

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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APPLE, INC.,  
Petitioner,

v.

UUSI, LLC d/b/a NARTRON,  
Patent Owner.

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Case IPR2019-00358  
Patent 5,796,183

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Before BRYAN F. MOORE, MINN CHUNG, and  
NORMAN H. BEAMER, *Administrative Patent Judges*.

CHUNG, *Administrative Patent Judge*.

DECISION  
Granting Institution of *Inter Partes* Review  
35 U.S.C. § 314

## I. INTRODUCTION

On November 29, 2018, Apple Inc. (“Petitioner” or “Apple”) filed a Petition (Paper 2, “Pet.”) requesting an *inter partes* review of claims 37–39, 94, 96–99, 101–109, and 115–117 (the “challenged claims”) of U.S. Patent No. 5,796,183 (Ex. 1001, “the ’183 patent”). UUSI, LLC d/b/a Nartron (“Patent Owner”) filed a Preliminary Response (Paper 8, “Prelim. Resp.”) on May 6, 2019. Pursuant to a May 22, 2019 Order (Paper 9), the parties exchanged briefs further addressing the issue of discretionary denial of institution under 35 U.S.C. § 314(a) (Papers 10, 11).

Institution of an *inter partes* review is authorized by statute when “the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition.” 35 U.S.C. § 314(a); *see* 37 C.F.R. § 42.4. For the reasons discussed below, upon considering the Petition, Preliminary Response, and evidence of record, we determine that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in showing the unpatentability of at least one challenged claim. We thus institute an *inter partes* review of all challenged claims (37–39, 94, 96–99, 101–109, and 115–117) of the ’183 patent, based on all grounds raised in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1359–60 (2018); U.S. Patent and Trademark Office, *Guidance on the impact of SAS on AIA trial proceedings* (Apr. 26, 2018), <https://www.uspto.gov/patents-application-process/patent-trial-and-appeal-board/trials/guidance-impact-sas-aia-trial> (“SAS Guidance”).

## II. BACKGROUND

### *A. Related Matters*

According to Petitioner, the '183 patent is the subject of the following district court litigation: *UUSI, LLC v. Apple Inc.*, No. 3-18-cv-04637 (N.D. Cal.); and *UUSI, LLC v. Apple Inc.*, No. 2:17-cv-13798 (E.D. Mich.), which has been transferred to the Northern District of California. Pet. 81. Patent Owner indicates that the '183 patent is also the subject of *UUSI, LLC v. Samsung Electronics Co.*, No. 1:15-cv-00146 (W.D. Mich.). Paper 3, 2.

The '183 patent has been subject to two reexaminations: Ex Parte Reexamination Control No. 90/012,439, certificate ("Reexam. Cert. C1") issued April 29, 2013 (Ex. 1006, 1); and Ex Parte Reexamination Control No. 90/013,106, certificate ("Reexam. Cert. C2") issued June 27, 2014 (Ex. 1007, 24). The challenged claims were amended or added during the reexaminations. Ex. 1006, 2–3; Ex. 1007, 27–28.

The '183 patent is the subject of an earlier-filed *inter partes* review proceeding, *Samsung Electronics Co. v. UUSI, LLC*, Case IPR2016-00908 ("Samsung IPR"). Pet. 81; Paper 3, 1. The Federal Circuit recently vacated the Final Written Decision in the Samsung IPR, in which the Board determined that Samsung had not demonstrated unpatentability of any claims, and remanded to the Board for further proceedings. *Samsung Elecs. Co. v. UUSI, LLC*, No. 2018-1310, 2019 WL 2511739, at \*5 (Fed. Cir. June 18, 2019) ("Samsung Appeal Opinion").

Petitioner has also filed five other petitions challenging claims of the '183 patent under various grounds in IPR2019-00355, IPR2019-00356, IPR2019-00357, IPR2019-00359, and IPR2019-00360. Paper 3, 1. We

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denied institution of review in IPR2019-00355, IPR2019-00356, and IPR2019-00357. IPR2019-00355, Paper 14; IPR2019-00356, Paper 14; IPR2019-00357, Paper 12.

*B. The '183 Patent*

The '183 patent, titled “Capacitive Responsive Electronic Switching Circuit,” was filed January 31, 1996, and issued August 18, 1998. Ex. 1001, [22], [45], [54]. The '183 patent has expired. Prelim. Resp. 18.

The '183 patent relates to a “capacitive responsive electronic switching circuit used to make possible a ‘zero force’ manual electronic switch.” Ex. 1001, 1:6–9. According to the '183 patent, zero force touch switches have no moving parts and no contact surfaces that directly switch loads. *Id.* at 2:40–41. Instead, such switches detect an operator’s touch and use solid state electronics to switch loads or activate mechanical relays. *Id.* at 2:42–44. “A common solution used to achieve a zero force touch switch has been to make use of the capacitance of the human operator.” *Id.* at 3:12–14. As background, the '183 patent describes three methods used by capacitive touch switches to detect an operator’s touch, one of which relies on the change in capacitive coupling between a touch terminal and ground. *Id.* at 3:13–15, 3:44–46. In this method, “[t]he touch of an operator then provides a capacitive short to ground via the operator’s own body capacitance.” *Id.* at 3:52–55. Figure 8, reproduced below, is an example that makes use of this method.

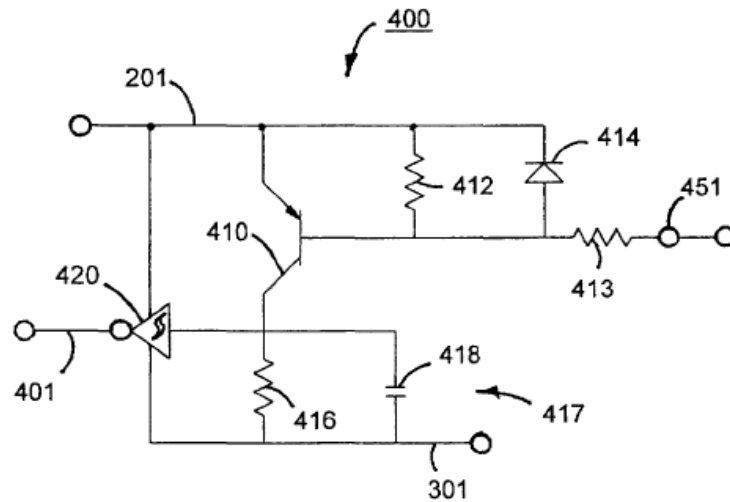


Fig. 8

Figure 8 depicts a “touch circuit” in which, when a pad (not shown) is touched to create a short to ground via terminal 451, transistor 410 turns on and connects a high frequency input at 201 to resistor/capacitor circuit 416/418, thus triggering Schmitt Trigger 420 to provide control output 401. *Id.* at 14:47–52, 15:17–47. Significantly, the operator of a capacitive touch switch using this method need not come in conductive contact with the touch terminal. *Id.* at 3:57–59. Rather, the operator needs only to come into close proximity of the switch. *Id.*

Figure 4 of the '183 patent is reproduced below.

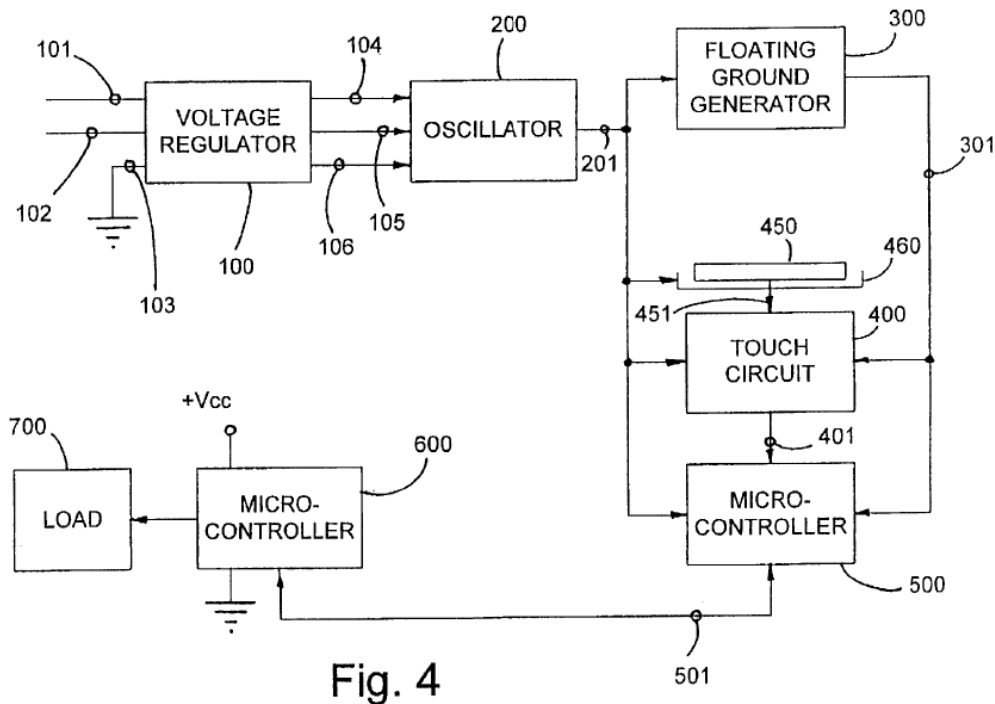


Fig. 4

Figure 4 is a block diagram of a capacitive responsive electronic switching circuit according to a first embodiment of the '183 patent. *Id.* at 7:23–25. As depicted in Figure 4, the electronic switching circuit of the first embodiment comprises voltage regulator 100, oscillator 200, floating ground generator 300, touch circuit 400, touch pad 450, and microcontroller 500. *Id.* at 11:64–12:33.

Voltage regulator 100 converts a received 24 volts (V) AC voltage to a DC voltage and supplies a regulated 5 V DC power to oscillator 200 via lines 104 and 105. *Id.* at 11:67–12:2. Voltage regulator 100 also supplies oscillator 200 with 26 V DC power via line 106. *Id.* at 12:2–3.

Upon being powered by voltage regulator 100, oscillator 200 generates a square wave with a frequency of 50 kHz, or preferably greater than 800 kHz, and having an amplitude of 26 V peak. *Id.* at 12:6–9.

Floating common generator 300 receives the 26 V peak square wave from oscillator 200, and outputs a regulated floating common that is 5 volts below the square wave output from oscillator 200 and has the same phase and frequency as the received square wave. *Id.* at 12:14–18. This floating common output is supplied to touch circuit 400 and microcontroller 500 via line 301 such that the output square wave from oscillator 200 and floating common output from floating common generator 300 provide power to touch circuit 400 and microcontroller 500. *Id.* at 12:18–23.

Touch circuit 400 senses capacitance from touch pad 450 via line 451 and outputs a signal to microcontroller 500 via line 401 upon detecting a capacitance to ground at touch pad 450 that exceeds a threshold value. *Id.* at 12:24–27. Figure 8 reproduced above describes touch circuit 400 in detail. *Id.* at 12:27–28.

Upon receiving an indication from touch circuit 400 that a sufficient capacitance to ground is present at touch pad 450, microcontroller 500 outputs a signal to load-controlling microcontroller 600 via line 501, which is preferably a two way optical coupling bus. *Id.* at 12:29–34. Microcontroller 600 then responds in a predetermined manner to control load 700. *Id.* at 12:33–35.

Figure 11 of the '183 patent is reproduced below.

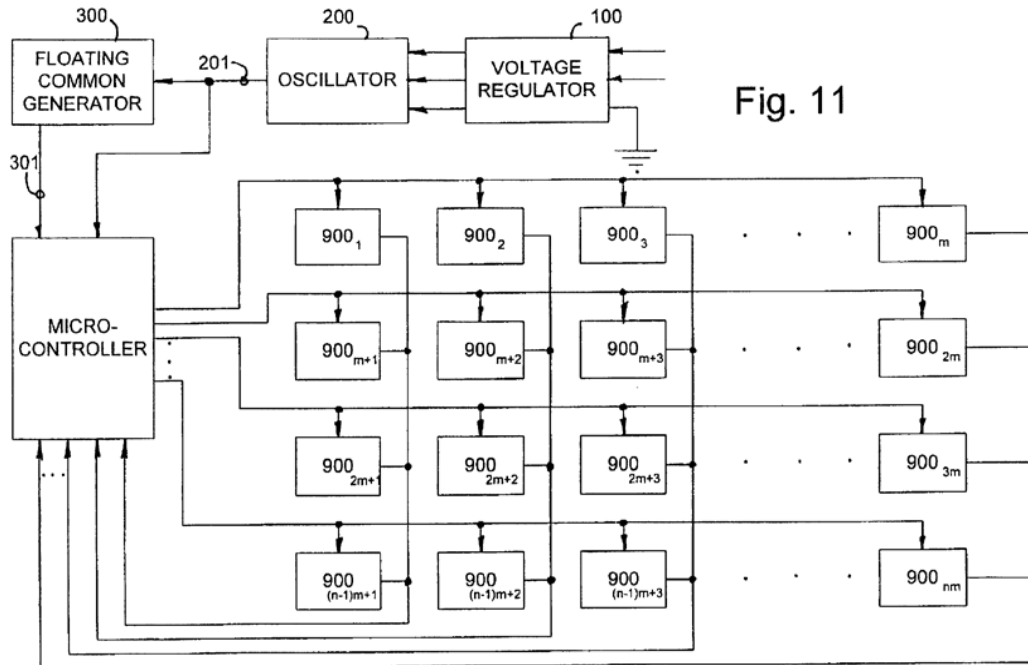


Fig. 11

Figure 11 is a block diagram of a capacitive responsive electronic switching circuit according to a second embodiment of the '183 patent. *Id.* at 7:43–45. As depicted in Figure 11, the second embodiment discloses a “multiple touch pad circuit,” which is a variation of the electronic switching circuit of the first embodiment discussed above in that the multiple touch pad circuit includes “an array of touch circuits” 900<sub>1</sub> through 900<sub>nm</sub>, where each element of the array includes touch circuit 400 described in Figures 4 and 8 above, as well as touch pad 450 depicted in Figure 4. *Id.* at 18:34–43.

