

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

NXP USA., INC.,
Petitioner,

v.

IMPINJ, INC.,
Patent Owner.

IPR2020-00514
Patent 9,471,816 B1

Before BRIAN J. McNAMARA, ROBERT J. WEINSCHENK, and
KEVIN C. TROCK, *Administrative Patent Judges*.

McNAMARA, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Granting Patent Owner's Non-Contingent Motion to Amend
35 U.S.C. § 318(a)

I. BACKGROUND

On August 18, 2020, we instituted an *inter partes* review of claims 1, 3–6, 8, 10–13, 15, and 17–20 (the “challenged claims”) of U. S. Patent No. 9,471,816 B1 (“the ’816 patent”). Paper 7 (“Dec. to Inst.”). Impinj, Inc. (“Patent Owner”) filed a non-contingent Motion to Amend (“MTA”), cancelling the challenged claims and proposing substitute claims 22–36. Paper 14. NXP USA, Inc. (“Petitioner”) filed a Response to Patent Owner’s Non-Contingent Motion to Amend (Paper 19). On February 26, 2021, the panel entered its Preliminary Guidance (Paper 21) indicating the claims proposed in the Motion to Amend were likely not supported by the written description in the ’816 patent. Patent Owner filed a non-contingent Revised Motion to Amend. Paper 23 (“Rev’d. MTA”). Petitioner filed an Opposition to Patent Owner’s Revised Motion to Amend. Paper 25 (“Opp. to Rev’d. MTA” or “Opposition”). Patent Owner filed a Reply to Petitioner’s Opposition. Paper 31 (“Reply to Opp.” or “Reply”). Petitioner filed a Sur-reply to Patent Owner’s Reply. Paper 33 (“Pet. Sur-reply”). We conducted an oral hearing on June 21, 2021. A transcript of the oral hearing has been entered in the record. Paper 36 (“Hr’g. Tr.”)

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a). We base our decision on the preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d).

In the Motion to Amend and the Revised Motion to Amend, Patent Owner cancelled the challenged claims. *See* MTA 1; Rev’d. MTA 3. In the Revised Motion to Amend, Patent Owner proposes adding substitute claims 22–36. Having reviewed the arguments of the parties and the supporting evidence, we grant Patent Owner’s Revised Motion to Amend.

II. THE '816 PATENT

The '816 patent concerns a radio frequency identification (RFID) tag, typically attached to an object to track its location, that senses an interrogating radio frequency (RF) wave from a reader and transmits an RF response that may include encoded information back to the reader. *See generally* Ex. 1001, 1:1–50. Such tags typically have an antenna section, a power-management section, a logical section, and a memory. *Id.* at 1:59–61. RFID tags may be battery powered or powered solely from the RF signal they receive. *Id.* at 1:61–66.

The invention in the '816 patent relates to

an RFID tag tuning circuit capable of tuning the impedance matching between an RFID integrated circuit (IC) and an antenna on an RFID tag to increase the amount of power that the IC can extract from an incident RF wave. The tuning circuit tunes the impedance matching by adjusting a variable impedance coupling the antenna and the IC.

Id. at 2:12–18. Figure 6 of the '816 patent is reproduced below.

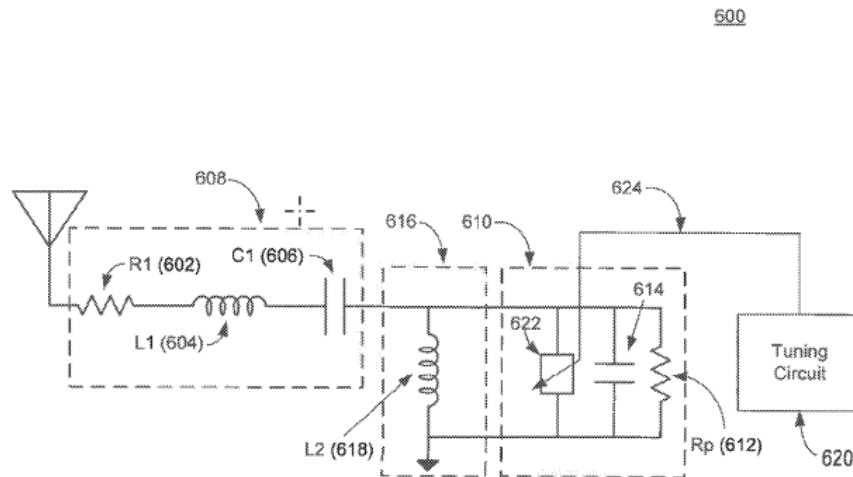


Figure 6 of the '816 patent

Figure 6 of the '816 patent illustrates front end tag equivalent circuit 600 including tuning circuit 620. *Id.* at 8:35–36. Matching network 616 couples

antenna section 608 to input section 610. *Id.* at 8:16–40. IC input section 610 includes resistor R_p (612), capacitor C_p (614), and tuning element 622 coupled to tuning circuit 620 via tuning control interface 624. *Id.* at 8:44–48.

