

**UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD**

**WESTERN DIGITAL TECHNOLOGIES,
INC.,**

Petitioner,

v.

LONGITUDE LICENSING LTD.,

Patent Owner.

CERTIFIED COPY

PAGES 1 - 72

DEPOSITION OF DR. BRUCE JACOB

Friday, June 21, 2024

APPEARING REMOTELY FROM HUNTINGTON BEACH, CALIFORNIA

**STENOGRAPHICALLY REPORTED BY:
LINDSAY A. STOKER, RMR, CRR, CRC
CA CSR No. 14373
Job No. 24-138824
Ref #: IPR2023-01230, CM#52414.15**

 **THE SULLIVAN GROUP
OF COURT REPORTERS**
SULLIVANCOURTREPORTERS.COM
PHONE 562.888.6488

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

**WESTERN DIGITAL TECHNOLOGIES,
INC.,**

Petitioner,

V.

LONGITUDE LICENSING LTD.,

Patent Owner.

CERTIFIED COPY

) PAGES 1 - 72

DEPOSITION OF DR. BRUCE JACOB

Friday, June 21, 2024

APPEARING REMOTELY FROM HUNTINGTON BEACH, CALIFORNIA

**STENOGRAPHICALLY REPORTED BY:
LINDSAY A. STOKER, RMR, CRR, CRC
CA CSR No. 14373
Job No. 24-138824
Ref #: IPR2023-01230, CM#52414.15**

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

WESTERN DIGITAL TECHNOLOGIES,	)	
INC.,	)	
	)	
Petitioner,	)	
	)	
v.	)	
	)	
LONGITUDE LICENSING LTD.,	)	
	)	PAGES 1 - 72
Patent Owner.	)	
	)	
	)	

Deposition of Dr. Bruce Jacob, taken on behalf of the
Petitioner Pursuant to Notice via remote teleconference
in Huntington Beach, California, commencing at 7:03
a.m., on Friday, June 21, 2024, before Lindsay Stoker,
RMR, CRR, CRC, Certified Shorthand Reporter No. 14373 in
and for the State of California.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

A P P E A R A N C E S
--oOo--

**APPEARING ON BEHALF OF THE PETITIONER WESTERN DIGITAL
TECHNOLOGIES, INC.:**

**HAYNES BOONE, LLP
BY: HONG SHI, ESQ.
98 San Jacinto Boulevard
Suite 1500
Austin, TX 78701
Telephone: (512) 867-8440
Facsimile: (512) 867-8644
Email: hong.shi@haynesboone.com**

**APPEARING ON BEHALF OF THE PATENT OWNER LONGITUDE LICENSING
LTD.:**

**RUSS AUGUST & KABAT
BY: JAMES MILKEY, ESQ.
12424 Wilshire Blvd
12th Floor
Los Angeles, CA 90025
Telephone: (310) 826-7474
Email: jmilkey@raklaw.com**

APPEARANCES CONTINUED:

ALSO PRESENT:

David O'Dell, Western Digital Technologies, Inc.

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

INDEX

WITNESS: DR. BRUCE JACOB

PAGE

EXAMINATION BY MS. SHI

6

EXHIBITS

(No new exhibits were offered.)

PREVIOUSLY MARKED EXHIBITS

NUMBER

PAGE

EXHIBIT 1001

53

EXHIBIT 2003

26

1 STENOGRAPHIC REPORTER APPEARING REMOTELY
2 HUNTINGTON BEACH, CALIFORNIA
3 Friday, June 21, 2024, 7:03 a.m.
4 THE REPORTER: Good morning. Today is
5 June 21st, 2024, and the time is 7:03 a.m. Pacific
6 Standard time.
7 This is the deposition for Dr. Bruce L. Jacob
8 in the matter of Western Digital Technologies, Inc.
9 versus Longitude Licensing Limited.
10 My name is Lindsay Stoker, and I will be the
11 court reporter in this proceeding.
12 Would all counsel please introduce themselves
13 and the parties they represent.
14 MS. SHI: Hong Shi from Haynes and Boon on
15 behalf of Western Digital.
16 MR. O'DELL: David O'Dell on behalf of
17 petitioner Western Digital.
18 MR. MILKEY: James Milkey on behalf of patent
19 owner Longitude Licensing Limited with the law firm Russ
20 August & Kabat and also representing the witness today.
21 BRUCE JACOB,
22 called as a witness, having been first duly
23 sworn, was examined and testified as follows:
24 ///
25 ///

1 EXAMINATION

2 BY MS. SHI:

3 Q. Good morning, Dr. Jacob.

4 A. Good morning.

5 Q. So you have had your deposition taken before;

6 is that right?

7 A. I have.

8 Q. And you're appearing here today as an expert

9 witness on behalf of Longitude; is that right?

10 A. Yes.

11 Q. So how many times have you had your deposition

12 taken before?

13 A. Maybe a dozen.

14 Q. When is the most recent?

15 A. Sometime in the last year. I don't recall, off

16 the top of my head.

17 Q. Okay. So I expect that you're familiar with

18 all the procedures, but I am just going to go over a

19 couple of things as a reminder for the purpose of this

20 deposition.

21 A. Okay.

22 Q. So, first of all, you understand the oath you

23 just took is the same oath that you would take if you

24 were testifying live in court in front of a judge and a

25 jury?

1 A. Yes.

2 Q. And you understand that oath carries the same
3 penalties of perjury as if you were testifying in court;
4 correct?

5 A. I do.

6 Q. Is there any reason, such as a health reason or
7 medication of any kind, that would impair your ability
8 to give your best and most accurate answer today?

9 A. No.

10 Q. Okay. And just some reminders that this
11 deposition is being transcribed today and we're
12 developing a record. Do you understand that?

13 A. I do.

14 Q. And because we are creating a record, I would
15 like to ask you to wait for me to finish asking the
16 question before you answer. Is that okay?

17 A. Yes.

18 Q. And I will try to ask questions only after you
19 are done answering so that we avoid speaking over each
20 other. Would that work?

21 A. Yes.

22 Q. And also -- because we are developing a record
23 and we have a court reporter, so try to provide an oral
24 response as opposed to nods or shakes of the head. Is
25 that clear?

1 A. Yes.

2 Q. And if I ask a question and you answer it, I
3 will assume you understand it. Is that fair?

4 A. Yes.

5 Q. And if you don't understand my question, please
6 let me know. I will try my best to clarify it for you.

7 A. Okay.

8 Q. And at what hourly rate are you being
9 compensated for your work in this matter?

10 A. I think it's 690.

11 Q. And that's the same rate at which you are
12 compensated for those times preparing for your
13 declaration and for your time in this deposition; is
14 that right?

15 A. Yes.

16 Q. Roughly how much time did you spend preparing
17 your declaration?

18 A. Oh, gosh. I don't know. It was months ago.
19 I -- yeah.

20 Q. Is there -- could you provide a rough estimate?

21 A. Well, in general, it's -- it takes me about,
22 you know, an hour to write a page, half hour if I'm
23 doing good, so somewhere in that range.

24 Q. And how much time did you spend to prepare for
25 this deposition?

1 A. A day.

2 Q. Have you ever -- well, strike that.

3 So how many IPRs have you worked on?

4 A. I don't know, off the top of my head. Maybe

5 half a dozen or so. They seem to be popular these days.

6 So -- for a while the ITC was popular and now the IPRs

7 are popular. So --

8 Q. So about half a dozen IPRs. How many did you

9 work with patent owners?

10 A. I -- honestly, I don't know. Presumably you've

11 got my CV in front of you. You can see. I go roughly

12 half and half between, you know, trying to prove

13 invalidity and going in support of the patent owner. So

14 I am sort of -- I have been on both sides before.

15 Q. Okay. So when you're working with patent

16 owners to provide opinions in the IPRs, what usually is

17 the general process?

18 MR. MILKEY: Object to form.

19 BY MS. SHI:

20 Q. You can answer.

21 A. Sorry. What was the objection?

22 MR. MILKEY: Objection to form.

23 THE WITNESS: Oh. What was the question?

24 BY MS. SHI:

25 Q. When you're working with patent owners to

1 provide opinions in the IPRs, what usually is the
2 general process?

3 MR. MILKEY: Same objection.

4 THE WITNESS: Well, there -- I don't have a
5 general process. I review the materials and write a
6 report, and once I figured out what -- what's happening
7 inside the technical stuff and, you know, what's
8 happening inside their legal argument -- I apologize. I
9 don't know how to turn off these visual things that show
10 up on Zoom.

11 Like this is going to cause an explosion to
12 happen. Yeah. I don't know how to turn this off. If
13 you guys have any thoughts, I would love to know. I --
14 it keeps coming on every single time, and it is in
15 depositions. It is very frustrating. I hate Zoom. So
16 if you have any ideas how I can make that go away,
17 please let me know. I have no idea how to get rid of
18 it.

19 Anyway, to get back to your -- I will try not
20 to use my hands. To get back to answering your
21 question, my general process for all of my cases,
22 whether -- it doesn't matter who I'm working for.

23 My general process is to read through the
24 technical materials, figure out what the technical
25 argument is and then confer with the lawyers to see what

1 their legal argument is and then see how these two
2 arguments mesh, you know, because it's -- every case
3 really is two arguments; right? You've got a technical
4 case that you are presenting, and you've got a legal
5 case that you're presenting.

6 And so, you know, you want to make sure that
7 what you're saying on a technical sense is true; but,
8 you know, to whatever extent you can, you are allowed to
9 help the legal argument or at least not destroy their
10 legal argument.

11 So, you know, that is just sort of how every
12 case goes. You figure out, okay, what's -- what's the
13 technical argument here, what is going on, and you write
14 it up.

15 That's, you know --

16 BY MS. SHI:

17 Q. So what are the materials you reviewed?

18 A. In this case?

19 Q. Yes. To provide the opinion in the IPR?

20 A. I read Stiegler's report. I read through your
21 IPR petition that is pretty much identical to Stiegler's
22 report, and I read through the prior art references that
23 Stiegler provided; and I read through the original
24 patent, '701 patent.

25 Q. Did you receive the original patent, '701

1 patent, before you received the Stiegler report and IPR
2 petition?

3 A. Probably. Yes, I think so. Usually what
4 happens is lawyers will forward me the patents involved
5 to make sure that I know -- I am versed in the
6 technology. So I am sure I received that first.

7 Q. And is that the same -- similar process when
8 you're working with petitioners in the IPR that you will
9 usually receive the patent at issue first?

10 A. Yes.

11 MR. MILKEY: Objection to form.

12 THE WITNESS: But if the question is, in
13 general, do I receive the patents before anything else?
14 The answer is yes, almost always, because I want to know
15 what I'm working with. And presumably the lawyers want
16 to make sure that I know what I'm working with.

17 BY MS. SHI:

18 Q. So when you receive the patent at issue, do you
19 usually review them in their entirety?

20 MR. MILKEY: Objection to form.

21 THE WITNESS: I don't understand the question.
22 I read through the patent. What do you mean "in its
23 entirety"?

24 BY MS. SHI:

25 Q. So, for example, a patent usually has a section

1 called "Specification" and have sections called
2 "Claims."

3 Do you review both the specification and the
4 claims?

5 A. Yes.

6 Q. Do you also usually review the prosecution
7 history when you receive the patent?

8 A. No. Usually that is about a thousand pages,
9 most of which is legalese. And so I review that if
10 there is something important and that the lawyers say,
11 "Oh, you should probably read this section because it is
12 important."

13 But otherwise I don't read through a
14 thousand-page document just for the heck of it.

15 Q. And when you're reviewing the patent at issue,
16 do you review it with the understanding that the claims
17 are part of that define the scope of the invention?

18 A. Yes. They -- they define the legal scope, but
19 usually you have to read the specification to get the
20 technical understanding.

21 Q. So you understand the claims when you review
22 the patent in light of the descriptions of the
23 specification. Is that fair?

24 A. Did you just ask did I "understand the claims"
25 in light of the specification?

1 Q. You try to understand the claim language in
2 light of the technical details described in the
3 specification; is that right?

4 A. Yes, yes. When you read the claims, if -- if
5 there is anything that isn't obvious, then the
6 specification explains what that -- what that thing
7 means.

8 Q. So when you're preparing your report either for
9 when you're working with patent owner or working with
10 petitioner to provide analysis of the claims, do you use
11 the claim language to guide the analysis?

12 A. Well, it depends on the analysis. But can you
13 give me an example of what we're talking about?

14 Q. Sure. So, for example, in the -- when you're
15 working with patent owner to provide a declaration --
16 for example, to provide your opinion that the claims are
17 not invalid, do you use the claim language as the
18 guidance of your analysis in your report?

19 MR. MILKEY: Objection to form.

20 THE WITNESS: Well, again, it depends upon the
21 situation. It -- it just depends because the goal is to
22 read what the other person has said and respond to it.

23 And, you know, you look at the claims; you look
24 at what they have written; you look at the
25 specification, everything. The analysis is guided by

1 all of the information.

2 BY MS. SHI:

3 Q. So the analysis is guided at least in part by
4 the claims. Is that fair?

5 MR. MILKEY: Objection to form.

6 THE WITNESS: Again, if you can give me an
7 example of what you're getting at, like a specific
8 example, not just what you were saying before, which is,
9 you know, when you're working with the patent owner. If
10 you can show me what you're getting at, I could give you
11 a better answer.

12 But, in general, you look at all the
13 information to perform an analysis; and I don't know
14 what you want beyond that.

15 BY MS. SHI:

16 Q. So when you're -- for example, when you're
17 providing your opinion that two references cannot be
18 combined to reach at the claimed invention of Claim 1,
19 do you use the language of Claim 1 as guidance?

