

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APPLE INC., LG ELECTRONICS, INC.,
and SAMSUNG ELECTRONICS CO., LTD,
Petitioner,

v.

ARIGNA TECHNOLOGY LTD.,
Patent Owner.

IPR2022-01037
Patent 8,947,164 B2

Before THU A. DANG, GARTH D. BAER, and SHARON FENICK,
Administrative Patent Judges.

FENICK, *Administrative Patent Judge.*

DECISION
Denying Institution of *Inter Partes* Review
35 U.S.C. § 314, 37 C.F.R. § 42.4

I. INTRODUCTION

A. *Background and Summary*

Apple Inc., LG Electronics, Inc., and Samsung Electronics Co., Ltd. (collectively, “Petitioner”) filed a petition for *inter partes* review challenging claims 1, 2, and 5–17 (the “challenged claims”) of U.S. Patent 8,947,164 B2 (Ex. 1001 (“the ’164 patent”)). Paper 4 (“Pet.” or “Petition”). Arigna Technology Ltd. (“Patent Owner”) timely filed a Preliminary Response. Paper 8 (“Prelim. Resp.”).

The Board has authority to determine whether to institute an *inter partes* review. *See* 35 U.S.C. § 314(b); 37 C.F.R. § 42.4(a). Under 35 U.S.C. § 314(a), we may not authorize an *inter partes* review unless the information in the Petition and the Preliminary 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.” For the reasons that follow, we do not institute an *inter partes* review as to the challenged claims of the ’164 patent.

B. *Real Parties in Interest*

Petitioner identifies Apple Inc., LG Electronics, Inc., LG Electronics U.S.A., Inc., LG Electronics Mobilecomm U.S.A. Inc., Samsung Electronics Co., Ltd., and Samsung Electronics America, Inc. as the real parties in interest. Pet. 88.

Patent Owner identifies only itself as the real party in interest. Paper 7 (Patent Owner’s Mandatory Notices), 2.

C. *Related Matters*

Petitioner and Patent Owner each indicates the ’164 patent as a subject of the following district court actions: *Arigna Tech. Ltd v. TCL Tech. Grp. Corp.*, 6-22-cv-00217 (W.D. Tex.); *Arigna Tech. Ltd v. OnePlus*

Tech. Shenzhen Co., 6-21-cv-01145 (W.D. Tex.); *Arigna Tech. Ltd. v. LG Elecs., Inc. et al.*, 2-21-cv-00377 (E.D. Tex.); *Arigna Tech. Ltd. v. Google LLC.*, 6-21-cv-01045 (W.D. Tex.); and *Arigna Tech. Ltd. v. Samsung Elecs. Co. et al.*, 6-21-cv-00943 (W.D. Tex.). Pet. 88–89; Paper 7, 2.

Patent Owner notes that it has settled all claims regarding the '164 patent with Petitioners LG Electronics, Inc. and Samsung Electronics Co., Ltd. Prelim. Resp. 1 n.1, 42 n.5.

D. The '164 Patent

The '164 patent is titled “Integrated Technique for Enhanced Power Amplifier Forward Power Detection” and generally relates to detection circuit for a power amplifier that can detect forward power output of a power amplifier. Ex. 1001, codes (54), (57), 1:59–2:22.

The '164 patent describes the prior art as including power detection circuits for power amplifiers which are inaccurate, costly, or which must be specific to design parameters of the power amplifier they are used with. *Id.* at 3:13–4:45, Figs. 1–5. The '164 patent then describes an improved forward power detector which can be integrated alongside a power amplifier. *Id.* at 2:66–3:12, 4:46–5:15. One provided exemplary embodiment is shown in Figure 6, reproduced below, which includes a detection circuit and a power amplifier. *Id.* at 2:45–46, 4:46–5:15.

