

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

SILICON LABORATORIES, INC.,
Petitioner,

v.

CRESTA TECHNOLOGY CORPORATION,
Patent Owner.

Case IPR2014-00881
Patent 7,251,466 B2

Before PHILLIP J. KAUFFMAN, GREGG I. ANDERSON, and
PATRICK M. BOUCHER, *Administrative Patent Judges*.

KAUFFMAN, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

A. Background

Petitioner, Silicon Laboratories, Inc., filed a petition (Paper 2, “Pet.”) to institute an *inter partes* review of claims 1, 2, 5, 8, 9, 11–13, 16, 20–22, 24–26, 29, 31, 32, 35–37, and 39 (the “challenged claims”) of U.S. Patent 7,251,466 B2 (Exhibit 1001, the “’466 patent”). Patent Owner, Cresta Corporation, timely filed a Preliminary Response. Paper 8 (“Prelim. Resp.”). In an October 24, 2014, Decision to Institute (Paper 9, “Dec.”) we instituted trial on claims 1, 2, 5, 8, 11–13, 20, 21, 24–26, 31, 32, 35, 36, and 39.

After institution of trial, Patent Owner filed a Patent Owner’s Response (Paper 28, “PO Resp.”), and Petitioner filed a Reply (Paper 31, “Pet. Reply”).

Patent Owner filed a Motion to Exclude certain evidence, which we discuss in Section III below.

At the request of both parties, oral hearing was held on Thursday June 12, 2015. Papers 35, 36, and 37. A transcript of the oral hearing is included in the record. Paper 44 (“Tr.”).¹

We have jurisdiction under 35 U.S.C. § 6(c). This is a Final Written Decision under 35 U.S.C. § 318(a) as to the patentability of the claims on which we instituted trial. Based on the record before us, Petitioner has demonstrated by a preponderance of the evidence that claims 1, 2, 5, 8, 12, 13, 20, 21, 25, 26, 31, 32, 35, and 36 are unpatentable.

¹ A single transcript was created for the oral hearing for IPR2014-00728, IPR2014-00809, and IPR2015-00881. See *infra*, Section I.B. (“*Related Proceedings*”).

B. Related Proceedings

The parties contend that the '466 patent is at issue in: *Cresta Technology Corporation v. Maxlinear, Inc. et al.*, Case No. 1:14-cv-00079-RGA, (filed on Jan. 21, 2014) (D. Del.), and in International Trade Commission (“ITC”) investigation No. 337-TA-907. Pet. 1; Paper 4 at 4,² *see also* Ex. 1002 (Complaint).

The parties are also involved in IPR2014-00728 challenging U.S. Patent No. 7,075,585 B2, and IPR2014-00809, challenging U.S. Patent No. 7,265,792 B2. Pet. 1–2; Paper 4 at 3.

C. The '466 patent

The '466 patent relates to a tuner circuit that includes an integrated band selection filter coupled to receive an input Radio Frequency (RF) signal and provide a band selected output signal. Ex. 1001, Abstract; 1:6–8. The '466 patent describes an embodiment of a band pass filter bank 200 that includes: variable amplifier 202 (first variable amplifier) and multiple band pass filters BPF-A to BPF-Z (band pass filters).³ *Id.* at 6:4–7, Fig. 4.

² The pages of Paper 4 are not numbered; we count the cover page as page 1.

³ Parenthetical nomenclature is to the corresponding language of independent claim 35.

Figure 4 of the '466 patent follows:

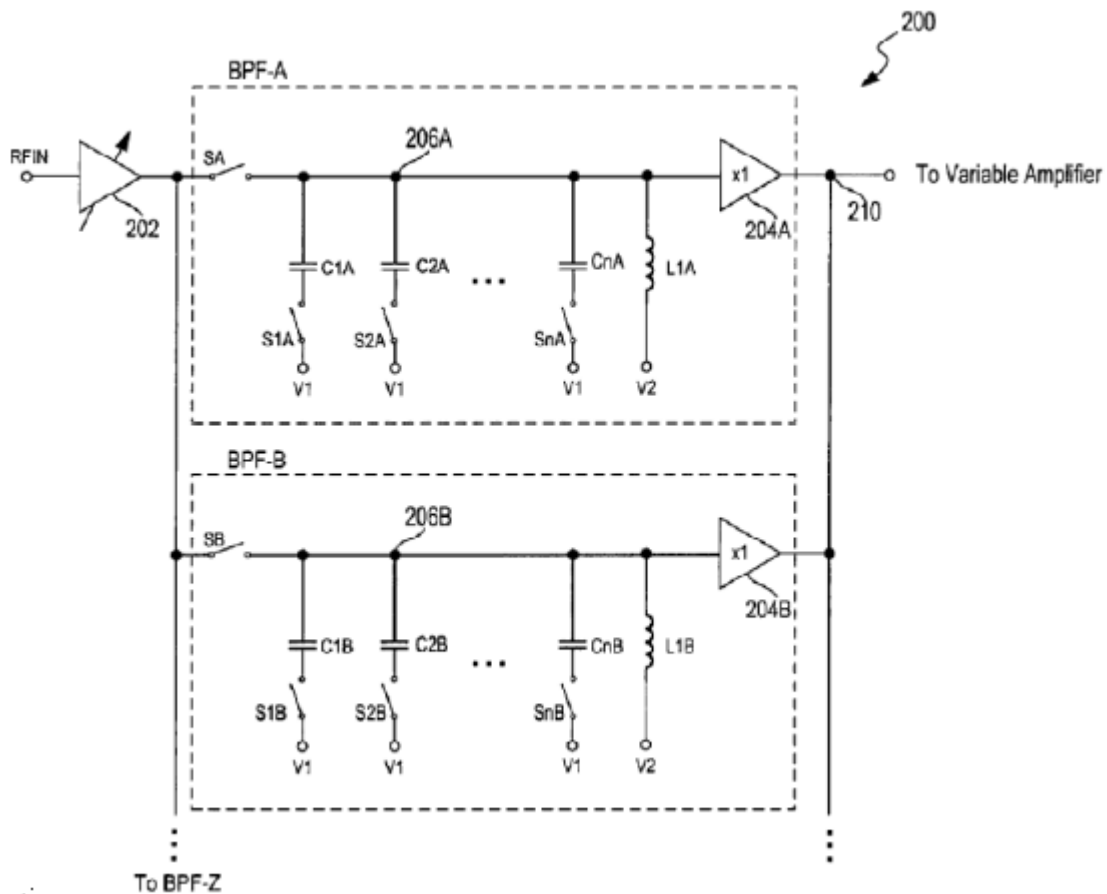


Figure 4 depicts a circuit diagram of a bank of integrated band pass filters according to one embodiment of the '466 patent. *Id.* at 3:62–64.

Variable amplifier 202 includes an input node coupled to the RF input connector for receiving the incoming RF signal, and an output node. *Id.* at 1:21; 6:4–6, Fig. 4. Band pass filter bank 200 includes multiple band pass filters BPF-A to BPF-Z connected in parallel between the output node of variable amplifier 202 and output node 210 providing the filtered output signal. *Id.* at 6:6–9, Fig. 4.