To maximize power transfer between the antenna and IC in equivalent circuit 600, the reactance of inductor L_1 604 should be the complex conjugate of the reactance of capacitor C_1 606, and the reactance of inductor L_2 618 should be the complex conjugate of the reactance of IC input section 610. In this “matching” situation the equivalent circuit 600 reduces to the resistors R_1 602 and R_p 612 in series.

Id. at 8:52–57. RFID tags often operate over a range of frequencies, and because antenna and IC impedances vary as a function of frequency, a tag with a matching network that transfers maximum power at one frequency may not transfer maximum power at another frequency. *Id.* at 8:64–67. If there is an impedance mismatch between antenna 608 and IC 610, tuning circuit 620 can adjust or “tune” tuning element 622 to compensate using control interface 624. *Id.* at 9:14–18.

Figure 9 of the '816 patent is reproduced below.

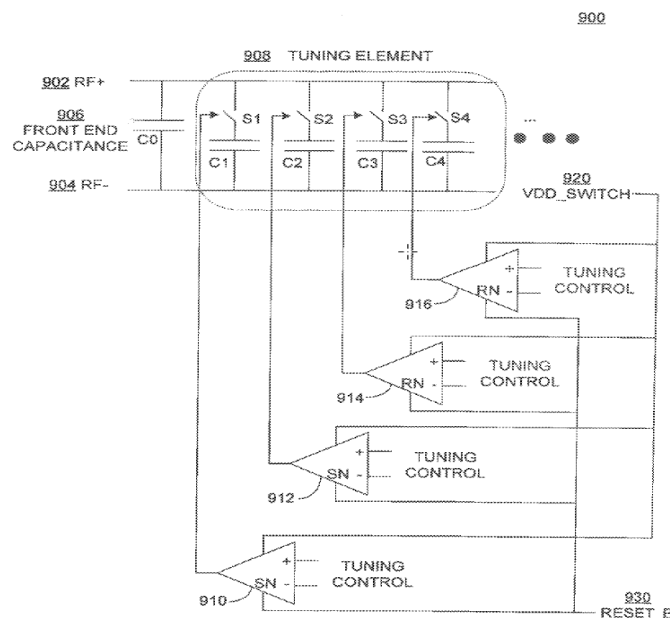


Figure 9 of the '816 patent

Figure 9 of the '816 patent illustrates how the effective impedance of tuning element 908 can be adjusted using switches S1–S4 to switch tuning devices e.g., capacitors C1–C4, into and out of tuning element 908. Ex. 1001, 12:1–13, 13:38–39.

Each of switches S1–S4 is controlled by a corresponding level shifter 910–916, each of which is connected to VDD_SWITCH (920), RESET_B (930) and tuning control inputs from tuning circuit 620. In one embodiment, in a first state for a first time period voltage 920 is high and voltage 930 is low, level shifters 910–916 ignore the control signals from tuning circuit, level shifters 910–912 (SN) default to output a high causing S1 and S2 to be closed (capacitors C1 and C2 switched in circuit), and level shifters 914–916 (RN) default to a low value causing switches S3 and S4 to be open (capacitors C3 and C4 switched out of circuit), such that the impedance is derived from C1 and C2 in conjunction with front end capacitance C0. *Id.* at 12:44–65. In a second state, voltage 920 and 930 are both high and level shifters 910–916 adjust their outputs, and consequently the impedance, by switching S1–S4 to engage or disengage C1–C4 in response to the control signals received from the tuning circuit. *Id.* at 12:66–13:7.

A component of the IC, such as a rectifier or the tuning circuit may put level shifters 910–916 into the first state for a first time period before tuning begins, and in the second state for a second time period after tuning has begun. *Id.* at 13:8–13. For example, if the IC component determines that the extracted power before tuning (EPBT) is below sufficient power to operate IC (SPOI), but at or above sufficient power to tune (SPTT), the IC can place level shifters 910–916 into the first state by setting voltage 920 high and voltage 930 low; when the tuning process begins, the IC

component can set voltage 930 high so that the level shifters respond to their tuning control signal inputs. *Id.* at 13:13–21. *See also* Fig. 10.