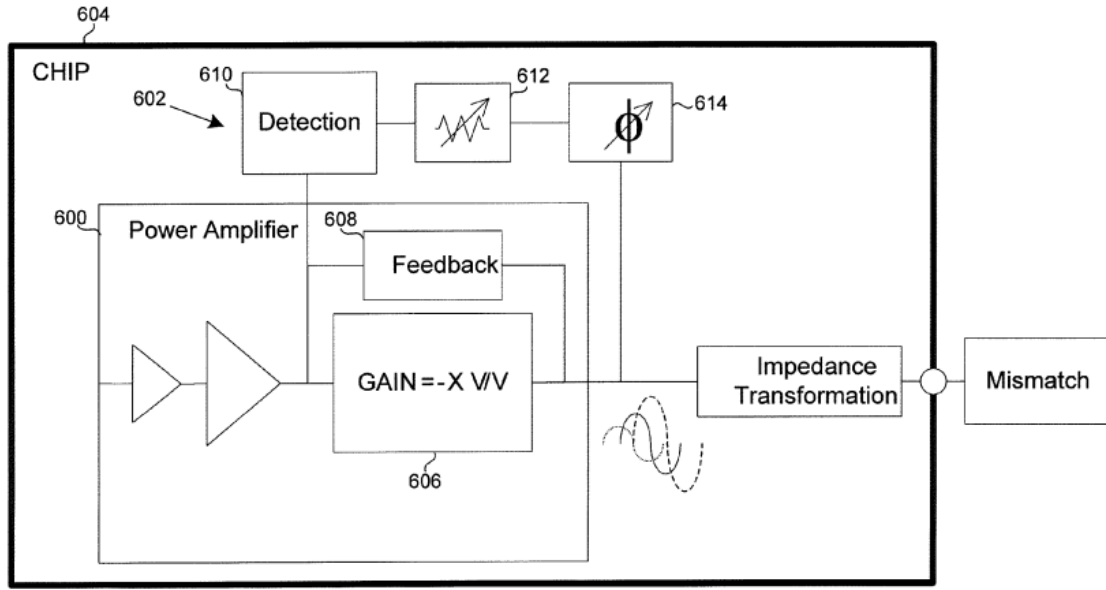


FIG. 6

Figure 6 shows power amplifier 600 and detector 602 on chip 604. *Id.* at 4:49–50. Power amplifier 600 includes final gain stage 606, and feedback loop 608 is coupled between the input and output of final gain stage 608. *Id.* at 4:50–58, 5:7–8, Fig. 6. Detector 602 includes detector circuit 610 with a detection circuit input coupled to the input of final gain stage 606 input. *Id.* at 4:55–58. A second input for detector circuit 610 is coupled to amplitude control circuit 612 and phase control circuit 614 coupled in series, and coupled in turn to final gain stage 606 output. *Id.* at 4:58–5:2. In this way, detector 610 produces an output signal that is proportional to the forward power output of power amplifier 600. *Id.* “The signal detected by the detection circuit 610 input on the input of the final gain stage 606 of the power amplifier 600 and the output signal that has been corrected for both amplitude and phase signal mismatch by the amplitude control circuit 612 and the phase control circuit 614 are summed in the detection circuit 610 independently of the performance characteristics inherent in the power

amplifier 600.” *Id.* at 5:7–13. Detection circuit 610 is independent of power amplifier 600 design parameters, and is insensitive to voltage standing wave ratio (VSWR) effects, where reflected power causes a variation in voltage amplitude because of a load mismatch on the output of the power amplifier. *Id.* at 3:22–30, 5:3–15.

The ’164 patent describes another exemplary embodiment of a power amplifier with a power detector. *Id.* at 2:47–48, 5:16–19. In this embodiment, the input to the detector circuit is also electrically coupled to a first phase control circuit and first amplitude control circuit in series, the input to this series is the input of the final gain stage of the power amplifier. *Id.* at 5:23–29. The second input is from the output of the final gain stage, electrically coupled to a second phase control circuit and second amplitude control circuit in series, as described with reference to Figure 6. *Id.* at 4:58–5:2, 5:30–35. The signals of these inputs are summed to produce a summed RF signal that “has a power proportional to a forward power output of the power amplifier 700.” *Id.* at 5:37–44. In some embodiments, the order of the phase and amplitude control circuits can be reversed or the phase control circuit in the first input to the detector circuit may be omitted. *Id.* at 5:36–37, 5:45–47, 5:60–61.

An example summing detection circuit is additionally described in the ’164 patent. *Id.* at 6:1–37, Fig. 8. This detection circuit provides a direct current (DC) voltage output that is proportional to amplitude of the RF signal at a summing node within the detection circuit. *Id.* at 6:28–32. “The DC voltage produced by the detection circuit 702 is also proportional to the voltage associated with the power of the signal output from the power amplifier. Because the signal is now a low frequency signal, i.e., a DC signal, it can be accurately communicated to other elements of the RF

transmission system.” *Id.* at 6:32–37. This communication can be used, therefore, to minimize forward power variation. *Id.* at 6:32–37; 8:24–30.

E. Challenged Claims

Of the challenged claims (claims 1, 2, and 5–17), claims 1 and 7 are independent.

Challenged claim 1 is reproduced below.

1. A power amplifier with power detection, comprising:
 - a radio frequency (RF) power amplifier having a gain stage that includes a gain stage input, a gain stage output, and a feedback loop coupled between an input and an output of the power amplifier;
 - a detection circuit having a first detection circuit input electrically coupled to the gain stage input and having a detection circuit output;
 - an amplitude control circuit and a phase control circuit electrically coupled together in series between the gain stage output and a second detection circuit input;wherein the amplitude control circuit and the phase control circuit produce a signal received by the second detection circuit input so that the detection circuit detects a signal at the output of the detection circuit that has a power proportional to a forward power output of the power amplifier.

Ex. 1001, 7:57–8:6.

F. References Relied Upon

Petitioner relies upon the following prior art references:

Reference	Exhibit
Sokal et al., US 3,900,823 (iss. Aug. 19, 1975) (“Sokal”)	1005
Adel S. Sedra and Kenneth C. Smith, MICROELECTRONIC CIRCUITS, Oxford University Press (5th ed. 2004), pp. ii–xxi, 170–185, 376–379, 410–413, 440–441, 1206–1215, 1248–1249, 210–211, 1100–1101. (“Sedra”)	1006

Reference	Exhibit
Tsutsui et al., US 2005/0179498 A1 (pub. Aug. 18, 2005) (“Tsutsui”)	1010
Williams et al., US 2009/0027119 A1 (pub. Jan. 29, 2009) (“Williams”)	1008
Ben G. Streetman and Sanjay Kumar Banerjee, SOLID STATE ELECTRONIC DEVICES, Pearson Prentice Hall (6th ed. 2006), cover pp. i, iii–xi, 437–440 (“Streetman”)	1009

Pet. 2.

