IN THE UNITED STATES DISTRICT COURT
DISTRICT OF DELAWARE

VISUAL EFFECT INNOVATIONS, LLC **Plaintiff,** **v.** **LG ELECTRONICS U.S.A., INC. and LG ELECTRONICS INC.,** **Defendants.**	**Civil Action No. 1:17-cv-1275-LPS-CJB** **JURY TRIAL DEMANDED**

AMENDED COMPLAINT FOR PATENT INFRINGEMENT

This is an action for patent infringement arising under the Patent Laws of the United States of America, 35 U.S.C. § 1 et seq. in which Plaintiff Visual Effect Innovations, LLC ("VEI" or "Plaintiff") brings this patent infringement action against Defendants LG Electronics U.S.A., Inc. ("LG USA") and LG Electronics Inc., its parent company ("LG Korea", together with LG USA, "LG" or "Defendants") and alleges as follows:

BACKGROUND

1. Plaintiff VEI is the assignee of all right, title, and interest in and to U.S. Patent No. 9,781,408, entitled "Faster state transitioning for continuous adjustable 3Deeps filter spectacles using multi-layered variable tint materials" ("the '408 Patent," attached as Exhibit A); and U.S. Patent No. 9,948,922, entitled "Faster State Transitioning For Continuous Adjustable 3deeps Filter Spectacles Using Multi-Layered Variable Tint Materials" ("the '922 Patent," attached as Exhibit B) (collectively, the "Patents-in-Suit"). VEI has the exclusive right to assert all causes of action arising under the Patents-in-Suit and the right to remedies for infringement thereof.

2. The inventors on the Patents-in-Suit are Kenneth Martin Jacobs and Ronald Steven Karpf.

3. Mr. Jacobs is the Distinguished Professor Emeritus of Cinema at SUNY Binghamton. He is the recipient of the American Film Institute's Maya Deren Independent Film and Video Artists Award, and the winner of the Los Angeles Film Critic's Douglas Edwards Experimental/Independent Film/Video Award. He is also the recipient of the Guggenheim Award and a special Rockefeller Foundation grant; and his work has been featured in prominent museums including the New York Museum of Modern Art, the American House in Paris, the Arsenal Theater in Berlin, the Louvre in Paris, and at the Getty Center in Los Angeles.

4. Mr. Karpf is the Founding Partner of bioinformatics company ADDIS Informatics, and Founding Partner of technology security company Geo Codex LLC. Mr. Karpf has an MA and Ph.D. in Mathematical Sciences.

5. The inventions claimed in the Patents-in-Suit are directed to unconventional improvements in the technology for displaying moving pictures, which has application in films, television and other display technology. In particular, these inventions are directed to, among other things, improvements in how continuous movement is displayed on presentation devices. *See* '408 patent, col. 2, lns. 16-32; '922 patent, col. 2, lns. 18-34.

6. As explained in the specifications, the claimed inventions originated as ways to solve problems arising in the technology used to portray continuous movement in the technology used to display films or movies in theaters. The specifications explain the traditional or conventional methods of displaying continuous movement in films or movies, which included:

> The appearance of continuous movement, using only two substantially similar pictures, has been accomplished in live performance by simultaneous projection of both images onto a screen, wherein one picture may be slightly off-set from the other picture as they appear on the screen, and by rotating a two-bladed propeller, wherein the propeller blades are set off from one another by 180 degrees, in front of and between the two projectors such that the two images are made to both alternate and overlap in their appearances, with both images in turn alternating with an interval of complete darkness onscreen when both projections are blocked by the spinning propeller.

'408 patent, col. 4, lns. 42-53; '922 patent, col. 4, lns. 44-55. As further explained, this method produced "flicker," an unintended and undesirable effect of the transitions between film frames.

See, e.g., '408 patent, col. 50, lns. 58-64; '922 patent, col. 51, lns. 17-23. As the specifications also noted, in conventional video and computer-display "image-continuity depends likewise on this rapid on-off display," or "flicker," which was similarly disfavored. '408 patent, col. 50, lns. 47-64; '922 patent, col. 51, lns. 5-23.

7. The claimed inventions turn a negative into a positive and deliberately use "flicker" and the resulting "effects of emphatic flicker on the human optical/nervous system" to produce better visual results. '408 patent, col. 50, lns. 58-64; '922 patent, col. 51, lns. 17-23. In particular, the results include enhanced continuous movement, various artistic visual effects and depth illusions to be experienced by persons without properly functioning binocular vision. *See, e.g.,* '408 patent, col. 50, ln. 65- col. 51, ln. 23; '922 patent, col. 51, lns. 24-49.

8. One core technique initially invented to harness the power of "flicker" for this purpose included the use of a different "bridge frame" between two picture frames. As explained in the specification:

> The method of the present invention entails repetitive presentation to the viewer of at least two substantially similar image pictures alternating with a third visual interval or bridging picture that is substantially dissimilar to the other substantially similar pictures in order to create the appearance of continuous, seamless and sustained directional movement.

'408 patent, col. 8, lns. 50-56; '922 patent, col. 8, lns. 52-58.

9. As seen in the Patents-in-Suit and others in this family, this "bridge frame" could include a black frame or different solid color frame or a blended image (e.g., an image which is a partial picture and partial black or other solid color frame). Other nuances of and improvements to this unconventional technique are disclosed and claimed within this patent family, including in the Patents-in-Suit. In this regard, this technique – of adding a black frame or blended image between image frames -- also can be accomplished in a variety of ways, including not only by "black frame insertion" but also by "backlight scanning" – where the lighting behind the screen is dimmed, in whole or in part, in planned intervals so as to achieve the same result, of inserting

a black or partially blackened "frame" between two images. These unconventional inventive techniques are claimed in the accused claims of the Patents-in-Suit.

10. These unconventional inventive techniques claimed in the patents-in-suit have application in any device that displays moving pictures, including not only devices that display film or movies in theaters, but also televisions, projectors, computer screens, gaming consoles and a variety of other applications.

11. By making, using, selling, offering for sale, and importing products including but not limited to LG televisions, LG is infringing the claims of the Patents-in-Suit.

PARTIES

12. VEI is a Texas Limited Liability Company with a principal place of business at 1400 Preston Road, Suite 400, Plano, Texas 75093.

13. On information and belief, LG is registered to do business in the State of Delaware and it may be served with process by delivering a summons and a true and correct copy of this complaint to its registered agent for receipt of service of process, Corporation Service Company, 251 Little Falls Drive, Wilmington, DE 19808.

14. On information and belief, Defendant LG Korea is a Korean corporation with its principal place of business in LG Twin Towers, 20, Yeouido-dong, Yeongdeungpo-gu, Seoul, Republic of Korea, Seoul, Republic of Korea.

JURISDICTION AND VENUE

15. This action arises under the patent laws of the United States, Title 35 of the United States Code. Accordingly, this Court has subject matter jurisdiction under 28 U.S.C. §§ 1331 and 1338(a).

16. Court has personal jurisdiction over LG because, among other reasons, LG has established minimum contacts with the forum state of Delaware.

17. Venue is proper in this District under 28 U.S.C. § 1400(b). LG Korea is a foreign corporation, while LG-USA is incorporated in this district. A substantial part of the infringement

alleged in this Complaint has occurred and is occurring in this district, including the marketing, selling, and offering for sale of infringing products.