In this “multiple touch pad circuit” embodiment, microcontroller 500 selects each row of touch circuits 900<sub>1</sub> to 900<sub>nm</sub> by providing the signal from oscillator 200 to selected rows of touch circuits. *Id.* at 18:43–46. The '183 patent describes that “[i]n this manner, microcontroller 500 can sequentially



activate the touch circuit rows and associate the received inputs from the columns of the array with the activated touch circuit(s).” *Id.* at 18:46–49. In other words, the microcontroller selects successive rows of the touch circuit array by providing the signal from oscillator 200 sequentially to each row, such that a particular activated touch circuit is detected by the microcontroller via association of an activated row with received input from a column line of the array. *Id.* at 18:43–49.

The ’183 patent recognizes that placing capacitive touch switches in dense arrays, as in Figure 11, can result in unintended actuations. *Id.* at 3:65–4:3. One method of addressing this problem known in the art involves placing guard rings around each touch pad. *Id.* at 4:4–7. Another known method of addressing this problem is to adjust the sensitivity of the touch pad such that the operator’s finger must entirely overlap a touch terminal. *Id.* at 4:8–14. “Although these methods (guard rings and sensitivity adjustment) have gone a considerable way in allowing touch switches to be spaced in comparatively close proximity, a susceptibility to surface contamination remains as a problem.” *Id.* at 4:14–18.

The ’183 patent uses the technique of Figure 11 to overcome the problem of unintended actuation of small capacitive touch switches “by using the method of sensing body capacitance to ground in conjunction with redundant detection circuits.” *Id.* at 5:33–35. Specifically, the ’183 patent’s touch detection circuit operates at frequencies at or above 50 kHz, and preferably at or above 800 kHz, in order to minimize the effects of surface contamination on the touch pads. *Id.* at 11:19–29. Operating at these frequencies also improves sensitivity, allowing close control of the

proximity required for actuation of small-sized touch terminals in a close array, such as a keyboard. *Id.* at 5:48–57.

*C. Illustrative Claim*

Of the challenged claims, claims 37, 94, and 105 are independent. Claim 105 is illustrative of the challenged claims and is reproduced below.

105. A capacitive responsive electronic switching circuit for a controlled keypad device comprising:
- an oscillator providing a periodic output signal having a predefined frequency;
  - a microcontroller using the periodic output signal from the oscillator, the microcontroller selectively providing signal output frequencies to a closely spaced array of input touch terminals of a keypad, the input touch terminals comprising first and second input touch terminals, wherein the selectively providing comprises the microcontroller selectively providing a signal output frequency to each row of the closely spaced array of input touch terminals of the keypad;
  - the first and second input touch terminals defining areas for an operator to provide an input by proximity and touch; and
  - a detector circuit coupled to said oscillator for receiving said periodic output signal from said oscillator, and coupled to said first and second touch terminals, said detector circuit being responsive to signals from said oscillator via said microcontroller and a presence of an operator's body capacitance to ground coupled to said first and second touch terminals when proximal or touched by the operator to provide a control output signal for actuation of the controlled keypad device, said detector circuit being configured to generate said control output signal when the operator is proximal or touches said second touch terminal after the operator is proximal or touches said first touch terminal.

Ex. 1001, Reexam. Cert. C2, 7:42–8:10.

*D. Asserted Prior Art and Grounds of Unpatentability*

Petitioner cites the following references in its challenges to patentability.

<b>Reference</b>	<b>Issue Date</b>	<b>Designation</b>	<b>Exhibit No.</b>
U.S. Patent No. 4,561,002	Dec. 24, 1985	Chiu	Ex. 1005
U.S. Patent No. 4,922,061	May 1, 1990	Meadows <sup>1</sup>	Ex. 1013
U.S. Patent No. 4,418,333	Nov. 29, 1983	Schwarzbach	Ex. 1014
U.S. Patent No. 4,731,548	Mar. 15, 1988	Ingraham '548	Ex. 1016
U.S. Patent No. 4,308,443	Dec. 29, 1981	Tucker	Ex. 1019
U.S. Patent No. 4,328,408	May 4, 1982	Lawson	Ex. 1032

Petitioner also relies on the Declaration of Dr. Phillip D. Wright (Ex. 1003, “Wright Declaration” or “Wright Decl.”).

Petitioner asserts the following grounds of unpatentability (Pet. 3):

<b>Claim(s) Challenged</b>	<b>Statutory Basis</b>	<b>References</b>
37, 94, 96, 101, 105, 106	§ 103(a) <sup>2</sup>	Chiu and Schwarzbach <sup>3</sup>
38, 39, 104, 115, 116	§ 103(a)	Chiu, Schwarzbach, and Lawson

<sup>1</sup> For clarity and ease of reference, we only list the first named inventor.

<sup>2</sup> The Leahy-Smith America Invents Act, Pub. L. No. 112-29, 125 Stat. 284 (2011) (“AIA”), amended 35 U.S.C. § 103. Because the '183 patent has an effective filing date prior to the effective date of the applicable AIA amendment, we refer to the pre-AIA version of § 103.

<sup>3</sup> As discussed below, in the purported ground based on Chiu and Schwarzbach, Petitioner in fact argues two separate grounds—namely, one based on Chiu alone and another based on the combination of Chiu and Schwarzbach.

<b>Claim(s) Challenged</b>	<b>Statutory Basis</b>	<b>References</b>
97–99, 107–109	§ 103(a)	Chiu, Schwarzbach, and Meadows
102	§ 103(a)	Chiu, Schwarzbach, and Ingraham '548
103	§ 103(a)	Chiu, Schwarzbach, and Tucker

### III. ANALYSIS

#### *A. Discretionary Non-Institution Under 35 U.S.C. § 314(a) Based on the Samsung IPR*

Patent Owner asserts that the Board should exercise its discretion to deny the Petition under 35 U.S.C. § 314(a) based on the Samsung IPR challenging the same claims of the '183 patent at issue in this case. Prelim. Resp. 16–24; Paper 10. The Samsung IPR involves a challenge to claims 37–41, 43, 45, 47, 48, 61–67, 69, 83–86, 88, 90, 91, 94, 96, 97, 99, 101, and 102 of the '183 patent. Samsung IPR, Paper 35, 2. Petitioner also challenges these claims, either in the instant Petition or in other concurrently filed petitions for *inter partes* review identified above.

Under § 314(a), the Director has discretion to deny institution of an *inter partes* review. *Cuozzo Speed Techs., LLC v. Lee*, 136 S. Ct. 2131, 2140 (2016) (“[T]he agency’s decision to deny a petition is a matter committed to the Patent Office’s discretion.”). In *General Plastic Industrial Co. v. Canon Kabushiki Kaisha*, Case IPR2016-01357, slip op. at 15–16 (PTAB Sept. 6, 2017) (Paper 19) (precedential), the Board articulated a non-exhaustive list of factors to be considered in determining whether to exercise

discretion under § 314(a) to deny a petition that challenges the same patent as a previous petition. These factors are

1. whether the same petitioner previously filed a petition directed to the same claims of the same patent;
2. whether at the time of filing of the first petition the petitioner knew of the prior art asserted in the second petition or should have known of it;
3. whether at the time of filing of the second petition the petitioner already received the patent owner's preliminary response to the first petition or received the Board's decision on whether to institute review in the first petition;
4. the length of time that elapsed between the time the petitioner learned of the prior art asserted in the second petition and the filing of the second petition;
5. whether the petitioner provides adequate explanation for the time elapsed between the filings of multiple petitions directed to the same claims of the same patent;
6. the finite resources of the Board; and
7. the requirement under 35 U.S.C. § 316(a)(11) to issue a final determination not later than 1 year after the date on which the Director notices institution of review.

*Id.* at 16.

*Factor 1: Whether Petitioner Previously Filed a Petition Directed to the Same Claims of the Same Patent*

Beginning with the first factor, Petitioner asserts that it has not filed any previous petition challenging the '183 patent. Pet. 6. Although Petitioner's assertion appears to be undisputed, it does not end our inquiry under the first *General Plastic* factor, because our application of the *General Plastic* factors is not limited solely to instances where multiple petitions are filed by the same petitioner. Rather, when different petitioners challenge the

same patent, we consider any relationship between those petitioners when weighing the *General Plastic* factors. *Valve Corp. v. Elec. Scripting Prod., Inc.*, Case IPR2019-00062, slip op. at 9 (PTAB Apr. 2, 2019) (Paper 11) (precedential). Here, Petitioner Apple and Samsung are both defendants in lawsuits brought by Patent Owner alleging infringement of the '183 patent.

Patent Owner argues that Apple and Samsung are “similarly situated defendants” in district court litigation, both facing “the same ongoing threat of Patent Owner’s infringement claims” regarding the '183 patent in co-pending lawsuits. Prelim. Resp. 23–24; Paper 10, 1–2. As the parties acknowledge, however, these are separate lawsuits in separate federal courts (Pet. 81; Paper 3, 2),<sup>4</sup> and Patent Owner did not bring its lawsuit against Apple until two years after suing Samsung and a few weeks after the Final Written Decision was entered in the Samsung IPR (Pet. 5; Prelim. Resp. 17–18; Paper 11, 1).

Apple argues that, unlike the parties in *Valve*, Apple and Samsung are unrelated and are not similarly situated defendants. Paper 11, 1. According to Apple, Apple and Samsung have never been co-defendants in an action involving the '183 patent; Apple and Samsung have completely separate products; and Patent Owner makes no overlapping infringement allegations between Apple and Samsung in lawsuits filed more than two years apart. *Id.*

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<sup>4</sup> As noted above in Section II.A, Patent Owner’s infringement action against Samsung involving the '183 patent was filed in the Western District of Michigan, whereas the lawsuits against Apple were filed in the Eastern District of Michigan and the Northern District of California. Pet. 81; Paper 3, 2.

Based on the record presented, we agree with Petitioner that, unlike the parties in *Valve*, there is no significant relationship between Petitioner and Samsung with respect to Patent Owner's assertion of the '183 patent. *Cf. Valve*, slip op. at 9–10 (related petitioners were co-defendants in the same litigation; accused devices sold by one petitioner incorporated technologies under a technology license from the other petitioner; and the petitioners collaborated on the development of the devices). Therefore, given that Petitioner has not filed any previous petitions challenging the '183 patent, the first *General Plastic* factor weighs against discretionary denial of institution. *See* Pet. 6.

*Factor 2: Whether Petitioner Knew of or Should Have Known of the Prior Art Asserted in the Instant Petition When the Prior Petition was Filed*

Turning to the second *General Plastic* factor, this factor includes considering whether the prior art relied on in the later petition “could have been found with reasonable diligence.” *Gen. Plastic*, slip op. at 20.

Because Patent Owner did not sue Petitioner until after the Final Written Decision issued in the Samsung IPR, Petitioner would have had little discernable reason, at the time of filing of the first petition (i.e., the petition in the Samsung IPR) to look for and identify the prior art that it ultimately asserted in the instant Petition. Pet. 6; Paper 11, 1. According to Petitioner, it received no notice of its purported infringement of the '183 patent at the time Patent Owner sued Samsung. Paper 11, 1.

Patent Owner submits that some of the references now relied upon were “known” to Petitioner during some unrelated patent prosecutions. Prelim. Resp. 19. Such “knowledge,” on the part of unidentified employees

or agents of Petitioner handling those unrelated matters, is of little relevance to this factor, given that, at the time such knowledge was acquired, the Patent Owner's lawsuit against Petitioner had not yet commenced or, insofar as the record shows, been threatened. Thus, the second *General Plastic* factor also weighs against exercising our discretion to deny institution.

*Factor 3: Whether Petitioner Had Patent Owner's Preliminary Response and the Board's Institution Decision on the Prior Petition When Petitioner Filed the Instant Petition*

The Board explained the relevance of this factor in *General Plastic*:

[F]actor 3 is directed to Petitioner's potential benefit from receiving and having the opportunity to study Patent Owner's Preliminary Response, as well as our institution decisions on the first-filed petitions, prior to its filing of follow-on petitions. . . . Multiple, staggered petitions challenging the same patent and same claims raise the potential for abuse. The absence of any restrictions on follow-on petitions would allow petitioners the opportunity to *strategically stage* their prior art and arguments in multiple petitions, *using our decisions as a roadmap* . . . . All other factors aside, this is *unfair to patent owners* and is an inefficient use of the *inter partes* review process and other post-grant review processes.

*Gen. Plastic*, slip op. at 17–18 (emphases added) (internal citation and footnote omitted).

Given the timing of Patent Owner's lawsuit against Petitioner, Petitioner's filing of the instant Petition does not raise the fairness concerns addressed by the third factor. Although Patent Owner alleges "gamesmanship" in Petitioner's filing of the instant Petition, Petitioner persuasively explains that Petitioner could not have "delay[ed]" its Petition to gain a strategic advantage by learning from the Samsung IPR because, by



the time Patent Owner sued Petitioner, the Samsung IPR was already complete. Paper 11, 2. Upon considering the record presented, we agree with Petitioner that any “delay” in Petitioner’s filing of the instant Petition was the direct result of Patent Owner’s litigation activity, not any “gamesmanship” of Petitioner. *See id.* at 1–2.

Patent Owner also asserts that Petitioner must have “studied Samsung’s IPR” (Prelim. Resp. 18) and used the Final Written Decision in the Samsung IPR “as a roadmap” in preparing the instant Petition (*id.* at 20). But there is no policy reason for discretionary denial of institution where, as here, Petitioner, when filing a Petition *after* being sued for infringement, takes into account prior proceedings that occurred *before* it was sued. Because the fairness concerns addressed by the third factor are not present under the specific circumstance of this case, the third *General Plastic* factor weighs against exercising our discretion to deny institution.