Petitioner also relies on the Declaration of Dr. Safye Kiaei.
(Ex. 1003).

G. Prior Art and Asserted Grounds

Petitioner asserts that the claims are unpatentable on the following grounds:

Claim(s) Challenged	35 U.S.C. § ¹	Reference(s)/Basis
1, 5	103	Sokal, Sedra, Tsutsui
2, 7–12, 14–17	103	Sokal, Sedra, Tsutsui, Williams
6, 13	103	Sokal, Sedra, Tsutsui, Williams, Streetman

Pet. 1.

II. ANALYSIS

A. Legal Standards

“In an [*inter partes* review], the petitioner has the burden from the

¹ The Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, 287–88 (2011), amended 35 U.S.C. § 103. The ’164 patent contains a priority claim to a provisional application (Ex. 1001, code (60)) dated before March 16, 2013 (the effective date of the relevant amendment), and apply the pre-AIA version of § 103 applies. Our decision would be the same if we applied the AIA versions of the statutes.

onset to show with particularity why the patent it challenges is unpatentable.” *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016) (citing 35 U.S.C. § 312(a)(3) (requiring [*inter partes*] review petitions to identify “with particularity . . . the evidence that supports the grounds for the challenge to each claim”)). This burden never shifts to Patent Owner. *See Dynamic Drinkware, LLC v. Nat’l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015) (citing *Tech. Licensing Corp. v. Videotek, Inc.*, 545 F.3d 1316, 1326–27 (Fed. Cir. 2008)) (discussing the burden of proof in *inter partes* review).

Furthermore, Petitioner must explain with particularity how the prior art would have rendered the challenged claims unpatentable. 35 U.S.C. § 312(a)(3); 37 C.F.R. § 42.104(b)(4) (“The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon.”).

A claim is unpatentable under 35 U.S.C. § 103 if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious to a person having ordinary skill in the art to which said subject matter pertains. *See 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) objective evidence of nonobviousness, i.e., secondary considerations². *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

² Neither party presents arguments or evidence of secondary considerations, therefore, secondary considerations do not constitute part of our analysis here.

B. Level of Ordinary Skill in the Art

The level of skill in the art is a factual determination that provides a primary guarantee of objectivity in an obviousness analysis. *Al-Site Corp. v. VSI Int'l Inc.*, 174 F.3d 1308, 1323–1324 (Fed. Cir. 1999) (citing *Graham v. John Deere Co.*, 383 U.S. at 17–18; *Ryko Mfg. Co. v. Nu-Star, Inc.*, 950 F.2d 714, 718 (Fed. Cir. 1991)).

Relying on the testimony of Dr. Kiaei, Petitioner contends that a person of ordinary skill in the art (“POSITA”) as of the critical date:

would have had at least a Master of Science Degree in an academic area emphasizing circuit design, such as electrical engineering or an equivalent field (or a similar technical Master’s Degree, or higher degree) with a concentration in circuit design, including study of analog, RF, and/or microwave circuits. EX-1003, 27. Alternatively, a POSITA would have had a Bachelor’s Degree (or higher degree) in an academic area such as electrical engineering with two or more years of work experience in circuit design. *Id.* Additional education in a relevant field, or relevant industry experience may compensate for a deficit in one of the other aspects of the requirements stated above. *Id.*

Pet. 9 (citing Ex. 1003 ¶ 27). Patent Owner proposes that one of ordinary skill in the art:

would have had (1) a bachelor’s degree in electrical engineering or a similar field, and approximately two years of industry or academic experience designing or analyzing integrated circuits or (2) a master’s degree or Ph.D. in electrical engineering or an equivalent field, with coursework, thesis, dissertation work, or research experience in integrated circuits.

Prelim. Resp. 9; *see* Ex. 2027 ¶ 36.

Patent Owner characterizes Petitioner’s definition as “slightly different” and Patent Owner asserts that its arguments show that Petitioner has failed to demonstrate a reasonable likelihood of success in the Petition “under either definition.” Prelim. Resp. 9.

Based on the present record including the disclosure in the '164 patent, we adopt Petitioner's proposed definition of the level of ordinary skill in the art, as modified to avoid ambiguity regarding those of greater than ordinary skill being included in the definition. Our definition is presented below with deletions and additions from Petitioner's definition indicated by strike-through and underlining. We determine that one of ordinary skill:

would have had ~~at least~~ a Master of Science Degree in an academic area emphasizing circuit design, such as electrical engineering or an equivalent field (or a similar technical Master's Degree, ~~or higher degree~~) with a concentration in circuit design, including study of analog, RF, and/or microwave circuits. Alternatively, [one of ordinary skill in the art] would have had a Bachelor's Degree ~~(or higher degree)~~ in an academic area such as electrical engineering with two ~~or more~~ years of work experience in circuit design. Additional education in a relevant field, or relevant industry experience may compensate for a deficit in one of the other aspects of the requirements stated above.

This modification of Petitioner's definition is consistent with the level of skill in the art as reflected by the prior art. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). Our decision here would not be different if we applied Patent Owner's proposed definition.

C. Claim Construction

1. Legal Standard

In interpreting the claims of the '164 patent, we "us[e] the same claim construction standard that would be used to construe the claim[s] in a civil action under 35 U.S.C. [§] 282(b)." 37 C.F.R. § 42.100(b) (2021). The claim construction standard includes construing claims in accordance with the ordinary and customary meaning of such claims as would have

been understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. *See id.*; *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312–14 (Fed. Cir. 2005) (*en banc*).

