

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

MICRON TECHNOLOGY INC.,

Petitioner,

v.

SONRAI MEMORY LIMITED,

Patent Owner

Case IPR2023-00904

Patent 6,920,527

REMOTE ORAL DEPOSITION OF

DAVID KUAN-YU LIU, PhD

THURSDAY, JULY 18, 2024

REPORTED BY:

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Sonrai Memory Limited
Ex. 2014 - Page 1

1 REMOTE ORAL DEPOSITION OF DAVID KUAN-YU LIU
2 PhD, produced as a witness at the instance of the
3 Patent Owner and duly sworn, was taken in the
4 above-styled and numbered cause on the
5 above-referenced date from 8:14 a.m. to
6 12:23 p.m. PDT before Lorie Rhyne, California CSR
7 No. 12905 (Section 1) and Michael E. Miller, FAPR,
8 RDR, CRR, California CSR No. 13649 (Section 2),
9 reported by real-time stenographic means at the
10 location of the witness.

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DAVID KUAN-YU LIU PhD

JULY 18, 2024

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EXAMINATION OF DAVID KUAN-YU LIU PhD:

BY MR. AUCHTER

5

CERTIFICATE

117

1

2

P R O C E E D I N G S

3

July 18, 2024, 8:14 a.m. PDT

4

5

DAVID KUAN-YU LIU PhD,

6

having been first duly sworn,

7

testified as follows:

8

9

EXAMINATION

10

11 BY MR. AUCHTER:

12

Q. Good morning, Dr. Liu. How are you

13

today?

14

A. Good morning. I'm doing well. How are

15

you?

16

Q. I'm good, actually. Thank you.

17

Is there any reason you can't testify

18

completely and accurately today?

19

A. No, there are no reasons.

20

Q. Have you been deposed before?

21

A. Yes, I have.

22

Q. How many times?

23

A. Approximately around ten times -- close

24

to ten times, maybe less.

25

Q. I'll go over some of the rules then. If

1 I ask you a question and you don't understand the
2 question, please ask me for clarification. If you
3 do answer the question, I'll assume you understood
4 it.

5 Do you understand that?

6 A. Yes, I do.

7 Q. Okay. Is it correct that you submitted
8 two declarations in IPR2023-00904 regarding
9 US Patent 6,920,527?

10 A. Yes, that's correct.

11 Q. This morning I'm going to be asking you
12 questions about your supplemental declaration, which
13 has been labeled MTI-1029.

14 Do you have a copy of that with you?

15 A. Yes, I have a printed copy, and that's
16 clean, without any marking, provided to me by my
17 counsel.

18 Q. What other documents do you have with
19 you?

20 A. I have the supplemental declaration, as
21 we just mentioned earlier. I also have my initial
22 declaration, just in case you want to refer to it.
23 And I have all the relevant -- I have the '527
24 patent and all the key reference -- prior art
25 references.

1 I requested to have a printed copy
2 because it's easier for me to flip through. As we
3 know just now, sometimes I don't trust myself with
4 the downloading and looking at it, yeah.

5 Q. I completely understand and agree with
6 you. I have printed copies as well.

7 Are the copies you have all clean copies
8 without any markings on them?

9 A. Yes, there are no markings whatsoever.

10 Q. What did you do to prepare for this
11 deposition?

12 A. I reviewed my supplemental declaration
13 and spent some time going through some of the prior
14 art and met with my counsel. And that's it.

15 Q. Which prior art did you spend time going
16 through?

17 A. I just briefly looked through the very --
18 the main one, Tsunoda.

19 Q. And how long did you meet with counsel?

20 A. Around four hours.

21 Q. Okay. And who were the counsel you met
22 with -- or who was the counsel you met with?

23 A. The counsel that are with me here this
24 morning, Tim Riffe and Kim Leung.

25 Q. Is there a proper construction of

1 "portable memory apparatus"?

2 MR. RIFFE: Objection, form.

3 A. You can tell by my declaration, I was not
4 asked to provide a claim construction for the term
5 "portable," so I did not provide one.

6 BY MR. AUCHTER:

7 Q. What claim construction were you using
8 for your supplemental declaration? And,
9 specifically, what construction of "portable memory
10 apparatus" were you using for your supplemental
11 declaration?

12 MR. RIFFE: Objection, form.

13 A. I did not provide -- again, I did not
14 provide any claim construction for the term
15 "portable," and I just used how a person of ordinary
16 skill in the art would understand the term
17 "portable" to be.

18 And, in addition, since I was informed
19 that Patent Owner had brought us some form factor to
20 be -- to be considered as portable, just to be
21 complete, I provided analysis based on that one.

22 Of course, as indicated in my
23 supplemental declaration, I don't necessarily agree
24 with that, with certain form factor to be portable;
25 but, nonetheless, I provided analysis just for

1 completeness' sake.

2 BY MR. AUCHTER:

3 Q. And how would a person of ordinary skill
4 in the art understand the term "portable" to be?

5 MR. RIFFE: Objection, form.

6 A. Again, I did not provide a claim
7 construction, but as a person of ordinary skill in
8 the art, I would know what a portable memory
9 apparatus to be as indicated in my -- clearly in my
10 supplemental declaration as well as the original
11 declaration. But the MMC form factor will be
12 considered portable to a person of ordinary skill in
13 the art, but USB thumb drive or USB storage media
14 will be considered to be portable.

15 To me, as a person of ordinary skill in
16 the art, if you presented me with a certain form
17 factor, I can evaluate based on my experience and
18 based on my knowledge to indicate whether it is a
19 portable or not. But sitting right here, I'm not --
20 I did not and I would not -- I would not need to
21 provide a claim construction. I will leave that to
22 the -- to the District Court and to the --

23 Q. Okay. So is it accurate to say that,
24 sitting here today, you're unable to articulate a
25 construction for the term "portable memory

1 apparatus"?

2 MR. RIFFE: Objection, form.

3 A. I would disagree with that
4 characterization. I would rather say that as a
5 person of ordinary skill in the art, I know fully
6 what the term "portable" is in its plain, ordinary
7 meaning.

8 But since I did not -- did not provide a
9 claim construction, I don't think I need to do that
10 right now. But if you have any form factor that you
11 would like me to opine that's within the scope of
12 this deposition, I certainly will be happy to
13 provide you my view whether they are portable or
14 nonportable.

15 BY MR. AUCHTER:

16 Q. Okay. So is it accurate to say that it's
17 your opinion that you would know if it was a
18 portable memory device by looking at it, but you're
19 not able to say what factors you would consider or
20 what standards you would use to determine whether or
21 not it was portable?

22 MR. RIFFE: Objection, form.

23 A. Again, this is not what I'm asked to do.
24 I'm asked to give my opinion in view of how a person
25 of ordinary skill in the art would view the plain,

1 ordinary meaning for the term "portable," so I
2 analyzed based on that.

3 And again, as I indicated in my
4 declarations, both of them, that I consider MMC form
5 factor to be portable. I consider USB form factor
6 also to be portable. And that's what my analysis
7 focused on in terms of trying to provide my opinion
8 in -- in these two declarations.

9 BY MR. AUCHTER:

10 Q. And what is the plain and ordinary
11 meaning of the term "portable" to a person of
12 ordinary skill in the art?

13 MR. RIFFE: Objection, form.

14 A. Again, I don't -- I do not provide a
15 claim construction. I did not provide a statement.
16 I simply -- based on my knowledge and experience as
17 a person of ordinary skill in the art, I opined, and
18 it's very clear in my -- in my declaration under the
19 scope of this -- this work that MMC and USB, at
20 least these two, I consider them to be portable.
21 And I do not necessarily agree that M.2 form factor
22 or similar form factor such as U.3 and E1.S would be
23 considered portable.

24 BY MR. AUCHTER:

25 Q. Is that -- so I understand that, you are

1 saying that you, in your expert opinion, are saying
2 that the MMC is a portable memory device or USB is a
3 portable memory device, but you're unable to
4 articulate why that is; is that correct?

5 MR. RIFFE: Objection, form.

6 A. I believe I articulate very clearly as
7 to -- that these two are portable. There are
8 many -- and I'm just not -- I have not been asked
9 and I will not need to provide exact definition or
10 some kind of claim construction regarding the term
11 "portable."

12 BY MR. AUCHTER:

13 Q. Okay. So is it accurate to say that an
14 MMC device is a portable memory device because you
15 say so?

16 MR. RIFFE: Objection, form.

17 A. I think not only I say so, but I believe
18 a person of ordinary skill in the art will
19 understand -- given the plain and ordinary meaning
20 of the term "portable" -- will understand that MMC
21 to be a portable form factor.

22 BY MR. AUCHTER:

23 Q. And what is the plain and ordinary
24 meaning of the term "portable"?

25 MR. RIFFE: Objection, form.

1 A. There are different aspects to qualify
2 to -- to be portable. Again, I am -- I am not asked
3 to provide claim construction, and I understand that
4 this is a term that's being under -- are being
5 construed and -- by both sides, so I am not going to
6 step out of my lane to try to provide a claim
7 construction for this term.

8 Suffice to say for my -- based on my
9 analysis, I believe I made it very clear in my
10 analysis. I provide a very, very clear explanation
11 why as to my opinion that MMC is portable and that
12 the other form factor, such as USB thumb drive
13 storage media, is also portable.

14 I think I made that clear, that these two
15 are portable, and I think a person of ordinary skill
16 in the art would agree with me.

17 BY MR. AUCHTER:

18 Q. Other than the fact that you say they're
19 portable, what makes an MMC form factor portable?

20 MR. RIFFE: Objection, form.

21 A. It simply is portable under the plain and
22 ordinary meaning. And again, I'm not going to try
23 to get into the different aspects because, again,
24 the term "portable" is on the claim construction.
25 I'd rather just stay within my declaration where I

1 made it clear -- my opinion, at least, is clear what
2 I consider to be portable and also clear what I
3 consider would not be portable.

4 For example, I do not necessarily agree
5 that M.2 form factor or even some of the form factor
6 such as U.3 and E1.S that those are considered to be
7 portable. But that's come from a person of ordinary
8 skill in the art. And I'm not going to try to --
9 try to provide claim construction on the term.

10 BY MR. AUCHTER:

11 Q. Why is the M.2 form factor not portable?

12 A. Can you point me to my supplemental
13 declaration where I discuss about a form factor?

14 Q. You just testified that you did not
15 necessarily agree that the M.2 form factor is
16 portable under oath. I'm asking you why.

17 A. I think I -- I think my testimony is that
18 I do not agree with the Patent Owner's decision that
19 the M.2 form factor will be considered portable. I
20 do not necessarily agree with that. I don't think I
21 provide --

22 Q. What is it about that that you don't
23 agree with?

24 A. Let me look into my -- my declaration.

25 Q. Which one -- when you say declaration, I

1 apologize, but you have to be clear because there
2 are two declarations here.

3 A. I'm sorry. I -- I was trying to
4 understand your question regarding M.2 form factor.
5 I did not provide an opinion in my declaration. I
6 simply said that I don't necessarily agree. And
7 again, I don't want to give you -- I may not be
8 willing to give you a reason because I don't want my
9 answer to be used as a -- to be a claim construction
10 for the term "portable."

11 But suffice to say that there are factors
12 that would lead me to -- (audio malfunction) --

13 MR. AUCHTER: Off the record.

14 (End of Section 1)

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1 BY MR. AUCHTER:

2 Q. Dr. Liu, if we could go back to the
3 question I was asking then: Is the proper
4 construction of "portable memory apparatus" a memory
5 apparatus that can be carried around in the palm of
6 one's hand?

7 MR. RIFFE: Objection, form.

8 A. Can you repeat your question again?

9 BY MR. AUCHTER:

10 Q. Of course.

11 Is the proper construction of "portable
12 memory apparatus" a memory apparatus that can be
13 carried around in the palm of one's hand?

14 MR. RIFFE: Objection, form.

15 A. Again, this is just one feature that you
16 are describing. And again, as I testified earlier,
17 I am not here to provide a claim construction for
18 the term "portable," and as my declaration has -- my
19 two declarations have clearly indicated what I
20 consider and how I analyze it for the plain and
21 ordinary meaning of "portable" with regard to MMC
22 form factor and with regard to USB thumb drive. And
23 I've also opined on the M.2 form factor.

24 So I think, sitting right here, if you
25 would like to provide me with a form factor and ask

1 me whether they're portable or not, I think my
2 answer stays the same.

3 If you ask 100 person of ordinary skill
4 in the art regarding what I have in my declaration,
5 I believe at least for the MMC form factor and for
6 the USB form factor, I believe all of them -- at
7 least most of them, if not all of them, will agree
8 with me those are portable form factor. And that's
9 how I analyze the -- in my report analyze this --
10 the petition based on that plain and ordinary
11 meaning as a POSITA would understand it.

12 BY MR. AUCHTER:

13 Q. So is it accurate to say that you're not
14 willing to say what your understanding is of the
15 meaning of portable memory apparatus to a person of
16 ordinary skill of the art at the time of the '527
17 patent?

18 MR. RIFFE: Objection, form.

19 A. I disagree. Again, I opined very clearly
20 and explicitly that MMC form factor and the USB form
21 factor are portable. I have an opinion, and I have
22 experience and expertise as a person of ordinary
23 skill in the art, and I provide the opinion and I
24 provide the analysis based on that understanding of
25 portable form factor.

1 BY MR. AUCHTER:

2 Q. So is it your opinion you've concluded
3 that the MMC form factor is portable?

4 MR. RIFFE: Objection, form.

5 A. I have to ask you to repeat your question
6 or rephrase it. I don't understand, I concluded.
7 What -- I don't understand how that word would come
8 about in my -- in my declaration, supplemental
9 declaration.

10 BY MR. AUCHTER:

11 Q. Well, you say that the MMC form factor is
12 portable, correct?

13 A. I said that MMC form factor will be
14 understood to be a portable memory apparatus with
15 the understanding of a person of ordinary skill in
16 the art.

17 Q. And you also said that a USB form factor
18 would be understood to be a portable memory
19 apparatus under the understanding of a person of
20 ordinary skill in the art; is that correct?

