

Transcript of P. Morgan Pattison, Ph.D.

Date: March 20, 2024
Case: Mianyang BOE Optoelectronics Tech. Co., et al -v- Samsung Display Co. (PTAB)

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WORLDWIDE COURT REPORTING & LITIGATION TECHNOLOGY

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MIANYANG BOE OPTOELECTRONICS TECHNOLOGY CO., LTD.; WUHAN CHINA STAR OPTOELECTRONICS SEMICONDUCTOR DISPLAY TECHNOLOGY CO., LTD; TIANMA MICROELECTRONICS CO., LTD.; and VISIONIX TECHNOLOGY, INC.,	:	Case Nos. IPR2023-00987 IPR2023-00988 IPR2023-01075
Petitioners,	:	U.S. Patent Nos. 9,818,803
v.	:	10,854,683
SAMSUNG DISPLAY CO., LTD. Patent Owner.	:	11,594,578

Videotaped Deposition of P. MORGAN PATTISON, Ph.D.

Conducted Virtually

Wednesday, March 20, 2024, 9:03 a.m. EDT

Job No.: 530060

Pages 1 - 264

Reported by: Debra A. Whitehead

Videotaped Deposition of P. MORGAN PATTISON, Ph.D., conducted virtually.

Pursuant to notice, before Debra Ann Whitehead, E-Notary Public in and for the State of Maryland.

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C O N T E N T S

EXAMINATION OF P. MORGAN PATTISON, Ph.D. PAGE

By Mr. Kudzin 7

EXHIBITS MARKED IN TODAY'S SESSION

(Attached to the Transcript)

PATENT OWNER DEPOSITION EXHIBIT PAGE

Exhibit 2011 U.S. Patent No. 6,747,618 116

Exhibit 2101 U.S. Patent No. 8,227,820 32

Exhibit 2102 Expert Report of P. Morgan Pattison, Ph.D., Regarding Non-Infringement of U.S. Patent Nos. 9,818,803, 10,854,683, and 11,594,578 and Failure to Establish Technical Domestic Industry for Same 217

EXHIBITS MARKED IN PRIOR SESSIONS

(Not Attached)

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P R O C E E D I N G S 09:02:56

VIDEO SPECIALIST: Here begins Media 09:02:56
Number 1 in the videotaped deposition of P. Morgan 09:03:02
Pattison, Ph.D., in the matter of Mianyang BOE 09:03:04
Optoelectronics Technology Co., et al., versus 09:03:11
Samsung Display Co., in the United States Patent 09:03:14
and Trademark Office, Before the Patent Trial and 09:03:21
Appeal Board; Case Numbers IPR2023-00987, 09:03:23
IPR2023-00988, and IPR2023-01075. 09:03:33

Today's date is March 20th, 2024. The 09:03:41
time on the video monitor is 9:03 a.m. eastern 09:03:44
time. The remote videographer today is Kylan 09:03:48
Barry, representing Planet Depos. All parties of 09:03:51
this video deposition are attending remotely. 09:03:53

Would counsel please voice-identify 09:03:58
themselves and state whom they represent. 09:04:00

MR. KUDZIN: My name is Matthew Kudzin, 09:04:00
of Covington & Burling, on behalf of Respondent 09:04:02
Samsung Display. And I'm joined by my colleague 09:04:07
Kee Young Lee. 09:04:11

MR. HERMAN: This is Patrick Herman from 09:04:12
Orrick, Herrington & Sutcliffe, here on behalf of 09:04:14

petitioners in three proceedings. 09:04:17

VIDEO SPECIALIST: The court reporter 09:04:20

today is Debbie Whitehead, representing Planet 09:04:20

Depos. 09:04:20

The witness will now be sworn. 09:04:38

P. MORGAN PATTISON, Ph.D., 09:04:38

having been duly sworn, testified as follows: 09:04:39

EXAMINATION BY COUNSEL FOR PATENT OWNER 09:04:39

BY MR. KUDZIN: 09:04:39

Q Good morning, Dr. Pattison. 09:04:40

A Good morning. 09:04:43

Q Have you ever been deposed before? 09:04:44

A Yes. 09:04:50

Q Approximately how many times? 09:04:50

A Eight or nine. 09:04:55

Q So you're familiar with the process, but 09:04:57

let me just go over a few of the basics just so 09:04:59

that we're all on the same page. 09:05:01

My name is Matthew Kudzin. I'm an 09:05:03

attorney at Covington & Burling, and I represent 09:05:06

Samsung in these cases. I'll be asking you a 09:05:11

number of questions about the declarations you've 09:05:13

submitted in these cases. If you don't understand a question please let me know, and I'll do everything I can to try and clarify it. But if you answer a question, I'll assume that you understood it. 09:05:14 09:05:17 09:05:20 09:05:22 09:05:24

Is that fair? 09:05:24

A Yes. 09:05:30

Q Where are you taking this deposition from today? 09:05:30 09:05:35

A Ringgold, Georgia. 09:05:39

Q Is there anyone else there with you? 09:05:41

A No. 09:05:44

Q Obviously you're connected to this through -- to this deposition through Zoom. But besides that, do you have any other communication programs running, any chat applications, anything like that? 09:05:44 09:05:49 09:05:54 09:05:57 09:05:59

A I do not. 09:06:03

Q Do you have any materials related to this case on the computer that you're sitting in front of? 09:06:04 09:06:06 09:06:09

A No. Sorry, they're not open. 09:06:10

Q Okay. 09:06:14
A They exist in files, yeah. 09:06:17
Q All right. I would just ask that, you 09:06:18
know, if you do want to look at something, you 09:06:20
just tell me what it is you're opening up and 09:06:22
looking at. 09:06:24
Is that fair? 09:06:25
A Sure. 09:06:26
Q I generally like to take breaks about 09:06:26
every hour or so. But if for any reason you want 09:06:31
to take a break at any time just let me know, and 09:06:34
I'll be happy to do so. I would just ask that if 09:06:36
there is a question pending, you answer the 09:06:40
question before we take a break. Okay? 09:06:42
A Okay. 09:06:44
Q Is there any reason why you can't testify 09:06:44
truthfully today? 09:06:50
A No. 09:06:52
Q What did you do to prepare for today's 09:06:52
deposition? 09:06:56
A I reviewed my declarations. 09:06:59
Q Did you speak to anyone about today's 09:07:03

deposition? 09:07:05

A I spoke with counsel. 09:07:08

Q Without getting into the details of anything you talked about with counsel, approximately how many times did you talk with counsel to prepare for today's deposition? 09:07:12 09:07:15 09:07:17 09:07:19

A Twice. 09:07:23

Q And when were those conversations? 09:07:23

A I believe it was Monday and last Thursday or Friday. 09:07:31 09:07:37

Q Approximately how long were those sessions? 09:07:38 09:07:40

A I don't know. Maybe an hour or so. 09:07:43

Q Was anyone other than counsel involved in those conversations? 09:07:49 09:07:53

A No. 09:07:56

Q Did you speak to anyone at BOE in preparation for your deposition today? 09:07:56 09:08:03

A No. 09:08:04

MR. KUDZIN: Let me -- if the tech, if you could please put Tab 001 into the chat and also put it up on the screen. 09:08:14 09:08:15 09:08:21

(Petitioners' Exhibit 1003, IPR2023-00987, previously marked, not attached.) 09:08:46

Q During the deposition at some point I may direct you to particular documents, particular parts of documents. But you should have the ability to scroll through the documents and look at whatever portions of the documents you want, and so you should certainly feel free to do so. 09:08:46 09:08:49 09:08:52 09:08:54 09:08:57 09:09:00

MR. KUDZIN: If we could just zoom out from this document a little bit so we can see maybe the full first page. This is a document that has previously been marked as Petitioner's Exhibit 1003 in IPR2023-00987. 09:09:07 09:09:08 09:09:13 09:09:19 09:09:23

Q Do you recognize this document? 09:09:29

A Yes. 09:09:35

Q And this is the declaration related to -- that you offered in the IPR related to the '803 patent. 09:09:35 09:09:38 09:09:42

Is that correct? 09:09:43

A I believe so. 09:09:44

Q If we could turn to the end of the declaration, it's printed Page Number 122. 09:09:50 09:09:53

According to the document, you signed this on June 21st, 2023. 09:10:05 09:10:06

Is that correct? 09:10:09

A Yes. 09:10:13

Q And just for the record, today's date is March 20th, 2024. Correct? 09:10:14 09:10:17

A Yes. 09:10:21

Q In the nearly nine months since you submitted this declaration, have any of your opinions with respect to the '803 patent changed? 09:10:21 09:10:28 09:10:34

A No. 09:10:38

Q Are you aware of any errors or mistakes in your declaration? 09:10:38 09:10:43

A No. 09:10:44

Q Is there anything in the declaration that you would want to correct or change? 09:10:45 09:10:47

A No. 09:10:54

Q If we could turn to Page 9. Paragraph 20 lists the materials that you considered in forming your opinions in this case. 09:10:54 09:11:12 09:11:16

Is that correct? 09:11:17

A Yes. 09:11:20

Q Are there any other materials that you considered in forming your opinions other than those that are listed in Paragraph 20 and the following table? 09:11:20 09:11:25 09:11:27 09:11:31

A No. 09:11:32

Q You cite a number of prior art references here, including Exhibit 1004, '5, and '6. And it's your opinion that the claims of the '803 patent are invalid in light of those references. 09:11:33 09:11:44 09:11:54 09:11:58

Is that right? 09:12:00

A That's correct. 09:12:04

Q How did you go about locating those references? 09:12:04 09:12:09

MR. HERMAN: Objection. Form. 09:12:11

A Searching on Google Patents and also working with counsel. 09:12:16 09:12:21

Q Were you the one that identified the references, or did counsel do that? 09:12:23 09:12:25

MR. HERMAN: Objection. Form. 09:12:28

A I don't recall. I think we were reviewing each different resources, and these were the ones that came out to be best. 09:12:31 09:12:34 09:12:39

Q Other than Google patents that you mentioned a minute ago, did you do any other searching for prior art? 09:12:41 09:13:03 09:13:05

MR. HERMAN: Objection. Form. Also outside the scope of his testimony. 09:13:07 09:13:08

A Yes. 09:13:15

Q What else did you do to search for prior art? 09:13:16 09:13:22

MR. HERMAN: Same objections. 09:13:22

A Checked textbooks and checked Google. 09:13:27

Q Which textbooks did you check? 09:13:31

MR. HERMAN: Same objections. 09:13:35

A I don't remember. 09:13:36

Q Did you read any patents other than those listed in Paragraph 20 and the following table? 09:13:36 09:13:44

MR. HERMAN: Objection. Outside the scope of his testimony. 09:13:49 09:13:50

A Yes. 09:13:55

Q Do you recall which ones you -- what other patents you read? 09:13:55 09:13:59

MR. HERMAN: Same objection. 09:14:01

A No. 09:14:03

Q Did you keep records of which other patents you may have read in searching for -- in this case? 09:14:03 09:14:09 09:14:13

MR. HERMAN: Objection. Outside the scope of direct. 09:14:13 09:14:14

A No, I don't think I did. Like I said, once -- well, no. 09:14:23 09:14:28

Q Did you read any other articles besides those listed in Paragraph 20? 09:14:29 09:14:37

MR. HERMAN: Objection. Outside the scope of direct. 09:14:40 09:14:41

A Articles? Can you clarify? 09:14:49

Q Any other scientific articles or technical articles? 09:14:50 09:14:53

A Yes. 09:15:00

Q Do you recall which articles you read? 09:15:00

A No, I don't recall. 09:15:06

MR. HERMAN: Objection. Outside the scope of direct. 09:15:08 09:15:10

A I don't recall. 09:15:11

Q How did you -- of the different patents and articles that you read, how did you decide 09:15:11 09:15:14

which ones to include in the table following Paragraph 20 in your declaration? 09:15:17 09:15:24

A The ones that are listed here are the ones that directly informed my opinions. 09:15:28 09:15:31

Q What do you mean when you say they "directly informed your opinions"? 09:15:39 09:15:40

A Well, just they have the -- the -- I guess the -- they show the prior art most clearly, or clearly that informed my opinion. 09:15:44 09:15:49 09:15:52

MR. KUDZIN: If we could -- if the technician could please put Tab 002 into the chat and put it up on the screen as well. 09:16:14 09:16:16 09:16:19

(Petitioners' Exhibit 1003, IPR2023-00988, previously marked, not attached.) 09:16:22 09:16:38

MR. KUDZIN: And if we could zoom out just a little bit just so we can see the title. 09:16:38 09:16:39

Thank you. 09:16:42

Q You're being shown what's previously been marked as Petitioners' Exhibit 1003 in IPR2023-00988. 09:16:43 09:16:45 09:16:51

Do you recognize this document? 09:16:52

A Yes. 09:16:57

Q And is this the declaration that you submitted regarding your opinions related to the '683 patent? 09:16:57 09:17:03 09:17:05

A Yes. 09:17:08

Q And, actually, let me just do a little bit of housekeeping here. 09:17:09 09:17:12

On the front page of the patent, of this document, it refers to U.S. Patent Number 10,854,683. 09:17:14 09:17:17 09:17:22

Is that correct? 09:17:22

A Yes. 09:17:23

Q And if I refer to that as the '683 patent, you'll understand what I'm talking about? 09:17:23 09:17:25

A Yes. 09:17:30

Q And the previous document we were looking at referred to U.S. Patent Number 9,818,803. 09:17:30 09:17:32

Is that correct? 09:17:37

A I believe so. 09:17:40

Yeah. Yes, sir. 09:17:50

Q And if I refer to that as the '803 patent, you'll understand what I'm referring to? 09:17:51 09:17:53

A Yes. 09:17:55

Q Do you have copies of your declarations in front of you? 09:17:55 09:17:59

A I do. 09:18:03

Q Do you have any other paper documents in front of you related to this case? 09:18:04 09:18:06

A No. 09:18:07

Q If we can turn to -- well, no. Let me first ask, with respect to the document on the screen and your declaration in the '683 IPR, have any of your opinions changed since you submitted your declaration? 09:18:07 09:18:17 09:18:23 09:18:30 09:18:32

A No, they have not. 09:18:40

Q Are there any mistakes or errors that you're aware of in your declaration? 09:18:40 09:18:42

A No. 09:18:44

Q Is there anything in your declaration that you would like to change or correct? 09:18:44 09:18:47

A No. 09:18:49

Q If we could turn to Page 9 of your '683 declaration, please. 09:18:49 09:18:58

MR. KUDZIN: And if the tech could also bring up Page 9, please. 09:19:17 09:19:18

Q Is this the list of materials, in Paragraph 20 and the following table, that you relied on in -- or that you considered in forming your opinions with respect to the '683 patent? 09:19:22 09:19:25 09:19:28 09:19:31

A Yes. 09:19:36

MR. KUDZIN: And if we can scroll down to the next page, so that we can see the bottom of the table. Thanks. 09:19:38 09:19:41 09:19:45

Q Exhibit 1014 is U.S. Patent Number 8,354,789 B2 to Kim. 09:19:50 09:19:57

Do you see that? 09:20:00

A I do. 09:20:01

Q You can check if you want, but I'll represent to you that that document is not listed in the materials considered for the '803 patent. 09:20:02 09:20:06 09:20:09

A Okay, I see that. 09:20:30

Q Why -- is it something you considered for the '683 patent but not the '803 patent? 09:20:31 09:20:37

A That's -- that's what it would appear to be, given that it's listed in one and not the other. 09:20:43 09:20:45 09:20:47

Q The '803, the '683, and the '578 patents, 09:20:48

they're all related patents. Correct? 09:20:56

A Correct, as they have the same 09:21:02

specification. 09:21:04

Q Why did you consider the Kim reference 09:21:09

relevant to the '683 patent, but not to the '803 09:21:14

patent? 09:21:16

A Well, they do have different claims, but 09:21:18

I don't recall. 09:21:20

Q Did you consider Kim in forming your 09:21:20

opinions with respect to the '803 patent? 09:21:26

A If it's not listed as the materials I 09:21:29

considered, it's not something I relied on, no. 09:21:33

Q And if we turn to, or we look at Exhibit 09:21:35

1006, which is U.S. Publication 2011/0291549 A1, 09:21:48

that's also not among the materials that you 09:21:58

considered for the '803 patent. 09:22:00

Is that correct? 09:22:02

A Yeah, that's correct. 09:22:10

Q Do you recall how either Exhibit 1014 or 09:22:11

1016 influenced your opinions with respect to the 09:22:27

'683 patent? 09:22:29

MR. HERMAN: Objection. Form. 09:22:30

A I don't recall. I guess we could look through the reference, or the declaration, and see -- see where I reference it. 09:22:34 09:22:37 09:22:39

Q If we can turn to Page 20 of your '683 declaration, Paragraph 71. 09:22:50 09:22:58

And Paragraph 71 says, "Patent owner argued that in both Credelle and Kim, the green pixel was larger, not smaller, than the other pixels." 09:23:21 09:23:23 09:23:26 09:23:31

Do you see that? 09:23:31

A Yes. 09:23:32

Q And in Paragraph 72 you say, "With respect to Kim '549 patent owner argued that the first pixels/third subpixels" ... "are offset such that the lines do not pass through the pixel centers." 09:23:32 09:23:36 09:23:42 09:23:48 09:23:50

Do you see that? 09:23:50

A Yes. 09:23:52

Q Do you know if there's any other references or any other mention of the Kim references in your declaration? 09:23:52 09:23:54 09:23:56

A I don't recall. 09:24:02

Q So Paragraph 71 you say, "Patent owner argued that in both Credelle and Kim, the green pixel was larger, not smaller, than the other pixels." 09:24:02 09:24:13 09:24:16 09:24:20

You haven't disagreed with that statement, have you? 09:24:21 09:24:23

MR. HERMAN: Objection. Form. 09:24:24

A I don't disagree with the fact that they argued that the green pixel was larger. 09:24:25 09:24:28

Q Do you disagree that in Kim the green pixel was larger than the other pixels? 09:24:30 09:24:34

A I'd have to go back and review, but -- review that. But that's -- that's what I said here. 09:24:37 09:24:41 09:24:44

Q If we can turn back to the very beginning of your declaration. I guess we can work with the declaration in the '683 since that's up on the screen. 09:25:14 09:25:16 09:25:25 09:25:27

MR. KUDZIN: And if we could go to Page 5, please, Paragraph 1. 09:25:28 09:25:30

Q Paragraph 1 you say that you've been retained by Mianyang BOE Optoelectronics 09:25:37 09:25:40

Technology Company, Limited. 09:25:45

Is that correct? 09:25:45

A Yes. 09:25:46

Q And if I refer to them as BOE, you'll understand who I'm referring to? 09:25:46 09:25:48

A I will. 09:25:51

Q Are you aware that the IPR petitions were actually filed by four separate companies? 09:25:51 09:25:58

A No. 09:26:04

Q If we go to the cover page of your declaration. And you see it lists the petitioner near the top of the screen, near the top of the page. 09:26:05 09:26:08 09:26:22 09:26:24

Is that correct? 09:26:25

A Yes. 09:26:26

Q And it lists Mianyang BOE Optoelectronics Technology Company, Limited, as the first one. 09:26:26 09:26:33

Correct? 09:26:34

A Yes. 09:26:35

Q And then it lists Wuhan China Star Optoelectronics Semiconductor Display Technology Company, Limited. 09:26:35 09:26:41 09:26:41

Do you see that? 09:26:43
A I do. 09:26:44
Q And then after that it lists Tianma 09:26:45
Microelectronics Company Limited. 09:26:49
Do you see that? 09:26:51
A I do. 09:26:51
Q And after that it lists Visionox 09:26:52
Technology, Incorporated. 09:26:56
Do you see that? 09:26:56
A I do. 09:26:57
Q Have you been retained by China Star 09:26:58
Optoelectronics Semiconductor Display Technology 09:27:05
Company, Limited? 09:27:05
MR. HERMAN: Objection. 09:27:06
A I have not been -- 09:27:10
Q I'm sorry, there was a little bit of a 09:27:12
talk-over there. Could you repeat your answer, 09:27:13
please? 09:27:16
A I have not been retained by that company. 09:27:16
Q Have you been retained by Tianma 09:27:20
Microelectronics Company Limited? 09:27:23
MR. HERMAN: Objection. Form. 09:27:25

A I have not. I have not been retained by that company. 09:27:32 09:27:36

Q Have you been retained by Visionox Technology, Incorporated? 09:27:37 09:27:45

MR. HERMAN: Objection. Form. 09:27:45

A I have not. 09:27:46

I will say I am working through a service, a finder service, so I'm not sure what their agreement is with the ultimate client, or there might be other clients. But I do know that I've been working with BOE. 09:27:48 09:27:53 09:27:57 09:28:02 09:28:05

Q In forming your opinions that you express in these IPRs, have you spoken to anyone from Wuhan China Star Optoelectronics Semiconductor Display Technology Company, Limited? 09:28:12 09:28:14 09:28:17 09:28:21

A Not that I recall. 09:28:29

Q In forming your opinions in these IPRs, have you spoken to anyone from Tianma Microelectronics Company, Limited? 09:28:29 09:28:32 09:28:38

A Not that I recall. 09:28:39

Q And in forming your opinions in these IPRs, have you spoken to anyone from Visionox 09:28:43 09:28:45

Technology, Incorporated? 09:28:49

A Not that I recall. 09:28:49

Q In forming your opinions in these IPRs, have you spoken to anyone from BOE? 09:28:52 09:29:00

A Yes. No, actually, no. Sorry. I have not, not for this opinion. 09:29:02 09:29:05

Q Have you spoken to anyone from BOE outside of these IPR proceedings? 09:29:08 09:29:13

MR. HERMAN: Objection. Outside the scope of direct. 09:29:18 09:29:19

A Yeah, there was another proceeding I was involved with. 09:29:25 09:29:27

Q In forming the opinions in these IPRs, have you relied on any of the information provided to you through your discussions with people at BOE? 09:29:30 09:29:34 09:29:36 09:29:40

MR. HERMAN: Objection. Form. 09:29:40

A No. 09:29:46

Q Let me just ask you a little bit about your background. And if we can turn to Page 122 of the declaration that's up on the screen. I believe that's Attachment A, which is your CV. 09:29:46 09:30:08 09:30:12 09:30:15

MR. KUDZIN: And if the technician could please take us there as well, just so that we're all on the same page. 09:30:37 09:30:38 09:30:41

(Discussion off the record with the A/V technician.) 09:30:51 09:30:54

Q The -- going in chronological order, the first experience that you have listed is, is it Cymer Laser? 09:31:02 09:31:11 09:31:18

A Cymer. 09:31:20

Q Cymer? 09:31:21

Can you describe the work that you did at Cymer Laser? 09:31:26 09:31:27

A Sure. I was a laser test engineer, which was troubleshooting, right, these excimer lasers, deep UV emitting lasers that are used for photolithography of semiconductor devices. 09:31:28 09:31:34 09:31:40 09:31:42

So I was responsible for troubleshooting new builds of these lasers and developing test methodology to ensure that the lasers were meeting their performance specifications. 09:31:49 09:31:51 09:31:55 09:32:00

Q Did any of your work at Cymer Laser relate to OLEDs? 09:32:01 09:32:08

A It related to patterning technologies of semiconductors, so they could be used for any -- any kind of semiconductor patterning or lithography. I don't think OLEDs were quite there at the time, but they could be used with that technology. 09:32:11 09:32:15 09:32:17 09:32:21 09:32:26 09:32:28

Q But you, personally, weren't doing any work on OLEDs at Cymer Laser. 09:32:28 09:32:32

Is that correct? 09:32:37

A Yeah, I was working on the lasers, like I said. 09:32:39 09:32:41

Q Did you do any work related to displays at Cymer Laser? 09:32:41 09:32:46

A No. It's like I said, I was working on the lasers that were used for photolithography and photolithography processes for any electronic type of component. 09:32:52 09:32:54 09:32:58 09:33:02

Q But there was nothing specific to displays? 09:33:06 09:33:07

A I mean, just the use of the tool, they potentially make displays. 09:33:14 09:33:18

Q At your time at Cymer Laser, did you 09:33:19

actually make any displays? 09:33:21
A No, I did not make displays. 09:33:27
Q In your work at Cymer Laser, did you 09:33:28
design any displays? 09:33:34
A No. 09:33:36
Q The next experience you have listed is 09:33:41
the University of California, Santa Barbara. 09:33:42
Can you describe what you did at 09:33:46
University of California? 09:33:49
A Yeah. I was working towards my master's 09:33:53
degree in electronic and photonic materials and 09:33:59
devices, and then subsequently my Ph.D. in 09:34:02
electronic and photonic materials and devices. I 09:34:06
developed advanced LED technologies and -- yeah, 09:34:12
that's -- that's basically the short version. But 09:34:19
it included design, characterization, fabrication, 09:34:23
actually making the LED structures, all of that. 09:34:29
Q As part of your master's degree, did you 09:34:33
write a master's thesis? 09:34:39
A I did. 09:34:42
Q What was your master's thesis on? 09:34:42
A Resonant cavity LEDs. 09:34:46

Q And what was your doctoral thesis on? 09:34:49

A Actually, check that. I did not write a 09:34:52

thesis. It was -- it was actually an oral 09:34:55

examination for my master's. 09:34:58

Q Okay. 09:35:00

A I think. That's a long time ago. 09:35:02

But it was -- it covered resonant cavity 09:35:07

LEDs. 09:35:10

Q Okay. 09:35:11

A And then my Ph.D. thesis was on micro 09:35:12

cavity LEDs. 09:35:14

Q Did any of your work at the University of 09:35:16

California relate to OLEDs? 09:35:23

A My work related or could be used for 09:35:31

displays as the source technology in displays. 09:35:33

There was some LED architectures that I pursued, 09:35:36

including the micro cavity and resonant cavity LED 09:35:40

that could be used as the light-emitting portion 09:35:43

of a display. 09:35:46

I was familiar with OLEDs, I took classes 09:35:47

on OLEDs. I participated in OLED research, 09:35:49

including working briefly on thin-film organic 09:35:52

transistors. So my work was more generally on optoelectronic materials and devices which, of course, included the study of OLEDs and their applications. 09:36:00 09:36:07 09:36:10 09:36:12

And my work at UCSB was within the -- what was called the solid state lighting and display center, the SSLDC. So displays were a big part of what I worked on and what the whole community was working on at UCSB. 09:36:14 09:36:19 09:36:21 09:36:25 09:36:28

Q In your work at UCSB -- sorry, University of California, did you design any OLED displays? 09:36:32 09:36:38

A I did not design OLED displays, but I did consider and develop pixel layouts. 09:36:46 09:36:49

Q Pixel layouts for displays? 09:36:55

A Yes, pixel layouts for displays. 09:36:57

Q For OLED displays? 09:36:59

A No. They were for inorganic devices. 09:37:02

Q Did you write any papers describing those pixel layouts? 09:37:04 09:37:16

A I have a patent on one of the technologies that was -- that was considered where we were trying to get different colors of light 09:37:18 09:37:20 09:37:25

coming out of an inorganic semiconductor growth device, and how we could change the geometry of the structure to get different colors coming out which could be used for displays. So one of my patents covers that. 09:37:28 09:37:33 09:37:39 09:37:42 09:37:45

Q If we can turn to Page 126 of your declaration. 09:37:46 09:37:53

Here you have a list of your patents. 09:37:57

Is that correct? 09:37:58

A Yes. 09:38:00

Q Which patent were you just referring to? 09:38:01

A I believe it was the 8227820 and 8643036, but I could be -- I could be wrong. And it could be too that the patent was only an application and it never -- never got past that phase. 09:38:06 09:38:17 09:38:20 09:38:22

MR. KUDZIN: Would the technician please mark what I have uploaded as Tab 103 as Exhibit 2101. And both put it in the chat and put it on the screen, please. 09:38:44 09:38:45 09:38:49 09:38:56

(Discussion off the record with the A/V technician.) 09:39:03 09:39:06

(Patent Owner Exhibit 2101 marked for 09:39:06

identification and is attached to the transcript.) 09:39:16

Q You're being shown what I've had marked 09:39:16

as Exhibit 2101. This is a copy of U.S. Patent 09:39:19

Number 8,227,820. 09:39:24

Is this the patent that you were just 09:39:27

talking about? 09:39:28

A Let me see. I can't navigate. Okay. 09:39:29

Yeah, I believe this is it. 09:39:41

Q And does this patent show the pixel 09:39:42

layout that you designed while at the University 09:39:46

of California? 09:39:50

A It shows the underlying technology, so 09:39:50

the idea was that you can texture surface to get 09:39:53

different colors of light coming out in different 09:40:00

regions within the semiconductor growth. So this 09:40:02

is -- yeah, this shows how you could texture a 09:40:06

surface. 09:40:10

It was aspirational, to achieve control 09:40:11

of light emission and how the layout -- have an 09:40:14

engineered layout of the light emission of 09:40:18

different colors. 09:40:19

Q Do you know if there is any description 09:40:21

in this patent of the pixel layout that you designed? 09:40:30 09:40:32

A I mean, it shows -- I don't -- I don't remember. I'd have to go through the figures. But the layout -- it was more about being able to control the emission colors based on the side wall emissions of the textures and get different -- different levels of control. 09:40:39 09:40:41 09:40:46 09:40:50 09:40:55 09:40:58

So, like, with the patent, this is the underlying technology that then could be used to lay out, lay out pixels. 09:41:01 09:41:02 09:41:05

Q Do you recall if the -- so was the pixel layout you designed for a full color display? 09:41:06 09:41:15

MR. HERMAN: Objection. Form. 09:41:18

A That was what we were trying to achieve. 09:41:19

Q Do you recall if the pixel layout was what would be called an RGB stripe layout? 09:41:23 09:41:30

MR. HERMAN: Objection. Form. Also outside the scope of direct. 09:41:35 09:41:36

A I don't recall. 09:41:39

Q Do you recall if you used what in your declarations you've referred to as a quad pixel 09:41:42 09:41:44

structure? 09:41:47

MR. HERMAN: Same objections. 09:41:48

A No. This would be an underlying 09:41:54

technology that could enable the creation of a 09:41:55

quad pixel structure with the gallium nitride 09:41:58

inorganic LED device. 09:42:02

So with different emitters you have 09:42:05

different considerations and different technical 09:42:07

limitations. And so what we were trying to do was 09:42:10

get past one of the technical limitations with 09:42:13

this type of device, which was actually getting 09:42:16

different colors of emitters and being able to 09:42:19

control the location of those different colors of 09:42:23

emitters. 09:42:26

Q What was the problem with -- that you 09:42:26

were trying to overcome in terms of getting 09:42:34

different color emitters? 09:42:36

MR. HERMAN: Objection. Form. Also 09:42:38

outside the scope of direct. 09:42:39

A I could go -- I could go on and on about 09:42:43

that. But with gallium nitride LEDs, it's very 09:42:45

difficult to get red emission. 09:42:51

Q Okay. If we could -- let's see. Going back to your work experience. The next job you have listed here is at the U.S. Department of Energy. 09:42:56 09:43:22 09:43:25 09:43:29

Is that correct? 09:43:29

A That's correct. 09:43:33

Q Can you describe the work that you did at U.S. Department of Energy? 09:43:33 09:43:36

A Yeah. So I was a project manager managing R&D and lighting technologies that could potentially save energy. And this included any possible technology related to energy-saving lighting, including LEDs and OLED technology. 09:43:41 09:43:46 09:43:49 09:43:52 09:43:56

Q Were you -- was that work related to displays, or to lighting? 09:44:04 09:44:07

A Both. 09:44:12

Q What work did you do at Department of Energy related to displays? 09:44:12 09:44:17

A Well, DOE would fund R&D. And some of the funded R&D was at -- on OLED technology, including OLED materials and OLED device structures and also other kind of intermediate 09:44:23 09:44:27 09:44:31 09:44:34

technologies like OLED-driven quantum dots. And with all those technologies there was a display element and a lighting element. And then there was a lot of cross-over. 09:44:39 09:44:43 09:44:46 09:44:55

So a lot of the research in OLEDs which relates to displays was to improve blue emitters, blue OLED emitter materials, because of their low efficiency and low lifetimes, which is important for both lighting and displays. And so some of the work was on the materials themselves, and some of the work was on different ways that the device structures could be made to try to mitigate that shortcoming with the blue OLED materials. 09:44:57 09:45:01 09:45:05 09:45:10 09:45:13 09:45:18 09:45:21 09:45:25 09:45:29

And so that would lead to discussions about OLED device structures as well -- you know, that could -- that were used for lighting, but also for displays. 09:45:33 09:45:36 09:45:40 09:45:42

Q You were describing -- correct me if I'm wrong, but as I understood it, you were describing research that was funded by the Department of Energy. 09:45:48 09:45:50 09:45:53 09:45:57