BPF-A includes enable switch SA (a first switch) coupled between the output node of variable amplifier 202 and node 206A (a second node).⁴ *Id.* at 6:29–31, Fig. 4. BPF-A also includes a bank of capacitors C1A to CnA (a plurality of switchably connected capacitors) connected in parallel between node 206A (second node) and a voltage V1 (first voltage), each switchably connected capacitor comprising a capacitor C1A and switch S1A connected in series between the node 206A (second node) and voltage V1 (first voltage). *Id.* at 6:34–37. BPF-A includes integrated inductor L1A (an inductor) coupled between the node 206A (second node) and voltage V2 (second voltage), inductor L1A being an integrated planer spiral inductor. *Id.* at 6:44–45.

The inductance of integrated inductor L1A and the capacitance provided by the bank of capacitors (plurality of switchable connected capacitors) form an LC resonator for selecting the desired frequency band from the incoming RF signal. *Id.* at 6:46–49; Fig. 4.

BPF-A also includes unity gain buffer 204A having an input node coupled to node 206A (second node) and an output node coupled output node 210 (the first node providing the filtered output signal). *Id.* at 6:49–53; Fig. 4.

⁴ The construction of the other band pass filters (e.g., BPF-B) is similar. Ex. 1001, 6:28–29.

D. Grounds

Inter partes review was instituted on the following grounds under 35 U.S.C. § 103(a):

References	Claims
Gomez, ⁵ Waight, ⁶ and Shen ⁷	1, 2, 5, 8, 9, 20, 21, 31, 32, 35, and 36
Gomez, Waight, Shen, and Liou ⁸	11, 12, 24, 25, and 39
Gomez, Waight, Shen, Liou, and Chiu ⁹	13 and 26

II. CLAIM CONSTRUCTION¹⁰

Our analysis necessitates that we construe the following terms using the broadest reasonable interpretation of the claims. *See* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,766 (Aug. 14, 2012); 37 CFR § 42.100(b).

A. Illustrative Claim

Of the challenged claims, claims 1, 20, and 35 are independent. Claim 35 is representative, and follows:

⁵ Ex. 1004, U.S. Patent No. 7,336,939 B2 (Feb. 26, 2008).

⁶ Ex. 1005, U.S. Patent No. 7,095,454 B2 (Aug. 22, 2006).

⁷ Ex. 1007, U.S. Patent No. 7,299,020 B2 (Nov. 20, 2007).

⁸ Ex. 1006, U.S. Patent No. 6,420,773 B1 (July 16, 2002).

⁹ Ex. 1013, U.S. Patent No. 5,559,360 (Sept. 24, 1996).

¹⁰ In the Patent Owner Response, Patent Owner argues that the proper standard for claim construction is the judicial standard under *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). PO Resp. 7–11. At oral argument, Patent Owner acknowledged that this argument is moot in light of a subsequent Federal Circuit decision. *See* Tr. 70 (referring to *In re Cuozzo Speed Techs., LLC*, 793 F.3d 1268, 1275–79 (Fed. Cir. 2015)).

35. A band pass filter for filtering an input RF signal, comprising:

- a first variable amplifier having an input node coupled to receive the input RF signal and an output node providing a first output signal;

- a band pass filter connected between the output node of the first variable amplifier and a first node providing the filtered output signal, the band pass filter comprising:

- a first switch coupled between the output node of the first variable amplifier and second node;

- a plurality of switchably connected capacitors connected in parallel between the second node and a first voltage, each switchably connected capacitor comprising a capacitor and a switch connected in series between the second node and the first voltage;

- an inductor coupled between the second node and a second voltage, the inductor being an integrated planer spiral inductor, wherein the inductance of the inductor and the capacitance provided by the plurality of switchably connected capacitors form an LC resonator;
- and

- a unity gain buffer having an input node coupled to the second node and an output node coupled to the first node providing the filtered output signal.

B. Band pass filter

Each of the independent claims includes either a “plurality of band pass filters” (claims 1 and 35) or a “band pass filter” (claim 20).

In the Decision to Institute, we interpreted that “band pass filter,” as used in the body of independent claims 1, 20, and 35, is not limited to use in the television transmission spectrum. Dec. 6–9.

Patent Owner argues that “band pass filter” should be construed to mean “a circuit for television receivers that allows television signals having frequencies within a given range within the television transmission spectrum

to pass through and substantially attenuates television signals having frequencies outside of the given range.” PO Resp. 6–7.

Petitioner contends that Patent Owner’s interpretation lacks support and the term “band pass filter” should be given the full breath of its plain and ordinary meaning. Pet. Reply 2. Petitioner does not provide that plain and ordinary meaning. *Id.*

We begin our analysis with the language of the claims. *Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004) (the claims of the patent define the invention).

Claim 1 is directed to a tuner circuit receiving an input RF signal having a first transmission spectrum. Claim 35 is directed to a band pass filter for filtering an input RF signal. The body of claims 1 and 35 does not explicitly recite that the band pass filter or filters is for a television receiver or operates only on signals within the television transmission spectrum. Consequently, nothing in claim 1 or claim 35 supports Patent Owner’s contention that the band pass filter is limited to signals having a frequency within the television transmission spectrum.

Claim 20 is directed to a “band pass filter bank for a television tuner for tuning an input RF signal having a first transmission spectrum.” The body of claim 20 does not explicitly recite that the plurality of band pass filter is for a television receiver or operates only on signals within the television transmission spectrum. Consequently, claim 20 calls for a band pass filter that is capable of use as a television tuner, but use of the device for other than the television transmission spectrum is not prohibited.

With the language of the claims in mind, we turn to the Specification. Although the Specification describes the *Field of the Invention* as relating to

a television signal receiver that includes a band pass filter, the description does not go so far as to describe that the band pass filter is limited to operation in the television transmission spectrum. *See* Ex. 1001, 1:7–8. The Specification of the '466 patent does not provide a lexicographical definition that would limit a band pass filter to the television transmission spectrum.

The Specification provides examples of use of a band pass filter in the television transmission spectrum; however, the language of the claims is broader than this example, and therefore this example is not imported into the meaning of the claims. *See Superguide Corp. v. DirecTV Enters., Inc.*, 358 F.3d 870, 875 (Fed. Cir. 2004).

The Specification describes that the band pass filter receives the full range of transmission frequency. Ex. 1001, 4:60–63. The Specification also describes that “the tuner IC [integrated circuit] of the present invention can have applications in receiving incoming RF signals other than a television signal.” Ex. 1001, 11:11–13. Therefore, the '466 patent has not demonstrated a clear intent to limit a band pass filter to the television transmission spectrum; rather, the '466 patent explicitly acknowledges that a band pass filter has broader application. *See Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 906 (Fed. Cir. 2004).

In light of this, we cannot agree with Patent Owner’s assertion that the band pass filter is limited to use in the television transmission spectrum.