20 MR. MILKEY: Objection to form.

21 THE WITNESS: I -- if you can give me a
22 specific example, I could give you a yes or no. But I
23 can envision scenarios where you don't need to look at
24 the claim language because someone has taken two
25 mechanisms and put them together in a way that simply

1 doesn't work and the technology shows it. The
2 engineering is obvious.

3 So that's something where it's -- that the
4 claim language is immaterial. The mechanism just
5 doesn't work.

6 BY MS. SHI:

7 Q. So in how many of the IPRs you worked you have
8 analyzed the combination, as you just proposed, just
9 looking at the combination without looking at the
10 claims?

11 MR. MILKEY: Objection to form.

12 THE WITNESS: I don't think that I've -- I
13 don't think that I ever said that I did that.

14 BY MS. SHI:

15 Q. So in all the IPRs that you have worked
16 together with patent owners, you have not analyzed the
17 combination without looking at the claims?

18 A. I don't think I said -- I have done a bunch of
19 IPRs, and I don't recall the specific analysis
20 mechanisms that -- specific analysis procedures that I
21 went through. If you want to pull one up and show me, I
22 can tell you how I arrived at the -- the conclusion.

23 Q. So for this declaration that you provided
24 labeled as Exhibit 2003, did you analyze the combination
25 without looking at the claim language of Claim 1?

1 A. No.

2 Q. So you reviewed the Claim 1 first and then
3 analyzed the combination; is that right?

4 A. Yes. I read the patent, and then I read
5 Dr. Stiegler's report.

6 Q. So when you're working with a petitioner, do
7 you usually analyze the -- what's the process for you to
8 analyze the invalidity of the claims?

9 MR. MILKEY: Objection to form. Outside the
10 scope of the report.

11 THE WITNESS: There is no one process. It's --
12 whenever one does analysis -- whenever I do analysis, it
13 depends.

14 Again, I read the patents. I read the
15 technical manuals and, you know, whatever documents are
16 out there; and I figure out what the argument is.

17 BY MS. SHI:

18 Q. Okay. So for your declaration labeled 2003,
19 what documents did you review to prepare for that
20 declaration?

21 A. I believe I told you that earlier. I read the
22 patents involved; so the prior art that Dr. Stiegler
23 references. I read the Hayashi '701 patent, and I read
24 Stiegler's report.

25 And I started reading through the petition.

1 Like I said, it was almost identical to Stiegler's
2 report; so I focused on Stiegler's report.

3 Q. So you said you reviewed the prior art
4 referenced in the Stiegler report. What prior art
5 references did you review?

6 A. So there's Zhang, Javanifard; and I believe
7 that there may have been another one that I didn't end
8 up using much. I can't remember. He had several
9 different combinations. The ones that I focused on
10 mostly were Zhang and Javanifard.

11 Q. And you couldn't recall the third referenced
12 name?

13 A. Let's see. I think there was a Kang, maybe;
14 right? There was a summary of Kang with Javanifard. I
15 can't remember. There was something else. There was
16 another -- I think there was another combination, wasn't
17 there? I don't recall.

18 The ones I focused on, like I said, were
19 Javanifard and Zhang.

20 Q. You mean P-a-m. You said Pam --

21 A. No. I said Kang, K-a-n-g.

22 Q. K-a-n-g. Okay?

23 A. I think that was -- I think Dr. Stiegler had
24 some combination involving that. So I believe I looked
25 at that reference as well.

1 Q. Did you provide any opinion related to Kang in
2 your declaration?
3 A. I did not.
4 MR. MILKEY: Objection to form.
5 THE WITNESS: I don't think I specifically
6 called out Kang in my report anywhere.
7 BY MS. SHI:
8 Q. So to prepare for your declaration, did you
9 review the patent owner preliminary response?
10 A. I think I looked at it, but I looked at it
11 after I read all the technical materials.
12 Q. Did you review any draft of the patent owner
13 preliminary response?
14 A. I don't think so. I think I was shown the
15 final thing that was submitted.
16 Q. Did you review the board's decision to
17 institute in this case?
18 A. I skimmed that, but that's -- that is legal
19 stuff. So I don't really consider that a whole lot.
20 Q. So you're also an expert witness in the
21 parallel district court proceeding; is that right?
22 A. I'm sorry, what?
23 Q. You're aware that there's a parallel proceeding
24 in the district court; is that right?
25 A. Oh. I am actually not aware of that.

1 Q. Did you review any party's documents in the
2 district court -- for example, the claim construction
3 briefs?

4 A. Oh. There was a claim construction thing a
5 while back, and I believe -- let me see. Hold on, let
6 me look that up. You're right. Actually, I wrote a
7 declaration for the Markman stuff. I apologize.

8 I had forgotten about that. Yes. That is
9 Central District of California, Southern Division. So,
10 yes, I apologize. I totally forgot about that.

11 That was the first thing that I did.

12 Q. So you did the claim construction brief
13 declaration before working on the IPR declaration; is
14 that right?

15 A. Yes.

16 Q. Did you review the patent owner's response to
17 prepare for your declaration?

18 MR. MILKEY: Objection to form.

19 THE WITNESS: You mean the -- for the -- are we
20 talking the Markman declaration that I wrote or the --
21 BY MS. SHI:

22 Q. Sorry. We are switching back to the IPR
23 proceeding. So we discussed there was a patent owner's
24 preliminary response, and then there's a patent owner's
25 response filed after the board's decision to institute.

1 Have you reviewed the patent owner's response?

2 A. I am sure I have seen it, but I've -- it is not
3 something I read in depth.

4 Q. Did you review any draft of the patent owner's
5 response?

6 MR. MILKEY: Objection to form.

7 THE WITNESS: I don't believe so. I think
8 that -- I think I have seen the versions that were
9 submitted.

10 BY MS. SHI:

11 Q. Did you see the patent owner's response
12 submitted -- when did you see that?

13 A. I don't recall. While I was writing the
14 declaration, I believe -- I don't recall when I saw it.

15 Q. Just to clarify, the -- just to clarify, the
16 patent owner's response is the patent owner's brief that
17 the Exhibit 2003 is used to support?

18 A. Oh, oh. Then I haven't seen that. What I saw
19 must have been the preliminary response.

20 Q. So did you draft all of your declaration?

21 A. Yes. Well, there's a section of legal stuff
22 that the lawyers wrote. But all the technical stuff, I
23 wrote.

24 Q. Did you work with anyone to draft the technical
25 sections of your declaration?

1 MR. MILKEY: Objection to form.

2 And for all these answers, Dr. Jacob, you can

3 answer to the extent it doesn't implicate privileged

4 information.

5 THE WITNESS: Okay. And the answer was, no, I

6 wrote all the technical stuff.

7 BY MS. SHI:

8 Q. Did you revise the technical part of your

9 declaration based on others' review?

10 MR. MILKEY: Objection to the extent it calls

11 for privileged information.

12 THE WITNESS: I'm not exactly sure how I'm

13 supposed to answer that, then.

14 BY MS. SHI:

15 Q. I will repeat the question. Did you revise the

16 technical part of your declaration based on other

17 people's reviews?

18 MR. MILKEY: Objection to the extent it calls

19 for privileged information.

20 Doctor, you can respond at a high level but --

21 THE WITNESS: Okay. Then the answer is yes.

22 BY MS. SHI:

23 Q. You just said you didn't work with others to

24 draft the technical sections of your declaration. What

25 does that mean?

1 A. That means that I didn't work with others to
2 draft the technical sections of the declaration.

3 Q. However, you did revise the technical sections
4 of the declaration based on other people's reviews;
5 correct?

6 A. Yes.

7 Q. So who has provided the reviews to your
8 declaration that you did the revision?

9 MR. MILKEY: Objection to form. Calls for
10 privileged information.

11 BY MS. SHI:

12 Q. You can answer.

13 A. Honestly, I don't know. I sent it in a draft,
14 and I got some comments back, and I don't know who
15 provided those comments.

16 Q. Where did you send in the draft?

17 MR. MILKEY: Objection to form. And I instruct
18 the witness not to discuss communications between
19 attorneys and himself.

20 BY MS. SHI:

21 Q. You can answer.

22 A. Well, I have been instructed not to. So --

23 MS. SHI: Counsel, did you instruct Dr. Jacob
24 not to answer?

25 MR. MILKEY: Counsel, I recall asking your

1 witness in his deposition whether you specifically told
2 him how to answer questions, and you instructed him not
3 to answer. I think that this is -- I think asking about
4 the specific attorney-client communications involved in
5 drafting his declaration go -- are much more
6 objectionable than the questions I was asking.

7 So unless you are going to allow me another
8 deposition with Dr. Stiegler to get at the questions
9 that, I think, were more than justified, I am going to
10 instruct Dr. Jacob not to answer -- not to answer
11 questions regarding attorney-client communications.

12 BY MS. SHI:

13 Q. So just to make the record clear, Dr. Jacob,
14 you sent the draft to your attorneys for review; is that
15 correct?

16 A. I'm not going to answer communication
17 questions.

18 Q. I'm not asking about -- I'm not asking about
19 the communications, but let me --

20 Okay. So for preparing for your deposition,
21 did you meet with anyone?

22 A. Yes.

23 Q. Who did you meet?

24 A. Jim Milkey.

25 Q. Anyone else?

1 A. No.

2 Q. When did you meet?

3 A. Yesterday.

4 Q. For how long?

5 A. I think for a total of maybe 30 minutes.

6 Q. Is that the only meeting you had?

7 MR. MILKEY: Objection to form.

8 And, Counsel, I will allow the witness to

9 answer; but I will just state for the record that,

10 during the deposition that I took, you instructed the

11 witness not to answer how long you had discussed his

12 testimony during the break.

13 And so I really don't understand why you are

14 asking these questions, given that you objected to very

15 similar questions being answered.

16 And, again, I will allow the witness to answer

17 these high-level questions, but I really view this line

18 of questioning as highly inappropriate, given your

19 behavior at the previous deposition.

20 BY MS. SHI:

21 Q. You can answer.

22 A. I don't know which question to answer.

23 Q. Is that 30-minute meeting with Jim the only

24 meeting you had to prepare for the deposition?

25 A. Yes.

1 Q. Have you done anything else to prepare for the
2 deposition?
3 A. Yes.
4 Q. What are those things?
5 A. I read through my report. I read through
6 Stiegler's report, and I think that's about it. I did
7 review the patents but very lightly.
8 Q. Are there any other things you did to prepare
9 for the deposition?
10 A. Not that I can think of.
11 Q. So could you open Exhibit 2003 from the IPR
12 number 2023-01230?
13 (Exhibit No. 2003 identified.)
14 THE WITNESS: And what -- what is that
15 document? I don't know exhibit numbers.
16 BY MS. SHI:
17 Q. Okay. It's your declaration in support of the
18 patent owner's response?
19 A. Okay. My declaration, got it. So where do you
20 want me to go?
21 Q. Okay. So let's go to the page 78.
22 Is that your signature?
23 A. Yes.
24 Q. Did you sign it after reviewing the entirety of
25 your declaration?

1 A. Did I sign it after what?

2 Q. After you reviewed your declaration in its
3 entirety, including both the technical sections and
4 legal sections?

5 A. Well, I signed it after writing it. I mean,
6 yes, I guess, you could say I reviewed it; but I didn't
7 review my document. I wrote my document. So, yes, I
8 wrote my document.

9 And one of the ways you can tell that I wrote
10 it is I spelled my name correctly on the front page.

11 Jim, I think that's why she is angry.

12 So, yes, this is my signature; and I put it on
13 the document after writing the document.

14 Q. And you don't have anything in your declaration
15 that you would like to correct today?

16 A. No. I mean, there are typos, but nothing
17 significant.

18 Q. What are the typos?

19 A. When I'm reading through it, I noticed some;
20 but I didn't want to mark them up because I didn't want
21 to have a marked-up copy of my report in front of me.
22 So --

23 Q. Did you analyze any products when preparing
24 your declaration?

25 MR. MILKEY: Objection to form.

1 THE WITNESS: What do you mean by "products"?
2 BY MS. SHI:
3 Q. For example, a real charge pump?
4 A. So are you saying did I have physical devices
5 in front of me --
6 Q. Correct.
7 A. -- in order to do the analysis? Is that the
8 question?
9 Q. Correct.
10 A. No. I did not have physical devices in front
11 of me to do the analysis.
12 Q. So let's go to paragraph 23?
13 A. Okay.
14 Q. You provided a figure; right? Paragraph 23,
15 what circuit is that?
16 A. That is a charge pump.
17 Q. What electric elements do the charge pump use?
18 A. Switches and capacitors and clock in its
19 complement.
20 Q. So the switches include switches S1, S2, S3,
21 S4, and S out --
22 (Reporter Clarification.)
23 THE WITNESS: Yes. The output switch. We have
24 got S sub 1, S sub 2, S sub 3, S sub 4, and S sub out.
25 THE REPORTER: Thank you.

1 BY MS. SHI:

2 Q. So in paragraph 24, you explained that "the
3 even/odd switches alternate between open and closed
4 positions." How does that work?

5 MR. MILKEY: Objection to form.

6 THE WITNESS: How does which work? How do the
7 switches work? Or how do you turn them on and off?
8 Or -- I'm not sure what you're asking.

9 BY MS. SHI:

10 Q. How are the switches controlled to be on or
11 off?

12 A. Well, presumably you have a controller that
13 turns them off and turns them off.

14 Q. And was that a well-known technology to control
15 the switches on and off?

16 MR. MILKEY: Objection to form.

17 THE WITNESS: Well, people know how to turn
18 switches on, and they know how to turn them off, but it
19 depends upon the technology.

