

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

DR. MICHAEL FARMWALD and RPX CORP.,
Petitioner,

v.

PARKERVISION, INC.,
Patent Owner.

Case IPR2014-01107
Patent 7,496,342 B2

Before MICHAEL R. ZECHER, BART A. GERSTENBLITH, and
JON B. TORNQUIST, *Administrative Patent Judges*.

ZECHER, *Administrative Patent Judge*.

DECISION
Denying Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Petitioner, Dr. Michael Farmwald and RPX Corporation (collectively, “RPX”), filed a Petition (“Pet.”) requesting an *inter partes* review of claims 18–21 and 23 of U.S. Patent No. 7,496,342 B2 (“the ’342 patent,” Ex. 1001). Paper 2. Patent Owner, ParkerVision, Inc. (“ParkerVision”), timely filed a Preliminary Response (“Prelim. Resp.”). Paper 6. We have jurisdiction under 35 U.S.C. § 314.

The standard for instituting an *inter partes* review is set forth in 35 U.S.C. § 314(a), which provides:

THRESHOLD.—The Director may not authorize an *inter partes* review to be instituted unless the Director determines that the information presented in the petition filed under section 311 and any response filed under section 313 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.

Taking into account the arguments presented in ParkerVision’s Preliminary Response, we conclude that the information presented in the Petition does not establish that there is a reasonable likelihood that RPX will prevail in challenging claims 18–21 and 23 of the ’342 patent as unpatentable under 35 U.S.C. §§ 102(b) and 103(a). We, therefore, do not authorize an *inter partes* review to be instituted for the ’342 patent.

A. *Related Matters*

The parties indicate that the ’342 patent was asserted in *ParkerVision, Inc. v. Qualcomm, Inc.*, No. 3:11-cv-719-J-37TEM (M.D. Fla.). Pet. 1; Paper 5, 1. In addition to this Petition, RPX filed three other Petitions challenging the patentability of a certain subset of claims in the following

patents owned by ParkerVision: (1) U.S. Patent No. 6,266,518 B1 (IPR2014-00946); (2) U.S. Patent No. 6,061,551 (IPR2014-00947); and (3) U.S. Patent No. 6,370,371 B1 (IPR2014-00948).

B. The '342 Patent

The '342 patent generally relates to the down-conversion and up-conversion of an electromagnetic ("EM") signal using a universal frequency translation ("UFT") module. Ex. 1001, 1:43–45, 6:25–29. A UFT module, such as UFT 102 illustrated in Figure 1A of the '342 patent, operates to generate an output signal from an input signal, whereby the frequency of the output signal differs from the frequency of the input signal. *Id.* at 6:37–41. In other words, the UFT module operates to generate the output signal from the input signal by translating the frequency of the input signal to the frequency of the output signal. *Id.* at 6:41–46.

Figure 16A of the '342 patent, reproduced below, illustrates an example of a receiver with two switches. Ex. 1001, 3:47–48, 18:6–9.

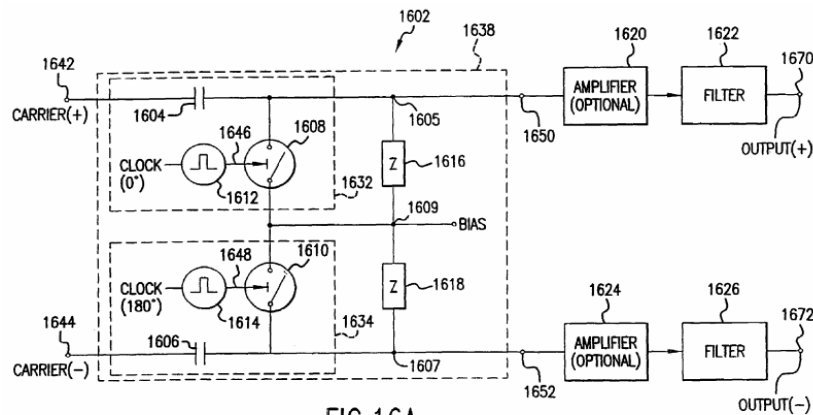
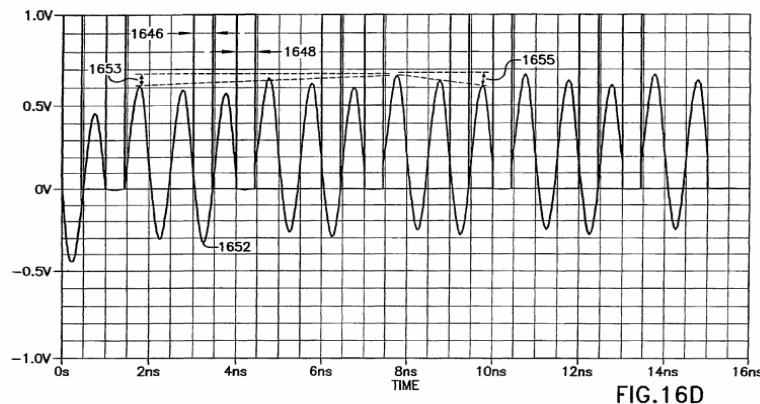


FIG. 16A

As shown in Figure 16A, universal frequency down-conversion ("UFD") module 1638 includes two aliasing modules 1632 and 1634 and

two impedance devices 1616 and 1618. Ex. 1001, 18:13–15. Aliasing module 1632 includes capacitor 1604 and switching device 1608 controlled by aperture generator 1612. *Id.* at 18:34–36. One end of switching device 1608 is connected to node 1609. *Id.* at 18:36–37. Aliasing module 1634 includes capacitor 1606 and switching device 1610 controlled by aperture generator 1614. Ex. 1001, 18:51–53. One end of switching device 1610 is connected to node 1609. *Id.* at 18:53–54. Impedance devices 1616 and 1618 are resistors coupled together at node 1609. *Id.* at 18:21–22.