“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.” *Phillips*, 415 F.3d at 1312. An inventor may rebut the presumption that the claim carries its ordinary and customary meaning by providing a definition of the term in the specification with reasonable clarity, deliberateness, and precision. *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994). In the absence of such a definition, limitations are not to be read from the specification into the claims. *In re Van Geuns*, 988 F.2d 1181, 1184 (Fed. Cir. 1993). Only those terms that are in controversy need be construed, and only to the extent necessary to resolve the controversy. *Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (citing *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999)).

2. *Claim 1: “the detection circuit detects a signal at the output of the detection circuit that has a power proportional to a forward power output of the power amplifier”*

Petitioner specifically asserts that “no formal claim constructions are necessary in this proceeding.” Pet. 10. However, Petitioner argues that one of ordinary skill in the art “would have interpreted” (Pet. 8) the recitation in claim 1 that “the detection circuit detects *a signal* at the output of the detection circuit that has a power proportional to a forward power output of the power amplifier” (Ex. 1001, 8:3–6 (emphasis added)) “as referring to a ‘signal [at the output of the detection circuit] proportional to a forward

power output.” Pet. 8–9. Petitioner presents reasoning for this interpretation grounded in its analysis of “inconsistent and contradictory explanations for the proportionalities associated with various signals” in the ’164 patent’s disclosure. *Id.* at 6 (citing Ex. 1003 ¶ 47). Based on testimony from Petitioner’s declarant Dr. Kiaei, Petitioner argues that a square law detector not depicted or otherwise disclosed in the ’164 patent must be present in the embodiment of Figure 8. *Id.* at 8. Petitioner thus concludes that claim 1’s recitation of a signal with “a power proportional to a forward power output” must mean a signal that is “proportional to a forward power output.” *Id.*

Patent Owner objects to Petitioner’s “unilateral[] rewording” of claim 1. Prelim. Resp. 15. Patent Owner argues that Petitioner has failed to set forth how the challenged claim is to be construed, as Petitioner’s argument amounts to a claim construction argument. *Id.* (citing 37 C.F.R. § 42.104 (b)(3)). Patent Owner additionally argues that, as Petitioner did not request claim construction of this limitation in related district court litigation, there is a possibility that any decision will be inconsistent with construction made by the district court in the related litigation. *Id.* at 13–17 & n.4 (citing Exs. 2003–2010 (each relating to *Arigna Tech. Ltd. v. Samsung Elecs. Co. et al.*, 6-21-cv-00943 (W.D. Tex.))). Patent Owner does not address the substance of Petitioner’s arguments regarding the claim limitation at issue.

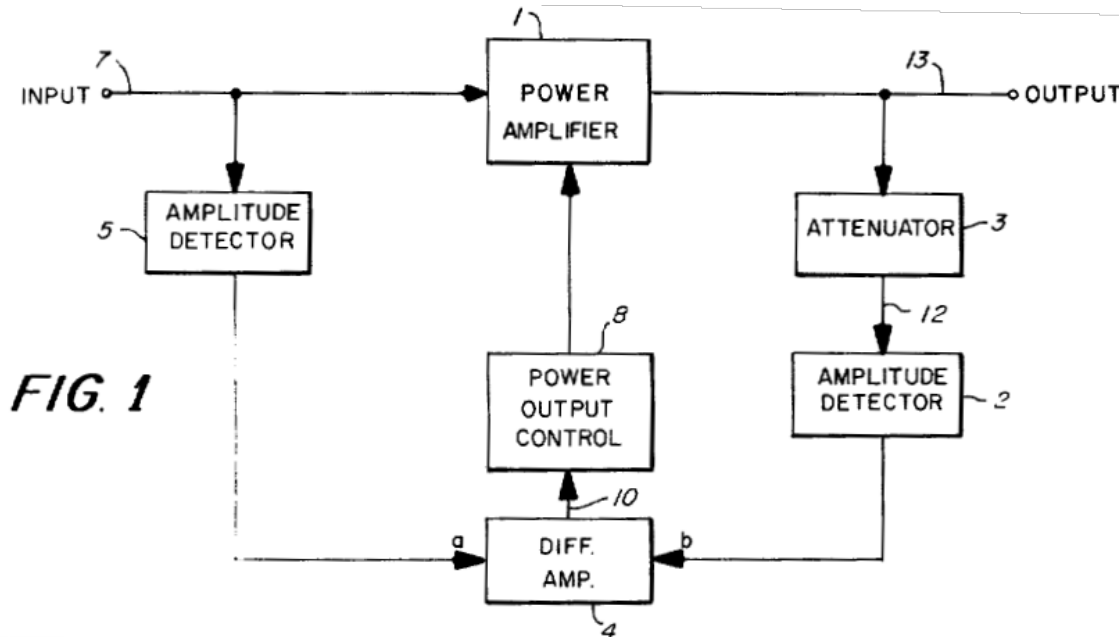
As we determine not to institute based on other reasoning, we do not need to resolve this controversy. *Nidec Motor Corp.*, 868 F.3d at 1017. Our determination is not based on either accepting or rejecting the interpretation urged by Petitioner.