III. ILLUSTRATIVE CLAIM

Proposed substitute claim 22 is representative of the subject matter of the claims at issue. Substitute claim 22, as amended from cancelled claim 1, is shown below:

22. (Proposed substitute for claim 1) A Radio Frequency Identification (RFID) integrated circuit (IC) requiring a sufficient power to operate according to a protocol (SPOI), the IC comprising:

a ~~variable-impedance~~ tuning element comprising at least:

a first capacitor; and

a first switch coupled to the first capacitor;

a first level shifter coupled to the first switch;

a tuning circuit configured to tune the ~~variable-impedance~~ tuning element, the tuning circuit by providing a tuning control input to the first level shifter;

and

a rectifier coupled to the ~~variable-impedance~~ tuning element and configured to extract a power from an RF wave; wherein during a first time period in which an extracted power before tuning (EPBT) is less than the SPOI but at least equal to a sufficient power to tune (SPTT), the IC is configured to:

disable the tuning circuit; and

tune the ~~variable-impedance~~ tuning element to an initial impedance value by causing the first level shifter to output a default value; and

during a second time period after the first time period, the IC is configured to:

enable the tuning circuit; and

~~cause the tuning circuit to tune the variable-impedance~~ tuning element by causing the first level shifter to adjust its

output value in response to the tuning control input such that an extracted power after tuning (EPAT) is at least equal to the SPOI.

Rev'd. MTA, Appx. A, 1–2.

Proposed substitute claim 22 incorporating Patent Owner's amendments to cancelled claim 1 and paragraph designations used by Patent Owner in the Revised Motion to Amend is shown below:

22. [pre] A Radio Frequency Identification (RFID) integrated circuit (IC) requiring a sufficient power to operate according to a protocol (SPOI), the IC comprising:

[a] a tuning element comprising at least:

a first capacitor; and

a first switch coupled to the first capacitor;

[b] a first level shifter coupled to the first switch;

[c] a tuning circuit configured to tune the tuning element, the tuning circuit by providing a tuning control input to the first level shifter;

and

[d] a rectifier coupled to the tuning element and configured to extract a power from an RF wave; wherein during a first time period in which an extracted power before tuning (EPBT) is less than the SPOI but at least equal to a sufficient power to tune (SPTT), the IC is configured to:

disable the tuning circuit; and

tune the tuning element to an initial impedance value by causing the first level shifter to output a default value; and

[e] during a second time period after the first time period, the IC is configured to:

enable the tuning circuit; and

tune the tuning element by causing the first level shifter to adjust its output value in response to the tuning control input such that an extracted power after tuning (EPAT) is at least equal to the SPOI.

Rev'd. MTA 6–7.

IV. ASSERTED GROUNDS

Petitioner does not assert any prior art against the proposed substitute claims. *See* Opp. to Rev'd. MTA; Pet. Sur-reply; Hr'g. Tr. 7:10–13.

Petitioner contends that Patent Owner's Revised Motion to Amend improperly enlarges the scope of the claims and, therefore, fails to comply with the statutory and regulatory requirements for a motion to amend. Opp. to Rev'd. MTA 3–15. Petitioner further contends that proposed substitute claims 23, 24, 28, 29, 33, and 34 are indefinite. *Id.* at 15–19.

V. LEGAL STANDARD

In an *inter partes* review, amended claims are not added to a patent as a matter of right; rather, they must be proposed as a part of a motion to amend. 35 U.S.C. § 316(d). In reviewing a motion to amend, the Board assesses the patentability of the proposed substitute claims “without placing the burden of persuasion on the patent owner.” *Aqua Prods., Inc. v. Matal*, 872 F.3d 1290, 1328 (Fed. Cir. 2017) (en banc); *see Lectrosonics, Inc. v. Zaxcom, Inc.*, IPR2018-01129, Paper 15 at 3–4 (PTAB Feb. 25, 2019) (precedential).

Notwithstanding the foregoing, a patent owner's proposed substitute claims must meet the statutory requirements of 35 U.S.C. § 316(d) and the procedural requirements of 37 C.F.R. § 42.121. *Lectrosonics*, Paper 15 at 4–8. In particular, a patent owner must demonstrate: (1) the amendment proposes a reasonable number of substitute claims; (2) the proposed claims are supported in the original disclosure (and any earlier filed disclosure for which the benefit of a filing date is sought); (3) the amendment responds to a ground of unpatentability involved in the trial; and (4) the amendment does

not seek to enlarge the scope of the claims of the patent or introduce new subject matter. *See* 35 U.S.C. § 316(d); 37 C.F.R. § 42.121.

