

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

ANKER INNOVATIONS LTD.,
Petitioner,

v.

POWERMAT TECHNOLOGIES LTD.,
Patent Owner

Case: IPR2024-00995

U.S. Patent No. 9,083,204

**PATENT OWNER'S RESPONSE TO PETITION FOR *INTER PARTES*
REVIEW OF U.S. PATENT NO. 9,083,204**

Mail Stop **Patent Board**
Patent Trial and Appeal Board
U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

TABLE OF CONTENTS

	Page
I. INTRODUCTION	1
II. BACKGROUND	2
A. Overview of the '204 Patent.....	2
B. Patent Prosecution History	7
C. Summary of Petitioner's Proposed Grounds for Unpatentability	13
D. The Relied-Upon References	14
1. Onishi (EX1004)	14
2. Purdy (EX1005)	17
3. Baarman392 (EX1006)	18
4. Tocci (EX1009).....	20
III. PERSON OR ORDINARY SKILL IN THE ART	21
IV. CLAIM CONSTRUCTION	22
A. "transmission frequency substantially different from said characteristic resonant frequency of said inductive couple"	22
1. The Board's Preliminary Construction	22
2. The term "non-resonant transmission frequency [that is] substantially different from said characteristic resonant frequency," as recited in claim 1, should be further construed to allow for some incremental change (increase or decrease) in frequency while remaining in the near- linear regions of the frequency amplitude graph.	23
B. "provide [less/more] power by [increasing/decreasing] said non-resonant transmission frequency by an incremental value" / "[reducing/increasing] said non-resonant transmission frequency by an incremental value [df1/+df2]"	28

1.	The Board’s Preliminary Decision to Institute Review of the ’204 Patent	28
2.	“provide [less/more] power by [increasing/decreasing] said non-resonant transmission frequency by an incremental value” and “[reducing/increasing] said non-resonant transmission frequency by an incremental value [df1/+df2]” should be interpreted consistent with their plain and ordinary meanings.....	30
V.	LEGAL STANDARD	34
VI.	THE PETITION FAILS TO DEMONSTRATE BY A PREPONDERANCE OF THE EVIDENCE THAT ANY CHALLENGED CLAIM IS UNPATENTABLE	36
A.	Ground 1A: Petitioner Fails to Establish that Claims 1-6, 8, and 10-13 are Anticipated by Onishi	36
1.	Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [1.2]	36
2.	Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [1.5]	43
3.	Petitioner Fails to Demonstrate that Onishi Anticipates Limitations [1.7] and [1.8]	55
4.	Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [10.1]	62
5.	Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [13]	62
B.	Ground 1B: Petitioner Fails to Establish that Claims 1-6, 8, and 10-13 are Rendered Obvious by Onishi in View of Purdy	63
C.	Ground 2: Petitioner Fails to Establish that Claims 1-6, 8, and 10-13 are Rendered Obvious by Baarman ³⁹² in View of Tocci.....	63
1.	Barrman ³⁹² and Tocci Do Not Render Obvious Claim Element [1.5].....	63

Case IPR2024-00995
Patent No. 9,083,204
Patent Owner Response

2.	Barrman392 and Tocci Do Not Render Obvious Claim Element [1.7].....	68
3.	Barrman392 and Tocci Do Not Render Obvious Claim Element [1.8].....	70
4.	Barrman392 and Tocci Do Not Render Obvious Claim Element [10.1].....	71
5.	Baarman392 and Tocci Do Not Render Obvious Claim Element [13].....	72
VII.	CONCLUSION.....	73

TABLE OF AUTHORITIES

Cases	Page(s)
<i>Connell v. Sears Roebuck & Co.</i> , 722 F.2d 1542 (Fed. Cir. 1983)	35
<i>E.I. DuPont de Nemours & Co. v. Synvina C.V.</i> , 904 F.3d 996 (Fed. Cir. 2018)	35
<i>Graham v. John Deere Co. of Kansas City</i> , 383 U.S. 1 (1966)	35
<i>Hockerson-Halberstadt, Inc. v. Avia Group Int'l</i> , 222 F.3d 951 (Fed. Cir. 2000)	47
<i>In re Wright</i> , 596 F.2d 1124 (C.C.P.A. 1977)	47
<i>Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.</i> , 821 F.3d 1359 (Fed. Cir. 2016)	35
<i>KSR Int'l Co. v. Teleflex Inc.</i> , 550 U.S. 398 (2007)	35
<i>Medichem, S.A. v. Rolabo, S.L.</i> , 437 F.3d 1157 (Fed. Cir. 2006)	35
<i>Net MoneyIN, Inc. v. VeriSign, Inc.</i> , 545 F.3d 1359 (Fed. Cir. 2008)	34
<i>Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.</i> , 853 F.3d 1272 (Fed. Cir. 2017)	42
<i>White v. H.J. Heinz Co.</i> , 640 F. App'x 930 (Fed. Cir. 2016)	47
<i>W.L. Gore & Assocs., Inc. v. Garlock, Inc.</i> , 721 F.2d 1540 (Fed. Cir. 1983)	42