D. Asserted Obviousness Over Sokal, Sedra, and Tsutsui

Petitioner contends claims 1 and 5 would have been obvious over Sokal, Sedra, and Tsutsui. Pet. 10–46. Patent Owner presents certain arguments relating to this ground. Prelim. Resp. 18, 21–41.

1. Sokal (Ex. 1005)

Sokal is titled “Amplifying and Processing Apparatus for Modulated Carrier Signals” and relates to power amplifiers for modulated carrier signals. Ex. 1005, codes (54), (57), 1:42–45. Sokal describes a “rudimentary embodiment” of its invention in its Figure 1, reproduced below. *Id.* at 4:16–17, 4:61–68.



Sokal’s Figure 1 depicts a circuit including power amplifier 1, and additional elements. *Id.* A modulated radio frequency (RF) signal from a signal source is applied via lead 7 to the input of RF power amplifier 1. *Id.* at 4:62–65. The output of power amplifier 1 is coupled to attenuator 3, and the amplitude (value *b*) of the resulting attenuated signal is detected by amplitude detector 2. *Id.* at 5:3–7. Amplitude detector 5 detects the

amplitude (value a) of the input signal. *Id.* at 5:17–20. Each of these are input to differential amplifier 4 which provides an output indicative of the difference between two input signals. *Id.* at 5:9–11, 5:17–20. Output 10 of differential amplifier 4 is input to power output control means 8 which varies the output amplitude of power amplifier 1 to cause it to be directly proportional to the amplitude of the input signal. *Id.* at 5:20–24. “The system as a whole constitutes a negative-feedback system operating on well-known principles.” *Id.* at 5:34–38.

Sokal presents, with reference to its Figure 5, reproduced below, a “superior” embodiment for use “[i]n the special case of a linear amplifier.” *Id.* at 4:24–25, 12:25–33.

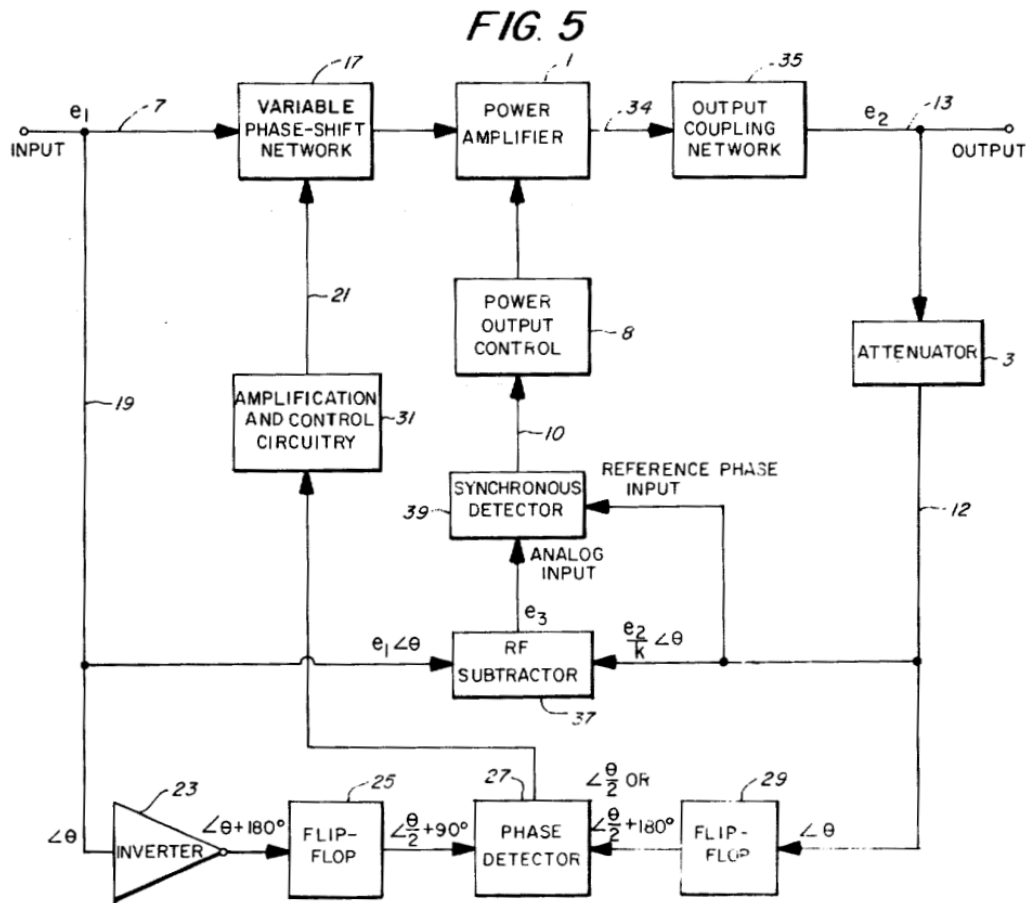


Figure 5 depicts a linear RF power amplifier in which the potentially nonlinear amplitude detectors of Figure 1 have been eliminated. *Id.* at 12:33–35. In Figure 5, an RF input signal of magnitude e_1 and phase θ is applied to the input of controlled variable phase-shift network 17 whose output provides the input to power amplifier 1. *Id.* at 12:37–40. Output e_2 of power amplifier 1 is coupled by network 35 to the output load. *Id.* at 12:40–41. Output e_2 of power amplifier 1 is also applied to attenuator 3 whose attenuation sets the system closed-loop gain. *Id.* at 12:45–47. Inverter 23, flip-flops 25 and 29, phase detector 27, control circuitry 31, and variable phase-shift network 17 form a phase-control subsystem which cancels phase distortions within power amplifier 1 by maintaining substantially zero phase shift between input and output of the system of Figure 5. *Id.* at 9:13–46, 12:48–53. The variable phase-shift network is controlled to cause the phase of the signal at the output of the system to be equal to the phase of the signal the input. *Id.* at 9:4–12, 12:48–53.