21 A. That's correct.

22 Q. Okay. But you're not willing to say what
23 factors went into that determination; is that
24 correct?

25 MR. RIFFE: Objection, form.

1 A. Again, I was not asked to provide the
2 factor that goes into, but a person of ordinary
3 skill in the art looking at the totality of the form
4 factor, looking at different aspect, I think a
5 person of ordinary skill in the art, such as I am,
6 would agree or come to the conclusion or come to the
7 understanding that MMC form factor and the USB form
8 factor would be considered as portable memory
9 apparatus.

10 BY MR. AUCHTER:

11 Q. And what are those different aspects?

12 A. Again, these aspects would have to be
13 taken in totality in consideration of any given
14 singular aspect, taken out of context, taken in
15 isolation would not be doing a service of the
16 understanding of the person of ordinary skill in the
17 art.

18 Again, I did not provide a claim
19 construction, and I'm not asked to provide this
20 different aspect in terms of claim -- to construe
21 what would be considered to be portable. And I
22 think I'm very explicit in my declaration what are
23 portable, and I analyzed the prior art against
24 the '527 alleged invention based on the
25 understanding.

1 Q. And what is your understanding as to what
2 it means to be a portable memory device?

3 MR. RIFFE: Objection, form.

4 A. Can you repeat the question? Because I
5 think we've been going over this, and I think I made
6 my answer very clear and explicit. Can you please
7 repeat the question? I'm sorry.

8 BY MR. AUCHTER:

9 Q. What is your understanding as to what are
10 the factors of a portable memory device?

11 MR. RIFFE: Objection, form.

12 A. As I answered earlier, there are --
13 everything is in context. There's a different
14 aspect, and you have to take the totality, not
15 taking any one aspect out of context. Because if
16 you take any -- anything out of context, then the
17 understanding would not be in sync with a person of
18 ordinary skill in the art.

19 So again, sticking to what I have
20 answered clearly, I think for the purpose of my
21 work, for the purpose of the opinion I render in my
22 supplemental and the original declaration, using the
23 prior art and comparing with the '527 invention, I
24 think I've made it very clear.

25 And then the analysis, based on that

1 understanding of MMC and USB being portable memory
2 apparatus, I think it suffice to -- for me to render
3 my opinion in the -- in my declaration with regard
4 to my opinion of the '527 inventions.

5 BY MR. AUCHTER:

6 Q. Other than the fact that you've concluded
7 that the MMC and USB form factors are portable
8 memory apparatuses, what other factors did you take
9 into account in determining they are portable memory
10 apparatuses?

11 MR. RIFFE: Objection, form.

12 A. I think I need you to repeat your
13 question because it's kind of lengthy, and I'm a
14 little bit lost. Sorry.

15 BY MR. AUCHTER:

16 Q. Sure.

17 A. I'm sorry.

18 Q. What factors did you take into account in
19 determining that the MMC and USB form factors are
20 portable memory apparatuses?

21 MR. RIFFE: Objection, form.

22 A. Again, as I testified earlier, there are
23 many -- many aspect, and they have to be taken into
24 totality for a person of ordinary skill art to look
25 at it within the context. And I do not want to just

1 list off one or two and then -- and this will form
2 an incomplete picture.

3 But suffice to say -- and again, for the
4 purpose of the analysis I render with regard to
5 comparing the prior art and at least the four that
6 you -- we just mentioned to the reporter, and
7 compare that with respect to the invention of '527,
8 I think suffice to say that the opinion I rendered
9 by -- with the conclusion -- or the understanding
10 that these MMC and USB portable form factor is
11 suffice to render opinion that I provided regard to
12 the -- my opinion of the alleged invention of '527.
13 BY MR. AUCHTER:

14 Q. Are there any factors that a person of
15 ordinary skill in the art would consider to
16 determine whether or not something was a portable
17 memory device that you are willing to list here
18 today?

19 MR. RIFFE: Objection, form.

20 A. Can you repeat again?

21 BY MR. AUCHTER:

22 Q. Are there any factors that a person of
23 ordinary skill in the art would consider to
24 determine whether or not something was a portable
25 memory device that you're willing to list here

1 today?

2 A. It's not a matter of willing to list or
3 not. It's a matter that, first of all, I did not
4 provide a claim construction for the term
5 "portable." I do not want to step out of my -- what
6 I was tasked to do.

7 So and second is that any aspect I listed
8 or any aspect I considered, I can assure you that is
9 in context with the -- in the context of the
10 totality of different aspect.

11 You cannot just take anything out of
12 isolation and then try to force in that way. That's
13 not how a person of ordinary skill in the art would
14 do.

15 I would just take into the many aspect --
16 but if you show me a form factor and I will actually
17 go through the progression of this different aspect
18 within the context and render opinion whether there
19 are -- what form factor there would be.

20 But again, you know, to list one or two
21 out of isolation, I don't believe would be doing the
22 analysis any justice. Again, I analyzed it very
23 clearly, and I -- as a person of ordinary skill in
24 the art with many years' experience in the storage
25 arena, I looked at it, I analyze it, I look at prior

1 art. My understanding is that -- and I render that
2 opinion, is that MMC and USB are portable memory
3 apparatus in their form factors.

4 Q. And what different aspects did you
5 consider in going through the progression within the
6 context, as you've just testified?

7 MR. RIFFE: Objection, form.

8 A. Look, I don't really want to start
9 listing them and -- because, again, it will not do
10 justice, and I don't want -- I don't want my answer
11 to be some kind of claim construction provision for
12 this case because I'm not asked to provide a claim
13 construction.

14 Again, if we look at my declaration and
15 supplemental declaration, my task is to analyze and
16 form opinion whether the invention -- alleged
17 invention of '527 will be rendered obvious to a
18 person of ordinary skill in the art.

19 Under all the limitation -- and I think I
20 provide my opinion in my declaration, my
21 supplemental declaration, and I come to the
22 conclusion that these are -- these kind of
23 limitation will be rendered obvious to a person of
24 ordinary skill in the art, and that's how I provide
25 it.

1 And sitting right here, again, if there's
2 new thing you need me to analyze, I can try to
3 analyze or try to at least think through, but
4 suffice to say that my analysis in my declaration
5 that render '527 obvious is based on understanding
6 of a POSITA, a person of ordinary skill in the art,
7 that MMC form factor and USB thumb drive form factor
8 are indeed portable memory apparatus.

9 BY MR. AUCHTER:

10 Q. Is a Dual Inline Memory Module a portable
11 memory apparatus?

12 MR. RIFFE: Objection, form.

13 A. Can you take me to my declaration where
14 I -- where I mention that? Again, I analyze the --
15 that form factor you have just mentioned based on
16 the fact that Patent Owner have accused a similar
17 device to be a portable memory apparatus.

18 As I mentioned very clearly, certain
19 thing I do not necessarily agree. I do not
20 necessarily agree with the position, but since I'm
21 not the one deciding the claim construction, for
22 completeness' sake, I analyze Tomio by itself in
23 that form factor.

24 But in reality, in the different aspect,
25 I analyze Tomio in view of Tsunoda and do not rely

1 on Tomio being -- form factor being -- being
2 necessarily being a portable. But I analyzed Tomio
3 alone by itself as a portable form factor based on
4 the position that Tsunoda has taken.

5 (Recess requested by the
6 stenographer.)

7 (Recess taken, 9:13 a.m. to
8 9:14 a.m. PDT)

9 BY MR. AUCHTER:

10 Q. Dr. Liu, in your opinion, is a DIMM, such
11 as disclosed in Tomio, a portable memory device?

12 A. Again, let me read my declaration --
13 supplemental declaration to you. I think I provide
14 an opinion. It says right here: To be clear, I do
15 not agree that Sonrai's interpretation are correct,
16 but I analyze -- I said right here.

17 As I explain in my first declaration, I
18 address claims 1 through 6, 9 through 12, and 15
19 through 17. Sorry, this is on page 5 of my
20 supplemental declaration, paragraph 8. As rendered
21 obvious by Tomio under the scope of these claim
22 terms and advanced by Patent Owner in its complaint
23 of infringement.

24 So I analyzed the Tomio's 168-pin SDRAM
25 DIMM for completeness' sake under the scope of the

1 claim term advanced by Patent Owner in his
2 complaint.

3 Q. And what is the scope of those claim
4 terms as advanced by Patent Owner in their
5 complaint?

6 A. Again, I was not -- I'm not involved in
7 the -- on the litigation side. My analysis was
8 that, look, this form factor, M.2 form factor -- I
9 was informed that M.2 form factor, as in my original
10 declaration, is considered by the Patent Owner to
11 be -- to be infringed -- to be infringing the '527;
12 therefore, my understanding is that Patent Owner --
13 at least from Patent Owner's perspective, that the
14 limitation of claim 1 would read against M.2 form
15 factor does -- I analyzed Tomio's DIMM form factor
16 based on that understanding.

17 Again, I'm not involved in the
18 litigation. I'm not involved in the claim
19 construction aspect of things. I'm simply tasked to
20 analyze the alleged invention of '527 with respect
21 to prior art, and my understanding, my conclusion,
22 my analysis render that it would be obvious to a
23 POSITA for these claim terms.

24 And the Tomio as a standalone to read
25 under claim 1 was advanced by Patent Owner in their

1 complaint, in their infringement, and I -- for
2 completeness' sake I analyzed Tomio based on that
3 assumption.

4 Q. Was Tomio accused of infringement by the
5 Patent Owner?

6 MR. RIFFE: Objection, form.

7 A. Can you repeat your question again?

8 BY MR. AUCHTER:

9 Q. Was the device disclosed in Tomio accused
10 of infringement by the Patent Owner?

11 MR. RIFFE: Same objection.

12 A. Which device disclosed by Tomio?

13 BY MR. AUCHTER:

14 Q. The DIMM, the Dual Inline Memory Module.

15 A. My understanding is that a similar form
16 factor such as M.2 -- that's my understanding.

17 Again, I need to emphasize I'm not on the
18 litigation side. I am simply -- I was simply
19 informed, look, the Patent Owner seemed to advance
20 that this form factor would fall under the
21 limitation -- claim limitation of claim 1.

22 So -- and my analysis that, if that's the
23 case, for completeness' sake, this form factor would
24 also render under that interpretation -- if that's
25 the interpretation Patent Owner advanced for

1 limitation of claim 1, then this form factor taught
2 by Tomio would fully meet all the limitation as
3 well.

4 Again, I do not necessarily agree that
5 Tomio's form factor will be -- I do not necessarily
6 agree with Patent Owner's position, but I analyze it
7 simply for the sake of completeness, that if this
8 was -- this is the position advanced by Patent
9 Owner, then Tomio will actually render all these
10 limitation as obvious under this position advanced
11 by the Patent Owner.

12 Q. So is it accurate to say that your
13 opinions regarding Tomio are based on what you
14 understand the Patent Owner's position to be in the
15 litigation?

16 MR. RIFFE: Objection, form.

17 A. Can you repeat your question, because I
18 don't understand how to parse that question. I'm
19 sorry.

20 BY MR. AUCHTER:

21 Q. Is it accurate to say that your opinions
22 regarding Tomio are based on what you understood the
23 Patent Owner's position to be in the litigation?

24 MR. RIFFE: Objection, form.

25 A. No, I don't believe that's the correct

1 characterization. I have my opinion, and as I
2 stated in my declaration, both supplemental and
3 original, I do not necessarily agree with Patent
4 Owner's position. But given that this is the
5 position they're advancing, as an expert trying to
6 analyze, I would have to take that position into
7 consideration; therefore, I analyzed Tomio based on
8 that position advanced by Patent Owner.

9 It doesn't change or shape my opinion as
10 an expert, as a person of ordinary skill in the art,
11 but because the position advanced by Patent Owner, I
12 want to be complete.

13 So given this is the position in that
14 case, there's another aspect of looking at Tomio
15 that would actually -- that can actually be analyzed
16 under that position and also still render
17 limitations of claim 1 as obvious.

18 BY MR. AUCHTER:

19 Q. How do you know what the Patent Owner's
20 position is with respect to Tomio?

21 MR. RIFFE: Objection, form.

22 A. I was informed that Patent Owner in their
23 invention -- you can call it a report or
24 infringement contention -- at least at the time when
25 I was analyzing to form an opinion with regard

1 to '527, that certain form factor was considered to
2 be -- to be read under the current limitation of
3 the '527 patent. So that's -- that is the basis of
4 my understanding of the position advanced by Patent
5 Owner.

6 BY MR. AUCHTER:

7 Q. Your supplemental declaration was signed
8 on June 12th of this year; is that correct? You can
9 look at it, if you want.

10 A. Give me a second just to be accurate, but
11 I think you're right.

12 That's correct. June 12th, last month.

13 Q. Do you know what Patent Owner's position
14 is with respect to the infringement contentions as
15 of June 12th?

16 MR. RIFFE: Objection, form.

17 A. I think the best way to answer is that I
18 may not -- I might not know the real-time update of
19 the position advanced by Patent Owner; however, at
20 least at the time frame of the original declaration
21 and the Patent Owner's response in that time frame,
22 I was not informed of any change in the Patent
23 Owner's advancing of the position that certain form
24 factor also fall under the current limitation
25 of '527.

1 BY MR. AUCHTER:

2 Q. And to be clear, that certain form factor
3 is the M.2 form factor; is that correct?

4 A. M.2 form factor is one of them, that's
5 correct.

6 Q. What are the others?

7 A. There may be others. I -- sitting right
8 here, I do not remember off the top of my head.

9 Q. In your opinion, could the 168-pin SDRAM
10 DIMM of Tomio be safely and reliably carried around
11 in the palm of a person's hand?

12 MR. RIFFE: Objection, form.

13 A. I think you have to -- I'm having a hard
14 time parsing your question because carry -- there
15 are many way to carry certain things, so I think the
16 context needs to be a little bit more clear. I'm
17 sorry.

18 BY MR. AUCHTER:

19 Q. Okay. Can I put an SDRAM DIMM in the
20 palm of my hand and carry it around without
21 potentially damaging the memory?