Statutes

35 U.S.C. § 102	13, 34
35 U.S.C. § 103	8, 13, 35
35 U.S.C. § 112	8
37 C.F.R. § 42.65(a)	1

PATENT OWNER’S EXHIBIT LIST

Exhibit No.	Description
2001	Expert Declaration of Patrick P. Mercier, Ph.D.
2002	U.S. Pub. No. 2009/0174263 (“Baarman263”)
2003	Defendant’s First Amended Invalidity Contentions of U.S. Patent No. 9,083,204 in view of US2008/0079392A1, <i>Powermat Technologies Ltd. v. Anker Innovations Ltd.</i> , Case No. 5-23-cv-00052 (E.D. Tex.), Apr. 18, 2024.
2004	Defendant’s First Amended Invalidity Contentions of U.S. Patent No. 9,083,204 in view of 2009/0174263, <i>Powermat Technologies Ltd. v. Anker Innovations Ltd.</i> , Case No. 5-23-cv-00052 (E.D. Tex.), Apr. 18, 2024.
2005	U.S. Patent No. 5,455,467 (“Young”)
2006	The American Heritage Dictionary of the English Language (Houghton Mifflin Co., 4th ed. 2006)
2007	Collins English Dictionary (HarperCollins Pub., 7th ed. 2005)
2008	Wiley Electrical and Electronics Engineering Dictionary (John Wiley & Sons, Inc., IEEE Press 2004)
2009	Expert Declaration of Patrick P. Mercier, Ph.D., May 21, 2025
2010	Deposition Transcript of Gary L. Woods, Ph.D., Feb. 20, 2025
2011	The American Heritage Dictionary of the English Language (Houghton Mifflin Co., 4th ed. 2002)
2012	Webster’s II Dictionary (Houghton Mifflin Co., 3rd ed. 2005)
2013	Deposition Transcript of Gary L. Woods, Ph.D., May 16, 2025
2014	Math Centre, <i>Symbols</i> (June 4, 2023)

LISTING OF CHALLENGED CLAIMS¹

Claim Element	Claim Text
[1.P]	An inductive power transfer system comprising
[1.1]	at least one inductive power outlet comprising at least one primary inductive coil wired to a power supply via a driver;
[1.2]	said primary inductive coil for forming an inductive couple having a characteristic resonant frequency with at least one secondary inductive coil wired to an electric load,
[1.3]	said secondary inductive coil associated with an inductive power receiver
[1.4]	wherein said driver is configured to provide a driving voltage across said primary inductive coil,
[1.5]	said driving voltage oscillating at a non-resonant transmission frequency substantially different from said characteristic resonant frequency of said inductive couple,
[1.6]	wherein said inductive power outlet further comprises a signal detector adapted to detect a first signal and a second signal, and
[1.7]	said driver is configured to: provide less power by increasing said non-resonant transmission frequency by an incremental value when said first signal is detected by the detector, and
[1.8]	provide more power by decreasing said non-resonant transmission frequency by an incremental value when said second signal is detected by the detector.
[2]	The system of claim 1 said signal detector being configured to adjust said transmission frequency in response to feedback signals.
[3]	The system of claim 2 wherein said feedback signals carry data pertaining to the operational parameters of said electric load.

¹ For convenience purposes only, Patent Owner adopts for this Response the numbering of claim limitations advanced by Petitioner in the Petition (Paper 2). Patent Owner does not concede the appropriateness of such grouping and numbering of claim limitations.