The operations of the two aliasing modules 1632 and 1634 are described with reference to Figures 16C and 16D of the '342 patent, respectively. Ex. 1001, 18:42–50, 19:1–8. For instance, output signal 1652 of aliasing module 1634 for input signal 1644 is illustrated in Figure 16D, reproduced below. *Id.* at 3:49–51, 19:1–2



As shown in Figure 16D, slope 1653 represents a down-converted signal and slope 1655 represents the rate of discharge of capacitor 1606 between apertures. Ex. 1001, 19:2–5. In one embodiment, low-pass filter 1626 is used to remove the carrier signal from the down-converted signal.

Id. at 19:5–7. In another embodiment, optional amplifier 1642 removes the carrier signal from the down-converted signal. *Id.* at 19:7–8.

According to RPX, the operations of aliasing module 1634 illustrated in Figure 16D indicate that, each time control signal 1648 goes on, it closes switch 1610 by pulling the node extending from the left side of capacitor 1606 to optional amplifier 1642 down to zero volts. Pet. 8. During this aperture period, a charge accumulates on the left-hand plate of capacitor 1606. *Id.* When switch 1610 is open, capacitor 1606 acts as an alternating current (“AC”)-coupling capacitor, effectively allowing the radio frequency (“RF”) input signal to pass through it. *Id.* RPX asserts that, while the AC-coupled RF signal is being passed through capacitor 1606 between apertures, some of the charge accumulated during the aperture period is discharged resulting in the successive peaks caused by the RF signal. Pet. 9. RPX further asserts that slope 1653 or the down-converted signal amounts to the interpolation between peak voltages resulting from each charging cycle. *Id.*

C. Illustrative Claim

Of the challenged claims, claim 18 is the only independent claim. Claims 19–21 and 23 directly depend from independent claim 18. Independent claim 18 is illustrative of the challenged claims and is reproduced below:

18. A method for down-converting an electromagnetic signal, comprising the steps of:
 - (1) receiving an information signal;
 - (2) inverting the information signal to generate an inverted information signal;

(3) electrically coupling the information signal to a first capacitor and the inverted information signal to a second capacitor;

(4) controlling a charging and discharging cycle of the first and second capacitors with first and second switching devices electrically coupled to the first and second capacitors, respectively; and

(5) performing a plurality of charging and discharging cycles of the first and second capacitors to generate first and second down-converted information signals across first and second impedance devices, respectively;

wherein the information signal is used to store a charge on the first capacitor when the first switching device is closed and the inverted information signal is used to store a charge on the second capacitor when the second switching device is closed.

Ex. 1001, 52:37–57.

D. Prior Art Relied Upon

RPX relies upon the following prior art references:

Sorrells, U.S. Patent No. 6,061,551 (“the ’551 patent”), issued May 9, 2000 (Ex. 1005, “Sorrells”).

Ed Oxner, *FETS in Balanced Mixers*, Application Note AN72-1, Siliconix Inc., 6-29–6-38 (1979) (Ex. 1004, “Oxner”).

Polly Estabrook, *The direct conversion receiver: Analysis and design of the front-end components*, 1–396 (1989) (Ph.D. diss., Stanford Univ.) (Ex. 1006, “Estabrook”).

Behzad Razavi, *Principles of Data Conversion System Design*, IEEE CIRCUITS AND SYSTEMS SOCIETY, SPONSOR 6–29 (1995) (Ex. 1007, “Razavi”).

Richard D. Thornton et al., *Multistage Transistor Circuits: Semiconductor Electronics Education Committee, Volume 5*, 180–83, 200–07, John Wiley & Sons, Inc. (1965) (Ex. 1008, “Thornton”).

Klaas Bult & Hans Wallinga, *A CMOS Four-Quadrant Analog Multiplier*, IEEE JOURNAL OF SOLID-STATE CIRCUITS, Vol. SC-21, No. 3, 430–35 (June 1986) (Ex. 1009, “Bult”).

E. Asserted Grounds of Unpatentability

RPX challenges claims 18–21 and 23 of the ’342 patent based on the asserted grounds of unpatentability set forth in the table below. Pet. 3–4, 29–44.

Reference(s)	Basis	Challenged Claims
Oxner	§ 102(b)	18 and 23
The ’551 patent in view of the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult	§ 103(a)	18–21 and 23
Estabrook in view of the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult	§ 103(a)	18–21 and 23

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, we construe claims by applying the broadest reasonable interpretation in light of the specification. 37 C.F.R. § 42.100(b); see Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012). Under the broadest reasonable interpretation standard, and absent any special definitions, claims terms are given their ordinary and customary meaning as would be understood by one of ordinary skill in the

art in the context of the entire disclosure. *In re Translogic Tech. Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

In its Petition, RPX proposes a claim construction for each of the following claim phrases: (1) “electrically coupling” (claim 18); (2) “controlling a charging and discharging cycle of the first and second capacitors with first and second switching devices, respectively” (claim 18); (3) “to generate first and second down-converted information signals across first and second impedance devices, respectively” (claim 18); (4) “impedance device” (claim 18); and (5) “removing a carrier signal from the first and second down-converted information signals” (claim 23). Pet. 16–22. We address each of these claim phrases in turn.