22 MR. RIFFE: Objection, form.

23 A. I think there may be a double negative in
24 that question, so I'm -- I'm really sorry. I'm
25 going to have to ask you to repeat the question.

1 Maybe perhaps I am not -- maybe a double negative
2 here?

3 BY MR. AUCHTER:

4 Q. Can Tomio's DIMM be carried around in the
5 palm of a person's hand?

6 MR. RIFFE: Objection, form.

7 A. In my -- if I go back to my supplemental
8 declaration, I say clearly that that form factor,
9 given its size -- given its size, certainly would
10 fit in and be carried around in the palm of one's
11 hand.

12 BY MR. AUCHTER:

13 Q. Would there be any risk of damaging the
14 portable memory apparatus by carrying it around in
15 the palm of your hand?

16 MR. RIFFE: Objection, form.

17 A. There's a risk to damage in carrying
18 around anything in the palm of your hand. If you --
19 if I show you my cell phone, it has a cracked
20 screen. So anything that you carry around in the
21 palm of your hand could be damaged. The damage
22 could come in different forms. So I don't -- I
23 don't necessarily understand the context of the
24 question.

25 ///

1 BY MR. AUCHTER:

2 Q. Are you familiar with the term
3 "electrostatic discharge"?

4 MR. RIFFE: Objection, form.

5 A. I'm familiar with the term "electrostatic
6 discharge," but I don't believe I have -- I don't
7 believe that's in my declaration or that's in the
8 supplemental declaration as well.

9 BY MR. AUCHTER:

10 Q. Would a memory -- sorry. Strike that.

11 Would a DIMM such as disclosed in Tomio
12 be subject to damage from electrostatic discharge if
13 it was carried around in the palm of one's hand?

14 MR. RIFFE: Objection, form.

15 A. Repeat your question again.

16 BY MR. AUCHTER:

17 Q. Would a DIMM such as disclosed in Tomio
18 be subject to damage from electrostatic discharge if
19 it was carried around in the palm of one's hand?

20 A. I think the best way to answer your
21 question is electrostatic discharge is simply
22 static -- it's really -- electrostatic discharge is
23 a big science. I spend a lot of time actually in my
24 field doing that.

25 So anytime you have charge built up and

1 that comes in the form -- come from a voltage, and
2 then when -- when it discharges, the instantaneous
3 voltage or instantaneous current, if it's sustained,
4 will actually cause damage to integrated circuits.
5 So as such, anytime you carry an integrated
6 circuit -- carries -- carry electronic devices, I
7 would assume that care must be taken in order to
8 avoid electrostatic discharge.

9 In fact, you know, if you walk on a
10 carpet for a long time and you touch somebody, you
11 could also damage somebody very quickly, although
12 for a very brief moment. So I think the question is
13 very loaded.

14 If any -- if a device could be damaged by
15 carrying around in the palm of your hand, I would
16 say, yes, any device would be damaged -- will be
17 subject to electrostatic discharge and impact due to
18 that; but I would assume that that alone doesn't
19 qualify. There would be other measure in order to
20 carry that in order to make sure that it could be --
21 it could be prevented from any damage.

22 So my answer is that yes, any electronic
23 device, especially an integrated circuit, could be
24 subject to electrostatic discharge and its
25 detrimental consequence. But there will be

1 precaution. Otherwise, you know, you made this
2 integrated circuit. If you cannot carry it safely
3 by whatever means, then you will never be able to
4 deploy them into your system, into your apparatus.

5 Q. Is flat memory susceptible to damage from
6 electrostatic discharge?

7 MR. RIFFE: Objection, form.

8 A. Did you say flat memory?

9 BY MR. AUCHTER:

10 Q. Flash.

11 A. Flash memory.

12 Again -- I'm sorry. Again, it has to
13 take into context, as I testified, anything that --
14 electronic device by nature are designed to be able
15 to operate under certain operating voltage and be
16 able to handle certain current -- handle capability.
17 And if you exceeded that, there will be detrimental
18 effect -- such as latch-up, for example; that's one
19 example of ESD. Or overvoltage, and then it will
20 cause other damage, say, to gate oxide of a
21 transistor or gate oxide of a flash memory device.

22 So to answer your question, anytime you
23 have a possibility of subject, your integrated
24 circuit, whether it be DRAM, SDRAM, whether it be
25 flash or anything, you are -- you need to make sure

1 that any external environment will not introduce
2 higher voltage or higher current than the device is
3 designed for. So I think that's the best way to
4 answer your question.

5 It could come in the form of ESD. It
6 could come in the form of a circuit not being
7 regulated. It could come in the form of -- in many
8 forms, yeah.

9 Q. Okay. In your experience, does
10 electrostatic discharge cause breakdown in
11 semiconductor devices?

12 MR. RIFFE: Objection, form.

13 A. I think we're a little bit out of
14 scope -- out of scope of my declaration, my
15 supplemental declaration, because I don't believe we
16 discussed electrostatic discharge. But just for
17 completeness' sake, and I would -- I'm willing to
18 answer your question.

19 Overvoltage and overcurrent on a device,
20 if you operate it exceeding the capability, the
21 damage comes in many form, okay? It could be
22 dielectric issue. It could be interconnect issue.
23 It could be a device performance issue. So you -- I
24 really have to understand the analysis.

25 And there's a big field -- since you

1 cover electrostatic, there's a big field on
2 electrostatic/ESD devices. I spent a few years of
3 my career trying to design ESD devices because
4 that's part of an integrated circuit.

5 So my answer to you would be that anytime
6 you operate or you subject your integrated circuit,
7 whether it's -- you know, whatever form it come
8 in -- form factor it come in, there's going to be
9 concern for that damage will be introduced -- or
10 detrimental impact will be introduced into the
11 device.

12 So it comes in many form. It comes in
13 many form factors. So I think you have to really
14 bracket it for me to identify where -- there's a big
15 field of FA analysis to see my -- where's my weak
16 point in the interface, whether it's the oxide,
17 whether it's the dielectric, whether it's the device
18 performance, whether it's latch-up and it goes away,
19 but it cause device to degrade due to
20 electromigration, hot carrier effect, many, many
21 things.

22 But these are beyond the scope of what I
23 opine with respect to the '527 patent, but I'm
24 willing to answer the question to be cooperative,
25 yeah.

1 BY MR. AUCHTER:

2 Q. Do you have an opinion as to what the
3 understanding of a person of ordinary skill in the
4 art would be of the term "housing" as it is used in
5 the '527 patent claims?

6 MR. RIFFE: Objection, form.

7 A. Again, I did not provide a claim
8 construction. I'm not asked to provide claim
9 construction. Again, just similar to "portable," I
10 assume a person of ordinary skill in the art, such
11 as I am, would have an understanding and would
12 understand what a housing to be.

13 And, of course, just as the case of the
14 patent analysis, I analyze this based on the
15 position advanced by the Patent Owner just for
16 completeness' sake.

17 (Recess requested by the
18 stenographer.)

19 (Recess taken, 9:37 a.m. to
20 9:39 a.m. PDT)

21 BY MR. AUCHTER:

22 Q. And, Dr. Liu, have you considered the
23 scope of the terms "portable" and "housing" in the
24 context of Patent Owner's current infringement
25 contentions?

1 MR. RIFFE: Objection, form.

2 MR. AUCHTER: That's legitimate.

3 BY MR. AUCHTER:

4 Q. Dr. Liu, have you considered the scope of
5 the term "portable" in the context of the Patent
6 Owner's current infringement contentions?

7 A. I don't know what the current
8 infringement contention is since I provide an
9 opinion for the initial declaration -- since the
10 initial declaration, and the supplemental
11 declaration is based on the initial declaration, so
12 perhaps the analysis that -- when I mentioned it was
13 advanced by the Patent Owner in this complaint for
14 infringement is carried through from the initial
15 declaration.

16 So I am not -- again, I'm not involved in
17 the litigation, the litigation side, so my
18 information of what is on, the word you said,
19 current infringement contention, may not be indeed,
20 in fact, current, so...

21 Q. Do you know if the products accused of
22 patent infringement in the current litigation are
23 portable or not?

24 MR. RIFFE: Objection, form.

25 A. Again, I am not involved in the

1 litigation, and when I was doing the initial
2 analysis for the initial original declaration, I was
3 informed that certain form factor was under the
4 infringement contention; therefore, for
5 completeness' sake, I analyze it.

6 So I provide analysis at the time using
7 the prior art that we have. And again, the prior
8 art include MMC form factor, USB form factor, either
9 standalone or in view of combination. And as
10 additional aspect for completeness' sake, I analyze
11 one of the prior art under the position that Patent
12 Owner advance at that time when I was informed that
13 was the case.

14 So any real-time development, I'm sorry
15 if my supplemental declaration or original
16 declaration did not reflect the current status.
17 But, however, the analysis still holds. And I stand
18 by my analysis.

19 And if certain things were no longer to
20 be considered, which I may or may not agree -- for
21 example, in the case of M.2, I state clearly how my
22 opinion of the Sonrai -- the position advanced by
23 Sonrai. But in any case, with any update, my
24 analysis based on the prior art and based on
25 combining the prior art still would be valid to

1 render the invention '527 -- the claims of '527
2 obvious.

3 BY MR. AUCHTER:

4 Q. You say you were informed. Did you see
5 the infringement contentions?

6 MR. RIFFE: Objection, form.

7 A. You know, my recollection is not that
8 great, but -- I agree I might have seen it, but at
9 least I -- it was confirmed to me -- it was informed
10 to me that this form factor was advanced by the
11 Patent Owner and indeed that I should analyze
12 certain references with respect to this position
13 advanced by Patent Owner. But sitting right here, I
14 would have to go back to my record to see the
15 different aspect of being informed of the Patent
16 Owner's position.

17 BY MR. AUCHTER:

18 Q. Do you know if any terms of the '527
19 patent claims have been construed by the District
20 Court?

21 A. To be honest with you, I'm not aware of
22 the status of the claim construction. Again, as I
23 mentioned, I am applying -- in my analysis, I'm
24 applying the plain and ordinary meaning to a person
25 of ordinary skill in the art, so my analysis is

1 based on that and also based on the information that
2 was given to me at the time regarding certain
3 position, although I do not necessarily agree with
4 that position. But again, for completeness' sake, I
5 analyze it for that position, not knowing how the
6 claim terms would be construed. And I'm not -- I'm
7 not involved in that aspect of things.

8 But I do my analysis, again, as I
9 indicated in my declaration, based on the
10 understanding of the plain and ordinary meaning,
11 based on understanding of a person of ordinary skill
12 in the art.

13 Q. And what's the understanding of a person
14 of ordinary skill in the art of the term "housing"
15 as it is used in the claims of the '527 patent?

16 MR. RIFFE: Objection, form.

17 A. Again, do you have any particular
18 location in my declaration you'd like to point me to
19 where I opine on the housing?

20 BY MR. AUCHTER:

21 Q. Is it accurate to say you do not have an
22 opinion as to what the understanding of a person of
23 ordinary skill in the art would be as to what the
24 term "housing" means in the '527 patent claims?

25 MR. RIFFE: Objection, form.

1 A. I totally disagree with that, and I
2 think, again, this is similar to my answer given
3 earlier.

4 As a person of ordinary skill in the art,
5 with the plain and ordinary meaning, I would know
6 certain form factor to satisfy the claim term
7 "housing," and I also know certain form factor may
8 or may not satisfy the claim term "housing."

9 So I provide the opinion -- so I do not
10 agree -- no, I do not agree with your
11 characterization.

12 BY MR. AUCHTER:

13 Q. All right. So what is the understanding
14 of a person of ordinary skill in the art as to the
15 meaning of the word "housing" in the '527 claims?

16 MR. RIFFE: Objection, form.

17 A. Again, I am not involved in the aspect of
18 claim construction of the term "housing," so I
19 would -- sitting right here, if you have a form
20 factor, if you have something you would like me to
21 opine under the term, I'll be happy to. But I do
22 not provide -- I do not provide a claim construction
23 for the term, and I'm not going to, sitting here,
24 try to provide a claim construction.

25 ///

1 BY MR. AUCHTER:

2 Q. How did you decide whether or not a piece
3 of prior art was a portable memory device or not?

4 MR. RIFFE: Objection, form.

5 A. I have answered the question earlier. I
6 looked through in the context, in the totality of
7 different aspect, and -- under the ordinary
8 meaning -- plain and ordinary meaning of the term
9 "portable" and rendered an opinion.

10 And I believe, again, I want to emphasize
11 that I would -- I strongly believe that a person of
12 ordinary skill in the art would agree with me that
13 MMC is a portable form factor, MMC card, and also
14 that USB thumb drive or USB memory device will be a
15 portable form factor, and that both will fit under
16 the term -- will also be comprised of a housing.

17 BY MR. AUCHTER:

18 Q. What --

19 MR. AUCHTER: Go ahead, I'm sorry.

20 THE WITNESS: Would it be okay when
21 you finish a question we take a more long
22 break? We've been going -- even though the
23 interruptions, we've been going at -- I think
24 I would like to at least grab some fresh air,
25 if possible.

1 MR. AUCHTER: First off, Dr. Liu, we
2 can take a break whenever you want. I prefer
3 you not do it when there's a question pending,
4 but, nevertheless, it's your call when you
5 want to take a break. I certainly don't want
6 to hold you here against your will in that
7 regard.

8 THE WITNESS: Sure.

9 MR. AUCHTER: If you'd like to take a
10 break now, we can go ahead and do that.

11 THE WITNESS: I will be happy to
12 answer the question. I didn't mean to
13 interrupt. I was just going to raise that
14 whenever the time is convenient, if we can
15 take a break to make sure that my mind is
16 clear and I'm refreshed.

17 MR. AUCHTER: Yeah. Actually, this
18 is probably a good time to take a break, so
19 let's do that. How long a break would you
20 like, Dr. Liu?

21 THE WITNESS: Ten minutes, just to
22 get some fresh air.

23 MR. AUCHTER: One question.

24 BY MR. AUCHTER:

25 Q. Did you discuss your testimony with

1 counsel during any of the previous breaks?