C. Integrated planar spiral inductor

Each of independent claims 1, 20, and 35 recite that the apparatus includes an “integrated planar spiral inductor.”

In the Decision to Institute, we interpreted that an integrated planar spiral inductor as claimed is “an inductor that is not formed discrete from the other circuitry, is situated in a single plane, and has *coils* that go about a fixed point at a generally increasing (or diminishing) distance from that point.” Dec. 9–10 (emphasis added). Petitioner agrees with this interpretation. Pet. Reply 3.

Patent Owner contends that a “spiral” as claimed should not be limited to a “coil” for two reasons. PO Resp. 6. First, “coil” has a three dimensional connotation while the claimed inductor has a mainly two dimensional geometry in that each layer of the claimed inductor sits in a plane parallel to the other layers. *Id.* (citing Ex. 2003 ¶ 38). Second, a spiral can be approximated by a pattern of straight segments while a “coil” cannot. *Id.* Based on this, Patent Owner asserts that a spiral as claimed should be construed to mean “a geometry that goes about a fixed point at a generally increasing (or diminishing) distance from that point.” *Id.*

Patent Owner’s concerns are accounted for by our claim construction. The term “coil,” in context of our claim construction, does not connote three-dimensional geometry. To the contrary, our interpretation expressly notes that the inductor is “planar” in that it is situated in a plane (two-dimensional). Dec. 9–10. Further, our interpretation states that the term “coil” is used only to refer to the conductive portion of the inductor so as to avoid using the word “spiral” to define the claim term “spiral.” *See* Dec. 10. In other words, the term “coil” simply means the conductive portion of the inductor and no further meaning is implied. Regarding the claim term “spiral,” our interpretation explains that the ordinary meaning of spiral as “continuously curving” is inconsistent with the Specification, which

describes that the conductive portion of the inductor may be formed using other than a continuous curve (e.g., a square, rectangular, octagonal, or other suitable shape). Dec. 10 (citing Ex. 1001, 4:1–6; 10:18–22). Consequently, Patent Owner’s interpretation is consistent with our claim construction.

We interpret an integrated planar spiral inductor as claimed as an inductor that is not formed discrete from the other circuitry, is situated in a single plane, and has *coils* that go about a fixed point at a generally increasing (or diminishing) distance from that point.

III. PATENT OWNER’S MOTION TO EXCLUDE

A. *Introduction*

As mentioned above, Patent Owner filed a Motion to Exclude Exhibits 1011 and 1072. Paper 34 (“Mot.”). Petitioner filed an Opposition to the Motion (Paper 40, “Opp.”), and Patent Owner filed a Reply to the Opposition (Paper 41, “Opp. Reply”).

B. *Objections*

A motion to exclude “must identify the objections in the record and must explain the objections.” 37 C.F.R. § 42.64(c). Patent Owner acknowledges these two requirements. Mot. 2. Patent Owner then states that “[w]e specify where the objections to Dr. Holberg[]’s declarations were originally made on the record.” *Id.* Despite acknowledging these requirements and expressing an intent to identify the objections, Patent Owner does not identify where the objections are in the record, nor explain those objections. Mot., *passim*. Due to these omissions, we are unable to assess the timeliness of Patent Owner’s objections as well as whether the

objections contained sufficient particularity to allow correction in the form of supplemental evidence. *See* 37 C.F.R. § 42.64(b)(1). For these reasons alone, Patent Owner's Motion is deficient and is denied. *See* 37 C.F.R. §§ 42.20(c), 42.22, 42.64(c).

C. Other Content of the Motion

Ignoring these deficiencies and considering the remaining content of the Motion, for the reasons that follow, we are not persuaded that Exhibits 1011 and 1072 should be excluded.

Exhibit 1011 is a Declaration of Dr. Douglas Holberg in support of the Petition, and Exhibit 1072 is a Declaration of Dr. Holberg in support of Petitioner's Reply. *See* Pet., v; Pet. Reply, 6.

Patent Owner moves to exclude both declarations because Dr. Holberg's "knowledge is below what one of ordinary skill in the relevant art would know, and would have to know to understand the relevance of the prior art and the invention" and because "his testimony clearly shows lack of credibility." Mot., 1. Patent Owner clarified at the oral hearing that "credibility" does not refer to Dr. Holberg's honesty, but to his ability to put support for his opinions on the record. Tr. 76:9–77:24. Petitioner opposes, contending that Dr. Holberg is qualified as an expert in the relevant field. Opp., 3–4.

The parties disagree in their characterization of the relevant field in evaluating whether Dr. Holberg is "qualified as an expert by knowledge, skill, experience, training, or education." *See* Fed. R. Evid. 702. Patent Owner contends that a person of ordinary skill in the art at the time of the invention of the '466 patent,

would be familiar with: 1) fundamental RF circuit design concepts, e.g. RF filters, LC tanks, RF variable gain amplifiers and low noise amplifiers 2) fundamental RF IC components, e.g. inductors, capacitors, and switches, 3) the required selectivity for an analog TV tuner, and 4) basic usage of the Cadence design platform (the most widespread RF integrated circuit design tool).

Mot., 3–4 (citing Ex. 2003 ¶ 19). We find Patent Owner’s characterization of the relevant field too narrow. The ’466 patent characterizes the field of the invention as follows, notably lacking the strong focus of Patent Owner’s characterization on RF circuit design:

The invention relates to a television signal receiver, and in particular, to a television signal receiver an integrated band selection filter.

Ex. 1001, 1:6–8. As Petitioner observes, the ’466 patent does not even mention selectivity for an analog TV tuner or basic usage of the Cadence design platform. Opp., 2. These factors weigh significantly against defining the field of *invention* as narrowly as Patent Owner proposes. Instead, we agree with Petitioner, and find that a person of ordinary skill in the art would have held at least a Master of Science or higher degree in electrical engineering, have at least four years of experience with mixed signal system design, including analog front ends and subsequent digital signal processing of various analog and digital signal formats of video and audio content. Pet. 10–11.

Dr. Holberg’s education and experience exceed these qualifications. Ex. 1011 ¶ 3, App. A. We have also considered Patent Owner’s contention that Dr. Holberg’s cross-examination testimony shows that he lacks ordinary skill in the art of the invention, and have reviewed that

testimony. We conclude that Dr. Holberg is an expert in the relevant field of the invention.

Accordingly, we deny Patent Owner's Motion to Exclude.

D. Related Contention

Patent Owner repeats the argument regarding the level of ordinary skill in the art, and contends that Dr. Holberg's Declaration should be given no weight because Dr. Holberg lacks ordinary skill in the art. PO Resp. 11–14.

As an initial matter, we note that Patent Owner does not specify which of Dr. Holberg's two Declarations (Exs. 1011, 1072) should be given no weight.

We clarify that Patent Owner does not present argument or evidence that Dr. Holberg's testimony fails to disclose the underlying facts or data on which his opinion is based. *See* 37 C.F.R. § 42.65(a). Further, as explained above, Patent Owner's argument is unpersuasive, in part, because it is premised on a mischaracterization of the field of the invention.

