describes the **display screen 25** can

be an electronic viewfinder and further describes that the display screen 25 can be a monitor screen attached to the case of the electronic camera 100, as shown in Figure 8. *Id.*, 3:49-51. The electronic camera 100 includes (1) an **image recording button 26** for recording lower quality moving images in the moving mode or for recording a higher quality still image in the still mode and (2) a **mode button 27** for switching between the moving mode and the still mode. *Id.*, 6:36-38, 7:36-40, 7:41-8:40, 9:11-17; LG-1003 ¶73.

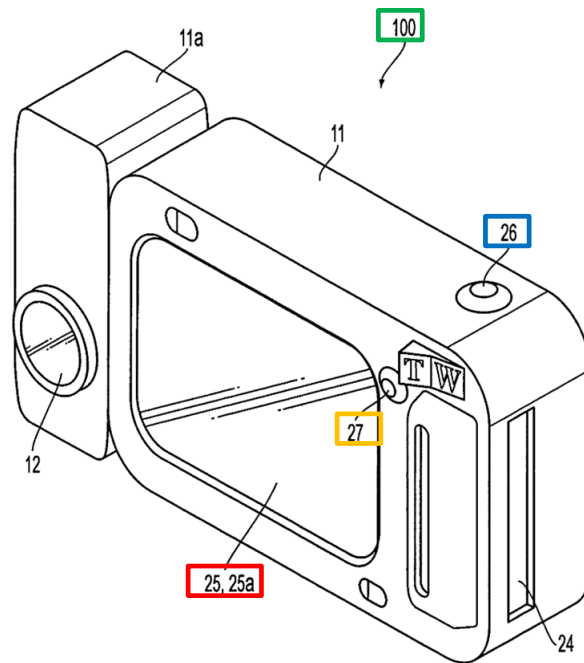


FIG. 8

LG-1011 fig.8 (annotated).

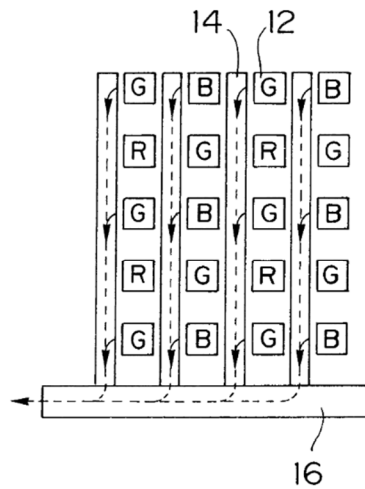
Juen's imaging means 1 has a pixel number larger than the display screen 25's scan format. *Id.*, 3:45-49, 3:64-65; LG-1003 ¶74. For example, an

imaging element of the imaging means 1 is a CCD image sensor and has a pixel resolution of 1280 pixels by 960 pixels. LG-1011, 5:63-6:2. The moving images, Juen describes, have a pixel resolution of 640 pixels by 480 pixels. *Id.*, 7:53-59.

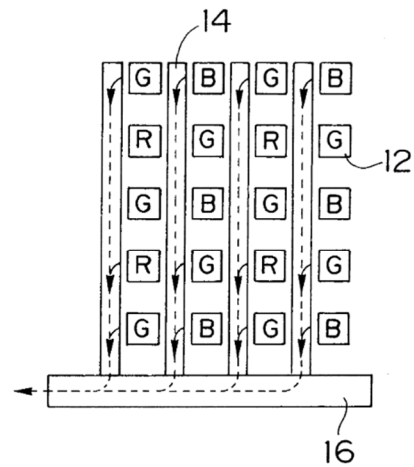
2. Misawa '607 Overview

Misawa '607 discloses a digital camera including an image sensor or solid-state imaging device and an image display or LCD. LG-1012, 5:51-60. The imaging device can be a CCD-type imaging device with a resolution of 1280 pixels by 960 pixels, like the resolution of Juen's imaging element. *Id.*, 6:16-17. The LCD can have a resolution of approximately 320 pixels by 240 pixels. *Id.*, 8:53-60.

Misawa '607 describes examples of driving the imaging device by reducing the number of photoelectric elements of the image sensor read from the image sensor. *Id.*, 4:1-2. For example, to read signals from one half (1/2) of the photoelectric elements 12, every other line of the photoelectric elements 12 is read (Figure 2(a) below), or two lines are skipped for every two lines read (Figure 2(b) below). *Id.*, 4:52-53, 5:4-7; LG-1003 ¶76.