20 This is just the way charge pumps were
21 initially shown a long time ago; so these things would
22 be, for instance, relays as opposed to transistors. So
23 it is a different concept.

24 But this is how people often explain charge
25 pumps at a very basic level because it's easier to

1 understand than showing it using transistors and/or
2 diodes.

3 BY MS. SHI:

4 Q. So in paragraph -- let's move to paragraph 25,
5 and you provided a figure describing two phases. What
6 are the two phases?

7 A. Well, one is when you're charging up the
8 top-plated capacitor, and then the second is when you
9 raise the voltage level of the bottom-plated capacitor,
10 thereby also raising the voltage of the top-plated
11 capacitor relative to the ground.

12 Q. And you provided some equations explaining
13 the -- how the voltage is -- how the output voltages are
14 generated? When we --

15 A. I apologize for interrupting. You said I
16 "provided some creations"?

17 Q. Equations.

18 A. Decorations?

19 Q. Equations, formulas.

20 A. Oh, equations. I am sorry. Okay. Now I see
21 what you're saying. I provided some equations, yes.
22 Where?

23 Q. So let's go to paragraph 42, you said, "Due to
24 the principle of charge conversion, it is the same
25 amount of charge."

1 What does that mean?

2 MR. MILKEY: Objection to form.

3 THE WITNESS: That means what it says. "Due to

4 the principle of charge conversion, it is the same

5 amount of charge, the same 'q' in both of the

6 scenarios." So the "qprecharge = qboost."

7 It is the same amount of charge that is stored

8 in the capacitor.

9 BY MS. SHI:

10 Q. So will the charge conversion always to be

11 100 percent efficient?

12 A. It is not charge conversion. It is charge

13 conservation.

14 Q. Okay. So will the charge conservation always

15 be 100 percent?

16 A. Well, what I'm saying is that principle of

17 charge conservation says a charge doesn't just

18 spontaneously disappear due to charge conservation.

19 That's why you get a boost when -- when you change the

20 voltage on the bottom-plated capacitor.

21 It is an explanation of why you can get this --

22 this mechanism that otherwise would seem like magic

23 where you are just producing voltage out of nothing.

24 So the reason that it works is charge

25 conservation.

1 Q. So is it fair to say that the charge pump
2 converts input power into output power?
3 A. No.
4 Q. Using --
5 A. No. That's not a correct statement.
6 Q. What is the correct statement?
7 A. Well --
8 MR. MILKEY: Objection to form.
9 THE WITNESS: I don't know. I don't know what
10 you're trying to say, but what you said was "is it
11 correct that charge converts input power to output
12 power" or something like that; and, no, that makes no
13 sense.
14 BY MS. SHI:
15 Q. So the charge pump does not convert the input
16 power to output power?
17 A. Well, you didn't say "charge pump." You said
18 "the charge." And previously we were talking about
19 charge conservation. Charge is an amount of
20 electricity. It charges a quantity of electrons.
21 That's what charge is.
22 The charge pump is a circuit.
23 Q. So my question is -- I will repeat the
24 question.
25 Is it fair to say that the charge pump converts

1 input voltage into output voltage?

2 MR. MILKEY: Objection to form.

3 THE WITNESS: Well, I would say that that's a
4 vague enough statement that it's kind of meaningless
5 because a wire converts input voltage to output voltage.

6 If you put a voltage on one end of a wire, you
7 know, a voltage will go out the other end of the wire.

8 What a charge pump does is a little bit more
9 complex than that.

10 BY MS. SHI:

11 Q. So my question is does the charge pump convert
12 an input voltage into a different output voltage?

13 A. Yes. That is something that the charge pump
14 does. It will specifically -- more specifically, it
15 boosts the voltage, and it increases it.

16 Q. And will there be -- how do you measure the
17 efficiency of the charge pump's conversion?

18 MR. MILKEY: Object to form.

19 THE WITNESS: It depends on what your metric
20 is.

21 BY MS. SHI:

22 Q. What are some examples of the metric?

23 A. Well, this was your question. Tell me what you
24 are trying to measure.

25 Q. What if we would like to measure the power

1 efficiency?

2 A. And by that, what do you mean?

3 Q. So what are the metrics for measuring -- are
4 you aware of any metrics for measuring the performance
5 of a charge pump?

6 MR. MILKEY: Objection to form.

7 THE WITNESS: There are ways to measure the
8 behavior of the charge pump. Like, for instance, what
9 voltage it produces, and how long it takes to get there.
10 And I've got to hit the head.

11 MR. MILKEY: Counsel, is this an okay time for
12 a break?

13 MS. SHI: Yeah. We can take a break. Would
14 10 minutes be a good time?

15 MR. MILKEY: Yeah, that works for us.

16 THE REPORTER: Going off the record at
17 7:56 a.m.

18 (Recess.)

19 THE REPORTER: Going back on the record at
20 8:07 a.m.

21 BY MS. SHI:

22 Q. Okay. Dr. Jacob, we were talking about
23 measuring the performance of the charge pump. You said
24 that there are various ways to measure the behavior of
25 the charge pump, for example, what voltage it produces

1 and how long it takes to get there.

2 Do you recall that?

3 A. Yes.

4 Q. Are you aware of any other parameters for
5 measuring the behavior of the charge pump in addition to
6 the voltage level it produces and the time it takes to
7 get there?

8 MR. MILKEY: Objection to form.

9 THE WITNESS: I am not exactly sure what you
10 are trying to get at. I mean, if you are asking about
11 what are the metrics that we care about regarding charge
12 pumps, well, for instance, how big it is matters. How
13 big is the circuit -- how big are the capacitors that
14 you are using and so forth.

15 There are a number of metrics.

16 BY MS. SHI:

17 Q. What are the number of metrics --

18 A. I don't --

19 Q. -- other than the one which you mentioned?

20 MR. MILKEY: Objection to form.

21 THE WITNESS: I don't know off the top of my
22 head how many metrics there are.

23 BY MS. SHI:

24 Q. What are examples of some of the metrics for --

25 A. Well, I just gave you some.

1 Q. Do you have any -- are you aware right now of
2 any other examples --

3 MR. MILKEY: Objection to form.

4 BY MS. SHI:

5 Q. -- of the metrics in addition to the ones that
6 you provided?

7 A. Well --

8 MR. MILKEY: Sorry, Dr. Jacob. If you could
9 wait for the objection just for the court reporter's
10 sake, primarily.

11 Objection to form.

12 THE WITNESS: So if you would like to give me a
13 list, I can tell you whether or not they are applicable.
14 I don't have everything memorized.

15 BY MS. SHI:

16 Q. I am not asking for everything memorized. I am
17 asking that right now, other than the metrics you
18 mentioned, are you aware of any other example metrics?

19 MR. MILKEY: Objection to form.

20 THE WITNESS: Like I said, I don't have it
21 memorized.

22 And if you want to give me a list, I can tell
23 you whether or not they are applicable.

24 BY MS. SHI:

25 Q. So is temperature stability a measurement for

1 measuring how -- the performance of the charge pump?

2 A. Well, if the temperature gets unreasonably hot,
3 then the behavior changes.

4 So temperature matters, I would imagine.

5 And the higher the temperature, the greater the
6 power dissipations in a lot of cases.

7 So, you know, that could be a possibility. I
8 think primarily, they care about less the stability of
9 the temperature and more that it stays within bounds.

10 Q. What do you mean by power dissipations?

11 A. Well, it's going to generate heat. It is going
12 to, you know, generate power. The -- rather dissipate
13 power as a side process of creating the output voltage.

14 And if -- you know, most things do. They
15 dissipate power while they're doing their job. And so
16 clearly, you want something that doesn't dissipate lots
17 and lots of power in order to produce an output
18 voltage -- excess power, waste power. I am talking
19 about stuff that is generated as heat.

20 Q. So there may be power loss when the charge pump
21 converts the input voltage to the output voltage; is
22 that correct?

23 A. Yes.

24 Q. How do you measure the power loss?

25 MR. MILKEY: Objection to form.

1 THE WITNESS: For instance, you could have a
2 temperature probe to see how hot it gets. There's a --
3 I would imagine there are a number of different ways.
4 How does this -- I am not sure that this is
5 discussed in Stiegler's report or in my report. What --
6 what are you getting at here?
7 BY MS. SHI:
8 Q. Oh, this is related to the performance of the
9 charge pump.
10 A. No, actually it is not, but okay.
11 Q. Why -- powerless loss not related to the
12 performance or the charge pump?
13 A. Well, which charge pump are we talking about,
14 and what analysis are we talking about? Nobody has
15 discussed this so far.
16 Q. So if we look at your declaration, right under
17 paragraph 25, you have shown the voltage boosting;
18 correct?
19 A. Yes.
20 Q. And the capacitors are controlled by clock
21 signals; is that right?
22 A. In this example, they are.
23 Q. When the charge pump shown under the paragraph
24 converts the input voltage to a higher output voltage,
25 the switches switch on and off.

1 What determines the frequency of the on-and-off
2 frequency of the switch?

3 A. Which paragraph are you talking about? You
4 said, "under the paragraph."

5 Q. Paragraph 25, you have shown a phase 1 and
6 phase 2 images, and S1 and S2 are turned on and off.

7 In phase 1, is it correct that S1 is on and S2
8 is off?

9 A. Yes.

10 Q. And in phase 2, is it correct that S1 is off
11 and S2 is on?

12 A. Correct.

13 Q. Do they have a switch on-and-off frequency for
14 switches 1 -- S1 and S2?

15 A. In this example, it would correspond with the
16 clock signal that's coming into the bottom plate of the
17 capacitor.

18 Q. Does that frequency affect the power efficiency
19 for this charge pump?

20 A. Well, for instance, if you run the frequency
21 faster than you can charge up the capacitor, then you
22 get a non-functioning boost circuit.

23 Q. When you say "non-functioning," does that
24 mean -- what does that mean?

25 A. It means it doesn't actually boost the voltage.

1 Q. Does that mean it provides a V out that is
2 lower than 2 VDD?
3 A. Yes, in that case.
4 Q. What if -- so is there a range of clock
5 frequencies that you can run while keeping the booster
6 circuit functioning?
7 A. Yes.
8 Q. Does -- within that range, does changing the
9 clock frequency affect the performance of the charge
10 pump?
11 A. How are you measuring performance?
12 Q. How do you usually measure the performance?
13 A. I don't --
14 MR. MILKEY: Objection to form.
15 THE WITNESS: I'm sorry. I don't measure
16 performance of charge pump.
17 BY MS. SHI:
18 Q. You have never measured the performance of a
19 charge pump.
20 A. I don't. It's not something that I do.
21 Q. So when you designed --
22 A. What I care about is what voltage it produces
23 and that is basically it.
24 Q. Have you designed a charge pump?
25 A. I drew the semantics for all of these.

1 Q. In addition to drawing the semantics for the
2 report, have you designed a charge pump?
3 A. Well, we built them at Maryland in the lab that
4 I ran.
5 Q. Did you design the charge pump circuit?
6 MR. MILKEY: Objection to form.
7 THE WITNESS: What do you mean by "design"?
8 You mean make up a new design that has never existed
9 before in the history of mankind?
10 BY THE WITNESS:
11 Q. What is your understanding of circuit design?
12 A. Build a circuit.
13 Q. What does "build a circuit" mean?
14 A. It means to build a circuit.
15 Q. What is the process of circuit design?
16 A. It depends. Circuit design means a lot of
17 different things to a lot of different people. It can
18 mean anything from drawing rectangles on a screen which
19 places metal and poly silicone and -- and various
20 dopants on silicone, all the way up to just drawing
21 boxes and arrows on a piece of paper. All of those
22 things constitute circuit design, including breadboard
23 design, circuit board designs. All of those things are
24 circuit design.
25 So what are you asking? All of those

1 constitute circuit design, so you would need to be a bit
2 more specific.

3 Q. What is the circuit -- process of circuit
4 design for a charge pump for you?

5 A. It depends on what you -- what level you want.
6 I've built them at the breadboard level. I've built
7 them at the circuit design level that you see before
8 you, transistors and whatnot. I have designed them at
9 the block -- block-and-arrow level as well.

10 Q. Did you use any tools for joining the
11 schematics of a charge pump during your design?

12 A. Yes.

13 Q. What tools?

14 A. A pen and paper.

15 Q. Have you used any other tool for the design --
16 for your design of a charge pump?

17 A. At Maryland in the lab that I ran, we had
18 breadboards and used ICs.

19 Q. Have you drawn a schematic of a charge pump
20 that was eventually implemented according to your design
21 of physical product?

22 A. Well, yeah. I just told you. We built these
23 in a lab at Maryland.

24 Q. My question -- I will repeat my question -- is:
25 Have you, Dr. Jacob, drawn a schematic of a charge pump

1 that was eventually implemented according to your
2 design, Dr. Jacob, of a physical product?

3 A. Yes. I just told you.

4 Q. You said, "We built these in the lab at
5 Maryland."

6 What do you mean by "we"?

7 A. The students. I ran a lab, I taught it, I
8 showed the students how to build a charge pump in class.

9 Q. Did you or your students build the charge pump?

10 A. Both.

11 Q. So in your design, do you consider the current
12 output of a charge pump?

13 MR. MILKEY: Objection to form.

14 THE WITNESS: Yeah, I'm not -- I agree with the
15 objection. I don't know what you're asking. Which
16 design and what do you mean by "consider"?

17 BY MS. SHI:

18 Q. Generally to a POSITA, is the current output of
19 a charge pump a measurement of its performance?

20 A. Yeah. So now I see -- now I think I understand
21 what you mean by "performance." I don't -- so the
22 current -- the current is just one of the
23 characteristics that it generates. The voltage it
24 generates, the amount of current it generates, and the
25 amount of time that it takes, those are the

1 characteristics of the thing.