Claim Element	Claim Text
[4]	The system of claim 3 wherein said operational parameters are selected from the group consisting of: required operating voltage for said electric load; required operating current for said electric load; required operating temperature for said electric load; required operating power for said electric load; measured operating voltage for said electric load; measured operating current for said electric load; measured operating temperature for said electric load; measured operating power for said electric load; power delivered to said primary inductive coil; power received by said secondary inductive coil; and a user identification code.
[5]	The system of claim 1 wherein said signal detector is selected from the list comprising optical detectors, radio receivers, audio detectors and voltage peak detectors.
[6]	The system of claim 1 wherein said driver further comprises a voltage monitor for monitoring the amplitude of a primary voltage across said primary coil.
[8]	The system of claim 1 comprising a power converter selected from the group comprising: a transformer, a DC-to-DC converter, an AC-to-DC converter, an AC-to-AC converter, a flyback transformer, a flyback converter, a full-bridge converter, a half-bridge converter and a forward converter.
[10.P]	A method for regulating inductive power transmission from a primary inductive coil, wired to a power supply via a driver, to a secondary inductive coil, wired to an electric load, said method comprising the following steps:
[10.1]	providing an oscillating voltage to said primary inductive coil at an initial transmission frequency f_t substantially different from a characteristic resonant frequency f_R of the system;
[10.2]	inducing a secondary voltage in said secondary inductive coil;
[10.3]	monitoring power received by said electric load;
[10.4]	sending a feedback signal when the monitored power deviates from a predetermined range;
[10.5]	said driver receiving said feedback signal; and
[10.6]	said driver adjusting said non-resonant transmission

Claim Element	Claim Text
	frequency.
[11]	The method of claim 10 wherein the step of sending a feedback signal further comprises: sending a feedback signal of a first type Sa to said driver, whenever said power drops below a predetermined lower threshold, and sending a feedback signal of a second type Sb to said driver, whenever said power exceeds a predetermined upper threshold.
[12]	The method of claim 10 wherein said initial non-resonant transmission frequency f_t is higher than the characteristic resonant frequency f_R .
[13]	The method of claim 10 wherein the step of said driver adjusting said non-resonant transmission frequency further comprises: said driver reducing said non-resonant transmission frequency by an incremental value df_1 when the received feedback signal is of the first type Sa, and said driver increasing said non-resonant transmission frequency by an incremental value $+df_2$ when the received feedback signal is of the second type Sb.

I. INTRODUCTION

Petitioner challenges the patentability of claims 1-6, 8, and 10-13 (the “challenged claims”) of U.S. Patent No. 9,083,204 (“the ’204 Patent”). Petitioner has failed to establish that the challenged claims are rendered obvious by any of the four asserted grounds.

Specifically, none of the cited references alone or in combination disclose or suggest the arrangement of each element of claims 1-7 and 9-14. Moreover, the Petition is filled with conclusory statements that are neither bolstered nor supported by Dr. Gary Woods’ declaration, which simply parrots Petitioner’s conclusions without additional analysis or evidence. *See* 37 C.F.R. §42.65(a).

For example, Petitioner has failed to demonstrate, among other things: (1) that the cited references alone or in combination disclose or suggest a driving circuit that is configured and operable to produce an oscillating driving voltage at a transmission frequency substantially different from the characteristic resonant frequency of an inductive couple; (2) that the cited references alone or in combination disclose or suggest a driving circuit that is configured and operable to produce, in response to a signal, less power by increasing a transmission frequency by an incremental value or more power by decreasing the transmission frequency by an incremental value;

and (3) that a person of skill would be motivated to combine the teaching of the cited references and a reasonable expectation that the combination would be successful.

Accordingly, Petitioner has failed to meet its burden of showing that any of the challenged claims are unpatentable.

II. BACKGROUND

A. Overview of the '204 Patent

The '204 Patent, entitled “Transmission-Guard System and Method for an Inductive Power Supply,” is generally directed to an inductive power transmission system. EX1001, 2:43-44. As an example, an inductive power outlet may include a primary inductive coil connected to a power supply, and a driver configured to apply an oscillating voltage across the primary coil. *See, e.g.*, EX1001, 1:27-32. When an inductive power receiver is properly aligned with the power outlet, the primary coil may form an inductive couple with a secondary coil contained in the power receiver. *See, e.g.*, EX1001, 1:32-34, Claim 1 (28:25-45).

The '204 Patent discloses the selection of the transmission frequency f_t within linear or near-linear regions of a frequency-amplitude curve (per Figure 6b below), apart from the resonance frequency f_R (or peak) of the inductive couple. *Id.* at 21:56-57.