*Factor 4: The Elapsed Time Between the Time Petitioner Learned of the Prior Art Asserted in the Instant Petition and the Filing of the Instant Petition*

Addressing the fourth *General Plastic* factor, Petitioner argues that this factor also weighs against denial because Petitioner’s prior art search and review that identified the prior art references relied upon in the instant Petition was not conducted (and Petitioner would have had no reason to conduct) until *after* Patent Owner filed lawsuit against Petitioner, which was *after* the Samsung IPR was completed. Pet. 6.

Patent Owner argues that four prior art references (Chiu, Meadows, Ingraham ’548, and Tucker) relied on in the Petition were known to

Petitioner either based on Petitioner's own patent prosecution activities or from the '183 patent itself, but Petitioner nonetheless waited a full year after being sued before filing the instant Petition. Prelim. Resp. 20–21. Patent Owner asserts that this “unexplained delay” weighs in favor of discretionary denial. *Id.* at 21.

We are not persuaded by Patent Owner's argument. By regulation, Petitioner had one year to file its Petition. *See* 37 C.F.R. § 42.101(b). In addition, Petitioner's alleged “delay” does not appear to be a “wait and see” tactic to benefit from the preliminary response, the institution decision, or the Final Written Decision in the Samsung IPR because those papers were already available when Petitioner was sued by Patent Owner.

Patent Owner also asserts the one year delay was a strategy to extend a stay of the patent lawsuit against Petitioner (Prelim. Resp. 21), but Patent Owner stipulated to a stay of that lawsuit (Ex. 2001 ¶ 13). Moreover, the decision of a district court to stay or not stay its lawsuits is not a primary concern of this forum.

Based on the record presented, we determine that the fourth *General Plastic* factor weighs against exercising our discretion to deny institution.

*Factor 5: Whether Petitioner Has Provided Adequate Explanation for the Time Elapsed between the Filings of Multiple Petitions Directed to the Same Claims of the Same Patent*

Petitioner argues that the fifth *General Plastic* factor also weighs against discretionary denial because any delay between the filing of the petition in the Samsung IPR and the instant Petition is due to Patent Owner's delay in filing suit against Petitioner. Pet. 7. For the reasons discussed

above, we agree with Petitioner's argument. Thus, the fifth *General Plastic* factor also weighs against exercising our discretion to deny institution.

*Factors 6 and 7: Board Considerations*

Finally, upon review of the current record in this and the co-pending related proceedings, we determine that factors six and seven do not raise concerns about Board resources or deadlines.

Patent Owner argues that Petitioner's filing of multiple petitions challenging different claims of the '183 patent amounts to a circumvention of the Board's page limitation rules and places undue burden on the finite resources of the Board. Prelim. Resp. 22. Patent Owner bears some responsibility for this, however, given that it obtained 117 claims during two reexaminations, many of which are asserted against Petitioner. Although a multiple-petition strategy to "circumvent" page limitations is not encouraged and may not necessarily be effective, Petitioner's filing of multiple petitions challenging the same patent may be appropriate where, as here, Petitioner has reasonable justification for multiple filings due to the multiplicity of claims to be challenged. *See* Office Trial Practice Guide July 2019 Update<sup>5</sup> referenced at 84 Fed. Reg. 33,925 ("July 2019 TPG Update") (July 16, 2019), at 26 ("[T]he Board recognizes that there may be circumstances in which more than one petition may be necessary, including, for example, when the patent owner has asserted a large number of claims in litigation or

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<sup>5</sup> Available at <https://www.uspto.gov/sites/default/files/documents/trial-practice-guide-update3.pdf>.

when there is a dispute about priority date requiring arguments under multiple prior art references.”).

Having considered the record presented, we conclude that factors six and seven are not implicated under the circumstances of this case, and, therefore, do not weigh for or against exercising our discretion to deny institution.

*Weighing the Factors for Discretionary Non-Institution Under § 314(a)*

To summarize, apart from the last two factors (factors six and seven), which are neutral, the majority of the *General Plastic* factors weigh against exercising our discretion to deny institution. Considering these factors as a whole, and on the record presented, we determine that exercising our discretion under 35 U.S.C. § 314(a) to deny institution is not appropriate in this case.

*B. Level of Ordinary Skill in the Art*

Petitioner’s declarant, Dr. Wright, opines that a person of ordinary skill in the art as of the critical date of the ’183 patent would have had at least a Bachelor of Science degree in electrical engineering or a related technical field, and two or more years of experience in electrical circuits and sensor systems. Ex. 1003 ¶ 22. Patent Owner does not propose a level of ordinary skill in the art in the Preliminary Response.

At this stage of the proceeding, we find Petitioner’s proposal consistent with the level of ordinary skill in the art reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001); *In re GPAC Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Therefore, for

purposes of this Decision, we adopt Petitioner’s unopposed position as to the level of ordinary skill in the art.

### C. Claim Construction

Due to a recent rule change, the claim construction standard that applies in an *inter partes* review depends on whether the petition was filed before or after November 13, 2018. *See* Changes to the Claim Construction Standard for Interpreting Claims in Trial Proceedings Before the Patent Trial and Appeal Board, 83 Fed. Reg. 51,340, 51,340–41 (Oct. 11, 2018) (codified at 37 C.F.R. § 42.100(b) (2019)). Because the Petition was filed November 29, 2018 (Paper 5, 1), we apply the same claim construction standard that would be used to construe a claim in a civil action under 35 U.S.C. § 282(b), following the standard articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc).<sup>6</sup> *See* 83 Fed. Reg. at 51,343.

Under that standard, claim terms are generally given their ordinary and customary meaning, which is “the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention.” *Phillips*, 415 F.3d at 1312–13. “Importantly, the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification.” *Id.* at 1313. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written

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<sup>6</sup> We note that, because the ’183 patent has expired, our claim interpretation would have followed *Phillips* regardless of filing date. *See In re Rambus Inc.*, 694 F.3d 42, 46 (Fed. Cir. 2012).

description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

Petitioner proposes constructions for three claim terms: “providing signal output frequencies” recited in independent claims 37, 94, and 105; “supply voltage” recited in claim 94; and “coupled” recited in claims 37, 94, and 105. Pet. 9–15. At this stage of the proceeding, Patent Owner disputes the construction for only one of those terms, namely, “providing signal output frequencies.” Prelim. Resp. 25–30. For purposes of this Decision, we need only to construe this sole disputed term. *See Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999) (holding that only terms that are in controversy need to be construed, and “only to the extent necessary to resolve the controversy”); *see also Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (applying *Vivid Techs.* in the context of an *inter partes* review).

*“providing signal output frequencies”*

The challenged independent claims 37, 94, and 105 each recite “the microcontroller selectively providing signal output frequencies to a closely spaced array of input touch terminals of a keypad.” Ex. 1001, Reexam. Cert. C1, 2:49–51 (claim 37); *id.*, Reexam. Cert. C2, 6:44–46 (claim 94), 7:46–49 (claim 105). The parties’ dispute over the construction of the term “providing signal output frequencies” centers on whether the recited microcontroller must provide frequencies *selected* from multiple frequencies. Patent Owner asserts that the challenged claims are so limited

(Prelim. Resp. 25–30), whereas Petitioner contends that they are not (Pet. 9–10).

Petitioner asserts that the challenged independent claims are not limited as Patent Owner contends because the “*selected* from multiple frequencies” feature argued by Patent Owner is recited in dependent claims as only one of two limiting alternatives. *See* Pet. 9–10. That is, Petitioner argues that the term “providing signal output frequencies” recited in independent claim 94 (and independent claims 37 and 105) should be construed broadly to encompass the “signal output frequencies” being set to the same frequency *or* selected from multiple frequencies. *Id.* Petitioner’s basis for this construction is the difference between claims 96 and 97, which depend from claim 94. Specifically, claim 96 recites “each signal output frequency” of the provided signal output frequencies “is selected from a plurality of hertz values,” whereas claim 97 recites the signal output frequency “has the same hertz value.”

Patent Owner argues that claims 96 and 97 limit the wherein clause of the microcontroller element of claim 94, which recites “wherein the selectively providing comprises the microcontroller selectively providing a signal output frequency to each row of the closely spaced array of input touch terminals of the keypad.” *See* Prelim. Resp. 29. Patent Owner focuses on the claim language “selectively providing . . . to each row” and argues that the alternatives recited in claims 96 and 97 are that the microcontroller can “selectively provide” the same *or* different frequencies from the available frequencies “to each row” of touch terminals of the keypad. *Id.* at 30. In other words, according to Patent Owner, regardless of whether the

same or different frequencies are provided to each row, the recited “signal output frequencies” must be *selected from* multiple available frequencies. *Id.* Pointing to the language of the wherein clause discussed above, Patent Owner asserts that the plain language of the challenged independent claims requires construing the claims such that “the microcontroller must be able to ‘selectively provide’ from ‘frequencies’—not simply one frequency as Apple proposes.” *Id.* at 26.

We are not persuaded by Patent Owner’s argument. The full claim language of the disputed limitation of claim 94 is reproduced below with emphases added:

the microcontroller *selectively providing* signal output frequencies to a closely spaced array of input touch terminals of a keypad, wherein *the selectively providing* comprises the microcontroller *selectively providing* a signal output frequency *to each row* of the closely spaced array of input touch terminals of the keypad.

Ex. 1001, Reexam. Cert. C2, 6:44–50. Claim 105 recites essentially the same claim language. *Id.* at 7:47–54. Claim 37 similarly recites “the microcontroller selectively providing signal output frequencies to a closely spaced array of input touch terminals of a keypad,” but does not recite the “wherein” clauses of claims 94 and 105. Ex. 1001, Reexam. Cert. C1, 2:49–51.

Considering the claim language, we note that none of the challenged independent claims actually recites that the microcontroller provides signal output frequencies “selected from multiple frequencies.” The claims recite “*selectively providing*,” not “providing *selected* frequencies.” Thus, at least based on their plain language, the challenged independent claims are not



limited to require the signal output frequencies be “selected from multiple frequencies” as Patent Owner contends.

As Patent Owner points out, the “wherein” clauses of claims 94 and 105 recite that the signal output frequencies are “selectively” provided “to each row” of the “array of input touch terminals of the keypad.” *See* Prelim. Resp. 29–30. Thus, based on the plain language, the “selectively providing” recited in the “wherein” clauses of claims 94 and 105 selects “each row” of the touch terminals array, not frequencies. In other words, the only type of “selecting” expressly recited in claims 94 and 105 is selecting rows of the array of touch terminals. Thus, the claim language indicates that the “selectively providing” recited in claims 94 and 105 encompasses selecting a row of the array of touch terminals. Because independent claims 37, 94, and 105 all recite the microcontroller “selectively providing” signal output frequencies “to a closely spaced *array* of input touch terminals of a keypad,” this identical claim language should be construed to have the same meaning, i.e., to encompass selecting of a row of the array of touch terminals, absent compelling evidence to the contrary. *See Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 904 (Fed. Cir. 2018) (“unless otherwise compelled, that the same claim term in the same patent or related patents carries the same construed meaning” (quoting *Omega Eng’g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1334 (Fed. Cir. 2003))).

Although the “selectively providing” recited in the phrase “the microcontroller selectively providing signal output frequencies to a closely spaced array of input touch terminals of a keypad”—which the “wherein” clause modifies—may be broader than selecting “each row” recited in the

“wherein” clause (such as selecting rows, columns, or other portions of the array of touch pads), there is no indication in the claim language that selection of frequencies from multiple available frequencies is the type of selecting contemplated in the “selectively providing” recited in the claims.

At most, the claim language “selectively providing” is ambiguous as to what the microcontroller is selecting—frequencies or rows of the touch terminals array, or both. “[I]n case of doubt or ambiguity it is proper in all cases to refer back to the descriptive portions of the specification to aid in solving the doubt or in ascertaining the true intent and meaning of the language employed in the claims.” *Phillips*, 415 F.3d at 1315 (quoting *Bates v. Coe*, 98 U.S. 31, 38 (1878)); *see also Howmedica Osteonics Corp. v. Zimmer, Inc.*, 822 F.3d 1312, 1321–22 (Fed. Cir. 2016) (when the meaning of a claim term is “not facially clear,” “[t]his problem is only resolved by examining the written description” as “a skilled artisan would naturally look to the written description for a full understanding of the claims”). Although claims “must be read in view of the specification, of which they are a part,” *Phillips*, 415 F.3d at 1315, and the specification is “the single best guide to the meaning of a disputed term,” *id.* at 1321, the parties do not discuss the Specification in any detail in their claim construction arguments. To the extent the meaning of the disputed term “selectively providing signal output frequencies” is not clear on its face, it is particularly important in this case to consult the Specification in order to ascertain the term’s correct meaning. *See Howmedica*, 822 F.3d at 1321 (when the meaning of a claim term is “not facially clear,” construing the claims by examining the written description is

“not only consistent with our precedent, but also necessary in light of the claim language at issue”).

Turning to the Specification, the '183 patent describes three main embodiments: a first embodiment depicted in Figure 4, which describes a capacitive switching circuit that includes a single touch pad (Ex. 1001, 7:23–25, 11:60–63, 12:24–32); a second embodiment depicted in Figure 11, describing a “multiple touch pad circuit,” which is a variation of the switching circuit of the first embodiment in that the multiple touch pad circuit includes “an array of touch circuits,” each touch circuit including a touch pad depicted in Figure 4 (*id.* at 7:42–44, 18:34–43); and a third embodiment depicted in Figure 12, which describes a touch pad connected to two identical touch circuits in parallel to provide touch circuit redundancy (*id.* at 7:45–47, 19:7–8, 20:32–34). Thus, the only embodiment disclosed in the '183 patent that describes an “array of input touch terminals of a keypad” recited in the claims is the “multiple touch pad circuit” embodiment depicted in Figure 11.