2 Performance is a -- sort of a measure of
3 goodness. You can show that this is better than that
4 over some metric.

5 And so -- so yes. I have -- we measured -- we
6 care about the current. In general, if you -- if you
7 are designing something to accomplish a task, if you are
8 designing a charge pump to accomplish a specific task,
9 you care about what voltage it is going to produce and
10 what current it is going to produce and the timeframe in
11 which it gets to that point.

12 Q. Why do you care about what current it is going
13 to produce?

14 A. Again, it is --

15 MR. MILKEY: Objection to form.

16 THE WITNESS: I'm sorry.

17 One would care, depending upon the application
18 that you are attempting to create, either the
19 application you were using the charge pump to -- to do.

20 BY MS. SHI:

21 Q. Can you give some examples where higher current
22 is preferred over lower current?

23 A. Yes, for instance, if you are driving a larger
24 load.

25 Q. So in the instance of driving a larger load,

1 you prefer a higher output current from the charge pump
2 over a lower current output from the charge pump; is
3 that right?

4 MR. MILKEY: Objection to form.

5 THE WITNESS: It is possible. That's a
6 scenario where you might want a higher current. It
7 depends upon the application.

8 BY MS. SHI:

9 Q. Also, you mentioned in the labs, you have
10 designed and implemented a physical product for a charge
11 pump; is that right?

12 A. Yes.

13 Q. Other than in the lab, have you ever designed a
14 commercially-used charge pump?

15 A. No. I have not designed a commercially-used
16 charge pump. Or rather, I have not designed a charge
17 pump that was then implemented in a commercial product.

18 Q. And in your experience, is there a difference
19 for choosing a higher clock frequency over -- strike
20 that.

21 So you said that there is a range of clock
22 frequencies that you can run for a charge pump while
23 keeping the charge pump functioning.

24 Do you recall that?

25 A. Yes.

1 Q. How does a designer, among that range of clock
2 frequencies, choose the optimal frequency for the charge
3 pump?

4 MR. MILKEY: Objection to form.

5 THE WITNESS: What would be considered optimal
6 would be up to the designer, and it depends upon the
7 application.

8 BY MS. SHI:

9 Q. Can you give an example?

10 A. Why don't you give me a scenario? I don't -- I
11 don't know what you're getting at.

12 Q. So, for example, in an application to provide
13 an output voltage for a memory, how do you determine
14 among the range of functioning clock frequencies --
15 clock frequency to be used in the product?

16 MR. MILKEY: Objection to form.

17 THE WITNESS: Well, if one is going to build a
18 charge pump for a memory device, then someone has to
19 specify what voltage it needs to reach, how much current
20 it needs to output, how much time you have to generate
21 that output and what the input voltage to the thing is,
22 and perhaps some other parameters that you can't exceed,
23 and then the designer picks a design that meets all the
24 requirements.

25 ///

1 BY MS. SHI:
2 Q. Does the selection of clock frequency affect
3 what voltage it needs to reach?
4 A. No.
5 Q. Does the selection of clock frequency affect
6 how much current it needs?
7 A. How much current it needs?
8 Q. Does the selection of clock frequency affect
9 how much current the charge pump outputs?
10 A. No.
11 Again, presuming that we're dealing with clock
12 ranges that are not up against the limit at what you can
13 push the capacitor. Assuming that the frequency is --
14 are low enough that you're charging, you are fully
15 charging the charge pump before you switch to the next
16 phase.
17 And then the -- and then the behavior isn't
18 affected by the clock frequency. The voltage level and
19 the current aren't affected.
20 Q. So what does the clock frequency affect?
21 A. How quickly you reach the target voltage.
22 Q. Does a higher clock frequency speed up the
23 settlement time?
24 A. I'm not sure what you mean by "speed up the
25 settlement time."

1 Q. So you said how fast -- the clock frequency
2 affects how fast you reach the target voltage. I was
3 trying to understand how the frequency affects how fast
4 it can reach the target voltage.

5 A. Right. So -- okay. So the higher clock
6 frequency will reach a higher -- will cause the charge
7 pump to reach the higher voltage more quickly and
8 starting out from a standstill. Like, for instance, you
9 can imagine if you have a clock that oscillates once per
10 day, it is going to take a full day for it to produce a
11 boosted voltage, you know, produce a 2-VDD voltage
12 level. Whereas a clock that oscillates twice a day will
13 take half a day to produce that voltage, and a clock
14 that oscillates four times a day will be, you know,
15 faster still.

16 So the faster the clock goes, the more quickly
17 you reach the target voltage when you are starting from
18 a standstill.

19 Q. Does the clock frequency affect the current
20 consumption of the charge pump?

21 A. Well, so if we're talking about current losses
22 and things like that -- right now, we've been discussing
23 things where it's sort of -- we're not talking about the
24 losses. You know, this is -- like, for instance, we're
25 talking about the charge pump that's pictured on page,

1 what is this, 13 of my -- of my declaration where, you
2 know, the switches can be assumed to have zero
3 resistance and the -- you know, and there's no losses in
4 driving the clock and so forth.

5 But as everyone who builds ICs knows, the
6 clock -- driving the clock around the chip dissipates
7 power. So the faster the clock, the more power you
8 dissipate in general.

9 So if we're going to talk about losses, then
10 yes, if you have a faster clock, in general, you
11 dissipate more power.

12 Q. Let's go back to paragraph 22 on page 12.

13 Let me know when you're ready.

14 A. I'm there.

15 Q. So in paragraph 22, you said, "The '701 patent
16 is concerned with charge-pump design, including the use
17 of a dynamically configurable number of charge-pump
18 stages to achieve higher voltage outputs."

19 Do you see that?

20 A. I do.

21 Q. What do you mean by "dynamically configurable"?

22 A. That means that you can change the
23 configuration of the charge pump at run time.

24 Q. Does the '701 patent allow configuration of the
25 charge pump not at run time?

1 MR. MILKEY: Objection to form.

2 THE WITNESS: I'm not sure that the -- I'm --

3 like, for instance, changing a patent not at run time

4 would be, like, for instance, redesigning a circuit and

5 remanufacturing the circuit.

6 So I'm not sure what question you're asking.

7 BY MS. SHI:

8 Q. Can you configure a circuit after it is

9 manufactured but before run time?

10 A. Yes. I can imagine circuits that will allow

11 you to do that.

12 Q. What are some of the techniques for doing that?

13 A. Well, people use fuses, they use antifuses,

14 they use package -- you know, package enablement, that

15 sort of thing.

16 Q. Does the circuit described in the '701 patent

17 allow configuration of the charge time after

18 manufacturing and before run time?

19 MR. MILKEY: Objection. Form.

20 THE WITNESS: What is a charge time?

21 BY MS. SHI:

22 Q. Configuration of the charge pump?

23 A. Oh, can you repeat the question, then?

24 Q. Does the circuit described in the '701 patent

25 allow configuration of the charge pump after the circuit

1 is manufactured, but before run time?

2 MR. MILKEY: Objection to form.

3 THE WITNESS: So I guess the question is, are

4 you asking whether or not the '701 patent describes that

5 scenario, or are you asking whether or not I can

6 envision a system in which that would be the case?

7 BY MS. SHI:

8 Q. Okay. That's fair. I will ask them

9 separately, then.

10 So is the '701 patent describing a scenario

11 where the configuration can be performed after

12 manufacturing, but before run time?

13 A. I --

14 MR. MILKEY: Objection to form.

15 THE WITNESS: Yeah, I don't recall. If you

16 could point me to relevant paragraphs in the '701. I

17 have not memorized the patent, so I don't recall if he

18 discusses that or not -- or he or she. I don't recall

19 if the patentee discusses that or not.

20 BY MS. SHI:

21 Q. And as a person skilled in the art, can you

22 envision a system, based on the circuits described in

23 the '701 patent, to be configured after manufacturing,

24 but before run time?

25 A. Yes.

1 Q. So is the opposite of dynamically configurable
2 also referred to as statically configurable in the art?

3 A. They can be, but there's no hard-and-fast rule
4 that says that they are opposite, if that makes sense.
5 You'd have to figure it out from context.

6 So they are different, but they are not
7 necessarily opposite, just because you used the word
8 "opposite."

9 Q. What is the difference between dynamically
10 configurable and statically configurable?

11 A. Well, dynamic configurability would be at run
12 time. Statically configurable could be at run time,
13 like, sort of, a set-and-forget-type arrangement or it
14 could be something that is done, like we said, after
15 manufacturing, but before runtime or it could be done
16 during the manufacturing phase.

17 It could just like, for instance, any circuit
18 that you designed, well, that circuit as-is is a static
19 design, if that makes sense. You know, you can't change
20 the circuit, but you can change the circuit's behavior
21 through switches.

22 Q. You said, "Statically configurable could be at
23 runtime."

24 What does that mean?

25 A. Well, for instance, there are a lot of

1 configuration steps that happen when you start up a
2 computer where you change -- the system boots up and
3 various controllers set the state of the devices that
4 they're controlling and you do that once. You don't
5 ever change it ever again. So it happens at
6 initialization time, the computer system, you don't then
7 dynamically change it later during operation. You
8 change it once right at start up, before you start
9 actually using these devices -- devices meaning, for
10 instance, disks or monitors or memory components or
11 whatever.

12 And so that would be, sort of, a static change,
13 meaning that you changed it once and then you don't go
14 back and change it again.

15 Q. What are some of the techniques that can be
16 used to statically configure a charge pump?

17 A. Well, like I said, you can use fuses,
18 antifuses, packaging options, and so forth.

19 MS. SHI: Could we bring up the '701 patent,
20 please?

21 (Exhibit No. 1001 identified.)

22 THE WITNESS: Okay, I have it.

23 BY MS. SHI:

24 Q. What sections in '701 describe dynamic
25 configuration?

1 A. Well, just for starters, figure 1 shows that
2 you have two switches, switch 1 and switch 2, that give
3 you a dynamic behavior of choosing which voltage to
4 choose as input to the booster circuit and whether or
5 not the booster circuit is going to be a 1 stage or
6 2-stage booster circuit.

7 Q. Can a POSITA apply the fuse option to switch 1?

8 A. Can what?

9 Q. Can a person skilled in the art apply the fuse
10 option you just described for switch number 1?

11 A. Probably.

12 Q. If fuse option is applied to switch 1, is the
13 charge pump of figure 1 dynamically configurable or
14 statically configurable?

15 A. Well, it's still dynamically configurable
16 because you've got switch 2 that's not implemented as a
17 fuse.

18 Q. Can a POSITA also implement switch 2 with a
19 fuse?

20 A. Presumably, yes.

21 Q. So if both switch 1 and switch 2 are
22 implemented with fuse, is figure 1 dynamically
23 configurable or statically configurable?

24 A. It depends on what type of fuse you use. If it
25 is the type where, for instance, you blow it with a

1 laser and the fuse is wiped out, then it's statically
2 configurable, and you can never change it back again.

3 But there are things that they call, like,
4 antifuses which you can set and reset later on, which
5 means it is, in theory, reconfigurable at a later point.
6 But then there's a larger question, which is if you do
7 make it statically configurable, it no longer does
8 the -- does the function of a circuit, which is to be
9 able to accommodate two different voltages.

10 So, I mean, you could do it, but I am not sure
11 that you get something that functions correctly. But
12 with that caveat in place, if you have a fuse that's
13 blown, for instance, with lasers, then you, know you,
14 would configure that statically, and you could never
15 change it back.

16 Q. So let's go back to your declaration,
17 Exhibit 2003.

18 A. Okay.

19 Q. Let's go to paragraph 57.

20 A. Okay. 5-7. All right, I'm there.

21 Q. So can you read the first sentence of paragraph
22 57?

23 A. Sure. "The '701 patent (Hayashi) is concerned
24 with the trade-off between overdesigning a charge pump
25 and underdesigning the charge pump."

1 Q. What does "overdesigning" mean?

2 A. Well, I can read the rest of the paragraph
3 because I get to that. I say, "As Hayashi describes,
4 early in the design of chips, the final voltage
5 specifications are not necessarily known. A designer
6 has two bad choices to make, to overdesign the charge
7 pump, in which case it will work irrespective of the
8 final operating voltage but will be larger and more
9 expensive than necessary, or to underdesign the charge
10 pump, in which case it could fail to work if the final
11 operating voltage is too much for the circuit to handle.

12 Q. Is it fair to say that one example of
13 overdesign is to provide a large, more powerful charge
14 pump?

15 MR. MILKEY: Objection. Form.

16 THE WITNESS: Well, what Hayashi specifically
17 is getting at is, for instance, the thickness of the
18 oxides, because the capacitance of a capacitor goes with
19 the area of the capacitor and with the inverse of the
20 space between the plates.

21 And so if you -- if you want, for instance,
22 a -- a capacitor that is twice as big, you know, you
23 want a charge pump that will give you twice as much
24 current, for instance, then you can either make the
25 capacitor twice as large. Or you can make that

1 dielectric, the oxide in between half as thick, and both
2 will accomplish the same goal, or you can do a trade-off
3 between the two.

4 And what he is saying is that what you would
5 really like to do -- and this is in the passages that I
6 quote in my -- in my report here. What he is saying is
7 that what you would like to do as the designer is to
8 make the charge pump as small as possible, and the way
9 to do that is to make the dielectric of the capacitor as
10 thin as possible.

11 And the problem with that is that if the final
12 operating voltage of the chip is higher than you
13 expected, then you end up breaking down that dielectric
14 and the capacitor doesn't work and that's a problem.

