

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICRON TECHNOLOGY, INC.,
Petitioner,

v.

YANGTZE MEMORY TECHNOLOGIES
COMPANY, LTD.,
Patent Owner

IPR2024-00795
Patent 11,501,822 B2

Held: July 14, 2025

BEFORE: JO-ANNE M. KOKOSKI, KIMBERLY McGRAW, and
MICHAEL T. CYGAN, Administrative Patent Judges.

IPR2024-00795
Patent 11,501,822 B2

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P R O C E E D I N G S

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JUDGE CYGAN: Good afternoon. This is Judge Cygan. Judges McGraw and Kokoski are present by video. We'll now hear argument in case number IPR2024-00795, between Petitioner Micron Technology, and Patent Owner Yangtze Memory Technologies, concerning U.S. Patent Number 11,501,822. Counsel for the parties, starting with Petitioner, please introduce yourself.

MR. HERMAN: Good afternoon, Your Honors. This is Patrick Herman from Orrick, Herrington & Sutcliffe, here on behalf of Petitioner.

JUDGE CYGAN: Thank you.

MR. DAVIS: Good afternoon, Your Honors. Jim Davis and Chris Bonny of Ropes & Gray for the Patent Owner.

JUDGE CYGAN: And which of you will be presenting?

MR. DAVIS: Your Honor, we'll be dividing the argument in half. I'll be addressing the independent claims and Mr. Bonny will be addressing the disclosed limitations for the dependent Claims 2, 3, and 12 (INDISCERNIBLE - TECHNICAL DIFFICULTY).

JUDGE CYGAN: Thank you, and welcome to the Board. Per our order dated June 12th of this year, each party is provided with 60 minutes. The parties need not use the entirety of that time. Petitioner will argue first and may reserve time for rebuttal. Patent Owner will respond to Petitioner's argument and may reserve time for surrebuttal. We have the demonstratives from each party. Please remember to identify yourself with speaking and mute yourself when not speaking. Please also identify each slide that you

1 refer to. Petitioner, how much time would you like to reserve for rebuttal?

2 MR. HERMAN: Fifteen minutes, Your Honor.

3 JUDGE CYGAN: Fifteen minutes. Thank you, Mr. Herman. You
4 may begin.

5 MR. HERMAN: Would Your Honor like me to show the
6 demonstratives on the screen here or would it be easier to refer to the copy
7 that you already have? Whichever is more convenient for you.

8 JUDGE CYGAN: We'll just refer to the copy you already have.

9 MR. HERMAN: Good afternoon, Your Honors. We're here today
10 to talk about the '822 patent. So turning to Slide 2 of Petitioner's
11 demonstratives, for discussing the party's dispute, I'll provide a very brief
12 introduction to the patent at issue for context. So what is the '822 patent
13 about? (INDISCERNIBLE - TECHNICAL DIFFICULTY) volatile memory
14 device.

15 Importantly, the '822 patent did not invent a new type of memory.
16 Non-volatile memory was known at least a decade before the patent was
17 filed. The patent also was not the first to supply pulse signals to a memory's
18 word lines. Pulse signals were also in routine use decades before the '822
19 patent. Instead, the only thing the '822 patent purports to have contributed to
20 the art is the application of different voltages, instead of the same voltage, to
21 different groups of word lines during a preparation step in advance of
22 programming in an effort to better address program disturb.

23 Turning to Slide 3, this is exactly what the claims require. As
24 shown, the claims require that three different word line pre-pulse signals be
25 applied to three different groups of word lines during a pre-charge period.
26 The limitations requiring those different signals during pre-charge are

1 highlighted in blue, orange, and purple on Slide 3. There also needs to be a
2 selected word line. The limitation requiring that is highlighted in yellow,
3 and a selected gate line -- and a select gate line, that's at the top of the
4 memory string and that's highlighted in green.

5 So Slide 4 provides a graphical example of what is claimed.
6 Figure 3, to the left of the slide, shows one example of memory string. The
7 selected word line or the word line that's targeted for programming is shown
8 in yellow. The select gate line is shown at the top of the string in green.
9 The groups of word lines are shown in blue, orange, and purple. Figure 4, to
10 the right, provides an example of the voltages that are applied during the
11 pre-charge period. While a rough schematic, the voltages applied to each
12 group are shown to be different.

13 Turning to Slide 6, Slide 6 provides a summary of the grounds. As
14 shown, the petition relied on three primary references -- Lee, Zhao, and
15 Yang. Each of these references standing alone render certain claims
16 obvious, as explained in the petition. That's the subject of Grounds 1, 2, and
17 4. The combination of Zhao and Lee also renders a larger collection of
18 claims obvious. That's the subject of Ground 3.

19 As I'll explain, each of Lee, Zhao, and Yang teach the very same
20 thing that purportedly serves to distinguish the '822 patent from the prior art.
21 In each reference, different voltages are applied to different groups of word
22 lines during a pre-charge period to address program disturb.

23 Slide 7 provides a very brief overview of Lee. What is Lee
24 directed to, a method for addressing program disturb and memory. And
25 what does Lee do to address program disturb? The same thing as the '822
26 patent. It applies different voltages to different groups of word lines in

1 advance of programming. Lee calls these pre-programming voltages pre-
2 biased voltages.

3 Slide 8 includes an annotated version of Figure 4B from Lee. As
4 shown, the memory word lines have been arranged into four groups and
5 different voltages are then applied to different groups during a pre-charge
6 step.

7 Turning to Slide 9, Zhao is also directed to a method for
8 addressing program disturb. And like both the '822 patent in Lee, it does so
9 by applying different pre-charge voltages to different groups of word lines
10 during a pre-charge step.

11 Slide 10 includes two figures from Zhao. That's Figures 4G and
12 13. Figure 4G shows a schematic of Zhao's memory. Figure 13 shows a
13 signal timing diagram. As the figure shows, Zhao addresses program disturb
14 by applying different voltages to the word lines around the selected word
15 line. The not yet programmed word lines that are closer to the select gate,
16 those are in orange, get V pre-charge. The already programmed word lines
17 immediately below the selected word lines, those are in purple, get V
18 bypass. And all the other already programmed word lines that are closer to
19 the source side of the memory string either remain at V_{ss} or, optionally, can
20 receive a low voltage.

21 Turning to Slide 11, Yang also teaches a method for addressing
22 program disturb and it also does so with different voltages. On the slide
23 here, it references three different voltages; an overdrive voltage, a bypass
24 voltage, and a dummy pre-charge voltage, applied to different groups of
25 word lines during pre-charge.

26 And Slide 12 shows this graphically with both the different word

1 line groups, and the different voltages those groups receive during the pre-
2 charge period annotated. So turning to Slide 14, the parties have a number
3 of disputes spanning the petition's four different grounds, and I've listed
4 them out here and we'll address each of these in turn as my presentation
5 continues.

6 So turning to Slide 16, I'll start with Patent Owner's arguments that
7 Lee does not teach the supply of pre-charge voltages in the form of pulses.
8 According to --

9 JUDGE CYGAN: Counsel, can I stop you for a second?

10 MR. HERMAN: Yes.

11 JUDGE CYGAN: Where in the claims is there a requirement that
12 there be a pulse?

13 MR. HERMAN: So looking back to Claim 1, the claim requires
14 three different signals that are applied during the pre-charge period and it
15 calls each of the pre-pulse signal. So the word pulse appears in connection
16 with the type of signal that's being applied in advance of programming.

17 JUDGE CYGAN: So what does it mean that it's a pre-pulse signal,
18 as opposed to a pulse?

19 MR. HERMAN: So the way that that has been interpreted in the
20 petition is that it's a pulse signal that's being applied in advance of a later
21 programming step.

22 JUDGE CYGAN: Okay. So it's still a pulse signal. And what's
23 the claim construction the parties have agreed to on this? I understand that
24 you -- have you agreed to a claim construction?

25 MR. HERMAN: I believe there's not a dispute, Your Honor,
26 about --

1 JUDGE CYGAN: Okay.

2 MR. HERMAN: -- what the term pulse means, and I believe the
3 parties agreement with respect to pulse is referring to a signal that starts at
4 one value, either goes up or goes down, and then returns to approximately its
5 original value at some later time period.

6 JUDGE CYGAN: Thank you.

7 MR. HERMAN: So returning to Slide 16, I'll start with Patent
8 Owner's argument that Lee does not teach the supply of pre-charge voltages
9 in the form of pulses. According to Patent Owner, rather than pulses -- Lee
10 would instead, for some reason, apply pre-biased voltages as a single flat
11 value, followed immediately by programming voltages. And Petitioner
12 believes that this is inconsistent with Lee's disclosure and also how voltages
13 were commonly supplied in the art.

14 So turning to Slide 17, being with Lee's disclosure, Lee explains
15 that its pre-charge and programming voltages are applied in separate and
16 distinct steps. This is shown in Figure 7, where pre-charge voltages are
17 applied in step S205, while programming voltages are applied in a different
18 step, S207. It's also explained in words in Lee, as shown by the passages on
19 the right, pre-charge voltages are applied only, quote, "during a pre-charge
20 operation," end quote. Then programming voltages are applied later, but
21 only after the pre-biased voltage is applied and after the pre-charge operation
22 is completed, and that word appears in Lee, "completed."

23 Now, it's important -- it's a recognition in Lee that pre-charge
24 voltages are applied only during pre-charging and not during programming,
25 and it's also a recognition that programming voltages are not applied until
26 the pre-charge operation is completed. Pre-charging ends before

1 programming begins.

2 Turning on to Slide 18, Patent Owner's expert confirmed that Lee's
3 pre-charge and programming steps are meant to be separate and distinct
4 during his deposition. As shown on Slide 18, when you apply the
5 programming voltage, according to Patent Owner's expert, only after you
6 wait for the pre-charge operation to have run its course and to have achieved
7 the desired results.

8 Turning to Slide 19, Patent Owner's expert also recognized that
9 word line voltages do not change instantaneously, so you can't immediately
10 change from a pre-charge voltage to a programming voltage. Instead, as
11 shown by the testimony on Slide 19, voltages take time to ramp from one
12 value to another.

13 All of what I've just summarized makes it highly obvious that Lee's
14 pre-charge voltages would be supplied in the form of pulses. Again, in Lee,
15 pre-charging and programming are separate and distinct steps. There's no
16 dispute about that. Also, according to Lee, the pre-charge voltage is only
17 supplied during pre-charging, and Lee waits for pre-charging to complete
18 before applying the programming voltage. There's also no dispute about
19 that. And finally, voltages do not change instantaneously. There's also not a
20 dispute about that. The only realistic way to achieve the type of pre-charge
21 and programming separation that Lee itself references is to supply voltages
22 in the form of a pulse.

23 What happens if you do not use a pulse? Slide 20 includes
24 testimony from Petitioner's expert. Petitioner's expert explains that if you
25 don't pulse the voltages, pre-charging and programming would blend
26 together because voltage takes time to adjust from one value to another.

1 This, of course, is not what Lee discloses. These two steps are meant to be
2 separate. Pre-charge is meant to complete before you program, and you
3 achieve that by pulsing the voltages during pre-charge and programming.
4 Moreover, this testimony was not disputed. Patent Owner elected not to take
5 Dr. Liu's deposition on this issue and asked him no questions about it.

6 Turning to Slide 21, while Lee's discussion of how pre-charging
7 and programming are meant to be separate itself, shows that Lee's voltages
8 are obviously pulsed. This --

9 JUDGE CYGAN: Pardon me, Counsel. Can you explain why
10 there's necessarily a decrease, which is necessary for the pulse, correct?

11 MR. HERMAN: Yes.

12 JUDGE CYGAN: At the end of the signal, there must be a
13 decrease. What in Lee is telling you that there's a decrease?

14 MR. HERMAN: That the steps are separate. The pre-charging has
15 to complete before you start programming, because if you don't return back
16 to your original value, pre-charging will blend into programming. You'll
17 start programming before you intended to start programming, and you'll
18 continue pre-charging longer than you had intended to pre-charge. The way
19 you avoid that is by allowing the word line to return to its value, such as
20 ground. And in fact, as I'll explain in a moment, that's also something you
21 would need to do to use the type of standard pulsed programming that the
22 prior art routinely used to program a memory cell in a NAND device.

23 JUDGE CYGAN: Are there any facts in the record that show you
24 have to return to zero?

25 MR. HERMAN: Respectfully, Your Honor, I believe that there
26 are facts in the record that show that. One of the facts that's in the record is

1 that in the art, something called incremental pulsed programming was
2 routinely used, and it -- to program a memory cell and 3D NAND, and that
3 conventionally started at zero volts, went up to a programming voltage for a
4 very short period of time, went back down to zero volts, and then continued
5 on in that pattern. But what that means is the programming began at zero
6 volts and the only way that the program could have begun at zero volts is if
7 it returns to that level after pre-charging was completed.