Referencing Figure 11, the '183 patent describes

*A multiple touch pad circuit constructed in accordance with the second embodiment is shown in FIG. 11. . . . The multiple touch pad circuit is a variation of the first embodiment in that it includes an array of touch circuits designated as 900<sub>1</sub> through 900<sub>nm</sub>, which, as shown, include both the touch circuit 400 shown in FIGS. 4 and 8 and the input touch terminal pad 451 (FIG. 4). Microcontroller 500 selects each row of the touch circuits 900<sub>1</sub> to 900<sub>nm</sub> by providing the signal from oscillator 200 to selected rows of touch circuits. In this manner, microcontroller 500 can sequentially activate the touch circuit rows and associate the received inputs from the columns of the array with the activated touch circuit(s).*

Ex. 1001, 18:34–49 (emphases added). As described in the quoted passage above, in the “multiple touch pad circuit” embodiment of the ’183 patent, the microcontroller *selects each row* of the array of touch pads by *providing the signal* from the oscillator *to the selected row*.

Although the ’183 patent describes using various high frequencies to improve “immunity to surface contaminants,” in all cases the selection of high frequencies is accomplished by selecting different circuit components or modifying the design of the touch circuit. *See id.* at 14:22–25, 18:1–33. Presumably, these design and component choices are made when the touch circuit is designed or constructed by a human circuit designer, *not* by a microcontroller during the operation of the touch circuit. Thus, we discern no disclosures in the Specification that describes a microcontroller “selectively providing” signal output frequencies *selected from* multiple available frequencies. As described in the ’183 patent, the only selection made by the microcontroller is *selection of rows* to “*sequentially* activate the touch circuit rows” to “associate the received inputs from the columns of the array with the activated touch circuit(s).” *Id.* at 18:43–49 (emphases added).

In view of these disclosures in the Specification, at a minimum, selecting a row of the array of touch pads to provide signal output frequencies falls within the scope of the term “selectively providing signal output frequencies” recited in the challenged independent claims because a construction which “excludes a [disclosed] embodiment from the scope of the claim is rarely, if ever, correct.” *Broadcom Corp. v. Emulex Corp.*, 732 F.3d 1325, 1333 (Fed. Cir. 2013) (quoting *Accent Pkg., Inc. v. Leggett &*

*Platt, Inc.*, 707 F.3d 1318, 1326 (Fed. Cir. 2013)) (citing *Phillips*, 415 F.3d at 1312–13).

Patent Owner’s proposed construction of the term “selectively providing signal output frequencies” to *require* the microcontroller select signal output frequencies from multiple available frequencies is improper because it would exclude from the scope of the challenged claims the *only* embodiment disclosed in the ’183 patent that describes a capacitive switching circuit including the recited “array of input touch terminals of a keypad.” Put another way, under Patent Owner’s proposed construction, *all* of the challenged claims would lack written description support from the Specification. At this preliminary stage, we conclude that such a construction is unlikely to be a correct interpretation of the disputed term under the well-established claim construction principles.

Even if the disputed term is to be construed broadly to encompass selecting frequencies, we are not persuaded that the claims require the microcontroller select signal output frequencies from multiple available frequencies as Patent Owner contends. When interpreting disputed terms, “the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms.” *Phillips*, 415 F.3d at 1314 (*quoting ACTV, Inc. v. Walt Disney Co.*, 346 F.3d 1082, 1088 (Fed. Cir. 2003)). The separate detector circuit element present in all challenged independent claims indicates that “the microcontroller selectively providing signal output frequencies” requirement encompasses a *single* oscillator frequency signal (“a periodic output signal having a predefined frequency”) provided to the microprocessor and then routed via

multiple outputs to the touch pads. For example, claim 94 recites that “a detector circuit” is “responsive to *signals from said oscillator via said microcontroller.*” Ex. 1001, Reexam. Cert. C2, 6:57–61.

Because a trial is being instituted, we encourage the parties to address the term “selectively providing signal output frequencies” further in their papers, including how a person of ordinary skill in the art would understand the meaning of the term in the context of the ’183 patent, including the Specification.

Patent Owner next asserts that the Final Written Decision in the Samsung IPR supports its proposed construction. Prelim. Resp. 27–28. Patent Owner argues that, although the Board in the Samsung IPR did not expressly construe the term “selectively providing signal output frequencies,” the Board’s rejection of Samsung’s obviousness challenge as failing to establish sufficient reasons to combine the asserted references (Gerpheide, Ingraham, and Caldwell) was based on the Board’s implicit construction of the term “selectively providing signal output frequencies” recited in claim 40. *Id.* Patent Owner argues that, in rejecting Samsung’s obviousness challenge, the Board in the Samsung IPR “read the ‘selectively providing signal output frequencies’ language in exactly [the same way as Patent Owner proposes]” (*id.* at 27) and “in a manner that directly conflicts with Apple’s proposed construction” (*id.* at 28).

In the Samsung Appeal Opinion, however, the Federal Circuit disagreed with the Board’s “implicit claim construction,” 2019 WL 2511739, at \*4, and concluded that “Samsung has established a motivation to combine Gerpheide with Ingraham/Caldwell,” *id.* at \*5. Thus, at this

stage of the proceeding, we are not persuaded by Patent Owner's argument based on the Final Written Decision in the Samsung IPR.

Because a trial is being instituted, however, we encourage the parties to address in their papers the import of the Samsung Appeal Opinion on the construction of the term "selectively providing signal output frequencies" in this case.

Lastly, Patent Owner asserts that the Examiner's finding of patentability of the claims over Boie, Gerpheide, Casio, and Lee during the second reexamination of the '183 patent supports Patent Owner's proposed construction. Prelim. Resp. 28–29 (citing Ex. 1007, 6–10, 16–17).

We disagree with Patent Owner's argument. During the second reexamination, the Examiner found that Boie and Casio do not teach or suggest that "the microcontroller is used" to "selectively provid[e] signal output frequencies to input touch terminals of a keypad." Ex. 1007, 7, 8. Regarding Lee, the Examiner found that the reference does not teach or suggest "sending signal output frequencies to the selected rows and/or column." *Id.* at 9. About Gerpheide, the Examiner found no teaching of a circuit "responsive to signals from the oscillator via said microcontroller and the presence of an operator's body capacitance to ground." *Id.* at 8. Contrary to Patent Owner's contention, none of these findings by the Examiner appear to be related to Patent Owner's proposed construction that the microcontroller must select frequencies from multiple available frequencies.

Based on the foregoing and the record presented, for purposes of this Decision, we determine that the term "the microcontroller selectively

providing signal output frequencies to a closely spaced array of input touch terminals of a keypad” recited in the challenged independent claims 37, 94, and 105 does *not* require the microcontroller to select signal output frequencies from multiple available frequencies.

Upon examining the claims as a whole and the Specification and based on the current record, for purposes of this Decision, we resolve the question of what the microcontroller is selecting—frequencies or rows of the touch pad array—according to the ’183 patent’s description of the invention in the Specification, and preliminarily construe the term “selectively providing signal output frequencies” to encompass the microcontroller selecting a row or a portion of the array of touch pads to provide signal output frequencies to the array. *See Phillips*, 415 F.3d at 1316 (“The construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” (quoting *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1250 (Fed. Cir. 1998))).

*D. Obviousness over Chiu Alone or Chiu Combined with Schwarzbach*

In this asserted ground of obviousness, Petitioner contends that claims 37, 94, 96, 101, 105, and 106 are unpatentable under 35 U.S.C. § 103(a) as obvious over the combination of Chiu and Schwarzbach. Pet. 16–58. As discussed below, Petitioner asserts that Chiu alone teaches all limitations recited in independent claim 105, as well as claim 106, which depends from claim 105. For claims 37, 94, 96, and 101, Petitioner relies on the combination of Chiu and Schwarzbach. Thus, in effect, Petitioner presents



two separate grounds of obviousness—namely, one based on Chiu alone and another based on the combination of Chiu and Schwarzbach.

*1. Relevant Principles of Law*

A claim is unpatentable under 35 U.S.C. § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved on the basis of underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations.<sup>7</sup> *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). We analyze these asserted grounds based on obviousness with the principles identified above in mind.

*2. Overview of Chiu (Ex. 1005)*

Chiu describes a capacitive type touch switch cell arrangement using capacitive coupling between a touch pad and an electrode, which is alterable by a human touching or being proximate to the touch pad. Ex. 1005, [57].

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<sup>7</sup> Patent Owner does not present arguments or evidence of such secondary considerations in its Preliminary Response. Therefore, at this preliminary stage, secondary considerations do not constitute part of our analysis.

Figure 6A of Chiu is reproduced below.

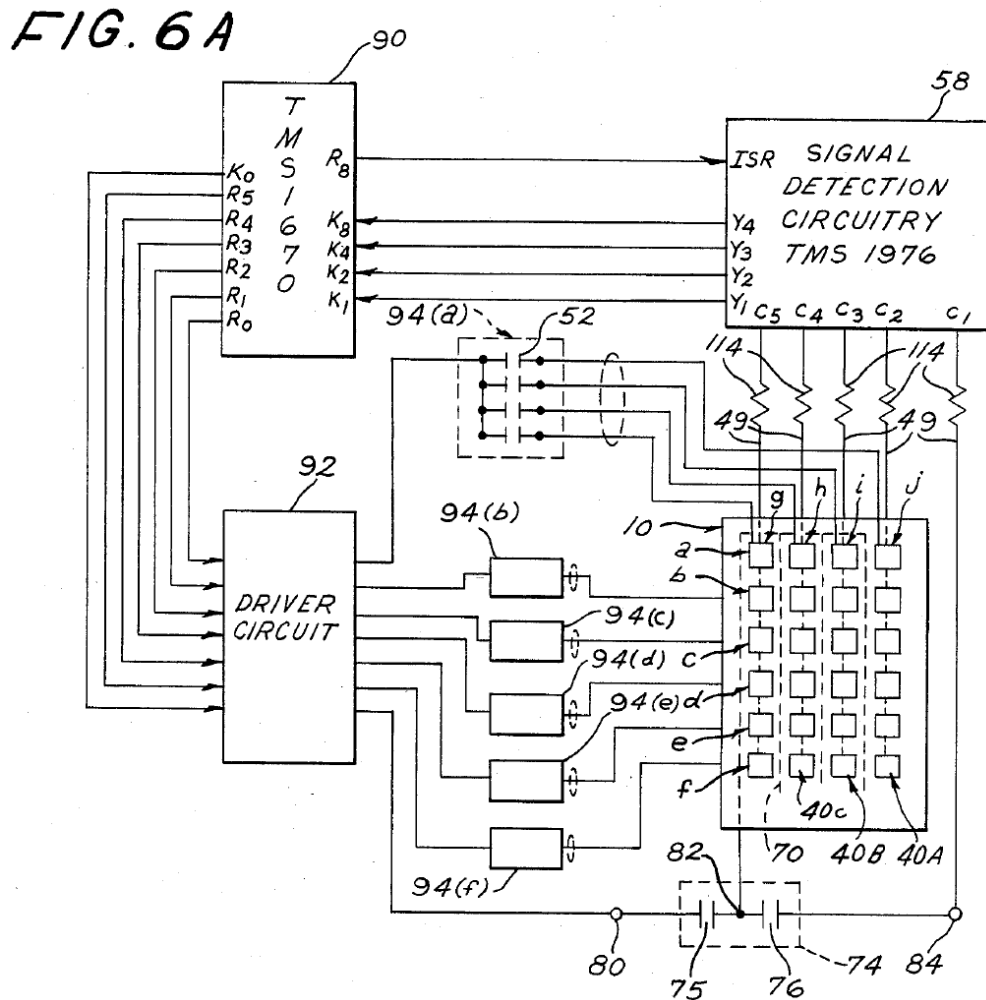


Figure 6A is a simplified schematic circuit diagram of an exemplary touch switch arrangement of Chiu. *Id.* at 3:38–41.

Chiu describes that, in the control circuit depicted in Figure 6A, microprocessor 90 sequentially generates a scan pulse at each of outputs R<sub>0</sub>–R<sub>5</sub>, which are coupled to rows a–f of the capacitive touch cell array 10 via driver circuitry 92. *Id.* at 8:45–49. According to Chiu, in this embodiment, microprocessor 90 is a commercially available TMS 1670 microprocessor, which can be customized by configuring its read only memory (ROM) to

implement the desired control scheme. *Id.* at 9:7–12. Chiu describes that a portion of the ROM of microprocessor 90 is configured to generate the capacitive touch keyboard drive signals, which are scan pulses provided sequentially at outputs  $R_0$ – $R_5$  of microprocessor 90. *Id.* at 9:12–18.

Figure 7 of Chiu is reproduced below.

**FIG. 7**

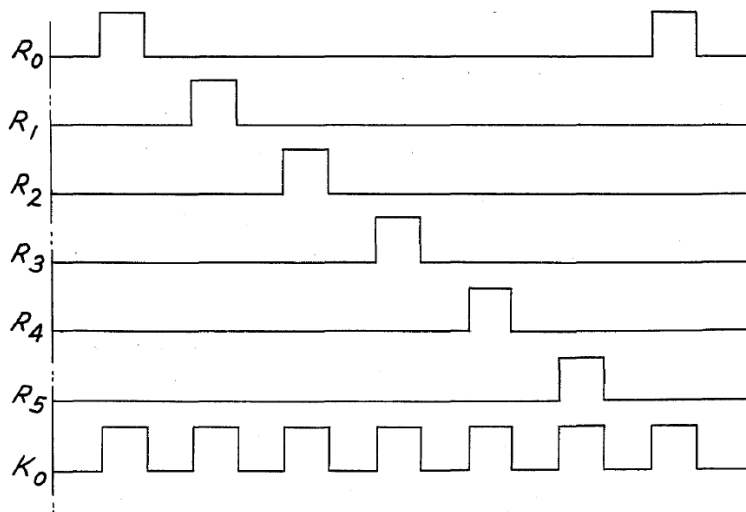


Figure 7 is a timing diagram illustrating the scan signals used in the control circuit depicted in Figure 6A. *Id.* at 3:45–46. According to Chiu, the timing diagram shown in Figure 7 represents one complete scan cycle. *Id.* at 10:30–31. Chiu describes that, during each scan cycle, a scan pulse appears sequentially at each of outputs  $R_0$ – $R_5$ .