Is that correct? 09:45:57

A Yes, that's correct. 09:45:58

Q Were you actually the one doing that research? 09:45:59 09:46:02

A I was the one managing the DOE investment in that research, so I would be getting monthly reports and quarterly reports on the development. I would provide guidance on the direction of the research. I was not the person in the lab doing the research. 09:46:05 09:46:07 09:46:10 09:46:13 09:46:16 09:46:20

Q So in your work at the Department of Energy, you, yourself, were not doing research on OLEDs. Correct? 09:46:22 09:46:35 09:46:38

A I was a -- well, I would -- I would not say it exactly like that. So I was a project manager. I would develop road maps, so I would do kind of literature review research; but I wasn't the person in the lab making the devices. I would be the one who would review the making of the devices and review the results of the made devices and review the thinking of why the devices were made and what could be the next step. 09:46:42 09:46:44 09:46:47 09:46:52 09:46:56 09:47:03 09:47:05 09:47:09 09:47:13

I was looking after the interest of the 09:47:17

Department of Energy investment in these technologies. 09:47:18 09:47:21

Q In your work at the Department of Energy, you, personally, did not design any displays. 09:47:24 09:47:26

Correct? 09:47:29

A I did not. 09:47:31

Q Did you review the design of any displays? 09:47:32 09:47:36

A Yes. 09:47:37

Q Were any of them OLED displays? 09:47:37

A Yes. 09:47:44

Q Do you recall the pixel layouts of any of the OLED displays that you reviewed? 09:47:44 09:47:50

A I don't recall. It covers a long period of time. But I -- yeah, no, I don't recall the specific pixel layout. I don't think that that -- it did come up a little bit in one of the technologies, which was a blue OLED driving a quantum dot converter display approach, but I don't recall the exact layout. 09:47:55 09:47:59 09:48:06 09:48:09 09:48:12 09:48:15 09:48:20

Q The next job that you have listed is at Solid State Lighting Services, Incorporated. 09:48:21 09:48:32

Is that correct? 09:48:36

A Yes, that's correct. 09:48:37

Q Can you describe the work that you do at Solid State Liability Services? 09:48:38 09:48:44

A Yeah. So first of all, I continued to advise the Department of Energy on lighting technologies and do -- and do pretty much a very similar job I did before, but as a consultant. Which includes managing R&D, LED and OLED technologies for lighting and displays, and also writing road maps and technology evaluations or -- yeah, guidance documents. 09:48:47 09:48:48 09:48:51 09:49:00 09:49:03 09:49:07 09:49:11 09:49:19

So one previous -- I don't know exactly when -- document was a review of display technologies and their prospects for becoming more efficient. But then in addition to my DOE work, I have other clients that I help with product selection, product development, technology evaluation, due diligence, things like that, mostly around optoelectronic devices, including displays and lighting and lasers and things like that. 09:49:22 09:49:27 09:49:29 09:49:32 09:49:36 09:49:38 09:49:42 09:49:46 09:49:50 09:49:53

Q In your work at SSL, do you design any displays? 09:49:55 09:49:59

A I have on behalf of a client. 09:50:04

Q Which client was that? 09:50:05

A It is a company called Glow. 09:50:08

Q Was that an OLED display? 09:50:10

A No; it was an LED display. 09:50:18

Q Did you design the pixel layout for that display? 09:50:24 09:50:33

A I provided input for the pixel layout on that display. 09:50:34 09:50:40

Q Do you recall what the pixel layout was on that display? 09:50:41 09:50:43

A I do. I don't know exactly how to describe it. Didn't have an easy name like -- like these OLED pixel layouts. But, of course, considerations were much different. This is a very new technology, basically a nano rod micro LED technology in the earlier days of the micro LED space. So it was -- it was pretty early days. 09:50:44 09:50:47 09:50:53 09:50:57 09:50:59 09:51:05 09:51:08

But there were different considerations and trade-offs that needed to be managed with this 09:51:17 09:51:19

technology, and so I helped -- I helped with that. 09:51:21

Q Do the different tradeoffs that needed to be managed affect the pixel layout? 09:51:24 09:51:34

MR. HERMAN: Objection. Form. 09:51:37

A Yeah, I mean, that's -- pixel layout is a design consideration that can be adjusted based on -- you know, based on the limitations or the facts of the underlying light-emitting technology. 09:51:41 09:51:44 09:51:53 09:51:56

Q What types of limitations on the underlying light-emitting technology would affect the pixel layout? 09:52:01 09:52:10 09:52:12

MR. HERMAN: Objection. Form. 09:52:14

A For inorganic displays, blue is the most deficient emitter. So, you know, managing the color balance and the lifetime and drive considerations, you know, would be what you're trying to do. And, also, there are -- are kind of basic growth considerations or, you know, fabrication considerations with the different colors. 09:52:18 09:52:25 09:52:30 09:52:37 09:52:39 09:52:46 09:52:50 09:52:51

To get -- to get a single material to emit in different colors is tricky, so you have 09:52:53 09:52:55

to -- you do have to grow these nano rods of different sizes and different layouts, which is pretty complicated when you're trying to do them all in a single growth. 09:52:58 09:53:00 09:53:04 09:53:06

Q Do you have any other experience with OLED displays that we haven't touched on at this point? 09:53:07 09:53:29 09:53:33

A No. I'd say, you know, I occasionally helped my wife with OLED work as a grad student. She did her research on OLEDs, and so I participated there just a little bit. 09:53:35 09:53:40 09:53:47 09:53:49

At DOE I managed R&D on OLED materials and devices and device structures also at DOE, which is ongoing. Still I'm doing that job. Also at DOE I develop road maps and guidance for OLED materials and devices and panel OLED displays. I've worked with clients on developing display technologies. 09:53:50 09:53:58 09:54:01 09:54:04 09:54:08 09:54:14 09:54:16

So, yeah, I guess -- I guess that's about it. 09:54:17 09:54:19

Q And in all the work that you've talked about, have you ever designed an OLED display? 09:54:25 09:54:27

MR. HERMAN: Objection. Form. 09:54:30

A I've designed pixel layouts. I've designed pixel layouts with the limitations of the underlying technology in mind. 09:54:32 09:54:35 09:54:39

Q Were any of those underlying technologies OLEDs? 09:54:41 09:54:44

A No; but it's within the realm of my training and expertise getting a Ph.D. in material science with a specific emphasis on optoelectronic devices and materials, and within my experience with the Department of Energy directly managing R&D on that topic. 09:54:50 09:54:52 09:54:55 09:54:58 09:55:02 09:55:04

Q But in order to design an OLED display, you would need to take into account the specific limitations of OLEDs. Correct? 09:55:10 09:55:19 09:55:23

MR. HERMAN: Objection. Form. 09:55:26

A Yeah, of course. I mean, it's been well known since I began even since grad school that, like, blue OLEDs have much lower efficiency than green or red OLEDs. So that would be an important consideration in developing an OLED display design. 09:55:30 09:55:32 09:55:35 09:55:41 09:55:45 09:55:50

Q And the pixel layout that you would use for an inorganic LED display would not be the same one that you would design for an organic LED display, correct, because of those differences? 09:55:52 09:55:54 09:55:59 09:56:03

MR. HERMAN: Objection to form. 09:56:05

A Yeah, they would be different; but they would be developed in the same way, by considering the efficiency and the growth parameters that -- fabrication of the technology. So the same process would be used for both. 09:56:07 09:56:09 09:56:11 09:56:17 09:56:19

Q But the -- and the fabrication, that's another factor that -- sorry, let me start over. 09:56:23 09:56:27

The fabrication process, that would be another factor that you would need to consider in designing a pixel layout for a display. Correct? 09:56:31 09:56:32 09:56:35

A Yeah, the -- I mean, the fabrication process and the limitations of the fabrication process are of course a consideration when making -- when making any kind of device. 09:56:41 09:56:44 09:56:48 09:56:52

I would -- I would note, though, that none of these patents at issue have any limitation on the fabrication process; they're purely pixel 09:56:54 09:56:56 09:57:00

layouts for OLED displays. So they don't -- they don't encompass or bake in that fabrication mindset. 09:57:07 09:57:10 09:57:13

Q And in the work that you've done in the past, have you ever built an OLED display? 09:57:19 09:57:26

A I don't recall. I may have helped my wife do something in grad school which is, you know, while I was waiting around helping her in the lab, but I don't -- I'm not sure. 09:57:32 09:57:35 09:57:40 09:57:42

MR. KUDZIN: Would the technician please put up Tab 14 and also drop it into the chat for everyone. 09:58:01 09:58:02 09:58:06

(Petitioners' Exhibit 1004, IPR2023-00987, previously marked, not attached.) 09:58:07 09:58:26

MR. KUDZIN: I'm sorry, I think I gave you the wrong number. Hold on one second. Can you make that Tab 11, please. 09:58:26 09:58:27 09:58:29

Q You're being shown what's previously been marked as Petitioner Exhibit 1004 in IPR2023-00987. This is a copy of U.S. Patent Number 6,897,855. 09:58:46 09:58:48 09:58:58 09:59:01

Do you recognize this document? 09:59:05

A Yes. 09:59:10
Q And this is a patent that you relied on 09:59:10
in your declarations. 09:59:16
Is that right? 09:59:16
A Yes. 09:59:17
Q And if I refer to this reference as 09:59:17
Matthies, will you understand what I'm referring 09:59:23
to? 09:59:25
A Yes. 09:59:35
Q The title of the patent is Tiled 09:59:35
Electronic Display Structure. 09:59:41
Do you see that? 09:59:43
A I do. 09:59:44
Q What's meant by a tiled display? 09:59:44
A Breaking down sets of pixels into tiles 09:59:52
that can be readily attached to make a larger 09:59:57
display. 10:00:00
Q Why would you want to do that? 10:00:01
A I think he says that it would enable 10:00:07
making a bigger display. And also potentially 10:00:11
simplified the electronics by having I guess easy 10:00:22
connection to the back plane electronics. 10:00:26

Q If we go to Figure 1 of Matthies. 10:00:40

In Figure 1 each tile has 16 pixels. 10:00:55

Is that correct? 10:01:00

A Yeah, I think it's -- it's 16. I'm not sure if we would call them subpixels or pixels, but 16 discrete emitters of different colors. 10:01:03 10:01:06 10:01:11

Q How does breaking up a display into 16 pixel tiles simplify the electronics? 10:01:17 10:01:26

A I think what he was proposing or showing was that there would be electronics in the back plane that could be readily attached, you know kind of a modular way, to these -- to these individual tiles. 10:01:34 10:01:38 10:01:42 10:01:45 10:01:48

Q Matthies is predominantly dealing with large area displays. Correct? 10:01:49 10:01:58

MR. HERMAN: Objection. Form. 10:02:00

A I don't -- I think that's one motivation that it brings up, is that this can enable the more -- more readily fabrication of a large area display. 10:02:02 10:02:08 10:02:10 10:02:16

Q And if we go to Column 1, Line 34. 10:02:18

Just so it's clear, are you looking at a 10:03:08

copy of Matthies in front of you? 10:03:10

A Yes. 10:03:12

Q Okay. So you -- do you have all of the prior art references in front of you that you relied on in this case? 10:03:12 10:03:15 10:03:17

A No. 10:03:20

Q What documents do you have in front of you? 10:03:21 10:03:27

A I think I have Matthies, Phan, Murai, and Yamada. 10:03:30 10:03:40

Q And you also have copies of your declarations in the three IPRs. Correct? 10:03:42 10:03:46

A Correct. 10:03:49

Q Any other documents in front of you? 10:03:49

A No, that's it. 10:03:52

Q So if we look at Column 1, Line 34 it says, "There are fundamental technical issues that impose scaling laws and limit the size of displays that can be manufactured." 10:04:00 10:04:04 10:04:06 10:04:10

Do you see that? 10:04:11

A I do. 10:04:12

Q Do you agree with that? 10:04:13

A Well, I would say in the context of whenever this was filed, 1999, you know, that is true. I guess it's maybe always true, but the reasons change. 10:04:20 10:04:21 10:04:30 10:04:34

Q Do you think that's still true today? 10:04:36

A There are different reasons. I mean, we have OLED TVs today. So the technical issues have -- have been solved, but maybe there are more economic issues now. 10:04:47 10:04:48 10:04:58 10:05:02

So, you know, there -- there -- I don't know. It's not one size fits all, I guess. There's different considerations. Things are always changing with technology. So, you know, we could have, if we wanted to, we could make OLED billboards today, you know, if someone wanted to. It's not -- maybe not that cost-effective, but there's not a technical reason you couldn't do that. 10:05:03 10:05:10 10:05:12 10:05:13 10:05:20 10:05:24 10:05:27 10:05:31 10:05:34

But, you know, so then it becomes a question are we talking about technical limitations or technical economic limitations. 10:05:36 10:05:38 10:05:40

So it's kind of a moving target. But I 10:05:44

don't -- I don't know. I don't know how fundamental the limitations are maybe is another way to say it. 10:05:49 10:05:51 10:05:54

But if you consider economic limitations as fundamental limitations, then it would -- it would be true. 10:05:55 10:05:57 10:06:00

Q You mentioned OLED televisions. When Matthies talks about large area displays, is he talking about something the size of a television? 10:06:04 10:06:12 10:06:15

MR. HERMAN: Objection to form. 10:06:18

A I don't recall. I believe he was. Yeah, he was. 10:06:21 10:06:34

Q Okay. Do you think a person of skill in the art would try to build a tile display television? 10:06:34 10:06:40 10:06:45

MR. HERMAN: Objection. Form. 10:06:48

A It depends on when, when they were doing it. But I would say people of skill in the art borrow from other technologies all the time. And in fact, we do have tile display billboards right now. They are inorganic LED, not organic LED. 10:06:51 10:06:55 10:07:00 10:07:04 10:07:10

Q Well, in 2005 when this patent issued, do 10:07:17

you think a person of skill in the art would try to build a tile display television? 10:07:22 10:07:24

MR. HERMAN: Objection. Form. 10:07:28

A Well, I think -- like I said, I think it was conceived of or filed in 1999. But, yeah, people are trying to do -- this is one thing I see in my work scouting technologies and understanding the state-of-the-art, is people are trying to do everything all the time and stretch technologies out in all sorts of different ways. 10:07:35 10:07:36 10:07:40 10:07:44 10:07:47 10:07:50 10:07:52

Q What about a cellphone display; do you think a person of skill in the art would try to build a tiled cellphone display? 10:07:55 10:07:58 10:07:59

MR. HERMAN: Objection. Form. Also outside the scope of direct. 10:08:02 10:08:03

A Yeah, I don't -- I don't see why not. 10:08:09

Q If we could turn to Column 4 of Matthies. 10:08:25

And beginning at Line 9 it says, "Figure 8A is a front-plan view of a single color pixel structure which includes separate subpixels." 10:08:36 10:08:44 10:08:49

Do you see that? 10:08:52

A I do. 10:08:53

Q And in Figure -- the next line says "Figure 8B is a front-plan view of an alternative single color pixel structure which includes separate subpixels." 10:08:53 10:08:56 10:09:00 10:09:03

Do you see that? 10:09:05

A I do. 10:09:06

Q And if we look at Figure 8A, that shows an RGB pixel structure. Correct? 10:09:06 10:09:14

A Yes. 10:09:19

Q And Figure 8B is what I think is referred to as a quad pixel structure? 10:09:19 10:09:24

Is that correct? 10:09:27

A Yeah, that's what I'd call that, a quad pixel. 10:09:28 10:09:31

Q Does Matthies say anything about which type of pixel structure you should use in a display? 10:09:31 10:09:42 10:09:44

MR. HERMAN: Objection to form. 10:09:48

A I don't recall. I mean, what he does show is -- provides a person of skill in the art an example of different -- different things that could be done. You know, the quad pixel array, 10:09:49 10:09:50 10:09:55 10:09:57

is -- yeah, is one layout that could be used. The striped pixel array is another. There's other arrays. A person of skill in the art would, you know, put that on his tool bench and, you know, take into account lots of design considerations, design and performance considerations. 10:10:05 10:10:11 10:10:14 10:10:18 10:10:21 10:10:24

So what this shows is just a possible pixel layout that could have some benefits. 10:10:28 10:10:32

Q But Matthies doesn't say, you know, use the -- use Figure 8B because 8B is better than Figure 8A. He doesn't say anything like that, does he? 10:10:36 10:10:39 10:10:44 10:10:47

MR. HERMAN: Objection. Form. 10:10:48

A I don't -- I don't recall if he says that or not. He provides these options. He says that they're -- you know, shows -- shows images of them, of a layout, so they were known by people of skill in the art that -- you know, and could be drawn upon to solve their technical problems and to improve -- improve their technologies. 10:10:50 10:10:53 10:11:00 10:11:04 10:11:08 10:11:11 10:11:13

Q Does Matthies identify any benefits of one pixel layout over another? 10:11:16 10:11:22

A I don't recall. I'd have to look. But, no, I don't -- I don't recall. 10:11:26 10:11:33

Q In your opinions you rely on the quad pixel structure of Figure 8B. Correct? 10:11:35 10:11:40

A Yes. 10:11:44

Q And you don't rely on the RGB pixel structure shown in Figure 8A. Correct? 10:11:45 10:11:54

A No; I mean, this -- the 8B shows prior art to the patents at issue, which are essentially quad pixel structures, quad pixel arrays. Right? So that's -- that's what I was doing, was showing that this -- this image is prior art to what's described in these -- these Samsung patents at issue. They're all using quad pixel arrays, and the quad pixel array was generally known. 10:11:58 10:12:02 10:12:05 10:12:11 10:12:13 10:12:19 10:12:23 10:12:26

Q But you don't claim that a display using Matthies' Figure 8A as the pixel structure would render any of the claims obvious, do you? 10:12:30 10:12:35 10:12:39

A I'd have to go back through it line by line. We could do that. I think that -- I'd have to recall, but I do think that Matthies by itself does render some of the claims obvious. But if we 10:12:45 10:12:47 10:12:52 10:12:57

could go through the declarations themselves and those sections and the different grounds, then I could be more sure. 10:13:01 10:13:03 10:13:05

Q Well, I'm not asking you to do any type of new analysis. I'm just asking whether in forming your opinions you offered any opinions that using Figure 8A, the RGB stripe, would render the claims obvious. 10:13:06 10:13:08 10:13:10 10:13:12 10:13:18

A Oh, 8A? 10:13:20

Q Yeah. 10:13:22

A Not 8A. That's a stripe configuration. That is not prior art to these Samsung patents. It's -- what is prior art is the quad pixel array. 10:13:22 10:13:26 10:13:31

Q In Figure 8B, do you see the circle labeled 816 prime? 10:13:37 10:13:41

A Yes. 10:13:45

Q What is that? 10:13:46

A I'd have to look back through to see. 10:13:49

Q Is that what Matthies called a via? 10:13:54

A Probably. 10:13:59

Q Do you know what a via is? 10:14:02

A It's like a vertical electronic 10:14:10

interconnect. 10:14:12

Q Is it a -- is it a hole in the substrate? 10:14:17

MR. HERMAN: Objection. Form. 10:14:22

A It can be a hole, but it can also be filled with -- with a conductor, like a wire or something, to be an electronic interconnect. 10:14:25 10:14:27 10:14:30

Q Oh, okay. 10:14:34

Do you know approximately how large a via is? 10:14:36 10:14:40

MR. HERMAN: Objection. Form. 10:14:44

A They can be all sorts of different sizes. They're generally related to the size of the, you know, electronics being made. But they're -- they can be tiny with a processor or bigger with a display. It just relates to the -- to the size of the rest of the technology. 10:14:45 10:14:48 10:14:51 10:14:54 10:14:58 10:15:03

Q In the -- in Figure 8B, the quad pixel has two green subpixels, one red subpixel, and one blue subpixel. 10:15:07 10:15:15 10:15:23

Is that correct? 10:15:24

A That's correct. 10:15:25

Q But Matthies also teaches that for some 10:15:25

technologies you should use a quad pixel structure having two blue subpixels. Correct? 10:15:28 10:15:30

MR. HERMAN: Objection. Form. 10:15:34

A I think I remember that. That just goes back to the -- the idea that, yeah, there's options, and a person of skill in the art would look at these different options and look at the design space and kind of co-optimize different factors. But that, yeah, using the quad pixel would be one, one possible solution. 10:15:36 10:15:39 10:15:43 10:15:46 10:15:49 10:15:53 10:15:57

And, yeah, switching the color around might be -- might be at play if you -- if green -- if green were the weakest color, you might want to do that. 10:16:00 10:16:02 10:16:07 10:16:10

You know, changing the other aspects of the geometry are also on the table. A person of skill in the art would understand that as well. 10:16:12 10:16:16 10:16:19

Q You say if green was the weakest color you would want to make -- you would want to have two blue pixels. Is that what you said? 10:16:24 10:16:26 10:16:29

A Well, that could be one of many design considerations. You know, I think maybe somewhat 10:16:31 10:16:33

Yamada teaches and what is kind of obvious and well known to a person of skill in the art at the time, because blue was less efficient, blue OLEDs, and they're still less efficient and there's been a lot of work to improve their efficiency but they haven't got there. Then it makes sense to -- and because green is the most efficient, it can make sense in many configurations to have a quad pixel with two greens and a blue and a red. 10:16:40 10:16:43 10:16:47 10:16:50 10:16:52 10:16:55 10:17:00 10:17:05 10:17:08

Q When you said "weakest" earlier, were you referring to the efficiency of the pixel? 10:17:10 10:17:14

A Yes. 10:17:16

Q If we could look at Column 17, beginning at Line 5. 10:17:21 10:17:23

And there it says, "Alternatively, the pixels 830 and 836 may both be red or blue pixels." 10:17:24 10:17:40 10:17:44

Do you see that? 10:17:44

A Yes. 10:17:45

Q It goes on to say, "In some display technologies, the amount of light emitted by the red or blue pixel material may be less than the 10:17:45 10:17:49 10:17:51

amount of light emitted by the green pixels." 10:17:54

Do you see that? 10:17:57

A I do. 10:17:58

Q And is that what you were talking about a minute ago, that a person of ordinary skill in the art would understand that for OLEDs blue are the least efficient? 10:17:59 10:18:01 10:18:05 10:18:08

MR. HERMAN: Objection. Form. 10:18:10

A Yeah, that would be one consideration in the design. And like we were talking about here, though, there's this quad pixel array is one -- one possible solution that can be combined with other solutions to -- to address, you know, these performance issues. 10:18:12 10:18:14 10:18:18 10:18:24 10:18:26 10:18:30

Q But when he's talking about the red or blue pixel material may emit less light than the green pixel, that's exactly the situation that we have for OLEDs. Correct? 10:18:32 10:18:36 10:18:42 10:18:45

MR. HERMAN: Objection. Form. 10:18:46

A That -- that is -- yes, blue, not necessarily that it emits less light, but that it's less efficient than the green and red pixel. 10:18:50 10:18:56 10:18:58

Q And then in the next sentence he goes on to say, "In this instance, making the pixels 830 and 830 both be red or blue pixels would improve the overall brightness of the display." 10:19:03 10:19:06 10:19:10 10:19:14

Do you see that? 10:19:17

A Yes. 10:19:17

Q Do you agree with that? 10:19:18

A No. 10:19:20

Q Why not? 10:19:21

A Brightness, if you have more of the brightest color, the green, you improve the brightness of the display. 10:19:24 10:19:27 10:19:30

Q So you don't think that a person of ordinary skill in the art would follow what Matthies is saying in this paragraph? 10:19:37 10:19:39 10:19:44

MR. HERMAN: Objection. Form. 10:19:46

A Not -- not blindly. 10:19:48

MR. KUDZIN: We've been going for a bit over an hour at this point. Would this be a good time for folks to take a break? 10:20:05 10:20:08 10:20:11

THE WITNESS: That's fine. 10:20:14

MR. KUDZIN: Counsel? 10:20:15

MR. HERMAN: That's fine with me. 10:20:16

MR. KUDZIN: All right. Ten minutes? 10:20:18

VIDEO SPECIALIST: We're going off the record at 10:20 a.m. 10:20:21 10:20:22

(A recess was taken.) 10:20:24

VIDEO SPECIALIST: We are going back on the record. The time is 10:31 a.m. 10:31:28 10:31:33

BY MR. KUDZIN: 10:31:36

Q Welcome back, Dr. Pattison. 10:31:37

Are you familiar with the concept of an active matrix display? 10:31:42 10:31:43

A Yes. 10:31:46

Q What is an active matrix display? 10:31:47

A Potentially it has each -- each pixel has a capacitor and transistor to drive that pixel. 10:31:52 10:31:55

Q Are you familiar with the term "passive matrix display"? 10:32:03 10:32:06

A Yes. 10:32:08

Q What is a passive matrix display? 10:32:09

A It's a display type where rows and columns are driven together sequentially. 10:32:13 10:32:16

Q In a passive matrix display, do you have 10:32:20

the capacitor and transistor that you were talking about in an active matrix display? 10:32:23 10:32:26

A No. 10:32:28

Q In an active matrix display, do you need those capacitors and transistors for every pixel? 10:32:28 10:32:39

A Yes. 10:32:46

Q And for every subpixel within the pixel? 10:32:46

A Yeah. 10:32:52

Q So if you're talking about even a low-resolution 640 by 480 display, you're probably talking about a couple million transistors? 10:32:52 10:32:55 10:32:59

A Yeah. Something like that. There's a -- a TF -- thin film transistor back plane that the -- that the OLEDs are deployed upon. 10:33:04 10:33:06 10:33:11

Q And passive matrix displays don't require that circuitry. 10:33:14 10:33:17

Is that correct? 10:33:18

A Yes. 10:33:18

Q Matthies is a passive matrix display. 10:33:26

Correct? 10:33:30

MR. HERMAN: Objection. Form. 10:33:31

A No. He actually explicitly says could be 10:33:33

active or passive. 10:33:37

Q The pixel structure that you're relying on in Figure 8B, that's a passive matrix display. 10:33:40 10:33:48

Correct? 10:33:56

MR. HERMAN: Objection. Form. 10:33:56

A Not necessarily. 10:33:58

Q Well, if we could turn back to Column 17, beginning at Line 10. It says, "The pixel structure shown in Figure 8B employs two row electrodes (not shown) and two column electrodes (not shown)." 10:33:59 10:34:10 10:34:27 10:34:31 10:34:37

Do you see that? 10:34:39

A Yeah, I see that. 10:34:40

Q And then it goes on to say, "The row electrodes are coupled to the electronics section by the vias 816 prime and 818 (shown in phantom) while the column electrodes are coupled to the electronics section by the vias 810 prime and 812 prime." 10:34:41 10:34:45 10:34:48 10:34:54 10:34:57 10:35:01

Do you see that? 10:35:01

A Yeah. 10:35:02

Q The use of row and column electrodes, 10:35:03

that's describing a passive matrix display, isn't it? 10:35:05 10:35:09

MR. HERMAN: Objection. Form. 10:35:09

A Not necessarily. 10:35:10

Q Does Matthies ever talk about having the capacitors and transistors that you described in terms of an active matrix display? 10:35:15 10:35:27 10:35:31

A I don't recall. He talks about there being electronics in the back plane which could -- could include capacitors and transistors. And then I believe somewhere in Column 8 he says that, you know, could be active or passive drive schemes. I forget exactly where. 10:35:37 10:35:38 10:35:41 10:35:44 10:35:47 10:35:55

So I didn't take it as that it must be active or passive. And, you know, just to zoom out a little bit, the patents at issue are agnostic as to the drive considerations. They're pixel layouts, not -- not drive schemes. The drive schemes are not a limitation in those patents. 10:35:59 10:36:04 10:36:08 10:36:10 10:36:15 10:36:18 10:36:20

So prior art from passive or active pixel layouts, you know, person of skill in the art 10:36:22 10:36:27

could see -- could use either. But I don't -- I don't think Matthies is necessarily passive; it could be either as well. 10:36:29 10:36:34 10:36:39

Q Do passive matrix displays have row and column electrodes? 10:36:40 10:36:44

A Passive matrix displays, yeah, have -- have row and column electrodes. 10:36:47 10:36:51

Q Do active matrix displays have row and column electrodes? 10:36:53 10:36:55

A They could, yeah. 10:37:01

Q Are you aware of any active matrix displays having row and column electrodes? 10:37:02 10:37:04

A They still have, yeah, drive circuitry that goes, that is -- that is lined up with the rows and columns to control the individual transistors. So, I mean, they could, yeah. 10:37:06 10:37:09 10:37:12 10:37:17

Q Is there a difference between the row and column electrodes on the one hand and data signals on the other? 10:37:22 10:37:26 10:37:30

A Electrodes can carry data. 10:37:32

Q Are you saying that -- so let me -- are you aware of any active matrix displays that 10:37:36 10:37:40

actually do include row electrodes and column electrodes? 10:37:43 10:37:46

MR. HERMAN: Objection to form. 10:37:46

A I don't understand. I'm -- a person of skill in the art would look at this, this pixel layout, and see that it is, you know, prior art to the pixel layout described in the patents at issue, which don't have a drive scheme. And, yeah, you could -- you could conceive of all sorts of architectures that don't necessarily get into commercial practice, if that's what you're asking, if I know of a commercial device. I don't know the in's and out's of Samsung's secret drive schemes. But I know that it could be hypothesized and could be prior art to -- to what's being done or other patents. 10:37:51 10:37:54 10:37:58 10:38:07 10:38:09 10:38:13 10:38:16 10:38:21 10:38:24 10:38:26 10:38:30 10:38:33 10:38:37

So I don't know exactly how to answer that question except that a person of skill in the art could use -- could conceive of a lot of things and try to mix and match and see what works. So, yeah, it's a -- I don't exactly know how to answer that. 10:38:41 10:38:42 10:38:44 10:38:49 10:38:54 10:38:59

Q Okay. Well, I'm not asking you to speculate about what Samsung may or may not have done. I'm just asking if you're aware of any active matrix displays using row and column electrodes? 10:38:59 10:39:01 10:39:04 10:39:08 10:39:12

MR. HERMAN: Objection. Form. 10:39:12

A They address -- yeah, I think they could. I don't know if they do. I think they could. 10:39:18 10:39:22

Q But sitting here today, you're not aware of any examples in which they do? 10:39:26 10:39:28

A Commercial examples? 10:39:31

Q Let's start with commercial examples. 10:39:34

A I don't know what the proprietary drive schemes are for -- for the display manufacturers, no, I don't know. 10:39:36 10:39:40 10:39:45

Q Are you aware of any noncommercial examples of an active matrix display having row and column electrodes? 10:39:45 10:39:47 10:39:50

A I could conceive of one myself, you know, just based on my understanding of how to -- how to, you know, drive a pixel. 10:39:51 10:39:55 10:39:58

Q But you're not -- are you aware of any 10:40:02

published papers in which an active matrix display had row and column electrodes? 10:40:06 10:40:10

MR. HERMAN: Objection. Form. 10:40:14

A Not offhand. All -- 10:40:19

Q Are you aware of -- I'm sorry. I didn't mean to cut you off. Go ahead. 10:40:21 10:40:24

A It would be simple to configure a system like that. I mean, it depends on what you're meaning by electrodes. But, yeah, it would not be -- it would -- it's just how you -- you could arrange a set of pixels in a configuration to have an electrode that goes horizontal and that has an electrode that's vertical. That's not -- I don't understand, really, the issue here. 10:40:26 10:40:29 10:40:30 10:40:33 10:40:36 10:40:45 10:40:48 10:40:51

Q Well, let's take a look at Figure 3 of Matthies. 10:40:55 10:40:59

And this Figure 3 is showing the layout of one of Matthies' tiles. 10:41:16 10:41:17

Is that correct? 10:41:21

A Yeah, I would have to look at the description, the figure description, but it looks like it's more of the linear pixel array, not the 10:41:28 10:41:30 10:41:32

quad pixel array. 10:41:37

Q And in Figure 3, what's marked as 322, those are the column electrodes. Correct? 10:41:38 10:41:45

A I'd have to look at the description. If you could point me to where those descriptions are. 10:41:57 10:42:00 10:42:01

Q Sure. 10:42:03

A I see it here. 322D? Well, it says it's column electrode. 10:42:04 10:42:13

Q So 322 is the column electrode? 10:42:13

Is that right? 10:42:15

A Yes, this is for a different figure, but it says -- it says Figure 9. But, yeah. 10:42:21 10:42:22

Q And 328, those are the row electrodes? 10:42:27

A Yes, I believe so. 10:42:38

Q And is this showing a passive matrix display? 10:42:39 10:42:42

A I believe so. 10:42:49

Q Is there any other similar figure in Matthies showing an active matrix display? 10:42:50 10:42:57