8 JUDGE CYGAN: And that's one type of conventional.

9 MR. HERMAN: Yes, Your Honor.

10 JUDGE CYGAN: But that's not -- your argument is that it
11 necessarily has to return to zero, correct?

12 MR. HERMAN: Not necessarily, but obviously would. So this is
13 not an anticipation case, Your Honor. It's an obviousness case, so it's
14 Petitioner's position that it's highly obvious that the word line voltage would
15 start at zero, increase to some value during pre-charging, return to zero, and
16 then you would continue with programming.

17 JUDGE CYGAN: And your argument from that is based upon if
18 not, it would bleed in together?

19 MR. HERMAN: So if you --

20 JUDGE CYGAN: Right?

21 MR. HERMAN: -- did not return to zero, yes, you would
22 effectively combine the two steps, and you would cause more pre-charging
23 than you intended and you would also cause programming to begin earlier
24 than intended, which would not provide the type of precise control that
25 incremental step programming is meant to provide.

26 JUDGE CYGAN: Is that because the programming voltage is

1 lower than the pre-charge voltage?

2 MR. HERMAN: Well, one of the reasons is that incremental step
3 programming is meant to slowly increase the threshold voltage of the
4 memory cell until it reaches the desired level, and the way you accomplish
5 that is by providing very short bursts of voltage to the memory cell, and
6 doing that several times until you arrive at the desired threshold voltage. So
7 it's a very controlled and slow progress.

8 JUDGE CYGAN: Okay. That's one type, but let's go ahead and
9 talk about that right now. The incremental pulse programming, that happens
10 in the programming step?

11 MR. HERMAN: Yes.

12 JUDGE CYGAN: That happens during the programming step in
13 Slide 22. Let's take a look at that.

14 MR. HERMAN: Yes.

15 JUDGE CYGAN: So in Slide 22, are those four different
16 programming steps or five different programming steps, or is that all just one
17 programming step in which you're incrementally increasing it to reach the
18 voltage you want to?

19 MR. HERMAN: It's one programming step where you're applying
20 a series of pulses to slowly increase the threshold voltage of the memory
21 cell, and you will stop applying those pulses when you reach the desired
22 threshold voltage.

23 JUDGE CYGAN: And so when we're requiring a pre-pulse signal
24 in the form of a pulse that increases and then decreases, what we have in the
25 incremental step pulse programming is multiple pulses that increase and then
26 eventually decrease.

1 MR. HERMAN: There are multiple examples of pulses shown on
2 Slide 22 of Petitioner's demonstrative. Yes, Your Honor.

3 JUDGE CYGAN: But for the incremental steps for programming,
4 I'm trying to understand the technology correctly.

5 MR. HERMAN: Yes.

6 JUDGE CYGAN: And my understanding of what you said is that
7 you need to have multiple pulses so you can sort of edge your up to what
8 you want, right?

9 MR. HERMAN: That's right.

10 JUDGE CYGAN: So if your obviousness is based upon the post-
11 programming schemes, you'd really need multiple pulses during the
12 programming step and you'd need multiple pulses during the pre-pulse
13 programming step, correct?

14 MR. HERMAN: Not necessarily, Your Honor. The point I'm
15 trying to make is that pre-charge will occur effectively to the left of what's
16 shown on Slide 22. There will be a separate pulse for purposes of pre-
17 charging the memory cell. And you would obviously then want to go to zero
18 before you started this incremental step programming scheme because the
19 incremental step programming scheme is a very controlled process. If you
20 did not first go to zero, your first pulse would be unnecessarily and
21 unintendedly long, thus potentially pushing you over that desired threshold
22 voltage immediately as opposed to allowing you to slowly approach it as
23 was conventionally done in the prior art.

24 JUDGE CYGAN: Is that issue with sort of the charge leakage, I
25 guess, into the next step -- is that only from the pulse programming scheme
26 or is that in general?

1 MR. HERMAN: The program disturb, you're talking to?

2 JUDGE CYGAN: No, no. So your obviousness case for Lee by
3 itself is based on the fact that you need to have discrete steps?

4 MR. HERMAN: Yes.

5 JUDGE CYGAN: And it has to go down to zero in the discrete
6 steps because otherwise, during the programming step, if you injure pre-
7 charging step and immediately, you jump back out -- you jump up to the
8 next step, there'll be a problem with the voltage that you applied. It won't be
9 the right voltage.

10 MR. HERMAN: This --

11 JUDGE CYGAN: That's your argument?

12 MR. HERMAN: Yes.

13 JUDGE CYGAN: Okay. Can you show me -- apart from the
14 pulse programming scheme, can you give us a cite to the record on where
15 that's supported?

16 MR. HERMAN: Well, Dr. Liu testified to that effect on Slide 20, I
17 believe -- 20 -- excuse me, just one moment -- on Slide 20 of Petitioner's
18 demonstratives. And that effect that he's referring to on Slide 20 of
19 Petitioner's demonstratives, Your Honor, would apply regardless of what
20 programming scheme you apply. So yes, incremental step programming
21 was the most conventional way to program a memory cell when the '822
22 patent was filed, but any type of programming scheme, if you combine the
23 pre-charge step with the programming step, you are going to impact the
24 amount of programming that's occurring because voltages are not going to
25 shift incrementally.

26 JUDGE CYGAN: And "usually," that's not an inherent property

1 because you're not arguing inherency. You're saying it may happen
2 sometimes if they effectively blend together and sometimes you may end up
3 with a voltage you don't want during a programming step, and sometimes, it
4 may not happen, right?

5 MR. HERMAN: It would be extraordinary difficult to avoid. This
6 is an effect that is highly obviously going to occur and the way you address
7 it is by separating the steps and separating the steps into a way that Lee itself
8 references.

9 JUDGE CYGAN: Is that -- and that's what Dr. Liu mentioned is
10 that --

11 MR. HERMAN: Yes.

12 JUDGE CYGAN: His testimony is that you need to have a
13 separation by going to zero; is that correct?

14 MR. HERMAN: I believe so, Your Honor.

15 JUDGE CYGAN: Okay. And he does say -- I just want to clarify
16 that he does say you need to go all the way back down to zero, not just to
17 some lower value?

18 MR. HERMAN: He does, Your Honor. So you would --

19 JUDGE CYGAN: Okay.

20 MR. HERMAN: -- start at zero, you would go up to whatever
21 value was specified, and you would return to zero. And there's another
22 reason for that, Your Honor, and the other reason that you would do that is
23 that type of behavior was precipitated by the types of conventional
24 equipment that was being used at the time the '822 patent was filed.

25 So for instance, if Your Honors direct your attention to Slide 21 of
26 Petitioner's demonstratives, well Lee's discussion of how pre-charging and

1 programming are meant to be separate itself shows that Lee's voltages are
2 obviously pulsed, as confirmed by other evidence of record. In particular, as
3 shown by Figure 1 of Lee, which is shown on Slide 21, Lee uses a standard
4 voltage generation unit and address decoder, and the record here is replete
5 with evidence that these components supply voltages in the form of pulses.

6 Voltages in NAND memory were almost always supplied with
7 charge pumps. Patent Owner's expert recognized that at deposition, Dr. Liu
8 testified to that effect, it's also referenced again and again in textbooks that
9 are cited by Petitioner. And address decoders work by switching word lines
10 between a supplied voltage and zero volts, resulting in further pulsing. And
11 Petitioner submits that this is exactly how a person having ordinary skill in
12 the art would understand Lee to work. Using voltage supply and addressing
13 components that were routinely used in the art results in pulsing.

14 Patent Owner, in contrast, said that the Board finds that Lee works
15 in some unusual way, using non-typical components. And I'll note here that
16 there's no dispute, again, that charge pumps and on/off addressed decoders
17 were well known. Patent Owner's expert admitted that at his deposition, and
18 again, Patent Owner did not take Dr. Liu's deposition to even ask him about
19 this, let alone challenge anything he said.

20 JUDGE CYGAN: In the -- sorry, Counsel -- on Slide 21, the
21 apparatus that you're referring to, does that necessarily return to -- does that
22 necessarily warn pulses that end -- begin and end at zero volts?

23 MR. HERMAN: So if you use the types of components that were
24 routinely used in the art at the time, yes, it would necessarily result in
25 pulsing, so if you're using a charging pump and an on/off road decoder, and
26 you have one charge pump associated with each word line, it would be

1 pulsing the voltages that are applied in the word line. You would have to do
2 something different, something out of the ordinary, to obtain the type of
3 effect the Patent Owner is referring to. Like you would have to come up
4 with some other way to supply the voltages to the word line, besides what
5 was commonly used in the art at the time.

6 JUDGE CYGAN: And it always returns to zero, is the testimony
7 here?

8 MR. HERMAN: So you could select another voltage as your
9 ground voltage, but the most common and typical voltage that the word line
10 would be returned to would be ground or zero.

11 JUDGE CYGAN: So in references such as Zhao, Zhao doesn't
12 return to zero. They return it to their Vss voltage, which may or may not be
13 zero, correct?

14 MR. HERMAN: I don't believe that's what Zhao teaches. I'll get
15 to that later, but Zhao does, in fact, start all of its word lines at zero, elevate
16 the potential of the word line to some desired voltage, and then return again
17 to zero. There's the parties --

18 JUDGE CYGAN: Doesn't Zhao also say they return it to Vss and
19 Vss make --

20 MR. HERMAN: Vss in Zhao is zero. I believe Your Honor is
21 referring to one of the other party's disputes. There's a portion of Zhao that
22 says, during the pre-charge period, you can supply a different voltage to the
23 word lines on the source side of the selected word line. Besides, Vss. That's
24 not talking about changing the ground voltage throughout Zhao's system.
25 It's simply talking about doing something different with the word lines,
26 WLn-X during the pre-charge period. So Mr. Zhao is not saying use a

1 different ground voltage. It's saying, treat these particular word lines
2 differently in this particular period of time. Don't leave them at zero.
3 Instead, supply them with a non-zero voltage for a short period of time.
4 That time being the pre-charge period. Does that answer your question?

5 JUDGE CYGAN: Yes, thank you.

6 MR. HERMAN: Turning on to Slide 24. Unless there are further
7 questions on Lee, I'm going to move on to the party's next dispute. So
8 Patent Owner also argues that Lee doesn't teach what certain dependent
9 claims -- those are Claims 2 and 3, and 12 through 13 -- require. According
10 to Patent Owner, these claims somehow require that the claimed groups be
11 reformed and changed every time a new word line is selected, and Petitioner
12 submits that this is wrong. That's not what claimed. And even if it were,
13 Lee would still teach what's required.

14 Turning on to Slide 25, Patent Owner is improperly reading
15 limitations into the claims. As shown here, Claim 2 only requires that there
16 be first, second, and third groups of word lines. While the claim specifies
17 where these groups must be located, they must be disposed in an order of
18 distance from the selected word line. It imposes no timing requirements on
19 when the groups are formed.

20 The groups can be formed at any time, including either before or
21 after word line selection. Likewise, there's no requirement that the groups
22 change every time a new word line is selected. So long as the memory has
23 the required groups and the required location, the claim is satisfied. It does
24 not matter if the groups remain the same as different word lines are selected.

25 JUDGE CYGAN: Counsel, at what point in Lee are you referring
26 to for your initial -- for the claimed setup?

1 MR. HERMAN: Are you referring to Patent Owners? Like how
2 Lee satisfies the claims under Patent Owner's interpretation of Claims 2, 3,
3 and --

4 JUDGE CYGAN: I'm trying to understand your argument saying
5 you don't need to reset it every time the word line changes.

6 MR. HERMAN: Yeah.

7 JUDGE CYGAN: But you do need to have the configuration at
8 some point.

9 MR. HERMAN: Yes.

10 JUDGE CYGAN: At some point, you have to have the word line,
11 you have to have the surrounding word line with "disposed." So at what
12 point in Lee are you focusing on saying, at this point, all these claim
13 limitations are met and it doesn't matter what happens before or after that
14 point, but at some point, they have to have that configuration, right?

15 MR. HERMAN: Yes. So in the petition, Your Honor, we
16 demonstrated that, for instance, if you select a word line in Lee's group one,
17 which is, I believe, word lines 1 through 11, there would be three additional
18 groups of word lines, each of those three word lines getting three different
19 voltages in Lee. So there exists a moment in time where you select a word
20 line in Lee and there are three groups between that selected word line and
21 the select gate line, and each of those three groups is receiving an
22 incrementally increasing pre-charge voltage.

23 JUDGE CYGAN: Okay, thank you.

24 MR. HERMAN: Now, turning on to Slide 26. Now, even if the
25 claims were constructed, as Patent Owner proposes, Lee still teaches what is
26 required and Slide 26 shows why. As Lee makes it way up its memory

1 string, selecting one word line at a time for programming, it reduces the
2 number of groups getting different voltages. As shown in the left passage,
3 Lee discusses word line 11 being selected and there, there are three groups,
4 getting three different voltages, as the red underlining shows.