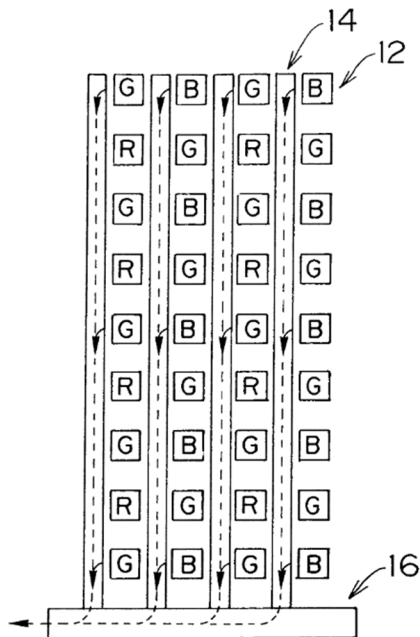


F I G. 2 (a)

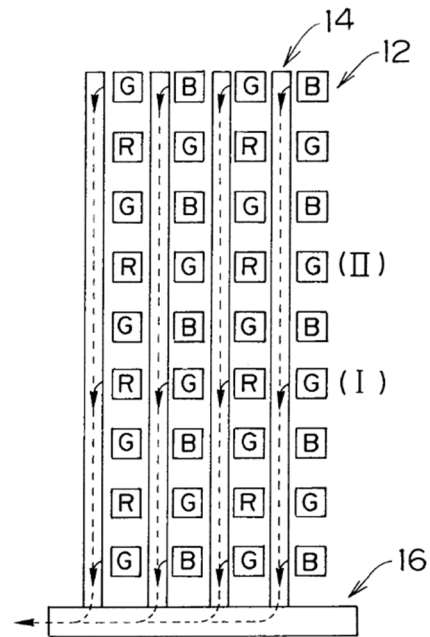


F I G. 2 (b)

LG-1012 figs.2(a)-2(b). To read signals from one quarter ($1/4$) of the photoelectric elements 12, three lines are skipped for every line read (Figure 3(a) below), or four or two lines are alternately skipped for every one line read (Figure 3(b) below). *Id.*, 5:12-16, 5:19-23; LG-1003 ¶76.



F I G. 3 (a)



F I G. 3 (b)

FIG. 4(a) and FIG. 4(b) are schematic diagrams of a multi-lane array. FIG. 4(a) shows a 4-lane array with columns labeled G, B, G, B from left to right. FIG. 4(b) shows a 4-lane array with columns labeled G, B, G, B from left to right. Both diagrams include a base 16 and dashed lines 12 indicating flow paths. FIG. 4(b) also includes labels (I) and (II) for specific rows.

Misawa '607 describes a normal image-capturing mode in which the imaging device 28 is driven by reading the signals from 1/4 or 1/8 of the photoelectric

elements 12, as described above, thereby reading 240 lines if 1/4 of the photoelectric elements are read or 120 lines if 1/8 of the lines are read. *Id.*, 7:52-56, 7:60-65. In this mode, the images can be displayed on the LCD at a relatively high refresh rate. *Id.*, 7:65-8:3; LG-1003 ¶77. In a macro image-capturing mode, the imaging device is driven by reading 1/2 or all of the photoelectric elements 12. LG-1012, 8:29-32; LG-1003 ¶77.

Misawa '607 also discloses a shutter release button, a mode switcher or macro key, and a mode setting dial. LG-1012, 7:32-34. Pressing the macro key toggles between the macro image-capturing process and the normal image-capturing process. LG-1012, 8:18-27; LG-1003 ¶78.

3. Juen-Misawa '607 Combination

As a general matter, a POSITA would have found it predictable to combine the teachings of Juen and Misawa '607 because both Juen and Misawa '607 pertain to digital cameras. LG-1011, 1:22-23; LG-1012, 1:8-13; LG-1003 ¶197. A POSITA would have been motivated to (1) configure Juen's display to have the display resolution taught in Misawa '607, and (2) use Misawa '607's line-skipping methods for producing images for Juen's display and for capturing moving images in Juen's movie mode. LG-1003 ¶198.

First, a POSITA would have found configuring Juen's display screen to have the display resolution taught in Misawa '607 (approximately 320 pixels by 240

pixels) to be predictable, as both Juen's display screen and Misawa '607's LCD are described as being used for monitoring an image to be captured in the context of digital cameras. LG-1011, 3:32-35, 3:49-51; LG-1012 at 5:51-60, 7:63-8:3; LG-1003 ¶199. Using a different resolution for Juen's display screen, such as Misawa '607's display resolution, would have had a reasonable expectation of success. LG-1003 ¶199.

Second, a POSITA would have been motivated to use a line-skipping process, as taught in Misawa '607, for producing images on Juen's display and for capturing 640-pixel by 480-pixel moving images in Juen's movie mode. *Id.* ¶200. Such modifications would have been desirable to increase the refresh rate for presenting images on the display, to decrease the electricity consumed for generating the images for the display or for the moving images, and to increase the processing speed for generating these images. *Id.*; see Misawa '607 at 10:3-7, 10:23-29. Because Juen and Misawa '607 teach using an image sensor that has more vertically arranged lines (e.g., 960 lines, as taught in both Juen and Misawa '607) than the images formed in monitoring (e.g., 240 lines or fewer, as taught in Misawa '607) and the images formed in recording moving images (e.g., 480 lines, as taught in Juen), a POSITA would have been motivated to use a line-skipping process to eliminate lines from the image sensor in forming the monitoring images and recording the moving images. LG-1003 ¶201. Such modifications would have had a

reasonable expectation of success as a POSITA would have found selecting a line-skipping pattern for monitoring images and for recording moving images to mathematically follow from knowing the number of lines of the image sensor (960) and the corresponding numbers of lines of the monitoring images (240) and the moving images (480). *Id.* ¶202.