MR. HERMAN: Objection. Form. 10:43:00

A I'm not sure. 10:43:05

Q But when Matthies talks about a structure having row and column electrodes, he's talking about the type of passive matrix display shown in Figure 3. Correct? 10:43:06 10:43:11 10:43:13 10:43:17

MR. HERMAN: Objection. Form. 10:43:18

A I'm not going to make that jump. 10:43:19

Q Is there a difference between active matrix displays and passive matrix displays in terms of the driving voltages that are required? 10:43:28 10:43:48 10:43:52

MR. HERMAN: Objection. Form. 10:43:55

A OLEDs have a fundamental drive -- the OLED devices have a fundamental drive voltage that depends on the OLED materials involved. So that would be constant. 10:43:58 10:44:00 10:44:05 10:44:07

Q Are -- for an OLED device, is it the voltage or is it the current that matters? 10:44:19 10:44:25

MR. HERMAN: Objection. Form. 10:44:30

A It's actually the current density that matters. But the turn -- the turn-on voltage for individual device is a function of the device material and the other parts of the device structure. 10:44:32 10:44:39 10:44:43 10:44:48 10:44:53

But I just wanted to go back to this active/passive thing. I found in Column 8, where he says, Electronics are used in the broadest sense to include both active and passive. 10:44:54 10:44:56 10:45:04 10:45:06

So, you know, to me Matthies is -- is agnostic as to the drive conditions. So -- so yeah, I think to the extent that it matters -- which I don't think it does, really -- he's talking about both active and passive drive schemes. 10:45:10 10:45:15 10:45:21 10:45:22 10:45:25 10:45:29

Q And when he -- when Matthies refers to active and passive electronics, you think he's referring to active matrix versus passive matrix displays? 10:45:29 10:45:34 10:45:37 10:45:41

A He says active matrix circuits also, yes. 10:45:43

So yeah. 10:45:50

Q But going back to the difference between active matrix and passive matrix displays. Are you aware of a difference in the drive voltage required between a passive matrix display and an active matrix display? 10:45:54 10:45:59 10:46:04 10:46:08 10:46:14

MR. HERMAN: Objection. Form. 10:46:15

A I think the drive voltage you're talking about is the voltage for these common electrodes in a -- in a passive matrix scheme, yeah, would be -- would be different. 10:46:17 10:46:18 10:46:24 10:46:29

Q You would require a higher drive voltage for the common electrodes in a passive matrix display. 10:46:35 10:46:37 10:46:40

Is that correct? 10:46:40

MR. HERMAN: Objection. 10:46:41

A I think you'd have -- 10:46:42

MR. HERMAN: Objection. Form. 10:46:43

THE WITNESS: Sorry. 10:46:44

A It would depend. It would depend on other resistances in the circuits. 10:46:45 10:46:48

But -- but yeah, I think you would have the potential for a higher voltage. You'd have just more -- more resistive circuit. 10:46:50 10:46:54 10:46:57

Q Turning back to your expert declarations. And we can look at the declaration for the '803 patent. 10:47:01 10:47:18 10:47:21

It's your opinion that Claims 1 through 5 and 19 to 21 of the '803 patent are obvious over 10:47:38 10:47:42

the combination of Matthies and Yamada. Correct? 10:47:46

A Yeah. Can we go to that specific 10:47:49

section? 10:47:55

Q Sure. 10:47:56

MR. KUDZIN: If the technician wants to 10:47:57

bring up, this is Tab 1, the document that's 10:47:59

previously been marked as Exhibit 1003 in the '987 10:48:01

IPR. 10:48:07

Q Is there a particular portion of the 10:48:29

report you want to go to? 10:48:30

A Just the portion you're referring to. 10:48:32

Q All right. Well, if we go to Page 35. 10:48:36

A Okay. Yes, I see that. 10:48:47

Q You don't claim that Matthies anticipates 10:48:48

any of the claims of the '803 patent, do you? 10:48:52

A Not -- not on this ground. 10:48:59

Q Are there other grounds where you claim 10:49:01

that Matthies anticipates any of the claims of the 10:49:06

'803 patent? 10:49:09

A I'd have to go through all of them. I 10:49:10

don't -- I don't recall specifically, but I 10:49:12

don't -- I don't think so. 10:49:14

Q You haven't alleged that Matthies anticipates any of the claims of the '683 patent either, have you? 10:49:16 10:49:23 10:49:26

A Let me double-check. I believe these are all obvious arguments. 10:49:29 10:49:49

MR. KUDZIN: And I know you have it in front of you, but just for the benefit of everyone on the line, would the technician please put up what I've uploaded as Tab 3 and drop it in the chat. 10:49:57 10:49:59 10:50:01 10:50:08 10:50:12

(Petitioners' Exhibit 1003, IPR2023-01075, previously marked, not attached.) 10:50:19 10:50:20

Q What you're being shown now is a copy of what's previously been marked as Petitioner Exhibit 1003 in IPR2023-01075. 10:50:20 10:50:22 10:50:25

Do you recognize this document? 10:50:34

A Yes. 10:50:36

Q And this is the declaration you submitted regarding the '578 patent? 10:50:36 10:50:39

A Yes. 10:50:42

Q And just so the record is clear, if I refer to U.S. Patent Number 11,594,578 as the '578 10:50:43 10:50:47

patent, you'll understand what I'm talking about? 10:50:53

A Yes. 10:50:55

Q And you have not claimed that Matthies anticipates any of the claims of the '578 patent, have you? 10:50:55 10:51:02 10:51:06

A No. For the '578 it's obvious over Matthies and Yamada and obvious over Matthies and Yamada and Hong. 10:51:09 10:51:14 10:51:19

Q Let's talk a little bit about Yamada. 10:51:43

MR. KUDZIN: So if the technician could please drop in the chat and bring up on the screen what I've uploaded as Tab 15. 10:51:47 10:51:49 10:51:55

(Petitioners' Exhibit 1008, IPR2023-00987, previously marked, not attached.) 10:51:57 10:52:17

Q So you're previously -- you're currently being shown what's previously been marked as Exhibit 1008 in IPR2023-00987. This is a copy of U.S. Patent Number 6,366,025. 10:52:17 10:52:19 10:52:25 10:52:35

Do you recognize this document? 10:52:42

A I do. 10:52:44

Q And is this the patent that you were previously referring to as Yamada? 10:52:44 10:52:48

A Yes. 10:52:51

Q And if I refer to it as Yamada, you'll know what I'm talking about? 10:52:51 10:52:58

A Yes. 10:52:59

Q Yamada is an active matrix display. Correct? 10:53:00 10:53:15

MR. HERMAN: Objection. Form. 10:53:18

A It shows an example of an active matrix display. I'm not sure that's a called out limitation. 10:53:24 10:53:27 10:53:36

Q Well, if we go to Column 1, Line 6. 10:53:36

A Yeah. Okay. He does explicitly describe that as having a thin film transistor element in this -- in this patent. 10:53:54 10:53:57 10:54:05

Again, I'd go back to the -- you know, what the issue at hand is actually a pixel arrangement, and there are no drive schemes limitations in the -- in these patents, in the Samsung patents. And a person of skill in the art wouldn't limit themselves to just thinking about one -- one drive scheme or the others when they're considering pixel layout. 10:54:10 10:54:11 10:54:17 10:54:23 10:54:28 10:54:31 10:54:33 10:54:37

Q But Yamada itself is talking about an active matrix display. Correct? 10:54:42 10:54:47

MR. HERMAN: Objection. Form. 10:54:49

A I'd say that Yamada says in the field of the invention that the invention relates to molecular luminescent display apparatus that comprises an electroluminescence element, which would be the OLED, and a thin film transistor. 10:54:53 10:54:55 10:55:01 10:55:06 10:55:10

Q And that's describing an active matrix structure? 10:55:12 10:55:15

A Probably, yes. 10:55:16

Q And if we look at, for example -- sorry -- Figure 5 of Yamada. 10:55:16 10:55:29

A Yeah. 10:55:45

Q This is showing one pixel in Yamada's display. Correct? 10:55:45 10:55:49

A Yes. 10:55:50

Q And it has the capacitor and transistors that you would associate with an active matrix display? 10:55:51 10:55:56 10:56:02

MR. HERMAN: Objection. Form. 10:56:03

A Yeah, and it also has vertical 10:56:05

electrodes, 53. Well, vertical power -- vertical power supply that connect to the electrode. 10:56:08 10:56:15

So, yeah, I'd have to go through the -- you know, the elements. I don't know what -- which element is the capacitor. But it seems like it would have a capacitor in there somewhere. Maybe it's -- yeah. 10:56:21 10:56:24 10:56:27 10:56:35 10:56:37

Q In forming your opinions in this case, did you consider the circuitry shown in Figure 5? 10:56:43 10:56:47

MR. HERMAN: Objection. Form. 10:56:52

A I did consider it, you know, and considered also that the pixel layout described by the Samsung patents, there is no limitation of it being a passive or active matrix or any other kind of drive scheme. So I considered this. 10:56:53 10:56:59 10:57:04 10:57:08 10:57:15

But more importantly with Yamada, I considered the considerations with respect to the pixel sizing. 10:57:18 10:57:20 10:57:31

Q Your arguments for why the claims of the '803 patent are obvious are based on a combination of Matthies -- or one of the grounds is based on a combination of Matthies and Yamada. Correct? 10:57:31 10:57:38 10:57:43 10:57:48

A Correct. 10:57:51

Q If a person of ordinary skill in the art were trying to combine the display shown in Matthies with the display shown in Yamada, would the resulting combination be an active matrix display or a passive matrix display? 10:57:51 10:57:55 10:57:58 10:58:02 10:58:06

MR. HERMAN: Objection. Form. 10:58:12

A It could be either, depending on the rest of the design. 10:58:13 10:58:15

Q Well, in the way that you've attempted to combine Matthies and Yamada in your combination, is the resulting display an active matrix display or a passive matrix display? 10:58:17 10:58:21 10:58:25 10:58:29

A It would be either -- 10:58:32

MR. HERMAN: Objection. Form. 10:58:33

A Just like Matthies says, it could be an active or a passive matrix design. I'd say it could be either. It could be made to be either. 10:58:34 10:58:36 10:58:41

Q In your analysis have you considered how to combine Matthies and Yamada to create a passive matrix display? 10:58:44 10:58:52 10:58:57

MR. HERMAN: Objection. Form. 10:58:58

A I considered how to combine Matthies and Yamada to show how the limitations in the '803 patent were obvious. There's no discussion in the '803 as to whether it needs to be a passive or active matrix drive scheme. It could be -- I'm sure it could be used to attack either type of display, you know, of their competitors. 10:59:01 10:59:04 10:59:08 10:59:12 10:59:20 10:59:25 10:59:31

So I didn't go through a design process. All I did was see that these elements existed and motivation existed to combine them. And so it would be obvious and predictable, the results. 10:59:34 10:59:36 10:59:40 10:59:44

Q Well, the claims of the asserted patents require an OLED display. Correct? 10:59:48 10:59:54

A An OLED display which could be passive or active or, honestly, it could be the size of a micro display, a cellphone, or a billboard. It's not -- it doesn't provide any limitation there. 10:59:58 11:00:01 11:00:04 11:00:08

Q So in order to show that the limitations are satisfied, you need to show that when you combine Matthies and Yamada, you actually end up with an organic light-emitting diode display. 11:00:12 11:00:15 11:00:18 11:00:22

Correct? 11:00:27

MR. HERMAN: Objection. Form. 11:00:27

A An organic light-emitting diode pixel 11:00:28

layout that could be used in the display. 11:00:32

Q But you actually need to have a display 11:00:34

itself as part of the combination. Correct? 11:00:36

MR. HERMAN: Objection. Form. 11:00:39

A You need to have the layout that's used 11:00:41

in the display. 11:00:43

Q Well, you need more than that. Don't you 11:00:45

actually need to have the actual display? 11:00:47

A I don't understand. Do I have to make 11:00:49

the display? I don't -- I don't think so. 11:00:50

MR. HERMAN: Objection to form. 11:00:53

Q Okay. 11:00:54

MR. KUDZIN: Well if, we could bring up 11:00:59

what -- Tab 6. If the technician could please 11:01:00

bring that up and also put it in the chat. 11:01:05

(Petitioners' Exhibit 1001, 11:01:07

IPR2023-01075, previously marked, not attached.) 11:01:26

Q You're being shown what's previously been 11:01:26

marked as Exhibit 1001 in IPR2023-01075. This is 11:01:28

a copy of U.S. Patent Number 11,594,578. 11:01:37

Do you recognize this document? 11:01:43
A I do. 11:01:44
Q And if I refer to this document as the '578 patent, will you understand what I'm talking about? 11:01:45 11:01:47 11:01:49
A Yes. 11:01:51
Q And this is the patent that is the subject of IPR2023-01075? 11:01:51 11:01:54
A Are you asking me? 11:02:11
Q Yeah. 11:02:12
A Yes. 11:02:13
Q Okay. If we could turn to Claim 1 of the '578 patent, which appears in Column 9 of the patent. And Claim 1 begins, "A pixel arrangement structure of an organic light-emitting diode (OLED) display." 11:02:13 11:02:23 11:02:26 11:02:41 11:02:46
Do you see that? 11:02:49
A I do. 11:02:49
Q And if you go further on it says, I guess the fourth limitation down, it says, "Wherein the OLED display comprises a pixel defining layer defining areas of the first pixels, the second 11:02:50 11:02:53 11:02:55 11:03:00

pixels, and the third pixels." 11:03:03

Correct? 11:03:05

A Yes. 11:03:05

Q So the -- so the patent itself requires, 11:03:05

or part of the limitations, is an OLED display. 11:03:11

Correct? 11:03:15

MR. HERMAN: Objection. Form. 11:03:16

A I don't know about that interpretation. 11:03:17

It says it's comprising, and in the preamble it 11:03:18

says it's a pixel arrangement structure of an OLED 11:03:21

display. And the pixel arrangement structure 11:03:25

comprising the plurality of pixels. 11:03:28

So I don't know about that 11:03:31

interpretation. Certainly these prior arts are 11:03:34

pixel arrangements and pixel considerations, as -- 11:03:38

that are within the context of an OLED display. 11:03:42

So I think they -- it would be obvious to look at 11:03:46

them as prior art and to combine them to get a 11:03:50

predictable result of a -- of an OLED pixel 11:03:55

arrangement. And I have -- you know, I don't 11:03:58

think it would be an issue to make that into a 11:04:03

passive or an active matrix drive scheme. 11:04:05

Q All right. In forming your opinions, have you considered how a person of ordinary skill in the art would combine the display in Matthies with the active matrix display in Yamada in order to actually create an organic light-emitting OLED -- diode OLED display? 11:04:09 11:04:15 11:04:19 11:04:23 11:04:28 11:04:33

MR. HERMAN: Objection. Form. 11:04:35

A I felt, and a person of skill in the art would understand, it would be obvious how to combine these and create a drive scheme to drive them as an active matrix display, just as Matthies brings up, and Yamada, or as a passive matrix display. I think it would be obvious and routine to put that together, yeah. 11:04:38 11:04:40 11:04:44 11:04:47 11:04:52 11:04:56 11:04:59

Q Do you think it would be obvious to a person of ordinary skill in the art to try to combine an active matrix display and a passive matrix display to create a new display? 11:05:03 11:05:10 11:05:13 11:05:18

MR. HERMAN: Objection. Form. 11:05:19

A I think a person of skill in the art would look at all kinds of display schemes, all types of display technologies, for different pixel 11:05:21 11:05:23 11:05:26

arrangements to suit their development needs. 11:05:29

I don't think active and -- sorry, active 11:05:34

and passive pixel arrangements would be 11:05:38

considered. LCD pixel arrangements would be 11:05:45

considered. All previous pixel arrangements would 11:05:47

be considered. 11:05:50

Fortunately with these two patents 11:05:50

they're both dealing with OLED devices and they 11:05:53

both, you know, explicitly talk about being active 11:05:55

matrix devices, so it would be obvious to combine 11:06:02

those. It would be more than obvious; it would 11:06:05

be ... 11:06:14

Q Would it be obvious to combine them to 11:06:19

create a passive matrix display? 11:06:22

MR. HERMAN: Objection to form. 11:06:27

A It would be obvious to combine them to 11:06:28

come up with the pixel layout described by -- by 11:06:30

the Samsung patents to show that they're prior 11:06:37

art. And they could be made into a passive matrix 11:06:42

display if that met your design objectives. 11:06:46

Q Are there different design requirements 11:06:53

for active matrix displays as opposed to passive 11:06:55

matrix displays? 11:07:00

MR. HERMAN: Objection to form. 11:07:01

A Certainly there's different design objectives which would lead a person to select one or the other based on cost and resolution and things like that. 11:07:04 11:07:05 11:07:08 11:07:11

Q And those different design requirements could lead to different pixel layouts. Correct? 11:07:13 11:07:16

MR. HERMAN: Objection. Form. 11:07:20

A They could lead to different pixel layouts or the same pixel layout. 11:07:24 11:07:27

Q Let's turn back to your declaration for the '803 patent, and in particular Paragraph 170. 11:07:30 11:07:52

A Okay. 11:08:16

Q You say, According to Matthies, quote, "The geometry of the" quad pixel -- sorry, "quad subpixel structure is defined by the dimensions dSH, the height of the subpixel, dSW, the width of the subpixel, de, the distance from the active subpixel areas to the edge of the pixel area, and dSI, the distance between adjacent subpixels." 11:08:16 11:08:19 11:08:23 11:08:27 11:08:30 11:08:36 11:08:38

Do you see that? 11:08:42

A I do. 11:08:44

Q And then you've included a copy of Figure 8B that shows those different dimensions? 11:08:44 11:08:51

A It shows the dimensions of an embodiment, yeah, that corresponds to that described embodiment. 11:08:55 11:08:57 11:09:01

Q And then below that you say, "Table 2 provides an example of these pixel geometry defining values, the variable P refers to the total pixel pitch." Correct? 11:09:02 11:09:07 11:09:11 11:09:15

A Correct. 11:09:18

Q And then in Paragraph 174 you've drawn a picture showing a tile with those dimensions. 11:09:18 11:09:28

Correct? 11:09:32

A Yeah, there's a demonstrative that shows that basically the same -- the same Figures 8B with the pixel colors colored in, and then those dimensions replaced by the dimensions in Table 2. 11:09:35 11:09:40 11:09:43 11:09:47

Q And this is what you've described as a quad pixel structure. Correct? 11:09:50 11:10:15

MR. HERMAN: Objection. Form. 11:10:20

A Matthies describes it as a quad pixel 11:10:23

structure. I would describe it that way as well. 11:10:25

Q Does Yamada describe a quad pixel 11:10:28

structure? 11:10:32

MR. HERMAN: Object to form. 11:10:34

A I don't recall. I don't think so. 11:10:35

Q Yamada uses an RGB stripe arrangement. 11:10:42

Correct? 11:10:47

MR. HERMAN: Objection. Form. 11:10:47

A Let me just check. I think in an 11:10:50

embodiment -- well, yeah, he's more talking about 11:10:53

a stripe arrangement. 11:11:08

Q And it's your opinion that based on 11:11:11

Yamada, a person of ordinary skill in the art 11:11:22

would rescale or resize each of the pixels in the 11:11:25

Matthies display. 11:11:30

Is that correct? 11:11:31

A Yeah, Yamada describes the motivation, 11:11:34

his motivation for resizing the different colored 11:11:39

pixels, and that was well understood at the time, 11:11:43

you know, people of skill in the art; that, you 11:11:48

know, the blue OLEDs were the least efficient and 11:11:51

resultingly had -- well, also have the worst 11:11:54

lifetime, and that this was a means to get past that. 11:11:57 11:12:00

So, yeah, it would have been obvious to take that design consideration and apply it to a quad pixel exemplified by Matthies, and combine them. And it would be really pretty easy, and the results would be predictable. 11:12:00 11:12:02 11:12:10 11:12:13 11:12:17

Q How does Yamada determine the size of each of the pixels? 11:12:19 11:12:22

A He -- I don't recall his specific math. But a person of skill in the art would know that that's not -- that's not an absolute requirement, because the efficiencies of these devices have been changing over time. 11:12:27 11:12:31 11:12:33 11:12:38 11:12:42

It's the general idea and mindset that the -- that the size could be changed and tuned for the different colors and for their -- their specific efficiencies, and with other design considerations in mind. 11:12:43 11:12:45 11:12:48 11:12:51 11:12:55

So I don't think any person of skill in the art would lock themselves down to the specific sizing ratios shown in Yamada. I don't -- I don't 11:12:56 11:12:58 11:13:01

recall his exact means or how he figured out his ratio. But like I said, a person of skill in the art wouldn't -- wouldn't only consider that ratio. 11:13:07 11:13:14 11:13:16

Q Okay. Well, if we look at what Yamada actually does. If we could turn to Column 4 of Yamada, beginning around, I think it's Line 30. 11:13:22 11:13:25 11:13:29

A Yes, I'm there. 11:13:48

Q It says, "In another aspect of the present invention, in a color display device in which a display pixel having an emissive element is provided for every color, the emissive area of the display pixel is set for every color in accordance with the emission efficiency of the emissive element provided at the display pixel, the chromaticity of each color emitted by the respective emissive element, and the chromaticity of target display white of the display device." 11:13:49 11:13:52 11:13:52 11:13:56 11:13:59 11:14:01 11:14:03 11:14:07 11:14:10 11:14:13

Correct? 11:14:16

A I see that. 11:14:17

Q And is that what you understand Yamada to be teaching, about how you determine the size of each of the pixels? 11:14:18 11:14:22 11:14:25

MR. HERMAN: Objection. Form. 11:14:27

A In this embodiment, you know, those are -- those are the considerations that he's teaching. There would be other considerations. But, yeah, you have color balance, you have efficiency. What else? 11:14:30 11:14:32 11:14:35 11:14:39 11:14:41

Q You have the chromaticity of each of the color -- each color emitted by the respective emissive elements? 11:14:46 11:14:50 11:14:55

A Well, he actually says both the chromaticity of each color and the chromaticity of the target white display. So those would all be considerations for how you size the different subpixels in any pixel arrangement, whether it's a quad or a stripe or something else. That's -- that would be obvious to a person of skill in the art. 11:14:57 11:14:59 11:15:03 11:15:07 11:15:14 11:15:18 11:15:21 11:15:23

Q Are there any other factors that you would take into account in determining the size of the -- of each of the pixels based on the teachings of Matthies? 11:15:23 11:15:26 11:15:30 11:15:35

A Yeah; total -- total brightness, which 11:15:39

would depend on the type of display, whether it's a micro display or a cellphone or smartphone or a TV or a billboard. The '803 patent is agnostic on that. So that would be another consideration that would -- that would come up, you know, which would also, you know, influence resolution. 11:15:43 11:15:45 11:15:49 11:15:55 11:15:58 11:16:02

So there's -- there's all these more holistic considerations that would be a part of the design process. 11:16:04 11:16:06 11:16:11

Q Are there any other factors that a person of ordinary skill in the art would consider when determining the size of each of the pixels? 11:16:12 11:16:18 11:16:22

A Probably. I can't -- can't think of any offhand right now. But, yeah, you'd -- it's a complicated system. There's all sorts of factors. 11:16:27 11:16:30 11:16:33

Cost. Cost could be another one. Yeah. 11:16:37

Q How would the cost affect the size of the pixels? 11:16:41 11:16:44

A Well, to affect the complexity of your system, how much the materials cost. So if you wanted to conserve one type of OLED material versus another, that -- that could play into it. 11:16:45 11:16:49 11:16:51 11:16:53

Q Yamada actually goes through and provides a couple of examples of calculations for different pixel sizes. Correct? 11:16:56 11:17:02 11:17:08

A Yeah. Could you show me what you're referring to? 11:17:10 11:17:11

Q Sure. If we can turn to Column 11, beginning at Line 4. And he says, "The following is given as an example of an area ratio. For example, when the supply currents are identical in the case where the luminance ratio of the green, red, and blue lights that are emitted is 1 to 1 to 1, the emission efficiency ratio becomes 10 to 3.8 to 1.8." 11:17:13 11:17:15 11:17:30 11:17:33 11:17:36 11:17:39 11:17:42 11:17:47

Do you see that? 11:17:48

A I do. 11:17:50

Q And he goes on to say, "The ratio of the emissive areas of the colors required to achieve a luminance of 1 among the colors is set" to one-tenth to one-third -- sorry, to "1 to 3.8 to 1 to 1.8 equals 1 to 2.6 to 5.6." 11:17:50 11:17:52 11:17:56 11:18:02 11:18:07

Do you see that? 11:18:11

A I do. 11:18:12

Q So he's saying in this example the red pixel would be 2.6 times as large as the green pixel? 11:18:15 11:18:18 11:18:22

Is that correct? 11:18:22

A Yeah. 11:18:28

Q And the blue pixel would be 5.6 times the size of the green pixel. Correct? 11:18:28 11:18:31

A Yes, in this example. Uh-huh. 11:18:32

MR. HERMAN: Object to form. 11:18:34

Q And then if we go down to column -- sorry, same column, Line 25, he gives a different example. Correct? 11:18:35 11:18:40 11:18:45

A Yes. 11:18:52

Q And beginning in Line 34 he says, "Furthermore, when the emission efficiency ratio of the various colors of the organic EL elements is 10 to 3.8 to 1.8 for green, red, and blue as described above, the emissive area ratio becomes GRB equals 1 over 10 to 0.5 divided by 3.8 to 0.63 divided by 1.8 equals 1 to 14.2 to 38." 11:18:52 11:19:10 11:19:13 11:19:16 11:19:20 11:19:24 11:19:34

Correct? 11:19:41

MR. HERMAN: Objection to form. 11:19:41

A I see that. 11:19:42

Q And so in this way of doing the 11:19:43

calculations, the red pixel would be 14.2 times 11:19:47

the size of the green pixel. Correct? 11:19:50

MR. HERMAN: Objection. Form. 11:19:54

A Yeah, I think that's what he's getting at 11:19:58

there. 11:20:00

Q And the blue pixel would be 35 times the 11:20:00

size of the green pixel. Correct? 11:20:04

A Yeah. 11:20:08

Q So depending on the efficiencies and the 11:20:08

chromaticities, you can get different ratios for 11:20:13

the sizes of the pixels. Correct? 11:20:15

A Yeah. So that's what Yamada is teaching, 11:20:19

is that this is an option to change your -- the 11:20:21

different colored pixel sizes for various design 11:20:26

considerations. 11:20:30

Q Is it possible for a POSITA to apply 11:20:30

Yamada's teachings and conclude that the area of 11:20:35

the green pixel should be the same as the area of 11:20:38

the red pixel? 11:20:40

MR. HERMAN: Objection. Form. 11:20:42

A It depends on what we're designing to. 11:20:43
Q But there's nothing in Yamada that says 11:20:45
the green pixels have to be smaller than the red 11:20:49
pixels. 11:20:52
MR. HERMAN: Objection. Form. 11:20:53
A Yamada teaches that this is a design 11:20:57
option. Right? And the POSITA would know that 11:21:00
reducing the green is a design option, and that it 11:21:02
could be applied with a, you know -- pretty much 11:21:07
any pixel layout to achieve different benefits. 11:21:11
If your -- if your benefit that you're 11:21:14
looking for is lifetime and simplification of the 11:21:17
drive current scheme, then what you would do is 11:21:19
increase -- relatively increase the size of the 11:21:24
blue pixel compared to the green and compared to 11:21:26
the red pixel. If that's your motivation. 11:21:31
There are different motivations, 11:21:34
different design targets. And at its core Yamada 11:21:35
shows that that exemplifies, people knew this, 11:21:40
that you could -- you could make this adjustment 11:21:43
for various reasons. 11:21:45
Q Is it possible for a POSITA to apply 11:21:49

Yamada's teachings and conclude that the area of the blue pixel should be the same as the area of the red pixel? 11:21:51 11:21:54 11:21:56

MR. HERMAN: Objection to form. 11:21:59

A It's possible. There are different motivations. But if your motivation is to increase the lifetime of the system, then you would -- you would relatively increase the size of the blue pixel. 11:22:00 11:22:02 11:22:06 11:22:11 11:22:15

So there's different motivations. You could make -- you could make all the same color with different size pixels. There's all sorts of design motivations out there, unlimited. 11:22:17 11:22:18 11:22:22 11:22:25

What Yamada shows is that changing the size of the pixel can accommodate these different design objectives. And one of those objectives is to have a longer-lived device, which results in a longer-lived display. And to do that, you would relatively make the blue pixel larger. 11:22:30 11:22:32 11:22:34 11:22:37 11:22:41 11:22:45

Q Does Yamada say that the way -- that when you follow his teachings, you're always going to make the blue pixels larger than the red pixels? 11:22:47 11:22:53 11:22:55

MR. HERMAN: Objection. Form. 11:22:58

A If your design objective is lifetime, you would always do that, yes. 11:23:01 11:23:03

Q Okay. If we turn to Column 10 of Yamada, Line 52. 11:23:05 11:23:22

It says, "In the above-mentioned embodiment when the emission efficiency is green is greater than red is greater than blue, an example was described where the emissive area of the display pixels was green less than red less than blue so that the size of the emissive area for the various colors differed in this order." 11:23:30 11:23:32 11:23:35 11:23:37 11:23:40 11:23:43 11:23:46

Do you see that? 11:23:49

A I do. 11:23:50

Q And it goes on to say, "However, an embodiment need not be limited to this example. For example, with the emission efficiency at the same green greater than red greater than blue, the emissive areas may be set to green approximately equal to red less than blue or to green less than red approximately equal to blue." 11:23:50 11:23:54 11:23:56 11:23:59 11:24:02 11:24:05 11:24:09

Do you see that? 11:24:11

A I do.

Q So it would be entirely consistent with the teachings of Yamada to make the red pixels and the blue pixels the same size.

Is that correct?

MR. HERMAN: Objection to form.

A There's other teachings that show the red pixels bigger than the green and bigger than the blue. And a POSITA would see that and consider that as, you know, with his design scheme. And practically speaking, blue OLEDs are much less efficient than green or red. And, therefore, in order to have a color balance that's -- that you need, you'd have to drive them -- if they were the same size, you would have to drive them harder, which would further reduce their lifetime.