5 As shown in the right passage, a group 3 word line is now selected.
6 That's one of the word lines 16 through 23. So because a word line that's
7 closer to the select gate line has been selected, there are now only two
8 groups getting two different voltages, once again, as shown by the red
9 underlining.

10 Now, by extension, if a word line near the source, like word line 1
11 in Lee is selected, there will be four groups getting four different voltages.
12 So Lee does, in fact, differently group its word lines by applying different
13 voltages as programming proceeds from the source to the drain side of its
14 memory string.

15 Now, turning on to Slide 28. I'm going to move on to discuss the
16 petition's second ground, which explains why Zhao renders the claim
17 obvious. Now, Patent Owner makes only a single argument here. It argues
18 that Zhao uses only two pre-charge voltages. According to Patent Owner,
19 the Vss voltage applied to Zhao's source side word lines do not qualify,
20 because it's flat and unchanging, and thus isn't the pulse. And as I've also
21 explained and previewed a little bit in one of my answers previously, this
22 doesn't account for the full extent of Zhao's teachings.

23 Slide 29 summarizes Zhao's pre-charge procedure. As shown in
24 both the text and Figure 13, at T-0, all the depicted signal lines are at zero
25 volts. According to Zhao, T-1 through T-3 corresponds to pre-charging.
26 During this time, certain word lines are raised to the pre-charge voltage or

1 bypass voltage. Then at T-3, those word lines are lowered to ground Vss.
2 So during pre-charging, Zhao describes the procedure where the word lines
3 start at zero volts or ground, are raised to a designated voltage, and then are
4 lowered back to ground when pre-charging ends. That's plainly referring to
5 pulsed pre-charging.

6 Now, Figure 13 does show word lines WLn-X remaining at Vss
7 throughout the pre-charge period, T-1 through T-3, but Zhao also teaches
8 that those word lines can be pulsed with a non-zero voltage during the pre-
9 charge period.

10 Turning on to Slide 30, as shown on the left, yes, Zhao does say
11 that word lines N-X can, quote, "remain," end quote, at zero volts.
12 Alternatively, Zhao explains that those word lines can receive a non-zero
13 voltage instead. Petitioner submits that this is not talking about changing the
14 ground voltage used through Zhao's system. It's also not talking about
15 changing the voltage applied to word lines N-X throughout the pre-charging
16 and programming period.

17 As shown by the beginning text on the right-hand side of the slide,
18 Zhao is referring to how those word lines are treated during pre-charge step
19 650, and that's the period of time that spans T-1 through T-3. So according
20 to Zhao, word lines N-X can either remain at zero volts, or like all the other
21 word lines, they can receive a non-zero voltage during pre-charging period
22 T-1 through T-3. And again, that non-zero voltage is not applied at all
23 times. It's only applied during step 650, as reflected in the passage on the
24 right.

25 Now, because all the word lines start at zero, because the pre-
26 charge voltages are applied only during time T-1 through T-3 and because

1 all the word lines return to zero at time T-3, as Zhao explained in the
2 passage on the prior slide, that non-zero voltage is pulsed. And that --

3 JUDGE CYGAN: Counsel, let me ask you, on Slide 40 -- I'm
4 sorry, Slide 30 -- on your left-hand side box, it says that the remaining
5 unselected word lines remain in Vss, e.g. zero volts. Why does it say e.g.
6 zero volts for Vss?

7 MR. HERMAN: Because I believe what Zhao is trying to do is
8 correlate Vss with the ground potential.

9 JUDGE CYGAN: And so it doesn't mean that Vss can be another
10 voltage than zero?

11 MR. HERMAN: Not that passage that's on the left-hand side of
12 the slide.

13 JUDGE CYGAN: Why does it say e.g.? What does e.g. mean?

14 MR. HERMAN: Exemplified, I would say, Your Honor.

15 JUDGE CYGAN: And as an example, it means it's not fixed,
16 right? It's not i.e.

17 MR. HERMAN: So --

18 JUDGE CYGAN: It's e.g. It could be another voltage than zero.

19 MR. HERMAN: So presumably, you could set another voltage
20 besides zero as the default ground voltage that's used throughout Zhao's
21 system.

22 JUDGE CYGAN: So they don't need to return to zero. They need
23 to return to Vss, correct?

24 MR. HERMAN: Well, if you look at the passage on the prior
25 slide, it appears to be discussing returning to ground voltage. So if you set
26 your ground voltage to something other --

1 JUDGE CYGAN: Well, it says return to ground/Vss, correct?

2 MR. HERMAN: Yes, Your Honor.

3 JUDGE CYGAN: That's two different things. It could be ground
4 or Vss.

5 MR. HERMAN: I believe it's open to both of those things, so you
6 could return to the ground voltage, you could return to zero, you could return
7 to Vss, but throughout Yang, it refers to zero as the ground voltage as Vss. I
8 don't believe it provides examples besides that.

9 JUDGE CYGAN: Well, I don't know that it needs to provide
10 examples, as long as it tells you that Vss can be a different number than
11 zero, right?

12 MR. HERMAN: It does use the word e.g. in the next slide, so it
13 does seem to be contemplating use of a ground voltage other than zero, but
14 at the same time, that would then be contemplating a system that starts at
15 that voltage, another voltage is supplied, and then you return back to
16 whatever voltage you specified as ground voltage. So you would still be
17 pulsing, you would still be starting and ending at the same place, just the
18 starting and the end would be slightly different.

19 JUDGE CYGAN: I understand that, but this bears upon the
20 arguments made in the Lee ground, where in Lee, you were very clear that it
21 had to return to zero, otherwise there would be some negative effect on the
22 next stage. But it does seem like you don't always have to have zero. If
23 we're looking at Zhao's teaching here that you don't necessarily have to have
24 a pulse that starts at zero, returns at zero. It's not going to be a problem if it
25 returns to another non-zero number.

26 MR. HERMAN: So --

1 JUDGE CYGAN: So even if -- I mean, it may have started a non-
2 zero number, it may return a non-zero number, but there's nothing magical
3 about zero volts, is what I'm getting at.

4 MR. HERMAN: I think that's right, Your Honor, but that being
5 said, in the Lee reference, you would still return to whatever your system has
6 specified as the ground voltage, whatever your system has specified as the
7 default voltage, between your pre-charge and your programming step. Yes,
8 that would be --

9 JUDGE CYGAN: That's --

10 MR. HERMAN: -- typically --

11 JUDGE CYGAN: That's why I'm having trouble with the logic,
12 though, because the logic on that is that there's nothing in Lee that says you
13 return to it, correct? The only reason why in Lee we think there has to be a
14 pulse is because there's going to be some negative effect on your
15 programming voltage if you don't return to zero, but if you don't need to
16 return to zero and if Zhao is evidence you don't need to return to zero, then
17 maybe that's evidence that you don't need to lower your voltage before you
18 start the next step.

19 MR. HERMAN: So there would still be a negative effect on
20 programming, Your Honor, if you do not return to your system's default
21 voltage between pre-charge and programming. Putting that aside, I
22 believe --

23 JUDGE CYGAN: But why is that, though?

24 MR. HERMAN: Because then you're essentially not resetting your
25 word line. You're allowing programming to begin earlier than intended
26 because programming voltage will be applied almost -- I mean, before

1 programming is set to begin, but you're still going to bleed together your
2 pre-charge step and your programming step. It does not matter if you're
3 using, like everyone is using, zero as your ground voltage or something
4 slightly different than zero as your ground voltage. You still need to return
5 to that baseline before starting programming or you're going to adversely
6 affect your programming steps.

7 JUDGE CYGAN: What if, for example, your pre-charge voltage
8 was one volt and your programming voltage was one volt? Why would you
9 need to return to zero?

10 MR. HERMAN: Because the programming is only supposed to
11 occur for a very small and fixed period of time, and if you blend those
12 together, then all of a sudden, programming will be occurring for twice as
13 long as you intended and you will program more than you intended.

14 JUDGE CYGAN: But the first part of it is pre-charging, correct?
15 So you're not programming during pre-charge.

16 MR. HERMAN: So those two things have different intents. Yes,
17 Your Honor.

18 JUDGE CYGAN: Right. So the reason why you would have to --
19 it seems to me, and I don't know that you have anything on the record for
20 this, about what's the characteristic about the pre-charge that's going to cause
21 problems with the programming voltage. And it seems to me that you're
22 saying it has to return down to a much lower voltage before you reach the
23 next one, but is that --

24 MR. HERMAN: So that's --

25 JUDGE CYGAN: That's your --

26 MR. HERMAN: So I believe the hypothetical, Your Honor, that

1 you presented us with is not something that any of the prior art is doing.
2 None of the prior art of record here is using the same voltage for both pre-
3 charging and for programming.

4 In all cases, the pre-charge voltage is significantly lower than the
5 programming voltage. The programming voltage is significantly higher than
6 the pre-charge voltage. That's the case in all of the prior art that has signal
7 timing diagrams in it. It's the case in Zhao, it's the case in Yang. In all of
8 those prior art references, the pre-charging voltage is very low, because its
9 intent -- the intent of that step is different than the intent of the programming
10 step. The intent of the programming step is to elevate the threshold of the
11 memory cells to make it store data, but the intent of the --

12 JUDGE CYGAN: Right. But in a sense, doesn't that make it
13 worse for your argument? If the problem is that you don't want to bleed the
14 two together, you want the first one to return down to zero, if your
15 programming voltage is ten times your pre-charge voltage, why is that a
16 concern that it's -- you have this one tenth of a volt as opposed to zero volts
17 before you go up to ten volts or one volt?

18 MR. HERMAN: Even if there is a voltage difference, you're going
19 to cause programming to occur earlier than you want it to, and you're also
20 going to cause the type of program disturb that all of these prior art
21 references are attempting to avoid. The program disturb in all of these prior
22 art references is caused by small amounts of electron movement in the
23 channel.

24 So even small voltage differences can have a large impact on the
25 program disturb that you're going to experience during the later
26 programming step. And by putting those two steps together, you're not only

1 adversely affecting programming, but you're also negating the purpose of
2 pre-charge, which is to allow electrons to distribute in a way that they don't
3 cause program disturb during the later pre-charge step.

4 So you're both impacting the type of pre-charge that's occurring
5 and impacting the type of programming that's occurring and, respectfully,
6 that's what Lee is trying to avoid is separating the two steps. So not only
7 does it say Lee says that it separates the two steps, but that's, again,
8 consistent with the types of components that were used to supply voltages,
9 it's consistent with the type of programming voltages that were applied in the
10 prior art at the time, but it's also consistent with all the other prior art of
11 record.

12 There's not a single example prior art reference in this record that
13 shows a pre-charge voltage being applied adjacent to a programming
14 voltage. There's not one example of that in the record. There are a lot of
15 examples in the record, Your Honor, of pre-charge voltages being pulsed
16 and programming voltages being separately pulsed and the word line
17 returning to zero volts in between. And there are a lot of examples of that in
18 the record, Your Honor, because that's the most obvious way to supply
19 voltages to a word line.

20 JUDGE CYGAN: So Counsel, can you talk about what's going on
21 in your Slide 29 in Figure 13? I think that Patent Owner had pointed this out
22 that for the word line, or WLn, after the pre-charge, there was a V pass
23 voltage, which didn't return to zero, but it went directly into the V program
24 voltage. I understand this is a little bit different than the pre-charge, and I'm
25 sure you'll point to the pre-charge as going back to a lower value, but is
26 there -- is this, as Patent Owner, I think, is alleging -- is this an example of a

1 situation where you do not need to return to zero? And if so, why is that not
2 disturbing the programming then?

3 MR. HERMAN: Well, so if you look at all of the word lines in
4 Figure 13, on Slide 29, every single one of those word lines is returning to
5 zero volts between pre-charge and programming. Every single one of them.
6 The only word line that does not return to zero volts is the bit line, but the bit
7 line -- the voltage applied to the bit line has a different purpose, but all of the
8 word lines -- every single one of the word lines -- start at zero, goes up to a
9 particular voltage, then returns to zero for a period of time before
10 programming begins. That's exactly how Lee, obviously, operates. That's
11 exactly how use of the types of standard components in the art would cause
12 word lines to operate, and it's also consistent with Dr. Liu's testimony.

13 JUDGE CYGAN: Okay, thank you.

14 MR. HERMAN: So I'll spend my last five minutes addressing the
15 combination of Zhao and Lee. And if we turn to Slide 32, the petition
16 explained why it would've been obvious to apply Lee's teachings -- in
17 particular, its use of increasing pre-charge voltages, as distance from the
18 selected word line increases to Zhao. Lee explains that this accounts for the
19 resistance effect of differing threshold voltages arising from stringing many
20 memory cells transistors together. You need to apply different voltages to
21 the word lines, connected to the transistor gates along a long channel to
22 obtain uniform pre-charge.