15 So this is what he is talking about, and he is
16 saying that what his design does is it allows you to
17 have an early-on design of the charge pump that will be
18 able to be used in both scenarios whether you're --
19 whether you overexpected or underexpected the voltage
20 level, you know, you can be off by a certain amount, and
21 this charge pump is still going to work just fine. And
22 you won't blow out the dielectric, and it'll work. And
23 you don't have an overdesigned -- an overdesigned
24 capacitor.

25 And overdesigning means you make the dielectric

1 really thick so that you can't blow out the capacitors,
2 but that means that you've got to make the capacitors
3 physically larger. And that's bad because when you make
4 your design larger, it is a manufacturing cost.

5 Manufacturing costs of chips go as -- about the area to
6 the fourth power, maybe higher now.

7 This is, you know, the way it used to be back
8 when I taught this stuff 15 years ago. But the
9 manufacturing costs are -- they go with area to about
10 the fourth power. So if you make your capacitors bigger
11 so that they won't get blown out and it turns out that
12 you didn't need to make them bigger, you could have just
13 made the outsides thinner, then that means that you pay
14 a lot of extra money that you didn't have to pay.

15 That's what his patent is about.

16 BY MS. SHI:

17 Q. So is the -- dealing with trade-off between
18 overdesign and underdesign a general issue in circuit
19 design?

20 A. I would say that yeah, people do worry about
21 that. All designers want to come up with something
22 that's appropriate.

23 Q. And also, you said, "Early in the design of
24 chips, the final voltage specifications are not
25 necessarily known."

1 Was this a common problem in circuit design as
2 well?

3 A. Well, this -- I took from the '701 patent.

4 Q. So is that what a POSITA would have known even
5 without looking at the '701, or '701 invented this
6 problem?

7 A. Honestly that I do not know. I don't know if
8 this is a wide-spread problem that every single engineer
9 would know or not. Let me look at how we defined a
10 person of ordinary skill. Circuit design,
11 memory-systems coursework, two years of experience in
12 the design of memory systems and associated components.

13 I think that that person would not necessarily
14 know that -- that when you design an IC, the final
15 target voltage is not exactly known.

16 Because when you're working at the level of
17 memories, you're often working at the level of memory
18 systems as opposed to the design of memory chips,
19 because this was two years of experience in the design
20 of memory systems and associated components as opposed
21 to just the design of memory-integrated circuits. If
22 the person of ordinary skill was in the area of the
23 design of memory-integrated circuits, he might be aware
24 of this issue. But since he is defined to be someone
25 who knows about the design of memory systems, I think he

1 probably would be less aware of this problem.

2 THE WITNESS: And I've got to hit the head.

3 MR. MILKEY: All right. Is now an okay time

4 for a break?

5 MS. SHI: Yeah. Yes. 10 minutes. Is that

6 enough?

7 MR. MILKEY: That works for us.

8 THE REPORTER: Going off the record at

9 8:59 a.m.

10 (Recess).

11 THE REPORTER: Going back on the record at

12 9:10 a.m.

13 MS. SHI: Let's go back to 1001, the

14 '701 patent.

15 THE WITNESS: Okay.

16 BY MS. SHI:

17 Q. Let me know when you're ready.

18 A. I am ready.

19 Q. So looking at figure 1, it shows VDDP1 and

20 VDDP2.

21 What is the design consideration for providing

22 two power supply lines?

23 MR. MILKEY: Objection to form.

24 THE WITNESS: So as the figure shows, VDDP2

25 gets a step down.

1 BY MS. SHI:

2 Q. So what is the difference between the circuit
3 of figure 1 compared to, for example, a circuit without
4 VDDP1?

5 MR. MILKEY: Objection to form.

6 THE WITNESS: Then you would only have one
7 voltage input to the charge pump.

8 BY MS. SHI:

9 Q. Is that a functional design?

10 MR. MILKEY: Objection to form.

11 THE WITNESS: I'm not sure. It doesn't
12 accomplish the -- Hayashi's goals. I mean, it is a --
13 it would be a charge pump, but it wouldn't satisfy
14 Hayashi's goals.

15 BY MS. SHI:

16 Q. Why it wouldn't satisfy Hayashi's goals?

17 A. Because what he is trying to provide is a
18 system in which it can tolerate voltage levels that
19 would otherwise exceed the range of the charge pump.
20 And so what he does is if the voltage input is too high,
21 the voltage is sent through the step-down unit and that
22 is chosen as an input and the booster is chosen to be a
23 multi-stage booster circuit which will boost the voltage
24 more.

25 So this is how Hayashi works. He's designed

1 this thing so that he can accommodate voltages that
2 would otherwise exceed the tolerances of the charge
3 pump.

4 Q. Understood.

5 My question is not to remove the VDDP2. My
6 question is, if we remove VDDP1, it still achieves its
7 function to accommodate a higher voltage; correct?

8 MR. MILKEY: Objection to form.

9 THE WITNESS: I see what you're getting at. So
10 it would achieve the high-voltage case, but on the
11 lower-voltage case, then it's not the right design. So
12 this is -- if you got rid of VDDP1 input, then you might
13 as well just scrap the whole thing.

14 The whole point is that the power supply step
15 down is only used in the cases where it's needed.

16 I mean, you would just functionally --
17 fundamentally change the nature of the design if you
18 eliminated one of those two inputs.

19 BY MS. SHI:

20 Q. So having VDDP1 and VDDP2 is important for
21 '701's goal of accommodating two input voltage levels;
22 is that correct?

23 MR. MILKEY: Objection to form.

24 THE WITNESS: It is there to accommodate a
25 voltage that would otherwise exceed the tolerances of

1 what the charge pump is designed for.

2 BY MS. SHI:

3 Q. So the power supply step down units, block 10,
4 is an essential part of the invention of '701 patent; is
5 that right?

6 MR. MILKEY: Objection to form.

7 THE WITNESS: I think some mechanism that
8 performs the same function, you would want to have. I
9 don't necessarily know that block 10 is a prerequisite.
10 I don't know if that's necessary, but -- but you want to
11 have two different inputs that you can select between.
12 That's -- that's one of the fundamental concepts.

13

14 BY MS. SHI:

15 Q. So is it correct that block 10 is not required
16 for 701's invention?

17 MR. MILKEY: Objection to form.

18 THE WITNESS: Well, so this is the second time
19 that you've said, you know, part of the invention. Do
20 you mean it is required by the claims, or do you mean it
21 is required in the circuit?

22 You know, so you are talking to an engineer,
23 and I think invention, I just think the circuit. But if
24 what you mean is, is it required in the claims, well, I
25 don't know. Let's just go look at the claims.

1 For instance, Claim 1 says selecting the first
2 input node, first power supply, second input node,
3 second power supply, higher than the first, coupling one
4 of the first and second input nodes to booster circuitry
5 comprised of booster stages -- all right -- providing an
6 output voltage.

7 Selection corresponds to a first number of
8 booster stages. Selection of the second corresponds to
9 a second number of booster stages, the second being less
10 than the first.

11 Changing the booster circuitry from the first
12 number of booster stages, corresponding to selection of
13 the first input node to the second number of booster
14 stages when the second input node is selected.

15 So that step-down voltage is not in the claim.
16 So if what you consider to be the invention, you know,
17 what is described in the claim, then no, that step down
18 is not part of the invention.

19 BY MS. SHI:

20 Q. So thank you for clarifying that.

21 For the invention as claimed in Claim 1 of the
22 '701 patent, is there any benefit for providing two
23 power supply lines as compared to a charge pump that is
24 receiving a single power supply line?

25 MR. MILKEY: Objection to form.

1 THE WITNESS: I don't even know how to answer
2 that. I mean, the claim is what it is. I -- I mean, it
3 is describing something.

4 BY MS. SHI:

5 Q. Okay. So generally speaking, we have two very
6 similar charge pumps, one can handle -- one receives two
7 power supply lines. The other receives a single power
8 supply line.

9 Is there any benefit for the charge pump that
10 receives two power supply lines?

11 A. I don't see that in this claim.

12 I'm sorry. I don't see that in this claim.

13 (Reporter Clarification.)

14 MR. MILKEY: Objection to form.

15 THE WITNESS: Yeah, so I don't see what
16 you're -- you are saying stuff that I don't see anywhere
17 in the claim.

18 BY MS. SHI:

19 Q. So what is the benefits, or is there any
20 benefit, for the invention of Claim 1 to receive two
21 power supply lines --

22 MR. MILKEY: Objection.

23 BY MS. SHI:

24 Q. -- as a charge pump design?

25 MR. MILKEY: Objection to form.

1 THE WITNESS: Yes, when we were discussing
2 figure 1, I explained it, and I can read you
3 Hayashi's -- actually, yes, I will.

4 "If specifications relating to DRAM are changed
5 or the specifications have not been fully decided, there
6 are cases where the power supply voltage supplied from
7 the outside in accordance with a request from the user
8 differs. A supply voltage supply circuit for driving a
9 word line is one circuit for which different supply of
10 voltages are required of externally applied power.
11 Designing such a supply voltage supply circuit involves
12 preparing a plurality of types of transistors having
13 oxide-film thicknesses for which circuit operation is
14 optimum, and designing the circuit based upon the
15 plurality of types of transistors."

16 "If a booster circuit" -- and this is the
17 important part. "If a booster circuit is designed
18 assuming a case where the power supplied will differ" --
19 "will differ depending upon the specifications. The
20 problem of oxide-film withstand voltage and a
21 current-consumption problem ascribable to gate leakage
22 must be taken into account.

23 If, in order to avoid these problems, a
24 transistor for thick-film capacitance is used in the
25 circuit in accordance with the higher voltage among

1 voltages that have been set depending upon
2 specifications, there is the danger that this will
3 result in a booster circuit of larger area."

4 And that's, you know, that is from Hayashi
5 1:23-41 and that is on page 26 of my report.

6 And there Hayashi goes on. Basically, what he
7 is saying is that you have these two lines so that you
8 can handle the case where the input voltage that you are
9 given is higher than you expected at design time.

10 BY MS. SHI:

11 Q. And the technique for handling the case where
12 the input voltage that you're given is higher than the
13 expected design time is to use the power supply
14 step-down unit 10; is that right?

15 MR. MILKEY: Objection to form.

16 THE WITNESS: Well, I think that's
17 oversimplifying it. So -- so what you have is a big
18 solution to a problem which is you have a step-down
19 unit. You've got a configurable charge pump. You've
20 got switches to choose between these things. There's
21 quite a bit going on.

22 BY MS. SHI:

23 Q. So what you described -- what you read from
24 '701, 1:23-41, and on the report, page 126 of your
25 report, is that covered in Claim 1?

1 MR. MILKEY: Objection to form.

2 THE WITNESS: I did not do any claims analysis

3 on this -- on this patent.

4 BY MS. SHI:

5 Q. What do you mean by "claim analysis"?

6 A. Preparing a report in which I match up claim

7 limitations to specific instances in specific designs.

8 Q. So you don't have an opinion whether what you

9 read from '701 patent, as provided in your report on

10 page 26, is covered in Claim 1; right?

11 MR. MILKEY: Objection to form; misstates

12 testimony.

13 THE WITNESS: I have not offered an opinion as

14 to what Claim 1 of the '701 patent covers.

15 BY MS. SHI:

16 Q. So, sitting here now, were you able to offer an

17 opinion? I understand that's not covered in your

18 report.

19 A. Am I willing to offer an opinion as to whether

20 or not Claim 1 covers the introductory material in

21 Hayashi that I read in Column 1, lines 23 to 41? Is

22 that what you're asking me?

23 Q. Right.

24 A. I'm not going to do claims analysis on the fly.

25 MS. SHI: Can we take a break?

1 MR. MILKEY: Yep.
2 THE REPORTER: Going off the record at
3 9:28 a.m.
4 (Recess.)
5 THE REPORTER: Going back on the record at
6 9:39 a.m.
7 MS. SHI: I don't have more questions.
8 MR. MILKEY: Okay. I probably don't have any
9 questions, but I would like to just review my notes, if
10 we can take 10 minutes.
11 MS. SHI: Sure.
12 MR. MILKEY: Thank you.
13 THE REPORTER: Okay. Going off the record at
14 9:40 a.m.
15 (Recess).
16 THE REPORTER: Going back on the record at
17 9:46 a.m.
18 MR. MILKEY: We have no questions.
19 THE REPORTER: Going off the record at 9:46
20 a.m.
21 (The deposition was concluded
22 at 9:46 a.m.)
23
24
25

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

I certify or declare under declaration
under penalty of perjury that the foregoing testimony is
true and correct.

Executed this _____ day of _____,
2024, at _____, California.

DR. BRUCE JACOB

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

DEPONENT'S CHANGES OR CORRECTIONS

Note: If you are adding to your testimony, print the exact words you want to add. If you are deleting from your testimony, print the exact words you want to delete. Specify with "Add" or "Delete" and sign this form.