Alternatively, a POSITA would have been motivated to modify Juen's still mode to include Misawa '607's normal image-capturing process and macro image-capturing process and to add Misawa '607's macro key for selecting between these processes. *Id.* ¶203. A POSITA would have been motivated to make this modification to provide flexibility for users in operating the camera, to enable the camera to capture both precise and rough images, and to provide users with a process for confirming a photo composition before initiating recording. *Id.*; *see* LG-1012, 2:1-5, 3:15-23, 6:63-7:1, 7:63-8:3, 9:59-10:2. Such a modification would have had a reasonable expectation of success, as Misawa '607's macro key and normal and macro image-capturing processes are used in connection with an electronic camera akin to the electronic camera described in Juen. LG-1003 ¶204; *see* LG-1012, 5:50-60; LG-1011, 3:32-44.

4. Claim 5

[5.0]

To the extent the preamble is limiting, Juen-Misawa '607 renders obvious

this element. LG-1003 ¶205. Juen discloses “an electronic camera that records both moving images and still images.” LG-1011, 1:22-23.

[5.1]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶206. Juen's imaging means including the imaging element corresponds to *an image sensing device with a light receiving sensor*. LG-1011, 3:32-35, 5:63-66. The imaging element has a resolution of 1280 pixels by 960 pixels, *id.*, 5:63-67, which a POSITA would have understood to refer to dimensions of *an array of pixels arranged vertically and horizontally in a grid pattern*, where the array has 960 lines. LG-1003 ¶206; *see* LG-1011, 1:37-42; LG-1012, 4:6-12.

[5.2]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶207. As shown in Figure 1 below, Juen includes a **signal processing unit**—including Juen's pixel density conversion means 2, moving image recording means 3, and still image recording means 4—that processes information from the imaging means 1 to record the information as a series of moving images or as a still image (e.g., “*output signals of the image sensing device*”). LG-1011, 3:35-44.

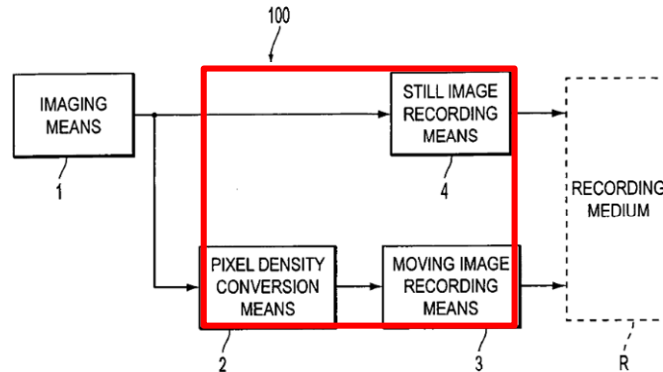


FIG. 1

Id. fig.1 (annotated). Juen's electronic camera includes other components that a POSITA would have considered to be part of a signal processing unit, such as the A/D converter, the picture image signal processor, the image density conversion component, the memory I/O component, the microprocessor, the interface component, the coding conversion component, the memory, the disk drive component, and the magneto-optical recording medium. *Id.*, 6:3-30; LG-1003 ¶207.

[5.3]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶208. Juen's display screen displays image information captured by the imaging means and converted by the pixel density conversion means to a pixel density compatible with the display screen. LG-1011, 3:45-49. Misawa '607 describes that its LCD can have a resolution of 320 pixels by 240 pixels. LG-1012, 8:53-59. A POSITA would have been motivated to modify Juen to include such a resolution. LG-1003 ¶208; *see supra* Section IV.C.3.

[5.4]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶¶209-10. Juen's still image recording means retrieves image information from the imaging means and records it in a recording medium as a still image. LG-1011, 3:32-35, 42-44. Juen discloses that "when the still image is recorded, the still image recording means 4 records the image information in a state in which the pixel density is high in the recording medium R as a still image." *Id.*, 4:9-13. When Juen's camera is in its still mode and an image recording button is pressed, the microprocessor "retrieves one frame of a still image from the camera part 11a" (which includes the imaging element). *Id.*, 5:63-66, 7:36-40, 9:11-16, fig.11 (elements "S20" and "S21"). A POSITA would have understood that, by retrieving one frame from the imaging element 13, Juen discloses *using all signal charges accumulated in all N number of vertically arranged pixel lines of an image sensing device, to provide N pixel lines*. LG-1003 ¶209. A POSITA would alternatively have been motivated to configure—and would have had a reasonable expectation of success in configuring—Juen's still mode to read all photoelectric elements of the imaging element, as taught in Misawa '607, so that a precise still image could be produced for display on an external display. *Id.*; see LG-1012 at 3:6-23, 8:36-43, 9:59-10:2; *supra* Section IV.C.3.