23 Turning to Slide 32, Patent Owner responds to this by arguing that
24 Zhao and Lee are incompatible and purportedly do not work together.
25 According to Patent Owner, Lee only engages in charging operations from
26 the source, while Zhao charges from the bit line. Patent Owner also argues

1 that Lee is meant to address a current flow problem, which isn't present in
2 Zhao. Respectfully, all of this is wrong. It's not how pre-charging works.
3 Turning to Slide 33, this slide --

4 JUDGE CYGAN: Counsel, before we go any further, if we were
5 to determine that Lee by itself doesn't make obvious a pulse, and that Zhao
6 by itself doesn't make obvious a pulse, how would we find a pulse in the
7 combination?

8 MR. HERMAN: So Zhao does pulse at least two groups of its
9 word lines. The dispute between the parties with respect to the Zhao ground
10 by itself refers to the third group, but in that -- in this obviousness
11 combination, we are arguing that following Lee's teachings, you would treat
12 the word lines that are between the drain and the selected word line in Zhao
13 differently. Now, those word lines in Zhao are already admittedly receiving
14 pulsed pre-charge voltages. The only modification that we're bringing in
15 from the Lee reference is instead of applying the same pulse pre-charge
16 voltage to all those word lines, following Lee's teachings, you'll apply
17 different pre-charge voltages to deal with the resistance effects along the
18 channel. So --

19 JUDGE CYGAN: And just to be clear, you're not sort of taking a
20 one for one saying, oh, Zhao by itself has Vss, I'm going to replace the Vss
21 with this one other line in Lee? Your combination is really, we're going to
22 rearrange all -- rearrange a lot of the lines in Zhao?

23 MR. HERMAN: No, Your Honor. I'll try to explain a little
24 further. Our combination is we will do exactly what Zhao is doing, which is
25 applying different pre-charge voltages around the selected word line. Now,
26 what Zhao does is it applies the same pre-charge voltage, which is calls V

1 pre-charge in the form of a pulse to the word lines that are between its
2 selected word line and the drain. So every single one of those word lines in
3 Zhao gets the same pre-charge voltage pulse.

4 What Petitioner is arguing is that following Lee's teachings, one of
5 ordinary skill in the art would understand that there's a problem with doing
6 that, and the problem with doing that is it does not take into account the
7 resistance component along that particular portion of the channel. And
8 following Lee's teachings, instead of applying only one pre-charge voltage
9 to those word lines, you would apply three or four or five, depending upon
10 how many word lines are between that selected word line and the drain side
11 of the memory. So we're not rearranging everything Zhao is doing. We're
12 just supplementing what Zhao is doing with Lee's teachings regarding what
13 you do on the drain side of a selected word line.

14 JUDGE CYGAN: Thank you.

15 MR. HERMAN: Now, before closing, I'd like to direct Your
16 Honors' attention to Slide 37, and Slide 37 includes Figures 4A and 5A from
17 Lee. Now, these two figures show memory strings being programmed in
18 opposite directions. In Figure 4A, Lee is programmed from the source to the
19 drain. That's the bottom to the top in the figure. In Figure 5A, Lee is now
20 programmed from the drain to the source. That's the top to the bottom
21 direction in the figure.

22 Now, Patent Owner has argued repeatedly that Lee is about pre-
23 charging from the source side, and it is correct that that's what Lee mentions.
24 So in both of these figures, you'd expect that pre-charging -- that pre-charge
25 channel voltage to be applied from the source side. Now, if Lee's different
26 pre-charge voltages had something to do with current flow for the distance

1 from the source of the channel voltage, as Patent Owner argues in its
2 response to this particular combination, you'd expect the word line voltages
3 near both figures tops to always get the highest voltage.

4 In both figures, those word lines are furthest from the source of
5 channel voltage. So if you follow Patent Owner's logic in Figure 5A, you'd
6 expect the word line closest to the source, that's word line one, to get the
7 lowest pre-charge voltage, and the word line furthest from the source, like
8 word line 23, to get the highest pre-charge voltage. But that's not what Lee
9 does in Figure 5A. There, it applies the highest word line voltage to the
10 word lines at the bottom, even though those word lines are closest to the
11 source of the channel voltage.

12 And what does that mean? It means that in Lee, the word line
13 voltages have nothing to do with current flow or how far a word line is from
14 the source of the channel voltage. Instead, word line voltages relate only to
15 how far a particular word line is from the selected word line in the direction
16 of programming. Zhao programs its word lines from the source to the drain.
17 That's the same way as shown in Figure 4A of Lee.

18 So a reasonable person having ordinary skill in the art, applying
19 Lee to Zhao, would follow the grouping and the associated voltages used in
20 Lee's Figure 4A when modifying Zhao, and higher voltages would be
21 applied to word lines further from the word lines selected for programming
22 to account for variations in threshold voltage as Lee itself teaches. And with
23 that, I'll reserve the rest of my time for rebuttal.

24 JUDGE CYGAN: Thank you, Counsel. You went about a minute
25 over into your rebuttal, so you have 14 minutes left for rebuttal.

26 MR. HERMAN: Thank you, Your Honor.

1 JUDGE CYGAN: Mr. Davis?

2 MR. DAVIS: Yes, Your Honor. We have --

3 JUDGE CYGAN: How much would you like for your surrebuttal?

4 MR. DAVIS: Fifteen minutes, Your Honor.

5 JUDGE CYGAN: Okay.

6 MR. DAVIS: And while you're doing that, we have a paper copy
7 of the demonstratives. Would that be helpful at all or you prefer electronic?

8 JUDGE CYGAN: I have a paper copy.

9 MR. DAVIS: Okay, sounds great. Thank you. May it please the
10 Board.

11 JUDGE CYGAN: Please go ahead.

12 MR. DAVIS: Petitioner's arguments here are largely self-
13 defeating. If you look at Ground 1 in the Lee reference, they argue that pre-
14 bias voltages must necessarily be pulses, but they cite art that acknowledges
15 that there are other ways to apply these voltages.

16 With respect to Ground 2, they argue that Zhao's flat voltage is a
17 pulse, even though both parties agree that to be a pulse, the signal has to go
18 up in voltage and then down, or vice versa. And with respect to Ground 3,
19 they try to fix gaps in both Lee and Zhao, by combining the two, and yet ask
20 the Board to ignore the very teachings in those references.

21 Now, I'll start with Slide 11. As I mentioned before, I'll be
22 addressing the independent claims and Mr. Bonny, my colleague, will be
23 addressing the dependent claims. Slide 11 has an excerpt of Claim 1 and its
24 requirements relating to the pre-pulse signal limitations and Claim 11 has
25 similar requirements. Both of them require an application of three separate
26 pre-pulse signals, to three separate groups of word lines during a pre-charge

1 period, where the third signal's voltage is greater than the second's and the
2 second's is greater than the first.

3 If you turn to Slide 12 of Patent Owner demonstratives, you see an
4 illustration there of how that's described in the '822 patent. As was
5 acknowledged earlier, what the inventors here were trying to solve was a
6 problem relating to what's called program disturb, and this occurs
7 particularly when you are trying to program a lot of memory cells that are in
8 close proximity to each other, for example, as would occur in 3D NAND
9 memory cells.

10 And as Your Honors know, the way you might program a memory
11 cell, if you take out a word line on an X axis and you take a bit line on a Y
12 axis and you apply a high voltage to that word line, you want to draw a lot of
13 electrons into and charge and program that particular memory cell. The
14 program with that is those electrons can also end up in some of the other
15 neighboring memory cells. And so what the inventors set out to do here was
16 try to find a way to solve for that program disturb that can occur, and it
17 particularly is exacerbated in the lower side of the bit line, as you get
18 towards the bottom, as you get closer to ground or VSS, whatever that
19 setting is.

20 And so what they developed is a way to apply voltages to create a
21 gradient and they illustrate this, an example of it in Figure 4, where you
22 might have increasing voltages up from the selected word line, through the
23 bottom set of word lines, to the middle, to the top set of word lines. Each of
24 those groups having an increasing voltage.

25 And importantly, each of those voltages is applied as a pulse set
26 for a particular duration. For example, Figure 4 depicts those durations

1 being different, increasing from the bottom word line up to the top word
2 line. That allows for the -- and I kind of think of this non-technically as
3 sweeping away of those electrons -- creating gradient to draw away those
4 electrons from what you're trying to -- the area you're trying to work in that's
5 close to that selected word line.

6 Now, as is recognized on Slide 12, there's no dispute between the
7 parties that to be a pulse, that voltage signal has to go up and then down, or
8 down, then up. And if we turn to Slide 13, they run immediately into a
9 problem with that construction in their Lee grounds.

10 Lee says nothing about a pulse. All it says is voltages are applied.
11 It says a pre-biased voltage is applied during this pre-charge operation. This
12 is in that middle quote there that comes from Column 9, lines 7 to 13 of Lee,
13 and a program voltage may be applied during the programming process.
14 And it talks about, in Figure 7, those two specific steps going from one right
15 into the other. It never mentions pulsing that voltage. It never mentions
16 lowering the voltage before you might increase it then as part of the
17 programming step.

18 And so Petitioner -- and this is on Slide 14 -- pivots. They know
19 they need to argue obviousness and they argue in their petition that
20 programming voltages were conventionally provided in the form of a pulse.
21 The problem they have with that argument, as we pointed out in the Patent
22 Owner response and Dr. Przybylski explained as shown in the two quotes
23 here in paragraphs 27 and 87 of his second declaration, programming pulses
24 have very different purposes from pre-programming or pre-charging.

25 The purpose, as we talked about for programming, is to apply a
26 very high voltage for a very particular period of time, whereas for pre-

1 charging, that objective can change from reference to reference. And in the
2 Lee reference -- and if we flip forward just a couple more slides to Slide
3 16 -- you see what Lee is trying to do. This is the top quote there, Column 7,
4 lines 58 to 62, and that same concept is repeated again at Column 8 and
5 Column 9 in the cites that we have provided there on the slide.

6 Lee's objective is to provide a uniform pre-voltage across all of the
7 work lines. So it's trying to smooth everything out everywhere. It's not
8 trying to program in one particular spot. A very different objective than
9 what you might try to do with a conventional pulse under Petitioner's
10 arguments.

11 JUDGE CYGAN: Counsel, did you have any testimony from your
12 declarant on this point?

13 MR. DAVIS: Yes, Your Honor. On Slide 14, Dr. --

14 JUDGE CYGAN: Slide 15?

15 MR. DAVIS: 14, Your Honor.

16 JUDGE CYGAN: 15.

17 MR. DAVIS: Sorry, Your Honor. I was trying to refer back to
18 Slide 14.

19 JUDGE CYGAN: Oh, sorry.

20 MR. DAVIS: Apologies for talking past each other, but we've
21 excerpted passages from Dr. Przybylski on those points, paragraph 87 of his
22 rebuttal declaration and paragraph 27, both of them explaining how
23 programming voltages and pre-programming or pre-charging is sort of very
24 different purposes, and he goes on to elaborate in these paragraphs, as well.

25 So Petitioner then falls back to the concept of effectively
26 inherency. This is on Slide 17 and this is their reply brief, but they argue

1 voltages would need to be generated, typically by a charge pump illustrating
2 that by their logic, charge pumps are only typically used, not always used,
3 and that a person of ordinary skill in the art would've understood that the
4 voltages applied to Lee's word lines would need to be or at the very least,
5 would obviously be pulsed. There's multiple problems with Petitioner's
6 logic here.

7 Your Honor, as you pointed out as an example earlier, if the
8 programming voltage is higher, it doesn't make any sense to go back down
9 to zero or ground or whatever, whatever it happens to be, before you go back
10 up again to a higher programming voltage, illustrating that there's not a need
11 to or you don't have to necessarily do that, or you don't have to necessarily
12 apply a pulse.

13 Lee itself doesn't make reference to a charge, let alone explain how
14 that charge pump would operate or describe what the signal wave forms
15 might be, or provide any additional information to a person of ordinary skill
16 in the art. But the other references Petitioner points to, like the Yang
17 reference, which we have excerpted here on Slide 17, illustrates various
18 examples where you have a voltage going from one setting to another setting
19 without going back down to zero.

20 At the very top, highlighted in purple, you have a V pre-charge
21 that's going to a V inhibit without going back to zero. In the middle, you
22 have a blue highlighted -- in Figure 8B, this is the word line VSB2, where
23 it's going from V bypass to V pre OD, and Your Honor had also pointed out
24 the example of going from V pass to V program. All those examples are
25 examples where a pulse isn't being applied. You're going from one voltage
26 to another voltage. You don't need to go back down to zero, as Petitioner is

1 arguing.

2 JUDGE CYGAN: And Counsel, besides those examples, do you
3 have any statements from either of the declarants that mention you don't
4 need to go back down to zero?