So Yamada is laying out a bunch of options, but he is also describing the pure motivation to extend the lifetime of making the blue greater than the size -- the blue size pixel greater than the red which is greater than the green. So he clearly provides that embodiment and

describes that motivation. 11:25:16

Of course, a POSITA would understand that all of these options are on the table. It's just a matter of what design objective you're trying to achieve. But that -- that shortcoming in blue efficiency is a pretty motivating factor for display designs, OLED display designs. So that's -- would be an obvious consideration. That's just the fundamentals of that technology. 11:25:17 11:25:20 11:25:24 11:25:26 11:25:32 11:25:37 11:25:41 11:25:44

Q Is it possible for a POSITA to apply Yamada's teachings and conclude that the area of the red pixel should be larger than the area of the blue pixel? 11:25:48 11:25:52 11:25:55 11:25:58

MR. HERMAN: Objection. Form. 11:25:59

A Of the blue pixel? 11:26:00

Q Yeah. 11:26:02

A I don't know what would motivate that decision. It's possible. Maybe they don't want a white display. Maybe hypothetically some -- I don't know, some efficiencies of these OLEDs have changed in the future. I don't -- I don't conceive of why they would do that right now. But 11:26:03 11:26:06 11:26:11 11:26:18 11:26:20 11:26:23

it is absolutely possible. But I don't -- I would not understand the motivation. Because the motivation is very clear on making the blue size pixel greater than the red, greater than the green. 11:26:28 11:26:31 11:26:32 11:26:36 11:26:40

Q What's the emission efficiency of the blue emitters in Matthies? 11:26:40 11:26:50

A I don't recall if he explicitly says anything about the emission efficiency. 11:26:59 11:27:01

Q What's the emission efficiency of the red emitters in Matthies? 11:27:02 11:27:04

A I just -- same thing. I don't recall if he makes a statement about the emission efficiency. 11:27:08 11:27:10 11:27:13

What Matthies is showing is a quad pixel arrangement that a POSITA might grab on to as a pixel arrangement, you know, and then further apply Yamada. So it's the combination that we're talking about here. 11:27:14 11:27:16 11:27:20 11:27:24 11:27:27

Q Does Matthies disclose anything about the emission efficiency of the green emitters? 11:27:27 11:27:30

A I don't recall. 11:27:33

Q What's the chromaticity of the blue light emitted in Matthies? 11:27:35 11:27:38

A Chromaticity? I don't recall. 11:27:42

Q Do you recall what the chromaticity of the red light emitted in Matthies is? 11:27:45 11:27:49

A It's just generally display red. I mean, I do think Matthies talks about other display technologies, so I'm not sure that, you know, he's definitely inclusive of organic LED display technologies, but I'm not sure he goes into that detail when he's talking about the general pixel arrangement. 11:27:51 11:27:54 11:27:58 11:28:03 11:28:06 11:28:08 11:28:10

Q Do you know what the chromaticity of the target display white of the display device is in Matthies? 11:28:11 11:28:14 11:28:17

A I don't recall if he says anything about that. 11:28:20 11:28:22

Q Without information about the emission efficiency, the chromaticity of the individual lights, or the chromaticity of the target display white, is it possible to calculate the appropriate sizes of the pixels? 11:28:23 11:28:26 11:28:29 11:28:34 11:28:37

MR. HERMAN: Objection. Form. 11:28:38

A Yes. 11:28:41

Q How? 11:28:41

A Well, because even though Matthies doesn't -- doesn't provide an exact chromaticity, he does talk about red, green, and blue, which are general chromaticities and within the display context are generally known. And, also, displays generally have a target white point, you know. 11:28:43 11:28:46 11:28:51 11:28:55 11:28:58 11:29:02

So if you know, especially with OLEDs -- now, Matthies doesn't get into this, but this is general -- general person-of-skill-in-the-art considerations, design considerations. 11:29:05 11:29:08 11:29:11 11:29:15

You have a red, green, and blue pixel, sometimes multiples as Matthies shows. They have a quad pixel arrangement, and you combine them to make white. 11:29:18 11:29:21 11:29:24 11:29:27

So that's just a general display understanding. And so, yeah, if you want to motivate the changing of the pixels, just like -- just like Yamada says, if blues have something like one-fifth or one-quarter of the efficiency of 11:29:29 11:29:31 11:29:33 11:29:36 11:29:41

green and red, which has been pretty consistent since the early 2000s, then, yeah, it would -- it would make sense to make the blue pixel bigger according to Yamada to balance the drive current and the lifetime. 11:29:46 11:29:49 11:29:53 11:30:00 11:30:03

Q Have you done those calculations for the combination -- for Matthies? 11:30:06 11:30:09

MR. HERMAN: Objection. Form. 11:30:12

A No, I did not. Because the note -- the '803 patent and the other patents don't -- don't require that -- level of design, I guess. They just talk about one's bigger than the other than the other. And you know, the combination of Matthies and Yamada show the arrangement and show the sizing and provide an obvious and routine kind of design combination that would be super predictable if you put them together. Whether the exact sizing, you know, that's I think a shortcoming in the '803 patent and the other Samsung patents, is that there's no absolute anything in there. They're all relative sizes, relative spacings. So you can't -- you can't know 11:30:15 11:30:18 11:30:22 11:30:30 11:30:33 11:30:36 11:30:41 11:30:45 11:30:49 11:30:52 11:30:54 11:30:57 11:31:01 11:31:04

what they're trying to get at ultimately because it's all relative. And those relative relationships are motivated by Yamada and shown by Matthies, and then especially with the combination. 11:31:10 11:31:12 11:31:14 11:31:18 11:31:21

Q But you can't rule out the possibility that if you were to do the calculations, you'd come to the conclusion that the red pixel and the blue pixel should, in fact, be the same size, based on the chromaticities? 11:31:21 11:31:26 11:31:29 11:31:31 11:31:33

MR. HERMAN: Objection to form. 11:31:36

A If it's -- it depends on what your design objectives are. But if you're doing a holistic design objective and your biggest issue is the shortcomings in the efficiency of the blue -- the blue OLED, then I can rule that out. 11:31:37 11:31:41 11:31:43 11:31:46 11:31:50

I can say someone might want to have a blue and a red that are the same size for some other motivation; but for -- for the motivation of extending or having optimal lifetime while also achieving the chromaticity, I think you'd want the blue biggest -- bigger -- the blue being biggest 11:31:55 11:31:57 11:32:01 11:32:06 11:32:10 11:32:12

and then the red and then the green. And that would be an obvious design choice and design option for a person of skill in the art. 11:32:16 11:32:19 11:32:21

Q Are you aware of any prior art references that criticize Yamada's teachings? 11:32:25 11:32:37

MR. HERMAN: Objection. Form. 11:32:41

A I can't specifically recall what it was, but I do think some people said, Well, the sizing is wrong that Yamada puts out there. But I think that they don't dispute the general idea that you'd want the blue to be largest. That's -- that's my recollection. 11:32:47 11:32:49 11:32:52 11:32:58 11:33:00 11:33:03

But yeah, I mean, any patent will have its critics. This -- you know, what Yamada shows, what a person of skill in the art would take away from Yamada, is that the pixels can be resized for various design objectives. And then when you put that in combination with Matthies, which shows a quad pixel array, you have a quad pixel array where the pixels can be designed to meet various objectives, and that would be obvious. 11:33:06 11:33:09 11:33:14 11:33:16 11:33:20 11:33:24 11:33:26 11:33:30 11:33:34

But for sure any patent, any type of 11:33:36

approach, will have its critics. That doesn't mean that a person of skill in the art wouldn't consider them. 11:33:39 11:33:41 11:33:43

Q Would a person of ordinary skill in the art also consider the references that criticize Yamada? 11:33:44 11:33:47 11:33:49

MR. HERMAN: Objection to form. 11:33:53

A They might if they're credible. But that doesn't mean that they would not consider Yamada. 11:33:54 11:33:56

Q Do you discuss in your declarations these -- any of these references that criticize Yamada? 11:34:00 11:34:05 11:34:07

A I didn't rely on them. I don't -- I don't recall. Just it's kind of a vague thing that came up. But, no, I didn't rely on them. The motivations are pretty clear for combining these. And Yamada teaches that you can resize the blue and make it larger to extend the lifetime sent by the current provision. So if somebody says -- someone else says -- you know, those are kind of fundamental considerations that are exemplified by Yamada. And if someone says, Oh, 11:34:09 11:34:13 11:34:18 11:34:24 11:34:26 11:34:32 11:34:39 11:34:41 11:34:45 11:34:47

no, blue is actually more efficient, well, that's just wrong. Someone might have said that at some point. That's a criticism that I would not rely on. Or if someone else says, Well, really it should be 1.5 instead of 1.4, for example, times bigger, that doesn't dispute the fundamental teachings of Yamada, which is the ability to resize the pixels. 11:34:51 11:34:53 11:34:56 11:34:58 11:35:03 11:35:08 11:35:12 11:35:14

And I'm sure as the potential for blue OLEDs, you know, as they get better, you might want to resize things again in the future. That's just what Yamada teaches. 11:35:17 11:35:20 11:35:23 11:35:26

Q Is there a reason why you didn't discuss any of the references that criticize Yamada in your declarations? 11:35:27 11:35:31 11:35:34

MR. HERMAN: Objection. Form. 11:35:35

A I don't recall those coming up when I wrote my declaration, and I didn't rely on them. 11:35:37 11:35:41

MR. KUDZIN: Can we please bring up Tab 21. And if you could drop it in the chat and also put it up on the screen, please. 11:36:00 11:36:04 11:36:09

(Petitioners' Exhibit 1015, 11:36:11

IPR2023-00987, previously marked, not attached.) 11:36:21

Q I'm showing you a document that has 11:36:21

previously been marked as Petitioner Exhibit 1015 11:36:23

in IPR2023-00987. This is a copy of U.S. Patent 11:36:28

6,867,549. 11:36:37

Do you recognize this document? 11:36:41

A Yes. 11:36:43

Q And if I refer to this as the Cok patent, 11:36:43

will you understand what I'm referring to? 11:36:50

A Yes. 11:36:52

Q And if we turn to Column 2, beginning at 11:36:52

Line 2. It says -- 11:37:08

A Yeah, if we can -- I can't scroll up 11:37:19

here. 11:37:21

MR. KUDZIN: Oh, I'm sorry. Can the 11:37:22

technician please take us to Column 2, please. 11:37:23

And it might be helpful to zoom in so people can 11:37:30

read it. Okay. 11:37:33

Q Beginning at Line 2 it says, "Yamada 11:37:39

discloses an OLED display with unequal 11:37:41

light-emitting element areas, wherein the area of 11:37:44

the light-emitting elements are adjusted with the 11:37:47

goal of improving the lifetime of the OLED display." 11:37:49 11:37:52

Do you see that? 11:37:52

A What line again? 11:37:57

Q Column 2, Line 2. 11:37:58

A Yeah. Okay. I see it. 11:38:01

Q And that's referring to the same Yamada patent that we've been talking about. Correct? 11:38:03 11:38:06

A I believe so, yeah. 11:38:08

Q And it goes on to say, "While Yamada discloses light-emitting elements having different sizes for optimizing the lifetime of the display, the display is not optimized with respect to the response to the human visual system." 11:38:09 11:38:13 11:38:15 11:38:18 11:38:20

Do you see that? 11:38:22

A I do. 11:38:24

Q So Cok is criticizing Yamada's approach. 11:38:24

Correct? 11:38:29

MR. HERMAN: Objection to form. 11:38:30

A He's criticizing it with respect to optimizing with respect to the response of the human visual system. Which I'm not super clear on 11:38:31 11:38:36 11:38:42

what he exactly means by that. I don't think he's criticizing the general approach of making the blue pixels larger. And even if he was, I don't -- I think, you know, making something larger, there's a lot of design space there, changing the sizes, that a person of skill in the art would deploy to achieve not just one requirement, which is optimizing to the human visual system, which is certainly important, but also motivating for other considerations like lifetime and simplification of provision of the current. 11:38:45 11:38:52 11:38:54 11:39:03 11:39:04 11:39:07 11:39:09 11:39:14 11:39:17 11:39:19 11:39:23 11:39:28

Q And those are all different design considerations that a person of ordinary skill in the art would have to take into account when designing a display. Correct? 11:39:29 11:39:32 11:39:34 11:39:36

MR. HERMAN: Objection to form. 11:39:39

A Not more. I mean, but like I said, Yamada teaches that a very important tool is this resizing option. And I think, I have to double-check, but I think Cok corroborates that, you know, ability to resize the different color 11:39:41 11:39:43 11:39:47 11:39:53 11:40:00

pixels. 11:40:03

Q Cok goes on to say in the next sentence, "There is a need, therefore, for an improved OLED display that simultaneously optimizes the resolution and lifetime in an OLED display device." 11:40:07 11:40:10 11:40:13 11:40:15 11:40:18

Correct? 11:40:19

A Yes. 11:40:24

Q Would a person of ordinary skill in the art have been aware of the Cok reference? 11:40:24 11:40:32

A Let me check the timing. 11:40:37

Yeah. 11:40:42

Q Would Cok's disclosures be relevant to a person of ordinary skill in the art? 11:40:42 11:40:46

MR. HERMAN: Objection. Form. 11:40:48

A I'm going to have to look at the full context and refresh myself on the full context of what he's saying. I don't think -- I think that there are a number of approaches that can be used to achieve or to help. And so help achieve these kind of range of design options so a person of skill in the art might use Cok and Yamada. They 11:40:50 11:40:51 11:40:54 11:41:01 11:41:06 11:41:13 11:41:18

wouldn't say, Oh, no, never use Yamada. Never, ever resize your different color pixels. A person of skill in the art would not say that. They would take this into account in addition to the Yamada reference. 11:41:20 11:41:24 11:41:28 11:41:29 11:41:33

And just going back to the fact that blue OLED material efficiency is so much lower than red and green is -- is, you know, a really important consideration and hasn't gotten better. It's -- so -- and the lifetime is so much worse. 11:41:35 11:41:39 11:41:42 11:41:47 11:41:51

So if you're trying to make a practical device, you would certainly consider Yamada. 11:41:54 11:41:57

Q If we turn to Figure 1 of Cok. 11:42:01

MR. KUDZIN: If the technician could take us there, please. 11:42:12 11:42:13

Q In Figure 1, Cok has the green pixels being larger than the red pixels. Correct? 11:42:33 11:42:35

A I see that, yes. 11:42:37

Q So after considering not just Yamada but Yamada and Cok and the other prior art references, it's possible for a POSITA to determine that the green pixels should be larger than the red pixels. 11:42:38 11:42:41 11:42:44 11:42:47

Correct? 11:42:51

MR. HERMAN: Objection. Form. 11:42:51

A Like I told you before, any -- depending 11:42:53
on the design criteria, any -- any combination is 11:42:56
technically possible. Yamada motivates making the 11:43:01
blue bigger than the -- than the green, and the 11:43:07
red -- well, the blue the biggest, the red the 11:43:11
next size, and the green the smallest. And 11:43:14
Matthies shows a quad pixel array just like this 11:43:16
is showing. 11:43:20

So it's possible. I'll say this: Red 11:43:20
OLEDs are more efficient than -- more efficient 11:43:28
than blue but less efficient than green. So, you 11:43:32
know, I don't -- I don't know, I don't recall the 11:43:35
exact mindset of Cok here, but it's possible. But 11:43:37
it's also pretty obvious to apply the Yamada basic 11:43:45
teaching that you can resize these pixels, and 11:43:51
that a pretty good option might be to make blue 11:43:54
bigger than red bigger than green. 11:43:57

MR. KUDZIN: If we could -- would the 11:44:16
technician please mark what I've uploaded as Tab 11:44:18
22 as Exhibit 2011. And then put it in the chat 11:44:21

and bring it up on the screen for everyone. 11:44:28

(Patent Owner Exhibit 2011 marked for identification and is attached to the transcript.) 11:44:28 11:44:45

(Discussion off the record with the A/V technician.) 11:44:45 11:44:49

Q I'm showing you what's been marked as Exhibit 2011. It's a copy of U.S. Patent 6,747,618. 11:45:03 11:45:05 11:45:13

The title of the patent is Color Organic Light-Emitting Diode Display With Improved Lifetime and the inventors are Andrew D. Arnold, Michael E. Miller, and Michael J. Murdoch. 11:45:15 11:45:18 11:45:21 11:45:24

If I refer to this as the Arnold patent, will you understand what I'm referring to? 11:45:30 11:45:33

A Yes. 11:45:42

MR. KUDZIN: If we can turn to Column 2 of Arnold. And zoom in so we can see the paragraph beginning at Line 27. 11:45:46 11:45:47 11:46:02

Q And it begins, "U.S. Patent Number 6,366,025 issued April 2, 2002 to Yamada discloses an OLED display with unequal light-emitting element areas, wherein the area of the 11:46:12 11:46:15 11:46:21 11:46:25

light-emitting elements are adjusted with the goal of improving the lifetime of the OLED display." 11:46:26 11:46:29

Do you see that? 11:46:32

A I see that. 11:46:32

Q And that's talking about the same Yamada patent that we've been discussing. Correct? 11:46:33 11:46:37

A Yes. 11:46:42

Q It goes on to say, "Yamada considers the emission efficiency of the material, the chromaticity of each of the emissive materials and the chromaticity of the target display, when attempting to determine the aim light emissive element areas." 11:46:42 11:46:48 11:46:50 11:46:53 11:46:55 11:46:58

Do you see that? 11:47:00

A Yes. 11:47:00

Q Do you agree with that? 11:47:00

A I think he also considers lifetime. 11:47:06

Q The -- sorry. Go ahead. I didn't mean to cut you off. 11:47:11 11:47:14

A Yeah, I just don't see lifetime in that sentence. 11:47:15 11:47:18

Q Arnold goes on to say, "However, Yamada 11:47:21

fails to discuss other important characteristics of OLED materials that will affect device lifetime, such as the differences in the inherent luminance stability over time for different materials." 11:47:23 11:47:25 11:47:29 11:47:31 11:47:34

Do you see that? 11:47:34

A I see that. 11:47:35

Q So Arnold is criticizing Yamada. 11:47:36

Correct? 11:47:41

A Yes. 11:47:42

Q And he goes on to say, "Yamada further does not consider important optical characteristics of the target display design, each of which will influence the overall lifetime of OLED materials." 11:47:42 11:47:46 11:47:48 11:47:51 11:47:53

Do you see that? 11:47:54

A I see that. 11:47:56

Q Would a POSITA have been aware of the Arnold patent? 11:47:56 11:48:02

MR. HERMAN: Objection. Form. 11:48:05

A I would -- I would assume so. But I think it misrepresents -- I think Arnold 11:48:07 11:48:09

misrepresents Yamada, and I don't -- I don't agree. Efficiency and lifetime are inherently coupled with an OLED device design to -- so if you have a low efficient -- a low efficiency color, you have to drive it harder, which lifetime is a function of drive current density. 11:48:12 11:48:15 11:48:21 11:48:27 11:48:32 11:48:36

So to say he's considering efficiency but not lifetime is kind of ridiculous because they go hand in hand, and a person of skill in the art would know that. So I think this is just, I don't know, some kind of competitive gesturing, but it doesn't unteach Yamada, the basic parts of Yamada or the motivation of Yamada. And, you know, that a person of skill in the art would use. 11:48:39 11:48:42 11:48:45 11:48:48 11:48:52 11:48:56 11:48:59 11:49:03

Q In forming your opinions in this case, did you consider the Arnold patent? 11:49:06 11:49:09

A I don't recall offhand. But if it's not listed in my materials, I did not rely on it. Like I said, it doesn't unteach Yamada. It seems like it's -- fails to accurately represent Yamada. And I haven't gone through the whole patent, but just that line right there. You know, and the 11:49:14 11:49:16 11:49:19 11:49:25 11:49:31 11:49:33

basic premise or the basic thing a person of skill in the art would pick up from Yamada is that the different colored pixels can be resized, and Yamada resizes them with blue being bigger than red being bigger than green. 11:49:36 11:49:41 11:49:43 11:49:47 11:49:50

And a person of skill in the art who -- assuming he knows about this other approach, whatever they're coming at, whatever their criticism is, would still learn from Yamada that that could be done. 11:49:53 11:49:56 11:49:59 11:50:02 11:50:06

MR. KUDZIN: We've been going for quite a while. Is this a good time to take a break? 11:50:13 11:50:14

THE WITNESS: Sure. 11:50:17

MR. HERMAN: Fine with me. 11:50:20

VIDEO SPECIALIST: We're going off the record at 11:50 a.m. 11:50:21 11:50:23

(A recess was taken.) 11:50:25

VIDEO SPECIALIST: We're going back on the record at 12:01 p.m. 12:01:49 12:01:53

BY MR. KUDZIN: 12:01:55

Q Welcome back. 12:01:55

If we can turn back to your declaration 12:01:58

in the 80 -- with respect to the '803 patent. And in particular, if we can turn to -- back to Paragraph 170. 12:02:02 12:02:08 12:02:11

And so we looked at this paragraph earlier, and the geometry of the quad pixel structure being defined in terms of these dimensions shown in Table 2. 12:02:23 12:02:26 12:02:33 12:02:36

Do you recall that? 12:02:40

A Yes. 12:02:41

Q If you were to change the value of dSW, that would change the width of both the green pixel and the blue pixel. Correct? 12:02:41 12:02:49 12:02:51

MR. HERMAN: Objection. Form. 12:02:56

A No. If you changed -- if you changed that -- the marking dSW on that figure, it wouldn't necessarily change the width of either of those pixels. It just -- it just would change dSW. That's -- yeah, I don't -- that doesn't make sense to me. 12:03:03 12:03:05 12:03:12 12:03:16 12:03:20 12:03:24

Q I'm sorry. So if we go back to Paragraph 180, you say, According to Matthies, quote, the geometry of the quad subpixel structure is defined 12:03:25 12:03:28 12:03:32

by the dimensions dSH, the height of the subpixel, dSW, the width of the subpixel, and then some other terms. 12:03:35 12:03:41 12:03:44

Do you see that? 12:03:44

A Yes. 12:03:45

Q So dSW with the width of the subpixels. 12:03:45

Correct? 12:03:48

MR. HERMAN: Objection. 12:03:49

A In that particular embodiment. 12:03:50

Q And so if you were in -- in the table provided in Table 2 which you quote in Paragraph 171, this is one embodiment in which dSW is 0.25P. 12:03:57 12:03:59 12:04:02

Correct? 12:04:08

A Yeah, that's -- that's 0.25 of the pitch, which Matthies says could be adjustable. And this is an embodiment provided by Matthies, yes. 12:04:10 12:04:17 12:04:19

Q And so if you were to then change that value of dSW to make dSW smaller than, for example, 0.25P, that would change the width of the green pixel. Correct? 12:04:22 12:04:25 12:04:30 12:04:35

MR. HERMAN: Objection. Form. 12:04:36

A You're tethering these two things. Let's 12:04:39

just -- not just -- let's just talk about width of the pixel, not that value dSW. Because you could change the -- obviously, like we're talking about, you could change the width and the height of each individual pixel independently. So you could -- you could change -- dSW could be the same, and that's the width of the blue pixel. And you've made the green pixel smaller. Right? So that's -- they don't all have to go together. 12:04:44 12:04:49 12:04:51 12:04:53 12:04:57 12:05:00 12:05:04 12:05:07 12:05:13

And, you know, if we could be a little more precise about what you're getting at, that would be helpful to me. Because this -- yeah, it's -- are you changing dSW, or are you changing the width of one pixel or both pixels? Not -- it's kind of not making sense. 12:05:16 12:05:18 12:05:21 12:05:23 12:05:26 12:05:29

Q Well, in Matthies, dSW is the width of all of the subpixels. Correct? 12:05:31 12:05:34

A That embodiment -- 12:05:37

MR. HERMAN: Objection. Form. 12:05:37

A Not -- without any changes, that's what it is. 12:05:38 12:05:43

Q Okay. And so different values of dSW 12:05:43

will result in different widths of the pixels, of the subpixels. Correct? 12:05:47 12:05:54

A No. 12:05:55

MR. HERMAN: Object to form. 12:05:56

Q Why not? 12:06:00

A You could keep dSW constant, and you could reduce the size of the subpixels. 12:06:01 12:06:03

Q Doesn't Matthies define dSW to be the width of the subpixel? 12:06:06 12:06:11

A Only in that one embodiment. 12:06:13

Q Is there another embodiment in which -- in which that isn't the case? 12:06:15 12:06:22

A If you change the width of the pixel, you can't use those values anymore. So what I'm suggesting here is that every dimension in Figure 8B could stay the same, but you could -- you could decrease not dSW, but let's call it DG, the width of the green pixel, while keeping everything else the same. 12:06:24 12:06:28 12:06:31 12:06:35 12:06:40 12:06:45 12:06:48

Q Is there any -- sorry. Go ahead. I didn't mean to cut you off. 12:06:49 12:06:51

A That's the combination we're talking 12:06:52

about with Yamada. Right? So, of course, there's not that -- Matthies doesn't go into changing pixel sizes. He does talk about changing pitch, which would be relatively changing the pixel sizes with respect to the overall display. But the combination we're talking about is if you changed the width and height of -- of the red pixel while keeping everything else the same in this -- in this demonstrative or whatever, this figure from the patent. 12:06:54 12:06:59 12:07:04 12:07:07 12:07:10 12:07:14 12:07:17 12:07:23 12:07:26 12:07:31

So, yeah, you're -- I guess I'm just not following your premise there. If you changed everything, all of the values the same, you would -- you would end up in the same place. But if you combine it with Yamada and you relatively reduce the green and red size of the pixel while changing nothing else, that's -- you know, that's what we're talking about. 12:07:35 12:07:38 12:07:42 12:07:44 12:07:47 12:07:49 12:07:53 12:07:55

Q Does Matthies teach that you can change the size of just the green pixel without affecting the red or the blue pixels? 12:07:57 12:08:00 12:08:03

A That's the combination we're talking 12:08:04

about with Yamada. 12:08:06

Q Well, I'm just asking about what Matthies teaches. 12:08:08 12:08:10

Does Matthies teach any way of changing just the size of one of the pixels? 12:08:11 12:08:13

MR. HERMAN: Objection. Form. 12:08:17

A He does not give absolute sizing; he gives a pitch. He does talk about changing the pitch while keeping the rest of the pixels the same size. 12:08:19 12:08:23 12:08:27 12:08:32

So the combination, Matthies doesn't teach that. It's the combination of Matthies which Yamada teaches together, which would be obvious and routine and predictable the results to change the pixel size, relative pixel sizing, according to the motivations in Yamada that -- that are -- teach the different sizing. 12:08:34 12:08:37 12:08:40 12:08:43 12:08:49 12:08:52 12:08:56

Matthies does not teach that, and that's in the report. It's the combination that teaches that. 12:08:58 12:09:01 12:09:03

Q But just based -- but, you know, Matthies isn't saying you have to use this particular value 12:09:03 12:09:08

for dSW, that it's 0.25. Matthies -- does Matthies allow to you change the numbers in that table? 12:09:12 12:09:18

A It allows you to change the pitch, the peak. 12:09:21 12:09:24

Q Okay. But in Matthies, the width of the pixel is always one-quarter of the pitch? 12:09:25 12:09:30

MR. HERMAN: Objection. Form. 12:09:32

A In this embodiment the size of the pixels are all the same. 12:09:34 12:09:40

Q One of Matthies' concerns is eliminating the visibility of the seams between the tiles. 12:09:46 12:10:02

Is that correct? 12:10:07

A Yeah, I recall that. 12:10:09

Q Okay. And one way of doing that is that Matthies says that the subpixels need to be evenly spaced up to the edge of the tile. Correct? 12:10:10 12:10:18 12:10:25

MR. HERMAN: Objection. Form. 12:10:27

A I -- if you want to point me to where he says that. But I'll say he does make a point of these being -- of the -- of the pixels being evenly spaced, and so that, you know, they can be tiled. Maybe a better way to say it is regularly 12:10:32 12:10:34 12:10:38 12:10:42 12:10:46

spaced. But, yeah, I recall that. 12:10:50

Q Okay. Well -- sorry. Are you done? 12:10:53

A I recall it. Yeah, I'm done. 12:10:58

Q If we can turn to Paragraph 148 of your declaration. You say, In particular, Matthies explains that its display includes, quote, tiles ... constructed with pixel forming elements evenly spaced up to the edge of the tiles. 12:10:59 12:11:03 12:11:16 12:11:19 12:11:24

Do you see that? 12:11:26

A Yes. I would say that's relative. If we go back to that Figure 8, you could see the subpixels don't go right up to the edge of the tile. There is a space still. 12:11:27 12:11:34 12:11:37 12:11:40

Q Sure. But the space is even across all the subpixels. Correct? 12:11:46 12:11:49

MR. HERMAN: Objection. Form. 12:11:50

A Yeah. Let's see. 12:11:53

Uh-huh. Yes. 12:11:56

Q The green pixel is 0.25P away from the edge. Correct? 12:11:57 12:12:02

MR. HERMAN: Objection. Form. 12:12:03

THE WITNESS: Sorry. 12:12:06

A In that embodiment. 12:12:07

Q In that embodiment. 12:12:07

And so is the red pixel. Correct? 12:12:09

A Correct. 12:12:11

Q And so is the blue pixel. Correct? 12:12:11

A Correct. 12:12:13

Q If we turn to Paragraph 229 of your 12:12:13

report. 12:12:25

And underneath Paragraph 229 there is a 12:12:43

figure showing how you purport to combine Matthies 12:12:51

and Yamada. Correct? 12:12:55

A Correct. 12:12:57

Q Okay. And in that you've made the green 12:12:57

pixels smaller than the red pixels smaller than 12:13:04

the blue pixels. Correct? 12:13:07

A Correct. 12:13:09

Q And in your figure, the distance of the 12:13:09

green pixel to the edge of the tile is bigger than 12:13:15

the distance from the blue pixels to the edge of 12:13:18

the tile. Correct? 12:13:23

A Yes. 12:13:23

Q And that's not what Matthies teaches. 12:13:23

Correct? 12:13:33

MR. HERMAN: Objection. Form. 12:13:35

A This is a combination of Matthies with 12:13:38
Yamada. So this is what Yamada -- this is what a 12:13:42
person of skill in the art could come up with when 12:13:48
considering both -- both of those prior arts and, 12:13:50
you know, this is an obvious combination of those 12:13:55
two -- of those two designs and motivations within 12:13:57
those patents. 12:14:01

So while the spacing to the edge of the 12:14:02
tile isn't perfectly even, it would be regular and 12:14:05
it would not be apparent to the viewer. So it 12:14:10
would be fine. 12:14:16

MR. KUDZIN: Could we bring up Tab 4, 12:14:53
please. And drop it in the chat as well for 12:14:59
everyone. 12:15:06

(Petitioners' Exhibit 1001, 12:15:08
IPR2023-00987, previously marked, not attached.) 12:15:19

Q Tab 4, which is being shown on the 12:15:19
screen, is a copy of a document that's previously 12:15:21
been marked as Petitioner's Exhibit 1001 in 12:15:23
IPR2023-00987. And this is U.S. Patent 9,818,803. 12:15:28

Are you familiar with this document? 12:15:40

A Yes. 12:15:42

Q And this is the '803 patent that's one of the patents at issue in these IPRs. Correct? 12:15:42 12:15:48

A Yes. 12:15:51

Q If we turn to Claim 1 of the '803 patent, which begins on Column 8. 12:15:51 12:16:04

Claim 1 requires, quote, "A pixel arrangement structure of an organic light-emitting diode, OLED display, comprising," and then "a plurality of pixels for displaying an image on the OLED display, comprising a first pixel having a center coinciding with the center of a virtual square." 12:16:25 12:16:28 12:16:31 12:16:36 12:16:39 12:16:47 12:16:48

Do you see that? 12:16:48

A I do. 12:16:49

Q Does Matthies discuss the concept of a virtual square? 12:16:49 12:16:52

MR. HERMAN: Objection. Form. 12:16:56

A Matthies provides a quad pixel layout, a repeating quad pixel layout, that can be -- you know, can be shown to make up a virtual square. 12:17:02 12:17:05 12:17:13

So, you know, the same way this is -- the virtual square, the idea is a construct, it's virtual. So that construct can be applied to Matthies as well. 12:17:15 12:17:18 12:17:21

Q But is there any description in Matthies talking about this construct? 12:17:24 12:17:28

A No. But the -- 12:17:31

MR. HERMAN: Objection to form. 12:17:33

A -- basic geometry of Matthies shows exactly this construct. 12:17:34 12:17:37

So it's just a mathematical interpretation or -- that shows you have exactly this construct within Matthies. 12:17:39 12:17:40 12:17:45

So basically what this is describing is just it's a different way of describing the layout that's exactly in Matthies. 12:17:47 12:17:49 12:17:51

Q Is there anything in Matthies that says that laying out the pixels so that they're arranged in this virtual square is important? 12:17:52 12:17:57 12:18:00

MR. HERMAN: Objection. Form. 12:18:10

A Matthies describes, yeah, the square, the tile layout, the fact that the tiles are even, it's all important in Matthies. 12:18:11 12:18:13 12:18:17

So, yeah, the virtual square that the -- yeah. Like, let me -- let me explain how to say this. 12:18:21 12:18:26 12:18:28

Matthies is talking about a regular square array of square pixels, and that is important; the repeatability of that is important. The quad -- the quad array is important. It is -- it is what Matthies is talking about. So it -- the fact that he's making this array in a square is fundamental to Matthies' approach which is the tiling. And that square can also be described as having this -- this virtual square. And so it's basically the same layout, just described in a different way. 12:18:30 12:18:32 12:18:35 12:18:38 12:18:42 12:18:47 12:18:52 12:18:56 12:18:59 12:19:03 12:19:05

MR. HERMAN: Could we pause for a moment. It seems like counsel for the other side is having a technical problem. 12:19:08 12:19:09 12:19:11

VIDEO SPECIALIST: We're going off the record at 12:19 p.m. 12:19:20 12:19:22

(A recess was taken.) 12:19:23

VIDEO SPECIALIST: We're going back on the record at 12:20 p.m. 12:20:29 12:20:33

BY MR. KUDZIN: 12:20:42

Q All right. So I'm just looking back 12:20:46

through your response to the previous question. 12:20:48

When you talk about the square array, 12:20:58

that the quad -- so the quad array, you're talking 12:21:14

about the shape of the quad pixels? 12:21:16

Is that correct? 12:21:18

A Not -- not just that, but their 12:21:21

repeatability. So that it's replicated over the 12:21:24

entire display is important. 12:21:30

Q But in order to find a virtual square, 12:22:36

you need to connect pixels from different tiles. 12:22:39

Correct? 12:22:46

MR. HERMAN: Objection. Form. 12:22:46

A Yeah. But the whole point of Matthies is 12:22:51

that the fact that they're different tiles is not 12:22:54

apparent. But that you have this repeatable 12:22:56

display with the tiles not being apparent, that's 12:23:05

a manufacturing approach. And with that -- with 12:23:07

that arrangement you can make a virtual square, if 12:23:10

you want to describe it like that. It's the exact 12:23:16

same pixel arrangement as what's being described 12:23:19

in the '803 patent. 12:23:22

Q But you're proposing to change the sizes 12:23:23

of the pixels. Correct? 12:23:29

A The sizes but not the arrangement. It's 12:23:31

not me. It would be obvious to a person of skill 12:23:35

in the art that you could maintain the 12:23:38

arrangement, the quad pixel arrangement, and apply 12:23:41

the Yamada motivation, and that's exactly what the 12:23:45

'803 patent is describing. That's -- that would 12:23:49

be an obvious thing to do. 12:23:52

Q And in some combinations you actually 12:23:58

change the shapes of the pixels. Correct? 12:24:00

A Matthies discusses using rectangles, I 12:24:03

believe, and Yamada discusses using different 12:24:11

shapes. So that would be on the table for a 12:24:13

person of skill in the art to achieve various 12:24:15

design considerations as well. 12:24:17

Q Okay. And, in fact, Yamada -- sorry, 12:24:19

Matthies shows examples where the pixels have 12:24:24

rectangular shapes, correct, as you said? 12:24:32

A Yeah. 12:24:35

Q Okay. And an example of that is shown in 12:24:36

Figure 7 of Yamada. Correct? Sorry. Let me reask that. 12:24:40 12:24:45

That's shown in Figure 7 of Matthies. 12:24:46

Correct? 12:24:49

A If you could just pull it up. I don't want to rely on my -- 12:24:49 12:24:52

Q Sure. If we could go to Paragraph 167 of your declaration. And in -- you have a copy of Figure 7 there. Correct? 12:24:55 12:24:57 12:25:23