VI. ANALYSIS

A. Introduction

As Patent Owner's non-contingent Revised Motion to Amend cancels all of the challenged claims, we address only Patent Owner's proposed substitute claims 22–36. Rev'd, MTA, 1, App. A at 1. As noted above, Petitioner does not challenge the proposed substitute claims on prior art grounds. *See* Section IV; Hr'g. Tr. 6:15–7:2. In this section, we first address whether Patent Owner's Revised Motion to Amend satisfies the statutory and regulatory requirements associated with a motion to amend, including Petitioner's contentions that Patent Owner's Revised Motion to Amend fails because it enlarges the scope of the claims and that certain proposed substitute claims fail to respond to a ground of unpatentability. We then turn to Petitioner's arguments that some of the proposed substitute claims are indefinite.

B. Statutory and Regulatory Requirements

Patent Owner argues that the Revised Motion to Amend satisfies the statutory and regulatory requirements associated with a motion to amend because: (1) the motion proposes one substitute claim for each challenged claim, which is a reasonable number of substitute claims, Rev'd. MTA 4; (2) the proposed substitute claims have written description support and do not propose new matter, *id.* at 5–14; (3) the amendment responds to a ground of unpatentability, *id.* at 14; and (4) the proposed substitute claims do not enlarge the scope of the original claims of the '816 patent, *id.* at 15–16. Petitioner provides no arguments against most of the statutory and regulatory requirements, arguing only that the proposed substitute claims

enlarge the scope of the original claims and that proposed substitute claims 26, 31, and 36 fail to respond to a ground of unpatentability. Opp. to Rev'd. MTA 3–15. We address these issues below. Having reviewed the record, we agree with Patent Owner that the Revised Motion to Amend meets all of the other statutory and regulatory requirements associated with a motion to amend for the reasons Patent Owner sets forth in its motion.

1. The Scope of the Proposed Substitute Claims

A patent owner bears the burden of persuasion to show by a preponderance of the evidence that a motion to amend does not seek to enlarge the scope of the claims of the patent. 37 C.F.R §§ 42.121(a)(2)(ii), 42.121(d)(1) (2019). Patent Owner argues that the proposed substitute claims do not enlarge the scope of the original claims. Rev'd. MTA 15–16. Petitioner asserts that Patent Owner's Revised Motion to Amend fails because it enlarges the scope of the patent claims in three ways: (1) by replacing the term “variable impedance” with a broader term, i.e., “tuning element,” (2) by removing limitations requiring the tuning circuit to tune the tuning element, and (3) by proposing other wholesale changes to the claims. *See generally* Opp. to Rev'd. MTA; Pet. Sur-reply.

a) The recitation of a “tuning element”

According to Petitioner, all of the proposed substitute claims are impermissibly broader because all of the substitute claims replace the term “variable impedance” with “tuning element.” Opp. to Rev'd. MTA 4. Petitioner argues that, because a variable impedance is a particular type of tuning element, Patent Owner's replacement of “variable impedance” with “tuning element” broadens the scope of the claims. *Id.* at 5.

Patent Owner contends that the proposed substitute claims are not broader because they replace “variable impedance” with a narrower

limitation, i.e., a “tuning element comprising at least a first capacitor and a switch coupled to the first capacitor.” Rev’d. MTA 15. Petitioner responds that narrowing a claim in certain respects, e.g., by reciting a capacitor and a switch, does not preclude the broadening of the claim because a person of ordinary skill would understand that the terms “variable impedance” and “tuning element” are not equivalent. Opp. to Rev’d. MTA 6–7. According to Petitioner, as an example that “tuning element” is broader than “variable impedance,” a person of ordinary skill would understand “tuning element” to encompass “an active load-pull system that uses a vector modulator and phase locked source for tuning, and not a variable impedance.” *Id.* at 7 (citing Ex. 2012 (sic), Second Supplemental Declaration of Dr. Daniel van der Weide (“van der Weide Supp. Decl. II”) ¶¶ 30–34 (discussing Ex. 1013¹)).