1. “*electrically coupling*” (claim 18)

RPX contends that the claim phrase “electrically coupling” should be construed as “indirectly or directly connecting such that an electric signal can flow between the coupled points.” Pet. 16. To support its proposed claim construction, RPX directs us to the construction purportedly agreed to by the parties in the related district court case, as well as the Specification of the ’342 patent. *Id.* at 16–17 (citing Ex. 1016, 110-1; Ex. 1001, 49:56–64). In response, ParkerVision contends that RPX’s proposed claim construction of the claim phrase “electrically coupling” does not constitute the broadest reasonable interpretation. Prelim. Resp. 26–27. Instead, ParkerVision argues that this claim phrase should be construed according to its ordinary and customary meaning. *Id.* at 27. ParkerVision argues that RPX’s proposed claim construction would inject ambiguity into this claim phrase

because “the coupled points” lacks antecedent basis, and RPX does not explain adequately how “the coupled points” relate or map to the “first and second capacitors,” as recited in independent claim 18. *Id.*

Upon reviewing the Specification of the ’342 patent, we do not find an explicit definition for the claim phrase “electrically coupled.” We, therefore, refer to its ordinary and customary meaning as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *Translogic*, 504 F.3d at 1257. The portion of the Specification of the ’342 patent relied upon by RPX when formulating its proposed claim construction is helpful in ascertaining the broadest reasonable interpretation of this claim phrase. When describing the receiver with two switches as illustrated in Figure 16H of the ’342 patent, the Specification discloses the following:

In accordance with method 6200, the RF information signal may also be electrically coupled to a capacitor using a switching device coupled to the capacitor. For example, for receiver 1688 shown in FIG. 16H, the received RF signal is coupled to capacitor 1604 through switching device 1608. Similarly, the inverted RF signal is coupled to capacitor 1606 through switching device 1610. Thus, as will be understood by a person skilled in the relevant arts, two or more devices can be electrically coupled yet not physically coupled.

Ex. 1001, 49:56–64.

This cited portion of the Specification of the ’342 patent supports RPX’s proposed claim construction of the claim phrase “electrically coupling” as “indirectly or directly connecting such that an electric signal

can flow between.” We, however, agree with ParkerVision that the remaining features of RPX’s proposed claim construction—namely, “the coupled points”—would inject ambiguity into this claim phrase. *See* Prelim. Resp. 27. If a feature is not necessary to give meaning to what the inventor means by a claim phrase, it would be “extraneous” and should not be read into the claim. *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1249 (Fed. Cir. 1998); *E.I. du Pont de Nemours & Co. v. Phillips Petroleum Co.*, 849 F.2d 1430, 1433 (Fed. Cir. 1988). RPX’s attempt to describe the claim phrase “electrically coupling” by including extraneous features such as “the coupling points” is not necessary to give meaning to this claim phrase, and should not be read into independent claim 18.

For purposes of this decision, we construe the claim phrase “electrically coupling” as “indirectly or directly connecting such that an electric signal can flow between.”

2. “controlling a charging and discharging cycle of the first and second capacitors with first and second switching devices, respectively”
(claim 18)

RPX contends that the broadest reasonable interpretation of the claim phrase “controlling a charging and discharging cycle of the first and second capacitors with first and second switching devices, respectively” is its ordinary and customary meaning. Pet. 17. ParkerVision does not propose an alternative claim construction for this claim phrase.

We cannot discern how construing the claim phrase “controlling a charging and discharging cycle of the first and second capacitors with first and second switching devices, respectively,” would add any clarity to the

claim phrase itself, which, in our view, is relatively self-explanatory. For purposes of this decision, no explicit construction is necessary beyond its ordinary and customary meaning.

3. *“to generate first and second down-converted information signals across first and second impedance devices, respectively” (claim 18)*

RPX contends that the broadest reasonable interpretation of the claim phrase “to generate first and second down-converted information signals across first and second impedance devices, respectively,” is “to cause first and second down-converted information signals to exist across first and second impedance devices, respectively.” Pet. 21. To support its proposed claim construction, RPX directs us to arguments regarding this claim phrase made in the related district court case, various embodiments in the Specification of the ’342 patent, and the testimony of its expert witness, Dr. Asad Abidi. *Id.* at 17–21 (citing Ex. 1019, 13;¹ Ex. 1001, 6:10–11, 6:38–41, 18:27–33, 20:5–11, 20:49–61, Figs. 1B, 16A, 16H; Ex. 1002 §§ 13, 14).