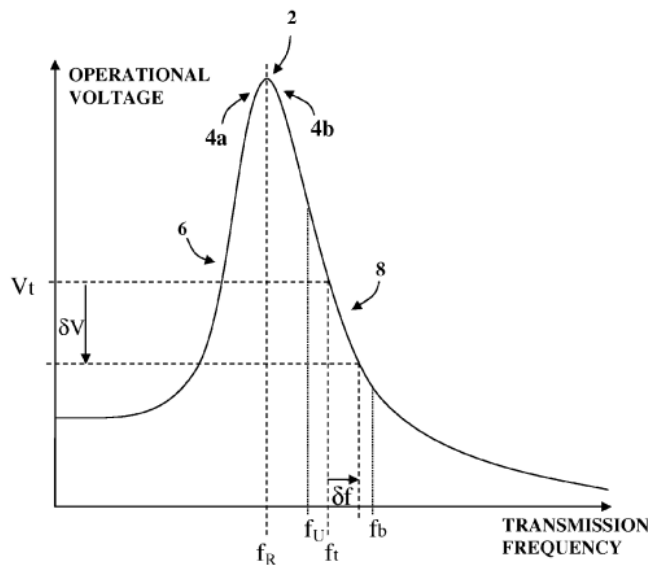


Fig. 6b

Id. at Fig. 6b.

The '204 Patent explains that “voltage is at its highest when the transmission frequency is equal to the resonant frequency f_R .” *Id.* at 21:3-4. But, this also means that “the slope of [a frequency amplitude graph] is steepest in the regions 4a, 4b to either side of the resonance peak . . .” *Id.* at 21:6-8. Accordingly, “a small variation in frequency results in a large change in induced voltage,” and “prior art inductive systems [were] typically very sensitive to small fluctuations in environmental conditions or variations in alignment between the induction coils.” *Id.* at 21:9-15.

Accordingly, the '204 Patent proposes, among other things, an inductive power transmission system that includes a driver “configured and operable to transmit a driving voltage which oscillates at a transmission frequency which is **substantially different** from the resonant frequency of the inductive couple.” *Id.* at

21:17-20 (emphasis added). With reference to Figure 6b, the '204 Patent explains that “[p]referably the transmission frequency is selected to lie within one of the near-linear regions 6, 8 where the slope of the frequency-amplitude graph is less steep.” *Id.* at 21:20-23.

The '204 Patent explains that one of the advantages of non-resonant transmission “is that the transmission frequency may be used to regulate power transfer,” as compared with “known inductive power transfer systems” in which power is “regulated by altering the duty cycle of transmission voltage provided by the driver.” *Id.* at 21:47-51. The '204 Patent further explains that the driver in the power outlet “may be configured to adjust the transmission frequency in order to regulate power transfer.” *Id.* at 21:52-55.

In this regard, the '204 Patent proposes a power outlet containing a driver configured to adjust the transmission frequency in a linear (or near-linear) manner to predictably regulate power transfer. *See* EX2009, ¶57. The '204 Patent therefore teaches a linear control technique for regulating power transfer through **incremental** adjustments to the transmission frequency. *See* EX1001, 22:60-23:7. For example, the “induced voltage can be increased by reducing the transmission frequency and can be reduced by increasing the transmission frequency.” EX1001, 21:61-63; *see also* Claim 1 (28:25-45), Claim 10 (29:17-32). In other words, the induced voltage

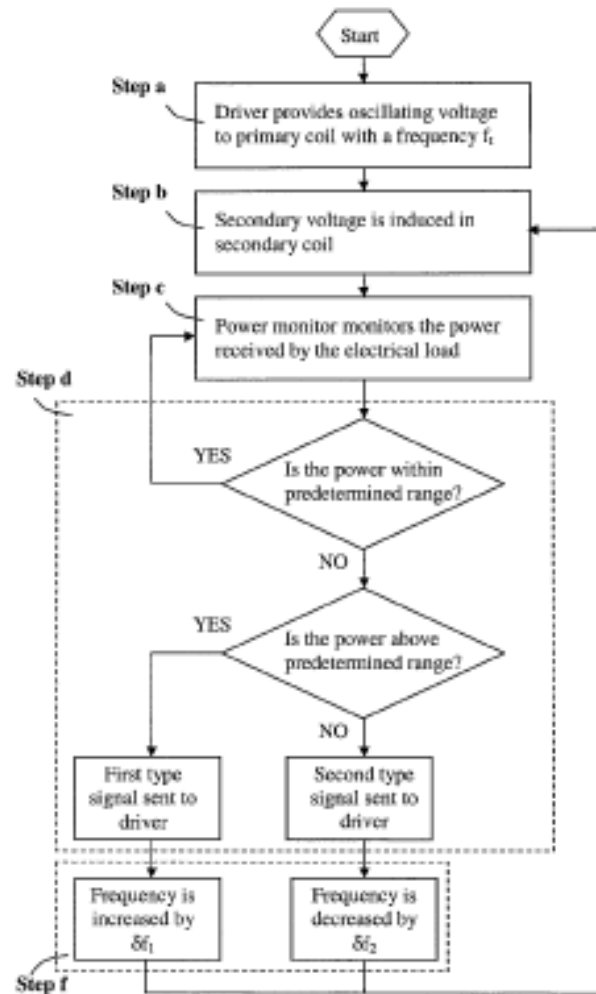
can be altered by a variable of δV by adjusting the transmission frequency by an incremental variable of δf . *See also id.* at 21:63-65, 22:60-37:7.