According to Patent Owner, “the specification consistently describes the tuning element as having multiple impedance values or settings that can be tuned, adjusted, or set.” Reply to Opp. 2 (citing Ex. 1001, 9:18–41, 10:47–61). Patent Owner explains that the ’816 patent describes the tuning element as having an initial impedance value prior to tuning and adjusting impedance during the tuning process. *Id.* at 2–3 (citing Ex. 1001, 10:62–11:2 as disclosing the tuning element 622 is configured to have an impedance value near the center of its range before beginning the tuning process and being adjustable up or down). Patent Owner also argues that “all instances in the patent identify the tuning element as providing a variable impedance with no teachings or suggestions that its scope is larger

¹ Caroline Arnaud et al., *Comparison of Active and Passive Load-Pull Test Benches*,” 57th ARFTG Conference Digest (2001) (Ex. 1013) (“Arnaud”).

than the scope of a variable impedance.” Reply 3 (citing Ex. 2003, Declaration of Dr. Gregory Durgin (“Durgin Decl.”) ¶¶ 22–28).

Petitioner does not identify any disclosure in the ’816 patent that describes the claimed tuning element in any context other than as a variable impedance. Instead, Petitioner cites an article concerning microwave device testing that compares passive load-pull techniques to active load-pull techniques that synthesize variable loads. Opp. to Rev’d. MTA 7 (citing Ex. 2012 (sic), van der Weide Suppl. Decl. ¶¶ 30–34); Pet. Sur-reply 5. Petitioner asserts that a person of ordinary skill would understand such active load pull techniques include tuning elements that are not variable impedances. Opp. to Rev’d. MTA 7; Pet. Sur-reply 5 (citing Ex. 1012, van der Weide Suppl. Decl. II ¶ 33).

In his discussion of Arnaud, Dr. van der Weide states that “[a]n active load (vs. the more common passive load) uses an active (*e.g.*, bias powered) device, such as a transistor amplifier, in combination with vector (amplitude and phase) modulation to present a specific wave to the port of a network.” Ex. 1012, van der Weide Suppl. Decl. II, at 10, n. 1. Dr. van der Weide testifies Arnaud discloses an active load-pull system that “enables tuning of microwave circuits by synthesizing loads . . . beyond what a passive variable impedance could offer.” *Id.* ¶ 30.

Arnaud concerns load-pull test benches used to evaluate the characteristics of devices under test and states it “presents the evolutions to apply the load-pull characterization techniques issued from the research to the industrial world.” Ex. 1013, Abstract (noting “[t]his application involves choices to make.”). After describing an active load-pull bench, Arnaud notes that “a commercial load-pull based on the use of a tuner is more adapted for industrial high power application,” that “such a tuner is a passive

device,” and that “one of the most advantages of this bench compared to the active load-pull bench is its ability to synthesize impedance corresponding to the final application.” *Id.* at 2. Arnaud concludes: “A passive harmonic load-pull characterization bench based on tuner use as this one of ST corresponds to a good compromise between capabilities and performance.” *Id.* at 3.

The active load-pull technology discussed in Arnaud is not mentioned in the ’816 patent, and Petitioner’s citation of Arnaud provides no context relative to the ’816 patent.² We find persuasive the testimony of Patent Owner’s expert, Dr. Durgin, that a person of ordinary skill would recognize the use of an active loop would be ill suited to an RFID tag where power is at a premium and that a person of ordinary skill would not consider the Arnaud paper as relevant to understanding the term “tuning element” in the ’816 patent. Ex. 2003, Durgin Decl. ¶ 33.

The ’816 patent states, “[t]he tuning circuit tunes the impedance matching by adjusting a variable impedance coupling the antenna and the IC” to maximize power transfer to the IC. Ex. 1001, 2:16–18, 8:9–17. According to the ’816 patent, “[t]o ensure that as much of the RF power incident on the antenna is transferred to the IC, the source (antenna impedance) should be the complex coordinate of the load (IC) impedance.” *Id.* at 8:21–24.

² For example, Dr. van der Weide asserts that active loads “are not ‘variable impedances’ as recited in the original claims of the ’816 patent.” Ex. 1012 ¶ 33. But Dr. van der Weide does not cite any specific portion of the ’816 patent that limits the term “variable impedance” to just passive loads. *See id.* ¶¶ 30–34. In fact, Dr. van der Weide acknowledges that both active and passive loads are “variable.” *Id.* ¶ 33.