In response, ParkerVision contends that RPX’s proposed claim construction for this claim phrase is unreasonable because it conflicts with the plain language recited in independent claim 18—namely, “to generate.” Prelim. Resp. 25. ParkerVision asserts that RPX’s attempt to replace the term “to generate” with alternative language only serves to add ambiguity to

¹ Exhibit 1019 contains both the original page numbers and the page numbers inserted by RPX. We refer to the original page numbers located in the bottom, middle of each page.

the plain language of independent claim 18. *Id.* Instead, ParkerVision argues that this claim phrase should be accorded its ordinary and customary meaning. *Id.*

RPX's proposed claim construction would effectively replace the claim term "to generate" for the term "to cause." RPX, however, fails to appreciate that one of the canons of claim construction is that the plain language of the claim generally controls. Independent claim 18 clearly recites "*to generate* first and second down-converted information signals across first and second impedance devices, respectively." Ex. 1001, 52:50–52 (emphasis added). Absent a disclosure in the Specification of the '342 patent that explicitly defines "to generate" as "to cause," which, in this case, we do not find, we decline to adopt RPX's proposed claim construction as the broadest reasonable interpretation.

For purposes of this decision, we agree with ParkerVision that no explicit construction of the claim phrase "to generate first and second down-converted information signals across first and second impedance devices, respectively," is necessary beyond its ordinary and customary meaning. *See* Prelim. Resp. 25.

4. "*impedance device*" (claim 18)

RPX contends that the claim phrase "impedance device" should be construed as simply "a device that exhibits an impedance." Pet. 21. RPX argues that the Specification of the '342 patent discloses that a resistor is just one example of an "impedance device." *Id.* (citing Ex. 1001, 18:20–24). RPX argues that this claim phrase is not so limiting and may encompass a

capacitor, an inductor, or a combination of circuit components. *Id.*
ParkerVision does not propose an alternative claim construction for this claim phrase.

Upon reviewing the Specification of the '342 patent, we do not find an explicit definition for the claim phrase “impedance device.” We, therefore, refer to its ordinary and customary meaning as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *Translogic*, 504 F.3d at 1257. For purposes of this decision, we adopt RPX’s claim construction of the claim phrase “impedance device” as “a device that exhibits an impedance,” such as a resistor, capacitor, an inductor, or a combination thereof. This construction is consistent with its ordinary and customary meaning as would be understood by one with ordinary skill in the art in light of the Specification of the '342 patent.

5. “*removing a carrier signal from the first and second down-converted information signals*” (claim 23)

RPX contends that the broadest reasonable interpretation of the claim phrase “removing a carrier signal from the first and second down-converted information signals” is its ordinary and customary meaning. Pet. 21. RPX argues that the ordinary and customary meaning of this claim phrase encompasses both the embodiment illustrated in Figure 16A of the '342 patent where the carrier signal is removed from the down-converted signals as a distinct step after the down-converted signals are generated, as well as the embodiment illustrated in Figure 16H of the '342 patent where the carrier signal is removed as part of the down-conversion process. *Id.* at

21–22 (citing Ex. 1001, 18:42–50, 20:49–61, Figs. 16A, 16H). ParkerVision does not propose an alternative claim construction for this claim phrase.

We cannot discern how construing the claim phrase “removing a carrier signal from the first and second down-converted information signals” would add any clarity to the claim phrase itself, which, in our view, is relatively self-explanatory. For purposes of this decision, no explicit construction is necessary beyond its ordinary and customary meaning.

B. Anticipation by Oxner

RPX contends that claims 18 and 23 are anticipated under 35 U.S.C. § 102(b) by Oxner. Pet. 29–32. RPX explains how Oxner describes the claimed subject matter of these claims and relies upon the Declaration of Dr. Abidi (Ex. 1002 §§ 3.1, 3.13) to support its positions. *Id.* We have considered RPX’s explanations and supporting evidence, but we are not persuaded that RPX has presented sufficient evidence demonstrating that Oxner expressly or inherently describes “performing a plurality of charging and discharging cycles of the first and second capacitors to generate first and second down-converted information signals across first and second impedance devices, respectively,” as recited in independent claim 18.

We begin our analysis with the principles of law that generally apply to a ground of unpatentability based on anticipation, followed by a general discussion of Oxner, and then we turn to the parties’ contentions with respect to whether Oxner expressly or inherently describes “performing a plurality of charging and discharging cycles of the first and second capacitors to generate first and second down-converted information signals

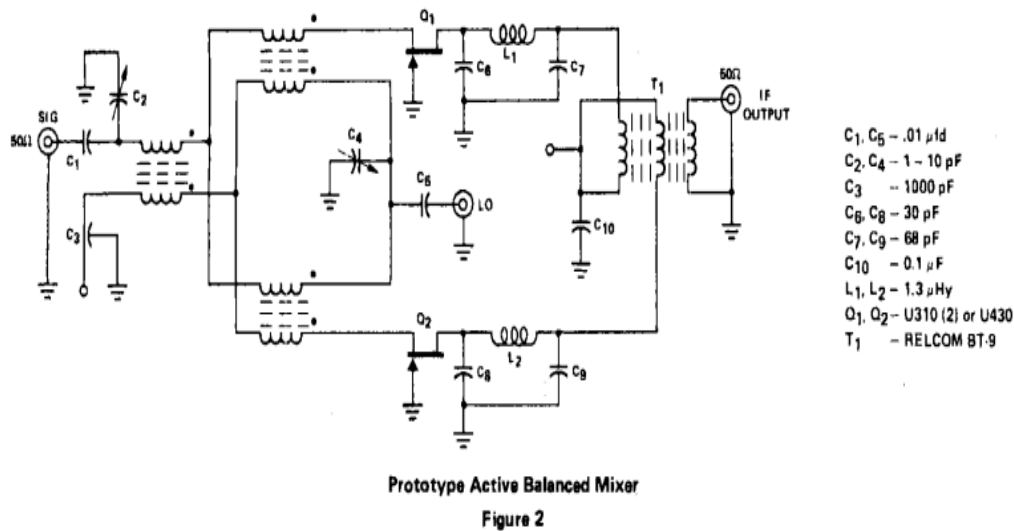
across first and second impedance devices, respectively,” as recited in independent claim 18.