The RF signal emerges from attenuator 3 with a magnitude e_2/k and phase θ . *Id.* at 12:54–56. This signal and RF input (magnitude e_1 and phase θ) and are applied to two inputs of RF subtractor 37, and in one embodiment, this occurs in such a way so that the output of RF subtractor 37 is proportional to the difference between magnitude e_1 and magnitude e_2/k and phase θ if e_1 is greater than e_2/k , and of phase $\theta + 180^\circ$ otherwise. *Id.* at 12:56–13:6. “Thus[,] the output e_3 contains the necessary magnitude and phase information from which to derive an error signal analogous to the output . . . of differential amplifier 4 in FIG. 1.” *Id.* at 13:6–9. Output e_3 is used by synchronous detector 39 to produce a slowly-varying DC signal of absolute value proportional to the magnitude of e_3 , which is used “by power output control means 8 to control the output of power amplifier 1 such that

the amplitude of the output signal at lead 13 is proportional to the amplitude of the input signal at lead 7.” *Id.* at 13:9–36.

Sokal describes certain modifications to various embodiments. Sokal explains that the embodiment of Figure 5 may be simplified in some cases by using a fixed phase-shift network in place of variable phase-shift network, and the associated control circuitry. *Id.* at 13:63–67. Instead of this control circuitry, a phase shift approximately equal to the negative of the phase shifts caused by power amplifier 1, coupling network 35, and attenuator 3 is applied by the fixed-shift network. *Id.* at 13:67–14:4. Because the phase shift of the coupling network 35 may vary in an extreme and complex manner, Sokal notes that the input to attenuator 3 may be taken at lead 34 (before the coupling network 35) to ease the requirements imposed on the fixed phase-shift network. *Id.* at 14:4–14:10.

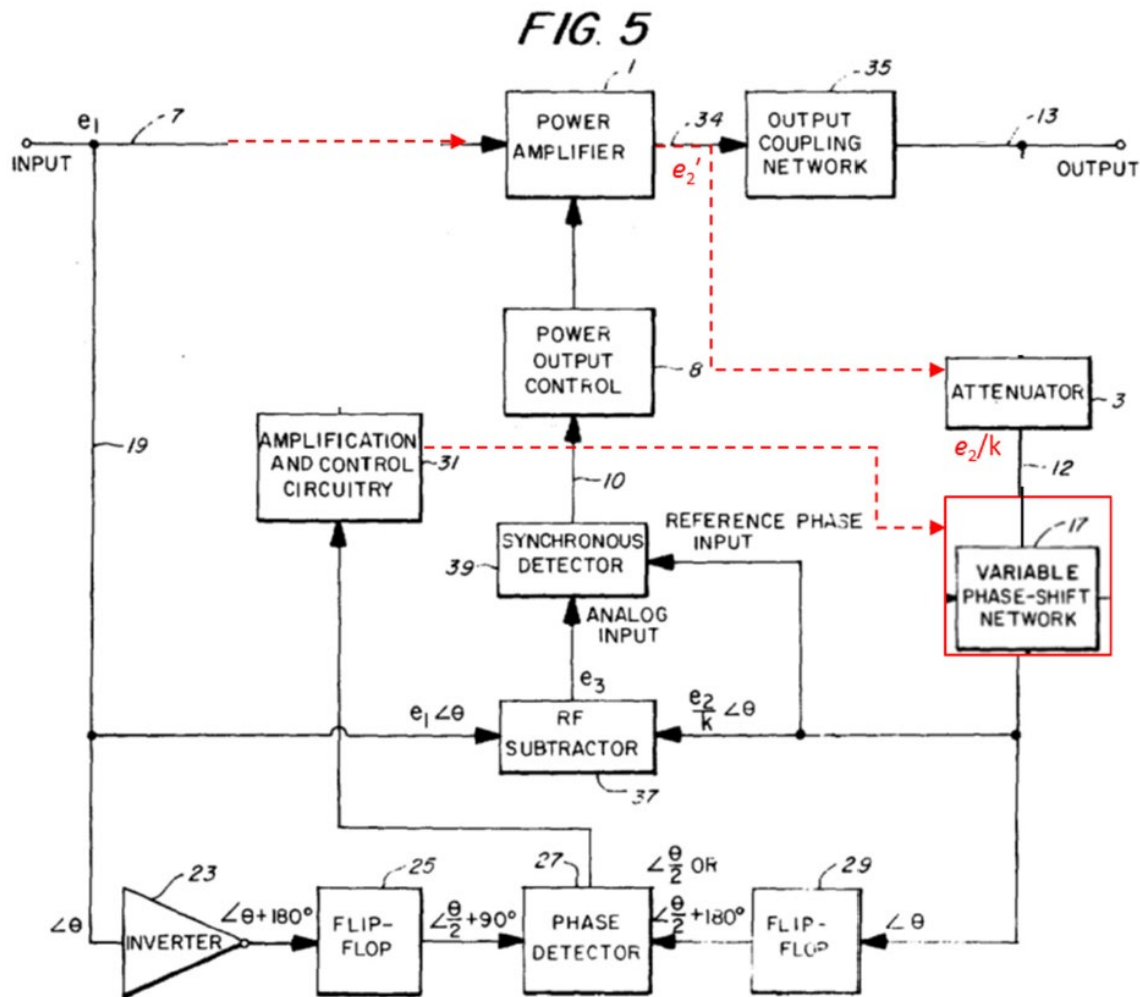
Additionally, Sokal teaches that the phase-shift network may be moved to lead 19 or lead 12 (following or preceding attenuator 3) and one of its purposes (that of ensuring that the two inputs to RF subtractor 37 are in phase) would still be served. *Id.* at 14:11–23.