According to Chiu, as shown in Figure 6A, columns g–j of the touch cell array are coupled to inputs  $C_5$ – $C_2$ , respectively, of detection circuitry 58 via limiting resistors 114. *Id.* at 8:56–58. Detection circuitry 58 senses the scan signal at each of the touch cells in the row being scanned by checking their respective column output lines 49 to detect an attenuation of the

column output line signal, signifying that a touch pad in a particular column has been touched. *Id.* at 8:63–67. If a touch pad in the row being scanned is touched, the signal detector circuit will detect the attenuation of the scanned signal for that column containing the touched pad. *Id.* at 8:67–9:3. Chiu describes that, in this fashion, a pad in the touch cell array that has been touched is identified by row and column. *Id.* at 9:5–6.

### 3. Overview of Schwarzbach (Ex. 1014)

Schwarzbach describes an appliance control system including a central control unit. Ex. 1014, [57]. Figure 1 of Schwarzbach is reproduced below.

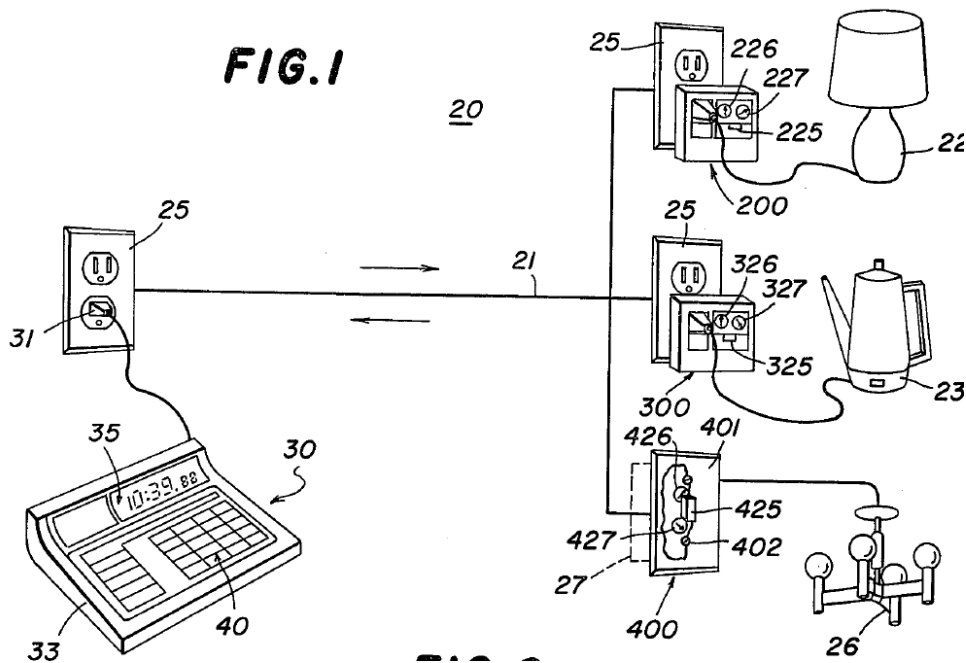
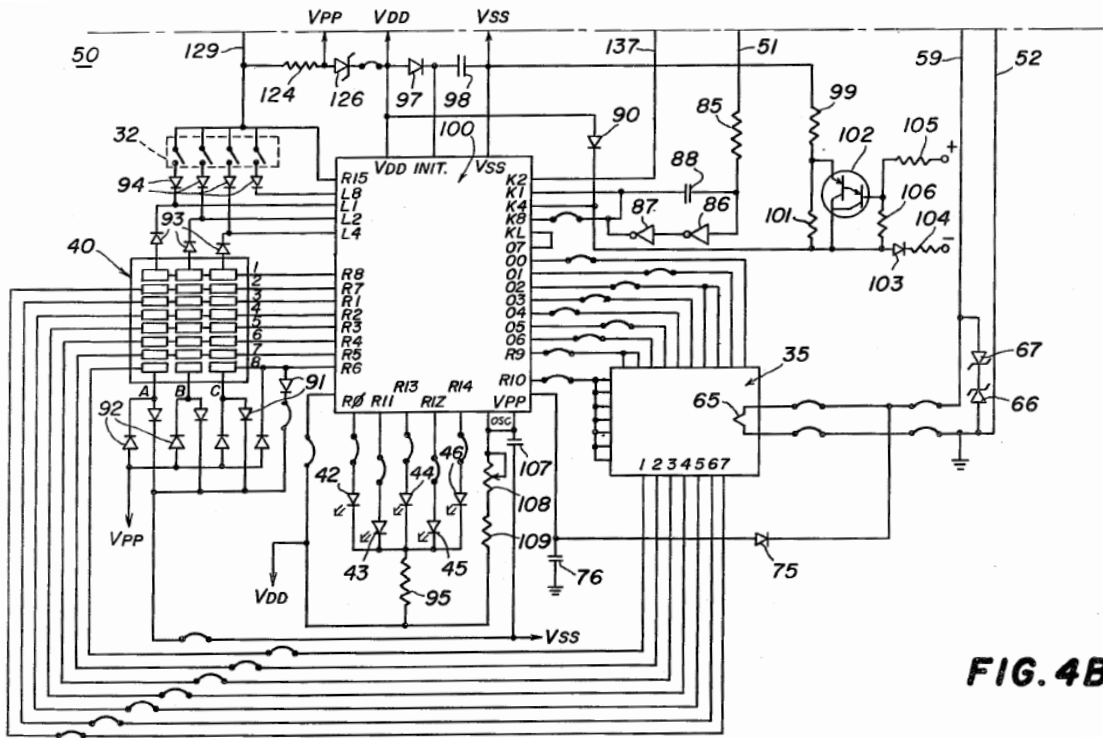


Figure 1 describes an exemplary appliance control system according to Schwarzbach. *Id.* at 3:8–10. As shown in Figure 1, system 20 includes central control unit 30, one or more lamp slave units 200, one or more appliance slave units 300, and one or more wall switch slave units 400.

Figure 4B of Schwarzbach is reproduced below.



**FIG. 4B**

Figure 4B is a schematic circuit diagram of a portion of the electrical circuit in central control unit 30 depicted in Figure 1. *Id.* at 3:18–20.

As shown in Figure 4B, electrical circuit 50 of central control unit 30 includes microprocessor 100. *Id.* at 4:9–11. Schwarzbach describes that microprocessor 100 is preferably a TMS 1670 microprocessor. *Id.* at 15:62. Central control unit 30 also includes keyboard 40 which is coupled to display panel 35 and to microprocessor 100. *Id.* at 4:50–52. Keyboard 40 is connected as a 3x8 matrix, with its row pins connected to corresponding microprocessor output terminals. *Id.* at 4:55–58. Key presses are detected by driving output terminals and scanning for closed keys. *Id.* at 4:58–67. When a key closure is detected, microprocessor 100 takes the appropriate action after the end of the keyboard scan. *Id.* at 4:67–5:1.

#### 4. Discussion

Many of the limitations recited in independent claims 37, 94, and 105 are identical or nearly identical. As discussed below, Petitioner relies on Chiu to teach all of these identical or nearly identical limitations common to the challenged independent claims. In what follows, we discuss these common limitations first and then address the remaining limitations and the claims as a whole.

##### *a. Common Limitations*

###### *(i) Preambles*

Claim 37 recites a preamble as follows: “[a] capacitive responsive electronic switching circuit for a controlled device.” Ex. 1001, Reexam. Cert. C1, 2:43–44. Claims 94 and 105 each recite a preamble with the following identical claim language: “[a] capacitive responsive electronic switching circuit for a controlled keypad device.”<sup>8</sup> *Id.*, Reexam. Cert. C2, 6:39–40 (claim 94), 7:42–43 (claim 105). Petitioner contends that Figure 6A of Chiu (reproduced above) describes a “control circuitry” that integrates a “touch panel” with a “control system for an appliance.” Pet. 21–22 (citing Ex. 1005, 8:41–44, Fig. 6A). Petitioner also asserts that Chiu teaches touch detection circuits that employ “a touch responsive pad or electrode and a receiver electrode” for “capacitive coupling [that] is alterable by [a] human being touching of or proximate to the touch pad.” *Id.* at 21 (citing Ex. 1005, 2:16–23). In addition, Petitioner contends that Chiu teaches that “capacitive

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<sup>8</sup> Petitioner treats the preambles of claims 37, 94, and 105 as limitations. *See* Pet. 21–22, 46–49, 56–57. For purposes of this Decision, we assume, without deciding, that the preambles are limiting.

touch keyboard drive signals” are generated and provided to an “array of touch switch cells (‘keypad’)”. *Id.* at 47 (citing Ex. 1005, 9:12–16).

Petitioner argues Chiu therefore teaches “[a] capacitive responsive electronic switching circuit for a controlled device,” as recited in claim 37, and “[a] capacitive responsive electronic switching circuit for a controlled keypad device,” as recited in claims 94 and 105. *Id.* at 22, 47–49, 56–57.

Patent Owner does not dispute Chiu teaches the preambles of claims 37, 94, and 105. Based on the record presented, we are persuaded that Petitioner has demonstrated sufficiently Chiu teaches the preambles of claims 37, 94, and 105.

(ii) *“an oscillator providing a periodic output signal having a predefined frequency”*

Claims 37, 94, and 105 each recite “an oscillator providing a periodic output signal having a predefined frequency.” Referencing Figure 6A of Chiu, Petitioner asserts that Chiu describes that a “portion of the ROM” of microprocessor 90 “is configured in a conventional manner to generate capacitive touch keyboard drive signals.” Pet. 22–23 (citing Ex. 1005, 9:7–25, Fig. 6A). According to Petitioner, Chiu refers to this ROM portion of the microprocessor as “signal generator circuitry.” *Id.* at 24 (citing Ex. 1005, 8:1). Citing the testimony of its declarant, Dr. Wright, Petitioner argues that a person of ordinary skill in the art would have understood that the signal generator circuitry of microprocessor 90 that generates square wave signals shown in Figure 7 of Chiu operates as an “oscillator” described in the ’183 patent. *Id.* at 24–25 (citing Ex. 1005, 8:1, 9:7–25, Figs. 6A & 7; Ex. 1001, 13:33–39; Ex. 1003 ¶¶ 93–94).

In addition, Petitioner asserts that Chiu describes the drive signal produced by the signal generator as “a pulsating waveform,” i.e., a periodic signal, as shown in Figure 7 of Chiu. *Id.* at 27 (citing Ex. 1005, 4:49–50). Relying on the testimony of Dr. Wright, Petitioner argues that, because Chiu teaches that the scan signal is a “pulsating” (i.e., periodic) “waveform,” such as the square wave shown in Figure 7, a person of ordinary skill in the art would have understood the scan signal to be a “periodic output signal” having a “predefined frequency.” *Id.* (citing Ex. 1003 ¶ 96).

Referencing an annotated version of Figure 7 (not reproduced herein), Petitioner additionally argues that the scan pulses shown in Figure 7 have a scan cycle that repeats during the operation of the circuit. *Id.* at 31–32 (citing Ex. 1005, 10:30–33, Fig. 7). Thus, Petitioner asserts that the scan pulses have a period of the duration of the scan cycle. *Id.* at 32. Citing the testimony of Dr. Wright, Petitioner argues that the period of the scan pulse signal is inversely related to the frequency of the signal. *Id.* (citing Ex. 1003 ¶ 105).

Patent Owner asserts that Chiu does not teach “an oscillator providing a periodic output signal having a predefined frequency” because the timing diagram in Chiu’s Figure 7 “has no time axis with units or divisions to indicate any periodicity or fixed scan frequency.” Prelim. Resp. 35.

For purposes of this Decision, we credit Dr. Wright’s testimony and are persuaded by Petitioner’s argument and evidence that Chiu’s scan pulses having a period of the scan cycle, which is a fixed time duration, teaches “a periodic output signal having a predefined frequency” recited in the challenged independent claims. Based on the record presented, we are



persuaded that Petitioner has demonstrated sufficiently that Chiu teaches “an oscillator providing a periodic output signal having a predefined frequency,” as recited in claims 37, 94, and 105.

Petitioner contends that Schwarzbach also teaches an “oscillator” with a frequency of “150 kHz” that generates a “carrier wave,” which is pulse-width modulated to produce “coded signals.” Pet. 27–28 (citing Ex. 1014, 9:8–32). Citing the testimony of Dr. Wright, Petitioner argues that because Schwarzbach describes the coded signals as a “wave form,” a person of ordinary skill in the art would have understood the coded signals to be a “periodic output signal.” *Id.* at 28 (citing Ex. 1003 ¶ 97). Petitioner contends that, because Chiu and Schwarzbach use the same TMS 1670 microprocessor, a person of ordinary skill in the art would have understood that Chiu’s microprocessor has the same features. *Id.* (citing Ex. 1003 ¶ 97).

Patent Owner asserts that Schwarzbach’s 150 kHz signal is a carrier frequency used to send coded communication signals and that the signal is not used in any way to generate signals used to activate touch terminals. Prelim. Resp. 35 (citing Ex. 1014, 9:20–24; Ex. 2002 ¶ 58).