Patent Owner has not persuaded us that either of Dr. Holberg's declarations should be give no weight.

IV. PATENTABILITY

A. Introduction

A patent 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 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 ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

We consider Patent Owner to have admitted those aspects of these grounds of unpatentability that are uncontested by Patent Owner and are material facts. See 37 C.F.R. § 42.23(a) (in an opposition, any material fact not specifically denied may be considered admitted), § 42.120(a) (the patent owner response is an opposition).

The parties rely upon expert testimony. Petitioner proffered the Declaration of Dr. Douglas Holberg (“Holberg Declaration,” Ex. 1011) with the Petition and a second Declaration with Petitioner’s Reply (“Holberg Reply Declaration,” Ex. 1072). Patent Owner proffered the Declaration of Dr. Ion E. Opris (“Opris Declaration,” Ex. 2003) with its Response. A transcript of Dr. Opris’s Deposition (“Opris Dep.,” Ex. 1056) was submitted by Petitioner. A transcript of Dr. Holberg’s Deposition (“Holberg Dep.,” Exhibits 2048 and 2049) was submitted by Patent Owner.

We address each of the three asserted grounds of unpatentability in turn.

B. Obviousness over Gomez, Waight, and Shen

Petitioner contends that claims 1, 2, 5, 8, 9, 20, 21, 31, 32, 35, and 36 would have been obvious over Gomez, Waight, and Shen. Pet. 12–38. We

analyze independent claims 35, 20, and 1 and then analyze the dependent claims.

1. *Independent Claim 35*

a. *Variable amplifier*

Claim 35 is directed to a band pass filter that includes a first variable amplifier. Petitioner contends that Gomez's low-noise amplifier (LNA) 301 receives an input RF signal and provides an output signal and therefore corresponds to a first variable amplifier as claimed, except that LNA 301 is not explicitly described as variable. Pet. 13–15; Ex. 1004, 4:1–3; Fig. 3. Petitioner contends that it would have been obvious to modify Gomez's LNA 301 to be variable like Waight's LNA 204 in order to compensate for environmental and physical conditions the degrade television signals. Pet. 13–14; Ex. 1011 ¶ 15–16.¹¹ We agree with Petitioner.

b. *Band pass filter including a first switch and a plurality of switchable connected capacitors*

Claim 35 requires that the band pass filter includes “a first switch coupled between the output node of the first variable amplifier and a second node.” Petitioner contends this limitation would have been obvious in view of Gomez and either Waight or Shen. Pet. 15–19. Specifically, Petitioner contends that each of Gomez's bank of programmable tracking filters 311 includes a tank circuit 430 that corresponds to a band pass filter as claimed. *Id.* at 15–16; Ex. 1004, 4:1–10, Fig. 4; Ex. 1011 ¶ 18. Petitioner explains that the output of Gomez's LNA 301 is passed to each of the plurality of

¹¹ The Holberg Declaration quotes, but does not cite to a portion of Waight. See Ex. 1011 ¶ 15 (quoting Ex. 1005, 2:15–17). Petitioner's reasoning is also supported by a second example (Lange) of a known variable gain amplifier. See Pet. 14; Ex. 1017, 3:31–39.

bandpass filters (tank circuits 430) and an enable switch on the output of each switch selectively feeds the output of one filter to the output (“To Mixer 302”). *Id.* 17; Ex. 1011 ¶ 19; Ex. 1004, 5:17–21, Fig. 4. Petitioner contends it would have been obvious to interpose switches, as disclosed by Waight or Shen, between Gomez’s LNA and programmable tracking filter, to selectively pass the amplified signal to one of Gomez’s bandpass filters because these switches would have reduced the capacitive and current load on the output LNA. *Id.* In support of this contention, Dr. Holberg explains that the use of switches for such purpose was well known. Ex. 1011 ¶¶ 20, 21.

Claim 35 also requires that the band pass filter includes “a plurality of switchably connected capacitors connected in parallel between the second node and a first voltage, each switchably connected capacitor comprising a capacitor and a switch connected in series between the second node and the first voltage.” Petitioner explains that Gomez’s bandpass filter (tank circuit 430) includes switchable capacitors (e.g., C403a) connected in series with a corresponding transistor switch (e.g., M407a to C403a) to form a pair. These pairs are connected in parallel between a second node (to mixer 302) and a first voltage (ground), and these pairs are switched in and out of the circuit by switches. Pet. 19–20; Ex. 1004, 4:35–39, Fig. 4; Ex. 1011 ¶ 22.

Patent Owner argues that Petition has failed to show a band pass filter having a first switch and a plurality of switchably connected capacitors as claimed. PO Resp. 14–18. Specifically, Patent Owner contends that “[n]either Gomez nor Waight provides any reason for a [person of ordinary skill in the art] to *substitute* the Gomez impedance Z (401) with the Waight’s switch 238 because there would not have been any reasonable expectation of

success.” PO Resp. 16 (emphasis added). Patent Owner elaborates that such a modification would render Gomez’s apparatus inoperable. *Id.* at 16–18 (citing Ex. 2003 ¶ 41).

We agree with Petitioner that this argument mischaracterizes Petitioner’s ground of unpatentability in that Petitioner does not propose to substitute Gomez’s impedance Z (401) for Waight’s switch 238. *See* Pet. Reply 3–5. Rather, Petitioner proposes to interpose switches as disclosed by Waight or Shen between Gomez’s LNA and programmable tracking filter to selectively pass the amplified signal to one of Gomez’s bandpass filters. Pet. 17.

c. Integrated planar spiral inductor

Claim 35 requires that the band pass filter includes “an inductor coupled between the second node and a second voltage, the inductor being an integrated planar spiral inductor.”

Patent Owner argues that Petitioner has not established sufficiently that Gomez inherently discloses an integrated planar spiral inductor as claimed. PO Resp. 18–22. Our Decision to Institute determined that Petitioner had not shown a reasonable likelihood of success in establishing that Gomez’s inductor is inherently spiral, limiting Petitioner to the contention that that it would have been obvious to modify Gomez’s inductor to be spiral. *See* Dec. 14–15. We see no reason to alter that determination in light of the record as developed during the trial.

Petitioner contends that Gomez discloses an integrated, planar inductor because inductors L406 may be discrete or printed, meaning either formed as a printed circuit board or as an integrated circuit, both of which are planar. Pet. 21; Ex. 1004, 4:42–43; Ex. 1011 ¶ 24. Petitioner contends

that it would have been obvious to modify Gomez's inductor L406 to be spiral because the use of planar spiral inductors was well known at the time of invention, as evidenced by Waight's on-chip inductors L0 and L1, and would have been a matter of design choice. Pet. 22–23 (citing Ex. 1011 ¶ 26; Ex. 1005, 2:25–34; Ex. 1006, 1:27–32).