COUNT I

INFRINGEMENT OF U.S. PATENT NO. 9,781,408

18. Plaintiff incorporates by reference each of the allegations in the foregoing paragraphs, and further alleges as follows:

19. On October 3, 2017, the United States Patent and Trademark Office issued the '408 Patent for inventions covering systems for producing an appearance of continuous movement using a finite number of images, *i.e.* as few as two images, which in one claimed embodiment comprise

a. a storage adapted to store one or more image frames; and

b. a processor adapted to obtain a first image frame from a first video stream;

c. expand the first image frame to generate a modified image frame, wherein the modified image frame is different from the first image frame;

d. generate a first altered image frame that includes first and second non-overlapping portions, wherein the first non-overlapping portion comprises a first portion of the modified image frame, wherein the first image frame does not include the second non-overlapping portion, wherein the modified image frame does not include the second non-overlapping portion; and

e. generate a second altered image frame that includes third and fourth non-overlapping portions wherein the third non-overlapping portion comprises a second portion of the modified image frame, the second portion of the modified image frame being different from the first portion of the modified image frame, wherein the first image frame does not include the fourth non-overlapping portion, wherein the modified image frame does not include the fourth non-overlapping portion.

20. A true and correct copy of the '408 Patent is attached as Exhibit A.

21. LG has been and is now directly and indirectly infringing one or more claims of the '408 Patent, in this judicial District and elsewhere in the United States.

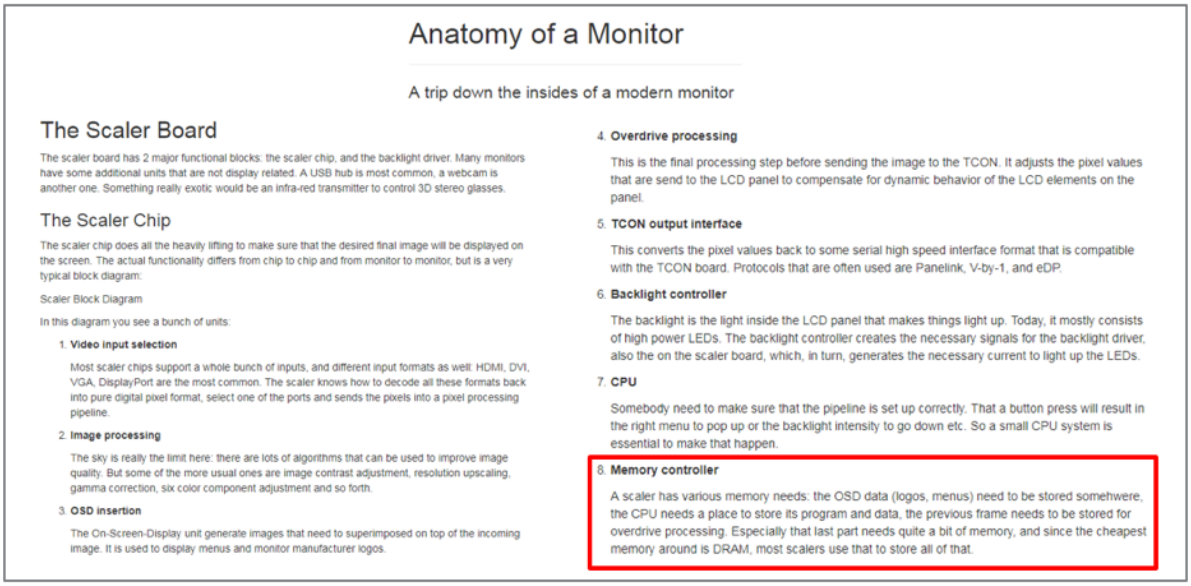
22. For example, LG directly infringes the '408 Patent, including but not limited to claim 1, by making, using, selling, importing, and offering for sale LG televisions and monitors. The LG UNES8000 is representative of the products accused, which encompass other LG products having similar features, *e.g.*:

Figure 1 http://www.flatpanelshd.com/review.php?subaction=showfull&id=1338560188; http://www.lg.com/us/tvs/lg-84LM9600-led-tv)

LG's LM9600 range will be available in 55 and 84 inches called 55LM9600 and 84LM9600 (4K resolution) in the US. In Europe it will be available in 47, 55 and 84 inches called 47LM960V, 55LM960V and 84LM960V.

23. LG televisions and monitors comprise a storage adapted to store one or more image frames. For example, the LG LM9600/LM960V is an LED monitor, and accordingly must include a storage for the monitor instructions to be stored on as well as being capable of storing one or more image frames.

Figure 2 (Source: http://monitorinsider.com/monitor_anatomy/)



Anatomy of a Monitor

A trip down the insides of a modern monitor

The Scaler Board

The scaler board has 2 major functional blocks: the scaler chip, and the backlight driver. Many monitors have some additional units that are not display related. A USB hub is most common, a webcam is another one. Something really exotic would be an infra-red transmitter to control 3D stereo glasses.

The Scaler Chip

The scaler chip does all the heavily lifting to make sure that the desired final image will be displayed on the screen. The actual functionality differs from chip to chip and from monitor to monitor, but is a very typical block diagram:

Scaler Block Diagram

In this diagram you see a bunch of units:

1. **Video input selection**

   Most scaler chips support a whole bunch of inputs, and different input formats as well: HDMI, DVI, VGA, DisplayPort are the most common. The scaler knows how to decode all these formats back into pure digital pixel format, select one of the ports and sends the pixels into a pixel processing pipeline.

2. **Image processing**

   The sky is really the limit here: there are lots of algorithms that can be used to improve image quality. But some of the more usual ones are image contrast adjustment, resolution upscaling, gamma correction, six color component adjustment and so forth.

3. **OSD insertion**

   The On-Screen-Display unit generate images that need to superimposed on top of the incoming image. It is used to display menus and monitor manufacturer logos.

4. **Overdrive processing**

   This is the final processing step before sending the image to the TCON. It adjusts the pixel values that are send to the LCD panel to compensate for dynamic behavior of the LCD elements on the panel.

5. **TCON output interface**

   This converts the pixel values back to some serial high speed interface format that is compatible with the TCON board. Protocols that are often used are Panelink, V-by-1, and eDP.

6. **Backlight controller**

   The backlight is the light inside the LCD panel that makes things light up. Today, it mostly consists of high power LEDs. The backlight controller creates the necessary signals for the backlight driver, also the on the scaler board, which, in turn, generates the necessary current to light up the LEDs.

7. **CPU**

   Somebody need to make sure that the pipeline is set up correctly. That a button press will result in the right menu to pop up or the backlight intensity to go down etc. So a small CPU system is essential to make that happen.

8. **Memory controller**

   A scaler has various memory needs: the OSD data (logos, menus) need to be stored somehwere, the CPU needs a place to store its program and data, the previous frame needs to be stored for overdrive processing. Especially that last part needs quite a bit of memory, and since the cheapest memory around is DRAM, most scalers use that to store all of that.