DEPOSITION OF: DR. BRUCE JACOB
CASE: WESTERN DIGITAL TECHNOLOGIES V. LONGITUDE LICENSING
DATE OF DEPOSITION: June 21, 2024

PAGE	LINE	CHANGE/ADD/DELETE	REASON
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Deponent's Signature _____ **Date** _____

1 STATE OF CALIFORNIA)
2) ss.
3 COUNTY OF ORANGE)
4 I, LINDSAY ANNE STOKER, RMR, CRR, CRC, and
5 Certified Shorthand Reporter and Deposition Notary
6 Public of the State of California, does hereby certify:
7 That the foregoing deposition was taken
8 before me at the time and place therein set forth, at
9 which time the witness was duly sworn by me;
10 That the testimony of the witness and all
11 objections made at the time of the deposition were
12 recorded stenographically by me and were thereafter
13 transcribed, said transcript being a true and correct
14 copy of the proceedings thereof;
15 I further certify that I am neither counsel for
16 nor related to any party to said action, nor in any way
17 interested in the outcome thereof;
18 Further, that if the foregoing pertains to the
19 original transcript of a deposition in a federal case,
20 before completion of the proceedings, review of the
21 transcript was not requested/offered on the record.
22 In witness whereof, I have subscribed my name,
23 this 10th day of July, 2024.
24 
25 _____
 Lindsay A. Stoker, RMR, CRR, CRC

1 1 15:18,19 16:25 17:2 28:24 39:5,7,14 54:1,2, 5,7,10,12,13,21,22 60:19 61:3 64:1,21 65:20 66:2 67:25 68:10, 14,20,21 10 34:14 60:5 63:3,9,15 67:14 69:10 100 31:11,15 1001 53:21 60:13 12 49:12 126 67:24 13 49:1 15 58:8 1:23-41 67:5,24 2 2 28:24 39:6,10 40:2 54:2,16,18,21 2-stage 54:6 2-VDD 48:11 2003 16:24 17:18 21:17 26:11,13 55:17 2023-01230 26:12 2024 5:3,5 21 5:3 21st	5:5 22 49:12,15 23 28:12,14 68:21 24 29:2 25 30:4 38:17 39:5 26 67:5 68:10 3 3 28:24 30 25:5 30-minute 25:23 4 4 28:24 41 68:21 42 30:23 5 5-7 55:20 57 55:19,22 6 690 8:10 7 701 11:24,25 17:23 49:15, 24 50:16,24 51:4,10,16, 23 53:19,24 55:23 59:3, 5 60:14 63:4 64:22	67:24 68:9,14 701's 62:21 63:16 78 26:21 7:03 5:3,5 7:56 34:17 8 8:07 34:20 8:59 60:9 9 9:10 60:12 9:28 69:3 9:39 69:6 9:40 69:14 9:46 69:17,19,22 A a.m. 5:3,5 34:17,20 60:9,12 69:3,6,14,17,20,22 ability 7:7 accommodate 55:9 62:1,7,24 accommodating 62:21 accomplish 44:7,8 57:2 61:12 accordance 66:7,25 account 66:22	accurate 7:8 achieve 49:18 62:10 achieves 62:6 addition 35:5 36:5 41:1 affect 39:18 40:9 47:2,5,8,20 48:19 affected 47:18,19 affects 48:2,3 agree 43:14 allowed 11:8 alternate 29:3 amount 30:25 31:5,7 32:19 43:24,25 57:20 analysis 14:10,11,12,18,25 15:3, 13 16:19,20 17:12 28:7, 11 38:14 68:2,5,24 analyze 16:24 17:7,8 27:23 analyzed 16:8,16 17:3 and/or 30:1 angry 27:11 answering 7:19 10:20 answers 22:2 antifuses 50:13 53:18 55:4 apologize 10:8 20:7,10 30:15
---	---	---	---

Index: 1-apologize

THE SULLIVAN GROUP OF COURT REPORTERS

appearing 5:1 6:8 applicable 36:13,23 application 44:17,19 45:7 46:7,12 applied 54:12 66:10 apply 54:7,9 area 56:19 58:5,9 59:22 67:3 argument 10:8,25 11:1,9,10,13 17:16 arguments 11:2,3 arrangement 52:13 arrived 16:22 arrows 41:21 art 11:22 17:22 18:3,4 51:21 52:2 54:9 as-is 52:18 ascribable 66:21 assume 8:3 assumed 49:2 assuming 47:13 66:18 attempting 44:18 attorney-client 24:4,11 attorneys 23:19 24:14 August 5:20	avoid 7:19 66:23 aware 19:23,25 34:4 35:4 36:1,18 59:23 60:1 B back 10:19,20 20:5,22 23:14 34:19 49:12 53:14 55:2, 15,16 58:7 60:11,13 69:5,16 bad 56:6 58:3 based 22:9,16 23:4 51:22 66:14 basic 29:25 basically 40:23 67:6 BEACH 5:2 behalf 5:15,16,18 6:9 behavior 25:19 34:8,24 35:5 37:3 47:17 52:20 54:3 benefit 64:22 65:9,20 benefits 65:19 big 35:12,13 56:22 67:17 bigger 58:10,12 bit 33:8 42:1 67:21 block 42:9 63:3,9,15 block-and-arrow 42:9 blow 54:25 57:22 58:1 blown	55:13 58:11 board 41:23 board's 19:16 20:25 Boon 5:14 boost 31:19 39:22,25 61:23 boosted 48:11 booster 40:5 54:4,5,6 61:22,23 64:4,5,8,9,11,12,13 66:16,17 67:3 boosting 38:17 boosts 33:15 boots 53:2 bottom 39:16 bottom-plated 30:9 31:20 bounds 37:9 boxes 41:21 breadboard 41:22 42:6 breadboards 42:18 break 25:12 34:12,13 60:4 68:25 breaking 57:13 briefs 20:3 bring 53:19 Bruce 5:7,21	build 41:12,13,14 43:8,9 46:17 builds 49:5 built 41:3 42:6,22 43:4 bunch 16:18 C California 5:2 20:9 call 55:3 called 5:22 13:1 19:6 calls 22:10,18 23:9 capacitance 56:18 66:24 capacitor 30:8,9,11 31:8,20 39:17,21 47:13 56:18, 19,22,25 57:9,14,24 capacitors 28:18 35:13 38:20 58:1, 2,10 care 35:11 37:8 40:22 44:6, 9,12,17 carries 7:2 case 11:2,4,5,12,18 19:17 40:3 51:6 56:7,10 62:10,11 66:18 67:8,11 cases 10:21 37:6 62:15 66:6 caveat 55:12 Central 20:9 change 31:19 49:22 52:19,20 53:2,5,7,8,12,14 55:2,
---	---	--	---

15 62:17	42:1,3,7 50:4,5,8,16,24, 25 52:17,18,20 54:4,5,6 55:8 56:11 58:18 59:1, 10 61:2,3,23 63:21,23 66:8,9,11,13,14,16,17, 25 67:3	18:16,24	configurability 52:11
changed 53:13 66:4		combinations 18:9	configurable 49:17,21 52:1,2,10,12, 22 54:13,14,15,23 55:2, 7 67:19
changing 40:8 50:3 64:11		combined 15:18	configuration 49:23,24 50:17,22,25 51:11 53:1,25
characteristics 43:23 44:1	circuit's 52:20	comments 23:14,15	configure 50:8 53:16 55:14
charge 28:3,16,17 29:20,24 30:24,25 31:4,5,7,10, 12,14,17,18,24 32:1,11, 15,17,18,19,21,22,25 33:8,11,13,17 34:5,8, 23,25 35:5,11 37:1,20 38:9,12,13,23 39:19,21 40:9,16,19,24 41:2,5 42:4,11,16,19,25 43:8, 9,12,19 44:8,19 45:1,2, 10,14,16,22,23 46:2,18 47:9,15 48:6,20,25 49:23,25 50:17,20,22, 25 53:16 54:13 55:24, 25 56:6,9,13,23 57:8, 17,21 61:7,13,19 62:2 63:1 64:23 65:6,9,24 67:19	circuitry 64:4,11	commercial 45:17	configured 51:23
	circuits 50:10 51:22 59:21,23	commercially-used 45:14,15	conservation 31:13,14,17,18,25 32:19
	claim 14:1,11,17 15:18,19,24 16:4,25 17:2 20:2,4,12 64:1,15,17,21 65:2,11, 12,17,20 67:25 68:5,6, 10,14,20	common 59:1	consideration 60:21
	claimed 15:18 64:21	communication 24:16	considered 46:5
	claims 13:2,4,16,21,24 14:4, 10,16,23 15:4 16:10,17 17:8 63:20,24,25 68:2, 24	communications 23:18 24:4,11,19	constitute 41:22 42:1
charge-pump 49:16,17	Clarification 28:22 65:13	compared 61:3 64:23	construction 20:2,4,12
charges 32:20	clarify 8:6 21:15	compensated 8:9,12	consumption 48:20
charging 30:7 47:14,15	clarifying 64:20	complement 28:19	context 52:5
chip 49:6 57:12	class 43:8	complex 33:9	control 29:14
chips 56:4 58:5,24 59:18	clear 7:25 24:13	components 53:10 59:12,20	controlled 29:10 38:20
choices 56:6	clock 28:18 38:20 39:16 40:4, 9 45:19,21 46:1,14,15 47:2,5,8,11,18,20,22 48:1,5,9,12,13,16,19 49:4,6,7,10	computer 53:2,6	controller 29:12
choose 46:2 54:4 67:20		concept 29:23	controllers 53:3
choosing 45:19 54:3	closed 29:3	concepts 63:12	controlling 53:4
chosen 61:22	Column 68:21	concerned 49:16 55:23	conversion 30:24 31:4,10,12 33:17
circuit 28:15 32:22 35:13 39:22 40:6 41:5,11,12, 13,14,15,16,22,23,24	combination 16:8,9,17,24 17:3	concluded 69:21	convert 32:15 33:11
		conclusion 16:22	converts 32:2,11,25 33:5 37:21 38:24
		confer 10:25	

copy 27:21	CV 9:11	describe 53:24	differ 66:18,19
correct 7:4 23:5 24:15 27:15 28:6,9 32:5,6,11 37:22 38:18 39:7,10,12 62:7, 22 63:15	D	describes 51:4 56:3	difference 45:18 52:9 61:2
correctly 27:10 55:11	danger 67:2	describing 30:5 51:10 65:3	differs 66:8
correspond 39:15	David 5:16	descriptions 13:22	Digital 5:8,15,17
corresponds 64:7,8	day 9:1 48:10,12,13,14	design 41:5,7,8,11,15,16,22, 23,24 42:1,4,7,11,15, 16,20 43:2,11,16 46:23 49:16 52:19 56:4 57:16, 17 58:4,19,23 59:1,10, 12,14,18,19,21,23,25 60:21 61:9 62:11,17 65:24 67:9,13	diodes 30:2
cost 58:4	days 9:5	designed 40:21,24 41:2 42:8 45:10,13,15,16 52:18 61:25 63:1 66:17	disappear 31:18
costs 58:5,9	dealing 47:11 58:17	designer 46:1,6,23 56:5 57:7	discuss 23:18
counsel 5:12 23:23,25 25:8 34:11	decided 66:5	designers 58:21	discussed 20:23 25:11 38:5,15
couple 6:19	decision 19:16 20:25	designing 44:7,8 66:11,14	discusses 51:18,19
coupling 64:3	declaration 8:13,17 14:15 16:23 17:18,20 19:2,8 20:7, 13,17,20 21:14,20,25 22:9,16,24 23:2,4,8 24:5 26:17,19,25 27:2, 14,24 38:16 49:1 55:16	designs 41:23 68:7	discussing 48:22 66:1
coursework 59:11	Decorations 30:18	destroy 11:9	disks 53:10
court 5:11 6:24 7:3,23 19:21, 24 20:2 36:9	define 13:17,18	details 14:2	dissipate 37:12,15,16 49:8,11
covered 67:25 68:10,17	defined 59:9,24	determine 46:13	dissipates 49:6
covers 68:14,20	depending 44:17 66:19 67:1	determines 39:1	dissipations 37:6,10
create 44:18	depends 14:12,20,21 17:13 29:19 33:19 41:16 42:5 45:7 46:6 54:24	developing 7:12,22	district 19:21,24 20:2,9
creating 7:14 37:13	deposition 5:7 6:5,11,20 7:11 8:13, 25 24:1,8,20 25:10,19, 24 26:2,9 69:21	device 46:18	Division 20:9
creations 30:16	depositions 10:15	devices 28:4,10 53:3,9	Doctor 22:20
current 43:11,18,22,24 44:6,10, 12,21,22 45:1,2,6 46:19 47:6,7,9,19 48:19,21 56:24	depth 21:3	dielectric 57:1,9,13,22,25	document 13:14 26:15 27:7,8,13
current-consumption 66:21			documents 17:15,19 20:1
			dopants 41:20
			dozen 6:13 9:5,8
			draft 19:12 21:4,20,24 22:24

23:2,13,16 24:14	eliminated 62:18	56:9	final 19:15 56:4,8,10 57:11 58:24 59:14
drafting 24:5	enablement 50:14	experience 45:18 59:11,19	fine 57:21
DRAM 66:4	end 18:7 33:6,7 57:13	expert 6:8 19:20	finish 7:15
drawing 41:1,18,20	engineer 59:8 63:22	explain 29:24	firm 5:19
drawn 42:19,25	engineering 16:2	explained 29:2 66:2	fly 68:24
drew 40:25	entirety 12:19,23 26:24 27:3	explaining 30:12	focused 18:2,9,18
driving 44:23,25 49:4,6 66:8	envision 15:23 51:6,22	explains 14:6	forgot 20:10
due 30:23 31:3,18	equations 30:12,17,19,20,21	explanation 31:21	forgotten 20:8
duly 5:22	essential 63:4	explosion 10:11	form 9:18,22 12:11,20 14:19 15:5,20 16:11 17:9 19:4 20:18 21:6 22:1 23:9,17 25:7 27:25 29:5,16 31:2 32:8 33:2,18 34:6 35:8, 20 36:3,11,19 37:25 40:14 41:6 43:13 44:15 45:4 46:4,16 50:1,19 51:2,14 56:15 60:23 61:5,10 62:8,23 63:6,17 64:25 65:14,25 67:15 68:1,11
dynamic 52:11 53:24 54:3	estimate 8:20	extent 11:8 22:3,10,18	formulas 30:19
dynamically 49:17,21 52:1,9 53:7 54:13,15,22	even/odd 29:3	externally 66:10	forward 12:4
	eventually 42:20 43:1	extra 58:14	fourth 58:6,10
E	EXAMINATION 6:1	F	frequencies 40:5 45:22 46:2,14
earlier 17:21	examined 5:23	fail 56:10	frequency 39:1,2,13,18,20 40:9 45:19 46:2,15 47:2,5,8, 13,18,20,22 48:1,3,6,19
early 56:4 58:23	examples 33:22 35:24 36:2 44:21	fair 8:3 13:23 15:4 32:1,25 51:8 56:12	Friday 5:3
early-on 57:17	exceed 46:22 61:19 62:2,25	familiar 6:17	front 6:24 9:11 27:10,21 28:5,10
easier 29:25	excess 37:18	fast 48:1,2,3	
efficiency 33:17 34:1 39:18	exhibit 16:24 21:17 26:11,13, 15 53:21 55:17	faster 39:21 48:15,16 49:7,10	
efficient 31:11	existed 41:8	figure 10:24 11:12 17:16 28:14 30:5 52:5 54:1, 13,22 60:19,24 61:3 66:2	
electric 28:17	expect 6:17	figured 10:6	
electricity 32:20	expected 57:13 67:9,13	filed 20:25	
electrons 32:20	expensive		
elements 28:17			