Patent Owner argues that “printed” as used in the cited portion of Gomez means printed on the circuit board. PO Resp. 19–20; Ex. 2003 ¶ 46. We agree with Petitioner that Patent Owner's argument ignores that Gomez discloses an inductor may be formed on an integrated circuit. Pet. Reply 6; Pet. 21; Ex. 1004, 4:42–43, 53 (“inductor L406 may on-chip or off-chip as noted above”); Ex. 1011 ¶ 24.

Patent Owner argues that Gomez expressly teaches away from integration of the programmable tracking filter 311 into a single integrated circuit. PO Resp. 20, 23–24. According to Patent Owner, Gomez discloses that the alternate embodiment of programmable tracking filter 311 shown in Figure 7 is like that of Figure 4 except that it may be integrated into a single IC (integrated circuit), implying that the embodiment of Figure 4 may not be made into a single IC. *Id.* (citing Ex. 1004, 7:8–11, Figs. 4, 7). For the reasons that follow, we disagree with Patent Owner's characterization of the reference.

Gomez discloses that “[t]he filter bank **311** shown in Fig. 7 functions similarly to the filter bank of Fig. **4**, except that it does not use an extra inductor and may be made more compact and better integrated into a single IC.” Ex. 1004, 7:8–11.

We agree with Petitioner that this disclosure does not mean that the embodiment of filter bank 311 shown in Figure 4 cannot be integrated into a

single IC. See Pet. Reply 6–7. Rather, this disclosure suggests that both the embodiment of Figure 4 and that of Figure 7 may be integrated as a single IC, and when so formed, because the embodiment of Figure 7 has one less inductor, it is more compact and better integrated than the embodiment of Figure 4. Such disclosure does not teach away from forming the embodiment of Figure 4 as an IC. Rather, Gomez teaches two alternatives (Figures 4 and 7), with the embodiment of Figure 7 being better integrated and more compact. See *DyStar Textilfarben GmbH v. C.H. Patrick Co.*, 464 F.3d 1356, 1364 (Fed. Cir. 2006) (“We will not read into a reference a teaching away from a process where no such language exists.”).

Patent Owner argues that a person of ordinary skill in the art would not have used Waight’s spiral inductors as the inductors in Gomez. PO Resp. 25–26. In support of this argument, Patent Owner contends that: (1) Waight’s spiral inductor is included in a preselect bandstop, rather than bandpass filter, (2) the spiral inductor of Waight lacks a sufficient Q value, and (3) Fig. 11 of Waight includes an external inductor in addition to the integrated spiral inductors L0 and L1. *Id.*

Petitioner counters that: (1) Petitioner relies on Gomez for the bandpass and integrated planar limitations and on Waight for the integrated planar spiral inductor limitation; (2) Q value is not claimed and a person of ordinary skill in the art would have understood that a Waight or Gomez integrated inductor could be used in Gomez; and (3) Figure 11 of Waight includes an external inductor in addition to the integrated spiral inductors L0 and L1. Pet. Reply 7; Ex. 1072 ¶ 26. We are persuaded by Petitioner’s counter argument.

Further, Patent Owner's arguments regarding Waight do not address cogently Petitioner's broader contention that the use of spiral inductors was well known and was a matter of design choice. Petitioner provides several examples in support of the contention that the use of spiral inductors was well known. *See* Pet. 22 (citing Liou (Ex. 1006), Chiu (Ex. 1013), Maeda (Ex. 1014), and Chang (Ex. 1016)). In particular, Petitioner highlights that it was known that "planar spiral inductors have become essential elements of communication circuit blocks." Pet. 22–23; Ex. 1010; Ex. 1011 ¶ 26.

d. Unity gain buffer

Claim 35 requires that the band pass filter includes "a unity gain buffer having an input node coupled to the second node and an output node coupled to the first node providing the filter output signal."

Petitioner contends that it would have been obvious to replace Gomez's switches with a unity gain buffer, such as disclosed by Shen, in order to isolate impedance of each LC circuit from the common output node. Pet. 24–26; Ex. 1011 ¶¶ 28–30.

Patent Owner argues that a person of ordinary skill in the art would not have made the proposed modification because Gomez's band pass filter is designed to work at zero DC voltage, and Shen's unity gain buffer would not operate at such voltage. PO Resp. 26–27; Ex. 2003 ¶ 55; Ex. 2049, 213.¹²

The premise of Patent Owner's argument is that the proper test for obviousness is whether Shen's unity gain buffer could be incorporated, as is,

¹² For consistency with Patent Owner, here, and throughout, we reference the page number at the top right of the page rather than the number at the bottom of the page.

into Gomez's device. We find this argument unpersuasive. See *In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art."); see also *In re Sneed*, 710 F.2d 1544, 1550 (Fed. Cir. 1983) ("[I]t is not necessary that the inventions of the references be physically combinable to render obvious the invention under review.").

Further, we agree with Petitioner that the person of ordinary skill in the art is not an automaton; rather, a person of ordinary skill in the art would be capable of modifying the voltage of Gomez's inductor so that the buffer would operate properly when substituted for Gomez's switches. Pet. Reply 8; Ex. 1072 ¶ 27; Ex. 2049, 269–270 (explaining how the voltage would be adjusted to make the combined device operable).

e. Conclusion

We conclude that Petitioner has shown by a preponderance of the evidence that claim 35 is unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

2. Independent Claim 20

As noted above, claim 20 is directed to a band pass filter bank for a television tuner for tuning an input RF signal having a first transmission spectrum, and therefore device must thus be capable of such use.

Patent Owner repeats the arguments for claim 35. PO Resp. 27. Our analysis of claim 35 above is equally applicable here.

Claim 20, like claim 35, requires the inductor to be an integrated spiral inductor.

Patent Owner argues that a person of ordinary skill in the art “would not have had a reason to use the Waight spiral inductors, L0 and L1, in place of the Gomez L406 inductor because the Waight spiral inductors were not suitable for a band pass filter bank for a television tuner.” PO Resp. 27–28. This is essentially the same argument Patent Owner made with regard to claim 35, and that analysis above is applicable here. See PO Resp. 25–26

Claim 20 recites, “a plurality of band pass filters ..., each band pass filter being disposed to select a different portion of the first transmission spectrum so that the plurality of band pass filters is disposed to select the entire frequency range of the first transmission spectrum.”

Patent Owner argues that Gomez does not filter above 280–300 MHz, and consequently does not teach a bank of band pass filters disposed to select the entire frequency range as claimed. PO Resp. 29–31

Claim 20 requires that the plurality of band pass filters is disposed to select the entire frequency range of the first transmission spectrum, which is a subset of the input RF signal. Consequently, the first transmission spectrum is not limited to above 280–300 MHz, and we agree with Petitioner that Patent Owner’s argument is unpersuasive because it is not commensurate in scope with claim 20. See Pet. Reply 9–10.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 20 is unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

3. *Independent claim 1*

As explained above, claim 1 is directed to a tuner circuit receiving an input RF signal having a first transmission spectrum, and is similar to independent claims 35 and 20.