1. Principles of Law

To establish anticipation under § 102(b), “all of the elements and limitations of the claim must be shown in a single prior reference, arranged as in the claim.” *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1383 (Fed. Cir. 2001). “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631 (Fed. Cir. 1987). “Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.” *In re Robertson*, 169 F.3d 743, 745 (Fed. Cir. 1999) (citations omitted). We analyze this ground of unpatentability based on anticipation by Oxner with the principles stated above in mind.

2. Oxner

Oxner generally relates to field-effect transistors (“FETs”) in balanced mixers. Ex. 1004, 6-29. According to Oxner, when high-performance, high-frequency junction field-effect transistors (“JFETs”) are used in the design of active balance mixers, the resulting FET mixer circuit exhibits superior characteristics when compared against its popular passive counterpart employing hot-carrier diodes. *Id.* Figure 2 of Oxner, reproduced below, illustrates a schematic of a prototype active balanced mixer. *Id.* at 6-30.



Ex. 1004, 6-31.

According to RPX, Figure 2 of Oxner depicts the prototype active balanced mixer receiving an information signal labeled “SIG.” Pet. 29 (citing Ex. 1004, 6-31, Fig. 2). RPX asserts that Oxner’s prototype active balance mixer includes switch Q_1 directly or indirectly coupled to capacitor C_6 and an impedance device in the form of capacitor C_7 , and switch Q_2 directly or indirectly coupled to capacitor C_8 and an impedance device in the form of capacitor C_9 . *Id.* at 23, 30, 31 (citing Ex. 1004, 6-31, Fig. 2; Ex. 1002 §3.1). RPX also asserts that a local oscillator (“LO”) controls the opening and closing of first switch Q_1 and second switch Q_2 . *Id.* at 23, 31 (citing Ex. 1004, 6-31, 6-33, 6-34, Fig. 2; Ex. 1002 § 3.1).

3. Claim 18

RPX contends that the circuit components disclosed in Oxner’s prototype active balanced mixer illustrated in Figure 2 describe the structural features required to implement each method step recited in independent

claim 18. Pet. 30–31. In particular, RPX asserts that Oxner’s switch Q_1 , capacitor C_6 , and capacitor C_7 describe the claimed “first switching device,” “first capacitor,” and “first impedance device,” respectively. *Id.* RPX further asserts that Oxner’s switch Q_2 , capacitor C_8 , and capacitor C_9 describe the claimed “second switching device,” “second capacitor,” and “second impedance device,” respectively. *Id.* Although we agree with RPX that Oxner expressly describes all the structural features required to implement each method step recited in independent claim 18, RPX does not present sufficient evidence to support a finding that Oxner expressly or inherently describes how these structural features perform the functions associated with each method step.

For instance, independent claim 18 recites “performing a plurality of charging and discharging cycles of the first and second capacitors to generate first and second down-converted information signals across first and second impedance devices, respectively.” Ex. 1001, 52:49–52. RPX contends that Oxner describes this limitation because it discloses that the LO control signal causes switches Q_1 and Q_2 to open and close during each LO cycle, thereby resulting in repeated charging and discharging cycles across capacitors C_6 and C_8 . Pet. 31 (citing Ex. 1004, 6-31; Fig. 2; Ex. 1002 § 3.1). RPX argues that, as a result of these repeated charging and discharging cycles, a down-converted information signal is generated across capacitor C_7 and a down-converted information signal is generated across capacitor C_9 . *Id.*

In response, ParkerVision contends that the disclosures in Oxner relied upon by RPX, particularly Figure 2 and page 6-31, do not describe generating down-converted information signals across capacitors C_7 and C_9 , much less performing a plurality of charging and discharging cycles to generate the down-converted information signals, as claimed. Prelim. Resp. 8, 32. ParkerVision asserts that these disclosures in Oxner do not describe the concept of down-conversion at all. *Id.* at 32. ParkerVision further argues that RPX does not apply the doctrine of inherency in either its Petition or through the supporting testimony of its expert witness, Dr. Abidi. *Id.* at 8–9, 32–33 (citing Ex. 1002 § 3.1).

We are not persuaded that RPX has presented sufficient evidence to support a finding that Oxner discloses “performing a plurality of charging and discharging cycles of the first and second capacitors to generate first and second down-converted information signals across first and second impedance devices, respectively,” as claimed. RPX does not direct us to, nor can we find, an express disclosure in Oxner that indicates that the LO control signal causes switches Q_1 and Q_2 to open and close during each LO cycle, which, in turn, results in repeated charging and discharging cycles across capacitors C_6 and C_8 . Oxner also is silent with respect to whether a down-converted information signal is generated across capacitor C_7 and a down-converted information signal is generated across capacitor C_9 . Although the aforementioned circuit components may be capable of performing a plurality of charging and discharging cycles to generate first and second down-converted information signals, mere probabilities and

possibilities fall short of demonstrating that Oxner necessarily describes this limitation as required for anticipation. *See Robertson*, 169 F.3d at 745.