Index: drafting-front

THE SULLIVAN GROUP OF COURT REPORTERS

frustrating 10:15	36:12,22 44:21 46:9,10 54:2 56:23	10:15	hourly 8:8
full 48:10	goal 14:21 57:2 62:21	Hayashi 17:23 55:23 56:3,16 61:25 67:4,6 68:21	HUNTINGTON 5:2
fully 47:14 66:5	goals 61:12,14,16	Hayashi's 61:12,14,16 66:3	
function 55:8 62:7 63:8	good 5:4 6:3,4 8:23 34:14	Haynes 5:14	I
functional 61:9	goodness 44:3	head 6:16 7:24 9:4 34:10 35:22 60:2	IC 59:14
functionally 62:16	gosh 8:18	health 7:6	ICS 42:18 49:5
functioning 40:6 45:23 46:14	greater 37:5	heat 37:11,19	idea 10:17
functions 55:11	ground 30:11	heck 13:14	ideas 10:16
fundamental 63:12	guess 27:6 51:3	high 22:20 61:20	identical 11:21 18:1
fundamentally 62:17	guidance 14:18 15:19	high-level 25:17	identified 26:13 53:21
fuse 54:7,9,12,17,19,22,24 55:1,12	guide 14:11	high-voltage 62:10	images 39:6
fuses 50:13 53:17	guided 14:25 15:3	higher 37:5 38:24 44:21 45:1, 6,19 47:22 48:5,6,7 49:18 57:12 58:6 62:7 64:3 66:25 67:9,12	imagine 37:4 38:3 48:9 50:10
	guys 10:13	highly 25:18	immaterial 16:4
G		history 13:7 41:9	impair 7:7
gate 66:21	H	hit 34:10 60:2	implement 54:18
gave 35:25	half 8:22 9:5,8,12 48:13 57:1	Hold 20:5	implemented 42:20 43:1 45:10,17 54:16,22
general 8:21 9:17 10:2,5,21,23 12:13 15:12 44:6 49:8, 10 58:18	handle 56:11 65:6 67:8	honestly 9:10 23:13 59:7	implicate 22:3
generally 43:18 65:5	handling 67:11	Hong 5:14	important 13:10,12 62:20 66:17
generate 37:11,12 46:20	hands 10:20	hot 37:2 38:2	inappropriate 25:18
generated 30:14 37:19	happen 10:12 53:1	hour 8:22	include 28:20
generates 43:23,24	happening 10:6,8		including 27:3 41:22 49:16
give 7:8 14:13 15:6,10,21,22	hard-and-fast 52:3		increases 33:15
	hate		information

Index: frustrating-information
THE SULLIVAN GROUP OF COURT REPORTERS

15:1,13 22:4,11,19 23:10	involved 12:4 17:22 24:4	K	level 22:20 29:25 30:9 35:6 42:5,6,7,9 47:18 48:12 57:20 59:16,17
initialization 53:6	involves 66:11	K-A-N-G 18:21,22	levels 61:18 62:21
initially 29:21	involving 18:24	Kabat 5:20	Licensing 5:9,19
input 32:2,11,15 33:1,5,12 37:21 38:24 46:21 54:4 61:7,20,22 62:12,21 64:2,4,13,14 67:8,12	IPR 11:19,21 12:1,8 20:13, 22 26:11	Kang 18:13,14,21 19:1,6	light 13:22,25 14:2
inputs 62:18 63:11	IPRS 9:3,6,8,16 10:1 16:7,15, 19	keeping 40:5 45:23	lightly 26:7
inside 10:7,8	irrespective 56:7	kind 7:7 33:4	limit 47:12
instance 29:22 34:8 35:12 38:1 39:20 44:23,25 48:8,24 50:3,4 52:17,25 53:10 54:25 55:13 56:17,21, 24 64:1	issue 12:9,18 13:15 58:18 59:24	L	limitations 68:7
instances 68:7	ITC 9:6	lab 41:3 42:17,23 43:4,7 45:13	Limited 5:9,19
institute 19:17 20:25	J	labeled 16:24 17:18	Lindsay 5:10
instruct 23:17,23 24:10	Jacob 5:7,21 6:3 22:2 23:23 24:10,13 34:22 36:8 42:25 43:2	labs 45:9	lines 60:22 64:23 65:7,10,21 67:7 68:21
instructed 23:22 24:2 25:10	James 5:18	language 14:1,11,17 15:19,24 16:4,25	list 36:13,22
interrupting 30:15	Javanifard 18:6,10,14,19	large 56:13,25	live 6:24
introduce 5:12	Jim 24:24 25:23 27:11	larger 44:23,25 55:6 56:8 58:3,4 67:3	load 44:24,25
introductory 68:20	job 37:15	laser 55:1	long 25:4,11 29:21 34:9 35:1
invalid 14:17	joining 42:10	lasers 55:13	longer 55:7
invalidity 9:13 17:8	judge 6:24	law 5:19	Longitude 5:9,19 6:9
invented 59:5	June 5:3,5	lawyers 10:25 12:4,15 13:10 21:22	looked 18:24 19:10
invention 13:17 15:18 63:4,16,19, 23 64:16,18,21 65:20	jury 6:25	leakage 66:21	loss 37:20,24 38:11
inverse 56:19	justified 24:9	legal 10:8 11:1,4,9,10 13:18 19:18 21:21 27:4	losses 48:21,24 49:3,9
		legalese 13:9	lot 19:19 37:6 41:16,17 52:25 58:14

Index: initialization-lot

THE SULLIVAN GROUP OF COURT REPORTERS

lots 37:16,17 love 10:13 low 47:14 lower 40:2 44:22 45:2 lower-voltage 62:11 M made 58:13 magic 31:22 make 10:16 11:6 12:5,16 24:13 41:8 55:7 56:6, 24,25 57:8,9,25 58:2,3, 10,12 makes 32:12 52:4,19 mankind 41:9 manuals 17:15 manufactured 50:9 51:1 manufacturing 50:18 51:12,23 52:15, 16 58:4,5,9 mark 27:20 marked-up 27:21 Markman 20:7,20 Maryland 41:3 42:17,23 43:5 match 68:6 material 68:20	materials 10:5,24 11:17 19:11 matter 5:8 8:9 10:22 matters 35:12 37:4 meaning 53:9,13 meaningless 33:4 means 14:7 23:1 31:3 39:25 41:14,16 49:22 55:5 57:25 58:2,13 measure 33:16,24,25 34:7,24 37:24 40:12,15 44:2 measured 40:18 44:5 measurement 36:25 43:19 measuring 34:3,4,23 35:5 37:1 40:11 mechanism 16:4 31:22 63:7 mechanisms 15:25 16:20 medication 7:7 meet 24:21,23 25:2 meeting 25:6,23,24 meets 46:23 memories 59:17 memorized 36:14,16,21 51:17 memory 46:13,18 53:10 59:12, 17,18,20,25 memory-integrated 59:21,23	memory-systems 59:11 mentioned 35:19 36:18 45:9 mesh 11:2 metal 41:19 metric 33:19,22 44:4 metrics 34:3,4 35:11,15,17,22, 24 36:5,17,18 Milkey 5:18 9:18,22 10:3 12:11,20 14:19 15:5,20 16:11 17:9 19:4 20:18 21:6 22:1,10,18 23:9, 17,25 24:24 25:7 27:25 29:5,16 31:2 32:8 33:2, 18 34:6,11,15 35:8,20 36:3,8,19 37:25 40:14 41:6 43:13 44:15 45:4 46:4,16 50:1,19 51:2,14 56:15 60:3,7,23 61:5,10 62:8,23 63:6,17 64:25 65:14,22,25 67:15 68:1, 11 69:1,8,12,18 minutes 25:5 34:14 60:5 69:10 misstates 68:11 money 58:14 monitors 53:10 months 8:18 morning 5:4 6:3,4 move 30:4 multi-stage 61:23	N nature 62:17 necessarily 52:7 56:5 58:25 59:13 63:9 needed 62:15 node 64:2,13,14 nodes 64:4 nods 7:24 non-functioning 39:22,23 notes 69:9 noticed 27:19 number 26:12 35:15,17 38:3 49:17 54:10 64:7,9,12, 13 numbers 26:15 O O'DELL 5:16 oath 6:22,23 7:2 Object 9:18 33:18 objected 25:14 objection 9:21,22 10:3 12:11,20 14:19 15:5,20 16:11 17:9 19:4 20:18 21:6 22:1,10,18 23:9,17 25:7 27:25 29:5,16 31:2 32:8 33:2 34:6 35:8,20 36:3, 9,11,19 37:25 40:14 41:6 43:13,15 44:15
--	--	---	--

45:4 46:4,16 50:1,19 51:2,14 56:15 60:23 61:5,10 62:8,23 63:6,17 64:25 65:14,22,25 67:15 68:1,11	original 11:23,25	package 50:14	pen 42:14
objectionable 24:6	oscillates 48:9,12,14	packaging 53:18	penalties 7:3
obvious 14:5 16:2	others' 22:9	pages 13:8	people 29:17,24 41:17 50:13 58:20
offer 68:16,19	output 28:23 30:13 32:2,11,16 33:1,5,12 37:13,17,21 38:24 43:12,18 45:1,2 46:13,20,21 64:6	Pam 18:20	people's 22:17 23:4
offered 68:13	outputs 47:9 49:18	paper 41:21 42:14	percent 31:11,15
on-and-off 39:1,13	outsides 58:13	paragraph 28:12,14 29:2 30:4,23 38:17,23 39:3,4,5 49:12,15 55:19,21 56:2	perform 15:13
open 26:11 29:3	overdesign 56:6,13 58:18	paragraphs 51:16	performance 34:4,23 37:1 38:8,12 40:9,11,12,16,18 43:19, 21 44:2
operating 56:8,11 57:12	overdesigned 57:23	parallel 19:21,23	performed 51:11
operation 53:7 66:13	overdesigning 55:24 56:1 57:25	parameters 35:4 46:22	performs 63:8
opinion 11:19 14:16 15:17 19:1 68:8,13,17,19	overexpected 57:19	part 13:17 15:3 22:8,16 63:4,19 64:18 66:17	perjury 7:3
opinions 9:16 10:1	oversimplifying 67:17	parties 5:13	person 14:22 51:21 54:9 59:10, 13,22
opposed 7:24 29:22 59:18,20	owner 5:19 9:13 14:9,15 15:9 19:9,12	party's 20:1	petition 11:21 12:2 17:25
opposite 52:1,4,7,8	owner's 20:16,23,24 21:1,4,11, 16 26:18	passages 57:5	petitioner 5:17 14:10 17:6
optimal 46:2,5	owners 9:9,16,25 16:16	patent 5:18 9:9,13,15,25 11:24,25 12:1,9,18,22, 25 13:7,15,22 14:9,15 15:9 16:16 17:4,23 19:9,12 20:16,23,24 21:1,4,11,16 26:18 49:15,24 50:3,16,24 51:4,10,17,23 53:19 55:23 58:15 59:3 60:14 63:4 64:22 68:3,9,14	petitioners 12:8
optimum 66:14	oxide 57:1	patentee 51:19	phase 39:5,6,7,10 47:16 52:16
option 54:7,10,12	oxide-film 66:13,20	patents 12:4,13 17:14,22 26:7	phases 30:5,6
options 53:18	oxides 56:18	pay 58:13,14	physical 28:4,10 42:21 43:2 45:10
oral 7:23			physically 58:3
order 28:7 37:17 66:23			picks 46:23
ordinary 59:10,22			pictured 48:25