We agree with Patent Owner that the 150 kHz signal generated by Schwarzbach’s inverter oscillator is a carrier bandwidth used to send coded communication signals to the remote slave units. *See, e.g.*, Ex. 1014, 8:21–26, 9:20–24. For purposes of this Decision, however, we need not resolve the issue of whether Chiu combined with Schwarzbach teaches or suggests “an oscillator providing a periodic output signal having a predefined frequency” used to drive an array of touch pads, because, as discussed

above, we are persuaded that Chiu alone teaches or suggests this claim limitation.

*(iii) “a microcontroller using the periodic output signal from the oscillator”*

Claims 37, 94, and 105 each recite “a microcontroller using the periodic output signal from the oscillator.” Petitioner maps the recited “microcontroller” to microprocessor 90 of Chiu and argues that Chiu’s microprocessor generates a scan pulse at outputs R<sub>0</sub>–R<sub>5</sub> coupled to rows a–f of capacitive touch cell array 10. Pet. 30 (citing Ex. 1005, 8:45–55). Because Chiu’s scan pulse is a “periodic output signal,” as discussed above, Petitioner asserts that Chiu’s microprocessor uses the scan pulse signal (the claimed “periodic output signal”) from the signal generator circuitry of microprocessor 90 (the claimed “oscillator”) to drive rows of touch cell array 10. *Id.*

At this stage, Patent Owner does not dispute that Chiu teaches “a microcontroller using the periodic output signal from the oscillator” recited in the challenged independent claims.

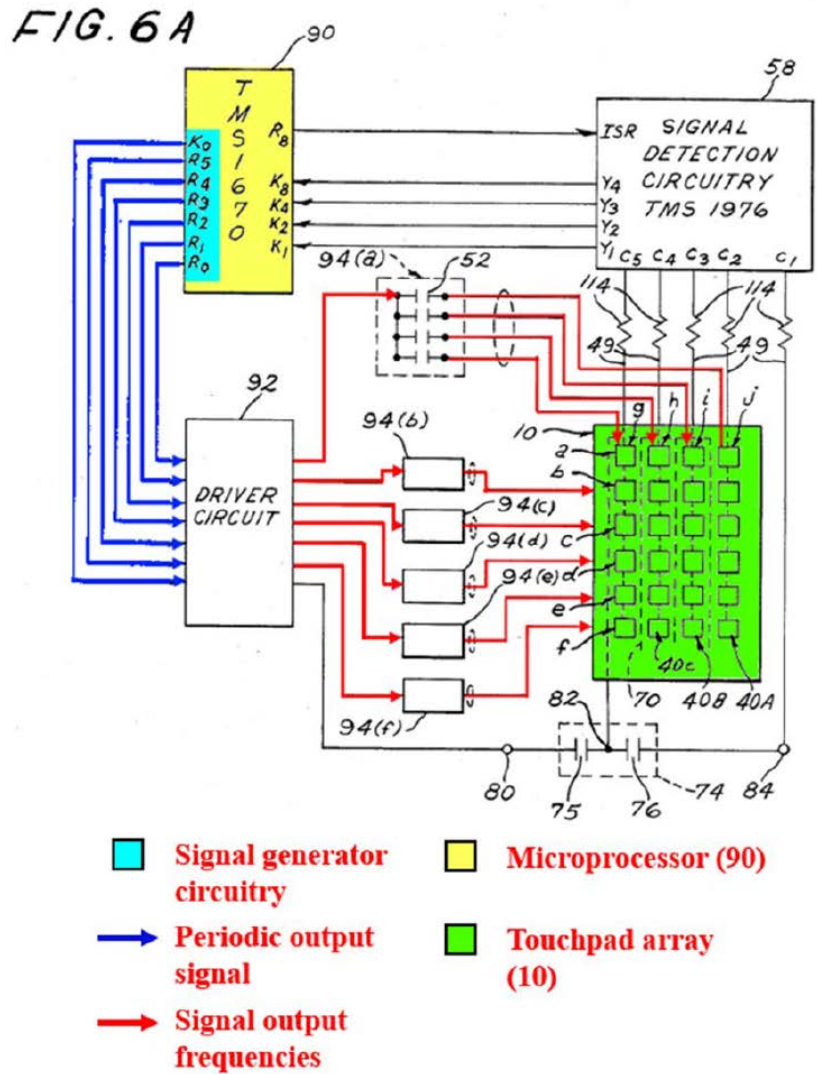
Based on the record presented, we are persuaded that Petitioner has demonstrated sufficiently that Chiu teaches “a microcontroller using the periodic output signal from the oscillator,” as recited in claims 37, 94, and 105.

*(iv) “the microcontroller selectively providing signal output frequencies to a closely spaced array of input touch terminals of a keypad”*

Claims 37, 94, and 105 each recite “the microcontroller selectively providing signal output frequencies to a closely spaced array of input touch

terminals of a keypad.” Referencing an annotated version of Figure 6A of Chiu, Petitioner contends that Chiu teaches this limitation (the “selectively providing limitation”).

Figure 6A of Chiu, as annotated by Petitioner, is reproduced below.



Pet. 34. Annotated Figure 6A above shows Petitioner’s identification of the claimed “microcontroller” (i.e., microprocessor 90, annotated in yellow); the claimed “array of input touch terminals of a keypad” (i.e., capacitive touch cell array 10, annotated in green); the claimed “periodic output signal” (i.e.,

scan pulse signal output from microprocessor 90 to driver circuit 92, annotated in blue); and the claimed “signal output frequencies” (i.e., signals provided from driver circuit 92 to rows a–f of touch cell array 10, annotated in red) present in Chiu.

Referencing Figure 6A, Petitioner asserts that Chiu teaches “the microcontroller selectively providing signal output frequencies” to an “array of input touch terminals of a keypad” because Chiu describes that each of outputs R<sub>0</sub>–R<sub>5</sub> of microprocessor 90 are “coupled to rows a–f of capacitive touch cell array 10” through driver circuit 92 and that driver circuit 92 amplifies the scan pulse signals and provides the amplified signals to the rows of capacitive touch cell array 10. Pet. 31 (citing Ex. 1005, 8:45–55, 9:20–25; Ex. 1003 ¶ 104). Petitioner also presents an annotated version of Figure 7 of Chiu (not reproduced herein) and argues that, as shown in Figure 7, the scan pulses generated on outputs R<sub>0</sub>–R<sub>5</sub> of microprocessor 90 are *sequentially provided* to rows a–f of capacitive touch cell array 10 during the repeating scan cycles. *Id.* at 31–32 (citing Ex. 1005, 9:7–25, 10:31–34, Fig. 7). Citing the testimony of Dr. Wright, Petitioner asserts that a person of ordinary skill in the art would have understood that the repeating scan pulse signals on outputs R<sub>0</sub>–R<sub>5</sub> are “selectively” provided to rows a–f of touch cell array 10. *Id.* at 32–33 (citing Ex. 1003 ¶ 105).

In addition, Petitioner asserts that Chiu teaches “a closely spaced array of input touch terminals of a keypad,” as recited in the challenged independent claims because Chiu describes that its techniques allow for “closer spacing of touch switch cells for greater switch density on” touch cell array 10. *Id.* at 33 (citing Ex. 1005, Abstract).

Patent Owner asserts that Chiu does not teach a “microcontroller” that “selectively” providing signal output frequencies because Chiu cannot “selectively provide” signal output frequencies from “multiple frequencies.” Prelim. Resp. 32.

Patent Owner’s argument is based on its proposed construction of the term “selectively providing signal output frequencies” that requires the “signal output frequencies” be selected from multiple available frequencies. We disagree with Patent Owner’s argument because, for the reasons discussed above in Section III.C (Claim Construction), we do not adopt Patent Owner’s proposed construction.

As discussed above in the same section, we determine that selecting a row of an array of touch pads to provide signal output frequencies falls within the scope of the term “selectively providing signal output frequencies” recited in the challenged independent claims. Thus, we agree with Petitioner that Chiu’s scan pulses generated on outputs R<sub>0</sub>–R<sub>5</sub> of microprocessor 90 that are *sequentially provided* to rows a–f of capacitive touch cell array 10 during the repeating scan cycles teach “the microcontroller selectively providing signal output frequencies” to an “array of input touch terminals of a keypad.”

Based on the current record, we are persuaded that Petitioner has demonstrated sufficiently that Chiu teaches “the microcontroller selectively providing signal output frequencies to a closely spaced array of input touch terminals of a keypad,” as recited in claims 37, 94, and 105.

*(v) Touch Terminals Limitations*

Claims 37, 94, and 105 each recite “the input touch terminals comprising first and second input touch terminals” and “the first and second touch terminals defining areas for an operator to provide an input by proximity and touch.” Ex. 1001, Reexam. Cert. C1, 2:51–54 (claim 37); *id.*, Reexam. Cert. C2, 6:50–51, 6:54–56 (claim 94), 7:49–50, 7:55–57 (claim 105).

Petitioner cites the disclosures in Chiu describing an array of touch sensitive switch cells and touch pads and asserts that Chiu teaches these limitations (the “touch terminals limitations”). Pet. 37–38 (citing Ex. 1005, Abstract, 4:1–9, Fig. 5A). In its Preliminary Response, Patent Owner does not dispute Chiu teaches these touch terminals limitations.

We have reviewed Petitioner’s arguments and evidence on the touch terminals limitations, and, determine that, for purposes of the Decision, Petitioner makes a sufficient showing.

*(vi) Detector Circuit Limitations*

Claim 37 recites

a detector circuit coupled to said oscillator for receiving said periodic output signal from said oscillator, and coupled to said first and second touch terminals, said detector circuit being responsive to signals from said oscillator via said microcontroller and a presence of an operator’s body capacitance to ground coupled to said first and second touch terminals when proximal or touched by the operator to provide a control output signal for actuation of the controlled device, said detector circuit being configured to generate said control output signal when the operator is proximal or touches said second touch terminal after the operator is proximal or touches said first touch terminal.

Ex. 1001, Reexam. Cert. C1, 2:55–67 (the “detector circuit limitation”). Claims 94 and 105 recite nearly identical limitations. *Id.*, Reexam. Cert. C2, 6:57–7:2 (claim 94), 7:58–8:10 (claim 105).

Petitioner maps the claimed “detector circuit” to signal detection circuitry 58 depicted in Figure 6A of Chiu and provides detailed explanations and specific citations to Chiu indicating where in the reference the recited features of the rest of the detector circuit limitation are disclosed. Pet. 39–46. In addition, Petitioner relies upon the testimony of Dr. Wright. *Id.*

At this stage of the proceeding, Patent Owner does not dispute Chiu teaches the detector circuit limitation.

We have reviewed Petitioner’s arguments and evidence, and, for purposes of the Decision, we are persuaded that Petitioner has demonstrated sufficiently that Chiu teaches the detector circuit limitation.

*b. Independent Claim 105*

In addition to the common limitations, claim 105 also recites “wherein the selectively providing comprises the microcontroller selectively providing a signal output frequency to each row of the closely spaced array of input touch terminals of the keypad.” Ex. 1001, Reexam. Cert. C2, 7:51–54 (the “selectively providing to each row limitation”). Claim 94 recites an identical limitation. *Id.* at 6:46–50.

Petitioner relies on Chiu alone to teach this limitation. Similar to Petitioner’s contentions on the “selectively providing” limitation discussed above, Petitioner relies on Figure 6A of Chiu to teach that the signal output frequency is “selectively” provided to “each row” of the array of touch

terminals. Pet. 49–50. Referencing another annotated version of Figure 6A (not reproduced herein), Petitioner asserts that microprocessor 90 (the claimed “microcontroller”) controls driver circuit 92 to *sequentially* (i.e., “selectively”) generate respective scan pulses for each microcontroller outputs R<sub>0</sub>–R<sub>5</sub> to provide a signal output frequency to each rows of input touch terminals of touchpad 10 via capacitor banks 94(a)–94(f). *Id.* (citing Ex. 1005, 8:45–55, Fig. 6A).

Based on the record presented, we are persuaded that Petitioner has demonstrated sufficiently that Chiu teaches “the microcontroller selectively providing a signal output frequency to each row of the closely spaced array of input touch terminals of the keypad,” as recited in claim 105 (and also in claim 94).

In addition to its argument discussed above that turns on claim construction, Patent Owner also argues that a person of ordinary skill would not have been motivated to combine Chiu with Schwarzbach. Prelim. Resp. 36.

Because Petitioner relies on Chiu alone to teach all limitations of claim 105, however, Petitioner need not demonstrate a motivation to combine Chiu with Schwarzbach. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1373 (Fed. Cir. 2019) (“[B]ecause the Board did not rely on Nelson for the disclosure of a particular element or teaching, the Board had no obligation to find a motivation to combine O’Brien and Nelson.”). Although the use of Chiu as a single anticipatory reference may have been more properly raised under § 102, “a disclosure that anticipates under § 102 also renders the claim invalid under § 103, for anticipation is the epitome of



obviousness.” *Realtime Data*, 912 F.3d at 1373 (internal quotation marks omitted) (citations omitted).

Based on the record presented, we are persuaded that Petitioner has demonstrated sufficiently that Chiu teaches all limitations of claim 105.

*c. Independent Claim 37*

In addition to the common limitations, claim 37 recites “wherein an oscillator voltage is greater than a supply voltage.” Ex. 1001, Reexam. Cert. C1, 2:46–47. Petitioner relies on Schwarzbach to teach this limitation. Pet. 28–30.

Petitioner asserts that Schwarzbach describes that a “supply voltage of approximately +16 volts is supplied to the microprocessor 100,” which is the same TMS 1670 microprocessor used by Chiu. Pet. 29 (citing Ex. 1014, 6:6–9, 15:62–63). Petitioner also contends that Schwarzbach teaches “an oscillator voltage” that is “greater than a supply voltage” because Schwarzbach describes that the “output of the *transmitter/modulator 110*” is “18 volts,” which is greater than the 16 volt supply voltage. *Id.* (emphasis added) (citing Ex. 1014, 9:33–48).