5 MR. DAVIS: Your Honor, these arguments were new in the reply
6 briefs, so that -- we didn't have an opportunity to put in another declaration
7 from Dr. Przybylski on these points. But what he did explain and actually
8 what we show here, as well, as Your Honor mentions, both in Yang, as well
9 as in the Zhao reference, Figure 13 is excerpted on Slide 19 where you have
10 the VSS voltage, as Your Honor was pointing out, that's applied during the
11 pre-charge period, but it's just a flat voltage that's being applied, that then
12 goes to another voltage V bypass in the programming phase. So, another
13 illustration how you don't have to have a pulse that isn't required.

14 Another new argument that Petitioner raised in its reply brief, and
15 this is at Slide 18, just flipping back one slide, is this incremental step pulse
16 programming. This, again, reference and argument was brand new in the
17 reply. It's discussed, for example, at pages 7 to 8 of the reply, but this
18 reference itself isn't part of the ground. They're relying on the Lee reference,
19 not on the Aritome reference that they show here for incremental step pulse
20 programming.

21 And more to the point, this is, again, about how you would go
22 about programming, not pre-programming, not pre-biasing, and certainly not
23 in the context or with the goal that Lee sets forth of having a uniform pre-
24 charge applied across the word lines. Unless there's any further questions on
25 Ground 1, I'll turn to Ground 2, Your Honor. Thank you.

26 So with respect to Ground 2, as I was just mentioning as shown on

1 Slide 19, this is Figure 13 of the Zhao reference, one of the three voltages or
2 signals that they're relying on is this Vss voltage, and Your Honor had a
3 number of questions about that I'd like to try to address. I'm happy to
4 address any more, but Your Honor is correct that for Vss, they -- and this is
5 the second quote there -- Zhao explicitly says, the remaining source light on
6 selected word line N-X remain at Vss, and they just provide an example of
7 that. It could be zero volts.

8 In the quote about that, they further describe -- and I apologize,
9 just to provide the cites, that was at Column 23, lines 5 and 12. At Column
10 19, lines 22 to 24, which is the second quote from the bottom that we have
11 on that Slide 19, it says, unselected source side where lines receive zero
12 volts or one or more voltages that are to load a pre-charge, explaining what
13 that e.g. means. It doesn't mean zero. It means some low voltage, but
14 regardless what that low voltage is, it is kept flat during the pre-charge phase
15 and would not meet the requirements of a pulse.

16 Petitioner also argues, and this is on Slide 20, and they again raised
17 this argument here today -- this is an argument that they raised in their reply,
18 that all signal lines have to go up and then go back down to ground or Vss,
19 but they ignore the expressed teachings of Zhao. Zhao expressly says that --
20 and it's, again, that same quote from Column 23, it's at the very bottom of
21 the slide here, Slide 20 -- the remaining source side unselected word lines at
22 WLn-X remain at Vss, e.g. zero volts at time T-3.

23 And then it lists out all the other word lines, except for word lines
24 N-X because those were already at Vss. They're not returning back down to
25 ground. So Petitioner's entire argument there is flawed. They're
26 mischaracterizing what the Zhao reference itself teaches. Unless there's any

1 questions on Ground 2, I'll turn to Ground 3, Your Honors.

2 So Ground 3, again, as I mentioned, kind of tries to cure the
3 infirmities of both, Zhao and Lee, by combining them together, but as Your
4 Honor points out, Zhao doesn't disclose pulses. The Vss line that they rely
5 on -- excuse me -- Lee doesn't disclose pulses. The Vss line that they rely
6 on in Zhao also doesn't disclose a pulse and they can't cure by combining the
7 two, but in addition to that, there's also a number of problems with the
8 motivation to combine.

9 If we start first on Slide 22, the first of those problems is that in
10 their petition, Petitioner just ignores how these particular disclosures are
11 operating. The Lee reference pre-charges from the source line, so from the
12 bottom, whereas the Zhao reference pre-charges from the bit line from the
13 top. Now, that directionality may not seem like it matters at first blush, but
14 you have to remember that the bit line at the very top is at a very different
15 voltage than the source line that's at the bottom. So when you're pre-
16 charging from one direction or another, it makes a big difference. That's
17 illustrated on Slide 23 in the Yang reference, that Petitioner also cites to as
18 one of their grounds, but they didn't address it today.

19 The bit line pre-charging and the source line pre-charging, and the
20 bit and source line pre-charging are provided as examples in Figures 8C, 9C,
21 and 10C, respectively. And if you look at the different wave forms that are
22 used for each of those three different setups, they're all different because it
23 makes a big difference whether you're pre-charging from the bit line or the
24 source line. Petitioner's petition ignores this entirely, and it comes back to
25 bite them because the way in which they're trying to apply these teachings
26 that we'll get to in a second. The second problem with --

1 JUDGE CYGAN: Counsel, can you explain why -- can you talk a
2 little bit about the difference in the biasing between the bit and the source
3 line pre-charging and what's special about it that -- if a person of ordinary
4 skill in the art would take the concept and try to, let's say, merge the concept
5 of Lee together with Zhao, is there something about that that is different
6 from just taking the bare concept and saying, well, I understand that we're
7 looking at a different -- we're looking at source line, the bit line, or the
8 opposite. What's sort of our hurdle here that's being contemplated?

9 MR. DAVIS: Yes, Your Honor, and I'm happy to skip right to that
10 one. This is our third rationale. It's on Slide 26. And I'll come back to the
11 second problem with -- not rationale. I should've said a problem with their
12 rationale. I'll come back to the second one in just a moment, but this is
13 assuming that Lee's teachings of there being a resistant component between
14 the drain select transistor and the source select transistor, so between the top
15 and the bottom, could somehow exist in Zhao, and we submit that it can't.

16 But assuming that it can, the principle that's being taught in Lee is
17 that when you are pre-charging from the bottom, from the source, you want
18 to -- and they illustrate this at Petitioner -- page 41 of the petition, it's
19 excerpted on Slide 26 -- where you want to increase the pre-pulse signal
20 voltage the further away you are from that source where you're pre-charging
21 from, because you're encountering more and more resistance as you go
22 along. So the voltages, the further away you are from that source, need to be
23 higher.

24 The directionality really matters when you start applying that
25 concept to Zhao. If you turn to Slide 27, as we talked about before, Zhao is
26 pre-charging from the top. So if you're going to apply Lee's concept of

1 increasing word line voltages to Zhao, you want to increase the word line
2 voltages, the further away you are from the top, so the lower you are down.
3 Well, it's exactly the opposite of what Zhao teaches. Zhao teaches word
4 lines N through X, the very lowest of the word lines that are depicted there
5 on Figure 13, that you want to have those as Vss or ground, or some low-
6 level voltage. You wouldn't be having -- you wouldn't have increasing
7 voltages on that end.

8 Now, Petitioner, in their slides -- this is on Slide 7 -- he references
9 this at the very end. Now, on the left-hand side of Slide 7, you see Figure
10 4A, which is what they relied on in their petition. And in Figure 4A, there is
11 a description in the Lee reference that says you're pre-charging from the
12 bottom, from the source line. I think it's at Column 8, lines 65 to 67.

13 In contrast, they never relied on Figure 5A in their petition. They
14 put it in for the first time in their reply and they cite no support in the
15 description of Figure 5 that says we are pre-charging from the source line.
16 In fact, that's contrary to the concepts that are being taught in Lee because
17 Lee is saying if you have this resistance component, the further away you
18 are from where the pre-charging is starting, the higher the voltage needs to
19 be.

20 It only makes sense then because Lee is otherwise silent in the
21 context in Figure 5A for the pre-charging to be coming from the drain at the
22 very top. But again, this whole concept wasn't in the petition. It was brand
23 new in the reply, and they don't cite support for the pre-charging to be
24 coming from the source at the bottom in the context of Figure 5.

25 There's an additional problem, Your Honor. Any other questions
26 on that issue, Your Honor? There's an additional problem, Your Honor, as I

1 mentioned before -- this is on Slide 24 of Patent Owner's slides -- in the
2 context of Lee. The primary motivation that a Petitioner points to, and this
3 is -- they point to about eight times in their petition -- is this quote from Lee
4 in the very middle of the slide, Column 8, Slides 25 to 31. And it's saying
5 there's this resistance component that I referenced before between the drain
6 select transistor and the source select transistor. The problem they have with
7 that argument is that unlike in Lee, where there's apparently current flowing
8 between the drain and the source select transistor, Zhao cuts that current off.

9 If we look at Slide 25, Zhao -- this is the same Vss that we've been
10 talking about before. The Vss that's applied to word lines N through X
11 basically create an open circuit for those transistors, and I don't think this is
12 disputed between the parties that in the context of Zhao, there isn't current
13 flowing. The transistors applied with -- as Dr. Przybylski describes at the
14 very bottom here, and I think this is a quote from paragraph 120, but he
15 discusses this issue in paragraphs 117 to 121. Those transistors applied with
16 Vss are turned off and act like open circuits, so therefore, there is no current
17 flow. Without current flow, you're not concerned about some supposed
18 resistance component.

19 Now, this was the whole of the motivation that was provided in the
20 petition. In reply, and I noticed that Counsel didn't raise this argument
21 again, but in reply, Petitioner tries to rewrite the disclosures in Lee to say
22 Lee actually isn't talking about resistance. It's talking about some sort of a
23 body effect. That's mentioned nowhere in the Lee reference, nor is it
24 applicable to Zhao. The concept of a body effect means there has to be
25 some sort of potential difference between the substrate and the individual
26 transistors.

1 The transistors in the context of Zhao, as Dr. Przybylski explains at
2 paragraph 119, are all in the same substrate, so there's no potential
3 difference, there's no additional resistance to account for, so there's no body
4 effect that would be applicable to Zhao, even if you were to rewrite the Lee
5 reference, and even if the Petitioner could rewrite its sole motivation
6 argument.

7 JUDGE CYGAN: Counsel, can you explain that a little bit?
8 Because Zhao Figure 13 is certainly showing word lines, which are part of
9 its memory cells, and they're being charged during pre-charge. So which of
10 Zhao's memory cells are not conducting during pre-charge?

11 MR. DAVIS: It's the ones that are associated with word line N-X,
12 and this is if I turn back to Slide 25. Those particular transistors are being
13 applied a low voltage, so they're effectively acting, as Dr. Przybylski
14 explains, they're turned off. They're acting like open circuits, such that
15 there's no current flowing between the two. Petitioner's position is there's
16 never any current flowing in this context -- in the context of Zhao. It asserts
17 that the same applies to Lee, and we disagree with that because Lee is
18 talking about a resistance component. But that's -- it's those particular
19 memory cells, Your Honor, word lines N through X, that are turned off.

20 JUDGE CYGAN: So word lines N through X are the -- correct me
21 if I'm wrong -- but my understanding is that those are all of the word lines
22 between the second word line from the selected word line, which is WLn-2.
23 All of those between WLn-2 and the source line, essentially, besides the
24 SGS, but that's (INDISCERNIBLE - TECHNICAL DIFFICULTY) word
25 lines and they're being turned off.

26 MR. DAVIS: Yes, Your Honor, and I --

1 JUDGE CYGAN: They are pre-charging only, correct?

2 MR. DAVIS: Correct, Your Honor, and I misspoke. I should have
3 said word lines N minus X, but yes. Same concept.

4 JUDGE CYGAN: And how do we know they're being turned off?

5 MR. DAVIS: Your Honor, it's because those transistors
6 themselves are applies a Vss from the word line, and so when the
7 transistor -- when the word line gets a zero voltage, it's turning off the
8 transistors. For reference, the transistors that we're talking about overall, if
9 you look in the context of Figure 4G, you're looking at there being some
10 sort -- we're looking at the current flowing kind of top -- between top and
11 bottom, between drain and source. And it's those ones that are in the blue
12 that are below the V bypass that would be turned off. I don't think that's a
13 dispute between the parties either, Your Honor.

14 JUDGE CYGAN: So essentially in Figure 4G, it's not really
15 shown, correct? Because it just starts with --

16 MR. DAVIS: That's correct, Your Honor. We were using the
17 excerpts. These are Petitioner's annotations, but we were trying to address
18 the arguments that they were raising.

19 JUDGE CYGAN: I'm trying to understand if it's being turned off
20 because of the Vss voltage being zero because that seems like it's an open
21 question that it may be more than zero or if it's being turned off because of
22 the voltage at 411.

23 MR. DAVIS: I appreciate that point, Your Honor. I think what
24 might help, Your Honor, is the quote from Zhao that's immediately above
25 the quote from Dr. Przybylski on Slide 25. This is Column 19, lines 22 to
26 24. It's saying unselected source slide word lines receive zero volts or one

1 or more voltages that are too low to pre-charge, meaning too low to turn that
2 on. That's what Dr. Przybylski addresses in the context of paragraphs 117 to
3 121.

4 JUDGE CYGAN: Okay. So in Slide 24, it's really -- what you're
5 really saying is that Zhao's memory cells are not conducting sufficiently to
6 pre-charge, so that's consistent with Slide 25. It's not that there's zero
7 conductivity. It's just that it's minimal conductivity.