24. LG televisions and monitors include a processor adapted to obtain a first image frame from a first video stream. For example, the LG LM9600/LM960V includes processors capable of obtaining a first image frame from a first video stream via any of its video input connections. The video stream could come from a cable box, DVD/Blu-Ray player, computer, or one of many other sources, *e.g.*:

Figure 3 (Source: http://www.hardwarezone.com/review-lg-lm9600-55-inch-cinema-3d-smart-tv-full-assault; http://www.lg.com/us/tvs/lg-84LM9600-led-tv)

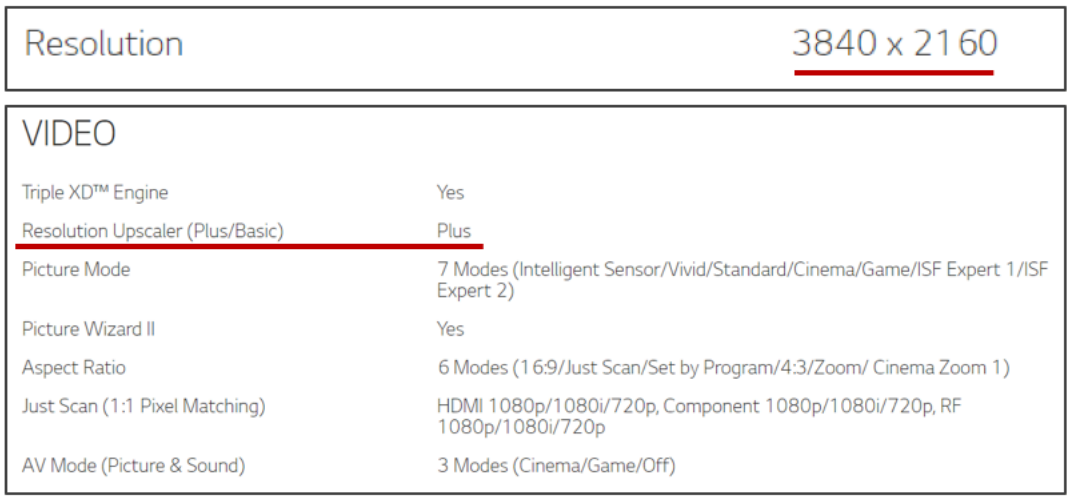
It's good to know that LG hasn't rested on their laurels either. The LM9600 flaunts a very zippy Motion Clarity Index of 1,000Hz (via frame interpolation and scanning backlights dubbed as TruMotion) with an equally impressive native refresh rate of 400Hz. Picture quality wise, LG has improved on their scaling algorithms for lower resolution videos, plus a 10,000,000 to 1 contrast ratio rating. That said, we'll regard the latter specification with a pinch of salt and revisit this later after our through analysis of the TV in the following pages. At the 3D end, LG latest passive 3D TV continues its assault on the active-shutter faction with more tweaks of its own. Some of the new features include 3D Depth-Control, and Color Correction - designed to correct the possibility of mismatched colors due to separate cameras used for left and right eye images. Powered by a dual-core central processor and a quad-core graphics processing unit, this model possesses the chops to meet Samsung's flagship ES8000 on the warpath as well. There are more new features, of course, like the reworked Magic remote which we'll update you along the course of our review. The LM9600 has form, but will it offer the same cool finesse too? If you're ready, it's time to visit this Cinema 3D set in detail to find out!

AV INPUTS/OUTPUTS

RF In (Antenna/Cable)	1 (Rear)
AV In	1 (Rear w/Gender)
Component Video In(Y, Pb, Pr + Audio)	1 (Rear w/Gender)
HDMI™/HDCP Input	4 (Side)
Digital Audio Out (Optical)	1 (Rear)
RGB In (D-Sub 15 Pin) - PC	1 (Rear)
PC Audio Input	1 (Rear)
USB 2.0	3 (Side /1:Hub)
LAN	1 (Rear)

25. LG televisions and monitors expand the first image frame to generate a modified image frame, wherein the modified image frame is different from the first image frame. For example, the LG LM9600/LM960V has a screen resolution of 3,840 x 2,160 pixels. It has an Upscaler, which in real-time expands the received image frames (most often 720p or 1080i) to a modified image frame with the screen's resolution (3,840 x 2,160). As the first image frame and the modified image frame are different sizes, the modified image frame is different from the first image frame, *e.g.*:

Figure **4**. (Source: http://www.lg.com/us/tvs/lg-84LM9600-led-tv)



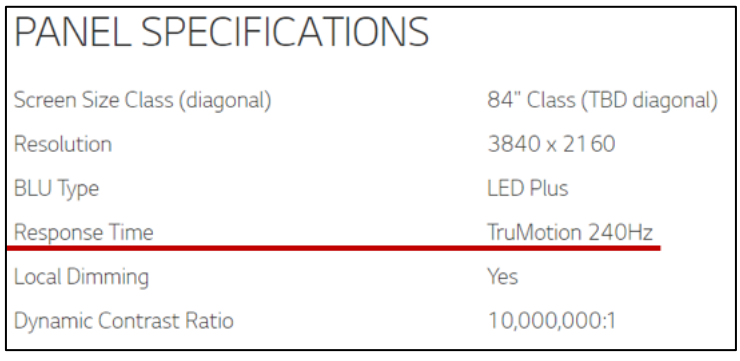
Resolution	3840 x 2160

VIDEO

Triple XD™ Engine	Yes
Resolution Upscaler (Plus/Basic)	Plus
Picture Mode	7 Modes (Intelligent Sensor/Vivid/Standard/Cinema/Game/ISF Expert 1/ISF Expert 2)
Picture Wizard II	Yes
Aspect Ratio	6 Modes (16:9/Just Scan/Set by Program/4:3/Zoom/ Cinema Zoom 1)
Just Scan (1:1 Pixel Matching)	HDMI 1080p/1080i/720p, Component 1080p/1080i/720p, RF 1080p/1080i/720p
AV Mode (Picture & Sound)	3 Modes (Cinema/Game/Off)

26. LG televisions generate a first altered image frame that includes first and second non-overlapping portions. For example, the LM9600/LM960V features LG's TruMotion 240Hz. LG TruMotion televisions utilize Backlight Scanning technology, which cannot be turned off, and adds additional frames between images to sync the signal rate with the television's refresh rate. This results in generating altered image frames with first and second non-overlapping portions, *e.g.*:

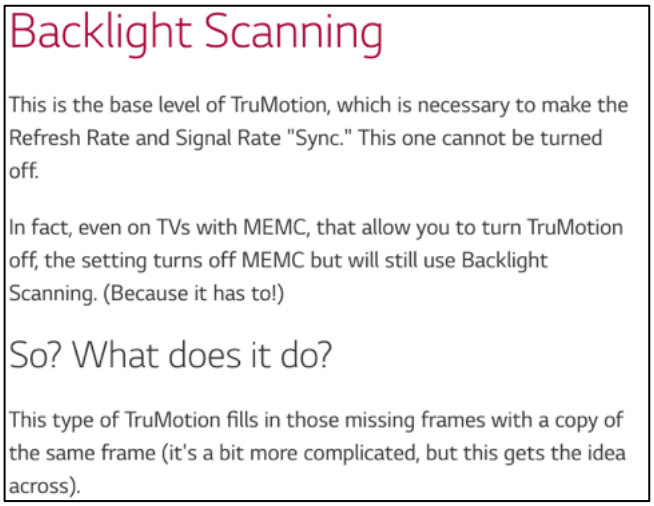
Figure **5**. (Source: http://www.lg.com/us/tvs/lg-84LM9600-led-tv)



PANEL SPECIFICATIONS

Screen Size Class (diagonal)	84" Class (TBD diagonal)
Resolution	3840 x 2160
BLU Type	LED Plus
Response Time	TruMotion 240Hz
Local Dimming	Yes
Dynamic Contrast Ratio	10,000,000:1