We are not persuaded by Petitioner’s argument and evidence. Although Petitioner contends that Schwarzbach teaches the TMS 1670 microprocessor includes a “transmitter/modulator” that functions as a “150 KHz oscillator” (*id.* (citing Ex. 1014, 8:24–9:32)), we discern no disclosure in Schwarzbach that transmitter/modulator 110 is included in the TMS 1670 microprocessor. Rather, in the portion of Schwarzbach cited by Petitioner, Schwarzbach describes that “[t]he *central control unit 30* also includes a *transmitter/modulator*, generally designated by the numeral 110, for

transmitting signals to the remote slave units 200, 300 and 400.” Ex. 1014, 8:21–26 (emphases added), Fig. 4A. As discussed above, Figures 1 and 4B of Schwarzbach describe that central control unit 30 is a controller box that includes electrical circuit 50, which in turn includes the TMS 1670 microprocessor. *Id.* at 3:66–4:1, 4:9–11, Figs. 1 & 4B. Although Figure 4B shows that the TMS 1670 microprocessor is included in electrical circuit 50 of Schwarzbach, there is no indication in Schwarzbach that transmitter/modulator 110, which is separately depicted in Figure 4A, is included in the TMS 1670 microprocessor, as Petitioner contends.

As discussed above, transmitter/modulator 110 of Schwarzbach generates a carrier wave frequency used to transmit messages to remote slave units. *Id.* at 8:21–26, 9:20–24. Petitioner does not explain how transmitter/modulator 110 of Schwarzbach relates to the TMS 1670 microprocessor of Schwarzbach, or for that matter, how the transmitter/modulator relates to the operation of Schwarzbach’s keypad. Thus, based on the current record, Petitioner does not show sufficiently that transmitter/modulator 110 of Schwarzbach teaches “an oscillator” recited in claim 37 having “an oscillator voltage . . . greater than a supply voltage.”

Therefore, Petitioner does not show sufficiently that the proposed combination of Chiu and Schwarzbach teaches all limitations of claim 37.

*d. Independent Claim 94*

In addition to the common limitations, claim 94 also recites “wherein the selectively providing comprises the microcontroller selectively providing a signal output frequency to each row of the closely spaced array of input touch terminals of the keypad.” Ex. 1001, Reexam. Cert. C2, 6:46–50.

Claim 105 recites an identical limitation. Thus, for the same reasons discussed above for claim 105, we are persuaded that Petitioner has demonstrated sufficiently that Chiu teaches “the microcontroller selectively providing a signal output frequency to each row of the closely spaced array of input touch terminals of the keypad,” as recited in claim 94.

Claim 94 also recites “wherein a peak voltage of the signal output frequencies is greater than a supply voltage.”<sup>9</sup> *Id.* at 6:51–53. Petitioner contends that the combination of Chiu and Schwarzbach teaches this limitation. *Pet.* 51–53.

As discussed above, Petitioner asserts that Schwarzbach describes a “supply voltage of approximately +16 volts is supplied to the microprocessor 100,” which is the same TMS 1670 microprocessor used by Chiu. *Id.* at 29 (citing Ex. 1014, 6:6–9, 15:62–63). Petitioner also contends that Chiu teaches the driver circuitry amplifies the pulse signals to a peak voltage of “30 volts.” *Id.* at 51 (citing Ex. 1005, 9:20–23). Thus, Petitioner argues that, in the proposed combination of Chiu and Schwarzbach, the peak voltage of the amplified pulse signals (the claimed “signal output frequencies”) produced by the driver circuitry of Chiu is greater than the supply voltage of the TMS 1670 microprocessor (the claimed “microcontroller”).

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<sup>9</sup> Petitioner contends that the term “supply voltage” recited in claim 94 should be construed to mean “a supply voltage of the microcontroller.” *Pet.* 12–14, 51. Although claim 94 does not expressly recite that the “supply voltage” is for the microcontroller, for purposes of the Decision, we need not resolve the issue of whether the recited “supply voltage” is for the “oscillator” or the “microcontroller,” because, as discussed above, Petitioner maps both to the same chip in Chiu. *See Pet.* 22–24, 30–31.

Petitioner contends that a person of ordinary skill in the art would have been motivated to modify Chiu to use the supply voltage of Schwarzbach because both references use the same TMS 1670 microprocessor. *Id.* at 19. Petitioner argues that because Chiu does not teach any particular supply voltage for the microprocessor, a person of ordinary skill in the art would have looked to well-known supply voltages used with the specific microprocessor described in Chiu—such as the supply voltage described in Schwarzbach. *Id.* (citing Ex. 1005, 9:7–9, Fig. 6A; Ex. 1014, 4:50–5:1; Ex. 1003 ¶ 83).

Patent Owner asserts that a person of ordinary skill in the art would not have been motivated to combine Chiu with Schwarzbach because Schwarzbach’s high frequency oscillator signals would be more costly to use and difficult to detect in Chui’s touch pad circuit. Prelim. Resp. 36.

For claim 94, however, Petitioner’s proposed combination does not combine Schwarzbach’s high frequency oscillator signals with Chui’s touch pad circuit. Rather, as discussed above, Petitioner combines only the microprocessor supply voltage of Schwarzbach with Chiu’s signal output voltage.

Based on the record presented, for purposes of this Decision, we are persuaded that Petitioner has demonstrated sufficiently that the combination of Chiu and Schwarzbach teaches all limitations of claim 94. We also determine, at this stage of the proceeding, Petitioner has shown sufficiently that a person of ordinary skill in the art would have been motivated to combine Chiu and Schwarzbach in the manner proposed by Petitioner.

*e. Dependent Claims 96, 101, and 106*

Claims 96 and 101 depend from claim 94, and claim 106 depends from claim 105. Petitioner relies on Chiu to teach all of the additionally recited limitations of dependent claims 96, 101, and 106. Pet. 54–55, 58.

Patent Owner does not respond specifically to Petitioner’s challenge to claims 96, 101, and 106 beyond Patent Owner’s arguments advanced with respect to the challenged independent claims discussed above.

We have reviewed Petitioner’s arguments and evidence, and, for purposes of the Decision, we are persuaded that Petitioner has demonstrated sufficiently that Chiu teaches all limitations recited in claims 96, 101, and 106.

*f. Conclusion*

Based on the current record, we determine that the information presented shows a reasonable likelihood that Petitioner would prevail in establishing that claims 105 and 106 are unpatentable as obvious over Chiu and that claims 94, 96, and 101 are unpatentable as obvious over the combination of Chiu and Schwarzbach. But for the reasons discussed above, we determine, on the current record, that Petitioner has not shown a reasonable likelihood of prevailing in its challenge to claim 37 as obvious over the combination of Chiu and Schwarzbach.

*E. Claims 97–99 and 107–109 as Obvious over  
Chiu, Schwarzbach, and Meadows*

Claims 97–99 depend from claim 94, and claims 107–109 depend from claim 105. Claims 97 and 107 each recite “wherein each signal output frequency selectively provided to each row of the closely spaced array of

input touch terminals of the keypad is selected from a plurality of Hertz values.” Ex. 1001, Reexam. Cert. C2, 7:12–16 (claim 97), 8:15–19 (claim 107). Claims 98, 99, 108, and 109 depend from claims 97 or 107, and further recite that plurality of Hertz values are “greater than 50 kHz” (claims 98 and 108) or “greater than 100 kHz” (claims 99 and 109). *Id.* at 7:17–22 (claims 98 and 99), 8:20–25 (claims 108 and 109).

Petitioner contends that claims 97–99 and 107–109 are unpatentable as obvious over the combination of Chiu, Schwarzbach, and Meadows. Pet. 67–73. Petitioner’s contention appears to be based on an implicit claim construction that the selecting recited in the term “selectively providing” is used in the same sense as the selection recited in “selected from a plurality of Hertz values” and that such selecting or selection takes place during the operation of the recited “electronic switching circuit.” *See, e.g., id.* at 71.

As discussed above, there is no support in the Specification for a requirement of a microcontroller “selectively providing” signal output frequencies “selected from” multiple available frequencies during the operation of a claimed device. When claims 97 and 107 were added during reexamination, the only support cited in the Specification discussed selecting frequencies *at the design stage*, not during operation. Ex. 1007, 117–119, 164–166.<sup>10</sup>

To the extent Petitioner is relying on an implicit claim construction which interprets the recited “selected from a plurality of Hertz values” as requiring selection of Hertz values during operation, we are not persuaded

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<sup>10</sup> Note that issued claim 107 was original claim 67 during the reexamination proceeding. *See* Ex. 1007, 45.

that Petitioner has demonstrated a reasonable likelihood of prevailing in showing that claims 97–99 and 107–109 would have been obvious over the combination of Chiu, Schwarzbach, and Meadows, for the reasons discussed below. Nevertheless, because Petitioner has demonstrated a reasonable likelihood of success in proving that at least one claim of the '183 patent is unpatentable, as discussed above, we will institute on all challenged claims and all grounds raised in the Petition.

Because a trial is being instituted, we invite the parties to address in their papers the proper construction of claims 97–99 and 107–109, as to whether the required “select[ion] from a plurality of Hertz values” refers to selection during operation or design; whether the selecting recited in the term “selectively providing” is used in a different sense than the selection recited in “selected from a plurality of Hertz values;” and whether the claims are unpatentable over the combination of Chiu, Schwarzbach, and Meadows in light of such construction.

*1. Overview of Meadows (Ex. 1013)*

Meadows describes a capacitive touch panel system that includes a position measurement apparatus to generate an address signal indicative of the position of a stylus touching the touch panel. Ex. 1013, [57]. The position measurement apparatus includes a position measurement signal source that generates a square-wave measurement signal. *Id.* In Meadows, a microprocessor of the touch panel system generates a pseudo-random number signal that is delivered to the position measurement signal source. *Id.* at 4:25–28. In response to the pseudo-random number signal, the measurement signal source generates a measurement signal with a frequency

of between 150 kHz and 250 kHz in accordance with the value of the pseudo-random number. *Id.* at 4:28–32. Meadows also describes that the position measurement signal source includes a voltage controlled oscillator and a digital-to-analog converter connected to the voltage controlled oscillator that operate in conjunction to generate a measurement signal of a frequency corresponding to the value of the pseudo-random number received from the microprocessor. *Id.* at 7:27–42, Fig. 3.

## 2. Discussion

In its proposed combination of Chiu and Meadows, Petitioner proposes to *replace* the “oscillator of Chiu” *with* the “voltage controlled oscillator” described in Meadows (Pet. 69 (citing Ex. 1013, 7:34–38)) to “generate a pseudo-random number and provide a periodic output signal with a frequency selected from the range of 150 and 250 kHz in accordance with the value of the pseudo-random number” (*id.* at 68 (citing Ex. 1013, 4:19–32; Ex. 1003 ¶ 150)). According to Petitioner,

Periodically, such as after a predetermined time interval or in response to a particular condition, the combined touch circuit generates a new pseudo-random number, selects a new frequency from the range based on the pseudo-random number, and provides a periodic output signal with the new frequency to the touch terminals described in Chiu.

*Id.* (citing Ex. 1013, 4:19–32; Ex. 1003 ¶ 150).

We are not persuaded by Petitioner’s argument and evidence for several reasons. First, Petitioner does not explain adequately how it proposes to “*replace*[] the oscillator of Chiu *with* the ‘voltage controlled oscillator’ described in Meadows.” *See id.* at 69 (emphases added). As



discussed above in Section III.D.4.a(ii), Petitioner maps the ROM portion of Chiu's microprocessor 90 to the "oscillator" recited in claims 94 or 105. *Id.* at 22–24. The same "oscillator" recitation is included in claims 97–99 and 107–109 by virtue of their dependency from claims 94 or 105. As discussed in the same section, Petitioner identifies the scan pulses (generated by Chiu's ROM) described in Figure 7 of Chiu as the claimed "periodic output signal having a predefined frequency" provided by the recited "oscillator." *Id.* at 24–27, 31–32.

But Petitioner does not explain adequately how the ROM portion of Chiu's microprocessor 90 may be replaced with the voltage controlled oscillator of Meadows. In the portion cited by Petitioner, Meadows describes that a digital-to-analog converter receives a pseudo-random number signal from the microprocessor and generates a control voltage of a magnitude corresponding to the value of the pseudo-random number. Ex. 1013, 7:30–34. The control voltage is then delivered to the voltage controlled oscillator, which in response to the control voltage, generates a signal of a frequency corresponding to the magnitude of the control voltage. *Id.* at 7:34–38.

Thus, for Meadow's voltage controlled oscillator to generate frequencies between 150 kHz and 250 kHz corresponding to the value of the pseudo-random number, which is relied upon by Petitioner to teach the frequencies recited in claims 97–99 and 107–109, the voltage controlled oscillator needs the digital-to-analog converter to convert the pseudo-random number signal from the microprocessor (a digital signal) to a control voltage (an analog signal) of a magnitude corresponding to the value of the

pseudo-random number. This suggests that the voltage controlled oscillator of Meadows is an analog circuit that generates an analog waveform of frequencies between 150 kHz and 250 kHz. Neither Petitioner nor Dr. Wright explains adequately how a person of ordinary skill in the art would have replaced the ROM inside Chiu's microprocessor with the digital-to-analog converter and the voltage controlled oscillator circuit of Meadows. *See* Pet. 68–69 (citing Ex. 1003 ¶¶ 150, 151).

Next, Petitioner does not explain adequately how the randomized frequency of Meadows would be combined with the circuitry of Chiu to drive the array of touch pads of Chiu. As discussed above in Section III.D.4.a(ii), Petitioner identifies the scan pulses (described in Figure 7 of Chiu) provided to rows a–f of Chiu's capacitive touch cell array through the driver circuit of Chiu as the claimed “signal output frequencies” “selectively provid[ed]” by the recited “microcontroller” to an “array of input touch terminals of a keypad,” as recited in claims 94 and 105. Pet. 31–34. In particular, Petitioner relies on the scan cycle of Chiu's scan pulses as teaching the period and, therefore, the frequency of the “signal output frequencies” limitations recited in claims 94 and 105. *See id.* at 31–33. Thus, if Chiu's oscillator is modified with Meadows's teaching of randomized frequencies, as proposed by Petitioner, Chiu's scan pulses would have randomized frequencies, and Chiu's scan cycle would, therefore, have randomized periods.