8 MR. DAVIS: And such that there's no current flow, such that
9 you're not -- you don't have any sort of resistance component to account for
10 in the context of Zhao.

11 JUDGE CYGAN: And that's supported by your expert?

12 MR. DAVIS: Yes, Your Honor.

13 JUDGE CYGAN: Okay, thank you.

14 MR. DAVIS: And just the last point before I pass it over to Mr.
15 Bonny here on Ground 3, this is on Slide 28. Petitioner is looking at this
16 concept -- this problem of program disturb and it's saying, well, Zhao is
17 talking about program disturb, Lee is talking about program disturb.
18 Therefore, those two solutions have to be complimentary, but when you look
19 at the solutions that are being proposed by the two, they're very difficult.

20 Lee -- this is on Slide 16 -- we talked about before how this is the
21 quote from Lee and we cite several different passages, but one of the quotes
22 in the middle of the slide there is that it's looking for a uniform pre-voltage
23 across the word lines. In contrast, Zhao -- let's look at Zhao's wave forms
24 you see on Slide 27 -- Zhao is applying all sorts of different voltages
25 because it's trying to achieve -- it's trying to solve for program disturb in a
26 very different way.

1 In particular, it's trying to solve for program disturb by applying
2 these bypass voltages that you see at word line N-1 and N-2, and you see
3 that Zhao describes this -- this is on Slide 28, again -- by applying those
4 bypass voltages, it allows the -- whatever excess electrons there might be
5 there to migrate up past the selected word line, up towards the higher -- more
6 higher charged bit line as a way to eliminate the -- whatever excess electrons
7 might be there because of program disturb.

8 The two goals of Zhao and Lee when they're trying to solve for
9 program disturb, one applying bypass voltages in a very targeted area and
10 Lee saying, let's try to make all the pre-charging levels the same, are just
11 simply very different and not compatible with each other. Your Honor, I
12 noticed that there weren't any arguments on the fourth ground of Yang. If
13 Your Honor has any questions on that ground, I'm happy to answer them.
14 Otherwise, I'll pass the podium to Mr. Bonny.

15 JUDGE CYGAN: I just have one question on the Zhao/Lee
16 combination.

17 MR. DAVIS: Yes, Your Honor.

18 JUDGE CYGAN: If the Zhao/Lee combination is really
19 supplanting Zhao's technique between the selected word line and the bit line,
20 why isn't it okay to solve a similar problem in a different way?

21 MR. DAVIS: A couple of different issues, Your Honor. First,
22 when you try to apply Lee as teaching that concept, you have to take into
23 context why Lee is teaching to apply those higher voltages at the higher
24 level. Lee is saying that because you're further away from where the pre-
25 charge is coming from. So when you try to apply that concept to Zhao, you
26 wouldn't apply it between the selected word line and the bit line. You apply

1 it -- instead of between the selected word line and the source line, because
2 that's what's further away from the pre-charging in the context of Zhao.

3 So that's why the -- when I started off saying there's a difference
4 between charging from the bit line and source line, that's why it really
5 ultimately matters here. I mean, there's other complications that need to be
6 accounted for when you switch like that, but kind of as a starting point and
7 they never address this in their petition, they needed to consider, all right,
8 what's the directionality of the pre-charging, where is that coming from, all
9 right, then how is that affecting the motivation that we're supposedly relying
10 on.

11 Instead, they're just using hindsight in saying, well look, here's a
12 bunch of word lines, let's line them up together. Okay, let's apply these
13 higher voltages from Lee and the context of Zhao, not paying attention to
14 why Lee is teaching to increase those voltages.

15 JUDGE CYGAN: And Petitioner's counter-argument was, well,
16 why don't we just charge from the bit line side. What would your response
17 be to that?

18 MR. DAVIS: And Your Honor, I think that's what their argument
19 is in the context of Figure 5A, which they introduce for the first time in
20 reply. The problem with that is they have no disclosure from Lee that says
21 in the context of Figure 5A, we are charging from the bit line -- excuse me --
22 charging from the source line and not from the bit line. In fact, the
23 motivation that's earlier described in Lee for Figure 4 is saying the further
24 you are from that pre-charging, the higher you need to increase that voltage
25 as you're going up.

26 When you apply that concept to Zhao where it's charging from the

1 bit line, that means you want higher word line voltages the lower you go, the
2 farther away you get from that source of pre-charging, and that directly
3 conflicts with Zhao's teachings where it's saying, let's just apply a flat Vss
4 for those very bottom word lines. So those two concepts are directly
5 contrary to each other.

6 JUDGE CYGAN: Thank you.

7 MR. DAVIS: Thank you, Your Honor.

8 MR. BONNY: Your Honors, I will address the disposed terms,
9 which was the second set of issues. First, I will address the claim
10 construction aspect of this, and specifically, I'll explain how Patent Owner's
11 construction is overwhelmingly supported by the claim language, the
12 specification, and the intrinsic evidence, while Petitioner repeatedly ignores
13 relevant claim language, including the key functional language disposed.

14 And then second, I'll address the teachings of Lee and specifically
15 how Lee is clear that it forms groups before selecting a word line for a
16 subsequent programming operation. And then finally, I'll just briefly touch
17 on Yang, which Petitioner did not address in its opening presentation.

18 So jumping to Slide 33, there are two sets of claims that speak to
19 disposing groups of word lines with reference to a selected word line, and
20 that's Claims 2 and 12, which recite that the groups of word lines are
21 disposed in an order of distance from the selected word line, and then
22 Claims 3 and 13, which recite a first group that's disposed adjacent to the
23 selected word line.

24 And now Patent Owner's proposed construction is that the claims
25 require that the groups are disposed in order based on the location of the
26 selected word line, that's in Claims 2 and 12, or disposed adjacent to the

1 location of the selected word line, and that's Claims 3 and 13. So first, this
2 interpretation gives proper meaning to the functional language in the claim
3 term, which is the word disposed, and I'll address that issue further in a few
4 minutes.

5 Second, the groups must be -- so rather, for the groups to be
6 disposed in an order of distance from the selected word line or adjacent to
7 the selected word line, a word line must first be selected. That makes sense
8 in the context of the claimed memory device because these word lines are
9 constantly changing which one is selected, depending on which word line is
10 being programmed.

11 And then third, Patent Owner's interpretation is consistent with the
12 purpose of the claimed invention as discussed by my colleague, Mr. Davis.
13 As he explained with reference to Figure 4 of the '822 patent, the purpose of
14 the claims is to reduce programming disturb by setting up a grading of pre-
15 pulse signals across the word line groups, with the pre-pulse signals varying
16 according to distance from the selected word line.

17 And so various factors play into that, like the size and position of
18 groups, the voltage and the pulsation, but these claims here are specifically
19 directed to the groups and their relative positions rather than the voltages.
20 And so it is the grouping that it's based on the location of the selected word
21 line that is one of those -- the things that helps further this grading of pre-
22 pulse signals that reduces programming disturb.

23 JUDGE CYGAN: Counsel, with respect to the “disposing in an
24 order of distance from,” does the claim require any particular ordering? Can
25 they be -- as long as they're disclosed in some ordering, does it matter if it's
26 one, two, three, or three, two, one?

1 MR. BONNY: Well, it is clear in the claim that it's in an order of
2 distance from the selected word line, and then that claim in conjunction with
3 the independent claim, further solidifies the particular order here because the
4 independent claim references the specific pre-pulse signals that are applied
5 to each group, and so it's the combination of those claims also that further
6 solidifies the particular order that's required here.

7 JUDGE CYGAN: But is there anything that tells the reader
8 whether the first word line should be the closest or the first word line should
9 be the furthest away?

10 MR. BONNY: The natural reading of the claim is that the claim is
11 saying in order of distance, and I believe there's no disagreement from the
12 parties on this issue, is that the first word line, when you put them in order
13 and in the order of distance from the word line, that means that the first
14 group is closest to the word line -- selected word line, rather -- and then they
15 increase in numbering away from the word line. And again, there's no
16 dispute between the parties that that is the way this claim is interpreted.

17 JUDGE CYGAN: Okay, thank you.

18 MR. BONNY: So turning to Slide 34, I also wanted to address
19 briefly the specification support. The specification describes a grouping
20 process and it's clear that the word line is selected, and then based on that
21 selection of the word line, the word lines are then divided into groups based
22 on that selection, and this is described, for example, at Column 5, lines 24
23 through 34.

24 Next on Slide 35, Patent Owner's construction is also supported by
25 the plain meaning of disposed. The record actually includes four separate
26 dictionaries that support Patent Owner's construction and Petitioner has not

1 rebutted this plain meaning and has not presented any competing definitions.
2 And in fact, as I'll explain in just a moment, they repeatedly ignore the term
3 "dispose" in the claims.

4 JUDGE CYGAN: Counsel, is there anything in the definitions that
5 has a time limitation? I believe that was one of Petitioner's contentions.

6 MR. BONNY: So I think the time limitation here is a bit of a red
7 herring. There's not a direct time limitation. Rather, it's because the
8 disposing is based on the selected -- or in the word of the claim is disposed
9 in an order of distance from the selected word line. You have to have a
10 selected word line to be able to dispose the word lines in that particular
11 order, and so that's the basis for this requirement that the word line must be
12 known in order to dispose the word lines based on the location of that
13 selected word line.

14 JUDGE CYGAN: And as long as at some point in time, those
15 could show a selected word line and then in ordering of the other word lines
16 in the claim configuration, that's sufficient, as long as there's one example of
17 it?

18 MR. BONNY: Yes, but with a caveat. It still has to be based on
19 the selected word line, and so as I'll explain, the word disposed is a key
20 important word in the claim. It's a functional term here and if the disposing
21 of the word lines was not based on the selected word line and they just
22 happened to be in an order that appears to match what Petitioner is saying,
23 that wouldn't be sufficient, but as far as to how many instances you would
24 have, that's correct, Your Honor.

25 So turning to Slide 36, there's a couple formulations of how
26 Petitioner has presented what they view the claims as requiring and one of

1 them is shown here on Slide 36. They argue that for purposes of Claim 2, all
2 that matters is that there be a first, second, and third group of word lines to
3 which pre-charge voltages referenced by the claim can be applied.

4 And notice that completely absent from that formulation, which
5 was in the reply at 10 through 11, is any mention of the selected word line or
6 groups disposed in any order of distance from the selected word line, and
7 there's just no concept of disposing or ordering whatsoever in that
8 formulation. The petitioner, in this example here, is simply ignoring the
9 claim language.

10 And this is repeated again if we jump to Slide 38. They argue that
11 the prior art does include examples of word line groups that adjust via the
12 application of different voltages as the selected word line changes. But this
13 is, as I mentioned, another example of ignoring the claim language. The
14 groups don't merely adjust -- the must be disposed in a specific way that
15 depends on their position relative to the selected word line.

16 And I want to touch, again, or go into more detail rather on the
17 dispose word in the claim with reference to Slide 37. Petitioner, although
18 they didn't mention this in their opening presentation, they argued in their
19 reply that some of these claims are apparatus claims and cover what a device
20 is and not what it does.

21 Briefly as an initial matter, that obviously doesn't address the
22 method claims, but even with respect to these apparatus claims, which is
23 Claims 2 and 3, Petitioner ignores that the functional language ignores that
24 functional language is highly relevant to computer-based claims like this
25 one, which if you look back to independent Claim 1 from which these claims
26 depend, it recites a memory device comprising a control circuit that is

1 configured to perform certain functionality. And that control circuit
2 specifically is configured to apply various pre-pulse signals to these
3 groupings. These dependent Claims 2 and 3 hang off of that limitation or
4 those limitations, rather, and provide further limitation on that configuration.

5 So in that context where the apparatus claim and the computer
6 context includes functional language like dispose, the Federal Circuit has
7 made clear that what the device does is actually highly relevant and this
8 comes from the INVT v. International Trade Commissions case that's cited
9 on Slide 37. And even further beyond that, the Federal Circuit in that case
10 expressly distinguished the Hewlett-Packard case that was cited by
11 Petitioner, and that's in the INVT case at page 1376.

12 JUDGE CYGAN: Counsel, can you explain your argument about
13 what the claimed invention is doing as opposed to just the arrangement of it?
14 If Petitioner were able to point to an arrangement of it, what more would
15 need to be shown?

16 MR. BONNY: Well, because this is a functional claim limitation
17 and is how the memory device is configured, the memory device in the
18 claimed control circuitry needs to be configured to do a certain thing. And
19 that specific thing that is recited is setting up these groups in order based on
20 the selected word line. And so it's not enough for there to be a set of groups
21 that are in a particular order. This device -- and to use the language from the
22 Federal Circuit -- INVT International Trade Commission, there must be
23 proof that when put into operation, it in fact executes all of the claimed
24 functions, and I was talking specifically about a computer implemented
25 apparatus claim.