The '816 patent explains that “the impedance of the tuning element 622 in circuit 600 can be adjusted using tuning circuit 620 (via tuning control interface 624)” and that “if there is an impedance mismatch between antenna 608 and IC 610 then tuning circuit 620 can adjust or tune tuning element 622 to compensate.” Ex. 1001, 9:14–18. We understand “can” in this context to explain how tuning element 622 is adjusted, i.e., by adjusting the impedance of tuning element 622 using tuning circuit 620. In some embodiments, tuning circuit 620 determines the peak voltages or extracted power for different impedance settings of tuning element 622 and determines the impedance setting corresponding to the highest peak voltage or extracted power; in other embodiments, tuning circuit 620 determines the impedance setting corresponding to a peak voltage or extracted power that is at least sufficient to power IC 610. *Id.* at 9:15–30. In any of the embodiments, tuning circuit 620 determines the impedance setting and adjusts the impedance of tuning element 622 accordingly. Further explanations in the '816 patent that tuning element 622 “may” be implemented as a continuously variable element or a switched element using combinations of resistors, capacitors, inductors, and variable length transmission lines, do not alter the fact that the only embodiments disclosed in the '816 patent all involve variable impedance.³

We also note that at the oral hearing Patent Owner disclaimed any meaning to “tuning element” other than a variable impedance. Hr’g. Tr. 40:4–12. Although Patent Owner’s disclaimer at the hearing is not

³ Further, proposed substitute claim 22 recites “a tuning element comprising at least: a first capacitor; and a first switch coupled to the first capacitor.” Rev’d. MTA, Appx. A at 1. Petitioner acknowledged at the oral hearing that a switch capacitor is a variable impedance. Hr’g. Tr. 23:9–15.

necessarily determinative, it is consistent with our understanding of the evidence before us.

Having considered the evidence and arguments of the parties, we find that Patent Owner has demonstrated its use of the term “tuning element” in the substitute claims does not enlarge the scope of the claims.

b) The requirement of the tuning circuit to tune the tuning element

Petitioner notes that original claims 1 and 15, although of different scope, both recite a first time period during which the RFID IC is set to a first impedance value without the use of the tuning circuit and a second, subsequent, time period during which the IC enables the tuning circuit and causes the tuning circuit to tune the variable impedance. Opp. to Rev’d. MTA 8–10. According to Petitioner, proposed substitute claim limitation 22(e) broadens the scope of the claims because, although the tuning element is tuned during the second time period, “the tuning circuit need not be involved at all in the tuning during the second time period.” *Id.* at 10–11. According to Petitioner, “[w]hereas the original claims required the ‘tuning circuit’ to perform the action of tuning, the proposed substitute claims accomplish the tuning by requiring the first level shifter to ‘adjust its output value’” without requiring involvement of the tuning circuit. *Id.* at 11. Petitioner contrasts the original claims as requiring the tuning circuit to do something, i.e., adjust the variable impedance, with the substitute claims as merely requiring the tuning circuit be enabled. *Id.* at 12–14.

Patent Owner notes that proposed substitute claim 22 recites “a tuning circuit configured to tune the tuning element by providing a tuning control input to the first level shifter.” Reply to Opp. 7. Patent Owner explains that claim limitation 22[e] recites “during a second time period after the first

time period, the tuning circuit is enabled and the tuning element is tuned by causing the first level shifter to adjust its output value *in response to the tuning control input.*” *Id.* at 8. Patent Owner further notes that the antecedent basis for the tuning control input of claim limitation 22[e] is found in claim limitation 22[c], which recites “a tuning circuit configured to tune the tuning element, by providing a tuning control input to the first level shifter.” *Id.* As a result, the first level shifter tunes the tuning element in response to the tuning control input from the tuning circuit.

Patent Owner maintains that because claim 22 recites (i) the tuning circuit is configured to tune the tuning element by providing a tuning control input to the first level shifter, (ii) during the second time period the tuning circuit is enabled and, (iii) the tuning element is tuned by causing the first level shifter to adjust its output in response to the tuning control input provided by the tuning circuit, claim 22 is actually narrower than the original claims. *Id.* at 7–9.

We need not decide whether proposed substitute claim 22 is narrower than the original claim it replaces; we need only decide whether the proposed substitute claims seek to broaden the scope of the original claims of the patent. We are persuaded that Patent Owner has shown proposed substitute claim 22 does not broaden the scope of the claims of the patent. Contrary to Petitioner’s assertion that proposed substitute claim 22 expands the scope of the original claims because it does not require the tuning circuit do anything during the second time period, we find that claim 22 requires the tuning circuit to provide a tuning control input signal to the level shifter that causes the level shifter to adjust its output, thereby causing the tuning element to respond, i.e., the tuning element varies the impedance accordingly.

c) Wholesale changes that allegedly enlarge the scope of the claims of the patent

Petitioner contends that proposed substitute dependent claims 26, 31, and 36, which substitute for original claims 6, 13, and 20, are further broadened because they recite tuning the tuning element to an initial value by providing a reset voltage to the first and second level shifters, and delete limitations that recite tuning the varying impedance to an initial value using a zero gate voltage switch that includes at least one of a junction FET and a floating gate transistor including a gate. Opp. to Rev'd. MTA 15.