We also do not credit Dr. Abidi's supporting testimony. When discussing Oxner's prototype active balanced mixer illustrated in Figure 2, Dr. Abidi testifies that "C6, L1 and C8 form a lowpass filter, as do C7, L2, and C9, that suppresses the LO and RF frequencies and passes to its output (the voltages across C8 and C9) [substantially] the waveform at IF."

Ex. 1002 § 3.1. A cursory review of Oxner's Figure 2, however, reveals that capacitor C₆ and circuit component L₁ are located in the top half of the prototype active balanced mixer, whereas capacitor C₈ is located in the bottom half of the prototype active balanced mixer. Dr. Abidi does not explain adequately how these circuit components form a lowpass filter even though they are located on different halves of Oxner's prototype active balanced mixer and, as a result, receive different inputs. For essentially the same reasons, we do not credit Dr. Abidi's testimony that capacitor C₇, circuit component L₂, and capacitor C₉ form a lowpass filter.

Based on the record before us, RPX has not demonstrated a reasonable likelihood that it will prevail on its assertion that independent claim 18 is anticipated by Oxner.

4. Claim 23

As we explained previously, claim 23 directly depends from independent claim 18. By virtue of its dependency, claim 23 incorporates the same limitations as its underlying base claim. For the same reasons discussed above with respect to independent claim 18, RPX has not

demonstrated a reasonable likelihood that it will prevail on its assertion that dependent claim 23 is anticipated by Oxner.

C. Obviousness Based, in Part, on the '551 Patent

RPX contends that claims 18–21 and 23 are unpatentable under 35 U.S.C. § 103(b) over the combination of the '551 patent and the knowledge of one with ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult. Pet. 32–37. RPX explains how the cited prior art references teach the claimed subject matter of each challenged claim and relies upon the Declaration of Dr. Abidi (Ex. 1002 §§ 3.5, 3.7, 3.9, 3.12, 6, 7) to support its positions. *Id.* We have considered RPX's explanations and supporting evidence, but we are not persuaded that RPX has presented a sufficient rationale to combine the '551 patent with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult.

We begin our analysis with the principles of law that generally apply to a ground of unpatentability based on obviousness, followed by brief discussions of the '551 patent, Razavi, Thornton, and Bult, and then we address the parties' contentions regarding whether RPX has presented a sufficient rationale to combine the '551 patent with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult.

1. Principles of Law

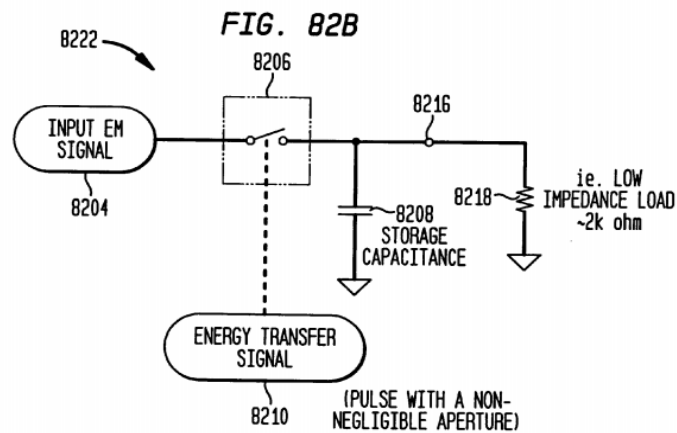
A claim is unpatentable under § 103(a) if the differences between the claimed subject matter and the prior art are such that the subject matter, as a whole, would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

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. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Once these underlying factual determinations have been resolved, the relevant inquiry then becomes whether there is “some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” *KSR*, 550 U.S. at 418 (citation omitted). We analyze the grounds of unpatentability based, in part, on the ’551 patent with the principles identified above in mind.

2. *The ’551 Patent*

The ’551 patent generally relates to down-converting EM signals to intermediate frequency (“IF”) signals or demodulated baseband signals by aliasing the EM signal at an aliasing rate. Ex. 1005, 1:23–24, 2:53–56, 22:34–36. An aliasing rate is a sampling rate that “is equal to, or less than, twice the frequency of the EM carrier signal,” and preferably “is much less than the frequency of the carrier signal.” *Id.* at 23:28–32.

Figure 82B of the ’551 patent, reproduced below, illustrates an exemplary energy transfer system for down-converting an input EM signal. Ex. 1005, 7:48–49, 66:55–56, 67:48–49.



As shown in Figure 82B of the '551 patent, energy transfer signal 8210 includes a train of energy transfer pulses having non-negligible pulse widths. Ex. 1005, 67:3–5. These energy transfer pulses control switch module 8206, causing the switch to open and close. *Id.* at 67:1–3. When the switch is closed, energy from the input EM signal is transferred to storage capacitance 8208. *Id.* at 67:14–25. The '551 patent discloses that the non-negligible amount of transferred energy is sufficient to “efficiently” down-convert the input EM signal. *Id.* at 67:26–30.

3. Razavi, Thornton, and Bult

According to RPX, Razavi, Thornton, and Bult each disclose a technique for mirroring a single-ended circuit around a line of symmetry in order to create a differential circuit that was old and well known to one of ordinary skill in the art long before the filing of the '342 patent. Pet. 24 (citing Ex. 1007, 25–26; Ex. 1008, 201–07, Ex. 1009, 430–31; Ex. 1002 § 6).