2 A. Oh, no, not at all. I understand that
3 the rule, and I fully intend to abide by the rule.

4 MR. AUCHTER: Thank you very much.

5 Let's go off the record for ten minutes. I
6 have 12:52, which I guess is 9:52 your time.

7 Shall we come back at 10:02?

8 (Recess taken, 9:51 a.m. to
9 10:01 a.m. PDT)

10 BY MR. AUCHTER:

11 Q. Dr. Liu, directing your attention to your
12 declaration, the supplemental declaration, which I
13 believe is Exhibit 1029, paragraph 10 of your
14 declaration, you cite to a paragraph in Tsunoda and
15 I believe paragraphs -- strike that. Let me start
16 again here.

17 Does Tsunoda discuss any examples of a
18 volatile memory that is not SDRAM?

19 MR. RIFFE: Objection, form.

20 A. As you can see in my declaration, this
21 says: Further, the nonvolatile memory and the
22 volatile memory of the present invention are not
23 limited to the flash memory 102 or the SDRAM 103.

24 So to answer -- sorry, go ahead.

25 ///

1 BY MR. AUCHTER:

2 Q. I'm sorry. I did not mean to interrupt
3 you. Please go ahead.

4 A. So to answer your question, I think your
5 question was does Tsunoda mention any other volatile
6 memory besides SDRAM.

7 I think Tsunoda contemplate other memory,
8 other volatile memory besides SDRAM, in the sentence
9 I just read you.

10 Q. Is there any citation to any kind of
11 volatile memory besides SDRAM in Tsunoda?

12 MR. RIFFE: Objection, form.

13 A. To be honest, sitting right here, I don't
14 know. But if you want to give me some time, I can
15 certainly go through Tsunoda and try to take a look
16 at it.

17 BY MR. AUCHTER:

18 Q. All right. We can go ahead.

19 I was specifically referring to
20 paragraph 0124 in my previously garbled question.
21 If you can find a disclosure of volatile memory
22 that's not SDRAM in Tsunoda, please identify it.

23 MR. RIFFE: Objection, form.

24 (Document review.)

25 A. Just briefly scanning through -- of

1 course I'm not using the electronic device to do
2 search, but just briefly looking through it, besides
3 paragraph 124 when Tsunoda mentioned other volatile
4 memory besides SDRAM is contemplated, in the claim
5 it also mentioned DRAM, just DRAM by itself, not
6 SDRAM.

7 BY MR. AUCHTER:

8 Q. You're talking about the claims at the
9 end of Tsunoda?

10 A. That's correct.

11 Q. And outside of the claims at the end of
12 Tsunoda, is there any other discussion of volatile
13 memory that's not SDRAM?

14 A. Sitting right here, I don't want to pick
15 up other deposition trying to scan -- to scrub the
16 Tsunoda reference. But as I mentioned in my -- in
17 the citation in my supplemental declaration, that
18 Tsunoda definitely mentioned that the invention is
19 not limited to the SDRAM in terms of the volatile
20 memory.

21 So there is definitely -- Tsunoda
22 definitely contemplate other form of volatile memory
23 with that paragraph 124, whether it have explicit or
24 no explicit mention of the term "SDRAM."

25 Q. Does Tsunoda teach an interface to

1 volatile memory that does not include an SDRAM
2 interface?

3 A. Repeat your question again.

4 Q. Does Tsunoda disclose an interface to
5 volatile memory that does not include an SDRAM
6 interface?

7 MR. RIFFE: Objection, form.

8 A. I think the question perhaps can be best
9 answered by giving an overview of Tsunoda.

10 Tsunoda explicitly, both with Figure 24
11 and also in his wording, describe a volatile memory
12 and a nonvolatile memory, and use -- for this
13 embodiment, it described the volatile memory as with
14 SDRAM.

15 And the whole concept of Tsunoda, given
16 that the description of SDRAM -- the whole concept
17 of Tsunoda is to have the host interface with this
18 portable memory apparatus through what he calls
19 SDRAM-compatible interface. And then after that,
20 after having the big picture of this embodiment
21 of -- main embodiment of SDRAM-compatible interface,
22 Tsunoda went on to list at least three embodiment
23 under that concept of SDRAM-compatible interface in
24 Figure 24.

25 So there are, in my declaration --

1 clearly, labeled Figure 1 is one of them, and
2 Figure 9 is a second embodiment, and Figure 14 is a
3 third embodiment.

4 All these embodiment are under the
5 teaching of Tsunoda that you have an
6 SDRAM-compatible interface interfacing with a host
7 and also interfacing with a memory apparatus that
8 has both -- both nonvolatile memory and volatile
9 memory; and that given that it's an SDRAM-compatible
10 interface, the host, once transmit a power signal to
11 the memory apparatus was initiated, the writing of
12 the data from nonvolatile memory to the volatile
13 memory, and at the end of the power will also write
14 the volatile memory content into nonvolatile memory
15 content. That's the general concept of Tsunoda.

16 So to answer your question whether
17 there's an explicit mention of any other memory,
18 it's only through paragraph 124, and the embodiment
19 is really in regard to SDRAM-compatible interface,
20 that interface memory apparatus that has SDRAM and
21 nonvolatile memory.

22 BY MR. AUCHTER:

23 Q. Okay. And to be clear, Figure 9 in
24 Tsunoda discloses an SDRAM interface; is that
25 correct?

1 A. Repeat your question again, please.

2 Q. Does Figure 9 of Tsunoda disclose an
3 SDRAM interface?

4 A. I think the best way to answer the
5 question is that Figure 9 denotes MMC interface and
6 SDRAM interface under the -- as an illustration
7 of -- as a second embodiment of an apparatus that
8 interface with a host through SDRAM-compatible
9 interface. I think that's -- that's the main
10 teaching of Tsunoda.

11 The SDRAM-compatible interface in which
12 there are different embodiment -- and the Figure 9
13 you highlighted happens to be second embodiment that
14 shows how to implement that SDRAM-compatible
15 interface between the host and this portable memory
16 apparatus.

17 Q. Does Figure 11 disclose an SDRAM
18 interface?

19 A. I'm sorry. You mentioned Figure 11?

20 Q. That's correct.

21 A. Similar to my answer earlier, Figure 11
22 describe an interface that's an SDRAM-compatible
23 interface between the host and between the memory
24 apparatus, portable memory apparatus, in which
25 there's an SD interface, and there's also an SDRAM

1 interface.

2 Q. Does Figure 12 of Tsunoda disclose an
3 SDRAM interface?

4 A. Yes. I'll answer the question the same
5 way: Tsunoda describe an SDRAM interface under the
6 teaching of a host connecting with the portable
7 memory apparatus via SDRAM-compatible interface.

8 Q. Does the embodiment shown in Figure 14 of
9 Tsunoda disclose an industry-standard MMC interface?

10 MR. RIFFE: Objection, form,
11 foundation.

12 A. I do not understand what do you mean by
13 industry-standard MMC interface.

14 BY MR. AUCHTER:

15 Q. Is the MMC an industry standard?

16 A. MMC interface is one of the interface
17 that's being used for communication between the host
18 and memory apparatus.

19 Q. Does Tsunoda teach that you would have to
20 use newly defined MMC commands to interface with the
21 embodiment shown in Figure 14?

22 MR. RIFFE: Objection, form,
23 foundation.

24 A. Can you please repeat your question? I
25 think this is -- I'm trying to parse it.

1 BY MR. AUCHTER:

2 Q. Sure.

3 Does Tsunoda teach that one would have to
4 use the newly defined MMC commands to interface with
5 the embodiment shown in Figure 14?

6 MR. RIFFE: Same objection.

7 A. MMC interface has its own pinout, and the
8 host communicate to the memory apparatus through
9 these different pins, so as such, the host will
10 issue command based on the available pinout. So I
11 don't understand what would be considered -- I guess
12 the way you phrased the question, I don't
13 understand.

14 The command would be given through the
15 host communication. The protocol or the commands
16 or the sequence will be going through these MMC
17 interface pinouts. So I don't -- I don't --

18 The term you used for command, what was
19 the term? I'm sorry.

20 BY MR. AUCHTER:

21 Q. A newly defined MMC command.

22 A. First, I don't know what that means, but
23 any commands, however it's defined, would have to go
24 through under the protocol, under the specification
25 of an MMC interface with its pinout. So I don't --

1 I don't believe -- I don't believe I fully grasp
2 your question.

3 Q. Okay. So to be clear, you did not
4 consider whether or not newly defined MMC commands
5 or a newly defined MMC command would be required to
6 interface to the disclosure of the embodiment in
7 Figure 14 of Tsunoda?

8 MR. RIFFE: Objection, form,
9 mischaracterizes testimony.

10 A. My testimony, I think, is that I do not
11 understand what you mean by newly defined command.
12 There are seven pins to an MMC, and you could issue
13 command from the host based on this seven pinout.

14 So what will constitute a newly
15 command -- defined command versus a command, I think
16 an application engineer or a user from the host
17 would have to -- are bounded by these protocol of
18 seven pins and the classic node and all the --
19 whatnot. So what will constitute a newly defined
20 command, to me, that's a concept I'm having a hard
21 time to grasp.

22 But suffice to say that Tsunoda is
23 teaching that MMC interface is an SDRAM-compatible
24 interface, and the host could go through this
25 interface to communicate through the internal data

1 transfer unit to communicate with the volatile
2 memory in the form of SDRAM and in the nonvolatile
3 memory in the form of flash memory.

4 And these commands, I do not know the --
5 what you meant in the context of newly defined
6 commands. There are commands, just like you write a
7 program based on the language you're given, and
8 you -- so the command line is the command line that
9 follow a protocol, follow the interface protocol to
10 communicate with the memory apparatus.

11 BY MR. AUCHTER:

12 Q. Directing your attention to paragraph 13
13 of your supplemental declaration.

14 Do you see that?

15 A. Give me a second. Let me get to it.

16 Q. Of course. Sorry.

17 A. Yes, I'm there. I'm there.

18 Q. You see your citation to paragraph 99 of
19 Tsunoda?

20 A. Okay.

21 Q. Is that a complete citation to
22 paragraph 99?

23 A. Give me a second to confirm.

24 (Document review.)

25 A. There's -- I'm only addressing -- citing

1 to paragraph 99 with respect to the Patent Owner's
2 response regarding writing between nonvolatile
3 memory and the volatile memory as well as writing
4 back between the volatile memory to the nonvolatile
5 memory.

6 So there are things in the paragraph, for
7 example, regarding the housekeeping or some people
8 call it the garbage management of flash memory
9 within the flash memory controller. Some of that is
10 within that context.

11 And I think, of course, I did not need to
12 cite that, but I'm only addressing in my citation
13 regarding the power-on of writing from nonvolatile
14 memory to the volatile memory and also as well as
15 power-off, writing from the volatile memory the data
16 back to the nonvolatile memory.

17 So if that's the context of what you
18 meant by complete citation, I think the citation is
19 adequate to -- for my position in responding to
20 Patent Owner's response.

21 BY MR. AUCHTER:

22 Q. Do you see the two sentences that read:
23 In this case, the program data stored in the
24 volatile area 203 is discarded when the power is
25 turned off; however, no problems occur because the

1 program data is held in the flash memory 102?

2 A. This just -- yes, I see this. It doesn't
3 change the -- I don't know how it -- I don't know if
4 it change any aspect of my analysis.

5 Q. Do you have an understanding as to what
6 Tsunoda was referring to in those two sentences?

7 MR. RIFFE: Objection, form, calls
8 for speculation.

9 A. The way I understand it is that if there
10 is -- in Tsunoda's implementation, how it manage the
11 data that did not get changed. Whether it needs to
12 write, communicate between volatile memory and
13 nonvolatile memory, that's the protocol for the
14 memory controller.

15 But it doesn't change the analysis that I
16 have given -- I have opined that Tsunoda meet the
17 current limitation of '527 claim 1 in terms of
18 having an SDRAM-compatible interface. In fact, it
19 is Sonrai's position that -- which I agree, although
20 I may not agree with the word "only." It's Sonrai's
21 position that data transfer from nonvolatile memory
22 to volatile memory -- it says "only with
23 SDRAM-compatible interface."

24 That's exactly what Tsunoda provides in
25 his limitation, especially with MMC label in

1 Embodiment 3 of Figure 24, that you do have an
2 SDRAM-compatible interface, so that you are fully
3 performing the action of writing from nonvolatile
4 memory to the volatile memory at the power-on.

5 And when there is need for -- when the
6 power is off, whether intentionally and there may be
7 cases where it is unintentionally, accidentally or
8 abruptly, then there's the provision -- there's
9 indeed a provision to write the data, especially the
10 data that has been modified, back from volatile
11 memory to nonvolatile memory.

12 Q. Where does Tsunoda teach that?

13 A. Tsunoda teach what?

14 Q. There is indeed a provision to write the
15 data, especially if the data has been modified, back
16 from volatile memory to nonvolatile memory.

17 A. In paragraph -- same paragraph 99: If a
18 user data is slightly changed or contained in
19 addition, the user data is copied to a flash memory
20 102 and held in the flash memory 102. At the end of
21 paragraph 99.

22 So again, Tsunoda teaches writing from
23 nonvolatile memory to volatile memory during
24 power-on and writing from -- writing from volatile
25 memory to the nonvolatile memory during the

1 power-off.

2 Q. In paragraph 14 of your supplemental
3 direct declaration, you cite to Tsunoda's Figures 24
4 and 25 in paragraphs 67 and 68; is that correct?

5 A. Can you repeat the question, because
6 there's a lot of number. Hang on.

7 Q. Okay. First of all, turn to paragraph 14
8 of your supplemental declaration.

9 A. Okay.

10 Q. And then can you confirm that you're
11 citing to Tsunoda's Figures 24 and 25 in the
12 description in paragraphs 67 and 68?

13 A. 24 and -- Figure 24 and 25? You mean
14 Figure 14 and Figure 1 or...

15 I'm sorry, I'm lost.

16 Q. That's all right.

17 Looking -- it's the continuation of your
18 paragraph 14, and it actually extends across to
19 page 11. I'm specifically referring to the sentence
20 at the top of page 11.