26 JUDGE CYGAN: Counsel, there's no -- in either 1 or Claim 2,

1 there's no function that's being recited that has to be performed. The
2 limitation of the control circuit is just telling you what -- which voltages
3 your applying where, correct? And what the relative voltages are. So if
4 Petitioner can point to you that arrangement, it's being done -- there's no
5 contention it's not being done by the control circuit, correct?

6 MR. BONNY: If you're referring to -- are you referring to the
7 language in the independent claim?

8 JUDGE CYGAN: Well, I'd take them both together. I'm trying to
9 understand where there's a requirement that the circuit do something. All I
10 understand from the claim language is that the control circuit has to apply
11 pre-voltages, they have to be in these proportions of voltage signals, and
12 that's in Claim 1. And then in Claim 2, they have to be disposed in an order
13 or distance. And for Claim 2, if the prior art, again, their control circuit,
14 selects different lines and it meets these limitations -- the voltages, the
15 disposed of difference. I'm trying to understand if there's anything
16 additional that you're arguing needs to be done past that.

17 MR. BONNY: Yeah. Yeah, so in the independent claim, you have
18 these various applying steps, which are clearly functional. And then in the
19 dependent claims -- the apparatus claims, specifically, not the method
20 claims -- you have this dispose term, which Patent Owner's position in our
21 construction is that that is a functional term. That is requiring actually
22 disposing these groups in the particular recited order based on the location of
23 the selected word line, and that's supported by, as I mentioned, the
24 specification, the plain reading of the claim, and also, the extrinsic evidence
25 for the word dispose.

26 JUDGE CYGAN: I don't think that's the point of contention. I

1 think the point of contention is if they do show that the prior art does dispose
2 these in that order, at one time, it meets that configuration. That's all the
3 claim needs to do. There's nothing past that, correct?

4 MR. BONNY: Right, but as I'll get to in a moment, they have not
5 shown that the prior art does that. They have not shown that it disposes
6 these groupings in that order based on the location of the selected word line.

7 JUDGE CYGAN: Thank you.

8 MR. BONNY: And so I'll just address that briefly. For Lee -- this
9 is on Slide 39 -- the main issue with Lee -- I'll skip over the top half of the
10 slide -- the main issue with Lee is that it specifically discloses that the
11 groups are determined before a word line is even selected, and so there is no
12 possible way that Lee has disposed the word lines in order of distance from
13 the selected word line because there wasn't even a selected word line when
14 those groups were disposed. This is explained in Lee at Column 10, line 63,
15 through Column 11, line 9.

16 The Petitioner has now pivoted in its reply to arguing that under
17 Patent Owner's construction, Lee still has this limitation because they argue
18 that two groups merge to form a new group, effectively, but this is really just
19 the same argument recast in different words. Setting voltages does not
20 equate to disposing groups and it leaves clear that it determines the
21 groupings without reference to the selected word line.

22 And finally, even if this were equivalent to forming a new group,
23 this is still, at most, only one new group, even under their theory, whereas
24 the claims require three groups disposed in a particular order from the
25 selected word line. And I'll stop there and reserve the remaining time for
26 surrebuttal, unless Your Honors have more questions on Lee or the Yang

1 reference, which Petitioner did not address in the reply.

2 JUDGE CYGAN: No. Thank you, Counsel.

3 MR. BONNY: Thank you, Your Honor.

4 JUDGE CYGAN: You have two minutes remaining, so you have
5 your full rebuttal time left. Mr. Herman? You can proceed when ready.

6 MR. HERMAN: Thank you, Your Honor. As I did during my
7 opening remarks, I'll start again with the Lee reference. Now, Petitioner
8 submits that here, all that Patent Owner and its expert have done in their
9 briefing, and again today, is theorize about other hypothetical ways voltages
10 could be supplied to Lee's word lines. Petitioner submits that there's a
11 fundamental issue with this, and that issue is that this is an obviousness case.
12 It's not an anticipation case.

13 So the mere fact that Patent Owner and its expert can come up with
14 some other hypothetical alternative way to supply pre-charge and
15 programming voltages that don't entail the use of a pulse says nothing about
16 what a person having ordinary skill in the art would have concluded from
17 Lee and from the other prior art and background knowledge that one of
18 ordinary skill in the art would have possessed. Alternatives do not rebut
19 obviousness.

20 So what would have been obvious in view of Lee? Petitioner
21 submits that application of pre-charge voltages in the form of pulses is what
22 would have been obvious here. Once again, that's plainly what Lee
23 intended. It explains in its specification and its figures that pre-charging and
24 programming are separate and distinct steps. It explains that pre-charging is
25 to be completed. It uses that word -- completed -- before programming
26 begins.

1 And as Patent Owner recognized during his presentation, pre-
2 charging and programming were known to serve very different purposes, so
3 it's all that. The reference to programming and pre-charging is separate
4 steps. The fact that pre-charging needs to be completed before programming
5 begins and the fact that those two steps have very different purposes, that
6 would lead a person having ordinary skill in the art to conclude that pre-
7 charge and programming voltages in Lee would, in fact, be pulsed. If not,
8 those two steps would blend together.

9 None of the prior art of record does that. Zhao does not do that. It
10 separates its pre-charge voltage and its programming voltages. Yang also
11 does not do that. It separates its pre-charge voltages and its programming
12 voltages.

13 So Patent Owner pointed Your Honors to Figure 8B of Yang
14 during the presentation and argued that that's an example of two different
15 voltages that are applied one after another, without going to zero in between.
16 But that figure shows that in Yang, all of the word lines go to zero after pre-
17 charging and before programming, so that's not an example of blending pre-
18 charge and program voltages.

19 So Patent Owner has pointed Your Honors to no examples of pre-
20 charge and programming voltages being stacked on top of each other. It
21 does nothing but speculate and there are no examples of that because a
22 person having ordinary skill in the art would know that you need to wait
23 between pre-charge and programming to avoid undesirable impacts to our
24 later programming steps.

25 So that's not the only evidence of why Lee is employing pulses in
26 this particular case. So in addition to Lee itself, Petitioner pointed to

1 evidence both that you obviously pulse your pre-charge voltage when you
2 use pulsed programming, otherwise the programming would not then be
3 pulsed and the user of pulsed programming is admittedly conventional. And
4 two --

5 JUDGE MCGRAW: Excuse me, Counselor. Are you citing to
6 anything in the record right now?

7 MR. HERMAN: So that, Your Honor -- the evidence of that is on
8 Petitioner's demonstratives. There's an example of pulsed programming on
9 Slide 22 and associated from a textbook.

10 JUDGE CYGAN: Counselor, can I jump in for a second?

11 MR. HERMAN: Yes.

12 JUDGE CYGAN: Just to clarify, is your argument that a person of
13 ordinary skill in the art would find it obvious that Lee is doing this already
14 or a person of ordinary skill in the art looking at Lee would find it obvious to
15 use pulses?

16 MR. HERMAN: So a person -- the latter --

17 JUDGE CYGAN: Okay.

18 MR. HERMAN: -- Your Honor. So a person looking at Lee
19 would find it obvious to use pulses because pulses were conventional in the
20 art at the time Lee was filed. As shown on Slide 22 of Petitioner's
21 demonstratives, pulsed programming had been used for more than 20 years
22 before the particular textbook that's cited on this slide was published. So for
23 decades, before Lee was filed and before the '822 patent was filed, pulsed
24 programming was in use.

25 So one of ordinary skill in the art reading Lee would immediately
26 appreciate that when Lee says it's programming, it was contemplating using

1 the types of programming that was conventionally available at the time, and
2 the most conventional type of programming that was available at the time
3 was pulsed programming. And if you're pulsing your programming
4 voltages, you're also obviously pulsing your pre-charge voltages.

5 JUDGE CYGAN: And do you have anything in the record that
6 links those together? Because you have -- it's well known in the art that it's
7 to use pulses during programming voltages, then it's -- your argument is that
8 it's obvious to use those with pre-charge voltages. Do you have anything in
9 the record that links those together?

10 MR. HERMAN: Dr. Liu explained that in his declaration.

11 JUDGE CYGAN: Okay.

12 MR. HERMAN: And if you would like me to point you to a
13 particular paragraph -- so we addressed this point on pages 7 through 8 of
14 our reply, as noted on this particular slide, and there we're citing the relevant
15 portions of Dr. Liu's testimony where he discusses why the conventional use
16 of pulsed programming voltages would also lead to it being obvious to pulse
17 pre-charging voltages.

18 JUDGE CYGAN: And this is at Slide 22?

19 MR. HERMAN: So Slide 22 is pointing, Your Honors, to the
20 portion of the reply where we're citing Dr. Liu's testimony. Now, Dr. Liu
21 said --

22 JUDGE MCGRAW: Excuse me. If I could -- I just want to, I
23 guess, close the loop. Other than the evidence that's cited on Slide 22, do
24 you have any other evidence that a POSITA -- person of skill in the art --
25 would have used pulsed pre-charge voltages?

26 MR. HERMAN: So a number of -- there's a number of sources of

1 that evidence, Your Honors. So in Petitioner's view, there's three different
2 reasons why that's the case. So as I've explained, there's what Lee itself
3 articulates and the separateness of the two steps. The bin of evidence
4 number two is the types of components that were conventionally being used
5 in the art at the time the '822 patent was filed, including charge pumps to
6 supply voltages to word lines and on/off address decoders, which were
7 admittedly in common use and are discussed in detail in textbooks that are
8 cited in Petitioner's reply, supply voltages in the forms of pulses to word
9 lines.

10 So that's discussed both, in Petitioner's reply, and in Dr. Liu's
11 expert testimony. So that's category of evidence number two. And category
12 of evidence number three is what we're been discussing about the use of
13 pulsed programming voltages.

14 JUDGE MCGRAW: Thank you.

15 MR. HERMAN: Now, again, Patent Owner didn't even take
16 Petitioner's expert deposition about any of this and it clearly hasn't pointed to
17 any evidence in the record to the contrary. Now, Patent Owner also argued
18 that Lee doesn't teach what Claims 2 and 3 require during his opening
19 remarks, but here, it's just reading limitations into the claims. The claims
20 say nothing about when the groups are formed. It doesn't have to be after a
21 particular word line is selected.

22 The claim requires only that there be groups. The claims also say
23 nothing about re-grouping the word lines. There are also no examples of
24 any of this regrouping occurring in the specification, so Patent Owner is not
25 only departing from the claims, but it's doing so without specification
26 support.

1 Its sole reason for this is because the claims use the word disposed.
2 This word does not mean what Patent Owner says. It says nothing about
3 forming groups and that it is not functional. It's just saying where the groups
4 the claims require are located, and that's exactly what Lee teaches. Lee
5 teaches word lines that are disposed between the selected word line and the
6 bit line that are grouped in the way the claims require. So turn --

7 JUDGE CYGAN: Can I ask you on a question on Mr. Bonny's
8 discussion on the use, I guess, or the functional operation? If the argument
9 is that the control circuit has to be performing these functions, so the control
10 circuit is configured to put them in these configurations, does a control
11 circuit need to know where the word line is -- the selected word line is -- E4,
12 it's able to apply these voltages in this -- any ordering from Claim 2?

13 MR. HERMAN: So I believe the claim only requires that there be
14 a first, a second, and a third group of word lines and that there are signals
15 applied. It does not require -- Claim 2 does not require the controller to
16 necessarily know anything about the selected word lines or the groups.
17 There just needs to be a selected word line and there needs to be groups that
18 are supplied with different signals, which is exactly what Lee teaches. There
19 are three groups between the selected word line and the bit line in the
20 examples of Lee, and those three groups are supplied with three different
21 pre-charge voltages.

22 JUDGE CYGAN: So your argument is there's no timing
23 requirement in Claim 2 itself?

24 MR. HERMAN: That's right.

25 JUDGE CYGAN: Thank you.

26 MR. HERMAN: So turning to the combination of Zhao and Lee,

1 here, Petitioner and Patent Owner fundamentally dispute how pre-charging
2 occurs, but Patent Owner here has done little beyond point to the word
3 resistance in Lee. And Patent Owner's expert, besides the fact that Lee uses
4 the word resistance, have not pointed to anything else. And that can be
5 contrasted with Petitioner's expert.

6 Petitioner's expert explained in detail why his opinions are
7 consistent with the prior art and are consistent without memory was known
8 to operate as described in multiple routinely cited industry textbooks. Lee's
9 pre-charging, as Petitioner's expert explained, has nothing to do with current
10 flow, so it does not matter whether you apply the channel voltage to the
11 source or the drain side of the channel. All that matters is the potential
12 difference created between the channel and the word lines, and it's this
13 potential difference that allows electrons to move from one place to another
14 for purposes of avoiding program disturb.

15 And more fundamentally, pre-charge is meant to prepare a memory
16 string for a later programming step. This is why the direction of
17 programming and the state of memory cells and the direction -- why it's the
18 direction of programming and the state of memory cells in the direction of
19 programming that dictates the appropriate pre-charge voltages that are to be
20 applied. And I have a number of slides in my demonstratives summarizing
21 Petitioner's expert's testimony tot his effect. You can find that on Slide 33
22 where Dr. Liu explains that pre-charging results only from potential
23 differences between the NAND string channel and the word lines, so current
24 is not flowing from the source to the drain during pre-charging.