4. *Claims 18–21 and 23*

To support combining the teachings of the '551 patent with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, RPX contends that:

It would have been obvious to one of skill in the art to mirror the circuit of FIG. 82B of the '551 patent around a line of symmetry and invert the input EM signal to generate an inverted input to and to create a differential version of the circuit as well known in the art and reflected in Razavi, Thornton, or Bult.

Pet. 33 (citing Ex. 1007, 25–26, Ex. 1008, 201–07, Ex. 1009, 430–31). RPX also directs us to the testimony of its expert witness, Dr. Abidi, to support this rationale to combine. *Id.* (citing Ex. 1002 §§ 6, 7).

In response, ParkerVision contends that RPX's rationale to combine the teachings of the '551 patent with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, is nothing more than a conclusory statement. Prelim. Resp. 11, 14. ParkerVision argues that Dr. Abidi's supporting testimony also relies upon conclusory statements. *Id.* at 11, 39. ParkerVision argues that Dr. Abidi does not explain why, or how, one of ordinary skill in the art would modify the circuit illustrated in Figure 82B of the '551 patent to generate a differential circuit. *Id.* at 43–44.

We agree with ParkerVision that RPX's rationale to combine the teachings of the '551 patent with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, is nothing more than a conclusory statement. See Prelim. Resp. 11, 14. It is well settled that

obviousness cannot be sustained by mere conclusory statements. *See KSR*, 550 U.S. at 418. RPX does not provide a convincing rationale as to why one of ordinary skill in the art would have chosen to mirror the specific circuit illustrated in Figure 82B of the '551 patent around a line of symmetry, and invert the input EM signal to generate an inverted input, in order to create a differential version of the circuit.

We also do not credit Dr. Abidi's supporting testimony. Dr. Abidi testifies that "[i]t would [have been] obvious to use a differential version of Fig. 82B of the '551 patent, with a balun at the input, to fulfill all the steps of Claim 18." Ex. 1002 § 7. This testimony is conclusory in nature and entitled to little, if any, weight. *See* 37 C.F.R. § 42.65 ("Expert testimony that does not disclose the underlying facts or data on which the opinion is based is entitled to little or no weight.").

Dr. Abidi also provides the following general testimony regarding symmetric balanced circuits:

Anyone ordinarily skilled in the art would have known the benefits of symmetric balanced versions of single-ended circuits. For example, when a balanced circuit is driven differentially and sensed differentially at the output, it will reject common-mode disturbances and it will null even-order distortion. Systematic methods were well-known on how to construct a symmetric circuit starting from a single-ended circuit; see [4, Sec. 6.3], for example, on how to construct a balanced amplifier starting from a single-ended amplifier, and [5] on how to develop a four-quadrant analog multiplier[] with two differential inputs and a different output, starting from a prototype multiplying circuit with single-ended inputs and outputs. The advantages of balanced mixers in rejecting a large

LO signal have been known for a very long time. [6, Fig. 4.20] describes several transformer-based balanced modulators that use diodes. [7] is the original disclosure of an all-transistor balanced modulator.

Ex. 1002 § 6. Notably absent from this testimony is an explanation of how the teachings of the '551 patent and the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, might be combined to arrive at the claimed invention, e.g., by combining and applying specific teachings of the '551 patent with Razavi, Thornton, or Bult to account for all the features of the challenged claims. *See ActiveVideo Networks, Inc. v. Verizon Commc'ns, Inc.*, 694 F.3d 1312, 1328 (Fed. Cir. 2012) (“This testimony is generic and bears no relation to any specific combination of prior art elements. It also fails to explain why a person of ordinary skill in the art would have combined elements from specific references in the way the claimed invention does.”).

Based on the record before us, RPX has not demonstrated a reasonable likelihood that it will prevail on its assertion that claims 18–21 and 23 would have been obvious over the combination of the '551 patent and the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult.

D. Obviousness Based, in Part, on Estabrook

RPX contends that claims 18–21 and 23 are unpatentable under 35 U.S.C. § 103(a) over the combination of Estabrook and the knowledge of one with ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult. Pet. 37–44. RPX explains how the cited prior art references teach the

claimed subject matter of each challenged claim and relies upon the Declaration of Dr. Abidi (Ex. 1002 §§ 3.6, 3.8, 3.10, 3.14, 6, 8, eq. 3.1) to support its positions. *Id.* We have considered RPX’s explanations and supporting evidence, but we are not persuaded that RPX has provided a sufficient rationale to combine Estabrook with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult.

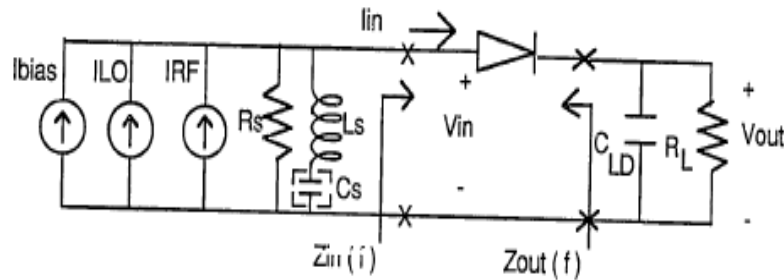
We begin our analysis with a brief discussion of Estabrook, and then we address the parties’ contentions regarding whether RPX has presented a sufficient rationale to combine Estabrook with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult.