Figure **6**. (Source: http://www.lg.com/us/support/product-help/CT10000018-20150159237971-menu-settings)



Backlight Scanning

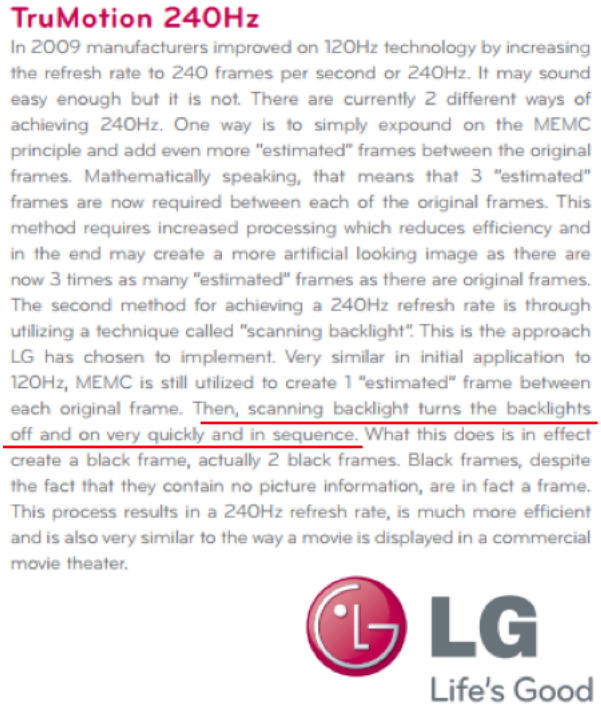
This is the base level of TruMotion, which is necessary to make the Refresh Rate and Signal Rate "Sync." This one cannot be turned off.

In fact, even on TVs with MEMC, that allow you to turn TruMotion off, the setting turns off MEMC but will still use Backlight Scanning. (Because it has to!)

So? What does it do?

This type of TruMotion fills in those missing frames with a copy of the same frame (it's a bit more complicated, but this gets the idea across).

Figure **7**. (Source: http://www.pcworld.com/article/156608/LG_Display.htm)



TruMotion 240Hz

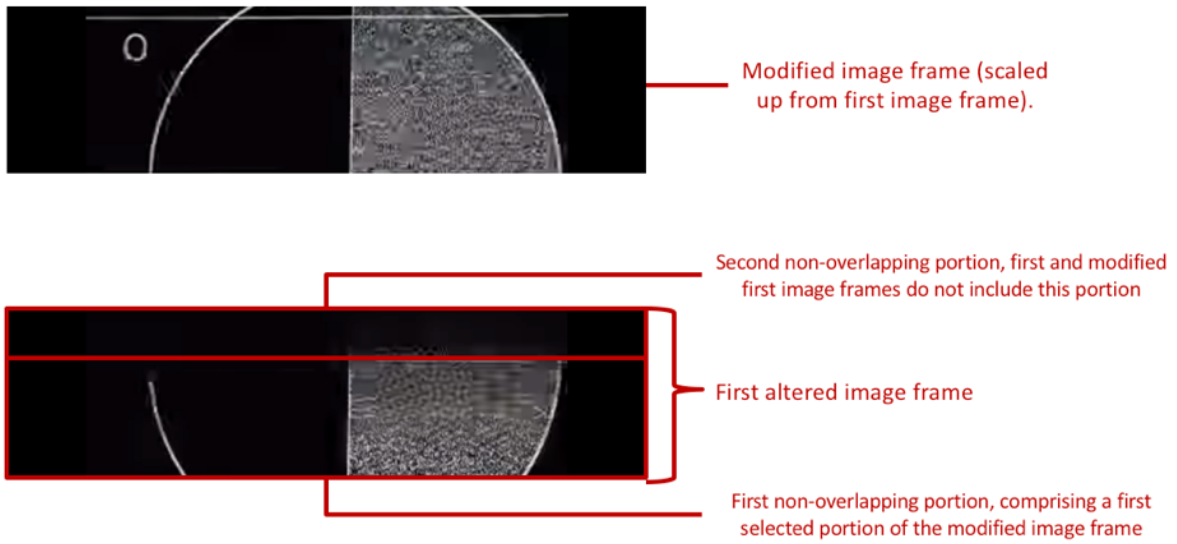
In 2009 manufacturers improved on 120Hz technology by increasing the refresh rate to 240 frames per second or 240Hz. It may sound easy enough but it is not. There are currently 2 different ways of achieving 240Hz. One way is to simply expound on the MEMC principle and add even more "estimated" frames between the original frames. Mathematically speaking, that means that 3 "estimated" frames are now required between each of the original frames. This method requires increased processing which reduces efficiency and in the end may create a more artificial looking image as there are now 3 times as many "estimated" frames as there are original frames. The second method for achieving a 240Hz refresh rate is through utilizing a technique called "scanning backlight". This is the approach LG has chosen to implement. Very similar in initial application to 120Hz, MEMC is still utilized to create 1 "estimated" frame between each original frame. Then, scanning backlight turns the backlights off and on very quickly and in sequence. What this does is in effect create a black frame, actually 2 black frames. Black frames, despite the fact that they contain no picture information, are in fact a frame. This process results in a 240Hz refresh rate, is much more efficient and is also very similar to the way a movie is displayed in a commercial movie theater.

LG
Life's Good

27. LG televisions generate a first altered image frame that includes first and second non-overlapping portions, where the first non-overlapping portion is a first portion of the

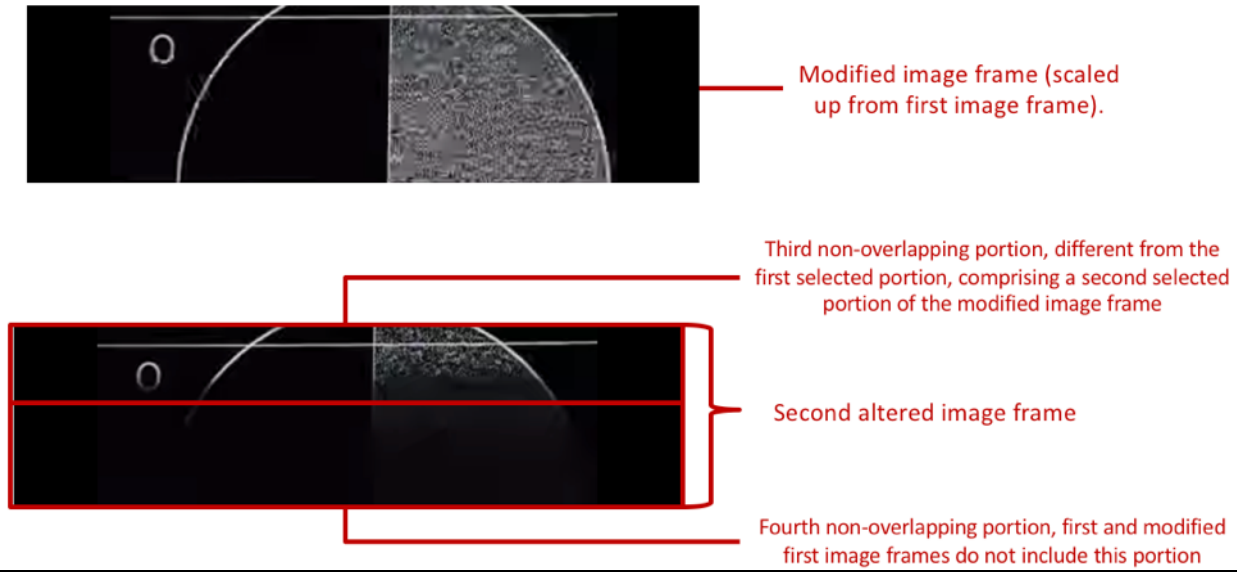
modified image frame, wherein the first image frame does not include the second non-overlapping portion, wherein the modified image frame does not include the second non-overlapping portion. For example, the following are screenshots from a recording of an LM9600/LM960V television showing how backlight scanning generate a first and second altered image frame that includes first and second non-overlapping portions, *e.g.*:

Figure **8**. (Source: https://www.youtube.com/watch?v=Jo4b2jEePg)



28. LG televisions generate a second altered image frame that includes third and fourth non-overlapping portions wherein the third non-overlapping portion comprises a second portion of the modified image frame, the second portion of the modified image frame being different from the first portion of the modified image frame, wherein the first image frame does not include the fourth non-overlapping portion, wherein the modified image frame does not include the fourth non-overlapping portion, *e.g.*:

Figure **9**. (Source: https://www.youtube.com/watch?v=Jo4b2jEePg0)



29. By making, using, selling, importing, and offering for sale LG televisions and other similar products, LG is infringing the claims of the '408 Patent, including but not limited to claim 1. LG has committed these acts of infringement without license or authorization.

30. LG has injured VEI and is liable to VEI for direct and indirect infringement of the claims of the '408 Patent pursuant to 35 U.S.C. § 271(a), (b), and (c).

31. As a result of Defendants' infringement of the '408 Patent, VEI has suffered harm and seeks monetary damages in an amount adequate to compensate for infringement, but in no event less than a reasonable royalty for the use made of the invention by LG, together with interest and costs as fixed by the Court.

COUNT II

INFRINGEMENT OF U.S. PATENT NO. 9,948,922

32. Plaintiff incorporates by reference each of the allegations in the foregoing paragraphs, and further alleges as follows:

33. On April 17, 2018, the United States Patent and Trademark Office issued the '922 Patent for inventions covering an apparatus which in one claimed embodiment comprises

a. a storage adapted to store one or more image frames;

b. a processor adapted to obtain a first image frame and a second image frame from a first video stream;

c. generate a first modified image frame by expanding the first image frame, wherein the first modified image frame is different from the first image frame;

d. generate a second modified image frame by expanding the second image frame, wherein the second modified image frame is different from the second image frame;

e. generate a bridge frame, wherein the bridge frame is a solid color, wherein the bridge frame is different from the first image frame and different from the second image frame;

f. display the first modified image frame;

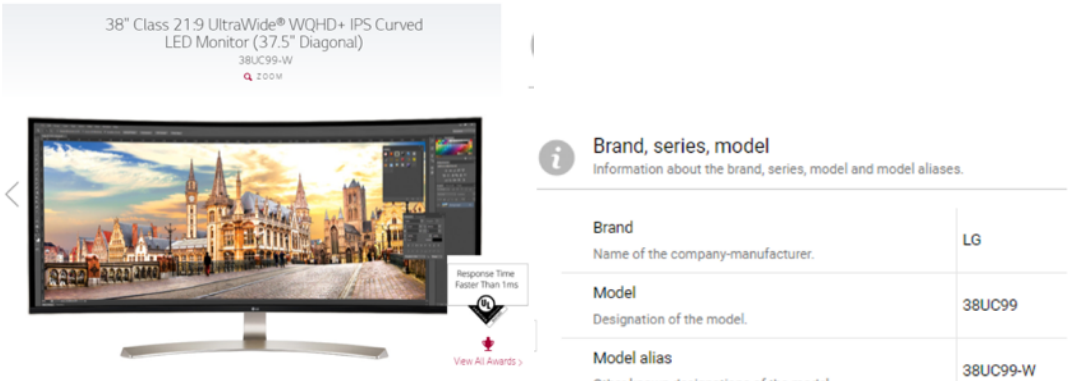
g. display the bridge frame; and

h. display the second modified image frame.

34. A true and correct copy of the '922 Patent is attached as Exhibit B.

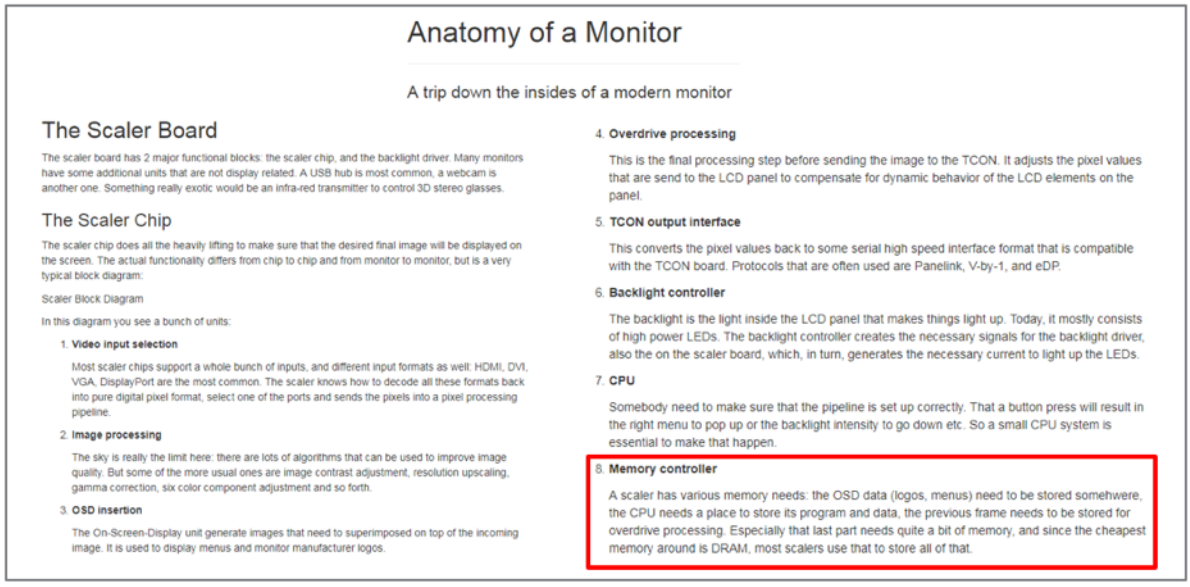
35. LG has been and is now directly and indirectly infringing one or more claims of the '922 Patent, in this judicial District and elsewhere in the United States. For example, LG directly infringes the '922 Patent, including but not limited to claim 1, by making, using, selling, importing, and offering for sale LG monitors. The LG 38UC99-W is representative of the products accused, which encompass other LG products having similar features, *e.g.*:

Figure **10**. (Source: http://www.lg.com/us/monitors/lg-38UC99-W-ultrawide-monitor; https://www.displayspecifications.com/en/model/65bf6db)



36. LG televisions and monitors comprise a storage adapted to store one more image frames. For example, the LG 38UC99-W is an LED monitor that must include a storage capable of storing one or more image frames.