Patent Owner replies by asserting that Petitioner's argument fails because the requirement of 35 U.S.C. § 316(d)(3) is not that the substitute claim cannot enlarge the scope of the claim it replaces, but that it cannot enlarge the scope of the claims of the patent. Reply to Opp. 9–10 (citing *SZ DJI Tech. Co. v. Autel Robotics USA LLC*, IPR2019-00846, Paper 33, 20-21 (PTAB Sept. 22, 2020) as rejecting an argument that dependent claims enlarged the scope of the patent claims where they depended from independent claims that did not enlarge the scope). Patent Owner also cites the Manual of Patent Examining Procedure as explaining in the context of a reissue application that an amendment to a dependent claim does not broaden the scope of claim of the patent where the independent claim was not broadened. *Id.* (citing MPEP 1412.03(II)). As discussed above, the proposed substitute dependent claims depend from independent claims that do not enlarge the scope of the claims of the patent. We agree with Patent Owner that dependent proposed substitute claims 26, 31, and 36 do not enlarge the scope of the claims of the patent. *See SZ DJI Tech. Co.*, IPR2019-00846, Paper 33, 20–21.

2. *Responsive to a Ground of Unpatentability*

Patent Owner asserts that the “proposed substitute claims are responsive to a ground of institution because they distinguish the El Waffaoui prior art of record. More specifically, the substitute claims recite a structure and method that is not disclosed in the El Waffaoui references, including the use of a level shifter with a tuning circuit to create the default impedance.” Rev’d. MTA 14.

Petitioner contends that proposed substitute claims 26, 31, and 36 fail to respond to a ground of unpatentability and that Patent Owner has not responded to its contention that these claims fail to respond to a ground of unpatentability. Opp. to Rev’d. MTA 15; Pet. Sur-reply 11. Original claims 1, 3–5, 8, 10–12, 15, 17–19 were challenged as unpatentable over El Waffaoui ’016⁴ and El Waffaoui ’279.⁵ Pet. 11–70. Original claims 6, 13, and 20 were challenged in further view of El Waffaoui ’729.⁶ Pet. 70–81. Petitioner does not contend that any of the proposed substitute claims is unpatentable over the prior art. *See* Section IV.

As discussed above, in response to our Preliminary Guidance, Patent Owner’s Revised Motion to Amend proposes revisions to the independent substitute claims from which claims 26, 31, and 36 depend. Proposed substitute claims 26, 31, and 36 in the Revised Motion to Amend are substantially the same as those Patent Owner proposed in its Motion to Amend. *Compare* MTA, App. A, *with* Rev’d. MTA App. A. In the Motion to Amend, Patent Owner explained that the proposed substitute dependent claims are responsive to a ground of unpatentability arguing that, because

⁴ U.S. Patent No. 8,730,016 B2, issued May 20, 2014 (Ex. 1003).

⁵ U.S. Patent No. 7,944,279 B1, issued May 17, 2011 (Ex. 1004).

⁶ U.S. Patent No. 9,430,729 B2, issued Aug. 30, 2016 (Ex. 1005).

the references do not disclose or render obvious the elements of the independent claims, they do not disclose or render obvious the elements of the dependent claims. MTA 18. Patent Owner further argued that the proposed substitute dependent claims add additional distinctions not disclosed in El Waffaoui. *Id.* at 18–19. In particular, Patent Owner argued that “dependent claim 26 provides that the IC tunes the tuning element to the initial impedance value by providing a reset voltage to the first and second level shifters.” *Id.* at 19.

A Motion to Amend may be denied where “[t]he amendment does not respond to a ground of unpatentability involved in the trial.” 37 C.F.R. § 42.121(a)(2)(i) (2019). The burden of persuasion to show that the motion to amend complies with the requirements of this paragraph lies with Patent Owner. *Id.* § 42.121(d)(1). The statute does not require that each claim be amended in a particular way or recite specific language. The statute requires that the amendment respond to a ground of unpatentability involved in the trial. As discussed above, Patent Owner has asserted that the amendments in proposed substitute claim 26 (and similar proposed substitute claims 31 and 36) recite features not disclosed in the El Waffaoui references. Petitioner does not dispute that claims as amended distinguish over the combination of the references. *See* Section V.