Alternatively, if Juen's static image mode were modified to include both

Misawa '607's macro and normal image-capturing processes, capturing a still image in the macro image-capturing process (e.g., "*recording the image in the static image mode*") would correspond to this feature. LG-1003 ¶210; *see supra* Section IV.C.3. A POSITA would have understood the macro image-capturing process in which all photoelectric elements are read involves *using all signal charges accumulated in all N number of vertically arranged pixel lines of an image sensing device, to provide N pixel lines*. LG-1003 ¶¶209-210; LG-1012, 8:28-31; *see supra* Section IV.C.2.

[5.5]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶¶211-16. Juen describes that its display screen can be an electronic viewfinder or a built-in monitor screen. LG-1011, 3:49-51. Figure 7 of Juen below shows the **display screen 25** being connected to the same **system bus 19** to which the **imaging element 13** is connected (through the **image signal processor 15** and the **memory I/O component 17**). *Id.*, 6:3-17, 23-25.

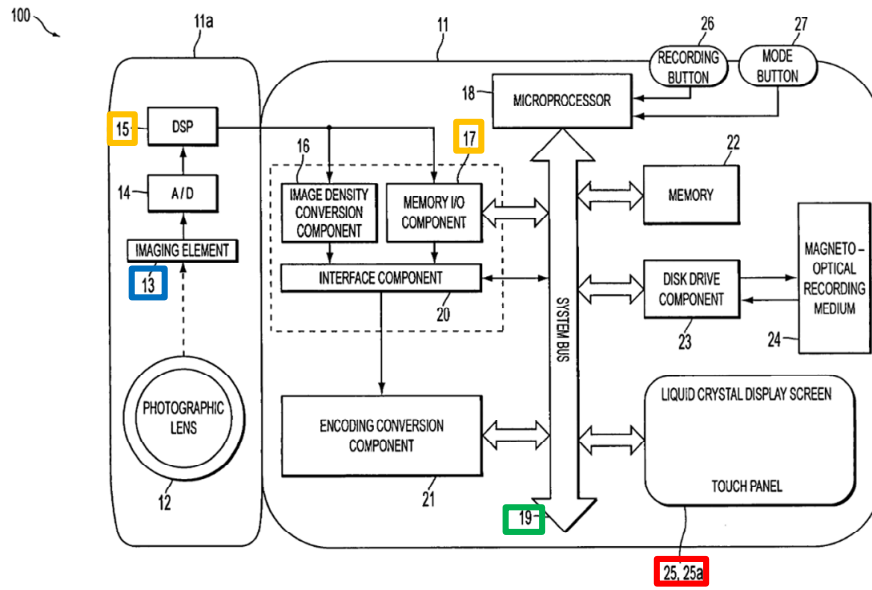


FIG. 7

Id. fig.7 (annotated). A POSITA would have understood that Juen's *signal processing unit* (which includes the image signal processor 15 and the memory I/O component 17), *when monitoring the image in the static image mode, generates image signals*. LG-1003 ¶211.

A POSITA would have been motivated to use a line-skipping process, as taught in Misawa '607, for generating the monitoring imagery for Juen's display (e.g., "*generat[ing] the image signals by using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines*"). *Id.* ¶212; *see supra* Section IV.C.3. A POSITA would have found such a modification to be predictable because both Juen and Misawa '607 teach using a display for monitoring imagery and Misawa '607 specifically teaches using line-skipping processes to generate imagery for its display. LG-1011, 3:49-50; LG-1012, 6:61-7:1, 7:60-8:3; LG-

1003 ¶212.

Moreover, a POSITA would have been motivated, based on the teachings of Misawa '607, to select any line-skipping pattern that involves cyclically or alternately skipping one or more consecutive lines for every one or more consecutive lines that are read (e.g., “*only include pixel lines separated from one another by intervals of a first distance*”). LG-1003 ¶213; *see infra* Section IV.C.4.[5.6].

Misawa '607 teaches numerous line-skipping patterns, e.g., cyclically skipping one, two, three, or seven lines for every line read, skipping two lines for every two horizontal lines read, or alternately skipping two or four lines or six or eight lines for every line read. LG-1003 ¶213; *see supra* Section IV.C.2. Misawa '607 therefore teaches both cyclically skipping the same number of lines and alternately skipping by a first number of lines or a second number of lines. LG-1003 ¶213.

A POSITA would have been motivated to select a line-skipping pattern based on the use case of the imagery and the processing specifications for that imagery. *Id.* ¶214. This would have had a reasonable expectation of success, as a POSITA would have understood how to adapt hardware and software to vary the precise number of skipped lines and read lines. *Id.* A POSITA would have been motivated to use a 1/4 line-skipping process to generate monitoring imagery. *Id.* ¶215. Juen's image sensor, as discussed above, has 960 vertically arranged pixel lines. LG-1011, 1:37-42. And in Juen-Misawa '607, a POSITA would have been

motivated to use a display having 240 vertically arranged lines. *See supra* Section IV.C.4.[5.3]. Based on these values, a POSITA would have understood to use a 1/4 line-skipping process to cull 240 lines from 960 lines of an image sensor to generate the monitoring imagery. LG-1003 ¶215; LG-1012, 8:61-63.