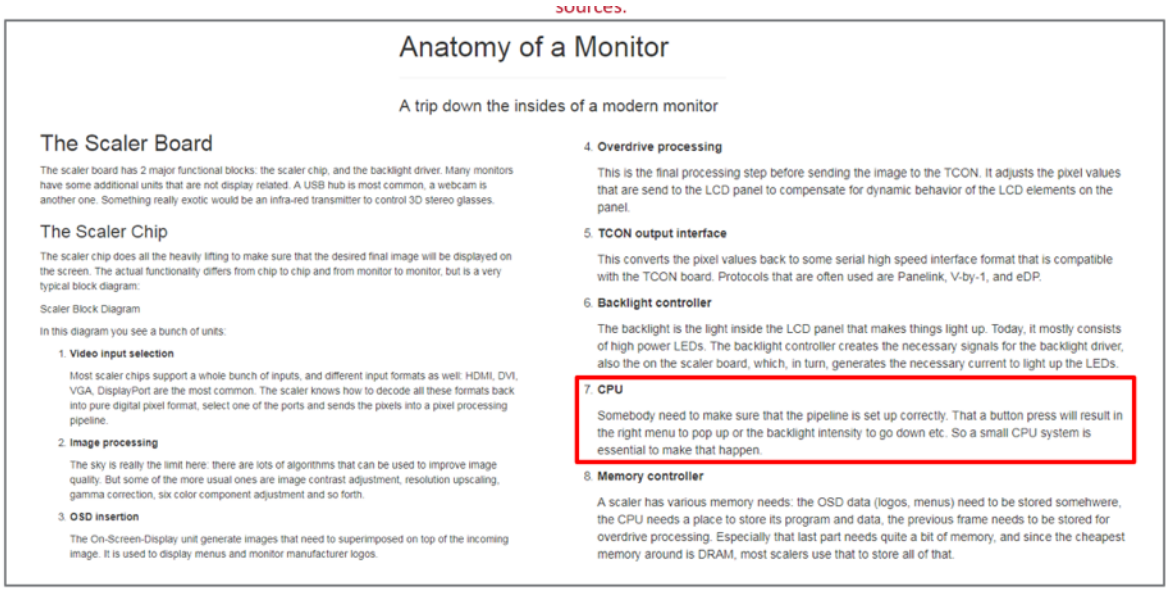
Figure 11 (Source: http://monitorinsider.com/monitor_anatomy)



37. LG televisions and monitors comprise a processor adapted to obtain a first image frame and a second image frame from a first video stream. For example, the LG 38UC99-W includes a processor capable of obtaining a first image frame and a second image frame from a

first video stream via any of its video input connections. The video stream could come from a cable box, DVD/Blu-Ray player, computer, or one of many other sources., *e.g.*:

Figure 12 (Source: Source: http://monitorinsider.com/monitor_anatomy)



Anatomy of a Monitor

A trip down the insides of a modern monitor

The Scaler Board

The scaler board has 2 major functional blocks: the scaler chip, and the backlight driver. Many monitors have some additional units that are not display related. A USB hub is most common, a webcam is another one. Something really exotic would be an infra-red transmitter to control 3D stereo glasses.

The Scaler Chip

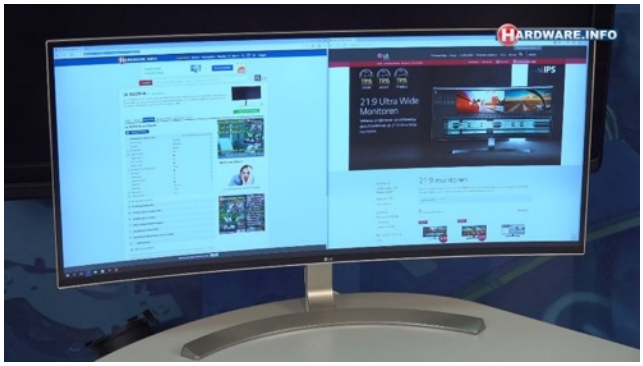
The scaler chip does all the heavily lifting to make sure that the desired final image will be displayed on the screen. The actual functionality differs from chip to chip and from monitor to monitor, but is a very typical block diagram:

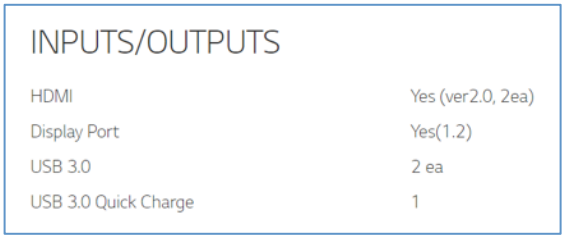
Scaler Block Diagram

In this diagram you see a bunch of units:

1. **Video input selection**
   Most scaler chips support a whole bunch of inputs, and different input formats as well: HDMI, DVI, VGA, DisplayPort are the most common. The scaler knows how to decode all these formats back into pure digital pixel format, select one of the ports and sends the pixels into a pixel processing pipeline.
2. **Image processing**
   The sky is really the limit here: there are lots of algorithms that can be used to improve image quality. But some of the more usual ones are image contrast adjustment, resolution upscaling, gamma correction, six color component adjustment and so forth.
3. **OSD insertion**
   The On-Screen-Display unit generate images that need to superimposed on top of the incoming image. It is used to display menus and monitor manufacturer logos.
4. **Overdrive processing**
   This is the final processing step before sending the image to the TCON. It adjusts the pixel values that are send to the LCD panel to compensate for dynamic behavior of the LCD elements on the panel.
5. **TCON output interface**
   This converts the pixel values back to some serial high speed interface format that is compatible with the TCON board. Protocols that are often used are Panelink, V-by-1, and eDP.
6. **Backlight controller**
   The backlight is the light inside the LCD panel that makes things light up. Today, it mostly consists of high power LEDs. The backlight controller creates the necessary signals for the backlight driver, also the on the scaler board, which, in turn, generates the necessary current to light up the LEDs.
7. **CPU**
   Somebody need to make sure that the pipeline is set up correctly. That a button press will result in the right menu to pop up or the backlight intensity to go down etc. So a small CPU system is essential to make that happen.
8. **Memory controller**
   A scaler has various memory needs: the OSD data (logos, menus) need to be stored somehwere, the CPU needs a place to store its program and data, the previous frame needs to be stored for overdrive processing. Especially that last part needs quite a bit of memory, and since the cheapest memory around is DRAM, most scalers use that to store all of that.

Figure 13 (Source: https://www.youtube.com/watch?v=4-rSki4p828; http://www.lg.com/us/monitors/lg-38UC99-W-ultrawide-monitor)





INPUTS/OUTPUTS

HDMI	Yes (ver2.0, 2ea)
Display Port	Yes(1.2)
USB 3.0	2 ea
USB 3.0 Quick Charge	1

38. LG televisions and monitors generate a first modified image frame by expanding the first image frame. For example, the LG 38UC99-W performs upscaling (as evidenced through its use of Super+ Resolution) which expands the input frame in real-time to a modified image frame matching the screen resolution. Since the image frame and the first modified image frame are different sizes (*e.g.*, achieved through interpolation), the first modified image frame is

different from the first image frame.