A Yes. So Matthies, Figure 7. 12:25:26

Q Okay. And the pixels are wider than they are tall. Correct? 12:25:28 12:25:34

MR. HERMAN: Objection. Form. 12:25:35

A Can you repeat -- can you repeat that question? I didn't -- I didn't hear that. 12:25:36 12:25:37

Q Sure. The pixels there are wider than they are tall. Correct? 12:25:39 12:25:43

A In that figure I don't think it's actually meant to be, like, a schematic design. It's just meant to show the layout. Figure 8 I think shows -- well, explicitly says that the height and width are the same. So, you know, 12:25:49 12:25:50 12:25:53 12:25:56 12:26:00

the -- with all these patents, with this one, the figures are meant to demonstrate a feature, and a person of skill in the art can use the figures to learn that and exemplify that feature without -- without I think them being exactly precise. 12:26:05 12:26:11 12:26:15 12:26:17 12:26:21

Q Is there any reason why when changing the size and the shapes of the pixels the pixels would still form a virtual square? 12:26:28 12:26:39 12:26:44

A Why they would? 12:26:51

Q Yes. 12:26:52

A I don't understand why would they not. They would -- they could still form a virtual square, yes. 12:26:54 12:26:59 12:27:01

Q Would they always form a virtual square as you change the size and shapes of the pixels? 12:27:01 12:27:09

MR. HERMAN: Objection. Form. 12:27:12

A It just depends on -- I'm not sure they would always, but they always could, depending on what the design objectives were for the person of skill in the art for the engineer. You know, what Matthies shows is that they could. My demonstrative shows that they could form a virtual 12:27:13 12:27:15 12:27:19 12:27:21 12:27:27 12:27:29

square. And like I said, virtual square is just another way of describing a pretty obvious and basic pixel layout. 12:27:32 12:27:35 12:27:38

Q Is there anything in Matthies that says that as you change the size and the shapes of the pixels, you should do it in a way to make sure that you always have a virtual square? 12:27:40 12:27:45 12:27:49 12:27:52

MR. HERMAN: Objection. Form. 12:27:54

A Number 1, I'm talking about the combination of Matthies with Yamada. But with Matthies, when you change the shape, you still need to have a repeatable array of pixels, which I think would imply or would mean that you would have -- you would have -- you would maintain a virtual square, yeah. 12:27:59 12:28:01 12:28:07 12:28:12 12:28:18 12:28:24 12:28:26

Q If we look at -- going back to Paragraph 229 of your expert report, where you show your combination of Matthies and Yamada. 12:28:27 12:28:55 12:29:00

(Discussion off the record with the court reporter.) 12:29:16 12:29:17

A Sorry, I am orienting myself. I'm there. 12:29:33

Q So as we discussed earlier, in this 12:29:35

layout the green pixels are a different distance away from the edge of the pixel than the blue pixels are. Correct? 12:29:39 12:29:43 12:29:45

A The green subpixels -- 12:29:48

Q Sorry, the edge of the display. 12:29:50

A From the edge of the tile. 12:29:53

Q Yeah, sorry, from the edge of the tile. The green pixels are a different distance away from the edge of the tiles than the blue pixels. Correct? 12:29:55 12:29:57 12:29:59 12:30:04

A Yes. 12:30:04

Q But you could move the green pixels, say, up and to the left and down to the right so that they were exactly the same distance to the edge of the tile. Correct? 12:30:05 12:30:09 12:30:12 12:30:14

MR. HERMAN: Objection. Form. 12:30:15

A Well, Matthies teaches that you could do different pitches, but not -- not random pitches. Right? You'd want to maintain the pitch. And you'd want to maintain the repeatability of the -- of the subpixels, or of these pixels when you tile them. So, of course, it's possible you could come 12:30:18 12:30:20 12:30:26 12:30:31 12:30:37 12:30:40

up with other embodiments that do different things and have different spacings. But this is a pretty obvious spacing of just resizing the pixels that Matthies shows and provides in the quad pixel array, the subpixels, and resizing them with respect to the teachings of Yamada. 12:30:44 12:30:48 12:30:54 12:31:00 12:31:04 12:31:07

So this is a pretty obvious combination. Of course people could do all sorts of different things; I'm just not sure why they would. But people have their reasons, for sure. 12:31:10 12:31:15 12:31:18 12:31:21

Q So I guess I'm a little confused. What do you mean by "pitch"? 12:31:24 12:31:26

A That's this -- the spacing between the pixels. 12:31:29 12:31:32

Q Between which pixels? 12:31:34

A Well, in this example, going back to, let's say, Figure 8B, it's that -- it's the spacing between the green and red and the blue and green, and kind of all the spacing. It's the fact that the spacing between the pixels is the same even when you add tiles. Right? Even among tile to tile to tile, the spacing between the pixels is 12:31:36 12:31:41 12:31:47 12:31:51 12:31:55 12:32:00 12:32:02

consistent. 12:32:05

Q Okay. So then the pitch refers to what in Figure 8B is called dSI? 12:32:08 12:32:11

A No, I don't think that's exactly right. It would not be -- it would be more I think in this -- in this case center to center. So it would be -- it would be I think -- well, it's P. Right? This number in Table 2, .25P? 12:32:16 12:32:20 12:32:27 12:32:30 12:32:37

So dSI is .25P. But I think P would be 1. So the pitch in this case is the whole width of the tile, or the height of the tile. 12:32:43 12:32:51 12:32:54

Q So it's not the distance between the individual subpixels. 12:32:58 12:33:03

A Yeah, but they need to be consistent tile to tile to have a regular display. 12:33:05 12:33:07

Q So consistently in all of the tiles, you could move the green pixels so that they are the same distance away from the edge of the tile as the blue pixel. Correct? 12:33:09 12:33:13 12:33:18 12:33:21

MR. HERMAN: Objection. Form. 12:33:23

A A person could choose to do that. You could choose to do all sorts of things. But, you 12:33:27 12:33:30

know, they could also -- and it would be maybe most obvious, to choose to use the basic teachings of Matthies' quad array and then apply -- simply apply Yamada's teachings to it. 12:33:37 12:33:40 12:33:43 12:33:49

Q But one of Matthies' teachings is to keep the pixels a uniform -- evenly spaced to the edge of the tile. Correct? 12:33:51 12:33:56 12:33:59

MR. HERMAN: Objection. Form. 12:34:00

A That's an embodiment of the basic quad teaching, but I don't -- a person of skill in the art wouldn't take that as -- as gospel. That's, you know -- I think it's -- the regularity is really more critical. 12:34:01 12:34:04 12:34:08 12:34:15 12:34:18

Q How would the -- how would moving the green pixels so that they're the same distance to the edge of the pixel change the uniformity? 12:34:20 12:34:25 12:34:28

A How would it -- I didn't say anything about the uniformity. I said regularity. 12:34:33 12:34:34

Q Sorry, how would it change the regularity? Wouldn't it still be regular? 12:34:37 12:34:39

A You could make it regular. But the question would be, you know, why would you make 12:34:41 12:34:42

that design choice? That's not clear. 12:34:46

So, obviously, you can apply Yamada to Matthies and come up with this virtual square idea. So I don't -- I don't know why somebody would -- a person with skill in the art wouldn't do that. Of course they could. But it's not -- I don't see the motivation. 12:34:52 12:34:56 12:35:03 12:35:07 12:35:10 12:35:14

Q What's the motivation to have a virtual square? 12:35:15 12:35:20

A Well, this is what Matthies shows. Right? This is the quad pixel. And the appearance of each pixel when you look closely would appear to be equally bright and equally spaced. So each subpixel. Because like I said, we're sizing these based on efficiency, so they would have the same brightness, the same perceived brightness, and the same spacing over -- over the course of the entire display. 12:35:25 12:35:31 12:35:37 12:35:39 12:35:42 12:35:48 12:35:53 12:35:55 12:35:59

Q Does the brightness of the pixel depend on its location within the quad pixel? 12:36:04 12:36:08

A Not the brightness, but the -- if you looked closely, the actual place where the light's 12:36:13 12:36:16

coming out depends on the location. Right? 12:36:23

So there would be even spacing. If you 12:36:26

looked closely you would see even spacing among 12:36:29

these pixels and among the light sources. A 12:36:32

person would perceive them to be uniformly bright 12:36:35

and uniformly spaced. 12:36:37

Q Do you think a person looking at one of 12:36:43

these displays can see the different -- can see 12:36:47

the individual red, green, and blue pixels? 12:36:53

MR. HERMAN: Objection to form. 12:36:56

A No. No. But I think if they looked 12:36:58

closely, they could -- they could look. But, 12:37:04

yeah, I think -- I think this gives a more even 12:37:08

layout for the entirety of the display. Because 12:37:14

they do see the aggregation of all of the pixels, 12:37:17

and this is a uniform layout among the pixels. 12:37:22

MR. KUDZIN: All right. If we can bring 12:38:20

up Tab 12, please. 12:38:21

(Petitioner Exhibit 1005, IPR2023-00987, 12:38:25

previously marked, not attached.) 12:38:34

Q You're being shown what's previously been 12:38:34

marked as Petitioner's Exhibit 1005 in 12:38:36

IPR2023-00987. It is a copy of U.S. Patent Number 7,091,986. 12:38:42 12:38:48

Do you recognize this document? 12:38:53

A Yes. 12:38:55

Q And this is a patent that you referred to in your declaration as the Phan reference. 12:38:55 12:39:01

Is that correct? 12:39:04

A That's correct. 12:39:10

Q So if I refer to it as Phan, you'll understand what I'm talking about? 12:39:10 12:39:13

A Yes, I will. 12:39:15

Q The title of Phan is Dynamic Pixel Resolution, Brightness and Contrast for Displays Using Spacial Elements. 12:39:15 12:39:23 12:39:28

Do you see that? 12:39:31

A Yes. 12:39:32

Q What is meant by "dynamic pixel resolution"? 12:39:32 12:39:40

A Basically I believe he's meaning that, if you look at that figure right there in this -- in this page, you have one pixel consisting of four subpixels. Again, it's the quad pixel array, with 12:39:40 12:39:42 12:39:46 12:39:51

red and green and green and blue laid out in basically a square array. And then you have a neighboring pixel of that same combination, red-green, green-blue. 12:39:56 12:40:00 12:40:03 12:40:08

What he's talking about is that how it's controlled could be not just as that whole group four subpixel grouping, but could be controlled using the two -- the two cross-over groupings, like the second circle. 12:40:09 12:40:11 12:40:17 12:40:22 12:40:24

So it's that, again, green-red blue-green quad pixel array that just gets controlled separately. And he says that this can give better resolution with the display. 12:40:26 12:40:33 12:40:36 12:40:38

Q How does this give you better resolution? 12:40:40

A I think just that intermediate control of the intermediate pixel. Instead of controlling one chunk and one chunk and you have whatever that pitch is between those quad pixels, now you have the ability to control the intermediate chunk. So at its simplest, instead of the pitch being the -- and the resolution being based on the quad pixel to quad pixel spacing, it's half the quad pixel to 12:40:47 12:40:50 12:40:53 12:40:58 12:41:00 12:41:03 12:41:07 12:41:11

quad pixel spacing, so you can conceivably double the resolution. 12:41:16 12:41:19

Q Are you aware of any displays that use Phan's dynamic pixels? 12:41:20 12:41:23

A This is from 2003. I'm not aware of whether this is used or not. I would say more generally people are kind of more granular in the control of the individual subpixel elements, so they get these benefits -- most likely get these benefits in modern displays anyway. This is, what, over 20 years old. So I'm not sure how much it's being applied. 12:41:31 12:41:32 12:41:38 12:41:40 12:41:43 12:41:47 12:41:50 12:41:54

Q What do you mean that "they get the benefits"? 12:41:54 12:42:01

A Well, instead of kind of controlling the pixels as a chunk, as a discrete grouping, you can -- you can control the subpixels independently. 12:42:06 12:42:08 12:42:15 12:42:18

Q Phan discloses a lot of different pixel ranges, doesn't it? 12:42:26 12:42:30

A Let's look. 12:42:31

Q If we turn, for example, to Figure 1? 12:42:36

A Yeah, 1A, 1B, 1C shows a schematic. I wouldn't -- I wouldn't design around these arrangements, but a schematic of different quad pixel arrangements. There's red-green green-blue, blue-red green-blue, red-green blue-red. So where there -- within the quad pixel, the two pixels he shows could be different -- different colors. 12:42:45 12:42:51 12:42:55 12:42:59 12:43:02 12:43:07 12:43:11

Q And if we look at Figure 3, it shows even more pixel arrangements. Correct? 12:43:15 12:43:20

A Yes. 12:43:25

Q Figures 3A and 3B are RGB stripe arrangements. Correct? 12:43:25 12:43:33

A That would be my assumption, yeah. 12:43:35

Q Figure 3E is what might be called a delta arrangement. Correct? 12:43:37 12:43:41

A Yeah, some sort of triangular arrangement. And 3D shows also kind of different shapes of pixels made into a square with just three pixels. They have kind of triangular and octagonal shapes. So, yeah, so there's people skilled in the art were aware that you could make pixels of all different sizes and shapes and 12:43:46 12:43:49 12:43:53 12:43:59 12:44:03 12:44:07 12:44:10

arrangements, even as early as 2004. 12:44:13

Q Is there anything in Phan that says that one pixel arrangement is better than another? 12:44:20 12:44:23

MR. HERMAN: Objection. Form. 12:44:29

A I don't recall. I do show, you know, this quad arrangement, and they tend to show more often the red-green, green-blue arrangement in their -- in their diagrams. Perhaps -- yeah, I don't want to speculate. I don't recall if they show one being the better. They certainly show the red-green, green-blue more often in their -- in their figures. 12:44:31 12:44:36 12:44:42 12:44:47 12:44:54 12:44:59 12:45:01 12:45:05

Q Okay. But they also have figures showing the RGB stripe arrangements. Correct? 12:45:06 12:45:09

A Yeah. That's what I just said. They show multiple arrangements. I just think they do show, make a point of showing the red-green green-blue quad kind of predominantly. 12:45:13 12:45:16 12:45:23 12:45:27

Q In your opinions you're relying on the quad pixel arrangement. Correct? 12:45:30 12:45:40

A Yeah. If you want to go to the opinion, it might be helpful. 12:45:44 12:45:47

Q Sure. Is there any particular part of the opinion you want to go to? 12:45:50 12:46:06

A It's your question. 12:46:08

Q Well, you're relying -- in your opinion you're relying on the pixel arrangement shown in Figure 1A. Correct? 12:46:13 12:46:15 12:46:20

A Yeah. But like I said, it would be helpful if we could just go through in my -- you know, there's multiple opinions in my opinion. And just to be as clear as possible, if we could get there, that would be good. 12:46:22 12:46:25 12:46:28 12:46:31 12:46:36

Q Sure. So why don't we turn to your declaration with respect to the '803 patent, and Paragraph 344. 12:46:38 12:46:42 12:46:49

A 344? 12:46:53

Q Yeah. 12:46:54

A Okay. 12:47:01

Q And if you look at the -- at the figure at the end of that paragraph, you're relying on the pixel arrangement structure shown in Figure 1A. Correct? 12:47:04 12:47:09 12:47:11 12:47:15

A Yes, that's true. 12:47:15

Q And you don't offer any opinions with respect to the pixel arrangement shown in Figure 1B. Correct? 12:47:17 12:47:20 12:47:25

A I don't think I do. I mean, the -- this arrangement that Phan teaches, you know, shows -- you know, shows the arrangement that the '803 is describing. So, yeah, this teaches that particular arrangement, so that's, you know, why I'd say it's made it obvious. 12:47:30 12:47:34 12:47:41 12:47:47 12:47:51 12:47:56

Q Okay. And you don't rely on the pixel arrangement shown in Figure 1C either, do you? 12:47:59 12:48:03

A No. 12:48:06

Q Okay. You don't rely on the pixel arrangement shown in Figure 3A? 12:48:07 12:48:11

A No, not -- not the stripe arrangement. That's not -- I don't rely on that. 12:48:18 12:48:23

Q Okay. Or, in fact, any of the other pixel arrangements shown in Figure 3? 12:48:24 12:48:26

A No. It's -- the quad pixel array, right, is -- this teaches, this Phan teaches the quad pixel array with -- with the blue-green green-red layout in a square. So I focused on that because 12:48:30 12:48:36 12:48:41 12:48:48

that's what the '803 is talking about. They're describing that same array in a different way. 12:48:51 12:48:56

So what I was trying to communicate was that that array was known, known by Phan, presented by Phan. You know, not all -- not all of those arrays in Phan were -- were recycled by the '803 patent, but that -- that one was. 12:49:00 12:49:01 12:49:05 12:49:09 12:49:17

Q So you chose to focus on Figure 1A because that's what's in the '803 patent, as far as you're concerned? 12:49:19 12:49:22 12:49:26

MR. HERMAN: Objection. Form. 12:49:26

A I was looking for -- looking at prior art to see if there was an obvious combination that would -- that would show that this was -- was an obvious thing to do. 12:49:28 12:49:33 12:49:41 12:49:46

So I wouldn't look at stripe arrangements. That I would, of course, acknowledge they existed. But I was -- I was trying to see if -- you know, if -- if a person of skill in the art would have been taught that that particular quad arrangement existed, and they would have been. 12:49:48 12:49:54 12:49:55 12:49:57 12:50:01 12:50:05 12:50:09

Q Does Phan describe any OLED displays? 12:50:13

A I believe he mentions that the work is applicable to organic electroluminescent displays, which are OLED displays. 12:50:21 12:50:24 12:50:30

Q Just so that we're all on the same page, if we can go to Column 1 of the -- of Phan? 12:50:34 12:50:37

MR. KUDZIN: Can we go to Column 1, please? Thanks. 12:50:44 12:51:16

Q And if we scroll down to, I guess it's about Line 18, under the Field of the Invention, it says, "The invention relates to a display comprising pixels and dots including but not limited to the following display technologies: Cathode Ray Tube (CRT), Field Emission Display (FED), Vacuum Fluorescent Display (VFD), Plasma Display Panel (PDP), Liquid Crystal Display (LCD), Light Emitting Diode (LED), Organic Light Emitting Diode (OLED), Polymer Light Emitting Diode (PLED), Electroluminescence (EL), Electronic Inks, Surface Emitting Display (SED), Digital Light Processing (DLP), Electromechanics, Phototronics, Biotronics and any light sources known or invented in the 12:51:27 12:51:29 12:51:34 12:51:36 12:51:39 12:51:44 12:51:50 12:51:58 12:52:03 12:52:09 12:52:16 12:52:23 12:52:27 12:52:34

future as well as a method for controlling the (said) display." 12:52:37 12:52:40

Is that right? 12:52:40

A That's what it says. 12:52:41

And I would note that a polymer light emitting diode is also a category of organic light emitting diode. 12:52:42 12:52:44 12:52:49

Q Is there any other disclosure in Phan about OLEDs, other than this one sentence? 12:52:49 12:52:51

A I don't -- don't recall. But that one sentence would be enough to point a person of skill in the art to consider this. 12:52:55 12:52:58 12:53:02

Like I said before, I don't think when a person of skill in the art looking for -- you know, to get taught, they're not going to artificially limit themselves. And so this does include OLED displays, two categories of OLED displays, at least. And to teach a person of skill in the art the quad pixel arrangement. 12:53:05 12:53:08 12:53:14 12:53:18 12:53:21 12:53:28 12:53:30

Q Does Phan ever say that the quad pixel arrangement should be used with OLED displays? 12:53:36 12:53:39

A I think that's -- he teaches that. I'm 12:53:45

not sure if he explicitly says that. But when he says this -- this patent, field of invention, can includes OLED displays and shows a quad pixel, then I think he's obviously teaching that. 12:53:48 12:53:51 12:53:56 12:54:02

Q So a person of ordinary skill in the art, reading Phan, would understand Phan to be saying that a quad pixel arrangement is an appropriate pixel arrangement structure for an OLED? 12:54:04 12:54:06 12:54:11 12:54:14

A I don't think he said "appropriate." I think he says it's -- he teaches that it's possible, that it's, you know, on the table, especially in light of what he's trying to focus on, which is this increased resolution approach, which applies to all of these -- all of these display technologies. 12:54:20 12:54:21 12:54:24 12:54:28 12:54:30 12:54:34 12:54:38

But, yeah, a person who is of skill in the art, who is working on OLEDs and says -- and reads this and says that the field of invention is OLEDs, and it shows a quad pixel array that lines up pretty well with the fundamentals of OLEDs, they would certainly learn that this could be a usable layout for OLEDs. 12:54:40 12:54:43 12:54:47 12:54:50 12:54:53 12:54:56 12:55:00

Q When you said a minute ago what he's trying to focus on is this increased resolution approach, you're talking about the dynamic pixels that we were talking about a minute ago? 12:55:05 12:55:12 12:55:15 12:55:19

A Yeah. That's what you asked me about before. 12:55:21 12:55:22

Q Yeah. I just wanted to make sure we were talking about the same thing. Okay. 12:55:23 12:55:25

And so Phan is saying that that idea of using these dynamic pixels, you could use that with, you know, any type of display technology, including those listed in this paragraph. Right? 12:55:29 12:55:32 12:55:35 12:55:39

A Yes. He is saying that the field of the invention is all of these -- all of these display technologies, including organic LED and polymer LEDs. 12:55:43 12:55:46 12:55:49 12:55:54

Q And that this -- you can use these dynamic pixels with all of them? 12:55:55 12:56:00

A I think that's -- that's what he's getting at, yes. And you can use these -- these layouts potentially with all of them. 12:56:03 12:56:05 12:56:08

Q And you can also use these dynamic pixels 12:56:10

with any light source known or invented in the future. Correct? 12:56:14 12:56:19

A That's what he's claiming. 12:56:20

Q How can he possibly say that? 12:56:21

A I don't understand. He said it. 12:56:26

Q I mean, do you agree with that, I mean, that there's -- that this invention will work with anything, any type of light source that might be invented in the future? 12:56:28 12:56:30 12:56:32 12:56:34

MR. HERMAN: Objection. Form. 12:56:39

A I don't think it's -- yeah, I do agree with it. Yeah. 12:56:40 12:56:42

Q Okay. You were talking about polymer light-emitting diodes a moment ago. What are polymer light-emitting diodes? 12:56:43 12:56:49 12:56:52

A Well, there's basically, you can -- you can organize organic light-emitting diodes into small-molecule organics and polymer organics. It's just a different category of an organic light emitter that -- that can be used. It's got -- it's more amenable to, like, liquid deposition, so you could -- you could use it in different 12:56:57 12:57:00 12:57:04 12:57:08 12:57:12 12:57:17 12:57:22

instances. There might be some cost benefits, other design considerations. But it is an organic light-emitting -- light emitter, so it comes under the umbrella of organic light-emitting diodes. 12:57:24 12:57:29 12:57:31 12:57:35

Q Just can you clarify when you say, "it's more amenable to, like, liquid deposition," which type are you talking about? 12:57:39 12:57:45 12:57:50

A Polymer. 12:57:52

Q The '803 patent talks about using vapor deposition. Correct? 12:57:55 12:58:03

A There's -- I think, well, they all share the same specification, I think, I believe. Right? They all have -- all the patents at issue have the exact same specification. 12:58:08 12:58:11 12:58:14 12:58:16

It is -- I think it does very briefly touch on vapor deposition, and it mentions fine metal mask in the specification, just one line, kind of one embodiment. But there's no claim limitation around any manufacturing method or -- yeah, deposition process or pattern deposition process in the claims. 12:58:21 12:58:24 12:58:28 12:58:33 12:58:35 12:58:38 12:58:42

You know, so it's -- it's agnostic, I'd 12:58:45

say, you know, beyond that -- that one mention of a portion of an embodiment, which doesn't really teach anything particularly about the claims. Especially because the claims don't have any absolute sizing involved or -- it's all relative. Right? So you kind of can imagine the way, the claims are written, they could be stretched out like an accordion or in. Right? And the relative spacings and sizings would still apply. So there's no real tether there to any -- any particular manufacturing method. 12:58:48 12:58:52 12:58:57 12:59:03 12:59:06 12:59:09 12:59:12 12:59:15 12:59:18 12:59:22 12:59:25

Q Can polymer light-emitting diodes be manufactured using vapor deposition? 12:59:29 12:59:32

A I believe they can. 12:59:35

Q Okay. The vapor deposition isn't going to damage the polymers? 12:59:36 12:59:40

A Excuse me? 12:59:42

Q The vapor deposition process won't damage the polymers? 12:59:42 12:59:45

A The polymers are generally more robust than the small-molecule materials. 12:59:47 12:59:49

Q In this list Phan identifies 12:59:55

electroluminescence as a separate category from OLEDs. Correct? 13:00:00 13:00:06

A Yeah. Yeah. 13:00:06

Q What's meant by electronic inks? 13:00:07

A Electronic inks? I'm not entirely sure, but maybe 20 years ago there was some prospect for, I don't know, some -- some ink. It kind of sounds like a polymer OLED. But, yeah, I'm not -- I'm not certain what he -- what he was intending or thinking of. 13:00:15 13:00:21 13:00:29 13:00:32 13:00:37 13:00:41

Q What's a surface emitting display, SED? 13:00:43

A Yeah, I don't -- I don't know what that one is either. I'd have to look it up. I mean, these -- these technologies, you know, in the context of the time was, OLEDs were coming on strong and a pretty interesting technology. But there were other -- other possibilities out there. So I don't -- I don't know, you know, some of these exotic biotronics, phototronics, exactly what he was thinking. Except like you suggested, he was maybe future-proofing this -- this concept. 13:00:51 13:00:53 13:00:59 13:01:02 13:01:08 13:01:12 13:01:15 13:01:19 13:01:24 13:01:26

MR. KUDZIN: We've been going for about 13:01:37

an hour, so why don't we take a break here and take our lunch. 13:01:38 13:01:41

VIDEO SPECIALIST: We are going off the record at 1:01 p.m. 13:01:45 13:01:46

(A recess was taken.) 13:01:52

VIDEO SPECIALIST: We are going back on the record. The time is 1:35 p.m. 13:35:21 13:35:23

BY MR. KUDZIN: 13:35:25

Q Welcome back, Dr. Pattison. 13:35:26

A Thank you. 13:35:28

Q So before the break we were talking about the Phan. And in particular we had been talking about Phan's use of dynamic pixels. 13:35:28 13:35:35 13:35:44

Do you recall that? 13:35:49

A Yes. 13:35:49

Q And one of the reasons that Phan recommends using dynamic pixels is because of problems with increasing the resolution of displays. 13:35:50 13:35:51 13:35:54 13:35:57

Isn't that right? 13:35:58

A Yeah, the opportunity, let's say, not problem. But the opportunity to increase the 13:36:00 13:36:02

resolution. 13:36:04

Q Well, if we go to Column 2 of Phan, 13:36:05

Paragraph beginning at Line 26. He says, "One 13:36:15

drawback of this kind of display is that the 13:36:25

number of pixels is limited by the fixed grid, 13:36:28

which limits the resolution and the picture 13:36:31

sharpness as well." 13:36:33

Do you see that? 13:36:35

A I do. 13:36:36

Q And he goes on to say, "The finer the 13:36:37

grid, the higher the resolution. The fineness of 13:36:45

the grid itself is limited by manufacturing 13:36:48

technology, however, because the cathode ray tubes 13:36:51

that are used for displays comprise so-called 13:36:56

shadow masks having holes therein, which cannot be 13:37:00

reduced to whatever size unless one puts up with 13:37:03

considerable expenditures." 13:37:07

Do you see that? 13:37:08

A Yes. 13:37:09

Q Okay. And Phan is trying to use these 13:37:09

dynamic pixels to overcome some of those 13:37:13

limitations. Correct? 13:37:18

A Yes, that's -- that's what he's saying. 13:37:19

Q And then in the next paragraph he goes on to talk about LCD displays. "Likewise, in LCD displays, the integration of a great number of thin film transistors (TFT) is extremely expensive and very prone to produce major amounts of rejects." 13:37:21 13:37:25 13:37:31 13:37:33 13:37:38 13:37:40

Do you see that? 13:37:41

A Yes. 13:37:42

Q When he's talking about the great number of thin film transistors, he's talking about problems with active matrix displays. Correct? 13:37:42 13:37:44 13:37:47

A Active matrix LCD in this case, but yeah. 13:37:54

Q And then he goes on to talk about problems with plasma displays. Quote, "In plasma (PDP) or in FED displays, the technical and economical manufactured size of an RGB pixel is physically limited by the mass production technology itself, and further reduction of the RGB pixel size for higher resolution cannot be achieved without huge manufacturing equipment costs" over -- and overproportion of scraps which 13:37:56 13:37:58 13:38:03 13:38:07 13:38:15 13:38:16 13:38:19 13:38:19 13:38:22

are economically not viable." 13:38:27

Do you see that? 13:38:29

A Yeah. And this goes back to my point 13:38:30

that there are common elements to different 13:38:32

display technologies that a person of skill in the 13:38:35

art can learn from. Right? He's talking about 13:38:37

all these different technologies in the same 13:38:42

breath. 13:38:44

So it's reasonable for a person of skill 13:38:44

in the art to consider other types of display 13:38:46

technologies as they -- as they go through their 13:38:51

process of trying to achieve their design goals. 13:38:53

So that's just an aside. But this kind of makes 13:38:55

that point. 13:38:59

Q And Phan itself is a passive matrix 13:39:12

display. Correct? 13:39:16

MR. HERMAN: Objection. Form. 13:39:18

A I mean, he mentions both types, active 13:39:22

matrix and passive. 13:39:26

Q Where does he mention active matrix 13:39:29

displays? 13:39:33

A The LCD, thin film transistor, is an 13:39:35

active matrix LCD. 13:39:38

Q But he's discussing problems with active 13:39:40

matrix displays. Right? 13:39:43

MR. HERMAN: Objection. To form. 13:39:45

A Yeah. Discussing problems with passive 13:39:46

matrix displays as well. 13:39:49

Q If you turn to Column 3 of Phan, Line 20. 13:39:51

Do I have that right? 13:40:12

No. Sorry, I sent you to the wrong 13:40:21

citation here. Sorry. Column 5, Line 20. 13:40:25

"Network 20 preferably is an optical 13:40:34

fiber network. Control circuitry 19 combines 13:40:37

adjacent dots 11 to form a dynamic pixel 18 in 13:40:40

order to then address these as a logical unit. 13:40:45

Addressing involves high-frequency repetition, 13:40:48

preferably at the rate of minimum 100 hertz for 13:40:51

passive driving display." 13:40:55

Right? 13:40:57

A I see that. 13:40:58

Q So he's specifically talking about 13:40:58

passive matrix here. Right? 13:41:02

A I don't -- I don't take that away from 13:41:03

that paragraph. 13:41:17

Q What's meant by "passive driving display"? 13:41:22 13:41:30

A Okay. Yeah. Sorry. He does -- he does say passive driving display. I'm just trying to -- trying to get my head around what he's meaning here. 13:41:30 13:41:34 13:41:41 13:41:43

But, yeah, 100 hertz preferably -- well, he does say preferably for a passive driving display, kind of suggesting that there could be other -- other driving schemes. 13:41:50 13:41:53 13:41:58 13:42:00

Q Is it your opinion that Phan discusses having different sized pixels? 13:42:05 13:42:42

MR. HERMAN: Objection. Form. 13:42:48

A I mean, he shows it in Figures -- Figure 11B. And so if we go back to my opinion, if we could kind of stick to the -- 13:42:54 13:42:59 13:43:07