21 A. Okay. So at paragraph 14, right?

22 Q. Yes.

23 A. Okay. What's the question?

24 Q. Are those citations directed to a portion
25 of Tsunoda that is disclosing an SDRAM-compatible

1 interface?

2 A. Is there a specific sentence you are
3 trying to -- I'm having a hard time understanding
4 the question, so I'm not able to answer the
5 question.

6 Q. Do the cited portions of Tsunoda
7 reference anything besides an SDRAM-compatible
8 interface?

9 MR. RIFFE: Objection, form.

10 A. Which citation? I'm really sorry.

11 BY MR. AUCHTER:

12 Q. The ones in the first sentence at the top
13 of page 11 in paragraph 14 of your supplemental
14 declaration.

15 A. Using the power supply voltage on a power
16 supply terminal 1004, is that what you're referring
17 to?

18 Q. Yes. You made that statement, and then
19 you cited to Tsunoda in specifically paragraph 67
20 and 68 and Figures 24 and 25.

21 My question is: Are those citations to a
22 portion of Tsunoda that discloses an
23 SDRAM-compatible interface?

24 A. Given that these cited paragraph that I
25 cited, 67 and 68, is referring to Figure 24, and

1 given Figure 24 is the main teaching of Tsunoda, and
2 there is SDRAM-compatible interface being taught,
3 4001, that communicate between the host and the
4 memory apparatus, I believe the context is the
5 SDRAM-compatible interface.

6 Q. Are your conclusions in paragraph 15
7 based on anything other than your knowledge and
8 experience?

9 MR. RIFFE: Objection, form.

10 A. It is based on my knowledge and
11 experience as a person of ordinary skill in the art,
12 also based on the explicit teaching of -- in
13 Figure 24.

14 And I think that was also agreed by
15 Patent Owner in terms of Dr. Brogioli -- I'm sorry
16 if I pronounce the name wrong -- where he says this
17 kind of interface, this kind of communication
18 between nonvolatile memory and volatile memory is --
19 he used the word "only." It's only doable with
20 SDRAM-compatible interface.

21 So I think speaking as a person of
22 ordinary skill in the art, I think that other people
23 will agree with me -- of course it's based on my
24 experience and knowledge, but it's also based on the
25 explicit teaching in Figure 24 of Tsunoda that

1 clearly --

2 And also, again, I have shown in Figure 1
3 and Figure 14 side by side to compare that all the
4 provision, whether it's through a direct so-called
5 SDRAM interface or it's through SDRAM-compatible
6 interface, the function -- the components to perform
7 the function are fully there and fully capable of
8 doing such protocol of communicating power-on, of
9 writing from nonvolatile memory to the volatile
10 memory, and at power-off, writing from volatile
11 memory back to the nonvolatile memory.

12 BY MR. AUCHTER:

13 Q. And to be clear, it is not your opinion
14 necessarily that Tomio has a housing or is portable,
15 but it is your opinion that, as you understood
16 Patent Owner's position, it would meet those
17 limitations; is that correct?

18 A. Repeat your question again. I'm sorry.
19 Yeah.

20 Q. I'm trying to shortcut an area that we
21 discussed at length earlier today.

22 Is it -- is it correct to say that it is
23 not your opinion that Tomio necessarily has a
24 housing, but rather that it is your opinion that
25 Tomio has a housing under your understanding of what

1 Patent Owner's positions are with respect to
2 infringement?

3 MR. RIFFE: Objection, form.

4 A. First of all, I don't know if Patent
5 Owner has any issue with my description of Tomio
6 being -- having a housing.

7 Again, as I testified earlier, I'm not
8 here to provide claim construction. I just provide
9 what will be understood as plain and ordinary
10 meaning for a person of ordinary skill in the art.
11 And I think in terms of my analysis, I opine clearly
12 what is -- what satisfied limitation of claim 1 of
13 portable memory apparatus and housing for MMC
14 implementation and for USB form factor and whether
15 the other form factor will fit under those.

16 I am in my analysis simply providing an
17 opinion under the context that Patent Owner advanced
18 certain form factor as having "portable" and
19 "housing," and I don't see any -- I don't -- I don't
20 try to construe the claims of these terms, and I
21 don't think I would be doing justice to the
22 litigation if I tried to interject my opinion.

23 But as I testified, I fully know what
24 would constitute portable memory apparatus and with
25 a housing, and I provide that opinion clearly for

1 MMC form factor and for USB form factor under my
2 analysis of the prior art against the '527.

3 BY MR. AUCHTER:

4 Q. Is there a difference between the
5 understanding of a person of ordinary skill in the
6 art and the construction of a claim term?

7 MR. RIFFE: Objection, form.

8 A. Ideally, I believe the -- would hope -- I
9 mean, ideally certain term will have plain and
10 ordinary meaning, but I've also been an expert in
11 which case that sometimes there are many -- many
12 scenario where the Patent Owner could serve their
13 own definition or other scenario where that may or
14 may not be true.

15 So each case has its own context. I'm
16 not going to be sitting here -- since I do not
17 provide any claim construction, I'm not going to try
18 to define terms and construe terms. That was not
19 within the scope of my work. And I'll be happy to
20 address any question you have with regard to any
21 supplemental declaration, but again, construing the
22 term was definitely not a task I was entrusted with.

23 BY MR. AUCHTER:

24 Q. What is a connector design for repeatedly
25 plugging and unplugging Tomio's memory module from

1 the computer system?

2 MR. RIFFE: Objection, foundation.

3 A. Can you point out the context that --

4 BY MR. AUCHTER:

5 Q. Paragraph 18, last sentence.

6 A. Paragraph 15, last sentence --

7 Q. 18, one-eight.

8 A. Paragraph 18, last sentence. Thank you.

9 I got up too early, so it's hard to remember all the
10 pages, all the paragraphs.

11 Q. What is a connector designed for
12 repeatedly plugging and unplugging Tomio's memory
13 module from the computer system?

14 A. I believe in paragraph 18 I am trying to
15 mention that in the context of Tomio describing that
16 a POSITA would have recognized that -- in the
17 context Tomio addressed, that this could be served
18 as a possible alternative to be used instead of
19 conventional floppy disk or a CD-ROM, okay?

20 So in that case, a floppy disk or
21 CD-ROM -- I say right here: A POSITA recognized
22 that conventional floppy disks and CD-ROM are
23 portable data storage devices as they are designed
24 to be repeatedly removed from the computer system.
25 So that's easy to understand, okay?

1 So -- but Tomio disclosure that this
2 memory module can be used instead of floppy disk or
3 CD-ROM indicate this memory module can be designed
4 to replace a floppy disk or CD-ROM, which would
5 include implementing the memory module to include a
6 feature of the devices designed to be repeatedly
7 inserted and removed from a computer system. So I
8 think that's pretty clear.

9 And then a POSITA would have understood
10 that the device that read these devices would also
11 need to be replaced with a connector designed for
12 repeatedly plugging and unplugging Tomio's memory
13 module from a computer system.

14 Q. And how would that connector be different
15 from a standard DIMM connector?

16 A. I think the way I'm trying to explain or
17 trying to opine is that when you insert a CD-ROM or
18 floppy disk, you just push a button and the things
19 come out and you insert it. There are also portable
20 CD-ROM drive that you can use with other USB form
21 factor or other form factor that you can use to
22 insert.

23 All I'm saying here is in the case of
24 the -- Tomio's memory module, you could do it every
25 time you wanted to insert, unplug and plug -- you

1 can open up your laptop and open up the chassis and
2 pry away all the connecting wires, all the cables,
3 and find out where the DIMM insertion is. You can
4 take it out, unplug it, and then you close your --
5 you close -- put everything back and hopefully it
6 fits back in the chassis and you close it and you
7 screw all the -- put in all the screw. And that's
8 one way to do it.

9 Or perhaps with Tomio, if he wants to do
10 that with the understanding of the position advanced
11 by the Patent Owner, then you could perhaps put in
12 some kind of a connector where the insertion --
13 plugging and unplugging may not be as tedious to
14 save you some time. I think that's the context of
15 my analysis.

16 Q. Okay. Is there any disclosure in Tomio
17 of such a connector?

18 MR. RIFFE: Objection, legal
19 conclusion.

20 A. Sitting right here, I would not be able
21 to -- I would have to go through Tomio, scrub it
22 very carefully.

23 But again, my citation is that Tomio does
24 suggest maybe use -- instead of a conventional
25 floppy disk or CD-ROM -- and I'm just advancing one

1 possibility based on a person of ordinary skill in
2 the art -- how that one could perhaps do that and
3 perhaps without -- with or without opening up the
4 chassis each time, as I just went through in terms
5 of plugging and unplugging.

6 But Tomio does mention that, given that
7 this module -- one of the functions of this module
8 could be serving as a replacement, may be used --
9 therefore, may be used instead -- so maybe could
10 serve as an alternative, perhaps a better word -- as
11 an alternative to a conventional floppy disk or
12 CD-ROM. And, of course, a different scenario, how
13 that would be made feasible.

14 BY MR. AUCHTER:

15 Q. Okay. Are you aware of any prior art
16 references that disclose a connector designed for
17 repeatedly plugging and unplugging a Dual Inline
18 Memory Module such as disclosed in Tomio?

19 A. Repeat your question again.

20 Q. Are you aware of any prior art references
21 that disclose a connector designed for repeatedly
22 plugging and unplugging a Dual Inline Memory Module
23 such as disclosed in Tomio?

24 A. Sitting right here, I did not go through
25 the effort. That was not the -- part of the -- I

1 did not think that was part of the task. I did not
2 go through effort to do search publication to see
3 how people may have tried to use a DIMM inline
4 module in a different way.

5 So no, my answer is I did not do a
6 search.

7 Q. Is a Dual Inline Memory Module interface
8 a parallel interface?

9 A. I guess one of the -- the way I would
10 answer is that certainly parallel interface is one
11 of the implementation of using two inline module in
12 its communication with the host. But I think the
13 host communicates with memory apparatus serially or
14 parallelly -- or in parallel, and both cases could
15 be done. And you could go from -- you could even
16 adapt, going from parallel to serial or serial to
17 parallel.

18 So I don't think the form factor or the
19 fact that the parallel or serial would prohibit
20 certain -- prohibit communication between the host
21 and a given memory apparatus.

22 Q. Does Tomio disclose a serial memory
23 interface?

24 MR. RIFFE: Objection, legal
25 conclusion.

1 A. Again, when you say interface, there may
2 be many, many level. For example, in the Tsunoda
3 implementation, you have SDRAM interface internal to
4 memory apparatus, and it comes out through an
5 SDRAM-compatible interface in terms of -- it forms
6 MMC. In between these two, certain one, you could
7 use serial communications or serial data transfer;
8 certain case, you could use parallel data transfer.

9 I'm saying -- all I'm saying is that
10 serial and parallel are not -- are not prohibited in
11 terms of the communication protocol between the host
12 and a control -- and a portable memory apparatus.

13 Q. Is there any disclosure of a serial
14 interface to Tomio's Dual Inline Memory Module in
15 Tomio?

16 MR. RIFFE: Objection, asked and
17 answered.

18 A. Again, interface -- interface is
19 pretty -- let's put it this way.

20 A serial interface could be used to
21 communicate with the host and also could be used to
22 take in data parallelly and yet communicate with the
23 host serially. There's nothing to prohibit a
24 conversion and using a conversion between -- going
25 from serial to parallel or going from parallel to

1 serial.

2 So when you said that -- is there an
3 interface, interface may come in stages. So there
4 are application, I'm certain in the host, where data
5 would come in a serial form. For example, in fact,
6 I would argue that the data of a portable CD, the
7 way the CD is read through the track, is a serial
8 data output.

9 So all I'm saying is that -- again, back
10 to my testimony. Whether it is serial, whether it
11 is parallel, it will not be a limiting factor or
12 prohibiting factor in terms of communication between
13 a host and a memory apparatus.

14 BY MR. AUCHTER:

15 Q. Does Tomio disclose an interface between
16 the motherboard and the Dual Inline Memory Module?

17 A. I would have to go through Tomio, given
18 that it's translated.

19 So do you want me to take the time to go
20 through Tomio?

21 Q. Sure. Go for it.

22 A. Your question again, please?

23 Q. Does Tomio disclose an interface between
24 the motherboard and the Dual Inline Memory Module?

25 (Document review.)

1 A. So if I look at Tomio with this -- if I
2 understood your question correctly, does Tomio teach
3 us an interface between the memory apparatus and the
4 host?

5 BY MR. AUCHTER:

6 Q. Actually, I said motherboard and Dual
7 Inline Memory Module, but...

8 A. The fact that the memory is communicating
9 with a memory controller and it goes through the --
10 go outside to the CPU, there has to be interface --
11 anytime you have memory and you have -- you have a
12 CPU that communicate, there is interface involved.
13 So I think the question is quite general.

14 I think the answer is that: Yes, of
15 course, in the diagram in the figure, anytime you
16 need to go from memory interacting with -- with the
17 host, there's going to be interface involved.

18 Q. How many separate data lines are
19 disclosed in Tomio's interface to the Dual Inline
20 Memory Module?

21 A. Which one are you referring to?

22 Q. Any of them.

23 A. Well, I mean, there are data lines in the
24 context that they mention like data, D0 through D15,
25 so that would be 16. And I don't know if sitting

1 here you want me to go through and count. Suffice
2 to say it's more than one.

3 Q. Would you say there's 16?

4 A. I'm saying that there's one where it says
5 that the data is D0 to D15, so that would be 16 data
6 lines. And I don't know -- when you asked for these
7 lines, do you count address line, command lines? I
8 do not know how to -- how to answer.

9 Q. Was there something confusing about my
10 use of the term "data lines"?

11 A. It has to have context in case the data
12 lines also include other things. Some people may
13 think other signal considered data. But if you want
14 to just talk about historic data, say DQ0 to D15,
15 that would imply 16 data lines.

16 Q. Would you consider that to be a parallel
17 interface?

18 A. Again, as I testified repeatedly, I would
19 consider that the DRAM or SDRAM chip has parallel
20 data input and parallel data output. Now, that's
21 different from a serial or parallel interface.