Dr. Mercier explained:

A POSITA would appreciate that a linear control system is significantly easier to design and operate than one based on non-linear dynamics. Linear control systems operate predictably: if one parameter increases, for example, a corresponding parameter may go down by a linear, predictable amount. In a non-linear control system, if one parameter increases, for example, the corresponding parameter may go down, but not by a linear, easily predictable amount. This significantly complicates control system design and, importantly, makes determination and achievement of control loop performance and stability much more difficult. Control systems employed in systems like wireless charging need to be stable in order to operate reliably and not overheat or breakdown, as may occur in an unstable system. For these reasons, designers often prefer to design linear control systems when possible.

EX2009, ¶58.

An exemplary power control method is depicted in Figure 6d:



Id. at Fig. 6d; *see also id.* at 22:45-64. The '204 Patent teaches that the implementation of this method utilizes (1) a feedback signal of a first type S_a that is sent to the driver to indicate that the power received by the electric load is below a predetermined range, and (2) a feedback signal of a second type S_b that is sent to the driver to indicate that the power received by the electric load is above a predetermined range. *Id.* at 22:52-59. If the driver receives a feedback signal of a first type S_a , then the transmission frequency is increased by an incremental value

$+\delta f_1$, and if the driver receives a feedback signal of the second type S_b , then the transmission frequency is decreased by an incremental value $-\delta f_2$. *Id.* at 22:60-64.

The '204 Patent further teaches that the power regulation method illustrated in Figure 6b relies on a series of transmitted feedback signals of the first type S_a “when the power received by the load is too high” to “reduce[]” the power received “into the acceptable range.” *Id.* at 22:65-23:2. Similarly, the power regulation method relies on a series of transmitted feedback signals of the second type S_b “when the power received by the load is too low” to “increase[]” the power received “into the acceptable range.” *Id.* at 23:2-5.

B. Patent Prosecution History

U.S. Patent Application No. 14/152,368—which would ultimately issue as the '204 Patent—was filed on January 10, 2014 as a division of U.S. Patent Application No. 12/883,457. The '204 Patent claims priority to a number of U.S. provisional applications, the earliest of which is U.S. Application No. 61/064,618 (“the '618

Application”) (EX1011), filed on March 17, 2008.²

On September 30, 2014, the Examiner issued a non-final office action that, among other things, rejected the original claims under (1) 35 U.S.C. §112 as indefinite, and (2) 35 U.S.C. §103 as obvious based on WO 2006/031133 (EX1007, “Malpas”). EX1002, 119-120.

In a response filed December 30, 2014, the Applicant amended claim 1, in relevant part, to recite:

said driving voltage oscillating at a non-resonant transmission frequency ~~significantly different from~~higher than said characteristic resonant frequency of said inductive couple,

...

provide less power by increasing ~~increase~~—said non-resonant transmission frequency by an incremental value when said first signal is detected by the detector, and

provide more power by decreasing ~~decrease~~ said non-resonant

² Petitioner relies on a cursory analysis in alleging that the ’204 Patent is not entitled to its March 17, 2008 priority date (EX1011). Pet., 1-2. As Petitioner notes, however, each of the prior art references asserted in the Petition appear to predate the filing of the ’618 Application. Pet., 2. As such, although Patent Owner disagrees with Petitioner’s allegations as to priority, the argument is moot because of the dates of the asserted references and the Board need not decide the issue.

transmission frequency by an incremental value when said second signal is detected by the detector.