Q Okay. 13:43:09

A -- opinion here. 13:43:10

Why don't we call up, yeah, the -- I have to go back to the specific context. 13:43:14 13:43:17

But he does show different sized pixels, 13:43:19

or subpixels. 13:43:22

Q All right. And are you referring -- if 13:43:24

we go back to your '803 declaration, this is 13:43:28

Paragraph 346 maybe and 347? 13:43:35

A Yeah, so he moves a cross point to change 13:43:48

the -- to change the size of the pixels, or the 13:43:52

subpixels, to be clear. 13:43:56

Q When you move the cross point, the red 13:43:59

pixel is always going to be smaller than the green 13:44:07

pixels. Correct? 13:44:09

MR. HERMAN: Objection. Form. 13:44:10

A In that embodiment. But a person of 13:44:13

skill in the art could see, like, okay, there 13:44:16

could be other ways to go. But yeah, in that -- 13:44:18

in that specific embodiment, if you move the cross 13:44:23

pixel in that direction, you would make the red 13:44:27

smaller than the green and the green smaller than 13:44:30

the blue. 13:44:32

Q In your -- and one of your arguments is 13:44:34

that a POSITA would have combined the teachings of 13:45:21

Phan and Yamada. Correct? 13:45:27

A Yeah, let's -- let's get there. Can you 13:45:32

tell me which -- 13:45:44

Q Sure. I think it starts on Page 87 at 13:45:44

Paragraph 404, which talks about Ground 3. 13:45:48

A Yeah. Yes. Thank you. That is one of 13:45:55

my opinions for Claim 5. 13:45:56

Q Yeah. And if we go to Page 426 -- sorry, 13:46:07

Paragraph 426, on Page 91, you have a figure 13:46:10

showing how you think Phan would be modified? 13:46:18

Is that correct? 13:46:21

A Yes. 13:46:23

Q How did you determine the size of the 13:46:23

pixels in this combination? 13:46:29

A I think I tried to maintain the basic 13:46:33

ratio from Yamada. Of course it's -- you can see 13:46:39

it's not an engineering drawing, but it's just a 13:46:43

figure to show, you know, how this could be done, 13:46:46

how it would be pretty easy to do, pretty obvious. 13:46:50

So I'm trying to recall, but I think I tried to 13:46:56

maintain the expressed ratio in Yamada. 13:46:58

Q There are two different ratios that we 13:47:04

talked about in Yamada earlier today. 13:47:09

Do you recall that? 13:47:12

A Yeah. 13:47:14

Q Do you know which one you chose when drawing this figure? 13:47:14 13:47:17

A No, I don't. I don't recall. Like I said, it's -- it's a demonstrative, not an engineering drawing. And, you know, as we talked about, the ratio expressed by Yamada is an embodiment. But the general teaching of resizing the pixels from Yamada for a -- for a quad is what I was trying to express here, for a quad pixel array. 13:47:20 13:47:23 13:47:27 13:47:29 13:47:36 13:47:39 13:47:43 13:47:46

So I hope nobody would take this as an engineering drawing; just trying to make the point of how -- how these could be combined relatively easily. 13:47:47 13:47:49 13:47:54 13:47:57

Q You said a couple of times that this was not an engineering drawing. What do you mean by that? 13:47:58 13:48:08 13:48:10

A It's not like a schematic meant for somebody to go and use in the engineering process to lay out pixels. But like with all of these patents, including the '803 patent and the other 13:48:10 13:48:14 13:48:17 13:48:23

Samsung patents, it's meant to demonstrate the concept of what I'm getting at here, which is the combination of Phan and Yamada. So that's -- that's what I mean. 13:48:27 13:48:29 13:48:34 13:48:38

Q Is the figure shown in Paragraph 426 drawn to scale? 13:48:39 13:48:46

A I think we just talked about that. It was intended to be drawn, and I forget to which scale, but it's intended to demonstrate how it's not very hard to resize the pixels in this quad -- the subpixels in this quad pixel array. So I recall that I intended to draw the area of the pixels to the scale expressed by Yamada. But I don't -- I don't recall exactly which ratio I used, but that that was my intent. 13:48:53 13:48:55 13:48:57 13:49:04 13:49:07 13:49:13 13:49:19 13:49:23 13:49:29

Q What about if we go back a few pages to Paragraph 355. And there's a -- there's a figure at the bottom of that paragraph. 13:49:46 13:49:50 13:50:06

Do you see that? 13:50:07

A I do. 13:50:09

Q That's not a figure that actually appears anywhere in Phan. Correct? 13:50:10 13:50:13

A Well, it's definitely suggested or taught or implied by Phan. I mean, if you have a quad pixel array, the idea is that you wouldn't -- the whole point of having a pixel is that there's not just one; it's an element within a display. So there would be an array. So this is an array of that quad pixel. And then, of course, it got colorized. So it didn't appear in Phan, but it would be obvious from Phan, it would be taught by Phan. 13:50:17 13:50:21 13:50:26 13:50:29 13:50:33 13:50:38 13:50:40 13:50:45 13:50:48 13:50:52

Q Did you draw this figure? 13:50:52

A It was drawn at my direction. 13:50:55

Q Do you know who did draw it? 13:50:57

A Not exactly. 13:51:00

Q Was it drawn by your attorneys? 13:51:04

A Possibly. 13:51:08

MR. HERMAN: Objection to form. 13:51:08

Q Have you discussed your opinions in this case with anyone other than your attorneys? 13:51:17 13:51:20

A No. 13:51:25

Q Did you ask anyone other than your attorneys to draw any figures for you in this 13:51:25 13:51:27

case? 13:51:28

A No. It was drawn at my direction through my attorneys. 13:51:30 13:51:35

Q What directions did you provide as to how this figure should be drawn? 13:51:41 13:51:44

A Let's -- let's make an array of pixels and color them in so it's clear and show how the array can meet the explanation of the idea, the concept of the virtual square. 13:51:46 13:51:51 13:51:56 13:52:02

Q How were the sizes of the pixels in this figure drawn -- or sorry. Let me rephrase that. 13:52:05 13:52:11

How were the sizes of the pixels in the figure in Paragraph 355 chosen? 13:52:14 13:52:17

MR. HERMAN: Objection. Form. 13:52:20

A I believe it's just a duplication of Figure 11B laid out in an array. That's what it -- that's what it looks like to me. 13:52:23 13:52:27 13:52:34

Q Sorry to jump around, but going back to where we were a minute ago in terms of Paragraph 426 and the figure that you've shown there. 13:52:46 13:52:49 13:52:51

A I'm there. 13:53:02

Q Okay. And if we go down to Paragraph 13:53:02

428, just two paragraphs down. It says, "While the pixels are no longer touching each other as they are shown to be in Figure 11A, a POSITA would have understood that there is already a space (even if not depicted) between the pixels to allow for the intermediate signal lines." 13:53:06 13:53:11 13:53:15 13:53:20 13:53:23 13:53:26

Do you see that? 13:53:30

A I do. 13:53:31

Q Does Figure 11A show that the pixels are touching each other? 13:53:31 13:53:34

A Not exactly. I mean, it shows that there's a -- I think they call it a rib material or a black insulator in between, in between the pixels. So like I said in that -- in that paragraph, that the exact size of that intermediate area would be up for design decision. 13:53:37 13:53:39 13:53:43 13:53:50 13:53:54 13:53:57

Q Okay. And you say, "A POSITA would have understood that there's already a space even if not depicted between the pixels to allow for the intermediate signal lines." 13:54:06 13:54:10 13:54:12 13:54:18

So a POSITA would understand that there should be some space that's not shown in Figure 13:54:20 13:54:23

11A? 13:54:26

A Yeah, I guess it's not -- the black area is part of that space, and that space could be expanded. So, yeah, I think a POSITA would be -- it would be pretty clear that that could be adjusted, and that it would need to be adjusted to accommodate these signal lines. It's like -- yeah. I mean, if you looked at that, the aperture ratio of this, it would have a pretty high aperture ratio if you took 11A to B in actual design drawing. 13:54:28 13:54:31 13:54:37 13:54:43 13:54:45 13:54:48 13:54:53 13:54:55 13:54:59 13:55:05

In reality a POSITA would know that that layout can be accommodated without, you know, jamming, you know -- without jamming those -- those light-emitting areas right up against each other as -- as 11A shows. 13:55:06 13:55:08 13:55:11 13:55:14 13:55:17

So it's not -- it's not a stretch for someone to understand that you could -- you could resize and pull apart these quad array from Phan, and it would still, you know, be pretty obvious and pretty predictable, the results from that. 13:55:21 13:55:24 13:55:27 13:55:34 13:55:37

Q In an OLED display at the time of the 13:55:42

'803 patent, what was a typical aperture ratio? 13:55:50

A I forget what they say. I mean, some of 13:55:57

the -- the other pixel layouts, some of the linear 13:56:02

pixel layouts and pentile pixel layouts, seem to 13:56:07

show a pretty high aperture ratio, and then -- you 13:56:11

know, which predate the '803. 13:56:16

But then with the '803 I think that, you 13:56:23

know, while it's claimed that it improves the 13:56:28

aperture ratio, there's no real connection of that 13:56:32

claim in the specification to the actual claim 13:56:35

limitations. And in practice I don't think that 13:56:38

the aperture ratio is improved for other, I 13:56:43

suppose, design reasons. 13:56:48

But, yeah, I don't have an exact number 13:56:53

for that. 13:56:55

Q Matthies talks about an aperture ratio of 13:56:56

about a quarter. Right? 13:56:59

A That's correct, yes. 13:57:01

Q Okay. Would that have been typical for 13:57:01

an OLED display at that time? 13:57:05

MR. HERMAN: Objection to form. 13:57:08

A At the time of the '803 patent? 13:57:09

Q Yeah. 13:57:12

A Yeah, I just don't know. I mean, I think 13:57:15
that some of the linear arrays have much higher 13:57:19
aperture ratios than the -- you know, what the 13:57:23
quad pixel arrays have been done. But -- so I 13:57:27
think -- I think they did have higher aperture 13:57:34
ratios. And I don't think that the '803 patent 13:57:37
actually does anything to -- any inventive aspect 13:57:42
to improve the aperture ratio. It just says that 13:57:49
it does, but then it doesn't say why or how, 13:57:51
especially because there's no absolute spacings or 13:57:54
distances involved. So you could imagine a whole 13:57:56
range of distances and spacings that both improve 13:58:00
and reduce aperture ratio from the '803. 13:58:04

So I don't know the exact answer, except 13:58:06
just in my kind of peripheral understanding, I do 13:58:11
think that some of the linear arrays have higher 13:58:17
aperture ratios than -- than we're ended up with 13:58:21
now. 13:58:25

And like I said, that's a design 13:58:25
consideration, and there might be some other 13:58:27
factors of OLED materials getting brighter and 13:58:29

having a high aperture ratio maybe being less important anymore. So -- so, yeah, it's kind of a complicated answer. Sorry. 13:58:33 13:58:37 13:58:41

Q That's okay. 13:58:43

At the time of the '803 patent was -- was it desirable to increase the aperture ratio? 13:58:46 13:58:50

MR. HERMAN: Objection. Form. 13:58:53

A It would depend. 13:58:55

Q What would it depend on? 13:59:00

A The whole context of the display you're trying to make, what the size was of the display, whether it's a micro display, a cellphone display, a TV, a movie theater or billboard. It would depend on, you know, the drive conditions and it would depend on the materials, qualities. So it's just like a whole range of bigger picture considerations would be -- would be at play. 13:59:04 13:59:07 13:59:13 13:59:15 13:59:22 13:59:25 13:59:28 13:59:30

Q Is there a reason why you would want a smaller aperture ratio? 13:59:37 13:59:39

A Yeah. 13:59:44

Q What would that be? 13:59:44

A Well, it depends on the -- the context of 13:59:46

the display with respect to viewer and the setting and the quality of the -- of the material that you're using. 13:59:52 13:59:58 14:00:00

You might come up against some level of brightness where you don't -- you don't need to jamb more emitters into a -- into an area. So there are absolutely reasons you could want to engineer and use, you know, design a design process and design flexibility to go in different directions. 14:00:01 14:00:03 14:00:06 14:00:10 14:00:14 14:00:18 14:00:21

Q Let's take as an example one of the -- one of the types of displays you talked about, cellphones. 14:00:33 14:00:36 14:00:38

For a -- for an OLED cellphone, would it be desirable to increase or decrease the aperture ratio? 14:00:40 14:00:44 14:00:46

MR. HERMAN: Objection. Form. 14:00:47

A In general -- well, it depends on how good your materials are and the specifics of your OLED structure that you're using. So you can basically imagine that you'd get to a point of, you don't want to make your cellphone brightness 14:00:52 14:00:58 14:01:03 14:01:07 14:01:11

any higher. Right? You know, it's not -- you don't want to make it infinite bright, given standard viewing conditions. So there are situations where you would back off on your aperture ratio because you can achieve the brightness and the resolution you need without -- without jamming more stuff in there. 14:01:14 14:01:19 14:01:22 14:01:24 14:01:28 14:01:30 14:01:33

And then there's other considerations where you might back off the aperture ratio to get more electronics functionality into the space somehow, sensors or something else. 14:01:36 14:01:37 14:01:40 14:01:44

So it's all dependent on the totality of your design considerations. 14:01:47 14:01:50

Q Going back to the figure in Paragraph 426. You said you tried to make the ratio of the areas the same as in one of the embodiments in -- in Yamada. Why is that? Why did you make that choice? 14:02:28 14:02:32 14:02:36 14:02:41 14:02:45

A Just to -- for I guess consistency. I don't think that that -- that's my recollection, first of all. But I don't think that ratio is set in stone or any kind of forever guidance. I don't 14:02:47 14:02:52 14:02:56 14:02:59

think any person of skill in the art would take it that way. But just to show that, you know, while that's not -- that specific ratio isn't set in stone, the idea that blue OLEDs are less efficient and have lower lifetimes at least has been set in stone since the early -- way early 2000s. So that consideration remains, and the ability to make a bigger -- a bigger blue and the motivation to make a bigger blue subpixel remains. 14:03:03 14:03:06 14:03:10 14:03:13 14:03:19 14:03:23 14:03:26 14:03:30 14:03:33

But the specifics, you know, the relative performance of any blue material at a given time compared to the state-of-the-art red and green materials at a stated given time, could change. And I think a person of skill in the art would understand that and make adjustments accordingly. 14:03:36 14:03:38 14:03:42 14:03:45 14:03:48 14:03:50

Q Earlier this morning we were talking about some of the factors that Yamada considers in sizing the pixels, such as the emission efficiency of the pixels, the chromaticity of the individual pixels, and the chromaticity of the white point. 14:03:53 14:03:57 14:04:03 14:04:07 14:04:11

Do you remember that? 14:04:14

A Yes. 14:04:15

Q You didn't do any calculation for Phan in terms of the emission efficiencies or the chromaticity to determine the correct pixel ratio, did you? 14:04:15 14:04:21 14:04:26 14:04:29

MR. HERMAN: Objection. Form. 14:04:29

A My recollection is I just stuck with Yamada's exemplary ratio, but understanding that those considerations will change, the specific targets of those considerations will change, the underlying materials and the OLED emitters will change. 14:04:32 14:04:36 14:04:42 14:04:45 14:04:47 14:04:53

The fact is is that Yamada teaches that the adjustment can be made not -- not an exact ratio, which is definitely something that changes over time. And like I said, anybody, any engineer working on this, would -- would know that without any issue. 14:04:53 14:04:56 14:05:02 14:05:05 14:05:08 14:05:11

Q Talking about the spaces between the pixels in Phan. Does Phan tell you how large those spaces should be? 14:05:32 14:05:35 14:05:42

A No. He -- I think he mentions black ribbed material or a black insulator. So the 14:05:47 14:05:52

implication there is if you're using a black insulator you can space pretty much any spacing you want between the pixels. A person of skill in the art would know that. And you would want to, you know -- if you're a person of skill in the art, you would know that you need to -- you do need to accommodate some sort of electronics whatever your drive scheme is. And so you would design your device accordingly. 14:05:54 14:05:58 14:06:01 14:06:04 14:06:06 14:06:08 14:06:10 14:06:16 14:06:19

Q Does Phan specify whether you have the same spacing in both the vertical and horizontal directions? 14:06:23 14:06:26 14:06:29

MR. HERMAN: Objection. Form. 14:06:30

A Well, Phan shows -- he does show a -- you know, the quad -- the two versions of the quad pixel array with the different relative areas of the emitter areas. And then that would be repeated over the course of the whole -- whole display. 14:06:36 14:06:45 14:06:50 14:06:54 14:06:59 14:07:03

You know, so you would -- you would keep the spacings constant. But I don't think beyond mentioning that it could be a black insulator or 14:07:05 14:07:06 14:07:12

ribbed material that the -- he discusses it any further, in my recollection. 14:07:16 14:07:20

Q So if you needed more circuitry running, you know, up and down the -- from the -- up and down the display than you did from left to right, the vertical spacing between pixels may be greater than the horizontal spacing between the pixels? 14:07:21 14:07:25 14:07:28 14:07:32 14:07:36

MR. HERMAN: Objection. Form. 14:07:41

A It's like -- it's like I said before. Yes, that could be done. A lot of things could be done. And this spacing, this explicit spacing, is one of them, you know, that he teaches. 14:07:42 14:07:44 14:07:48 14:07:53

So, you know, could there be other arrangements? Yes. But a person of skill in the art would clearly take away this arrangement, and especially when combined with Yamada, you know, come to a solution that's a quad -- a quad pixel array with different pixel sizing. It's pretty -- pretty easy job. 14:07:59 14:08:03 14:08:06 14:08:10 14:08:13 14:08:16 14:08:20

Q Sorry, when you say, "this explicit spacing," what explicit spacing are you referring to? 14:08:22 14:08:25 14:08:28

A Well, you're hypothesizing a change in vertical versus horizontal spacing. I'm going back to this suggestion in 11B that the spacing is at least, you know, similar in vertical or the same vertical and horizontal directions. 14:08:28 14:08:32 14:08:35 14:08:39 14:08:42

Q I wasn't suggesting changing anything. I'm just trying to understand what it is that Phan -- what you -- what your opinion is as to what Phan discloses. 14:08:44 14:08:46 14:08:48 14:08:50

A No. I think you said that whether if you changed the horizontal and not the vertical spacing, which is not -- not suggested by Phan. 14:08:52 14:08:55 14:08:57

It's possible someone could do that. But I think that's what you said. 14:09:03 14:09:05

Q Sorry. If I did, I apologize. 14:09:07

Is it your understanding that the figures in Phan are drawn to scale? 14:09:12 14:09:15

A I would say it like this: It's my understanding that the emission areas are drawn to scale, but not -- they're embodiments, and not set in stone. So the -- because he kind of glosses over the -- the intermediate area for the rib, you 14:09:19 14:09:21 14:09:25 14:09:33 14:09:36

know, I don't think you would limit yourself to the -- that relative spacing between the active region and the intermediate region. 14:09:43 14:09:47 14:09:50

But I do think that he's intentional when going from 11 -- 11A to 11B, that the areas would size like that. 14:09:53 14:09:56 14:10:01

Now, that said, you know, we can extend that thinking with Yamada and come up with another alternative. 14:10:03 14:10:09 14:10:11

So, yeah, I think that emission areas are generally spaced into his embodiments. But when viewed in light of Phan -- Yamada, a person skilled in the art would make an easy jump to a different relative emission areas and spacings. 14:10:12 14:10:17 14:10:23 14:10:27 14:10:30

MR. KUDZIN: All right. Can we bring up Tab 014, please, and make it available to folks in the chat. 14:10:56 14:10:58 14:11:03

(Petitioner Exhibit 1007, IPR2023-00987, previously marked, not attached.) 14:11:03 14:11:12

Q You are being shown what's previously been marked as Petitioner Exhibit 1007 in IPR2023-00987. It is a copy of Japanese examined 14:11:12 14:11:13 14:11:19

patent application JP 4496852. 14:11:27

Do you recognize this document? 14:11:37

A Yes. I think we've -- I refer to it as Murai. 14:11:38 14:11:41

Q Okay. And if I do the same, you'll understand what I'm talking about? 14:11:42 14:11:45

A Yes. 14:11:47

Q Does Murai describe any OLED displays? 14:11:47

MR. HERMAN: Objection. Form. 14:11:55

A Yes, it does. I have to find it again. But I think he calls it -- maybe it's the one he calls it an organic electroluminescent device. 14:12:00 14:12:06 14:12:10

Q Are you referring to -- if we can turn to Paragraph 58. 14:12:14 14:12:20

A Yes. 14:12:32

Q The Paragraph 58 says, "The color image display device according to the present invention can be applied to liquid crystal display devices, organic EL display devices, plasma display devices, projectors, and the like." 14:12:33 14:12:36 14:12:39 14:12:42 14:12:47

Correct? 14:12:48

A Yes. 14:12:50

Q And it's your opinion that organic EL display devices refers to OLEDs? 14:12:50 14:12:58

A Absolutely. Electroluminescent device, LEDs are electroluminescent devices. And organic LEDs are LEDs. So an organic electroluminescent device is just that, another -- another way to say an OLED. 14:13:04 14:13:08 14:13:08 14:13:12 14:13:14

Q But when we were looking at Phan, Phan explicitly distinguished between OLEDs and electroluminescent devices. Correct? 14:13:15 14:13:19 14:13:23

MR. HERMAN: Objection to form. 14:13:25

A Yeah, he does. 14:13:26

Now, there are a flavor of electroluminescent devices which use a different type of electroluminescence than LEDs. But they are both electroluminescent devices, and both referred to -- LEDs are constantly referred to as electroluminescent devices. 14:13:28 14:13:32 14:13:35 14:13:40 14:13:43 14:13:48

So while there may be some difference in some kind of jargon between Japan and the U.S. or the way some people frame this, an organic electroluminescent device absolutely includes an 14:13:48 14:13:50 14:13:55 14:13:59

OLED. 14:14:04

Q But at least some people such as Phan refer to electroluminescent devices as a distinct category from OLED devices. Correct? 14:14:04 14:14:07 14:14:11

MR. HERMAN: Objection. Form. 14:14:14

A Phan did. And I think he made a mistake. And I think a person of skill in the art would see this absolutely as an OLED, particularly given the context of the rest of the patent. 14:14:16 14:14:19 14:14:22 14:14:27

Q Is there any discussion of OLEDs anywhere else in the rest of the patent? 14:14:47 14:14:49

A I don't think so. I think this is the only place where he brings up OLEDs. Where he says, Oh, yeah, everything I've talked about in this patent could apply to OLEDs. So that's, you know -- I'll take him at his word. 14:14:59 14:15:00 14:15:02 14:15:05 14:15:09

Q You don't claim that Murai anticipates any of the claims of the '803 patent, do you? 14:15:37 14:15:42

A I think it's an obviousness argument. But if we could go back to that section so I can be sure. 14:15:48 14:15:51 14:15:54

Q Sure. It's Page 96 of the '803 14:15:54

declaration. 14:15:59

A So it's an obviousness analysis in light 14:16:13

of Murai and Yamada, not in anticipation. 14:16:16

Q And similarly for the '683 patent, you 14:16:22

don't claim that Murai anticipates any of the 14:16:26

claims of the '683 patent. Correct? 14:16:30

A I believe all of my analyses were 14:16:36

obviousness analyses. 14:16:41

Q And the reason why you're combining Murai 14:16:44

with Yamada is to resize the pixels. 14:17:01

Is that correct? 14:17:04

A Murai shows the possibility of resizing 14:17:09

the pixels also. But just trying to recall. I 14:17:14

think Yamada just really is clear about the 14:17:20

motivation to resize. So taking them together is 14:17:23

helpful. 14:17:28

Q And if we turn to Paragraph 511 on Page 14:17:31

109 of your '803 declaration. 14:17:37

A I see it. 14:17:54

Q Yeah. You say, "The below demonstrative 14:17:55

provides one example of how a POSITA would have 14:17:58

obviously accomplished this. The green dots are 14:18:00

made smaller via the inclusion of two larger cutouts. The red dots have an intermediate size with two smaller cutouts. The blue dots are largest because they include no cutouts." 14:18:03 14:18:07 14:18:10 14:18:13

Is that right? 14:18:15

A That's correct. 14:18:16

Q And on the next page, 110, is your demonstrative. Correct? 14:18:16 14:18:21

A Yes. 14:18:22

Q In this demonstrative have you resized the pixels in accordance with the emission efficiency of each color's emissive element? 14:18:22 14:18:38 14:18:41

A No. They are resized, not according to the relative efficiency, but according to what Murai teaches that resizing can be done this way. And it could be done more extremely, too. Right? It could be the cutouts could be more extreme. 14:18:48 14:18:51 14:18:57 14:19:03 14:19:06

But, yeah, this was not done to a scale but, rather, as a demonstrative to show that it could be done, using the approach for setting up this subpixel array that is described by Murai. And a person of skill in the art would understand 14:19:09 14:19:13 14:19:16 14:19:20 14:19:26

that and understand making this adjustment. 14:19:28

Q Is the figure shown at the bottom of 14:19:33

Paragraph 511 intended to be drawn to scale? 14:19:39

A Let me try to understand the scale. 14:19:55

No. Well, what scale? It's intended to 14:19:57

describe how the teachings of Murai could be -- 14:20:01

could be used to resize the pixels and achieve the 14:20:04

claim limitations described in the '803 patent, so 14:20:10

to make it obvious or clear how a POSITA would 14:20:16

understand this. You know, the scale, the 14:20:20

explicit scale, kind of as we discussed, would 14:20:24

rely on a lot more elements, design elements, when 14:20:27

you're actually making an actual display. 14:20:29

Q When we were talking about Phan you said 14:20:34

you tried to draw your figure so that the 14:20:45

relative -- or the ratio of the pixel sizes was 14:20:51

the same as an embodiment in Yamada. Correct? 14:20:54

A Yes. 14:20:59

Q Did you do that in this diagram as well? 14:20:59

A No. 14:21:04

Q Why not? 14:21:04

A I stuck to the imagery provided by Murai 14:21:08

to show that by nipping off the corners, as he teaches, is another way to adjust the relative sizing of the -- of the subpixels, you know, accomplishing what's taught by Yamada and, you know -- yeah, and showing this, you know, quad pixel array, which could be also described at -- by the limitations in '803. 14:21:12 14:21:18 14:21:21 14:21:28 14:21:35 14:21:38 14:21:44

Q In the example you -- of Yamada that you used with Phan, the green pixels were approximately one-fifth the size of the blue pixels. 14:21:46 14:21:53 14:21:56 14:22:00

Is that right? 14:22:00

A What page is that on? 14:22:03

Q We were previously talking about your figure on Page 91, Paragraph 426. 14:22:05 14:22:12

A Okay. It looks about right, just eyeballing it here. A quarter to a fifth ratio, area ratio, between the blue and green pixels. 14:22:25 14:22:31 14:22:36

Q In -- so turning back to Murai. 14:22:46

If a person of ordinary skill in the art wanted to make the green pixels one-fifth the size -- one-fifth the area of the blue pixels, 14:22:50 14:22:53 14:22:56

would they do that by trimming off the corners? 14:22:59

MR. HERMAN: Objection. Form. 14:23:02

A They could do that by trimming off the corners. It would be pretty extreme. They could do it by just shrinking all the dimensions. 14:23:06 14:23:08 14:23:10

You know, that one-fifth number, like we talked about, is not some sort of absolute number; it's a design consideration that people would use to accommodate the multiple of goals, chromaticity, targets, the, you know, mitigating for the lifetime of the blue and the efficiency of the blue. 14:23:15 14:23:17 14:23:20 14:23:23 14:23:27 14:23:32 14:23:35

So, you know, whatever the design constraints were, this -- you know, this approach could -- could be pursued to achieve those design constraints. 14:23:36 14:23:37 14:23:42 14:23:48

And, yeah, you could -- you could absolutely thin down that green emission area, or you could lop off the other corners. There's a number of ways you could go about adjusting the size of the subpixels, the relative sizing of the subpixels, as taught by Yamada. And -- 14:23:48 14:23:50 14:23:55 14:23:58 14:24:04 14:24:08

Q And in -- sorry. Go ahead. 14:24:12

A In Murai, Murai teaches that as well. 14:24:15

But kind of in a -- for other context, for other 14:24:17

reasons. 14:24:25

Q The other example that we looked at in 14:24:25

Yamada, the green pixels were one-35th the size of 14:24:29

the blue pixels. Correct? 14:24:34

A Yeah, I don't -- I don't recall the exact 14:24:38

numbers from that discussion, but I'll take your 14:24:40

word for it. 14:24:43

Q If a POSITA were trying to combine Murai 14:24:44

and Yamada as you suggest, and have the green 14:24:53

pixels be one-35th the area of the blue pixels, 14:24:59

would a person of ordinary skill in the art 14:25:05

accomplish that by trimming off the two corners? 14:25:06

MR. HERMAN: Objection. Form. 14:25:10

A I kind of reject the premise of that. I 14:25:12

mean, Yamada doesn't teach an absolute number but 14:25:14

teaches a design objective. And, you know, a 14:25:17

POSITA could make these adjustments intelligently. 14:25:24

They have skill in the art, and they would not, 14:25:29

you know, blindly take that ratio from Yamada and 14:25:32

try to achieve that. So they would recognize that they need to make these decisions on the relative sizing of the pixels based on the current state-of-the-art that they're dealing with and the design criteria that they're targeting, and make those adjustments. 14:25:38 14:25:44 14:25:48 14:25:50 14:25:52 14:25:54

So that's -- it's -- I don't know. It's kind of underappreciating what skill in the art means to think that someone would make an extreme kind of blind decision like that. You know, especially when Yamada explicitly teaches the actual considerations, which are these chromaticity targets and the lifetime targets. 14:25:55 14:25:58 14:26:02 14:26:04 14:26:08 14:26:11 14:26:15

So, yeah, I don't -- I don't think they would do that. But conceivably they could find a way to shrink down the green to hit whatever their desired ratio is. 14:26:18 14:26:20 14:26:23 14:26:27

Q But, I mean, if you were going to shrink the size of the green pixels to be one-35th the size, it would be much more natural for a POSITA to just shrink the entire pixel overall rather than trying to do it just by cutting off the 14:26:30 14:26:32 14:26:36 14:26:39 14:26:43

corners. Right? 14:26:45

MR. HERMAN: Objection to form. 14:26:46

A It's an arbitrary number, that one-35th. 14:26:47

There are a number of ways you could do it. 14:26:52

Cutting off corners is -- would be very difficult 14:26:54

to get to a one-35th number. 14:26:59

But really, you know, to get to other 14:27:03

values, other less extreme differences of larger 14:27:08

versus smaller like described in the '803 patent, 14:27:12

they don't talk about one-35th or any actual 14:27:15

absolute size difference, just bigger and smaller. 14:27:19

This is bigger and smaller. And Yamada teaches 14:27:22

bigger and smaller. 14:27:26

So, yeah, I think if I was going to try 14:27:29

to make the green one-35th the size of the blue, I 14:27:31

would actually have a lot of other problems with 14:27:34

my device, including luminance issues being too 14:27:36

bright in that absolute space because the color 14:27:40

emission over area would be too bright. I'd have 14:27:44

other issues. 14:27:47

But, yeah, you could -- you could 14:27:48

consider other ways to shrink that pixel down. 14:27:50

Q What would be the luminance issues? 14:27:54

A Well, you -- luminance for pixels or -- 14:27:57

is candelas per square meter. So if you say now 14:28:02

I've shrunk my square meter, my area down by that 14:28:06

much, you've really jacked up the luminance. 14:28:09

Luminance is kind of a relative number, 14:28:13

not an absolute light output number. So you've 14:28:15

really jacked up the luminance levels in a way 14:28:19

that would not be I think conducive for display. 14:28:22

Q Earlier we were talking about Claim 1 of 14:28:26

the '803 patent and the requirement for a virtual 14:28:46

square. 14:28:53

Do you recall that? 14:28:53

A Yeah. 14:28:57

Q And if we can just quickly bring up the 14:28:59

'803 patent again. 14:29:01

MR. KUDZIN: I believe it was Tab 4. 14:29:14

Q And go to Column 8. 14:29:19

So Claim 1, among the other requirements, 14:29:32

requires, quote, "A first pixel having a center 14:29:35

coinciding with the center of a virtual square." 14:29:39

Correct? 14:29:43

A Yes. 14:29:45
Q And it also requires the next limitation, 14:29:45
"A second pixel separated from the first pixel and 14:29:50
having a center at a first vertex of the virtual 14:29:54
square." 14:30:00
Correct? 14:30:00
A Yes. 14:30:01
Q What does the '803 patent mean by the 14:30:01
center of a pixel? 14:30:08
A By what? 14:30:10
Q What does the '803 patent mean by the 14:30:11
center of a pixel? 14:30:13
A I'm not a hundred percent on that. Not 14:30:21
all geometric objects have centers. Could be the 14:30:23
luminance centroid, or it could be the geometric 14:30:26
center of geometric shapes that have centers. So 14:30:31
I think that might be something that's up for 14:30:35
debate. 14:30:39
Q So you referred to one possibility as the 14:30:44
luminance centroid. 14:30:48
Is that correct? 14:30:49
A Yeah, I think that's what it's called. 14:30:50