Petitioner contends that all aspects of claim 1 were addressed in the discussion of claim 20, with two exceptions.¹³ Pet. 29. The first exception is the frequency conversion circuit, and Petitioner notes that this element is conventional and present in all television tuners, including those taught by Gomez and Waight. *Id.* The second exception is a “tuner circuit receiving an input RF signal having a first transmission spectrum” as recited in the preamble. Petitioner contends that the preamble is not limiting and even if it is, this aspect was shown in Gomez, Waight, and Shen. *Id.* at 29–30 (citing Ex. 1004, Abstract; Ex. 1011 ¶ 34).

Patent Owner presents no additional arguments against Petitioner’s challenge of claim 1.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 1 is unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

4. *Claim 2*

Claim 2 depends from claim 1 and recites, “wherein the tuner circuit is formed as a single integrated circuit.”

Petitioner contends that Gomez, Waight, and Shen each describe that a tuner circuit may be formed as a single integrated circuit, and doing so would reduce material cost and space required for the circuit board. Pet. 32; Ex. 1011 ¶ 41.

Patent Owner argues that Gomez would have led a person of ordinary skill in the art to eliminate Gomez’s inductor L406 in order to integrate the tuner circuit into a single IC. PO Resp. 32–33. This argument is based upon

¹³ For that reason, Petitioner relies upon the analysis of claim 20, which relies in turn upon the analysis of claim 35. *See* Pet. 27.

the same characterization of Gomez's Figures 4 and 7 relied upon for claim 35. *See Id.* at 20, 23–24. As explained above, this characterization of the reference is not accurate, and for that reason this argument is not persuasive. *See also* Pet. Reply 10 (noting that Patent Owner is repeating an earlier argument).

Patent Owner argues that Waight's integrated spiral inductors L0 and L1 are not suitable for band pass filters for a tuner circuit.¹⁴ *Id.* at 33 (citing Ex. 2003 ¶ 64). This argument is similar to the argument for claim 35 that a person of ordinary skill in the art would not have used Waight's inductors in Gomez. *See* Pet. Resp. 25–26. Our analysis in claim 35 is applicable here.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 2 is unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

5. *Claim 5*

Claim 5 depends from claim 1 and recites,
wherein the frequency conversion circuit comprises:

an image rejection mixer coupled to receive the input signal corresponding to the band selected output signal and for performing image rejection filtering and frequency conversion on the input signal to provide the frequency converted output signal having the predetermined frequency.

Petitioner explains that “frequency conversion circuits” were standard in television tuner and Gomez, Waight, and Shen each describe such a

¹⁴ Patent Owner also presents an argument based on Shen. PO Resp. 33. Petitioner does not respond to this argument. Because we have analyzed the obviousness of this element based on Gomez and Waight, we do not need to address Shen.

circuit. Pet. 33. Petitioner provides a more detailed explanation with regard to Waight. *Id.* at 33–34.

Patent Owner does not provide additional argument regarding claim 5.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 5 is unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

6. *Claims 8, 21, and 36*

Claims 8, 21, and 36 depend from independent claims 1, 20, and 35, respectively, and each recite, “wherein the first switch and the switch in each of the plurality of switchably connected capacitors each comprise an NMOS or PMOS transistor.”

Petitioner explains that Gomez’s switchable capacitors (e.g., M407a) use NMOS transistors as the switches. Pet. 34; Ex. 1004, 4:38–39, Fig. 4; Ex. 1011 ¶¶ 46–47.

Patent Owner does not add any arguments for claims 8, 21, and 36.

We conclude that Petitioner has shown by a preponderance of the evidence that claims 8, 21, and 36 are unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

7. *Claims 9, 22, and 37*

Claims 9, 22, and 37 depend from independent claims 1, 20, and 35, respectively, and each recite,

wherein each band pass filter further comprises a plurality of resistors, each resistor associated with one of the plurality of switchably connected capacitors, each resistor having a first terminal coupled to a node between the switch and the capacitor of the respective switchably connected capacitor and a third voltage.

Petitioner contends that this additional limitation would have been obvious in view of Waight. Pet. 35. Specifically, Petitioner explains, using Waight’s Figure 5, that Waight discloses a plurality of resistors (R), each associated with one of a plurality of switchably connected capacitors (16C, 32C, etc.), and a third voltage is supplied by the output voltage of inverter I. *Id.* at 35–36 (citing Ex. 1005, 7:28, 7:65–8:1, Fig. 5; Ex. 1011 ¶ 48).

Patent Owner does not add any arguments for claims 9, 22, and 37.

We conclude that Petitioner has shown by a preponderance of the evidence that claims 9, 22, and 37 are unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

8. *Claim 31*

Claim 31 depends from independent claim 20 and recites, “wherein an inductor in a first band pass filter of the plurality of band pass filters has an inductance value suitable for operation in a low frequency range.”

Petitioner explains that the ’466 patent describes that conventional television tuners included three band pass filters, to include one for the low frequency band of 50–200 MHz. Pet. 37. Petitioner contends that Gomez explicitly describes that he TV spectrum includes the “low-frequency band in 50–200 MHz.” *Id.* Therefore, according to Petitioner, a person of ordinary skill in the art would have understood that one of Gomez’s three band pass filters would cover the low-frequency band as claimed. *Id.* (citing Ex. 1011 ¶ 50).

Patent Owner does not add any arguments for claim 31.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 31 is unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

9. *Claim 32*

Claim 32 depends indirectly from claim 31 and recites, “wherein the low frequency range comprises frequencies less than 500 MHz.”

Petitioner relies upon the explanation of the ground of unpatentability asserted against claim 31. Pet. 37–38.

Patent Owner does not add any arguments for claim 32.

We conclude that Petitioner has shown by a preponderance of the evidence that claim 32 is unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, and Shen.

C. *Obviousness over Gomez, Waight, Shen, and Liou*

Petitioner contends that claims 11, 12, 24, 25, and 39 would have been obvious over Gomez, Waight, Shen, and Liou (Ex. 1006). Pet. 38–45.

1. *Claims 11, 24, and 39*

Claims 11, 24, and 39 depend from independent claims 1, 20 and 35, respectively, and recite,

wherein the integrated planar spiral inductor comprises a single-spiral metal spiral inductor having an outer end as a first terminal and an inner end being coupled to form a second terminal of the inductor, the metal spiral being formed using a set of metal layers on a semiconductor substrate.

Petitioner contends that this additional limitation would have been obvious in view of Liou. Pet. 37–40. Specifically, Petitioner contends that Liou discloses a multilevel structure that includes three coils, each of which corresponds to an inductor as claimed. Pet. 38–40; Pet. Reply 11–12.

Petitioner proposes to modify the Gomez, Waight, Shen combination by modifying the integrated planar spiral inductor to be formed as disclosed by Liou because it would have resulted in a space efficient, “high Q” inductor

with greater reliability at lower cost. Pet. 38–40; Ex. 1011 ¶¶ 52–53.