Alternatively, if Juen's static image mode were modified to include both Misawa '607's macro image-capturing process and Misawa '607's normal image-capturing process, monitoring the still image on the display unit in the normal image-capturing process would correspond to this feature. LG-1003 ¶216; *see supra* Section IV.C.3. Misawa '607 describes that images captured in the normal image-capturing process can be "satisfactory for confirmation of a picture composition as far as the images are displayed on a compact monitor, etc. attached to the image-capturing apparatus." LG-1012, 2:1-5. A POSITA would have understood the normal image-capturing process—particularly when 1/4 photoelectric elements are read and presented on the display—would involve *using pixel lines that have been mixed or culled from the N number of vertically arranged pixel lines to only include pixel lines separated from one another by intervals of a first distance*. LG-1003 ¶216; LG-1012, 6:63-7:1; 7:55-8:3; *see infra* Section IV.C.4.[5.6].

[5.6]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶¶217-19. Juen's moving image recording means, when in the movie mode, records the output of the

imaging means in a recording medium as a series of moving images (e.g., “*when recording the image in a moving video mode, the signal processing unit generates image signals*”). LG-1011, 3:38-44; *see id.*, 7:41-8:40.

A POSITA would have been motivated to use a line-skipping process as taught in Misawa ’607 (e.g., the 1/2 line skipping process) for generating the movie in Juen’s movie mode (e.g., “*generat[ing] the image signals by using a portion of, or the entirety of, pixel lines which have been mixed or culled from the N number of vertically arranged pixel lines*”). LG-1003 ¶218; *see supra* Sections IV.C.3, IV.C.4.[5.5]. Moreover, a POSITA would have been motivated, based on the teachings of Misawa ’607, to select any line-skipping pattern that involves cyclically or alternately skipping one or more consecutive lines for every one or more consecutive lines that are read (e.g., “*only include pixel lines separated from one another by intervals of a first distance*”). LG-1003 ¶218; *see supra* Section IV.C.4.[5.5]. And a POSITA would have been motivated to use a 1/2 line-skipping process to generate the movie imagery. LG-1003 ¶218. Juen’s image sensor, as discussed above, has 960 lines. LG-1011, 1:37-42. In Juen’s movie mode, the generated movie has 480 lines. *Id.*, 7:53-56. Based on these values, a POSITA would have been motivated to use a 1/2 line-skipping process to generate the movie imagery. LG-1003 ¶218. Indeed, Misawa ’607 precisely teaches using a 1/2 line-skipping process to cull 480 lines from 960 lines of an image sensor. LG-

1012, 8:61-63. Thus, in Juen-Misawa '607, a POSITA would have understood that using the 1/2 line-skipping process for generating Juen's movie and using the 1/4 line-skipping process for generating monitoring imagery would result in *the second distance being different from the first distance*. LG-1003 ¶219.

5. Claim 7

[7.0]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶220. Because the number of lines for monitoring (240 lines) is fewer than the number of lines for recording a movie picture (480 lines), the distance between the 240 lines for monitoring will be larger than the distance between the 480 lines for recording a movie. *Id.*; *see supra* Section IV.C.4.[5.6]. Moreover, a POSITA would have understood that because that using the 1/2 line-skipping process for generating Juen's movie and using the 1/4 line-skipping process for generating monitoring imagery would result in *a value of the first distance being larger than a value of the second distance*. LG-1003 ¶220; *see supra* Section IV.C.4.[5.6].

6. Claim 8

[8.0]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶221. Juen's number of lines on the imaging element (960 lines) is greater than a product of the number of scanning lines of Misawa '607's display (240 lines) and a fixed parameter (e.g., any value equal to four or less). *Id.*; *see supra* Sections IV.C.4.[5.1], [5.3].

7. Claim 9

[9.0]

See supra Section IV.C.6.[8.0]; LG-1003 ¶222.

8. Claim 10

[10.0]

See supra Sections IV.C.4.[5.0]-[5.3]; LG-1003 ¶223.

[10.1]

Juen-Misawa '607 renders obvious this element. LG-1003 ¶¶224-27.

Juen discloses an **image recording button 26** and a **mode button 27**. LG-1011, 6:31-34. When a user presses the mode button 27, the microprocessor determines that the camera is in the still mode, and when the user does not press the mode button 27, the microprocessor determines that the camera is in the movie mode (e.g., “*selecting between a static image mode and a moving video mode*”). *Id.*, 7:35-43; LG-1003 ¶224.