Figure 14 (Source: http://www.lg.com/us/monitors/lg-38UC99-W-ultrawide-monitor; http://www.lg.com/hk_en/monitor/lg-E1951T-home)

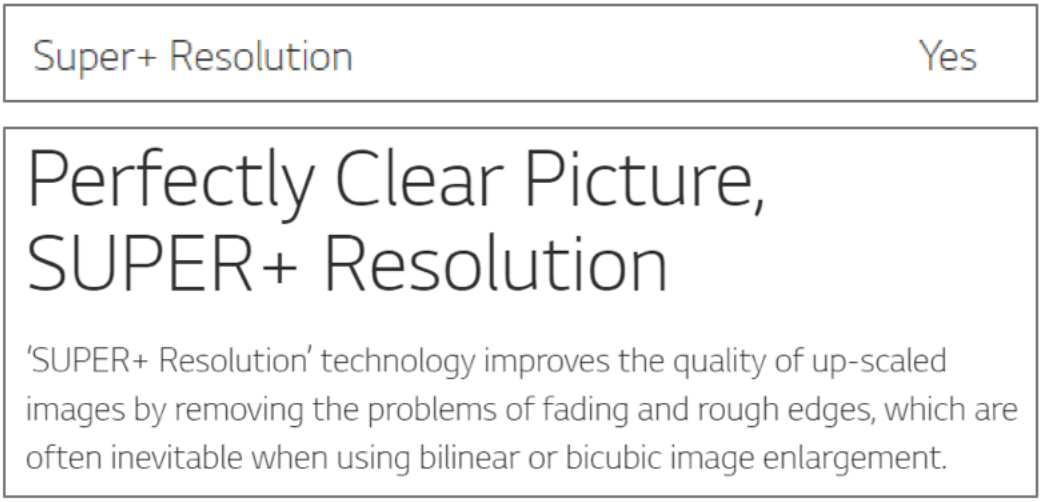
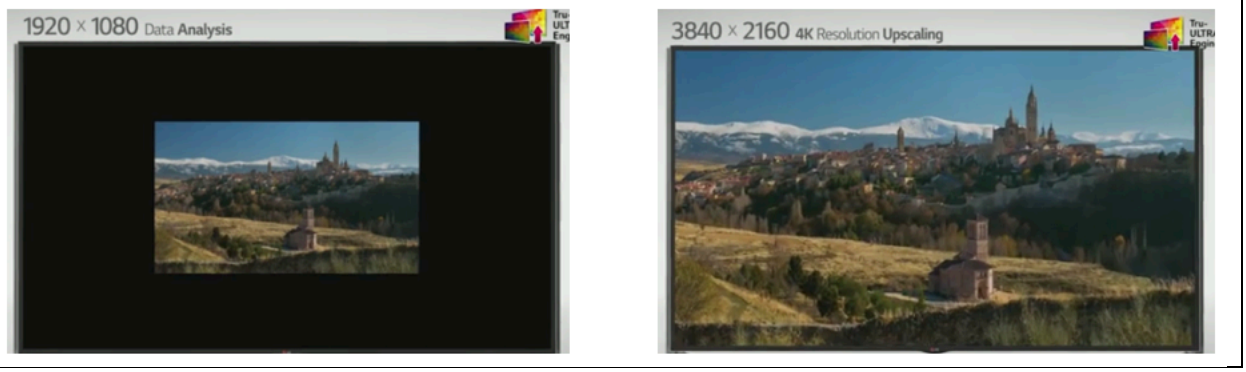


Figure 15 (Source: http://www.lg.com/us/support/video-tutorials/CT10000018-1432737109927-trumotion)



39. LG televisions and monitors generate a second modified image frame by expanding the second image frame. For example, the LG 38UC99-W performs upscaling which expands the input frame in real-time to a modified image frame matching the screen resolution. Since the second image frame and the second modified image frame are different sizes (*e.g.*, achieved through interpolation), the second modified image frame is different from the second image frame, *e.g.*:

Figure 16 (Source: http://www.lg.com/us/monitors/lg-38UC99-W-ultrawide-monitor; http://www.lg.com/hk_en/monitor/lg-E1951T-home)

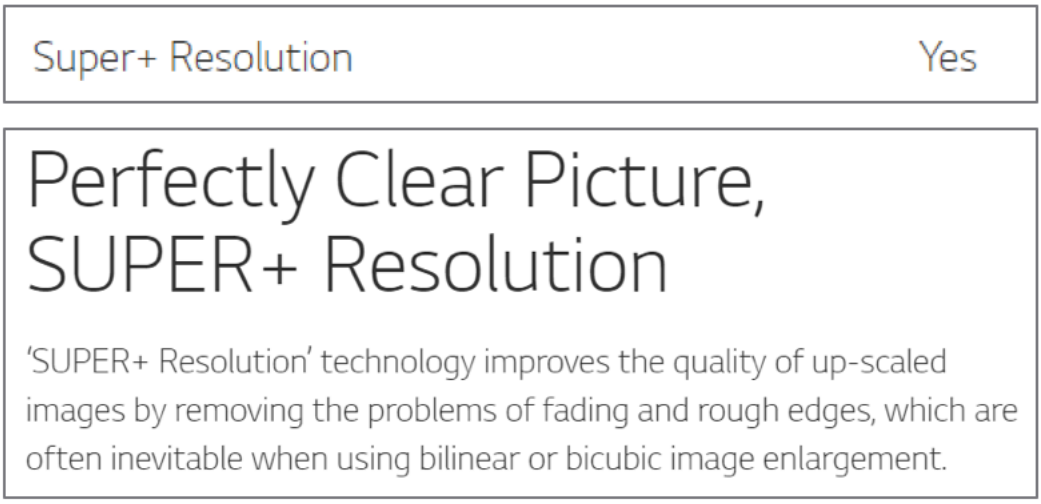
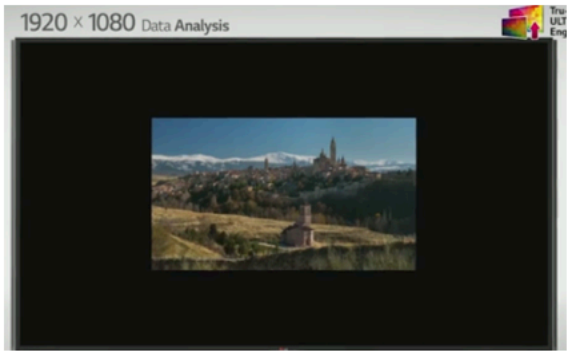


Figure 17 (Source: http://www.lg.com/us/support/video-tutorials/CT10000018-1432737109927-trumotion)



40. LG televisions and monitors generate a solid color bridge frame that is different from the first image frame and the second image frame. For example, the LG 38UC99-W uses black frame insertion ("BFI"). BFI creates a solid black frame that is different from the first frame and different from the second image frame, *e.g.*:

Figure 18 (Source: http://www.lg.com/us/monitors/lg-38UC99-W-ultrawide-monitor; http://www.lg.com/in/monitors/lg-24GM79G)

Figure 19 (Source: http://www.lg.com/in/monitors/lg-24GM79G)