Underlying this contention is Petitioner’s claim interpretation that the claims use the open-ended term “comprising”, and for that reason the integrated planar spiral inductor is not limited to a single-spiral metal spiral inductor. Pet. Reply 12. For the reasons that follow, we disagree with Petitioner’s contention.

As an initial matter, we cannot agree with Petitioner’s claim interpretation. Each of the claims use the term “comprising” in the preamble, and each of the claims recite that the integrated planar spiral inductor “comprises a single-spiral metal spiral inductor.” The transitional phrase “comprising” means that the named elements are essential and other elements permitted. *See Genentech, Inc. v. Chiron Corp.*, 112 F.3d 495, 501 (Fed. Cir. 1997). Here, the single-spiral metal spiral inductor is an essential element of the claims and other elements are permitted.

The Specification is consistent with our interpretation that an inductor having more than one spiral is not a single-spiral inductor. For example, the Specification describes that the integrated spiral inductor may be formed using a single spiral or multiple stacked spirals. Ex. 1001, 2:60–65. By contrast, the Specification emphasizes the distinction between a single-spiral inductor and one having multiple spirals.

Petitioner’s claim construction permits a three-spiral inductor to be seen as three single-spiral inductors, effectively rendering the claim term “single” meaningless. *See Bicon Inc. v. Straumann Co.*, 441 F.3d 945, 950 (Fed. Cir. 2006) (“[C]laims are interpreted with an eye toward giving effect to all terms in the claim.”); *see also Stumbo v. Eastman Outdoors, Inc.*, 508 F.3d 1358, 1362 (Fed. Cir. 2007) (denouncing claim constructions that

render phrases in claims superfluous); *Spectrum Int'l, Inc. v. Sterilie Corp.*, 164 F.3d 1372, 1379–80 (Fed. Cir. 1998) (“‘Comprising’ is not a weasel word with which to abrogate claim limitations.”).

The claims are broad enough to cover a device having more than one single-spiral inductor; however, the at least one single-spiral inductor is essential.

Petitioner’s characterization that Liou’s multilevel structure having three or more spirals is in fact “three separate inductors” is not supported adequately. See Pet. Reply 12 (citing Ex. 1006, 1:6–13; 2:37–40). These portions of the reference describe that Liou’s spiral inductor has more than three spiral coil patterns. Ex. 1006, 1:6–13; 2:37–40; Fig 2 (depicting a first, second, and third spiral coil); see also *Id.* at 1:66–2:2 (describing the device as comprising at least three spiral coil patterns). That is, Liou describes a single three-spiral inductor, not three single-spiral inductors.¹⁵ See *id.* 2:63–3:7 (describing a single inductor in that electricity flows from a first pad 20 through each of the three spiral coils to a second pad 30).

Petitioner does not explain adequately how Liou’s three-spiral inductor is in fact three single-spiral inductors. Nor does the citation to Dr. Holberg’s Declaration cure this deficiency. Pet. Reply 12 (citing Ex. 1072 ¶ 37). Dr. Holberg supplies the conclusion that each of Liou’s three spirals functions as an inductor, and repeats what is stated in the Petitioner’s

¹⁵ We note that Petitioner’s characterization of Liou’s inductor here differs from the characterization in the ground of unpatentability asserted against claims 12 and 25, analyzed below. Specifically, Petitioner refers to Liou’s inductor as a multiple spiral inductor (as contrasted to three single-spiral inductors), and Petitioner acknowledges that electricity flows from pad 20 through each of the three spirals to pad 30. See Pet. 42.

Reply. See Ex. 1072 ¶ 37. Dr. Holberg does not provide the underlying facts or data for this opinion. See 37 C.F.R. § 42.65(a). In sum, Liou discloses a three-spiral inductor, and Petitioner has not persuaded us that each of these three coils is itself a single-spiral metal spiral inductor as claimed. Further, Petitioner's theory is new in that the Petition does not assert that each of the three spirals of Liou's inductor corresponds to a single-spiral metal spiral inductor. Cf. Pet. 38–40, Pet. Reply 12.

Petitioner has not persuaded us that Liou's three-spiral inductor (a multiple stacked spiral inductor) is three single-spiral inductors as claimed.

We conclude that Petitioner has not shown by a preponderance of the evidence that claims 11, 24, and 39 are unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, Shen, and Liou.

2. *Claims 12 and 25*

Claim 25 depends from independent claim 20 and recites,

wherein the integrated planar spiral inductor comprises a multi-spiral integrated planar spiral inductor having a first terminal and a second terminal and formed in a semiconductor substrate, the inductor comprising:

a first metal spiral formed in a first set of metal layers wherein the first metal spiral has an outer end being the first terminal of the inductor and the first metal spiral spirals inward to an inner end in the center of the spiral;

a second metal spiral formed in a second set of metal layers and overlying the first metal spiral, wherein the second metal spiral has an inner end in the center of the spiral and being coupled to the inner end of the first metal spiral through a metal interconnect and the second metal spiral spirals outward to an outer end being the second terminal of the inductor; and

a dielectric layer formed between the first metal spiral and the second metal spiral isolating the first metal spiral from the second metal spiral except for the metal interconnect.

Claim 12 depends from independent claim 1 and is similar.

Petitioner contends that the additional limitations of claims 25 and 12 would have been obvious in view of Liou. Pet. 41–45. Petitioner contends that Gomez demonstrates a concern that high Q value components be used. Pet. 41 (citing Ex. 1011 ¶ 54). Indeed, Gomez describes that off-chip inductors generally are available with higher Q factors and give better performance. Ex. 1004, 4:53–54. Petitioner contends that Liou describes a multi-level spiral inductor structure having high inductance (L) and high quality factor (Q) for products operating in the RF band. Pet. 41–42. Liou discloses a multilevel inductor with high inductance and high-Q value for products operating in the RF band. Ex. 1006, 1:20–21; 1:64–2:2. In light of this, Petitioner’s contends that use of Liou’s inductor in Gomez’s television tuner would have been a predictable use of a prior art element according to its established function. Pet. 42.

Patent Owner repeats the arguments based upon the grounds of unpatentability against independent claims 1, 20 and 35. PO Resp. 33–34. To the extent that these arguments apply, they are unpersuasive here as well.

Patent Owner argues that Dr. Holberg, “said he did not consider the inductance values that would be needed to replace the Gomez inductor L406a or how would he consider implementing.” PO Resp. 36 (citing Ex. 2049, 252). According to Patent Owner, Dr. Opris finds that neither Shen nor Liou teaches how to obtain high inductance values for substituting an integrated spiral inductor for the Gomez L406 inductor, and a person of ordinary skill in the art would not have had a reasonable expectation that the proposed modification would have yielded predictable results. PO Resp. 37 (citing Ex. 2003 ¶ 72).

These contentions are not persuasive for several reasons. First, Patent Owner overstates what is disclosed in Dr. Holberg's testimony. Patent Owner asked Dr. Holberg, "what in Liou would teach an inductance that would be suitable for replacing the Gomez inductor L406a?" Ex. 2049, 252. Dr. Holberg indicated that he did not consider the value of Gomez's inductor. *Id.* But contrary to Patent Owner's assertion, Dr. Holberg did not state that he did not consider implementing the proposed modification.