Dr. Wright, Petitioner's declarant, opines that

Meadows' technique involves varying the frequency of the signal produced by the oscillator at regular intervals. This technique can be applied to various circuits, such as those

described in Chiu and Schwarzbach, and does not rely on the detection of interference or other external conditions to trigger a change in the frequency.

Ex. 1003 ¶ 152 (citing Ex. 1013, 4:19–32); Pet. 69–70 (citing Ex. 1003 ¶ 152). But Dr. Wright does not explain adequately how Chiu’s scan pulses with randomized frequencies would be applied to the driver circuits of Chiu to activate the rows of Chiu’s touch pad array. Dr. Wright also does not explain adequately how Chiu’s detector circuitry would work with the scan pulses with randomized scan cycles when identifying by row and column which touch pad has been touched (*see* Ex. 1005, 8:56–58, 8:63–67, 9:5–6).

We are mindful that, in general, “[t]he test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference.” *In re Keller*, 642 F.2d 413, 425 (CCPA 1981). Instead, the relevant issue is “what the combined teachings of the references would have suggested to those of ordinary skill in the art.” *Id.* “Combining the teachings of references does not involve an ability to combine their specific structures.” *In re Nievelt*, 482 F.2d 965, 968 (CCPA 1973). Here, however, Petitioner’s position is premised on its specific proposed combination of Chiu and Meadows—i.e., replacing Chiu’s oscillator with Meadow’s voltage controlled oscillator. *See* Pet. 69. Therefore, this authority does not alter our conclusion in this case.

In sum, based on the record presented, we determine that Petitioner has not explained adequately how a skilled artisan would have made the proposed combination of Chiu and Meadows.

Further, Petitioner has not explained adequately *how* the proposed combination is supposed to work. *Cf. Pers. Web Techs., LLC v. Apple, Inc.*,

848 F.3d 987, 994 (Fed. Cir. 2017) (“[T]he Board nowhere clearly explained, or cited evidence showing, how the combination of the two references was supposed to work. At least in this case, such a clear, evidence-supported account of the *contemplated workings of the combination* is a *prerequisite* to adequately explaining and supporting a conclusion that a relevant skilled artisan would have been motivated to make the combination and reasonably expect success in doing so.” (emphases added)). According to the Federal Circuit,

The amount of explanation needed to meet the governing legal standards—to enable judicial review and to avoid judicial displacement of agency authority—necessarily depends on context. A brief explanation may do all that is needed if, for example, the technology is simple and familiar and the prior art is clear in its language and easily understood. On the other hand, complexity or obscurity of the technology or prior-art descriptions may well make more detailed explanations necessary.

*Id.* (internal citation omitted). We find that this case falls into the latter category. Given the level of ordinary skill in the art as well as the complexity of the design and operation of the circuits in Chiu and Meadows, it was incumbent on Petitioner to explain how the ROM inside Chiu’s microprocessor would have been replaced with Meadow’s digital-to-analog converter and Meadow’s voltage controlled oscillator, and how the circuit of the proposed combination would have worked with scan pulses of randomized frequencies and scan cycles of randomized periods. Because Petitioner has failed to do so, we determine that Petitioner has not established sufficiently that a person of ordinary skill in the art would have

been motivated to combine the teachings of Chiu and Meadows to achieve the claimed invention.

Thus, based on the record presented, we are not persuaded that Petitioner has shown a reasonable likelihood that one of ordinary skill in the art would have combined Chiu and Meadows in the manner asserted.

To the extent Petitioner relies on Schwarzbach or Schwarzbach combined with Meadows to teach the frequencies recited in claims 97–99 and 107–109 (*see* Pet. 70), Petitioner’s argument is not persuasive because, for the reasons discussed above in Section III.D.4.c, Petitioner does not show sufficiently that transmitter/modulator 110 of Schwarzbach teaches “an oscillator” recited in claims 94 and 105.

Accordingly, for the reasons discussed above, we are unable to determine based on the current record that Petitioner has shown a reasonable likelihood it would prevail in showing that the subject matter of claims 97–99 and 107–109 would have been obvious over the combination of Chiu, Schwarzbach, and Meadows. Nevertheless, as discussed above, because Petitioner has demonstrated a reasonable likelihood of success in proving that at least one claim of the ’183 patent is unpatentable, we will institute on all grounds and all claims raised in the Petition.

*F. Claims 38, 39, 104, 115, and 116 as Obvious over Chiu and Lawson or over Chiu, Schwarzbach, and Lawson*

In this asserted ground of obviousness, Petitioner contends that dependent claims 38, 39, 104, 115, and 116 would have been obvious over Chiu and Schwarzbach, further combined with Lawson. Pet. 58–67. As discussed above, Petitioner asserts that Chiu alone teaches all limitations

recited in independent claim 105, from which claims 115 and 116 depend. Thus, we understand Petitioner’s contentions on claims 115 and 116 to be obviousness arguments based on the combination of Chiu and Lawson.

*1. Overview of Lawson (Ex. 1032)*

Lawson describes an oven controller including a microprocessor, a keyboard, and a display. Ex. 1032, [57]. Lawson describes using a microprocessor to change LED indicators in response to keypad input—e.g., touching a “0” will cause a single VLED to be illuminated. *Id.* at 28:4–5.

*2. Dependent Claims 38 and 39 as Obvious over the Combination of Chiu, Schwarzbach, and Lawson*

Claims 38 and 39 depend from claim 37. Petitioner contends that Lawson teaches the additionally recited limitations of dependent claims 38 and 39. Pet. 60–66.

As discussed above, Petitioner has not shown a reasonable likelihood of prevailing in its challenge to claim 37, from which claims 38 and 39 depend, as obvious over the combination of Chiu and Schwarzbach. Petitioner’s arguments and evidence presented with respect to dependent claims 38 and 39 only address the additionally recited limitation of these claims, and, therefore, do not remedy the deficiencies in Petitioner’s analysis of independent claim 37 discussed above. *See id.*

Therefore, for the same reasons discussed above with respect to claim 37, the information presented in the Petition does not demonstrate a reasonable likelihood of Petitioner prevailing in its challenge to claims 38 and 39 under 35 U.S.C. § 103(a) as obvious over the combination of Chiu, Schwarzbach, and Lawson.

3. *Dependent Claims 104, 115, and 116 as Obvious over Chiu and Lawson or over Chiu, Schwarzbach, and Lawson*

Claim 104 depends from claim 94, and claims 115 and 116 depend from claim 105. The additionally recited limitations of these dependent claims all recite “an indicator” for indicating the detector circuit has determined that the operator is proximal or touches a touch terminal. *See* Ex. 1001, Reexam. Cert. C2, 7:38–41, 8:46–53.

Petitioner contends that Lawson teaches the additionally recited limitations of dependent claims 104, 115, and 116. Pet. 66–67. Petitioner also explains persuasively that a person of ordinary skill in the art would have been motivated to modify Chiu based on the teachings of Lawson to allow a user to receive feedback after touching a touch sensitive cell terminal on the touch panel of Chiu. *Id.* at 59–60. Citing the testimony of Dr. Wright, Petitioner argues that the visual feedback provided by the proposed combination would have allowed a user to determine when a touch input has been successfully detected, which reduces instances of a user providing additional, unnecessary inputs for an action that has already been performed. *Id.* at 59 (citing Ex. 1003 ¶ 138).

Patent Owner does not respond specifically to Petitioner’s challenge to claims 104, 115, and 116 beyond Patent Owner’s arguments advanced with respect to the challenged independent claims discussed above.

As discussed above, Petitioner has demonstrated a reasonable likelihood that Petitioner would prevail in showing that claim 94, from which claim 104 depends, is unpatentable as obvious over the combination of Chiu and Schwarzbach, and that claim 105, from which claims 115 and 116 depend, is unpatentable as obvious over Chiu.

We have reviewed Petitioner’s arguments and evidence, and, for purposes of the Decision, we are persuaded that Petitioner has demonstrated sufficiently that Lawson teaches the additionally recited limitations of dependent claims 104, 115, and 116. We also determine that Petitioner has established sufficiently that a person of ordinary skill in the art would have been motivated to combine Chiu with Lawson (or Chiu, Schwarzbach, and Lawson) in the manner proposed by Petitioner to obtain the subject matter recited in claims 104, 115, and 116.

Based on the record presented, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing in its challenge to claim 104 under 35 U.S.C. § 103(a) as obvious over Chiu, Schwarzbach, and Lawson. Petitioner has also established a reasonable likelihood of prevailing in its challenge to claims 115 and 116 as obvious over Chiu and Lawson.

*G. Claim 102 as Obvious over Chiu, Schwarzbach, and Ingraham ’548*

Petitioner contends that claim 102 is unpatentable as obvious over the combination of Chiu, Schwarzbach, and Ingraham ’548. Pet. 74–76. Claim 102 depends from claim 94 and further recites “wherein the supply voltage is a voltage regulator supply voltage.”

Petitioner contends that Ingraham ’548 teaches the additionally recited limitation of claim 102 because the reference describes a power supply including a “voltage regulator circuit” to regulate the supply voltage provided to a “touch controlled electronic switching circuit.” *Id.* at 75 (citing Ex. 1016, Abstract, 2:32–33, 3:29–31). Petitioner also explains persuasively that a person of ordinary skill in the art would have been motivated to modify the touch circuit of Chiu based on the teachings of



Ingraham '548 to ensure a constant supply voltage and protect the touch circuit from unexpected variations in the supply voltage. *Id.* at 74 (citing Ex. 1016, 3:29–38; Ex. 1003 ¶ 158). Citing the testimony of Dr. Wright, Petitioner argues that a person of ordinary skill in the art would have recognized that such variations in supply voltage can damage electronic circuits, and would have been motivated to avoid this potential damage to the touch circuit by adding the voltage regulator described in Ingraham '548. *Id.* (citing Ex. 1003 ¶ 158).

Patent Owner does not respond specifically to Petitioner's challenge to claim 102 beyond Patent Owner's arguments advanced with respect to the challenged independent claims discussed above.

We have reviewed Petitioner's arguments and evidence, and, for purposes of the Decision, we are persuaded that Petitioner has demonstrated sufficiently that Ingraham '548 teaches the additionally recited limitation of dependent claim 102. We also determine that Petitioner has established sufficiently that a person of ordinary skill in the art would have been motivated to combine Chiu, Schwarzbach, and Ingraham '548 in the manner proposed by Petitioner to obtain the subject matter recited in claim 102.

Based on the record presented, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing in its challenge to claim 102 under 35 U.S.C. § 103(a) as obvious over Chiu, Schwarzbach, and Ingraham '548.

*H. Claim 103 as Obvious over Chiu, Schwarzbach, and Tucker*

Petitioner asserts that claim 103 would have been obvious over the combination of Chiu, Schwarzbach, and Tucker. Pet. 76–81. Claim 103

depends from claim 94 and additionally recites “wherein said detector circuit is configured to generate said control output signal only when the operator is proximal or touches said second touch terminal within a predetermined time period after the operator is proximal or touches said first touch terminal.”

Petitioner contends that Tucker teaches the additionally recited limitation of claim 103 because Tucker describes a disable function in a cook-top touch control pads that disables all commands for increasing the temperature except for five seconds after a first touch of the unlock control. *Id.* at 79–81 (citing Ex. 1019, Abstract, 5:13–22, 24:15–20, 26:38–55, Fig. 1). Petitioner also explains persuasively that a person of ordinary skill in the art would have been motivated to modify the touch circuit of Chiu based on the teachings of Tucker to provide for increased safety when operating the touch control panel of Chiu. *Id.* at 78. Citing the testimony of Dr. Wright, Petitioner argues that a person of ordinary skill in the art would have recognized that requiring temperature adjustment operations to be made within a predetermined time of pressing an unlock button, as taught by Tucker, would prevent inadvertent operation of the control panel (such as by children) which could result in potentially dangerous situations. *Id.* (citing Ex. 1003 ¶ 165).

Patent Owner does not respond specifically to Petitioner’s challenge to claim 103 beyond Patent Owner’s arguments advanced with respect to the challenged independent claims discussed above.

We have reviewed Petitioner’s arguments and evidence, and, for purposes of the Decision, we are persuaded that Petitioner has demonstrated sufficiently that Tucker teaches the additionally recited limitation of

dependent claim 103. We also determine that Petitioner has established sufficiently that a person of ordinary skill in the art would have been motivated to combine Chiu, Schwarzbach, and Tucker in the manner proposed by Petitioner to obtain the subject matter recited in claim 103.

Based on the record presented, we are persuaded that Petitioner has demonstrated a reasonable likelihood of prevailing in its challenge to claim 103 under 35 U.S.C. § 103(a) as obvious over Chiu, Schwarzbach, and Tucker.

#### IV. CONCLUSION

For the foregoing reasons, taking into account the arguments presented in Patent Owner's Preliminary Response, we conclude that the information presented in the Petition establishes a reasonable likelihood that Petitioner would prevail in challenging at least one claim of the '183 patent as unpatentable under § 103(a). Accordingly, we institute an *inter partes* review, which will include all challenged claims and grounds asserted in the Petition.

At this stage of the proceeding, we have not made a final determination as to the patentability of any of the challenged claims. Our final determination will be based on the record as fully developed during trial.

#### V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that pursuant to 35 U.S.C. § 314, an *inter partes* review of all challenged claims (37–39, 94, 96–99, 101–109, and 115–117) of

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the '183 patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 314(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial, the trial commencing on the entry date of this Decision.

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