EX1002, 96 (emphasis in original).³ In doing so, the Applicant explained that amended claim 1⁴ requires two distinct frequencies—a transmission frequency and a characteristic resonant frequency:

As a first matter, Applicant notes that as currently amended claim 1 recites **two different frequencies**:

- 1) a “**transmission frequency**” – this being the rate at which the switching unit of the driving circuit produces the oscillating driving voltage, and
- 2) a “**characteristic resonant frequency** of the inductive couple” – this being the natural frequency of oscillation of the inductive couple formed between the primary coil and the secondary coil, which is also the frequency at which the amplitude of voltage induced in the secondary coil peaks.

³ Claim 10 was similarly amended, in relevant part, to recite:

providing an oscillating voltage to said primary inductive coil at an initial transmission frequency f_t ~~which is substantially different from~~ higher than a characteristic resonant frequency f_R of the system.

EX1002, 98 (emphasis in original).

⁴ Any arguments or explanations asserted by the Applicant are equally applicable to claim 10. EX1002, 104-105.

Id. at 103 (emphases added). The Applicant emphasized that “these two frequencies do not have the same value,” and highlighted claim 1’s express requirement that the “transmission frequency is **different** from the characteristic resonant frequency of said inductive couple.” *Id.* at 103 (emphasis added).

Addressing the obviousness rejection, the Applicant explained that a person or ordinary skill in the art would have interpreted Malpas to require transmission **at or near** resonant frequency:

A person having ordinary skill in the art, upon reading Malpas, would have understood that in order to transmit power to a remote pick-up, it would be necessary to use a transmission frequency ***at or near to the resonant frequency of the pick-up*** (as opposed to the invention recited in instant claim 1, wherein the transmission frequency is selected to be ***different*** from, and more specifically higher than, the characteristic frequency of the inductive couple formed between the primary and secondary coils).

Id. at 104 (emphasis in original). As a result, Applicant argued, “Malpas teaches away from the invention.” *Id.* at 104.

On January 20, 2015, the Examiner issued a final office action, maintaining the Malpas obviousness rejection. EX1002, 78-85. On February 26, 2015, the Applicant conducted an Examiner Interview to discuss the “higher than” claim term. *Id.* at 69. An agreement was reached “that the ‘substantially different’ regarding the

driving per Figure 6B and the specification [0160+] would overcome the art of record.” *Id.*

In an April 2, 2015 response, the Applicant further amended claim 1, in relevant part to recite:

said driving voltage oscillating at a non-resonant transmission frequency ~~higher than~~ substantially different from said characteristic resonant frequency of said inductive couple.

EX1002, 56 (emphasis in original).⁵ Moreover, the Applicant clarified that “**substantially different** from said characteristic resonant frequency” refers to the “near-linear” regions of a frequency-amplitude graph:

The claims must be interpreted in light of the specification as they would be understood by one of ordinary skill in the art. As such, one having ordinary skill in the art would appreciate that the term “*substantially different from said characteristic resonant frequency*” recited in claims 1 and 17,⁶ in view of at least Fig. 6b,

⁵ Claim 10 was similarly amended, in relevant part, to recite:

providing an oscillating voltage to said primary inductive coil at an initial transmission frequency f_t ~~higher than~~ substantially different from a characteristic resonant frequency f_R of the system.

EX1002, 57 (emphasis in original).

⁶ Based on the context of the Applicant’s remarks, it appears the Applicant intended to refer to claim 10 and not claim 17.

should be interpreted **to mean that the frequency of the driving voltage is selected so as to lie within one of the near-linear regions of a frequency-amplitude graph associated with the inductive couple.**

EX1002, 62 (emphasis added). In doing so, the Applicant highlighted Paragraph [0161] of the pending application (now column 21, lines 16-23) and Figure 6b:

It is a particular feature of embodiments of the current invention that the driver 6230 (FIG. 6 *a*) is configured and operable to transmit a driving voltage which oscillates at a **transmission frequency which is substantially different from the resonant frequency of the inductive couple. Preferably the transmission frequency is selected to lie within one of the near- linear regions 6, 8** where the slope of the frequency-amplitude graph is less steep.

EX1002, 62 (emphasis added); *see also* EX1001, 21:16-23.