22 I could take these data, and I could go
23 through an interface and output them serially.
24 There's nothing prevent me from doing that. And
25 my -- in that case, my interface will be -- will be

1 a serial interface to the host.

2 Or I can take the serial data and going
3 through means of outputting them in parallel after I
4 collect enough data and output them in parallel, and
5 that would be a parallel interface.

6 So when you say interface, I think we
7 need to be very careful. Interface allows parallel
8 and serial. Although perhaps in Tomio, when he
9 described this SDRAM chip, there may be multiple
10 input pin and multiple output pin to that DRAM, but
11 the -- it doesn't say anything about how the host
12 may or may not communicate with the memory, with the
13 DRAM, in which fashion. It may not -- it may not be
14 limited to parallel, and it would be in serial if
15 there is a provision to convert from parallel to
16 serial.

17 So interface is different from
18 input/output pins. I just want to caution that.

19 Q. Is an MMC interface a parallel data
20 interface?

21 A. Repeat your question. MMC interface is
22 what?

23 Q. A parallel data interface.

24 A. I think I opine on that very clearly. I
25 think MMC interface is considered to be a serial

1 interface.

2 Q. Okay. Is a USB interface a parallel
3 interface?

4 A. USB interface is -- is a parallel -- I
5 should say this.

6 USB interface communicate serially, but
7 just because USB communicate serially does not mean
8 that USB or MMC cannot communicate with SDRAM, which
9 I think under your assumption with the multiple data
10 pin, input/output pin, will be parallel.

11 There's nothing preclude a form factor
12 that communicate outputs as data -- taking this data
13 serially, there's nothing that will prevent that to
14 communicate with a parallel data output.

15 There are provision to be made, and you
16 can certainly communicate using USB, using MMC
17 interface to communicate with a memory. The output
18 is data in a parallel fashion. There's nothing that
19 prohibits that, and nothing prevents that.

20 Q. How many data pins are there in a USB 2.0
21 interface?

22 A. I believe USB 2.0 has four pins. You
23 have power, you have command Vcc and command -- and
24 you have data-plus, data-minus.

25 And again, in order to communicate with

1 SDRAM in this case as Tomio or in the case of
2 Tsunoda, all you need to do is synchronize the
3 clock. So both USB and MMC form factor have the
4 capability, and -- although it's done differently,
5 but they both have capability to synchronize and
6 communicate synchronously. And again, as I
7 testified repeatedly, nothing preclude MMC and USB
8 form factor to communicate with SDRAM.

9 THE WITNESS: Would it be okay -- I
10 think we we've been on the clock for almost an
11 hour here.

12 MR. AUCHTER: As I said before,
13 Dr. Liu, whenever you want to take a break,
14 just tell me.

15 THE WITNESS: I really appreciate the
16 accommodation.

17 MR. AUCHTER: It's not whether or not
18 it's okay. If you want to take a break, we'll
19 take a break.

20 THE WITNESS: Okay. Thank you.

21 (Recess taken, 11:01 a.m. to
22 11:06 a.m. PDT)

23 BY MR. AUCHTER:

24 Q. Dr. Liu, have you ever unplugged a USB
25 device without stopping it first?

1 A. I always try not to, and I preach the
2 gospel of not unplugging USB drive without going
3 through the protocol. I preach that to everybody.
4 I work in flash memory, and I work in integrated
5 circuit, and I always preach that.

6 Q. But have you ever unplugged one without
7 stopping it at some time or another?

8 A. Yes. I believe I have, yes.

9 Q. And was the device damaged after you did
10 that?

11 A. Usually when I do that, I get a message
12 saying that USB was unplugged, your data may be
13 compromised. And sometimes I would go into my USB
14 drive and -- when you say damage, it comes in many
15 form.

16 I have cases where the data is not --
17 doesn't seem to be able to recover, for example,
18 say, a PDF file or something like that. Or again,
19 as someone who have done this quite a bit, I should
20 say that damage comes in many form. It could be
21 eventually that USB will wear out much faster. It
22 could be data retention. It could be longer to
23 program. It comes in many forms.

24 Sometimes these are in the form of damage
25 you don't know until they show up. It comes in many

1 form, and it's definitely not recommended. I
2 definitely preach that gospel, not to pull your USB
3 drive.

4 Q. You cite an Exhibit 1032 in your
5 declaration on paragraph 19.

6 Do you see that?

7 A. Give me a minute to get that.

8 Yes, I see -- I see MTI-1032.

9 Q. Do you have a copy of 1032 with you?

10 A. No, I don't, unfortunately.

11 Q. I thought that might be the case. I'm
12 going to put it in the chat. Let's see if this
13 works.

14 A. Okay.

15 Q. Do you have that now and are you able to
16 open it?

17 A. I think it's asking me to download it
18 first and then open it. Hang on a second.

19 Okay. I have it.

20 Q. What is the date of that document?

21 A. Can you point me to it? I can't seem to
22 find the date.

23 Q. I couldn't either.

24 A. But regardless, sitting here as a person
25 of ordinary skill in the art and also as a person

1 who worked on flash memory for nearly his industrial
2 career of over 20 years, I can assure you in the
3 early days of USB drive, I actually was the first
4 one to -- one of the first few to use a USB drive,
5 and that USB drive was 1 gigabyte, and it cost a
6 fortune.

7 And as early as a USB drive come into
8 existence, I think the provision -- and especially
9 in Windows -- not to remove the USB mass storage --
10 USB 2.0 drive without closing the file, without
11 properly informing the CPU, that's definitely
12 problematic.

13 Q. Did you download Exhibit 1032?

14 A. I may have. Sitting right here, I'm
15 not -- I was simply trying to find the supporting
16 evidence for -- I was the one who tried to use just
17 at least -- just in case people don't take my word
18 and try to find some document to support the safe
19 dismounting of USB drive. So I was -- definitely
20 it's something I looked for and something I got.

21 But I think the date -- the date should
22 be okay, although I'm sorry that it didn't have a
23 date on it right now.

24 Q. Then you also cite a document
25 Exhibit 1033. Do you have that one with you?

1 A. No, I do not.

2 Just because these document -- I should
3 mention -- do not have the date, I cannot find a
4 date, I think I -- as someone who had done this for
5 a few times, I definitely am cognizant of the
6 timeline we're dealing with, and I would hope that I
7 practiced proper literature search in trying to find
8 the timeline that precedes the defined date of '527.
9 I should mention that.

10 I apologize I don't have the date right
11 now, but I strive to at least know what the prior
12 art is and the prior art date should be, so...

13 Q. Is that also true with respect to
14 Exhibit 1033 and Exhibit 1042?

15 A. Look, another way of saying this, if
16 you -- I do not know the date. I believe they
17 are -- but another way of saying this, USB,
18 regardless whether this publication of warning on
19 USB, I think given technology advances and always
20 trying to make things easier, the fact that you have
21 a problem even now, meaning that you certainly have
22 a problem even back in the day preceding the
23 invention of '527 -- because you always want to
24 improve. The fact that you still have problem is
25 certainly a clear indication that it was problematic

1 back then. Although I hope that these days -- these
2 dates will precede the prior art date.

3 But even in the unlikely case that they
4 do not, I just want to emphasize that you're always
5 trying to make things safer. The fact that it's
6 still not safe to unplug should mean that it's not
7 safe to unplug. It's like one of those seatbelt
8 things, you...

9 Q. I always wear a seatbelt.

10 A. Yeah, it doesn't mean -- when you get a
11 document that says, you know, wear your seatbelt to
12 avoid severe injury, it doesn't mean that just
13 because it's -- the document might be dated -- the
14 one might be dated 2024 doesn't mean that, you know,
15 you shouldn't be wearing a seatbelt back in the
16 earlier days. The damage would be the same.

17 I think, analogously, USB is the same
18 thing. Just even in the unlikely event -- I'm not
19 sure you're trying to -- if you know the date or
20 not. In the unlikely event somehow due to minor
21 negligence that if this date did not precede
22 the '527, I do not think they invalidate any of my
23 opinions or diminish any of my opinion, because if
24 it's unsafe to remove the USB drive, unplug the USB
25 drive without warning, it would also be not

1 recommended to remove back then, so...

2 Q. Do you have Exhibit 1042 in front of you,
3 perchance?

4 A. I'm sorry, I do not. As I mentioned in
5 my earlier testimony, the only exhibit I have are
6 the four prior arts as well as my initial
7 declaration and supplemental declaration. I did not
8 try to print out all these other exhibits. I'm
9 sorry.

10 Q. I sent it to you. You should have it by
11 now, hopefully.

12 A. I see it now. Thank you.

13 Q. Were you able to download that document?

14 A. Yes.

15 Q. Do you agree with the statement that 90%
16 of the time or more you will get away with removing
17 your device without any consequences?

18 A. As I testified earlier, the consequence,
19 whether it's immediate or it's not right away, the
20 subtle damage or the inherent damage that may not be
21 visible that could impact the lifetime or impact the
22 integrity of the flash memory would still occur. It
23 may not lead to some of the example I gave, when I
24 opened my file, my file is corrupted. It says your
25 file is now corrupted.

1 Nonetheless, it's not advisable. It's
2 just like, you know, if I don't wear my seatbelt, I
3 have a 90% chance of not getting into an accident,
4 but that's not going to prevent me from wearing the
5 seatbelt and my kids wearing a seatbelt. I insist
6 on them wearing a seatbelt.

7 Conversely, damage comes in many form.
8 And I've seen this, and I've spent a lot of time in
9 my career looking into damage. Damage could come,
10 as I testified earlier, to the gate oxide, to the
11 dielectric, to the metal, to many things. It's not
12 limited to -- it's not limited to visible damage or
13 corruption of the file right away. Maybe your
14 picture -- maybe somehow some contrast is lost.
15 Somehow it doesn't manifest one of my pimples or
16 something.

17 But nonetheless, there are damage --
18 there are damage that could be incurred to your USB
19 devices if you unplug unsafely, and that's well
20 known.

21 And as a person of ordinary skill in the
22 art, as someone who practiced flash memory, again --
23 you know, my counsel will tell you the first thing
24 when I work with them, and I actually told them
25 that, don't unplug your USB without -- without

1 proper protocol. I preach that, and I'm a firm
2 believer of that, so...

3 Q. Directing your attention to paragraph 21,
4 specifically the portion on page 17 of your
5 supplemental declaration.

6 A. Okay.

7 Q. You state that: Based on my knowledge
8 and experience in this field, a POSITA -- et cetera.

9 You'll see that it's in the middle of the
10 page, almost directly --

11 A. Uh-huh.

12 Q. Were you relying on anything besides your
13 knowledge and experience in the field for that
14 statement?

15 A. Again, it's taking into totality of
16 analysis. And, for example, Tsunoda said that I
17 need to make sure the transfer is done completely,
18 so I have an indicator or I have some kind of a
19 protocol to tell -- to tell when the transfer is
20 done.

21 I believe that indicates that at the time
22 of invention and consistent with my knowledge as a
23 person of ordinary skill in the art, that data
24 integrity of writing back from volatile memory to
25 nonvolatile memory in case of power loss is

1 critical.

2 Now, power loss comes in many form. It's
3 intended shutting-down or unintentional
4 shutting-down, as I testified earlier. You could
5 just simply -- someone just without knowing just
6 unplug it or turn off the power or there's a power
7 outage.

8 So if you look at Tsunoda's teaching,
9 saying that, look, I do want to make sure that the
10 data is transferred properly, of course you can have
11 an indicator. You can have communication. But that
12 does not guarantee any of the unintentional
13 interruption of power.

14 So to go a step further, it will be
15 natural evolution or natural -- natural next step
16 for person of ordinary skill in the art is that,
17 look, if some data are really critical and if I want
18 to ensure that -- especially, for example -- I'll
19 give you an illustration.

20 Part of my career I work in the FPGA
21 field, so you use FPGA to emulate, for example, a
22 microprocessor or to emulate some function or -- a
23 control function, and you have this configuration
24 memory come in the form of nonvolatile memory.

25 And basically you essentially

1 configure -- write the configuration how the tracing
2 route designer designed the FPGA to perform certain
3 function. You write it into them. You can consider
4 those to be volatile memory.

5 And when the -- when the configurations
6 change, you definitely want to be able to restore
7 this configuration information back into nonvolatile
8 memory to ensure that next time when you boot up
9 your system -- it could be, like, a rocket, it could
10 be a spaceship. These need to work right away, so
11 you've got to reconfigure.

12 So in those cases, just having a signal
13 saying, look, don't shut off the power or I lose the
14 data is not good enough. You have to have also
15 taken measure to ensure that if power is indeed shut
16 off, do I have a solution to actually still ensure
17 proper integrity, saving the proper data with
18 integrity.

19 So Tomio teaches the use of battery, so a
20 person looking at Tsunoda and trying to practice
21 art, trying to make sure that his volatile memory
22 data is actually preserved with integrity into
23 nonvolatile memory data -- nonvolatile memory, would
24 definitely consider adopting the inclusion of a
25 backup rechargeable battery. That could come in

1 many forms and many shapes, and taking up different
2 real estate, different costs. It's a trade-off.

3 But a POSITA, a person of ordinary skill
4 in the art, would definitely take the next step to
5 ensure that -- that the data will be preserved with
6 integrity.

7 Q. Are you aware of any documents besides
8 the '527 patent that disclose an internal power
9 supply and a portable memory device?

10 MR. RIFFE: Objection, form.

11 A. I believe if you Google, there will be
12 USB with battery backup. So I did not provide and
13 it's not part of my -- I don't think I need to
14 provide that.

15 But suffice to say that if you want to
16 preserve the data based on the knowledge and
17 experience of a POSITA, the only way to guarantee
18 that data is written properly in case of stoppage of
19 power -- again, that comes in many form, intentional
20 or unintentional -- the way to do it would be follow
21 the teaching or incorporate the teaching of Tomio
22 having a backup battery. In fact, you know, not
23 only the backup battery -- it should not only serve
24 as power, but it also serves as a regulation of the
25 power supply.