1. Estabrook

Estabrook generally relates to the analysis and design of a direct conversion receiver. Ex. 1006, 1.² In one example, Estabrook discloses down-converting a signal from 909 megahertz (“MHz”) to an intermediate frequency of 9 MHz. *Id.* at 40–41, 46.

Figure 14(a) of Estabrook, reproduced below, illustrates a circuit diagram for one embodiment. *Id.* at 37.

² Estabrook contains both the original page numbers and the page numbers inserted by RPX. We refer to the original page numbers located in either the middle, bottom of each page, e.g., page 1, or the top, right-hand corner of each page, e.g., page 2.



As shown in Figure 14(a), the circuit includes capacitive storage device (“output capacitor”) designated as C_{LD} , source impedance R_S , and load impedance R_L . Ex. 1022, 34.

In order to minimize conversion loss (C_L), or maximize the energy transferred from the EM signal to the output, Estabrook discloses that the on-time for the diode should be approximately 50% of the period of the incoming signal. *Id.* at 21, 71; *see also id.* at 34 (noting that “[m]inimization of conversion loss is, of course, an important element of mixer design”).

2. Claims 18–21 and 23

To support combining the teachings of Estabrook with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, RPX contends that:

It would have been obvious to one of skill in the art to mirror the single-ended circuits of Estabrook around a line of symmetry and invert the input IRF signal to generate an inverted input and create a differential version of the circuit as well known in the art and reflected in Razavi, Thornton, or Bult.

Pet. 38 (citing Ex. 1007, 25–26, Ex. 1008, 201–07, Ex. 1009, 430–31). RPX also directs us to the testimony of its expert witness, Dr. Abidi, to support this rationale to combine. *Id.* (citing Ex. 1002 §§ 6, 8).

In response, ParkerVision contends that RPX’s rationale to combine the teachings of Estabrook with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, is nothing more than a conclusory statement. Prelim. Resp. 11, 14. ParkerVision argues that Dr. Abidi’s supporting testimony also relies upon conclusory statements. *Id.* at 11, 47. ParkerVision argues that Dr. Abidi does not explain why, or how, one of ordinary skill in the art would modify the single-ended circuit illustrated in Figure 14(a) of Estabrook to generate a differential circuit. *Id.* at 47–48.

Similar to our analysis above regarding the ’551 patent (*see supra* Section II.C.4.), we agree with ParkerVision that RPX’s rationale to combine the teachings of Estabrook with the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, is nothing more than a conclusory statement. *See* Prelim. Resp. 11, 14. RPX does not provide a convincing rationale as to why, or how, one of ordinary skill in the art would have chosen to mirror the specific single-ended circuit illustrated in Figure 14(a) of Estabrook around a line of symmetry, and invert the input EM signal to generate an inverted input, in order to create a differential version of the circuit.

For essentially the same reasons discussed above with respect to the ’551 patent, we do not credit Dr. Abidi’s supporting testimony. Dr. Abidi

testifies that “[i]t would[have been] an obvious extension of the single-ended sampling mixer shown in [8, Fig. 14] to create a balanced version that fulfills all parts of Claim 18. [8, Sec. 5.5] shows one step towards a fully differential realization.” Ex. 1002 § 8. This testimony is conclusory in nature and entitled to little, if any, weight. See 37 C.F.R. § 42.65. Dr. Abidi does not explain adequately how the single step towards a fully differential realization purportedly disclosed in section 5.5 of Estabrook relates to the single-end circuit illustrated in Figure 14(a) of Estabrook, nor does he explain why one of ordinary skill in the art would have looked to these disparate disclosures in Estabrook to account for all the features of independent claim 18.

RPX also directs us to Dr. Abidi’s general testimony regarding symmetric balanced circuits. Ex. 1002 § 6. As we explained above, notably absent from this testimony is an explanation of how the teachings of Estabrook and the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult, might be combined to arrive at the claimed invention, e.g., by combining and applying specific teachings of Estabrook with Razavi, Thornton, or Bult to account for all the features of the challenged claims. See *ActiveVideo Networks*, 694 F.3d at 1328.

Based on the record before us, RPX has not demonstrated a reasonable likelihood that it will prevail on its assertion that claims 18–21 and 23 would have been obvious over the combination of Estabrook and the knowledge of one of ordinary skill in the art, as evidenced by Razavi, Thornton, or Bult.

III. CONCLUSION

Taking into account the arguments presented in ParkerVision's Preliminary Response, we conclude that the information presented in the Petition does not demonstrate that there is a reasonable likelihood that RPX will prevail in challenging claims 18–21 and 23 of the '342 patent as unpatentable under 35 U.S.C. §§ 102(b) and 103(a).

IV. ORDER

In consideration of the foregoing, it is ORDERED that the Petition is DENIED and no trial is instituted.

IPR2014-01107
Patent 7,496,342 B2

For PETITIONER:

W. Todd Baker
Oblon Spivak
cpdocketbaker@oblon.com

James T. Bailey
The Law Office of James T. Bailey
jtb@jtbaileylaw.com

For PATENT OWNER:

Robert Greene Sterne
Michael Q. Lee
Sterne, Kessler, Goldstein & Fox P.L.L.C.
rsterne-PTAB@skgf.com
mlee-PTAB@skgf.com

Jason E. Stach
Finnegan, Henderson, Farabow, Garrett & Dunner, LLP
jason.stach@finnegan.com

Rick D. Nydegger
Workman & Nydegger PC
rnydegger@wnlaw.com