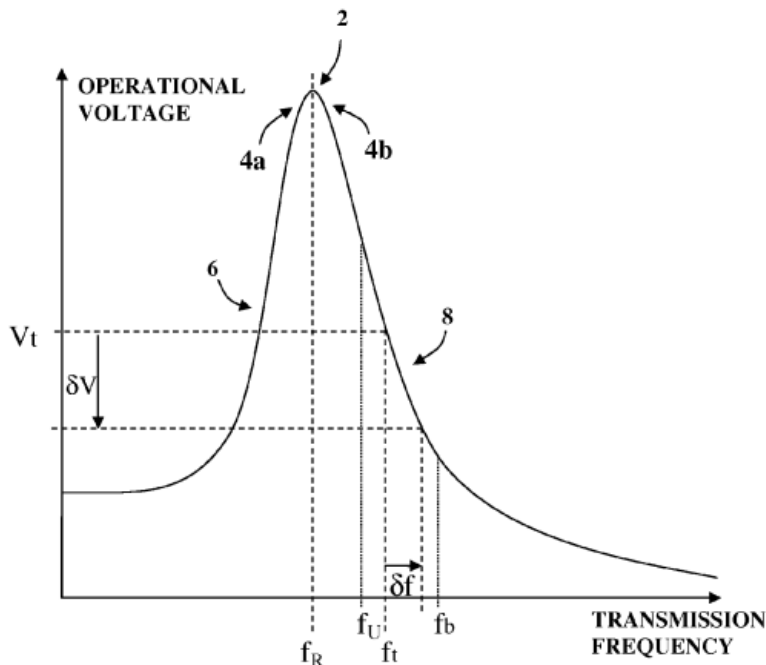


Fig. 6b

EX1001, 6b.

The Applicant further emphasized that “Malpas *teaches away from* the invention . . . in which the transmission frequency [in the ’204 Patent] is deliberately selected to be substantially different from the characteristic resonant frequency of the inductive couple.” EX1002, 63 (emphasis in original).

On April 16, 2015, the Examiner issued a Notice of Allowance. EX1002, 35.

C. Summary of Petitioner’s Proposed Grounds for Unpatentability

Petitioner alleges that claims 1-6, 8, and 10-13 would have been anticipated under pre-AIA 35 U.S.C. §102 or obvious under pre-AIA 35 U.S.C. §103 and raises three grounds of alleged unpatentability based on four references:

1. U.S. Patent Pub. 2008/0197804 (“Onishi”);
2. U.S. Patent Pub. 2007/0236169 (“Purdy”);
3. U.S. Patent Pub. 2008/0079392 (“Baarman392”); and
4. Excerpts from Ronald J. Tocci et al., *Digital Systems: Principles and Applications*, Pearson Education International, 10th Edition (2007) (“Tocci”).

The alleged invalidity grounds are as follows:

Ground	'204 Patent Claims	Type of Challenge	Primary Reference	Secondary References
1A	1-6, 8, and 10-13	§102	Onishi	
1B	1-6, 8, and 10-13	§103	Onishi	Purdy
2	1-6, 8, and 10-13	§103	Baarman392	Tocci

D. The Relied-Upon References

The four references relied upon by Petitioner to challenge the patentability of claims 1-6, 8, and 10-13 of the '204 Patent are summarized as follows:

1. Onishi (EX1004)

U.S. Patent Pub. 2008/0197804 (“Onishi”) is entitled “Power Transmission Control Device, Power Reception Control Device, Non-Contact Power Transmission System, Power Transmission Device, Power Reception Device, and Electronic Instrument.” Onishi was filed on February 15, 2008 and was published on August 21, 2008. Onishi claims priority to Japanese Patent Application 2007-

036745, filed on February 16, 2007.

Onishi is directed to “[a] power transmission device [that] performs power-saving power transmission [and] that transmits a small amount of power as compared with normal power transmission when the power transmission device has detected that a battery of a load has been fully charged so that the operation of a charge control device (charge control IC) of the load is maintained, thereby enabling recharging due to a charge management function of the charge control device.” EX1004, Abstract. Onishi controls the amount of power transmitted by the primary coil by selecting one of three power transmission frequencies f1 (transmitting “1” during normal power transmission), f2 (transmitting “0”), and f3 (power-saving mode”) for driving the primary coil. *Id.* at [0181]. When recharging starts “the load state of a power reception device increase” and “the power transmission device detects an increase in the load state and changes power transmission from power-saving power transmission to normal power transmission.” *Id.* at Abstract. In contrast, when the power-saving power reception device is “removed during power-saving power transmission, the power transmission device detects that the power reception device has been removed, and stops continuous power transmission so that unnecessary power consumption does not occur.” *Id.*