1 In the flash memory you already have
2 that. In flash memory, you have charge PROM, and
3 charge PROM actually is portable in a way. It is a
4 portable battery because it takes the internal
5 voltage and it convert into certain voltage where
6 there's a higher voltage or lower voltage for
7 different function, but, in fact, it is a
8 rechargeable battery through the charge PROM.

9 And depending on the size and the shape,
10 that rechargeable battery should be able to
11 withstand the consumption of writing safely the data
12 from volatile memory back to nonvolatile memory.

13 BY MR. AUCHTER:

14 Q. Back to my question: Are you aware of
15 any documents predating the '527 patent that
16 disclose a portable memory device with an internal
17 power source?

18 MR. RIFFE: Objection, asked and
19 answered.

20 A. I will say that I have provided one at
21 least in the form of Tomio.

22 BY MR. AUCHTER:

23 Q. What components would be needed to add an
24 internal power source to Tsunoda's MMC?

25 A. Repeat your question again.

1 Q. What components would be needed to add an
2 internal power source to Tsunoda's MMC?

3 A. Are you asking a hypothetical question?
4 A person practicing the art would look into -- for
5 example, the illustration I'd give would be look
6 into Tomio and implement a battery in the form of
7 Tomio, whether it's the same size or smaller size,
8 much smaller size, depending on the needs, and be
9 able to implement that with all the proper signal
10 interface to facilitate that to happen.

11 And as I mentioned, internal power
12 source, meaning a rechargeable power supply, could
13 come in many form. And rechargeable battery could
14 be -- could be a very small form factor, and the
15 package would be -- within the form factor or it
16 could be integrated on chip in the form of a charge
17 reservoir that -- because in -- in reality, a
18 battery is really a supply of charge at a given
19 predefined voltage, so you just have to have a
20 charge reservoir with a voltage regulator and a
21 reference voltage that supply these charges.

22 So that's the definition of a battery,
23 so -- I wouldn't say definition. That is a
24 description of a battery, so you have a regulated
25 voltage and through that voltage you output charges

1 to supply -- to meet the need of consumption by
2 the one that's consuming this power.

3 So it could -- so the battery or the
4 backup battery or the internal battery, as you said
5 it, as a backup, could be a simple battery or it
6 could be any form of charge reservoir with regulated
7 voltage.

8 Q. In paragraph 22 of your declaration, you
9 say that: One would be varying the power supplied
10 through the electrical interface to accommodate the
11 rechargeable battery. That's about in the fifth
12 line of the paragraph on page 19.

13 Do you see that?

14 A. Okay. Fifth line? One, two, three,
15 four, five.

16 (Sotto voce document review.)

17 A. Okay.

18 BY MR. AUCHTER:

19 Q. Okay. Would varying the power supply
20 through the electrical interface to accommodate the
21 rechargeable battery be part of a standard host
22 interface?

23 MR. RIFFE: Objection, form,
24 foundation.

25 A. I don't understand your question, really,

1 so can you repeat your question?

2 BY MR. AUCHTER:

3 Q. Would a standard host interface be able
4 to vary the power supplied through the electrical
5 interface to accommodate the rechargeable battery as
6 you've described it in paragraph 22 of your
7 declaration?

8 A. It's just like Tomio. Tomio, in terms of
9 taking the external power -- and I think this is
10 simply saying that -- I think it's just like simply
11 saying that I'm taking the internal -- the external
12 power that might come in the form of AC, you know,
13 alternating current, AC waveform, and that need to
14 have a simple -- come in the form of inverter to
15 converter AC to DC. It's very, very commonly done.

16 And I think there's -- it's just like,
17 you know, when -- like when someone like you, if I
18 were to implement a capacitor, I need to have a
19 capacitor. I need to have a voltage regulator to
20 make sure that I'm coming in. But the waveform, the
21 clock waveform that supply the charge PROM or supply
22 the capacitor, it's sinusoidal. It's AC, but I'm
23 converting to DC. It's a very straightforward
24 conversion.

25 So this whole point of saying that --

1 we've got to take into account not every power
2 supply is a DC 3.3 volt or DC 5 volt. I'm simply
3 saying that, depending on the power supply and
4 depending on the host and depending on the
5 application, you would definitely need to -- you
6 would make some slight modification to ensure that
7 the voltage required to write from the RAM -- the
8 SDRAM to flash memory -- you know, writing to flash
9 memory requires certain voltage, requires certain --
10 depending on -- especially NAND, because of the
11 charge PROM, this is simply saying you've got to
12 provide those things.

13 And it's no different than what Tomio is
14 teaching. And again, varying the size and shape of
15 the housing, I think that's very clear. USB drive
16 come in many different form, and you can simply
17 modify it. And then -- so this -- to me this is
18 not -- it's not a -- I guess it's very -- should be
19 very clear.

20 Q. Do you know what size capacitor would be
21 needed for Tsunoda's MMC?

22 MR. RIFFE: Objection, form.

23 A. I think the capacitor would be similar to
24 the size that already in existence in terms of
25 programming, and a controller in terms of providing

1 voltage to program -- to write the data from the --
2 from the SDRAM to nonvolatile memory even when you
3 have the extent of supply.

4 Because as I mentioned, the capacitor,
5 the charge PROM, serves already within there --
6 already serves the function of regulating the
7 voltage and supplying the charge. All I perhaps
8 need to do is increase the size.

9 I can -- I can do a calculation knowing
10 how many -- what the size of the DRAM and how much I
11 need to write to it, and what -- in terms of
12 writing, nowadays with NAND using -- it's very
13 efficient. I just need to know the charge, the
14 voltage, and then a calculation could be made right
15 away in terms of how -- what kind of size the
16 capacitor.

17 Because it's no secret. The formula is
18 very easy: Capacitance times voltage is equal to
19 charge. And that charge is the charge that needs to
20 supply at that voltage in order to maintain the
21 voltage level to facilitate the writing.

22 So I don't think it's a difficult
23 exercise, but it requires more information for me to
24 give you a definitive answer.

25 ///

1 BY MR. AUCHTER:

2 Q. Would a person of ordinary skill in the
3 art look to the Department of Justice for
4 information relating to portable memory devices?

5 MR. RIFFE: Objection, form,
6 incomplete hypothetical.

7 A. I don't understand the question, please.
8 I'm sorry.

9 BY MR. AUCHTER:

10 Q. Okay. Would a person of ordinary skill
11 in the art look to publications from the Department
12 of Justice for information relating to portable
13 memory devices?

14 MR. RIFFE: Objection, speculation,
15 incomplete hypothetical.

16 A. I think the way you would look, as
17 someone -- for example, if I were to either try to
18 practice something or try to improve something, I
19 would do a search and -- however, the search result
20 that provide information, I have no control.

21 I'm not deliberately looking into --
22 that's not how the relevant art is done. I'm not
23 looking into -- I don't look at -- for example, in
24 the area of portable memory apparatus or storage
25 system, I'm not going to type in "DOJ" and try to

1 filter that out. I'm going to type in -- I'm going
2 to try to search or look into art, prior art, that
3 has -- that's germane or relevant to the subject
4 matter of portable memory apparatus.

5 I don't search by the origin come from.
6 I think -- I hope that I will look into the patent
7 or subject-related field for inspiration and for
8 guidance rather than looking for an entity.

9 So I don't understand -- I'm having a
10 hard time understanding the questions. If I'm not
11 answering correctly, I apologize.

12 BY MR. AUCHTER:

13 Q. Do you have Exhibit 1034 with you today?

14 A. No, I don't.

15 Q. Okay. Were you able to download that?

16 A. 1034? I'm doing it now, yeah.

17 Q. Okay.

18 A. Okay. I just opened it.

19 Q. Okay. I believe you cited this document
20 for very small batteries can be custom built for
21 devices, also in paragraph 22 of your supplemental
22 declaration.

23 A. Uh-huh. Yes.

24 Q. Is a metal air cell a rechargeable
25 battery?

1 MR. RIFFE: Objection, form, scope.

2 A. I give this as example that you could
3 custom build a very small battery, and this is not
4 the only example I give. I give more than just this
5 example how a POSITA at the time of invention, if
6 the need to preserve the integrity of the data to
7 write from the volatile memory to the volatile
8 memory [sic].

9 Looking at Tomio, as an inspiration, as
10 a guide, I think adding the -- my position, adding
11 rechargeable battery or even a built-in battery into
12 the system, it will be obvious to a POSITA and
13 especially someone who is -- who recognize
14 themselves as a person of ordinary skill in the art
15 working in the memory arena for many years.

16 And I also mentioned -- I think this was
17 corroborated by -- of course by Patent Owner as
18 well, that the rechargeable battery could come in
19 different form and different shape, and it could
20 also be incremented simply as a charge reservoir in
21 the simple form of a capacitor.

22 So I'm citing this as a support but not
23 the only, exclusive implementation. I'm citing this
24 as support that a built-in battery, a very small
25 custom built-in battery, is not out of the

1 consideration for a person of ordinary skill in the
2 art looking to address the issue of -- at the time
3 of the invention to address the issue of reliably
4 preserving the data that has been updated in the
5 volatile memory into the volatile memory --
6 nonvolatile memory.

7 BY MR. AUCHTER:

8 Q. But is a metal air cell a rechargeable
9 battery?

10 MR. RIFFE: Objection, asked and
11 answered.

12 A. Again, I think I started this reference
13 as a very small battery could be custom built as an
14 example that you can build a small custom-built
15 battery. But I've seen rechargeable battery comes
16 in very small form factor, and I give the
17 illustration -- I give the illustration already of a
18 capacitor. But sitting right here, I don't
19 recall -- I cannot tell you whether that is
20 rechargeable or nonrechargeable.

21 But I cited this reference. I did not --
22 I don't think in my declaration I claimed this to be
23 a rechargeable battery. I claimed to be a very
24 small battery that would be custom built for
25 devices, and this would apply also for different

1 form of batteries, whether they are rechargeable or
2 not rechargeable and -- preferably rechargeable, and
3 they could come in different form and could come in
4 with different chemistries or different
5 implementations, so...

6 Q. So am I correct that a metal air cell
7 battery is not a rechargeable battery?

8 A. I don't think that's the right way to
9 characterize my answer. I'm simply saying that
10 sitting right here, right now, I don't -- sitting
11 right here, right now, my testimony is that I did
12 not cite this as a specific example of a
13 rechargeable battery. It may be a rechargeable
14 battery, but I did not cite it as a rechargeable
15 battery. I cite it as a very small form factor of a
16 battery that could be custom built into devices.

17 And again, this is the citation I used as
18 an illustration, and I also in my declaration
19 mention many other ways, and I testified that
20 battery is just a charge reservoir and output at a
21 regulated voltage.

22 So that's my testimony, and I cannot -- I
23 do not recall specifically, but I never mentioned
24 this to be an example of rechargeable battery. I
25 think this is example of small form factor

1 custom-built battery, yeah, for devices.

2 Q. Do you know if silver oxide batteries are
3 rechargeable?

4 A. Is there -- you just want me to opine the
5 chemistry of rechargeable battery?

6 Q. You cited the document, sir.

7 Do you know if silver oxide batteries are
8 rechargeable?

9 A. Again, I cite a document to support that
10 the battery could be custom built in a small form
11 factor in the devices. And there are many
12 implementation of battery, and there are also many
13 implementation of rechargeable batteries.

14 I'm citing this as an example of how a
15 small battery at the time of invention is not --
16 it's a known concept to a person of ordinary skill
17 in the art.

18 Q. Is there anything to indicate that the
19 document at MTI-1034 is disclosing rechargeable
20 batteries in the context of button and miniature
21 batteries?

22 A. Again, I cited this as a very small
23 battery could be custom built for devices. So it
24 could be -- based on the language, it could be a
25 small button. It could be custom built, small

1 sizes. It could be rechargeable. It could also be
2 nonrechargeable.

3 But nonetheless, this shows that you can
4 build a battery put in a small form factor, custom
5 built into the shape to fit in the form factor that
6 you want, into the shape. And whether it's --
7 depending on the chemistry or depending on the
8 implementation, you could certainly make it into a
9 rechargeable battery.

10 Q. Would a person of ordinary skill in the
11 art use a nonrechargeable battery in a portable
12 memory device?

13 MR. RIFFE: Objection, calls for
14 speculation, incomplete hypothetical.

15 A. There are many electronic devices that
16 use batteries, whether it's rechargeable or
17 replaceable. So sitting right here, certainly it's
18 possible, but I would have to analyze -- this is
19 just too broad of a question, and I mentioned to you
20 already there are USB devices with built-in
21 batteries. And they could be rechargeable, come in
22 the form of rechargeable, or come in the form of
23 nonrechargeable, but no one can exclude any
24 implementation. And, of course, you try to optimize
25 based on your constraint for the best choices, but

1 there are -- there are choices.

2 And again, I'm citing this 1034 document
3 as a support that you can have battery that come
4 in -- that can fit in different form factor and
5 custom build a small battery to fit the form factor
6 you want. And you certainly can also make these
7 battery rechargeable, if the right chemistry or
8 right implementation, such as a capacitor or such a
9 feasible charge reservoir with regulated voltage.
10 Certainly, that's -- a POSITA would understand that
11 to be the case.

12 BY MR. AUCHTER:

13 Q. Directing your attention to paragraph 23
14 of your supplemental declaration. Do you have that
15 in front of you, sir?

16 A. Yes, I do.

17 Q. Is the AC voltage applied to the memory
18 device in Tomio's disclosure?

19 A. Can you repeat your question again?

20 Q. Is the AC voltage applied to the memory
21 device in Tomio?

22 A. Given that the -- I think this will be a
23 long way to answer the question.

24 Given that these are semiconductor
25 devices and given that there may be, depending on

1 how the power is coming in -- for example, if this
2 apparatus is receiving power through the host or
3 through -- through the host, I will imagine the host
4 would already regulate the voltage into the voltage
5 that the memory device will be operated under.

6 Having said that, there may be -- the
7 host itself may be connected either to a voltage
8 regulator that's already outputting the regulated
9 voltage or the host is connected to the available
10 outlet, which will -- may be supplying the AC
11 voltage.

12 And then there will be certain -- as I
13 mentioned, testified earlier, there will be an
14 inverter, and there will be regulator to facilitate
15 the operation such that the internal semiconductor
16 devices or the memory devices or -- within the host
17 and within the memory apparatus will be properly
18 operating without suffering damage.