In consideration of the above, we are persuaded that Patent Owner has demonstrated that proposed substitute claims 26, 31, and 36 are responsive to a ground of unpatentability involved in the trial.

C. Indefiniteness

Petitioner contends that proposed claims 23, 24, 28, 29, and 34 are indefinite because they recite a “high-voltage supply.” Opp. to Rev’d. MTA 15. According to Petitioner, “high-voltage supply” is indefinite because it is

a subjective term of degree with no objective boundaries for those of skill in the art. *Id.* at 15–16. Petitioner argues that “high-voltage supply” is not a term of art with a common, accepted meaning in the field of RFID systems. *Id.* at 16 (citing Ex. 1012, van der Weide Supp. Decl. II). Petitioner notes that Patent Owner cites as support for this amendment portions of the Provisional Application describing VDD_SWITCH voltage 920, which corresponds to voltage 820 provided to the output of the rectifier stage. Opp. 18. According to Petitioner, because the cited disclosure does not provide example voltages that can be used, it does not clarify the scope of the term “high-voltage supply.” *Id.* at 19.

Patent Owner argues that “high-voltage supply” is not indefinite and provides a person of ordinary skill sufficient clarity and clear objective boundaries when viewed in the context of the remaining claim limitations and the detailed description. Reply to Opp. 10–11 (citing *Sonix Tech. Co., Ltd. v. Pubs. Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017)). Patent Owner argues that proposed substitute claim 23 “makes it clear that the high-voltage supply is a voltage supply for providing a voltage used by the first level shifter to output the default value.” *Id.* at 11. Patent Owner notes that Figure 8 of the ’816 patent discloses a multi-stage rectifier configured such that each stage provides an output voltage between 100 and 500 millivolts higher than the preceding stage and that lower voltage 810 from preceding stage 806 powers other circuits associated with the IC. *Id.* Nevertheless, Petitioner contends that a person of ordinary skill could not easily find out a value for voltage 810 with reasonable certainty. Pet. Sur-reply 11–12.

We are not persuaded by Petitioner’s argument because the absolute values of the voltages depend upon the circuit’s implementation. We agree

with Patent Owner that the '816 patent provides sufficient context for a person of ordinary skill to understand the limits of “high-voltage supply” as used in the proposed substitute claims. As Patent Owner points out, Figure 8 depicts a multi-stage rectifier 800 in which the highest voltage stage 808 is a tuning switch stage that provides voltage output 820 for pre-tuning adjustment, i.e., to set the initial value of the tuning element. Reply to Opp. 11–12 (citing Ex. 1001, 11:30–56). The '816 patent explicitly discloses that each rectifier stage 802, 804, 806, and 808 is connected in series, with larger output voltages at each successive stage. Ex. 1001, 11:36–43. The Specification also states that highest voltage 810 from stage 808, which drives the first level shifter to set the initial impedance, and voltage 820 that drives the rest of the IC may be separated from each other by more than one rectifier stage. Thus, taken in context, we find that “high-voltage supply” as used in the proposed substitute claims is sufficiently clear to a person of ordinary skill and is not indefinite.

VII. CONCLUSION

All the challenged claims have been cancelled by Patent Owner. None of the proposed substitute claims are challenged based on prior art, and we are not persuaded that any of the proposed substitute claims are indefinite. Having considered the evidence and arguments of the parties, we conclude that Patent Owner has demonstrated proposed substitute claims 22–36 meet the statutory and regulatory requirements, and we GRANT Patent Owner’s non-contingent Revised Motion to Amend.

In summary:

Motion to Amend Outcome	Claim(s)
Original Claims Cancelled by Amendment	1, 3–6, 8, 10–13, 15, 17–20
Substitute Claims Proposed in the Amendment	22–36
Substitute Claims: Motion to Amend Granted	22–36
Substitute Claims: Motion to Amend Denied	
Substitute Claims: Not Reached	

VIII. ORDER

In consideration of the above it is:

ORDERED that Patent Owner’s request in its non-contingent Revised Motion to Amend to cancel claims 1, 3–6, 8, 10–13, 15, and 17–20 is GRANTED;

FURTHER ORDERED that Patent Owner’s non-contingent Revised Motion to Amend adding substitute claims 22–36 is GRANTED; and

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

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Patent 9,471,816 B1

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