Second, both Patent Owner's question of what in Liou would teach an inductance that would be suitable for replacing Gomez's inductor, and Dr. Opris's statement that Liou does not teach how to obtain high inductance values for substituting an integrated spiral inductor for the Gomez L406 inductor are premised on the concept that there must be an explicit teaching in the reference. Such is not the law. *See KSR*, 550 U.S. at 418 (rejecting the rigid requirement of a teaching suggestion or motivation to combine known elements in order to show obviousness).

Third, Dr. Opris's statement that Liou does not teach how to obtain high inductance values and that the proposed combination lacks a reasonable expectation of success are conclusory and do not disclose the underlying facts or data for that opinion. *See* 37 C.F.R. § 42.65(a). Further, Dr. Opris's comments do not persuasively address Petitioner's contention that Gomez describes a need for high Q value and that Liou provides high Q value via a multilevel, multi-spiral inductor.

Patent Owner correctly points out that Dr. Holberg did not consider the value of Gomez's L406a inductor. However, this omission does not persuasively demonstrate that the proposed combination is something more than the use of known components to produce a predictable result. Nor has

Patent Owner persuaded us that the combination is beyond the level of skill in the art.

We conclude that Petitioner has shown by a preponderance of the evidence that claims 12 and 25 are unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, Shen, and Liou.

D. Obviousness over Gomez, Waight, Shen, Liou and Chiu

Claims 13 and 26 depend from claims 12 and 25, respectively, which depend in turn from independent claims 1 and 20, respectively. Claims 13 and 26 recite, “wherein the first metal spiral and the second metal spiral each has a circular or octagonal shape.”

Petitioner contends that this additional limitation would have been obvious over Chiu. Pet. 45–47. Specifically, Petitioner asserts that Chiu discloses an inductor having a metal spiral with an octagonal shape. Pet. 45–46 (citing Ex. 1013; Fig. 5B). Petitioner reasons that a person of ordinary skill in the art would have been motivated to combine Chiu and Liou because both are directed to high Q inductors suitable for RF applications, and because the shape of an inductor spiral is a matter of design choice. Pet. 46.

Patent Owner repeats the arguments based upon the grounds of unpatentability against independent claims 1, 20 and 35. PO Resp. 37. To the extent that these arguments apply, they are unpersuasive here as well.

Patent Owner argues that Petitioner’s use of design choice as a rationale amounts to using the claims of the ’466 patent as a road map (impermissible hindsight). PO Resp. 38.

Although Petitioner uses the phrase “design choice” the rationale proffered here is more than just “design choice.” Petitioner contends that circular and octagonal inductor spiral shapes were well known in the art. Pet. 46 (citing Ex. 1011 ¶ 60). The Holberg Declaration provides several examples, and the cited references disclose inductors having an octagonal shape (Ex. 1010, Fig. 1(b)) and inductors having a circular shape (Ex. 1010, Fig. 1(d); Ex. 1014, 2:30–34). Ex. 1011 ¶ 60. In particular, Petitioner contends, and we agree, that Chiu discloses an octagonal shape inductor suitable for RF applications. Pet. 45–46; Ex. 1013, Figs. 4A, 4B, 5B. Given this, Petitioner’s reasoning that a person of ordinary skill in the art would have modified Liou’s inductor to have an octagonal shape suitable for RF applications as taught by Chiu has a rational underpinning. See Pet. 46; Ex. 1011 ¶ 60; Pet. Reply 14.

Patent Owner also utilizes the Declaration of Dr. Opris in support of the contention that the proposed modification was more than a matter of design choice. Specifically, Dr. Opris states that the geometry of the metal spirals dictates the value of inductance as well as space requirements, and that not all geometries yield the high value inductance and small space requirements demanded for integration. *Id.* at 39–40 (citing Ex. 2003 ¶ 76).

We credit this uncontested evidence; however, it does not demonstrate that Petitioner’s proffered rationale is insufficient. First, as stated above, Petitioner offers more than a naked assertion of design choice. Rather, Petitioner explains that it was known to use circular and octagonal inductors in RF applications. Dr. Opris’s statement does not address persuasively this contention. Second, while inductance varies with the geometry of the spiral, the inductor still functions to provide inductance. The question is whether

that inductance was applicable to RF applications, and Petitioner has demonstrated that it was. Further, the '466 patent describes that the metal spirals may be circular (Figs. 6, 7), square, rectangular, octagonal, or other suitable shapes. Ex. 1001, 10:18–22. Therefore, a wide variety of shapes are compatible with RF applications, and nothing in the '466 patent indicates that the shape of the inductor provided unexpected results or was otherwise unpredictable.

Patent Owner argues that Liou's inductor cannot be combined with Chiu's inductor. Specifically, Liou's inductors are stacked while Chiu's inductor uses metal strips on various layers, and "[t]he same metal layers cannot be laid out and connected as in Chiu and simultaneously be laid out as in the Liou's rotated geometry." PO Resp. 39–40 (citing Ex. 2003 77; Ex. 2049, 261).

Patent Owner argues as if Petitioner proposes to place Chiu's inductor in Liou's device. Such is not the case. Petitioner proposes to modify Liou's inductor to have an octagonal shape as taught by Chiu. Pet. 45–47; Pet. Reply 15; Ex. 1072 ¶ 43. Patent Owner's argument is unpersuasive because it does not respond to the asserted ground of unpatentability as put forth by Petitioner.

Patent Owner argues that Gomez's programmable filter bank 311 occupies 50–860 MHz spectral range while Chiu utilizes an inductor for every frequency range extending from about 100 MHz to about 10 MHz. PO Resp. 40 (Ex. 1013, 3:24–25). In light of this, Dr. Opris opines that a person of ordinary skill in the art would not have a reasonable expectation of success for the proposed modification. Ex. 2003 ¶ 78.

Petitioner counters that Patent Owner does not identify any design issue for inductors operating below 100 MHz. According to Dr. Holberg, dealing with inductors operating at such frequencies was within the knowledge of a person of ordinary skill in the art. Ex. 1072 ¶ 44. We are persuaded by Petitioner's argument.

We conclude that Petitioner has shown by a preponderance of the evidence that claims 13 and 26 are unpatentable under 35 U.S.C. § 103(a) over Gomez, Waight, Shen, Liou, and Chiu.

VI. ORDER

For the reasons given, it is:

ORDERED that based on a preponderance of the evidence, claims 1, 2, 5, 8, 12, 13, 20, 21, 25, 26, 31, 32, 35, and 36 of U.S. Patent No. 7,251,466 B2 are held to be unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Exclude Exhibits 1011 and 1072 is *denied*;

FURTHER ORDERED that, because this is a final written decision, parties to this proceeding seeking judicial review of our decision must comply with the notice and service requirements of 37 C.F.R. § 90.2.

Case IPR2014-00881

Patent 7,251,466 B2

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