19 Q. You cite to a section of Tomio that talks
20 about a direct current power supply that includes
21 rechargeable batteries.

22 Do you see that at the bottom of page 20
23 and top of page 21?

24 A. Yes.

25 Q. Okay. Is that direct current power

1 supply on the memory device or is it on the
2 motherboard?

3 A. Unfortunately, I don't have...

4 Bear with me. I'm trying to find the
5 proper context.

6 (Document review.)

7 THE WITNESS: Bear with me, please.

8 I want to make sure I have the context. Okay.

9 So yeah.

10 Can you please -- please repeat your
11 question again?

12 BY MR. AUCHTER:

13 Q. Is the direct current power supply 6 on
14 the memory device or is it on the motherboard in
15 Tomio?

16 A. I think you have to qualify "direct
17 current supply." It's clear that external -- the
18 direct current supply just means that it's -- I
19 believe it's operating DC voltage, is what it's
20 trying to say, "direct," okay?

21 So you have an AC power supply that's
22 obviously outside the motherboard in the form of 15,
23 okay? So this is what I was saying, that in this
24 case, the direct current supply, it would be some
25 sort of regulator that takes input from the -- from

1 the external supplier of power and then convert it
2 to a DC voltage.

3 And if you look at -- further downstream
4 for Tomio, and within that, there's a 52 which is in
5 the module that actually have the battery, internal
6 battery.

7 Q. Is that referenced anywhere in your
8 paragraph 23?

9 A. I think my paragraph 23 is taken in the
10 context of impeaching Tomio.

11 Q. Uh-huh.

12 A. So if you look at how it facilitated
13 doing that, I mean, obviously the -- then the
14 Figure 12 and Figure -- the other figure,
15 Figure 11 -- Figure 11 and Figure 12 would be
16 involved. But I'm making a statement out of
17 totality in the context of Tomio's teaching.

18 Q. And in the paragraphs of Tomio that you
19 cite to in this paragraph 23 -- 38, 39, 22, 27, 28
20 and 32 -- do any of those disclose unplugging the
21 memory module?

22 MR. RIFFE: Objection, form.

23 A. Again, as I testified earlier, it speaks
24 when the power is off. And the power -- the origin
25 or the cost of power being off comes in many form,

1 and unplugging is one of the form where you will
2 have loss of power.

3 BY MR. AUCHTER:

4 Q. And to be clear, the other citations in
5 this paragraph to MTI-1003, that's your own
6 declaration; isn't that correct?

7 A. It's referring to -- maybe referring to
8 my original declaration, but I'm sure that has its
9 own context and citation, so...

10 THE WITNESS: Counsel, we're going
11 for about an hour already. Would it be okay
12 for another break?

13 MR. AUCHTER: Yeah, and then I am --
14 I promise I am almost done. As you probably
15 know from your experience, when a lawyer says
16 that, they're not necessarily telling the
17 truth. I am in this case.

18 THE WITNESS: Can you define almost
19 done?

20 MR. AUCHTER: No.

21 THE STENOGRAPHER: We'll go off the
22 record.

23 (Recess taken, 12:00 p.m. to
24 12:07 p.m. PDT)

25 ///

1 BY MR. AUCHTER:

2 Q. Dr. Liu, directing your attention to
3 paragraph 25 of your supplemental declaration, how
4 would a host access the data in the SDRAM through a
5 USB interface?

6 A. Assuming -- let's just do the two level
7 of answer I want to give, but I don't want to bog
8 down with technical details, so let me just answer
9 one simple way, okay?

10 As I mentioned in my declaration, the
11 existence of USB-to-MMC interface is very well
12 known, actually. Actually, as my declaration
13 indicated, I mean, I have an adapter that you just
14 plug in the MMC into this connector that's enclosed,
15 and then the output is USB.

16 So we already establish based on
17 Tsunoda's teaching that MMC interface is an
18 SDRAM-compatible interface, so that MMC is fully
19 capable of communicating with the SDRAM.

20 Now, if I -- just going through this
21 adapter, as I mentioned -- when you mentioned
22 interface, there is many interface, you know, at
23 different level that you can connect. So if I go
24 through that implementation and go through a USB
25 interface, of course, then in that case, by

1 definition USB -- that USB interface with the MMC
2 within it would be able to communicate with SDRAM.
3 That a simple way, okay?

4 Q. Is there any disclosure of using a
5 USB-to-MMC adapter in your original declaration?

6 A. No. It may be in part, but since I
7 mentioned that the USB-to-MMC adapter is very widely
8 known -- and it's been known since the existence
9 almost of USB and MMC form factor, okay? So that's
10 one way that could be done.

11 The other way is directly have USB
12 interface -- have USB interface without going
13 through MMC to communicate with SDRAM. Now, that
14 would require a little bit of handshaking, but it's
15 well known that you would have a sync operation when
16 you connect them. The sync operation essentially
17 help you to synchronize the clock of the SDRAM with
18 the USB, even though as I mentioned -- testified
19 earlier USB has only four ports, and I think one
20 could say no clock. But that's not true.

21 Because the way USB works, interfacing
22 with SDRAM with a clock, is that there is eight bits
23 initial information that's being passed as a packet.
24 They call that a sync. They use that eighth data
25 input, the packet, to synchronize your USB to the --

1 to the clock of whatever memory device you have.

2 So my point, by going through the
3 detail -- and I'm trying to tell you that a POSITA
4 will understand that the many, many ways to -- there
5 are a few ways -- I don't want to use hyperbole, but
6 there's a few ways to communicate using USB port to
7 the volatile memory.

8 And I just give two illustration, and I
9 think -- I think the -- one of them, it's implied
10 very much by saying that the USB-to-MMC adapter is
11 widely available at the time of invention or even
12 many, many years preceding the time of invention.

13 Second, the way USB protocol works -- and
14 I don't want to go into detail, but definitely USB
15 protocol could be synchronized to a synchronous
16 memory device.

17 Q. And is that described in any of the
18 documents that you've referenced in your -- either
19 one of your declarations?

20 MR. RIFFE: Objection, form.

21 A. I think the way to answer that is a
22 POSITA, a person of ordinary skill in the art, based
23 on my experience and knowledge, I think this -- this
24 is very, very clear.

25 In fact, I think if you look at the --

1 even the disclosure or the citation of the
2 disclosure from the '527, I think this is also very
3 well -- in fact, even Tsunoda also mentioned that
4 there are different, other form factor or different
5 other interface.

6 So I didn't feel it was necessary for me
7 to -- as a person of ordinary skill in the art and
8 given my knowledge and experience, I think this is
9 perhaps something I believe is well known, and I did
10 not take the effort to describe it in detail.

11 Suffice to say that at least I mention
12 that the interoperability between a USB and an MMC,
13 that at least provide a way for the USB interface to
14 communicate with SDRAM, so...

15 BY MR. AUCHTER:

16 Q. But it's correct that the word "USB" does
17 not appear anywhere in Tsunoda, does it?

18 A. No. Sitting right here, again, I'd have
19 to do a search, and we can take the time to do the
20 search.

21 But I think in that -- in this field,
22 given the MMC, given there's all these interface,
23 and one of the key that -- as a user, as a person of
24 ordinary skill in the art, the interoperability is
25 very important, and it's made obvious, exemplified

1 by the fact that USB and MMC interface came into
2 existence as early as when MMC form factor came into
3 existence.

4 So I think that's -- that's a well-known
5 fact, and that's -- that kind of interoperability is
6 basically very much -- in a way I would agree. In a
7 way, it's very much the given and taken for granted,
8 so...

9 Q. Do you have an understanding as to why
10 USB is not mentioned anywhere in Tsunoda?

11 MR. RIFFE: Objection, calls for
12 speculation.

13 A. I'm not going to -- I'm not Tsunoda, and
14 when he write this invention, maybe he works for a
15 company -- I don't know that -- a competitor. I
16 don't want to speculate. I have no reason, no cause
17 to speculate.

18 But suffice to say, again, as I
19 testified, the existence of a USB adapter or an MMC
20 adapter to USB came into existence well before '527
21 and right after the form factor of MMC come to --
22 come about speaks of the interoperability between
23 the two, so...

24 BY MR. AUCHTER:

25 Q. Is there any reason you couldn't have

1 cited MTI-1040, which is US Patent No. 6,438,638 to
2 Jones in your original declaration?

3 MR. RIFFE: Objection, form.

4 A. Repeat your question again.

5 BY MR. AUCHTER:

6 Q. Is there any reason you couldn't have
7 cited MTI-1040, US Patent No. 6,438,638 to Jones, in
8 your original declaration?

9 MR. RIFFE: Same objection.

10 A. So you mean I cite it in the -- it was in
11 my supplemental, but I didn't cite in my original?

12 BY MR. AUCHTER:

13 Q. Right.

14 A. Again, you know, in fact, I showed my
15 counsel one of the earliest gadgets I have, which is
16 an MMC adapter to a -- an MMC-to-USB adapter, and if
17 I overlooked citing this, perhaps to me it's very --
18 this interoperability of MMC to USB and USB form
19 factor, it's very obvious as a person of ordinary
20 skill in the art.

21 And so in my current declaration, perhaps
22 I'm trying to address the certain argument raised by
23 Sonrai, so perhaps I feel like I need to have a
24 little bit of -- more explicit rather than take it
25 for granted citation to support my opinion even

1 though perhaps in the original declaration I believe
2 that, as a person of ordinary skill in the art and
3 with my knowledge and experience, this would be
4 quite obvious, perhaps.

5 Q. Directing your attention to paragraph 33
6 of your declaration, is Shigeo a portable memory
7 apparatus?

8 MR. RIFFE: Objection, form, calls
9 for a legal conclusion.

10 A. It really depends on the context. I
11 don't rely on saying that Shigeo is a portable
12 memory apparatus. I mention that Shigeo disclose an
13 information processing device, and I'm using Shigeo
14 simply to highlight the fact that the power loss or
15 the loss of power or even the reduction of power or
16 even the degradation of power signal, it's a
17 concern, especially when you're dealing with
18 volatile memory.

19 Therefore, it's supporting evidence that
20 a POSITA recognizing this situation, knowing that
21 such degradation does exist, not just due to loss of
22 power, but even the degradation of the supply
23 voltage will cause detrimental effect on the
24 integrity of the DIMM.

25 There's more supporting evidence that if

1 a person of ordinary skill in the art in the field
2 were actually looking to teachings such as Tomio to
3 implement a backup power supply in the form --
4 whether it is chargeable or rechargeable -- of
5 course, preferably rechargeable and in a certain
6 kind of form factor -- and it could come in any
7 form, as we discussed. It could be a charge
8 reservoir with regulated voltage. That's what a
9 capacitor is. So I used Shigeo to that extent.

10 And if you really want me to pin that,
11 you know, portable memory apparatus, that
12 definition, it's -- I think it really needs the
13 context to bracket. Otherwise, a lot of things
14 could -- we could be going on for quite a while in
15 our discussions.

16 BY MR. AUCHTER:

17 Q. Okay. So is Shigeo a portable memory
18 device?

19 MR. RIFFE: Objection, asked and
20 answered.

21 A. It depends on whether you consider a
22 mobile information terminal to be a portable device.

23 BY MR. AUCHTER:

24 Q. Do you?

25 A. In the context, I would have to

1 understand a little bit more. In certain contexts,
2 it may or my not be, so we have to look at each
3 individual cases, right? So it depends on, again,
4 the definition of portable -- and I'm not trying to
5 do claim construction here.

6 But I rely on Shigeo, given that it is an
7 information processing device; given within there,
8 there's a volatile memory, and that this volatile
9 memory is subject to data integrity if the power is
10 either lost -- or even if the power is diminished,
11 the voltage diminished, will you have some
12 detrimental effect.

13 I use that as the supporting evidence and
14 to render obvious that having a battery within my,
15 quote/unquote, portable memory apparatus is
16 advisable, and it will be obvious to a person of
17 ordinary skill in the art to have such
18 implementation at the time of the '527 invention.

19 MR. AUCHTER: All right. Well, thank
20 you. Dr. Liu. I don't have any further
21 questions at this time.

22 MR. RIFFE: Let's take a short break,
23 and we'll be right back.

24 (Recess taken, 12:20 p.m. to
25 12:23 p.m. PDT)

1 MR. RIFFE: We don't have any further
2 questions at the time.

3 I just want to reserve on the record
4 the right to have Dr. Liu review and sign any
5 errata and submit that as part of the
6 transcript. But otherwise, no further
7 questions.

8 MR. AUCHTER: Thank you, Dr. Liu.

9 THE WITNESS: Thank you very much.

10 (Time noted: 12:23 p.m. PDT)

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C E R T I F I C A T E

WE, LORIE RHYNE, California CSR No. 12905, and
MICHAEL E. MILLER, FAPR, RDR, CRR, California CSR
No. 13649, do hereby certify:

That DAVID KUAN-YU LIU PhD, the witness whose
deposition is hereinbefore set forth, was duly sworn
by me and that such deposition is a true record of
the testimony given by such witness;

I further certify that I am not related to any
of the parties to this action by blood or marriage,
and that I am in no way interested in the outcome of
this matter.

IN WITNESS WHEREOF, we have hereunto set our
hand on July 22, 2024.

LORIE RHYNE
California CSR No. 12905

MICHAEL E. MILLER
Fellow of the Academy of Professional Reporters
Registered Diplomate Reporter
California CSR No. 13649

1 I HEREBY CERTIFY that I have read this
2 transcript of my deposition, and that this
3 transcript accurately states the testimony given by
4 me, with the changes or corrections, if any, as
5 noted.

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10 X _____

11 DAVID KUAN-YU LIU PhD
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1 ERRATA SHEET FOR THE TRANSCRIPT OF:

2 CASE NAME: MICRON v. SONRAI

3 DEP DATE: July 18, 2024

4 DEPONENT: DAVID KUAN-YU LIU PhD

5 PG. LN. NOW READS SHOULD READ REASON

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25 DAVID KUAN-YU LIU PhD

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