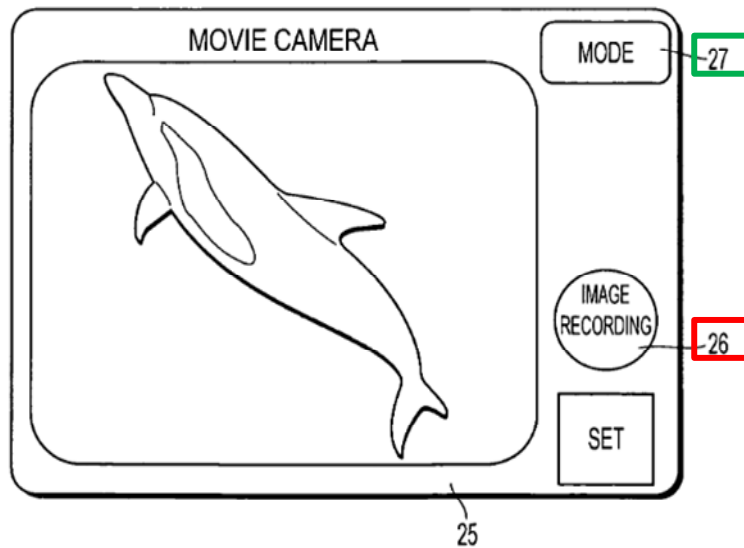


FIG. 16

LG-1011 fig.16 (annotated).

In addition to describing that its display screen can be used as an electronic viewfinder or a built-in monitor screen, Juen describes that when the mode button 27 is operated, the display screen 25 changes between Figure 16 above for the movie mode and Figure 17 below for the still mode. *Id.*, 3:49-51, 10:45-55. When the camera is in the still mode, the user operates the recording button 26 to cause the microprocessor 18 to set the coding conversion component for still image compression and to record a still image. *Id.*, 9:2-44; *see supra* Section IV.C.4.[5.4]. A POSITA would have thus understood that Juen discloses *when in the static image mode, selecting an operation from a list includes (1) recording the image in the static image mode, and (2) monitoring the image in the static image mode.* LG-1003 ¶225.

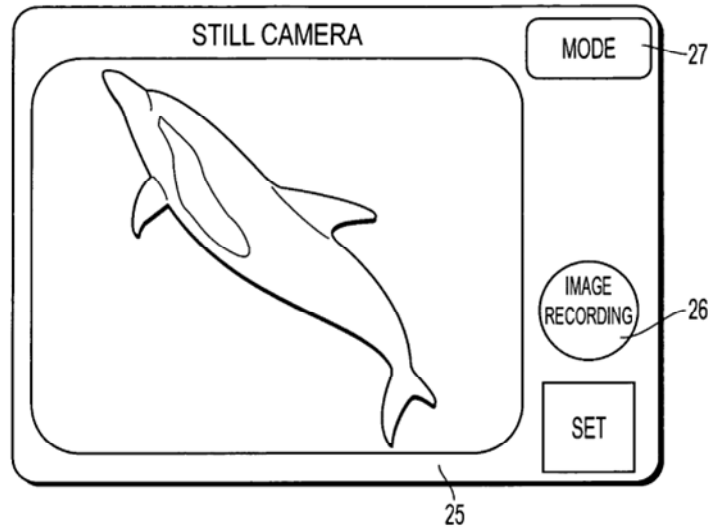


FIG. 17

LG-1011 fig.17.

Juen's disclosure is commensurate with the '493 Patent's discussion of examples of this element. LG-1003 ¶226. For example, the '493 Patent's "mode selector switch [14] to change over the operation mode between the moving video taking and the still image taking" is indistinguishable from Juen's mode button 27. LG-1001, 4:27-29; LG-1011, 7:35-43, 10:45-55; LG-1003 ¶226. And the '493 Patent's "record button [15] to start or stop the recording" is indistinguishable from Juen's image recording button 26. LG-1001, 4:27-29; LG-1011, 7:44-8:41, 9:3-10; LG-1003 ¶226.

Alternatively, Misawa '607 teaches *when in the static image mode, selecting an operation from a list includes (1) recording the image in the static image mode, and (2) monitoring the image in the static image mode.* LG-1003 ¶227. A POSITA

would have been motivated to modify Juen's static image mode to include both the macro image-capturing mode and the normal image-capturing mode and to include the macro key for switching between these modes in the static image mode. *Id.*; see *supra* Section IV.C.3. In this modification, in the static image mode, a user presses the macro key to toggle between the macro image-capturing mode (e.g., "*recording the image in the static image mode*") in which all the photoelectric elements can be read and the normal image-capturing mode in which 1/4 of the photoelectric elements can be read (e.g., "*monitoring the image in the static image mode*"). LG-1012, 7:60-63, 8:18-27, 8:28-31; LG-1003 ¶227.

[10.2]

See supra Sections IV.C.4.[5.4], IV.C.8.[10.1]; LG-1003 ¶228.

[10.3]

See supra Sections IV.C.4.[5.5], IV.C.8.[10.1]; LG-1003 ¶229.

[10.4]

See supra Sections IV.C.4.[5.6], IV.C.8.[10.1]; LG-1003 ¶230.

9. Claim 12

[12.0]

See supra Section IV.C.5.[7.0]; LG-1003 ¶231.