25 You can see on Slide 34 where Dr. Liu explained that the only time
26 during NAND operation where there is current flow from the source to the

1 drain is during a read operation. No current flow during pre-charging or
2 programming.

3 And you can see on Slide 35 that when Lee talks about a resistance
4 component, it's not referring to current flow. It's instead referring to the fact
5 that the threshold voltages of transistors that are located along a memory
6 string vary, if that memory string is long, requiring application of different
7 voltages to the gates of those transistors to achieve the same level of pre-
8 charging along a channel.

9 And as shown on Slide 36, Dr. Liu explains that to Patent Owner,
10 not just once, but twice, including before Patent Owner submitted its
11 response in this proceeding. And as shown on Slide 36, Patent Owner asked
12 Dr. Liu what Lee meant when it refers to a resistance component and Dr. Liu
13 responded by explaining that this just means that the threshold voltage of the
14 transistors vary based on how many are connected in a series.

15 Then as shown from the declaration excerpt on the right of that
16 same slide, Dr. Liu said the very same thing in his reply declaration. So
17 that's why Lee is applying different pre-charge voltages to different groups
18 of word lines when many transistors are connected in series. The threshold
19 voltages of the transistors vary, necessitating the application of different
20 voltages to the transistor gates to achieve the same relative pre-charging in
21 the channel, in the direction of programming, and that's what renders Lee
22 directly applicable to Zhao.

23 And I'll conclude by just very, very briefly mentioning the Yang
24 reference. The dispute regarding Yang is clear. All that Patent Owner has
25 done here is visually compare the signals in Yang's figures, whereas
26 Petitioner has reviewed not only the figures, but also how those signals are

1 described in the specification. And I believe with that, unfortunately my
2 time is up, but I would be happy to answer any questions Your Honors have.

3 JUDGE CYGAN: Thank you, Counsel. Does anyone else on the
4 panel have any further questions? Thank you.

5 MR. DAVIS: And Your Honor, just as a quick point of order, I
6 think we had gone two minutes over, so we should have 13 minutes left.

7 JUDGE CYGAN: I'll take your word for it.

8 MR. DAVIS: Hopefully we won't need all the time, but I just
9 wanted to --

10 JUDGE CYGAN: I actually gave Petitioner an extra minute.

11 MR. DAVIS: Okay.

12 JUDGE CYGAN: Was it an extra minute or an extra two minutes?
13 Extra minute, I think.

14 MR. HERMAN: Correct.

15 JUDGE CYGAN: So I'll give you -- I'll set you up at 14, as well.

16 MR. DAVIS: That's fine. Appreciate it, Your Honor. Thank you.
17 May it please the Board. Turning back to Patent Owner's slides, we can turn
18 first to Slide 14. What Petitioner now seems to be saying for the Lee ground
19 is that it is only relying on obviousness. It's not relying on inherency or
20 what a person of ordinary skill in the art would've understood, pivoting away
21 from those arguments in its petition.

22 So it's left solely with the obviousness argument that it included in
23 its petition, which is included at the top of Slide 14 here. It argues that while
24 programming voltages were conventionally provided in the form of a pulse.
25 As Petitioner conceded, I think at least three times during its argument just
26 now on its rebuttal, programming voltages and pre-programming voltages

1 they said serve very different purposes. Both parties agree on that.

2 Illustrating that -- you can't just say, well, because we are applying
3 pulses in the context of programming, that immediately applies to pre-
4 programming. It's particularly the case that that's inapplicable in the context
5 of Lee when you consider what Lee's objectives were, and this is on Slide
6 16. As quoted there in the middle, in Column 7, lines 58 to 62, but again in
7 Columns 8 and 9, as cited there, Lee is looking for a uniform pre-voltage
8 level across all of its word lines, and as Dr. Przybylski explains -- this is in
9 paragraph 87 of his second declaration -- using transient pulses does not
10 create a more uniform pre-charge level in the context of these systems, and
11 would at best introduce time and efficiencies by requiring a longer total time
12 to perform the programming operation, illustrating that the very motivation
13 that they're relying on would be inapplicable in the context of Lee. Now, the
14 other arguments that they're raising now --

15 JUDGE CYGAN: Counsel, can I ask you --

16 MR. DAVIS: Yes, Your Honor.

17 JUDGE CYGAN: -- a quick question about that? One way to
18 interpret what Dr. Przybylski is saying is that the top of the pulse needs to be
19 flat and he's not really mentioning anything about what happens at the ends
20 of the pulses. Can you point to something in his testimony that really goes
21 to your point that the pulses have to, I guess, extend the entire timeframe?

22 MR. DAVIS: Your Honor, I think, again, it's not -- as Your Honor
23 knows, it's not Patent Owner's burden to prove that it's not obvious. What
24 he's saying is the motivation that Dr. Przybylski is explaining is that the
25 motivation they're trying to apply here doesn't apply in the context of Lee
26 because in Lee, you're looking for a uniform flat voltage the entire time

1 during pre-charging. You're not looking to have the voltage go up and go
2 down again because that wouldn't create that uniform pre-charge.

3 So I think that's what he's getting at here with this very concept
4 when he's saying using transient pulses does not create a more uniform pre-
5 charge level because it's the opposite. You're dropping out the voltage that
6 would be applied. And I think if Your Honor goes back to just the very
7 admission that both sides seem to agree on, programming and pre-
8 programming have very different objectives, very different purposes, so you
9 can't just say let's take what's conventional in the context of programming
10 and now all of a sudden say, we're going to use that in the context of pre-
11 programming when the objectives are very different.

12 That's further illustrated with Petitioner's arguments on Slide 18
13 where Petitioner is raising this new argument using the Aritome reference --
14 excuse me -- Patent Owner's Slide 18. Petitioner is relying on the ISPP, the
15 incremental step pulse programming. They're pointing to what they say is
16 conventional in the context of programming, ignoring the fact that that is
17 inapplicable in the context of pre-charging. It's a very different purpose and
18 they fail to bridge that gap.

19 Their other argument that you use charge pumps, which again, Lee
20 never mentions the concept of using charge pumps. But if charge pumps
21 required some sort of pulsing that always would have to occur, that's belied
22 by the other teachings of Yang and Zhao that we've been reviewing, where
23 it's showing you don't have to go down after you've applied a voltage. You
24 can continue going up.

25 And as Your Honor pointed out earlier, that makes sense
26 particularly in the context of when you're moving from pre-charging -- or

1 pre-programming to programming, the programming voltage may need to go
2 up after that. It doesn't any sense to go down instead.

3 Unless there's any further questions on that Lee reference, I want
4 to address real quickly the issue of the combination of Zhao and Lee, where
5 Petitioner tries to cure the infirmities of both and ends up ignoring the actual
6 teachings of the references.

7 And for this, I'd actually like to refer to Petitioner's demonstratives.
8 This is Slide 37. It's that figure where they put up both Figures 4A and 5A.
9 This is the crux of the problem with their arguments. The main reason why
10 Lee teaches that you want to increase the word line voltage, and this is
11 described further in Lee at Column 8 where there's a long discussion that's in
12 the context of Figure 4A, is explaining that the further you get away from
13 where the pre-charging is coming from, the higher the word line voltage
14 needs to be. And they illustrate that in the context of Figure 4A.

15 When you flip over to Figure 5A, the new argument that they're
16 raising in reply, they've annotated the bottom of Figure 5A here saying, pre-
17 charge voltage applied via common source line. They have absolutely no
18 support for that. Lee never teaches in the context of Figure 5A that you're
19 pre-charging from the common source line. In fact, as is logical, given what
20 the teachings are for Figure 4A, you'd instead be pre-charging from the drain
21 at the top -- or from the bit line at the top, excuse me. And Petitioner's
22 arguments in reply never even attempt to address that infirmity in this
23 combination.

24 They also try to return to their arguments of rewriting Lee's
25 expressed disclosures of a resistance component, arguing that it's instead,
26 referring to some sort of a ground effect. There's just simply no support for

1 that in the Lee reference. Actually, Your Honor, I did note that they do
2 finally return to the Yang ground, Ground 4, in Petitioner's arguments. I
3 think that's beyond the scope of what was a proper reply here. If Your
4 Honor has any questions about Yang, I'd be more than happy to answer
5 them. Otherwise, I can pass the podium to Mr. Bonny. All right. Thank
6 you, Your Honors.

7 JUDGE CYGAN: Well, Counsel, I did have one question.

8 MR. DAVIS: Yeah.

9 JUDGE CYGAN: Sorry to get you on the move. Your argument
10 on Slide 25 about the current is off --

11 MR. DAVIS: I'm sorry, Your Honor. Can you say that one more
12 time? I --

13 JUDGE CYGAN: Sure.

14 MR. DAVIS: -- missed the last part.

15 JUDGE CYGAN: Your argument on Slide 25 where there would
16 be no motivation because the current is off in the source side lines -- word
17 lines. Is the program disturb only caused by current flow or is it being
18 caused by electronic density? What's --

19 MR. DAVIS: Yes, Your Honor. So program disturb generally
20 involves the issue of electrons going where they shouldn't be and interfering
21 with programming. In the context of Lee, though, Lee is -- and this is in
22 Column 8 that we were referring to before -- Lee is describing that we have
23 this problem.

24 As you're pre-charging from the source at the bottom, you'll want
25 to -- and this is, in particular, at Column 8, lines -- I'm around line 45 or so --
26 it's talking about in the case of a word line group, including the word line 31,

1 coupled to the memory cell to be the last program or word line group that is
2 close thereto, a comparatively high pre-biased voltage may be applied to the
3 corresponding word line. Therefore, effects caused by the resistance
4 component between the source select transistor and the drain select transistor
5 are offset, whereby the pre-charge level and the channel may be uniformly
6 formed. Consequently, a program disturb phenomenon is mitigated.

7 So what Lee is trying to solve for program disturb in a very
8 particular way, it's saying there's resistance between a drain select transistor
9 and the source select transistor, along that line, which occurs when there's
10 current flowing along that line. And to account for that when you're further
11 away from where the pre-charge is coming from, you need to increase the
12 voltages in the word lines. And we've talked about how in Zhao, that gets
13 flipped and you're trying to then change V_{ss} to a high voltage and it doesn't
14 make any sense.

15 So the reason the resistance component comes into play here is
16 they're trying to solve program disturb in a very particular way in Lee to
17 make things uniform across, so that the pre-charge throughout is at the same
18 uniform level. Zhao does that in a very different way where Zhao is saying,
19 no, let's apply some bypass voltages to particular word lines. Let's turn other
20 word lines off. They're just incompatible solutions to -- they're both trying
21 to solve for the problem of program disturb, but they're not solving it in the
22 same way. They're solving it in incompatible ways.

23 JUDGE CYGAN: Thank you.

24 MR. BONNY: Your Honors, I'll just use the last couple minutes
25 here to respond to two assertions that were made by Counsel for Petitioner
26 on the disposed claim terms. So first, Counsel asserted that the word

1 disposed was the sole reason for Patent Owner's construction and that's not
2 quite accurate. The construction, as I've explained and as I've set forth in
3 our papers is also supported by the specification and the extrinsic evidence.

4 And in particular, with respect to this specification and as I had
5 explained, the specification describes this process in a way in which the
6 word line is selected and that is then used for the division of the groupings.
7 So Petitioner has ignored that evidence, has not responded to either the
8 specification or the extrinsic evidence. And in particular in a situation like
9 this where there's disagreement about what the claim term means, this is the
10 very type of situation where that type of evidence is even more important to
11 be considering.

12 And the second point that I wanted to address was Patent
13 Owner's -- or Petitioner, rather -- Petitioner's assertion that the controller
14 does not need to know anything about the selected word line. Respectfully,
15 if the controller is not -- does not know anything about the selected word
16 line, then it is not configured to dispose the groups in order of distance from
17 the selected word line. It does not -- in the words of the Federal Circuit in
18 the INVT case -- in fact, execute all of the claimed functions. It is doing
19 something else entirely. And if there are no further questions from the
20 Board, we'll yield the remaining of our time.

21 JUDGE CYGAN: Does the panel have any further questions?

22 MR. BONNY: Thank you, Your Honor.

23 JUDGE MCGRAW: None from me.

24 JUDGE CYGAN: Well, I would like to thank Counsel for both
25 parties for your attendance and your presentation today. I appreciate the
26 level of preparedness on both sides and your command of the record, which

1 is very helpful for the Board. I'd also like to compliment your colleagues
2 who prepared the demonstratives who did a fine job with that. And this case
3 is submitted, and a final decision will be issued in due course. Please stay to
4 answer any questions from the Court Reporter. Thank you.

5 (Whereupon, the above-entitled matter went off the record at 3:06
6 p.m.)

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