Sokal also teaches that attenuator 3 may use “capacitive and inductive couplings . . . combined so as to sense separately the ‘forward’ (‘incident’) signal and the ‘reverse’ (‘reflected’) signal in a system which has a load which is not purely resistive, i.e. a standing wave ratio (SWR) greater than 1.0.” *Id.* at 7:13–21.

2. *Petitioner’s Modifications to Sokal*

Petitioner bases the combination of Sokal, Sedra, and Tsutsui on a variation of Sokal’s Figure 5 including three modifications. First, Petitioner argues that input to attenuator 3 may be taken from lead 34 instead of lead 13. Pet. 13 (citing Ex. 1005, 14:8–10; Ex. 1003 ¶ 58). Additionally,

Petitioner argues that the phase-shift network could be located in lead 12 after attenuator 3. *Id.* (citing Ex. 1005, 14:18–22; Ex. 1003 ¶ 59). Lastly, Petitioner argues that attenuator 3 may be modified to output an attenuated version of only the forward output signal and not of the total output signal (which may include a reflected component). *Id.* at 13–14 (citing Ex. 1005, 7:13–23, 7:28–29; Ex. 1003 ¶ 60). Petitioner provides an “alternative” version of Sokal’s Figure 5 reflecting these changes, reproduced below. *Id.* at 15.



Alternative FIG. 5 circuit of Sokal

Petitioner's alternative version of Figure 5 indicates modifications it makes from Sokal's Figure 5, including a different location in the circuit for variable phase-shift network 17 (red box) and additional changes in inputs and outputs (indicated with dashed red lines or lines deleted). The input to attenuator 3 is taken from output 34 of power amplifier 1. Variable phase-shift network 17 has been moved so it receives input from output 12 of attenuator 3 while still being connected to amplification and control circuitry 31 via a redrawn line. Lastly, the indicator for total output of power amplifier 34 has been changed to be labeled as e_2' with e_2 now used to refer to the forward component of the output signal, indicating that attenuator 3's output only relates to the forward output signal (as attenuated: e_2/k). *Id.* at 14–15. Petitioner argues that this alternative version of Figure 5 is a result of “explicitly-described modifications” in Sokal. *Id.* at 14.

3. *Patent Owner's Arguments Regarding Sokal*

Patent Owner argues that Petitioner does not provide a proper motivation or evaluate the expectation of success one of ordinary skill in the art would have had in making the changes necessary for Petitioner's alternative version of Figure 5. Prelim. Resp. 21–22.

Patent Owner argues that the modification in which the input to attenuator 3 is the output of power amplifier 1 (rather than the output of the output coupling network 35) is discussed in Sokal as a modification that made where a fixed phase-shift network is used in place of variable phase-shift network 17. *Id.* at 22–23 (citing Ex. 1005 13:63–66, 14:8–10). Patent Owner notes that Sokal describes making this change because in such a network the value of the fixed phase-shift must be based in part on the phase shift of coupling network 35, which may vary phase in an extreme and complex manner. *Id.* at 23–24 (citing Ex. 1005, 14:4–7). Patent Owner

argues that the modification is only discussed in terms of a fixed phase-shift network, and would come with “some compromise”—taking the coupling network out of the linearization of the control loop. *Id.* at 24–25 (citing Ex. 2027 ¶ 54). Patent Owner contends that Petitioner’s provided motivation for this change is conclusory and inadequate—“there is no apparent reason,” Patent Owner argues, “and Petitioners fail to offer any” for taking the input from attenuator 3 rather than output coupling network 35 when a variable phase-shift network is used. *Id.* at 25.

With respect to the third modification, changing the attenuator to output only an attenuated version of the forward signal, Patent Owner argues that there is no explanation or motivation for the use of only the forward signal. *Id.* at 30–31. Patent Owner contends that Sokal, instead, describes how both the forward and the reverse signal magnitudes would be used. *Id.* at 30 (citing Ex. 1005, 7:28–31).

4. *Analysis*

We agree with Patent Owner that significant flaws exist in Petitioner’s proposed alternative version of Sokal’s Figure 5.