10. Claim 13

[13.0]

See supra Section IV.C.6.[8.0]; LG-1003 ¶232.

11. Claim 14

[14.0]

See supra Section IV.C.7.[9.0]; LG-1003 ¶233.

V. PTAB DISCRETION SHOULD NOT PRECLUDE INSTITUTION

A. Discretionary Denial - *Fintiv*

The facts do not favor denial under *Apple v. Fintiv*, IPR2020-00019, Paper 11 (PTAB Mar. 20, 2020) (precedential). The merits of Petitioner’s arguments are compelling, and the supporting evidence is substantial. That “alone demonstrates that the PTAB should not discretionarily deny institution under *Fintiv*.” LG-1013, 4-5.

Factor 1 is neutral; neither party has requested a stay in co-pending litigation.

Factor 2 favors institution; the Court has not set a trial date. The Board will issue its FWD around August 2026, approximately **1.5 years** before the projected trial date (1/25/2028). LG-1014, 66.

Factor 3 favors institution; Petitioner has filed this Petition ahead of the one-year time bar, while litigation is in its early stages. Significant resources have not been expended.

Factor 4 favors institution; Patent Owner only alleges infringement of claims 10 and 12-14, while this Petition challenges more than the asserted claims. Accordingly, a material number of Challenged Claims will likely be unaddressed

in the litigation. *See Apple, Inc. v. SEVEN Networks, LLC*, IPR2020-00156, Paper 10, 21-22 (June 15, 2020).

Factor 5: The parties in the parallel NDCA litigation are the same.

Factor 6 favors institution; the merits of this Petition are compelling. And no references forming the grounds in this Petition were considered during prosecution, and these references form grounds that demonstrate, in a straightforward manner, the obviousness of the claims. *See supra* Section IV.

B. Discretionary Denial - *General Plastic*

The factors in *General Plastic Industries Co., Ltd. v. Canon Kabushiki Kaisha*, IPR2016-01357, Paper 19 (PTAB Sept. 6, 2017) (precedential) do not favor denial.

Factor 1: While prior petitioners—Apple Inc.; ZTE Corporation, ZTE (USA), Inc.; and Olympus Corporation, Olympus America, Inc., and Olympus Corporation of the Americas—challenged the '493 Patent in IPR2020-00597, IPR2018-00236, and IPR2018-00904, respectively, Petitioner was neither the same petitioner nor a real party-in-interest. Rather, Petitioner and the prior petitioners are competitors who sell different products and do not have a “significant relationship ... with respect to [the challenged patent].” *Valve Corp. v. Elec. Scripting Prods., Inc.*, IPR2019-00062, Paper 11 at 2, 9 (PTAB Apr. 2, 2019) (precedential).

Factors 2-5: The remaining *General Plastic* factors are “necessarily

outweigh[ed]” when different petitioners have no “significant relationship.” *Videndum Prod. Sols., Inc. v. Rotolight Ltd.*, IPR2023-01218, Paper 12, at 6 (PTAB Apr. 19, 2024) (Vidal); *see also Toshiba Am. Info. Sys., Inc. v. Walletex Microelectronics Ltd.*, IPR2018-01538, Paper 11, at 21 (PTAB Mar. 5, 2019). *Videndum* is controlling here.

Factors 6-7 favor institution. The Petition presents compelling evidence of unpatentability and furthers “the Board’s mission to improve patent quality.” *Code200, UAB v. Bright Data Ltd.*, IPR2022-00861, 2022 WL 3646167, at *3 (PTAB Aug. 23, 2022) (precedential). The Petition—the only one challenging the ’493 Patent now before the Board—provides an efficient means for resolving patentability. *See Micron Tech., Inc. v. Sonrai Memory Ltd.*, IPR2023-00909, Paper 7, 9 (PTAB Nov. 28, 2023).

Thus, discretionary denial under *General Plastic* is not warranted.

C. Discretionary Denial - *Advanced Bionics* Test Favors Institution - 35 U.S.C. §325(d)

The grounds advanced in this Petition are based on five prior art references: Misawa ’482, Parulski, Kurashige, Juen, and Misawa ’607. The Office has not considered Kurashige. Although the remaining references were previously presented to the Office, discretionary denial based on this fact is improper under *Advanced Bionics. Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GmbH*, IPR2019-01469, Paper 6, 8-9 (PTAB Feb. 13, 2020) (precedential).

Using the Board's two-part framework and evaluation of "the *Becton* factors," such evaluation favors institution. *Id.*, 8-10 (citing *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (PTAB Dec. 15, 2017) (precedential as to §III.C.5, first paragraph) ("*Becton*"); see Trial Practice Guide July 2019 Update, 28-31, Fed. Reg. 33,925 (July 16, 2019).