It's like the center of -- center of, quote/unquote, mass for the luminance emission. 14:30:53 14:30:56

Q And the other possibility you talked about was the geometric center. 14:30:59 14:31:02

Is that correct? 14:31:04

A Yeah, the geometric center. And that's -- the geometric center is what's shown in the figures in the '803 patent, so there is some context there. 14:31:05 14:31:08 14:31:11 14:31:20

Q So is it your understanding that when the '803 patent refers to the center of a pixel, it's referring to the geometric center? 14:31:20 14:31:26 14:31:29

MR. HERMAN: Objection. Form. Also outside the scope of direct. 14:31:31 14:31:33

A I -- let me say it like this: That's -- that is some context. Not every shape has a geometric center. And -- and, you know, I think it would be more accurate, or another alternative, to use the luminance center point. But in this -- you know, with this context, '803 patent does show in these -- in some of these I guess polygonal pixel shaped, that they're using the geometric 14:31:41 14:31:44 14:31:48 14:31:58 14:32:03 14:32:09 14:32:16 14:32:25

center. 14:32:30

Q I believe you said a second ago that not every shape has a geometric center. 14:32:30 14:32:36

Is that correct? 14:32:39

A Yes. 14:32:39

Q Which shapes do not have geometric centers? 14:32:40 14:32:43

MR. HERMAN: Objection. Form. Also outside the scope of direct. 14:32:44 14:32:45

A I don't know. Like something like a -- well, a lot of nonpolygonal shapes don't have geometric centers, like some sort of moon with a rectangle attached at the bottom, a half moon attached with a rectangle at the bottom. 14:32:53 14:33:00 14:33:05 14:33:09 14:33:11

MR. KUDZIN: If we can turn to Murai, and Figure 6. 14:33:20 14:33:25

(Discussion off the record with A/V technician.) 14:33:44 14:33:48

Q Okay. If we look at Figure 6A, there are -- 14:34:51 14:34:58

MR. KUDZIN: Next page. Yeah. There you go. Figure 6A, top left corner. 14:34:59 14:35:00

Q Does what's indicated as Pixel 64 in the bottom left corner, does that pixel have a geometric center? 14:35:07 14:35:12 14:35:15

MR. HERMAN: Objection. Form. Also outside the scope of direct. 14:35:17 14:35:19

A I'm not sure about that. I would say possibly not, but just would also say that in my demonstrative I used more the upper right subpixel shapes, which would have a pixel center, and corresponds to the shapes shown in the '803 patent. 14:35:24 14:35:28 14:35:32 14:35:39 14:35:42 14:35:45

So, actually, I didn't use an uneven cut-out shape like that. In my analysis it would be obvious for someone trying to do this to be able to cut off both corners and to make, let's say, a hexagonal shape with the center. And that's -- that's what I showed in my demonstrative. 14:35:46 14:35:54 14:35:56 14:36:00 14:36:05 14:36:11 14:36:12

Q How did you determine the center of the pixel in the top right corner, 62? 14:36:13 14:36:20

A I think if the cutouts are kind of symmetrical it would -- on both sides, it would 14:36:26 14:36:30

stay the same as the -- as the square. I'd have to double -- I'd have to circle back on that, but I'm pretty sure it would be just the same. 14:36:33 14:36:37 14:36:40

Q Is the geometric center the same thing as the centroid of the pixel? 14:36:44 14:36:47

MR. HERMAN: Objection. Form. Also outside the scope of direct. 14:36:49 14:36:51

A Yeah, I don't think I bring up the centroid topic in this report at all. But that depends on a lot of other factors of the OLED device design and other elements in the -- in the construction of the display. 14:36:53 14:36:55 14:37:00 14:37:04 14:37:07

So there's no way you could know that for sure. It's -- it speaks to the manufacturing process and a lot of other elements. 14:37:09 14:37:11 14:37:16

So like I said, I don't think I brought that up in this report. And it just depends on a lot of variables. 14:37:17 14:37:19 14:37:24

Q What's your understanding as to the meaning of the centroid of a shape? 14:37:24 14:37:26

MR. HERMAN: Objection. Form. Also outside the scope of direct. 14:37:29 14:37:31

A The centroid? 14:37:33

Q Yes. 14:37:34

A I think it's an approach that can be used if you don't have a better option for determining the center. It's kind of a -- almost like a center-of-mass approach where you -- where in all directions you have equal area in any direction, something like that. 14:37:36 14:37:40 14:37:45 14:37:49 14:37:56 14:37:59

It's like a -- it kind of says center of mass, all things being equal in the -- in the emission area. We're not talking about mass, but just like kind of all areas being equal in every direction. But that's -- in all optics that's really not what you're really dealing with, is that everything being equal. There are luminance hotspots. 14:38:00 14:38:06 14:38:10 14:38:14 14:38:17 14:38:22 14:38:25 14:38:28

But like I said, I don't really touch on that in this report. If you want to point me to a section in the report that we can focus on, that would be good. 14:38:29 14:38:31 14:38:34 14:38:38

Q Well, I think a minute ago you said that it would be more accurate to determine the center 14:38:38 14:38:42

in terms of the luminance, the luminance setting. 14:38:46

Is that correct? 14:38:53

MR. HERMAN: Objection. Form. Also 14:38:54

outside the scope of direct. 14:38:55

A If it's -- it's not exactly more 14:38:57

accurate. It's more -- possibly more relevant. 14:39:00

But it takes an actual optical measurement to do 14:39:02

that. And also, like I said, that's not the 14:39:06

context of the '803 patent, which shows 14:39:11

essentially geometric centers being used as the 14:39:16

center. 14:39:20

So I guess it's debatable about -- funny 14:39:21

that it is debatable, but what center actually 14:39:27

means. 14:39:31

So in this analysis, you know, I was 14:39:31

looking at the geometric center. A person of 14:39:36

skill in the art would know that they could make 14:39:38

these adjustments and tailor their design. And 14:39:40

what this shows, though, too, is that without much 14:39:46

tailoring and with just the teachings in Murai and 14:39:50

Yamada, you can, you know, pretty easily satisfy 14:39:52

the claim limitations in the '803 patent. 14:39:55

Q So for the purposes of your analysis, you did not consider the luminance center. Correct? 14:39:58 14:40:01

MR. HERMAN: Objection. Form. 14:40:07

A Sorry, you kind of faded out. The what center? 14:40:08 14:40:10

Q I apologize. In your analysis, you did not consider the luminance center. Correct? 14:40:10 14:40:11

MR. HERMAN: Objection. Form. 14:40:16

A No. That -- that actually wouldn't be possible unless I had actual devices made, with, you know, which there's a lot of details of the devices which are not apparent in this patent, you know, details. So that's a measurement that has to be made. 14:40:17 14:40:23 14:40:35 14:40:37 14:40:42 14:40:45

So it's not really possible to do that with these hypothetical designs. I'm just saying in practice, in practical application, the luminance across the area of a device is important. 14:40:46 14:40:48 14:40:53 14:40:58 14:41:02

Q So for your analysis in these IPRs, you relied on what you're calling the geometric center. Correct? 14:41:02 14:41:08 14:41:11

A Yes. 14:41:12

Q And you think that that's all that's 14:41:12

required of the '803 patent. Correct? 14:41:20

MR. HERMAN: Objection. Form. Also 14:41:22

mischaracterizes testimony. 14:41:23

A Yeah, I -- yeah, I don't -- I think 14:41:25

that's the context, that's some of the context of 14:41:31

the '803 patent. But there could be pixel shapes 14:41:34

and layouts where the center is not clear. That's 14:41:43

not what I worked on in this -- in this 14:41:53

declaration. But I think it's possible because of 14:41:57

some -- some of the ambiguity in the '803 and all 14:42:00

the patent claims that that could be a 14:42:04

consideration. 14:42:06

Q Okay. Well, if we go back to the claim 14:42:09

language it says, "A first pixel having a center 14:42:11

coinciding with a center of a virtual square." 14:42:15

Is that claim limitation satisfied if the 14:42:20

geometric center of the pixel coincides with the 14:42:23

center of a virtual square? 14:42:28

MR. HERMAN: Objection. Form. Also 14:42:30

outside the scope of direct, to the extent it's 14:42:31

not tied to a particular prior art reference. 14:42:33

A I guess it just depends on the 14:42:40

interpretation of that center claim limitation. 14:42:44

In my analysis I used that, the geometric center, 14:42:53

in this document. But -- yeah, I don't -- I don't 14:43:00

know, you know. I don't know. 14:43:04

Q Is it your opinion that in these cases 14:43:06

the Patent Trial and Appeal Board will need to 14:43:10

construe the term "center" in order for us to know 14:43:14

what it means? 14:43:16

MR. HERMAN: Objection. Form. Also 14:43:18

outside the scope of direct. 14:43:20

A I don't -- I don't think it's necessary. 14:43:22

Because, obviously, you know, based on Murai and 14:43:28

Yamada, based on Matthies and Yamada, you can -- 14:43:32

you know, the obvious combination of resizing the 14:43:40

pixels with the quad pixel, repeated quad pixel 14:43:44

shape, will get you a vertical -- or virtual 14:43:48

square, based on the simple construction of the 14:43:51

center language. 14:43:58

So it's not really coming up in this 14:43:59

issue. And, you know, it would be obvious that an 14:44:02

adjustment could be made, even if -- even if there was some -- I don't know. An engineer could obviously make that, make that layout with those pixel sizings based on the teachings of these prior arts. 14:44:08 14:44:11 14:44:17 14:44:23 14:44:26

So I don't think it's -- I'm not going to tell PTAB what to do, but I don't think it's necessary in this evaluation or in this analysis. 14:44:26 14:44:29 14:44:32

Now, there could be -- I'm not a lawyer. So maybe there could be infringement considerations or something else where this becomes more pertinent. But I don't think it's necessary for this evaluation. 14:44:36 14:44:39 14:44:41 14:44:44 14:44:48

Q But for purposes of the validity of the patent, it's sufficient, in your opinion, to consider just the geometric center of the pixel. 14:44:51 14:44:54 14:44:57

Correct? 14:45:00

MR. HERMAN: Objection to form. 14:45:01

A In my analysis, I considered the geometric center. And I think that's sufficient to show that what these patents, these Samsung patents are showing, is obvious and predictable 14:45:04 14:45:08 14:45:12 14:45:17

and, you know, relatively easy to do based on some prior art teachings. 14:45:22 14:45:27

MR. KUDZIN: Can we bring up Tab 16, please. 14:45:38 14:45:40

(Petitioner Exhibit 1011, IPR2023-01075, previously marked, not attached.) 14:45:41 14:45:50

Q You're being shown what's previously been marked as Petitioner's Exhibit 1011 in IPR2023-01075. It is United States Patent Application Publication Number US 2011/0234550. 14:45:50 14:45:52 14:46:00 14:46:05

Do you recognize this document? 14:46:15

A Yes. I refer to it as the Hong patent. Or maybe it's just -- it shouldn't be called a patent. The Hong reference. 14:46:21 14:46:25 14:46:28

Q Okay. And you relied on this patent application in your declaration regarding the '578 patent. Correct? 14:46:29 14:46:38 14:46:44

A Yeah, let me -- let me open that up. 14:46:47

Q Sure. 14:46:50

MR. KUDZIN: For folks following along at home, I believe this is Tab 3. And I think it's Page 111 of the declaration. 14:47:01 14:47:02 14:47:06

THE WITNESS: Thank you. 14:47:15

A Yeah, I considered with Matthies and 14:47:24

Yamada together. 14:47:28

Q And on Page 115 of your declaration, 14:47:33

you've got a copy of Figure 9 from Hong. Correct? 14:47:38

A Yes. 14:47:48

Q And in Figure 9 in the top row there is a 14:47:50

green pixel that's labeled 250B. 14:48:04

Do you see that? 14:48:08

A Yes. 14:48:09

MR. HERMAN: Objection. Form. 14:48:10

Q And that pixel has a hexagonal shape. 14:48:13

Correct? 14:48:19

A Yeah. I'm just trying to -- hexagonal. 14:48:29

But the patent also discusses octagonal shapes as 14:48:33

well. 14:48:36

Q Does the pixel shown as 250B in Figure 9 14:48:37

of Hong have a geometric center? 14:48:42

MR. HERMAN: Objection. Form. Also 14:48:46

outside the scope of direct. 14:48:47

A You know, I don't -- I don't know in a 14:48:51

shape like that, I don't recall if it does or how 14:48:56

it would be calculated. 14:49:00

Q I guess while we're talking to -- talking 14:49:02

about the '578 patent, if we can look at Page 97, 14:49:28

Paragraph -- beginning with Paragraph 374. 14:49:57

And this is talking about the limitation, 14:50:07

quote, "Wherein only one of the second pixels and 14:50:08

third pixels is included in a virtual quadrangle 14:50:11

containing outer edges comprising some of the 14:50:15

edges a group of four neighboring ones, plurality 14:50:19

of first pixels, all portions of all others second 14:50:22

pixels, and the third pixels being outside of the 14:50:27

virtual quadrangle." 14:50:30

Is that right? 14:50:32

A Yes. 14:50:39

Q And on the next page in Paragraph 379, 14:50:39

you have a figure that shows how you believe this 14:50:46

limitation is satisfied by the combination of 14:50:53

Matthies and Yamada. 14:50:56

Is that correct? 14:50:57

A Yes. 14:51:01

Q What are the -- some of the edges of a 14:51:01

group of four neighboring ones of the plurality of 14:51:10

first pixels in your figure? 14:51:15

A On this demonstrative, they're the 14:51:23

corners, the outer corners, of the green pixels. 14:51:26

But would have -- in that demonstrative, that's 14:51:36

what I showed. 14:51:38

Q And in your opinion, the corners of the 14:51:39

pixel count as edges? 14:51:44

A I think a person of skill in the art 14:51:48

would know that they could be made into edges or 14:51:50

engineered into edges. And I recall that 14:51:55

subsequent in this discussion somewhere that if 14:52:00

you used a different shape taught by Hong, that, 14:52:04

you know, you could have, instead of a corner, an 14:52:11

edge define that pixel. 14:52:14

So, yeah, in this demonstrative I'm 14:52:22

showing, and it would be obvious to a person 14:52:24

skilled in the art, that the virtual square is 14:52:28

defined by those corners which somebody might 14:52:30

interpret to be edges. 14:52:34

But even if they didn't interpret that, a 14:52:36

person of skill in the art would think it would be 14:52:38

obvious to perhaps use an octagon and have an edge 14:52:40

there that could define that. 14:52:45

So, yeah. 14:52:48

Q So you address this I think in Paragraph 380, where you say, "Patent owner may argue that corners of the green subpixels touching the virtual quadrangle above do not constitute some of the edges of those subpixels." 14:52:51 14:52:54 14:52:57 14:53:01 14:53:04

Do you see that? 14:53:06

A Yeah. 14:53:07

Q Okay. And you go on to say in Paragraph 381, "In my opinion, such an interpretation of Claim 45 would be wrong. The claims requires only that some pixel edges -- not all the edges or even a whole edge -- form the virtual quadrangle." 14:53:07 14:53:12 14:53:15 14:53:19 14:53:23

Correct? 14:53:26

A Yes. 14:53:28

Q You go on to say, "This is what the combination of Matthies and Yamada teaches: Some of the edges of green subpixels (the pairs of corners that form one subpixel side shown above) cooperative to form the shown virtual quadrangle." 14:53:28 14:53:32 14:53:34 14:53:38 14:53:43

Correct? 14:53:46

A That's correct. 14:53:47

Q So it's your opinion that the pixel 14:53:47

corners are the required some pixel edges. 14:53:51

Correct? 14:53:56

A Yeah, that's what -- that's what's here. 14:53:56

It's like the -- that some of the pixel edges in 14:53:59

the corner constitutes some of the pixel edge and 14:54:05

that the virtual, what is it, virtual quadrangle 14:54:12

could be defined by those, by those pixel edges. 14:54:15

But furthermore, it would be obvious, 14:54:18

like I say subsequently, if the interpretation of 14:54:21

edge was up for grabs, it would be obvious for a 14:54:27

POSITA to reshape pixel into a different polygon, 14:54:30

and use those edges. 14:54:35

Q In addition to your work in these IPRs, 14:54:43

you also served as BOE's expert witness in an ITC 14:54:45

investigation involving the '578 patent. Correct? 14:54:50

MR. HERMAN: Objection. Form. Also 14:54:53

outside the scope of direct. 14:54:57

A Yes. 14:54:59

Q And you submitted two expert reports in 14:54:59

that case? 14:55:04

MR. HERMAN: Same objections. 14:55:09

A I don't recall how many, but I'll take your word for it. 14:55:11 14:55:12

Q You submitted some expert reports in that case. Correct? 14:55:13 14:55:16

A Yes. 14:55:16

MR. KUDZIN: Can we bring up Tab 201, please. 14:55:18 14:55:20

Q I'm showing you a copy of the expert report of P. Morgan Pattison, Ph.D., regarding noninfringement of U.S. Patent Numbers 9,818,803, 10,854,683, and 11,594,578 and failure to establish technical domestic industry for same. 14:55:38 14:55:39 14:55:43 14:55:49 14:56:00

And I will represent that after -- let me say, did you serve such an expert report in this case, sorry, in the ITC investigation? 14:56:00 14:56:07 14:56:09

A Yes. 14:56:13

Q And I'll just note for the record that after the original expert report was served, the parties exchanged redacted copies of the report. And so the version that I'm showing you, all BOE confidential has been redacted by BOE's counsel. 14:56:13 14:56:18 14:56:23 14:56:27 14:56:34

And so if you see black redactions, that's why they're there. The blue redactions are redactions applied by Samsung to remove their confidential information. So this document does not contain any confidential information. 14:56:40 14:56:43 14:56:45 14:56:48 14:56:50

MR. HERMAN: Counsel, just to be clear, was this publicly filed? 14:56:53 14:56:54

MR. KUDZIN: It was not -- I don't know if it was publicly filed. It was exchanged between the parties on October 31st, 2023. And it was also provided to OUII at the same time through their box account. 14:56:56 14:56:59 14:57:02 14:57:07 14:57:11

If we could turn to Paragraph 567 of this report, please. And this is on Page 126. 14:57:23 14:57:29

I'm sorry, I'm having trouble seeing the version. Can we zoom in on that version on the screen. Is this Page 126? 14:58:03 14:58:04 14:58:07

(Discussion off the record with the A/V technician.) 14:58:15 14:58:18

A/V TECHNICIAN: Counsel, is this exhibit being marked? 14:58:25 14:58:26

MR. KUDZIN: Yes, I appreciate you 14:58:27

reminding me of that. Would you please mark this as Exhibit 2101. 14:58:28 14:58:31

(Patent Owner Exhibit 2102 marked for identification and is attached to the transcript.) 14:58:31 14:58:45

Q And in Paragraph 567 you say, "The specification of the '578 patent is silent on whether a single point on the perimeter of a first pixel can satisfy the outer edges comprising some of the edges of the first pixels limitation." 14:58:45 14:58:47 14:58:50 14:58:54 14:58:57

Do you see that? 14:59:01

A Yes. 14:59:01

Q And you go on to say, "The prosecution history is therefore informative here in understanding what should be understood as outer edges comprising some of the edges of first pixels." 14:59:01 14:59:04 14:59:07 14:59:09 14:59:13

Correct? 14:59:13

A Correct. 14:59:16

Q Then in Paragraph 568 you go on to say, "The prosecution makes clear that the virtual quadrangle must share actual edges, not just points, with the first pixels." 14:59:16 14:59:20 14:59:22 14:59:26

Do you see that? 14:59:27

A Yes. 14:59:31

Q Do you agree with that? 14:59:31

MR. HERMAN: Objection to form. Also 14:59:35

outside the scope of direct. 14:59:36

A I don't recall the claim construction on 14:59:38

this thing. And I did -- I did write that, so -- 14:59:44

yeah, I mean, either way, like I'm saying in my 14:59:54

report at issue here, by either interpretation if 14:59:57

you include Hong, you get an edge there that can 15:00:03

define that virtual quadrangle. Or if the claim 15:00:08

construction requires that it needs to be -- or it 15:00:13

can be a corner, then that -- then that would 15:00:16

satisfy the claim. 15:00:21

Q Okay. But in the -- going back to your 15:00:24

declaration in this case, in Paragraph 380, you 15:00:27

say that, Patent owner may argue that some of the 15:00:31

green -- that corners of the green subpixels 15:00:34

touching the virtual quadrangle above do not 15:00:36

constitute some of the edges of those subpixels 15:00:39

and, quote, in my opinion, such an interpretation 15:00:41

of Claim 45 would be wrong. 15:00:44

Correct? That's what you wrote in this declaration? 15:00:47 15:00:48

A Yep, that's what I wrote. 15:00:50

Q And that's exactly what you're saying the claim does require or what you did say in your expert report in the ITC. Correct? 15:00:51 15:00:54 15:00:56

MR. HERMAN: Objection. Form. Also mischaracterizes both, both of the opinions. 15:00:59 15:01:00

A Can you -- can we scroll up here? 15:01:25

I'm not seeing the full thing. 15:01:27

Q Sure. I mean, if you want to take control of the document or look at it, look at whatever you want. 15:01:28 15:01:30 15:01:31

A I don't have control. 15:01:53

MR. KUDZIN: Can the tech please give control to Dr. Pattison. 15:01:54 15:01:56

THE WITNESS: Okay. 15:02:01

A Okay. So -- so can you repeat the question here? 15:02:42 15:02:46

Q Yes. In your expert declaration in this case you said that, "In my opinion, such an interpretation of Claim 45 would be wrong, where 15:02:47 15:03:00 15:03:03

some of the edges were taken to mean the corners of pixels." 15:03:06 15:03:08

Correct? 15:03:10

A Yes. 15:03:12

Q And that's now -- but that's the very same interpretation that you said was correct in the ITC expert report. Correct? 15:03:12 15:03:15 15:03:18

A Yeah, but can you show me exactly where I'm saying that? 15:03:30 15:03:34

Q Sure. Paragraph 568. "The prosecution makes clear that the virtual quadrangle must share actual edges, not just points, with the first pixels." 15:03:35 15:03:41 15:03:44 15:03:47

A Yeah, that's what the prosecution history showed. Yeah. So I did write both of these things. And I guess I must have paid a little more attention to the prosecution history in -- in this document. 15:03:52 15:03:53 15:03:58 15:04:04 15:04:09

Q So are you saying that the statements in the expert report served in the ITC are correct? 15:04:11 15:04:15

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:04:19 15:04:20

A I'd say in my IPR report I acknowledge that there is room for interpretation outside of my opinion as to what constituted an edge, which is why I give, you know, a little disclaimer in 382. You know, that that -- you know, either interpretation might come into play, depending on, I don't know, claim construction or other -- other issues. 15:04:23 15:04:26 15:04:30 15:04:34 15:04:40 15:04:45 15:04:48 15:04:51

So I made it a point to say by either -- by either interpretation, the -- let's see, the virtual quadrangle can be constructed using -- let's see. Is this Phan, Yamada, and Hong? By using the combination of those, of those references. 15:04:53 15:04:57 15:05:06 15:05:12 15:05:17 15:05:18

So, yeah, I would -- I would ... 15:05:21

Q So sitting here today, what's your opinion as to the correct interpretation of the term "some of the edges," as used in the claims of the -- in Claim 45 of the '578 patent? 15:05:28 15:05:30 15:05:34 15:05:39

MR. HERMAN: Objection. Form. 15:05:42

A I think it's -- I think it's ambiguous, the edge. And I think I've -- yeah. I think it 15:05:46 15:05:51

SDC EX. 2062 - 222/320

is ambiguous. In the real world these things don't make perfect corners in the manufacturing process. So I think it really would require some sort of claim construction or -- or define, you know, definition by someone else. 15:05:59 15:06:03 15:06:06 15:06:12 15:06:17

I think it could genuinely go either way. 15:06:20

Q When you say "In the real world these things don't make perfect corners in the manufacturing process," what do you mean? 15:06:36 15:06:39 15:06:41

MR. HERMAN: Objection. Form. 15:06:43

A Yeah, that's a -- it's hard to define shapes with patterning and lithography and whatever. So, you know, there's the -- the aspirational design, which would be the engineering drawings. There's, like, the concept, which of these conventions, the aspirational design which are the engineering drawings with known tolerances, and then there's the resulting device. 15:06:52 15:06:56 15:06:59 15:07:08 15:07:10 15:07:16 15:07:21 15:07:24 15:07:26

And, you know, those tolerances, those manufacturing tolerances, depending on how good the process is and the exact manufacturing 15:07:28 15:07:31 15:07:37

process -- yeah, the exact manufacturing approach that's being used, can be, you know -- can possibly round off corners because that's just the physics of these deposition processes. So that's what I mean. 15:07:40 15:07:43 15:07:50 15:07:56 15:07:59

Q Well, let's turn back to your declaration with respect to the '578 patent in the IPR. And if we could turn to Page 82, beginning at Paragraph 310. 15:08:09 15:08:13 15:08:18 15:08:25

MR. HERMAN: Counsel, if you're switching topics, I feel like we've been going about an hour and a half. But correct me if I'm wrong. 15:08:29 15:08:30 15:08:34

MR. KUDZIN: If you want to take a break, that's fine with me. 15:08:35 15:08:37

MR. HERMAN: I'll leave that up to the expert. 15:08:38 15:08:40

THE WITNESS: Yeah, that's fine. 15:08:41

VIDEO SPECIALIST: We're going off the record at 3:08 p.m. 15:08:44 15:08:46

(A recess was taken.) 15:08:47

VIDEO SPECIALIST: We're going back on the record. The time is 3:18 p.m. 15:18:45 15:18:46

BY MR. KUDZIN: 15:18:49

Q Welcome back, Dr. Pattison. 15:18:50

A Thank you. 15:18:52

Q So before the break we were just turning to your declaration in the '578 patent, where I was directing your attention to Page 82, beginning at Paragraph 310. 15:18:52 15:18:56 15:19:03 15:19:07

A Okay. 15:19:21

Q And it appears like you're dealing with three separate limitations, which you've numbered 23-1, 23-2, and 23-3. 15:19:22 15:19:24 15:19:28

Is that correct? 15:19:32

A Yes. 15:19:34

Q And Limitation 23-3 is, quote, "The first second pixel, the first third pixel, the second second pixel, and the second third pixel form a first virtual quadrangle." 15:19:34 15:19:41 15:19:44 15:19:50

Correct? 15:19:53

A Yes. 15:20:01

Q Can you explain your opinion as to how you think Matthies satisfies this limitation? 15:20:01 15:20:02

A So the first second pixel, which would be 15:20:06

on the next page, Paragraph 313, which would be the blue pixel with the 1 by it, the first third pixel, which would be the red pixel with the 1 by that, and the second second pixel would be the blue pixel with the 2, and the second third pixel, they form a virtual quadrangle. 15:20:12 15:20:16 15:20:26 15:20:29 15:20:34 15:20:41

So if you connect those pixels, they -- you can virtually make a quadrangle. 15:20:43 15:20:49

Q So you're -- and just so the record is clear, you're referring to the figure on Page 83, at the bottom of Page 313. Correct? 15:20:55 15:20:58 15:21:02

A Yes. And it shows it on Page 84 also. 15:21:08

Q Did you, personally, draw these figures, the Paragraphs 313 and 314? 15:21:14 15:21:21

A No. I directed -- 15:21:24

MR. HERMAN: Object to form. 15:21:25

A -- their generation. 15:21:27

Q And is that true of all of the figures in your declarations, that you directed the drawing of them but did not draw them yourself? 15:21:28 15:21:34 15:21:37

MR. HERMAN: Objection. Form. 15:21:40

A Yeah, I kind of sketch out what I had in 15:21:41

my head, or, you know, the bits and pieces from the prior art, and get them put together. 15:21:43 15:21:47

Q The way it's shown in the figure below Paragraph 313, it appears that there's a gap between the red and blue pixels. 15:22:00 15:22:09 15:22:13

Is that correct? 15:22:15

MR. HERMAN: Objection. Form. 15:22:20

A Yeah, just the normal spacing, you mean? 15:22:27

Q Yes. 15:22:30

A Okay. Yeah. 15:22:33

Q So the pixels are not adjacent to each other. Correct? 15:22:36 15:22:47

MR. HERMAN: Objection. Form. 15:22:49

A I would say they're adjacent, the adjacent blue and red pixels. 15:22:58 15:23:01

Q But the pixels do not form a quadrangle with continuous sides. Correct? 15:23:03 15:23:07

MR. HERMAN: Objection. Form. 15:23:10

A No, not with continuous sides. 15:23:16

Q Is it your opinion that you can, quote, form a quadrangle even if the pixels -- if they do not form a quadrangle with continuous sides? 15:23:20 15:23:32 15:23:36

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:23:40 15:23:42

A A virtual quadrangle? 15:23:45

Q Well, do they form a quadrangle? 15:23:48

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:23:51 15:23:53

A I mean, I don't -- I don't understand. They form a virtual quadrangle, like a hypothetical quadrangle. A quadrangle could be drawn on top of these pixels. Which I think is the context of the -- of the patent, of the '578 patent here, is when they're talking about this, they're talking not about a continuous quadrangle but a virtual quadrangle that could be drawn among the pixels. 15:23:56 15:24:03 15:24:07 15:24:11 15:24:19 15:24:23 15:24:28 15:24:34 15:24:38

So what this shows is that, you know, based on what they're doing in the '578 patent, this was already done, based on Matthies. This already could be done by the same processes and by the same analysis. 15:24:39 15:24:41 15:24:45 15:24:53 15:24:56

Q And so in determining whether or not this limitation is satisfied, does it matter whether or 15:24:56 15:25:02

not there are gaps between the pixels? 15:25:04

MR. HERMAN: Objection. Form. Also 15:25:11

outside the scope of direct. 15:25:12

A It just depends on the specifics of the 15:25:13

claim construction. In the context that I used 15:25:15

here, it's just basically replicating how the 15:25:19

figures are done in the -- in the Samsung patent, 15:25:23

and doing it the same way. 15:25:27

Q So as you've interpreted the claims, 15:25:29

there's no requirement in this limitation as to 15:25:33

whether or not there are gaps between the pixels. 15:25:38

That's perfectly okay under your construction. 15:25:41

Correct? 15:25:44

MR. HERMAN: Objection. Form. Also 15:25:44

outside the scope of direct. 15:25:46

A That's the context from the '578 patent. 15:25:47

So that's -- that's what I used in this specific 15:25:55

analysis. 15:25:58

Q If we could turn back to what's 15:26:04

previously been marked as Exhibit 2101, which is 15:26:28

your expert report in the ITC investigation. And 15:26:34

turn to Page 82, please. 15:26:39

MR. KUDZIN: And just I'm referring to the Page Number 82 internal to the document, not the PDF page number. Thank you. 15:27:15 15:27:18 15:27:25

Q And in this page you're referring to Limitation 23F, which is the same limitation, the second second pixel, the second third pixel, and the third second pixel, and the third third pixel form a second virtual quadrangle. 15:27:57 15:28:00 15:28:04 15:28:08 15:28:13

Correct? 15:28:15

A Yes. 15:28:16

Q In Paragraph 374 you wrote, "It is my opinion that Dr. Kymissis has not demonstrated that any of the accused products meet these limitations." 15:28:16 15:28:20 15:28:23 15:28:25

In Paragraph 375 you go on to say, "While it may be the case that Dr. Kymissis can outline a quadrangle uses four pixels as vertices, such annotations do not provide a complete analysis to determine whether any accused products infringe this limitation." 15:28:28 15:28:31 15:28:34 15:28:37 15:28:40 15:28:43

Correct? 15:28:45

A That's -- yes. 15:28:46

Q And then on the next page in Paragraph 377 you say, "It is also my opinion that since there are large gaps between each of the pixels identified by either of these limitations, those pixels cannot form a quadrangle." 15:28:46 15:28:50 15:28:54 15:28:58 15:29:02

Correct? 15:29:05

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:29:07 15:29:08

A Yeah, that's what it says. 15:29:17

Q And you go on to say, "For example, with regards to the Limitation 23E, those four pixels are not adjacent to each other. To the contrary, gaps exist between each pixel in all directions." 15:29:18 15:29:20 15:29:24 15:29:27