First, while Sokal describes “[m]ore elaborate versions of attenuator 3,” Petitioner does not show how its third modification (changing attenuator 3 to output an attenuated version of only the forward output signal and not of the total output signal) is taught or suggested by Sokal. Sokal discusses alternate versions of attenuator 3 that “sense *separately* the ‘forward’ (‘incident’) signal *and the ‘reverse’ (‘reflected’) signal* in a system which has a load which is not purely resistive.” Ex. 1005, 7:13–21 (emphasis added). Petitioner’s modification does not include any sensing of the reverse signal. Sokal does not teach using only a portion of the signal in a circuit such as Figure 1 or Figure 5, and Petitioner does not provide an

argument or evidence that the functioning of the Figure 5 embodiment would be unaffected by this change in which only some portion of the signal input to the attenuator would be passed on (in an attenuated fashion) to the remainder of the circuit. *See* Pet. 13–14. Petitioner does not use Sokal’s alternative embodiment that senses both forward and reverse signals, mention or justify the differences between the changes it makes to Figure 5 and Sokal’s discussed alternative attenuator, or provide any discussion of the expectation of success in the change from Sokal’s disclosure. While arguing that it is merely combining modifications “made according to the specification of Sokal” (Pet. 13), Petitioner does not account for this difference at all.

Additionally, Petitioner has not described a motivation to combine the different embodiments of Sokal. We are mindful that “[c]ombining two embodiments disclosed adjacent to each other” does not “require a leap of inventiveness” and may be a predictable variation supporting an obviousness determination. *Boston Scientific Scimed, Inc. v. Cordis Corp.*, 554 F.3d 982, 991 (Fed. Cir. 2009). Still, “to establish a prima facie case of obviousness based on a combination of elements disclosed in the prior art, the [Petitioner] must articulate the basis on which it concludes that it would have been obvious to make the claimed invention.” *Eli Lilly and Co. v. Zenith Goldline Pharm.*, 471 F.3d 1369, 1380 (Fed. Cir. 2006). Impermissible hindsight is inferred when the specific understanding or principle within the knowledge of one of ordinary skill in the art that would have motivated one (with no knowledge of the claimed invention) to make the proposed combination has not been explained. *In re Rouffet*, 149 F.3d 1350, 1358 (Fed. Cir. 1998).

We agree with Patent Owner that Petitioner has selected a modification (changing the input for attenuator 3) that is specifically described in Sokal as relating to a fixed phase-shift network, but employed it for use with a variable phase-shift network. Prelim. Resp. 22–25. In doing so, the only motivation Petitioner advances for making this modification is in the quote from Sokal that it would “eas[e] the requirements imposed upon the fixed phase-shift network.” Pet. 13 (quoting Ex. 1005, 14:8–10). This does not address why one of ordinary skill would have selected this modification where, as in Figure 5 (and Petitioner’s proposed alternative version of Figure 5) a variable phase-shift network, and not a fixed phase-shift network, is used.

While not mentioned in the Petition, Petitioner’s declarant testifies regarding the modification that “this advantageous performance would be provided whether the phase-shift network is fixed or variable.” Ex. 1003 ¶ 58. However, we agree with Patent Owner that this is conclusory and provides no meaningful explanation regarding the purported advantages in a variable phase-shift network. *See* Prelim. Resp. 24–25.

Additionally, as discussed above, Petitioner appears to employ a further modification of Sokal’s “[m]ore elaborate versions of attenuator 3” embodiment, in which only a forward signal is sensed by attenuator 3. Pet. 13–14 (quoting Ex. 1005, 7:13–21). Petitioner does not describe the motivation for using only the forward output signal, and does not provide any discussion regarding whether one of ordinary skill would have expected to be successful in combining the further modification of Sokal’s “[m]ore elaborate” attenuator 3 with the Figure 5 embodiment of Sokal, removing the reflected power from the phase correcting circuitry.

Thus, rather than simply combining four embodiments (Figure 5 and the three modifications) of Sokal disclosed side by side, Petitioner proposes that we combine a variable phase-shift network embodiment (Figure 5) with a fixed phase-shift embodiment (the first modification) with an unsupported modification to Sokal's "[m]ore elaborate" attenuator 3 embodiment (the third modification), without sufficient support regarding the motivation to do so or regarding the likelihood of success in the result.

For these reasons, we determine that Petitioner has not sufficiently shown that one of ordinary skill in the art would have been motivated to create a circuit such as that shown in Petitioner's proposed alternative Figure 5 or that one of ordinary skill in the art would have had a reasonable expectation of success in doing so.

5. *Conclusion*

Petitioner's contentions that claims 1 and 5 would have been obvious over Sokal, Sedra, and Tsutsui rely in part on the alternative Sokal Figure 5 circuit proposed by Petitioner. Pet. 32–46. For the reasons discussed above, the information presented in the Petition fails to establish a reasonable likelihood that Petitioner would prevail in showing the unpatentability of claim 1 or 5.

E. Asserted Obviousness of Claims 2 and 6–17

Each of the remaining grounds similarly relies upon the alternative Sokal Figure 5 circuit proposed by Petitioner. Pet. 46–83. Thus, for the same reasons discussed above, the information presented in the Petition fails to establish a reasonable likelihood that Petitioner would prevail in showing the unpatentability of claims 2 and 6–17.

III. CONCLUSION

For the foregoing reasons, on the record before us, we are not persuaded that the Petition establishes a reasonable likelihood that Petitioner would prevail in showing any claim of the '164 patent to be unpatentable under the asserted grounds.

IV. ORDER

For the reasons given, it is hereby ordered that the Petition is *denied*, and no trial is instituted.

IPR2022-01037
Patent 8,947,164 B2

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