Becton factors (a)-(c) and (d) support institution because this Petition does not present substantially the same prior art combinations or arguments that were previously before the Office. Kurashige was never before the Office. Though Juen was before the Board in IPR2020-00597 and Reexamination Control No. 90/014628, the Board and the Office did not consider Juen in combination with Misawa '607 as presented in this Petition (*Becton*, factor (d)). While it is true that Misawa '607 was before the Board in IPR2018-00904, the Board did not consider the merits of the obviousness grounds presented herein in that IPR (*Becton*, factor (c)). And although Misawa '482 and Parulski '218 appeared as a combination in Grounds 2 and 3 of IPR2018-00904, again, the Board did not consider the merits of the obviousness grounds presented herein in that IPR (*Becton*, factor (c)). Thus, the combinations as set forth in this Petition are not cumulative of those previously before the Board or Office.

Although part 1 of the *Advanced Bionics* framework is not satisfied for the reasons above, part 2 is also not satisfied. *Becton* factors (e) and (f) favor Petitioner

because the Office erred in evaluating the references and because evidence presented above warrants reconsideration of said evaluation. For example, as previously noted, (i) neither the Board nor the Office considered Kurashige, (ii) the Board did not make factual findings as to the teachings of Misawa '607 in IPR2018-00904 (*Becton*, factors (e) and (f)), (iii) the Board made no factual findings as to the teaching of the combination of Misawa '482 and Parulski '218 in IPR2018-00904, and (iv) the Board failed to consider Juen in combination with Misawa '607 as presented in this Petition. *See Advanced Bionics*, Paper 6 at 26 (petitioner may show error “if the record of the Office’s previous consideration of the art is silent or not well-developed.”); *see also Samsung Electronics Co., Ltd., et al. v. Evolved Wireless LLC*, IPR2021-00943, Paper 9 at 10-12 (PTAB Dec. 1, 2021) (declining to exercise discretion when the prosecution history provides little insight into the examiner’s evaluation of the prior art and the petitioner demonstrates with a reasonable likelihood that the previously presented art discloses the allegedly patentable features).

For the reasons above, the Board should decline to exercise its discretion to deny institution.

VI. CONCLUSION AND FEES

The Challenged Claims are unpatentable. Petitioner respectfully requests institution of an IPR for the '493 Patent on the grounds presented in this Petition.

Petitioner authorizes charge of fees to Deposit Account 06-1050.

VII. MANDATORY NOTICES UNDER 37 C.F.R. §42.8(A)(1)

A. Real Party-In-Interest Under 37 C.F.R. §42.8(b)(1)

LG Electronics, Inc. and LG Electronics USA, Inc. are the real parties-in-interest.

B. Related Matters Under 37 C.F.R. §42.8(b)(2)

The '493 Patent is the subject of a civil action, *Maxell, Ltd. v. LG Electronics Inc. et al.*, 5-23-cv-00152 E.D. Tex. filed December 29, 2023 (transferred) and *Maxell, Ltd. v. LG Electronics Inc. et al.*, 5-24-cv-04972 N.D. Cal. filed August 9, 2024 (pending), *Apple Inc. v. Maxell, Ltd.*, 21-1033 (CAFC) filed October 9, 2020; *Apple Inc. v. Maxell, Ltd.*, IPR2020-00597 (PTAB) filed March 17, 2020; *Maxell, Ltd. v. Apple Inc.*, 5-19-cv-00036 (EDTX) filed March 15, 2019; *Olympus Corporation et al v. Maxell, Ltd. f/k/a Hitachi Maxell, Ltd.*, IPR2018-00904 (PTAB) filed June 20, 2018; *Maxell Ltd. v. ZTE Corporation*, 5-18-cv-00080 (EDTX) filed June 15, 2018; *ZTE Corporation et al v. Maxell, Ltd. et al.*, IPR2018-00236 (PTAB) filed November 22, 2017 and *Maxell, Ltd. v. ZTE Corporation et al.*, 5-16-cv-00179 (EDTX) filed November 18, 2016.

The '493 Patent is subject to an *ex parte* reexamination certificate in Control No. 90/014,628 confirming the patentability of claims 5-6. LG-1005, 5.

Petitioner is not aware of any other disclaimers, reexamination certificates, or IPR petitions addressing the '493 Patent.

C. Lead And Back-Up Counsel Under 37 C.F.R. §42.8(b)(3)

Petitioner provides the following designation of counsel.

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D. Service Information

Please address all correspondence and service to the address listed above.

Petitioner consents to electronic service by email at IPR18768-0217IP4@fr.com

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Respectfully submitted,

Dated: December 31, 2024

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CERTIFICATION UNDER 37 C.F.R. §42.24

Under the provisions of 37 C.F.R. §42.24(d), the undersigned hereby certifies that the word count for the foregoing Petition for *Inter Partes* Review totals 13,996 words, which is less than the 14,000 allowed under 37 CFR §42.24.

Dated: December 31, 2024

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CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§42.6(e)(4)(i) *et seq.* and 42.105(b), the undersigned certifies that on December 31, 2024, a complete and entire copy of this Petition for *Inter Partes* Review and all supporting exhibits were provided by Federal Express, to the Patent Owner, by serving the correspondence address of record as follows:

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