Correct? 15:29:30

A Yes. 15:29:30

Q Can pixels form a quadrangle if there are gaps between them, between pixels? 15:29:30 15:29:38

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:29:41 15:29:43

A I think it depends on the claim construction. And this had some other inputs, so I was giving my opinion on Professor Kymissis' 15:29:46 15:29:54 15:29:57

analysis. And I don't recall all of the context involved there, and the other materials that were considered after writing this initial IPR report. So I don't -- I don't know all the -- all of the, like I said, context, if the claim construction was different and the details of Professor Kymissis' evaluation. So I don't -- really don't know. 15:30:02 15:30:09 15:30:10 15:30:18 15:30:20 15:30:23 15:30:30 15:30:33

Q Well, as you have interpreted the claims in this, in these IPRs, can you -- can pixels, quote/unquote, form a quadrangle if there are gaps between pixels? 15:30:34 15:30:40 15:30:45 15:30:48

MR. HERMAN: Objection. Form. 15:30:50

A Yeah, by the interpretation in the IPR, just based on review of the patents and the prior arts, you can overlay a virtual quadrangle on top of the layout of the pixels. 15:30:54 15:30:57 15:31:02 15:31:06

Q And that's enough to satisfy the limitation that the pixels form a quadrangle, in your opinion? 15:31:10 15:31:12 15:31:17

MR. HERMAN: Objection. Form. 15:31:18

A Yeah, that's -- that's my analysis. 15:31:19

Q And would the same be true in the ITC investigation? 15:31:22 15:31:25

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:31:27 15:31:29

A I'd need to know all the rest of the context and be recalled with all of that, which I don't -- I don't know. 15:31:30 15:31:32 15:31:38

Q What context would you need to know? 15:31:39

MR. HERMAN: Same objections. 15:31:43

A I'd need to review Professor Kymissis' report. I'd need to know the claim construction. Basically everything. 15:31:45 15:31:48 15:31:51

Q Is it your understanding that there was a claim construction in the ITC investigation for the term, "the second second pixel, the second third pixel, the third second pixel, and the third third pixel form a second virtual quadrangle"? 15:31:54 15:31:58 15:32:01 15:32:05 15:32:07

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:32:10 15:32:11

A I don't -- I don't recall. I don't think on that in particular. But I would just want to know all of the materials. Like different 15:32:16 15:32:19 15:32:26

materials were considered in that analysis than in the IPR analysis. So I would want to refresh myself with all of that before revisiting that matter. 15:32:29 15:32:32 15:32:37 15:32:44

Q But you applied a different standard as to what it means to form a virtual quadrangle in the ITC investigation than the ones you're applying here. Correct? 15:32:46 15:32:49 15:32:53 15:32:57

MR. HERMAN: Objection. Form. Argumentative. Mischaracterizes the testimony. And way outside the scope of his direct testimony. 15:32:57 15:32:58 15:33:02

Counsel, please keep yourself to his IPR opinions. 15:33:04 15:33:07

A I said there was different context, different materials, subsequent additional materials. So I would need to get refreshed on that before I would want to answer that question. 15:33:12 15:33:13 15:33:16 15:33:22

Q If we could turn back to your declaration with respect to the '803 patent. I believe this is Tab 1. And if we can turn to Page 57 of the document. It's beginning at Paragraph 249. 15:33:23 15:34:04 15:34:18 15:34:34

And this deals with the limitation, what 15:34:57

you've labeled as 4A of the '803 patent, "Wherein the second pixels and third pixels enclose the first pixel in the virtual square." 15:34:59 15:35:04 15:35:08

Correct? 15:35:12

A Yes. 15:35:12

Q And you say, "This, in my opinion, is taught by Matthies." 15:35:12 15:35:19

Correct? 15:35:20

A Yes. 15:35:26

Q And the next paragraph, 250, you go on to say, "Matthies' pixels are arranged in repeating, square matrix." 15:35:27 15:35:30 15:35:35

Correct? 15:35:36

A Yes. 15:35:36

Q And then, "Due to this use" of this -- "of a this pixel arrangement, along with the presence of two green subpixels for every red and green subpixel, Matthies' second pixels (the blue subpixels) and third pixels (the red subpixels) surround and enclose its first pixel (the green subpixels) in the center of a virtual square." 15:35:37 15:35:44 15:35:47 15:35:51 15:35:57 15:36:02 15:36:06

Correct? 15:36:10

A Yes. 15:36:10

Q So you put the word "enclose" in quotes in Paragraph 251. Correct? 15:36:10 15:36:25

A Yes. 15:36:28

Q What's your understanding of the meaning of the word "enclose"? 15:36:28 15:36:31

A I took it to mean, I guess within the context of the -- of the '803 patent, that the virtual, I guess you could say virtually encloses if you -- if you were to say that these virtual lines, you know, are a wall, then they enclose the green pixel. And that's -- I think I treated it like the '803 patent treated it in the -- within -- yeah, in the context there. 15:36:36 15:36:42 15:36:46 15:36:55 15:36:58 15:37:07 15:37:09 15:37:17

Q Is this limit -- does -- you're not claiming that the pixels in Matthies actually touch each other. Correct? 15:37:18 15:37:33 15:37:37

A No. I mean, that could be an interpretation, that they need to touch each other. But in this analysis I used the context of the '803 patent and showed how Matthies, you know, is -- has the exact same -- pretty much the exact 15:37:42 15:37:44 15:37:47 15:37:51 15:37:58

same pixel arrangement, especially in light of Yamada, as what's being disclosed in the '803 patent, according to how the '803 patent is explaining and describing, you know, the claim limitations. 15:38:02 15:38:05 15:38:08 15:38:13 15:38:16

Q But the way that you're interpreting the claims, the pixels don't need to touch each other. 15:38:17 15:38:20

Correct? 15:38:24

MR. HERMAN: Objection. Form. 15:38:25

A I mean, that's -- the "enclose" is in quotes for a reason. 15:38:26 15:38:33

I think, you know, a person could interpret that in a different way. But with the context of the patent and just in an effort to show how Matthies and Yamada obviously, you know, showed that they covered the same ground and the same limitations, I used the interpretation basically provided by the '803 patent. And there, you know, the analysis suggested by the '803 patent. And, you know, any person skilled in the art would see this the same way, that, you know, the blue and the red pixels make the same 15:38:35 15:38:36 15:38:39 15:38:41 15:38:49 15:38:54 15:38:57 15:39:03 15:39:05 15:39:11 15:39:15

arrangement, however it's described, but described in the '803 patent enclosed. But according to the context, has this kind of going-around situation. Any person skilled in the art would see that these two patents are describing the exact same thing. And the '803 is just describing that same -- same layout but using different terminology. 15:39:18 15:39:22 15:39:28 15:39:33 15:39:36 15:39:40 15:39:44

MR. KUDZIN: Can we turn back to Exhibit 2101, and go to Page 52 of the document, please. 15:39:50 15:39:52

(Discussion off the record with the A/V technician.) 15:40:26 15:40:30

Q And so we're again looking at your expert report in the ITC investigation. And at the top of the page you're talking about the same limitation, Wherein the second pixels and the third pixels enclose the first pixel in the virtual square. Correct? 15:40:31 15:40:34 15:40:37 15:40:39 15:40:44 15:40:47

A That's what it looks like, yeah. 15:40:48

MR. HERMAN: Object. Also outside the scope of direct. 15:40:50 15:40:53

Q And if we look at Paragraph 232, you say, "I understand that none of the parties have sought 15:40:54 15:40:59

to construe the term 'enclose,' and therefore it should be given its plain and ordinary meaning as would be understood by a POSITA." 15:41:01 15:41:04 15:41:07

Correct? 15:41:08

A Correct. 15:41:11

Q And then in the next paragraph, 233, you say, "It is my opinion that the term 'enclose' should therefore be given its ordinary meaning, which I understand to mean 'surround or close off on all sides,' or 'bound on all sides, contain.'" 15:41:11 15:41:15 15:41:17 15:41:20 15:41:23

Correct? 15:41:30

A Yes. 15:41:31

Q Is that still your understanding as to what the plain and ordinary meaning of the term "enclose" would be to a person of ordinary skill in the art? 15:41:31 15:41:35 15:41:38 15:41:41

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:41:41 15:41:43

A This is a response to Professor Kymissis's analysis, so I'd have to look at that context. He might have brought something up about that. I don't -- I don't recall, you know. 15:41:45 15:41:47 15:41:51 15:41:56

Q All right. Well, let's look at the very next paragraph. You say, Dr. Kymissis has not offered his understanding of what that term means. 15:42:01 15:42:04 15:42:07

Correct? 15:42:10

MR. HERMAN: Object to form. Also outside the scope of direct. And completely and totally lacking in foundation and context. 15:42:10 15:42:11 15:42:14

A Yeah, you have to look at the whole report. I don't -- I don't recall, you know, the specifics of Dr. -- Professor Kymissis's opinions there. You know, I guess enclose is -- is ambiguous and -- and he didn't, in his opinion, clarify his meaning of that. So, you know, that would -- I suppose that I was thinking that would have been helpful, if he'd touched on that or clarified that for us. 15:42:21 15:42:23 15:42:26 15:42:31 15:42:38 15:42:47 15:42:52 15:42:55 15:42:59

Going back to the IPR, though. You know, like I said, I used the information in the patents. For this analysis, you know, with no other context, no other materials, you know, except what I've listed here, this was done before the subsequent analysis, which had more and 15:43:00 15:43:03 15:43:09 15:43:12 15:43:14 15:43:19

different materials and more and different assignment, intent, for me. 15:43:22 15:43:27

So, yeah, I'm -- I guess that's -- that's where some of these differences come in. But I'd have to go back through all that material to really be clear. 15:43:31 15:43:36 15:43:38 15:43:40

Q Okay. Well, in Paragraph 233 you state your opinion as to what the meaning of "enclose" is. 15:43:41 15:43:45 15:43:47

Correct? 15:43:47

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:43:50 15:43:51

A That's the plain and ordinary meaning. But then I said it should be given that, that's true. 15:43:55 15:43:57 15:43:57

But in the IPR matter here, with my declarations here, I used the context provided by the '803 patent; and showed how basically using Matthies and Yamada, you could make -- make the same pixel arrangement. It would have been well known and obvious to a person of skill in the art exactly in the same way that -- that the '803 15:44:05 15:44:08 15:44:11 15:44:15 15:44:17 15:44:22 15:44:23

shows.

So using their interpretation, their analysis, the exact same -- you know, the exact same process, showed that it was, you know, pretty obvious and easy to make that pixel array. 15:44:29 15:44:30 15:44:32 15:44:37 15:44:40

Q When you say "their interpretation, their analysis," who is the "they" that you're referring to? 15:44:42 15:44:46 15:44:48

A Just the context in the '803 patent. 15:44:49

Q Is there any reason why we should use a different definition of "enclose" in the IPRs than you applied in the ITC? 15:44:52 15:44:57 15:45:01

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:45:04 15:45:05

A I don't know, and I don't recall. 15:45:08

Q Turning to Paragraph 237 on the next page of Exhibit 2101. You say, "Indeed, applying the plain meaning of the word 'enclose' to this limitation, it is clear that large gaps exist on each side of the box, such that the four corner pixels do not enclose the first pixel within that box, as shown below, annotated by yellow lines." 15:45:10 15:45:21 15:45:33 15:45:36 15:45:38 15:45:42 15:45:45

Correct? 15:45:48

A I see that. 15:45:49

Q And so in the ITC, it was your opinion that if there were large gaps between the pixels, that this limitation was not satisfied. Correct? 15:45:50 15:45:55 15:45:59

MR. HERMAN: Objection. Outside the scope of direct. 15:46:03 15:46:04

A Yeah, I guess it could be that in this analysis I tended towards more the plain meaning; whereas in the IPR analysis I just tried to replicate using the prior art, the context, and the limitations that were in the '803 more directly. 15:46:08 15:46:11 15:46:15 15:46:19 15:46:25 15:46:29

So, you know, Matthies and Yamada should be put together to make this same pixel arrangement, enclosed in the same way as shown in the figures in the '803, everything just the same. So in this invalidity analysis, I used the context definitions and went through my evaluation like that. 15:46:30 15:46:33 15:46:37 15:46:40 15:46:44 15:46:51 15:46:56

You know, I guess there could be a different interpretation of plain and ordinary 15:46:58 15:47:00

meaning. I didn't even have to do that. In this IPR analysis I could just stick with the context and the exact approach described in the patent. 15:47:02 15:47:05 15:47:07

So I guess less ambiguous. 15:47:17

Q If I could turn your attention back to your expert -- sorry, your declaration in the '803 case. Tab 1. And if we could turn to Page 10, please. 15:47:18 15:47:34 15:47:38 15:47:46

And there's a section here saying, Understanding of the Law. Correct? 15:47:57 15:47:59

A Yes. 15:48:01

Q And I appreciate that you're not an attorney. 15:48:02 15:48:03

A I'm not. 15:48:06

Q In Paragraph 23 you say, "I have been further instructed and understand that a patent claim is unpatentable and invalid as obvious if the subject matter of the claim as a whole would have been obvious to a POSITA of the claimed subject matter as of the time of the invention at issue." 15:48:06 15:48:13 15:48:15 15:48:18 15:48:21 15:48:23 15:48:25

Do you see that? 15:48:26

A Yes. 15:48:27
Q That's your understanding? 15:48:27
A Yes. 15:48:30
Q And then in the next sentence you say, "I understand that when assessing the obviousness of claimed subject matter, the following factors are evaluated: 1, the scope and content of the prior art; 2, the difference or differences between each claim of the patent and the prior art; and 3, the level of ordinary skill in the art at the time the patent was filed." 15:48:30 15:48:35 15:48:38 15:48:40 15:48:44 15:48:49 15:48:53 15:48:56
Do you see that? 15:48:57
A Yes. 15:48:58
Q Is that your understanding as to the factors to be evaluated when determining whether a claim is obvious? 15:48:58 15:49:02 15:49:07
A Yes. 15:49:08
Q Are those the factors that you considered in forming your opinions in the -- in these IPRs? 15:49:09 15:49:11
A Yeah, in the scope and content, like you've been asking me about, the field of use, the pixel arrangements for displays, the fact that 15:49:17 15:49:20 15:49:23

there are organic LED displays, the differences and why a POSITA might -- might think that whatever differences are marginal or not -- not that relevant, and the level of skill which I believe I get to later. I think I say it's somebody with a college degree plus two years of experience. 15:49:27 15:49:31 15:49:36 15:49:42 15:49:45 15:49:49 15:49:51

So, yeah, I understand that. 15:49:52

Q If we turn to Page 13 and take a look at Paragraph 33. You go on to say, I've been informed and I understand that factors referred to as, quote, objective indicia of nonobviousness, or, quote, secondary considerations, are also to be considered when assessing obviousness when such evidence is available. 15:49:54 15:50:00 15:50:10 15:50:13 15:50:17 15:50:20 15:50:22

Is that correct? 15:50:24

A Yes. 15:50:25

Q You go on to say, "I understand that these factors can include: 1, commercial success; 2, long-felt but unresolved needs; 3, copying of the invention by others in the field; 4, initial expressions of disbelief by experts in the field; 15:50:26 15:50:28 15:50:32 15:50:37 15:50:41

5, failure of others to solve the problem the claimed subject matter solved; and 6, unexpected results." 15:50:44 15:50:48 15:50:52

Correct? 15:50:53

A Yes. 15:50:53

Q And that's your understanding of so-called secondary considerations? 15:50:54 15:50:58

A Yes. 15:51:01

Q Have you considered any secondary considerations in forming your opinions in these IPRs? 15:51:02 15:51:08 15:51:11

A Yes. 15:51:13

Q Which secondary considerations did you consider? 15:51:14 15:51:17

A I think it's at the end of the report. All of them. And I didn't identify any of them as being relevant. And this is in particular to the -- the actual pixel layout. I know Samsung phones are successful. I know they have good displays. But I also know they had good displays, you know -- they've always had good displays, and it's not clear that there's a direct line between 15:51:19 15:51:34 15:51:37 15:51:46 15:51:52 15:51:54 15:51:59 15:52:02

the display performance and -- and this explicit pixel array. Which, also, I would say that this pixel array was obvious. So, you know, I wouldn't give the credit to the Samsung patent but, rather, to Matthies and Yamada in the same -- in the exact same way. 15:52:04 15:52:13 15:52:18 15:52:21 15:52:25 15:52:30

So I did -- I did, you know, consider those factors, and they didn't move the needle for me. 15:52:31 15:52:35 15:52:39

Q So if we go back to the list of factors that you identified in Paragraph 33, when you talk about the Samsung phones being successful, that's -- is that the first of these factors, commercial success? 15:52:41 15:52:53 15:52:57 15:53:01 15:53:05

MR. HERMAN: Objection. Form. 15:53:06

A No; it's -- it would be if the patent was on the entire phone. But the patent's only on the display. And so the direct line between the commercial success of the phone and this -- just this display element, is not clear at all. 15:53:08 15:53:12 15:53:17 15:53:20 15:53:24

Q What evidence did you consider regarding the commercial success of the Samsung phones? 15:53:30 15:53:33

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:53:37 15:53:38

A Well, didn't -- Number 1, I think because in my opinion these patents are obvious combinations of previous patents, you know, the extent that -- that -- well, let me rephrase that. 15:53:45 15:53:49 15:53:54 15:53:59

In the shared specification of all these patents, the -- the inventor claims that there is improved performance. But there is no linkage between the claim limitations and any improved performance. So it's -- it's -- you know, to the extent that Samsung phones have been commercially successful, and to the extent that they have superior displays, which I'm not -- I don't know if that's true, to the extent that the displays' superiority, why their displays might be superior, it doesn't connect to these patents, because the patents don't connect the claimed performance enhancements to the actual claim limitations. 15:54:05 15:54:08 15:54:16 15:54:21 15:54:26 15:54:32 15:54:36 15:54:40 15:54:43 15:54:50 15:54:53 15:54:56 15:54:58

So when I'm trying to evaluate this, I can't say, Oh, you know, Samsung has a better phone because it has a better aperture ratio, 15:55:03 15:55:05 15:55:10

because of this diamond pixel, when the diamond pixel array or the quad array doesn't actually connect to a better aperture ratio. So I did the analysis, but it's hard to make the connection to any commercial performance to the actual specific claim limitations. 15:55:13 15:55:19 15:55:23 15:55:26 15:55:28 15:55:31

You can possibly make a connection to the claimed performance benefits in the specification, but those are not connected to the claim limitations. 15:55:33 15:55:35 15:55:38 15:55:40

Q In forming your opinions in these IPRs, have you considered any evidence of long-felt but unresolved needs? 15:55:42 15:55:49 15:55:54

MR. HERMAN: Objection. Form. 15:55:58

A It's the same -- same analysis. To the extent that there are long-felt but unresolved needs, there's no clear connection with the claim limitations. And so that's -- you can't say, Oh, this patent solves something, when the claim limitations have no linkage to any actual improved performance or shortcoming of the technology. 15:55:59 15:56:01 15:56:07 15:56:11 15:56:17 15:56:19 15:56:25

Q Prior to the invention of the '803 15:56:29

patent, was there a long-felt need for a new pixel arrangement? 15:56:32 15:56:38

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:56:38 15:56:40

A No, because the pixel -- I mean, I don't even think the '803 patent is an actual invention. And to the extent that, you know, this quad pixel array is being used with the different sized pixels of different colors, that was invented by Matthies and Yamada, and just an obvious combination. So I don't see the linkage. 15:56:44 15:56:45 15:56:48 15:56:53 15:56:58 15:57:00 15:57:02

Q In forming your opinions in these IPRs, did you consider any evidence of copying of the invention by others in the field? 15:57:07 15:57:11 15:57:12

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:57:15 15:57:16

A I don't think the '803 is an actual invention, or any of these patents. I think they're patents that are obvious, obvious combinations of previous actual inventions. So, no. 15:57:22 15:57:24 15:57:26 15:57:28 15:57:33

Q All right. Did you consider any evidence 15:57:36

of copying of what's claimed by the '803, '683, and '578 patent, regardless of whether or not you feel like it's an invention? 15:57:37 15:57:46 15:57:48

MR. HERMAN: Objection. Form. Also outside the scope of direct? 15:57:50 15:57:51

A I don't think it would be possible to know if -- which -- if the '803 was copied or this patent set, or if the prior art in an obvious combination was copied. 15:57:54 15:57:56 15:58:01 15:58:05

Q Have you considered any evidence as to whether BOE has copied the pixel arrangement claimed by the '803 patent? 15:58:07 15:58:09 15:58:13

MR. HERMAN: Objection. Form. Also outside the scope of direct. 15:58:15 15:58:16

A Have I -- I have no way of knowing if whatever similarities there are between the different manufacturers are based on the '803 patent or the obvious combination of prior art. 15:58:25 15:58:31 15:58:32 15:58:35

Q In forming your opinions in this case, have you considered the similarity -- any similarities between the pixel structures in any BOE products and the pixel structures described in 15:58:39 15:58:44 15:58:47 15:58:50

the '803 patent? 15:58:56

MR. HERMAN: Objection. Form. Also 15:58:57

outside the scope of direct. 15:58:58

A Not for this analysis. 15:58:59

Q In forming your opinions in this -- in 15:59:00

these IPRs, have you formed -- have you considered 15:59:06

any evidence regarding initial expressions of 15:59:10

disbelief by experts in the field? 15:59:14

MR. HERMAN: Objection to form. 15:59:16

A I did not consider that -- well, again, 15:59:21

it's -- there's always some sort of noise about 15:59:26

new -- new displays, whether they're Apple or 15:59:36

Samsung or whatever. But for this analysis I 15:59:40

thought about that. And because there's no 15:59:46

linkage between the actual claims and any 15:59:48

expression of disbelief around -- around display 15:59:52

performance, it just couldn't be -- couldn't be 15:59:59

connected. There's no linkage. Right? 16:00:01

So somebody could say, Oh, this new phone 16:00:04

has a way higher aperture ratio. Well, there's no 16:00:07

linkage, despite the mention in the specification, 16:00:13

that these -- these so-called inventions enable a 16:00:17

higher aperture ratio. There's no actual linkage between the actual claims and an improved aperture ratio which would result in improved performance. So without that linkage, any such expressions of disbelief are not linked to the actual patents. 16:00:20 16:00:24 16:00:27 16:00:30 16:00:35

And so, yeah, there was no secondary indicia of nonobviousness that could be -- that could be perceived. 16:00:40 16:00:43 16:00:48

Q Let me make sure I understand your opinion. 16:00:51 16:00:55

Are you saying that there were no expressions of disbelief, or are you saying that the expressions of disbelief that there were were not tied -- that there was no linkage between those expressions of disbelief and the patents? 16:00:57 16:00:59 16:01:02 16:01:06 16:01:11

MR. HERMAN: Objection. 16:01:13

A The -- the patents do not in and of themselves relate to display performance. Despite what they say in the specification, there is no linkage. So any expressions of disbelief that there may or may not have been are not actually connected to the patent, to these patents. 16:01:14 16:01:19 16:01:24 16:01:30 16:01:32 16:01:34

Because they say, Oh, we could have improved aperture ratio. Well, aperture -- you know, that's not a function or a result of the claim limitations. So any expressions of disbelief are not connected to the patent limitations. 16:01:40 16:01:42 16:01:44 16:01:51 16:01:56

So I knew -- I do know that there were some expressions of disbelief, and there have been for every phone and every technology. But the connection between those expressions of disbelief and only one part of the display technology, and a part that actually doesn't have a direct linkage to performance, is meaningless. 16:02:01 16:02:03 16:02:05 16:02:09 16:02:13 16:02:16 16:02:17

Q What expressions of disbelief are you referring to? 16:02:22 16:02:25

A I don't recall. Just general noise. Like I said, I didn't -- I didn't -- I evaluated this. But because I couldn't connect the -- in my evaluation I was trying to connect the actual performance or the actual limitation that was claimed in these -- in these patents to an actual performance benefit, and there is no linkage to a performance benefit. So there is no reason to try 16:02:25 16:02:28 16:02:31 16:02:38 16:02:40 16:02:44 16:02:50 16:02:53

to connect that to an expression of disbelief. 16:02:56

Q In performing this evaluation, did you 16:03:03

encounter any expressions of disbelief? 16:03:08

MR. HERMAN: Objection. Form. 16:03:11

A It was -- it was -- I would say I did. 16:03:19

They were cursory. I didn't rely on them because 16:03:22

the more critical element is that -- the 16:03:24

performance, whatever expressions of disbelief 16:03:30

that were -- I cursorily saw, were not related to 16:03:34

the claim elements of these patents. 16:03:38

Q Where -- what were those expressions of 16:03:42

disbelief that you located? 16:03:45

MR. HERMAN: Objection. Form. 16:03:48

A They're on the internet. I don't really 16:03:51

recall. 16:03:52

But like I said, any -- if the patent 16:03:53

doesn't result in an important -- performance 16:03:57

improvement, then it's really immaterial whether 16:04:01

somebody says, Hey, look, we have a performance 16:04:04

improvement. That was the core of my analysis. 16:04:07

Q Did you keep any records of the 16:04:13

expressions of disbelief that you considered in 16:04:14

forming your opinions in these IPRs? 16:04:17

MR. HERMAN: Objection. Form. 16:04:19

A No. 16:04:21

Q In forming your opinions in these IPRs, did you consider any evidence of failures of others to solve the problem the claimed subject matter solved? 16:04:21 16:04:29 16:04:31 16:04:34

MR. HERMAN: Objection to form. 16:04:35

A I did consider that, yes. 16:04:38

Q What evidence of failure of others to solve the problems the claimed subject matter solved did you consider in forming your opinions in these IPRs? 16:04:39 16:04:43 16:04:48 16:04:50

A The limitations in these patents don't actually claim to solve any problems or don't connect to the claims of problems being solved. So that was basically the extent of the analysis. But there's not a single problem that -- that this patent solves in a novel way, that has an invention of some new solution. So that was the -- basically the extent of my analysis there. 16:04:53 16:04:56 16:04:58 16:05:00 16:05:03 16:05:07 16:05:11 16:05:15

Q Did you consider any specific evidence 16:05:17

related to failure of others in your opinion -- in forming your opinions in this case? 16:05:25 16:05:29

MR. HERMAN: Objection. Form. Also outside the scope of direct. 16:05:31 16:05:33

A This -- so the key -- the key line here is, "The problem the claimed subject matter solved." The subject matter, the patents at issue in the specification mentioned improved aperture ratio. But like I said, they don't connect to that at all. 16:05:42 16:05:44 16:05:53 16:05:59 16:06:04 16:06:10

So there is no problem that's solved by these -- by these patents. So there was no failure of others to solve this problem, to solve the problem that these patents don't solve, either. 16:06:13 16:06:17 16:06:21 16:06:24 16:06:27

Q Did you consider the aperture ratio of other pixel arrangements used by others in evaluating this secondary consideration? 16:06:29 16:06:33 16:06:35

MR. HERMAN: Objection. Form. 16:06:40

A Not really. Because this -- these claims don't relate to aperture ratio. Without having absolute numbers of spacings and pixel sizes it's 16:06:42 16:06:47 16:06:51

meaningless to consider aperture ratio. You could satisfy these claims with huge distances between the pixels and various small pixels, and all the claim limitations would be satisfied and you'd have a much lower aperture ratio. So there's no connection between any improvement of aperture ratio with this -- with these patents. It's just a claim, an unfounded, unsupported -- not a claim, but a -- not a patent claim, but it's a claim in the specification that's unfounded and unsupported. So I didn't bother to look too closely into that. Because whatever changes in aperture ratio were achieved by anybody weren't a result of the claim limitations in these patents. 16:06:56 16:06:58 16:07:02 16:07:05 16:07:07 16:07:10 16:07:16 16:07:19 16:07:23 16:07:30 16:07:34 16:07:36 16:07:39 16:07:42

Q Did you consider any evidence of unexpected result in forming your opinions -- 16:07:49 16:07:51

A Yes. 16:07:56

Q -- in these IPRs? 16:07:56

MR. HERMAN: Objection. Form. 16:07:58

A Yes, I did. 16:07:59

Q What evidence of unexpected results did you consider in forming your opinions in this 16:08:00 16:08:02

case? 16:08:05

A Well, this is a basic obviousness 16:08:05

analysis, that the results of -- of the -- of 16:08:07

applying the claim limitations in these patents 16:08:13

would be entirely obvious and entirely expected 16:08:17

and predictable. So there were no unexpected 16:08:20

results. 16:08:24

MR. KUDZIN: Why don't we take a 16:09:13

ten-minute break. 16:09:15

VIDEO SPECIALIST: We're going off the 16:09:17

record at 4:09 p.m. 16:09:18

(A recess was taken.) 16:09:20

VIDEO SPECIALIST: We're going back on 16:16:05

the record at 4:16 p.m. 16:16:06

MR. KUDZIN: I just have one last 16:16:09

housekeeping matter. I think there may have been 16:16:11

some confusion as to the numbering of the 16:16:14

exhibits, and so I just want to get it on the 16:16:17

record so that's straight. 16:16:19

I think we may have accidentally marked 16:16:23

two exhibits as Exhibit 2101. I believe that 16:16:26

there were three new exhibits that were introduced 16:16:32

in this that did not have previous numbers. There was Tab 22, which is a copy of the Arnold patent, that should have been marked 2011. 16:16:37 16:16:40 16:16:43

There was Tab 103, which was one of Dr. Pattison's patent, U.S. Patent Number 8,227,820, which would have been Exhibit 2101. 16:16:48 16:16:55 16:16:57

And then there was Tab 201, which was the redacted Pattison report, and that would therefore be Exhibit 2102, not 210. 16:17:01 16:17:05 16:17:09

MR. HERMAN: Those are all patent owner exhibit numbers that you'll have in a table of exhibits whenever your file your response? 16:17:18 16:17:20 16:17:22

MR. KUDZIN: Correct. They're all 2000 numbers, yeah. I just wanted to get on the record that to the extent that there may have been a confusion about what Exhibit 2101 is, Exhibit 2101 was Dr. Pattison's patent. And then the expert report should be Exhibit 2102. But you're right, that will be indicated in a supplemental filing. 16:17:24 16:17:27 16:17:30 16:17:31 16:17:34 16:17:37 16:17:40

With that, I have nothing further, and I pass the witness. 16:17:47 16:17:48

MR. HERMAN: I don't have anything on 16:17:50

redirect. So I think that means we're done. But thank you. 16:17:52 16:17:55

MR. KUDZIN: Thank you, Dr. Pattison. I appreciate all your time, and I hope you have a good rest of the day. 16:17:56 16:17:57 16:18:00

THE WITNESS: Thank you. 16:18:01

VIDEO SPECIALIST: This marks the end of the deposition of Morgan Pattison. We're going off the record. The time is 4:18 p.m. 16:18:02 16:18:03 16:18:05

(Off the record at 4:18 p.m. EDT.)

ACKNOWLEDGMENT OF DEPONENT

I, P. MORGAN PATTISON, Ph.D., do hereby acknowledge that I have read and examined the foregoing testimony, and the same is a true, correct and complete transcription of the testimony given by me, and any corrections appear on the attached Errata sheet signed by me.

_____ _____

(DATE) (SIGNATURE)

C E R T I F I C A T E

I, Debra Ann Whitehead, E-Notary Public in and for the State of Maryland, do hereby certify:

That P. MORGAN PATTISON, Ph.D., the witness whose deposition is hereinbefore set forth, was duly sworn by me before the commencement of such deposition and that such deposition was taken virtually and is a true record of the testimony given by such witness.

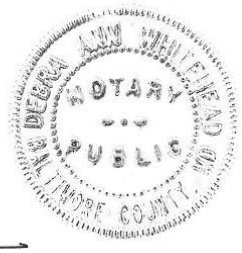
I further certify that the adverse parties, MIANYANG BOE OPTOELECTRONICS TECHNOLOGY CO., LTD.; WUHAN CHINA STAR OPTOELECTRONICS SEMICONDUCTOR DISPLAY TECHNOLOGY CO., LTD; TIANMA MICROELECTRONICS CO., LTD.; and VISIONIX TECHNOLOGY, were represented by counsel at the deposition.

I further certify that the deposition of P. MORGAN PATTISON, Ph.D., occurred virtually, on Wednesday, March 20, 2024, from 9:03 a.m. to 4:18 p.m. EDT.

I further certify that I am not related to any of the parties to this action by blood or marriage, I am not employed by or an attorney to any of the parties to this action, and that I am in no way interested, financially or otherwise, in the outcome of this matter.

IN WITNESS WHEREOF, I have hereunto set my hand this 22nd day of March, 2024.

My commission expires:
April 30th, 2027



E-NOTARY PUBLIC IN AND FOR THE
STATE OF MARYLAND

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