Index: objectionable-pictured
THE SULLIVAN GROUP OF COURT REPORTERS

piece 41:21	8:12,16 14:8 24:20 27:23 66:12 68:6	product 42:21 43:2 45:10,17 46:15	Q
place 55:12	prerequisite 63:9	products 27:23 28:1	qboost 31:6
places 41:19	presenting 11:4,5	proposed 16:8	qprecharge 31:6
plate 39:16	presuming 47:11	prosecution 13:6	quantity 32:20
plates 56:20	pretty 11:21	prove 9:12	question 7:16 8:2,5 9:23 10:21 12:12,21 22:15 25:22 28:8 32:23,24 33:11,23 42:24 50:6,23 51:3 55:6 62:5,6
plurality 66:12,15	previous 25:19	provide 7:23 8:20 9:16 10:1 11:19 14:10,15,16 19:1 46:12 56:13 61:17	questioning 25:18
point 44:11 51:16 55:5 62:14	previously 32:18	provided 11:23 16:23 23:7,15 28:14 30:5,12,16,21 36:6 68:9	questions 7:18 24:2,6,8,11,17 25:14,15,17 69:7,9,18
poly 41:19	primarily 36:10 37:8	providing 15:17 60:21 64:5,22	quickly 47:21 48:7,16
popular 9:5,6,7	principle 30:24 31:4,16	pull 16:21	quote 57:6
POSITA 43:18 54:7,18 59:4	prior 11:22 17:22 18:3,4	pump 28:3,16,17 32:1,15,17, 22,25 33:8,11,13 34:5, 8,23,25 35:5 37:1,20 38:9,12,13,23 39:19 40:10,16,19,24 41:2,5 42:4,11,16,19,25 43:8, 9,12,19 44:8,19 45:1,2, 11,14,16,17,22,23 46:3, 18 47:9,15 48:7,20,25 49:23,25 50:22,25 53:16 54:13 55:24,25 56:7,10,14,23 57:8,17, 21 61:7,13,19 62:3 63:1 64:23 65:9,24 67:19	R
positions 29:4	privileged 22:3,11,19 23:10	pump's 33:17	raise 30:9
possibility 37:7	probe 38:2	pumps 29:20,25 35:12 65:6	raising 30:10
power 32:2,11,12,16 33:25 37:6,10,12,13,15,17,18, 20,24 39:18 49:7,11 58:6,10 60:22 62:14 63:3 64:2,3,23,24 65:7, 10,21 66:6,10,18 67:13	problem 57:11,14 59:1,6,8 60:1 66:20,21 67:18	purpose 6:19	ran 41:4 42:17 43:7
powerful 56:13	problems 66:23	push 47:13	range 8:23 40:4,8 45:21 46:1, 14 61:19
powerless 38:11	proceedures 6:18 16:20	put 15:25 27:12 33:6	ranges 47:12
prefer 45:1	proceeding 5:11 19:21,23 20:23		rate 8:8,11
preferred 44:22	process 9:17 10:2,5,21,23 12:7 17:7,11 37:13 41:15 42:3		reach 15:18 46:19 47:3,21 48:2,4,6,7,17
preliminary 19:9,13 20:24 21:19	produce 37:17 44:9,10,13 48:10, 11,13		read 10:23 11:20,22,23 12:22 13:11,13,19 14:4, 22 17:4,14,21,23 19:11 21:3 26:5 55:21 56:2
prepare 8:24 17:19 19:8 20:17 25:24 26:1,8	produces 34:9,25 35:6 40:22		
preparing	producing 31:23		

66:2 67:23 68:9,21	related 19:1 38:8,11	requirements 46:24	Russ 5:19
reading 17:25 27:19	relating 66:4	reset 55:4	S
ready 49:13 60:17,18	relative 30:11	resistance 49:3	S1 28:20 39:6,7,10,14
real 28:3	relays 29:22	respond 14:22 22:20	S2 28:20 39:6,7,11,14
reason 7:6 31:24	relevant 51:16	response 7:24 19:9,13 20:16,24, 25 21:1,5,11,16,19 26:18	S3 28:20
recall 6:15 16:19 18:11,17 21:13,14 23:25 35:2 45:24 51:15,17,18	remanufacturing 50:5	rest 56:2	S4 28:21
receive 11:25 12:9,13,18 13:7 65:20	remember 18:8,15	result 67:3	sake 36:10
received 12:1,6	reminder 6:19	review 10:5 12:19 13:3,6,9,16, 21 17:19 18:5 19:9,12, 16 20:1,16 21:4 22:9 24:14 26:7 27:7 69:9	satisfy 61:13,16
receives 65:6,7,10	reminders 7:10	reviewed 11:17 17:2 18:3 21:1 27:2,6	scenario 45:6 46:10 51:5,10
receiving 64:24	REMOTEY 5:1	reviewing 13:15 26:24	scenarios 15:23 31:6 57:18
recent 6:14	remove 62:5,6	reviews 22:17 23:4,7	schematic 42:19,25
Recess 34:18 60:10 69:4,15	repeat 22:15 32:23 42:24 50:23	revise 22:8,15 23:3	schematics 42:11
reconfigurable 55:5	report 10:6 11:20,22 12:1 14:8,18 17:5,10,24 18:2,4 19:6 26:5,6 27:21 38:5 41:2 57:6 67:5,24,25 68:6,9,18	revision 23:8	scope 13:17,18 17:10
record 7:12,14,22 24:13 25:9 34:16,19 60:8,11 69:2, 5,13,16,19	reporter 5:1,4,11 7:23 28:22,25 34:16,19 60:8,11 65:13 69:2,5,13,16,19	rid 10:17 62:12	scrap 62:13
rectangles 41:18	reporter's 36:9	rough 8:20	screen 41:18
redesigning 50:4	represent 5:13	roughly 8:16 9:11	section 12:25 13:11 21:21
reference 18:25	representing 5:20	rule 52:3	sections 13:1 21:25 22:24 23:2,3 27:3,4 53:24
referenced 18:4,11	request 66:7	run 39:20 40:5 45:22 49:23, 25 50:3,9,18 51:1,12,24 52:11,12	select 63:11
references 11:22 15:17 17:23 18:5	required 63:15,20,21,24 66:10	runtime 52:15,23	selected 64:14
referred 52:2			selecting 64:1
			selection 47:2,5,8 64:7,8,12
			semantics

Index: reading-semantics

THE SULLIVAN GROUP OF COURT REPORTERS

40:25 41:1	sides 9:14	7:19 65:5	statically 52:2,10,12,22 53:16 54:14,23 55:1,7,14
send 23:16	sign 26:24 27:1	specific 15:7,22 16:19,20 24:4 42:2 44:8 68:7	stays 37:9
sense 11:7 32:13 52:4,19	signal 39:16	specifically 19:5 24:1 33:14 56:16	STENOGRAPHIC 5:1
sentence 55:21	signals 38:21	specification 13:1,3,19,23,25 14:3,6, 25	step 60:25 62:14 63:3 64:17
separately 51:9	signature 26:22 27:12	specifications 56:5 58:24 66:4,5,19 67:2	step-down 61:21 64:15 67:14,18
set 53:3 55:4 67:1	signed 27:5	speed 47:22,24	steps 53:1
set-and-forget-type 52:13	significant 27:17	spelled 27:10	Stiegler 11:23 12:1 17:22 18:4, 23 24:8
settlement 47:23,25	silicone 41:19,20	spend 8:16,24	Stiegler's 11:20,21 17:5,24 18:1,2 26:6 38:5
shakes 7:24	similar 12:7 25:15 65:6	spontaneously 31:18	Stoker 5:10
Shi 5:14 6:2 9:19,24 11:16 12:17,24 15:2,15 16:6, 14 17:17 19:7 20:21 21:10 22:7,14,22 23:11, 20,23 24:12 25:20 26:16 28:2 29:1,9 30:3 31:9 32:14 33:10,21 34:13,21 35:16,23 36:4, 15,24 38:7 40:17 43:17 44:20 45:8 46:8 47:1 50:7,21 51:7,20 53:19, 23 58:16 60:5,13,16 61:1,8,15 62:19 63:2,14 64:19 65:4,18,23 67:10, 22 68:4,15,25 69:7,11	simply 15:25	stability 36:25 37:8	stored 31:7
	single 10:14 59:8 64:24 65:7	stage 54:5	strike 9:2 45:19
	sitting 68:16	stages 49:18 64:5,8,9,12,14	students 43:7,8,9
	situation 14:21	Standard 5:6	stuff 10:7 19:19 20:7 21:21, 22 22:6 37:19 58:8 65:16
	skill 59:10,22	standstill 48:8,18	submitted 19:15 21:9,12
	skilled 51:21 54:9	start 53:1,8	summary 18:14
	skimmed 19:18	started 17:25	supplied 66:6,18
	small 57:8	starters 54:1	supply 60:22 62:14 63:3 64:2, 3,23,24 65:7,8,10,21 66:6,8,9,11 67:13
	solution 67:18	starting 48:8,17	support 9:13 21:17 26:17
	sort 9:14 11:11 44:2 48:23 50:15 52:13 53:12	state 25:9 53:3	supposed 22:13
	Southern 20:9	statement 32:5,6 33:4	
	space 56:20	static 52:18 53:12	
	speaking		

switch 28:23 38:25 39:2,13 47:15 54:2,7,10,12,16, 18,21 switches 28:18,20 29:3,7,10,15, 18 38:25 39:14 49:2 52:21 54:2 67:20 switching 20:22 sworn 5:23 system 51:6,22 53:2,6 61:18 systems 59:12,18,20,25	temperature 36:25 37:2,4,5,9 38:2 testified 5:23 testifying 6:24 7:3 testimony 25:12 68:12 theory 55:5 thick 57:1 58:1 thick-film 66:24 thickness 56:17 thicknesses 66:13 thin 57:10 thing 14:6 19:15 20:4,11 44:1 46:21 50:15 62:1,13 things 6:19 10:9 26:4,8 29:21 37:14 41:17,22,23 48:22,23 55:3 67:20 thinner 58:13 thoughts 10:13 thousand 13:8 thousand-page 13:14 time 5:5,6 8:13,16,24 10:14 29:21 34:11,14 35:6 43:25 46:20 47:23,25 49:23,25 50:3,9,17,18, 20 51:1,12,24 52:12 53:6 60:3 63:18 67:9,13 timeframe 44:10 times 6:11 8:12 48:14	today 5:4,20 6:8 7:8,11 27:15 told 17:21 24:1 42:22 43:3 tolerances 62:2,25 tolerate 61:18 tool 42:15 tools 42:10,13 top 6:16 9:4 35:21 top-plated 30:8,10 total 25:5 totally 20:10 trade-off 55:24 57:2 58:17 transcribed 7:11 transistor 66:24 transistors 29:22 30:1 42:8 66:12, 15 true 11:7 turn 10:9,12 29:7,17,18 turned 39:6 turns 29:13 58:11 type 54:24,25 types 66:12,15 typos 27:16,18	U underdesign 56:9 58:18 underdesigning 55:25 underexpected 57:19 understand 6:22 7:2,12 8:3,5 12:21 13:21,24 14:1 25:13 30:1 43:20 48:3 68:17 understanding 13:16,20 41:11 Understood 62:4 unit 61:21 67:14,19 units 63:3 unreasonably 37:2 user 66:7
T takes 8:21 34:9 35:1,6 43:25 talk 49:9 talking 14:13 20:20 32:18 34:22 37:18 38:13,14 39:3 48:21,23,25 57:15 63:22 target 47:21 48:2,4,17 59:15 task 44:7,8 taught 43:7 58:8 technical 10:7,24 11:3,7,13 13:20 14:2 17:15 19:11 21:22, 24 22:6,8,16,24 23:2,3 27:3 technique 67:11 techniques 50:12 53:15 Technologies 5:8 technology 12:6 16:1 29:14,19	T takes 8:21 34:9 35:1,6 43:25 talk 49:9 talking 14:13 20:20 32:18 34:22 37:18 38:13,14 39:3 48:21,23,25 57:15 63:22 target 47:21 48:2,4,17 59:15 task 44:7,8 taught 43:7 58:8 technical 10:7,24 11:3,7,13 13:20 14:2 17:15 19:11 21:22, 24 22:6,8,16,24 23:2,3 27:3 technique 67:11 techniques 50:12 53:15 Technologies 5:8 technology 12:6 16:1 29:14,19	T takes 8:21 34:9 35:1,6 43:25 talk 49:9 talking 14:13 20:20 32:18 34:22 37:18 38:13,14 39:3 48:21,23,25 57:15 63:22 target 47:21 48:2,4,17 59:15 task 44:7,8 taught 43:7 58:8 technical 10:7,24 11:3,7,13 13:20 14:2 17:15 19:11 21:22, 24 22:6,8,16,24 23:2,3 27:3 technique 67:11 techniques 50:12 53:15 Technologies 5:8 technology 12:6 16:1 29:14,19	V vague 33:4 VDD 40:2 VDDP1 60:19 61:4 62:6,12,20 VDDP2 60:20,24 62:5,20 versed 12:5 versions 21:8 versus 5:9 view 25:17 visual 10:9

voltage 30:9,10,13 31:20,23 33:1,5,6,7,12,15 34:9, 25 35:6 37:13,18,21 38:17,24 39:25 40:22 43:23 44:9 46:13,19,21 47:3,18,21 48:2,4,7,11, 13,17 49:18 54:3 56:4, 8,11 57:12,19 58:24 59:15 61:7,18,20,21,23 62:7,21,25 64:6,15 66:6,8,11,20,25 67:8,12 voltages 30:13 55:9 62:1 66:10 67:1 W wait 7:15 36:9 waste 37:18 ways 27:9 34:7,24 38:3 well-known 29:14 Western 5:8,15,17 whatnot 42:8 wide-spread 59:8 wiped 55:1 wire 33:5,6,7 withstand 66:20 word 52:7 66:9 work 7:20 8:9 9:9 16:1,5 21:24 22:23 23:1 29:4, 6,7 56:7,10 57:14,21,22 worked 9:3 16:7,15 working 9:15,25 10:22 12:8,15,	16 14:9,15 15:9 17:6 20:13 59:16,17 works 31:24 34:15 60:7 61:25 worry 58:20 write 8:22 10:5 11:13 writing 21:13 27:5,13 written 14:24 wrote 20:6,20 21:22,23 22:6 27:7,8,9 Y year 6:15 years 58:8 59:11,19 Yesterday 25:3 Z Zhang 18:6,10,19 Zoom 10:10,15 THE SULLIVAN GROUP OF COURT REPORTERS	
---	--	--