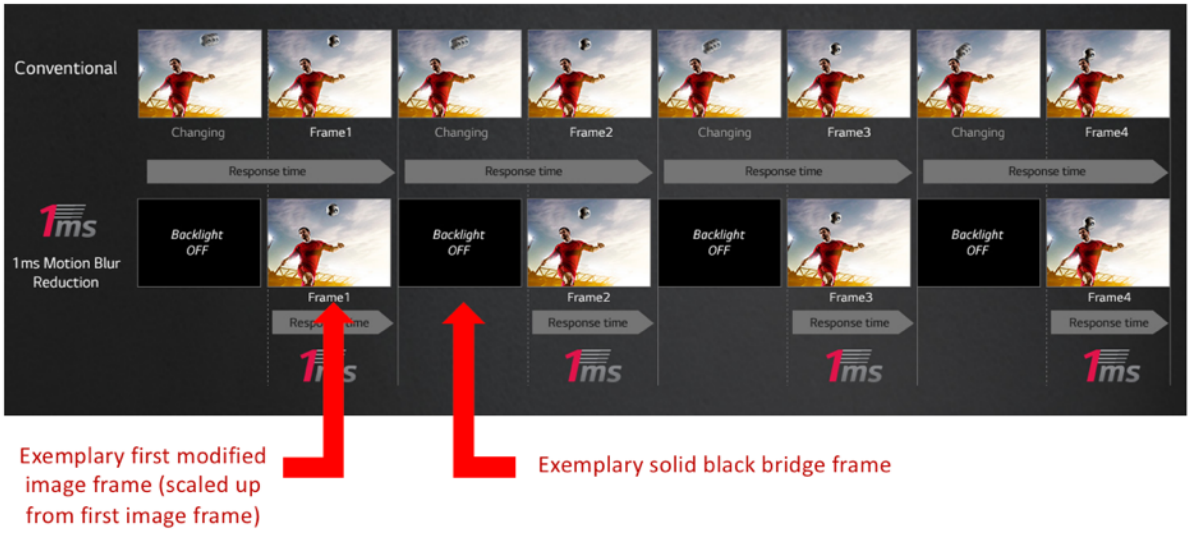
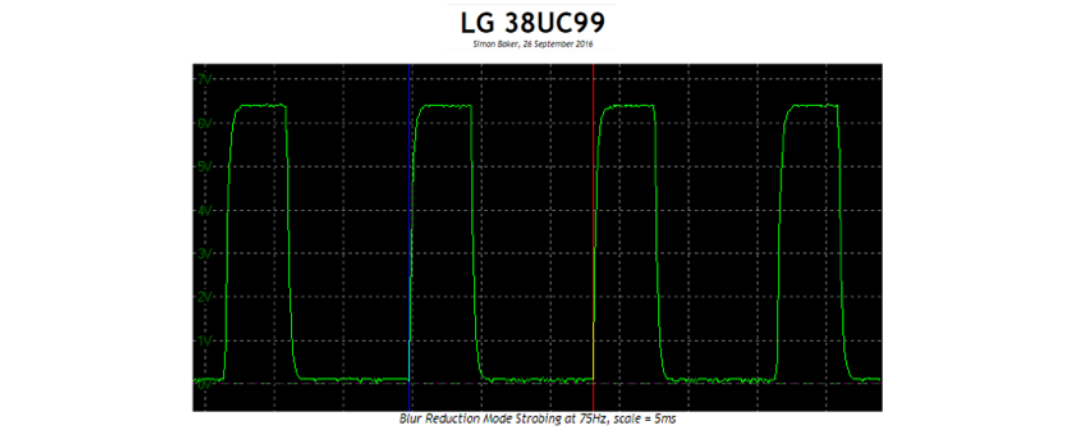


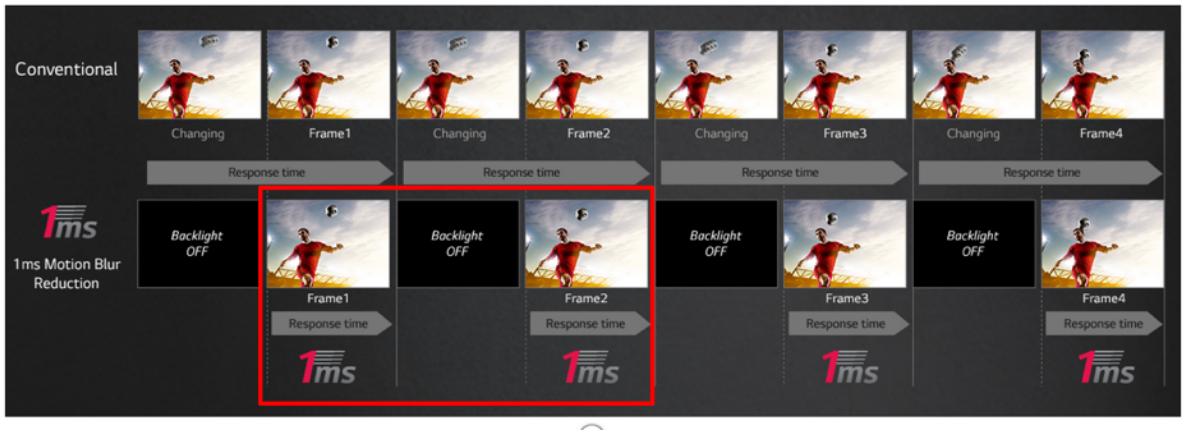
Figure 20 (Source: http://www.tftcentral.co.uk/reviews/lg_38uc99.htm)



41. LG televisions and monitors display the first modified image frame, display the bridge fame, and display the second modified image frame. For example, the LG 38UC99-W processor is adapted to display th[1]e first modified image frame (i.e., first upscaled image), the bridge frame (*i.e.*, black frame), and the second modified image frame (i.e., second upscaled image), *e.g.*:

1

Figure 21 (Source: http://www.lg.com/in/monitors/lg-24GM79G)



42. By making, using, selling, offering for sale, and importing the subject monitors, LG is infringing the claims of the '922 Patent, including but not limited to claim 1. LG has committed these acts of infringement without license or authorization.

43. LG has injured VEI and is liable to VEI for direct and indirect infringement of the claims of the '922 Patent pursuant to 35 U.S.C. § 271(a), (b), and (c).

44. As a result of LG's infringement of the '922 Patent, VEI has suffered harm and seeks monetary damages in an amount adequate to compensate for infringement, but in no event less than a reasonable royalty for the use made of the invention by LG, together with interest and costs as fixed by the Court.

PRAYER FOR RELIEF

Plaintiff respectfully requests the following relief from this Court:

A. That LG has directly and indirectly infringed the '408 and '922 Patents;

B. That LG be ordered to pay damages to VEI, together with costs, expenses, pre-judgment interest and post-judgment interest as allowed by law;

C. A declaration that this case is exceptional under 35 U.S.C. § 285, and an award of VEI's reasonable attorneys' fees;

D. That the Court enter judgment against LG, and in favor of VEI in all respects;

E. For any such other and further relief as the Court deems just and equitable.

JURY TRIAL DEMANDED

Pursuant to Rule 38 of the Federal Rules of Civil Procedure, VEI requests a trial by jury of any issues so triable by right.

Dated: May 4, 2018

Respectfully submitted,

STAMOULIS & WEINBLATT LLC

/s/ Stamatios Stamoulis
Stamatios Stamoulis #4606
stamoulis@swdelaw.com
Richard C. Weinblatt #5080
weinblatt@swdelaw.com
Two Fox Point Centre
6 Denny Road, Suite 307
Wilmington, DE 19809
Telephone: (302) 999-1540

LAW OFFICES OF N.D. GALLI LLC

/s/ Nicole D. Galli
Nicole D. Galli (*pro hac vice forthcoming)*
ndgalli@ndgallilaw.com
Charles P. Goodwin (*pro hac vice forthcoming*)
cgoodwin@ndgallilaw.com
2 Penn Center Plaza, Suite 910
1500 JFK Blvd.
Philadelphia, PA 19102
Telephone: (215) 525-9580

Attorneys for Plaintiff
Visual Effect Innovations, LLC