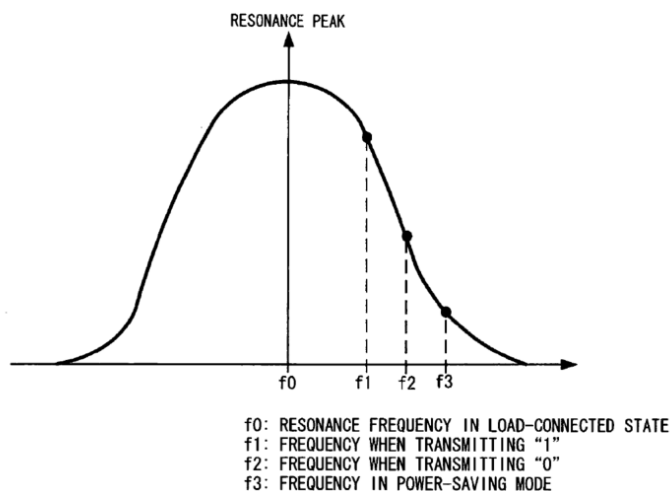
Specifically, Onishi discloses a figure for illustrating the “Frequency Used in

Power-Saving Mode” that “show[s] the resonance characteristics of the induction coil and applications of frequencies,” where “the horizontal axis indicates the frequency, and the vertical axis indicates the resonance peak value. *Id.* at [0179]-[0180]. Onishi explains that:

[T]he frequency f_1 is a frequency used when transmitting “1” during normal power transmission. The frequency f_1 is a basic frequency during power transmission. The frequency f_2 is a frequency used when transmitting “0” (see FIGS. 3A and 3B). A frequency f_3 is a frequency used in the power-saving mode. As is clear from FIG. 4, the relationship “ $f_1 > f_2 > f_3$ ” is satisfied.

Id. at [1081].

FIG. 4



Id. at FIG. 4 (illustrating the relationship $f_3 > f_2 > f_1$).

2. Purdy (EX1005)

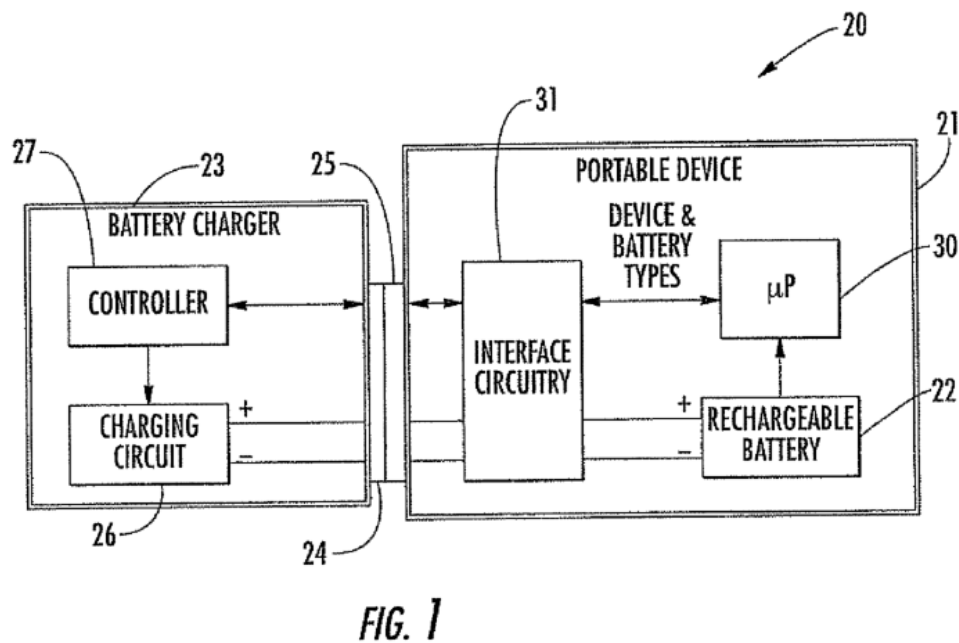
U.S. Patent Pub. 2007/0236169 (“Purdy”) is entitled “Battery Charger for Portable Devices and Related Methods.” Purdy was filed on June 14, 2007 and was published on October 11, 2007. Purdy claims priority to U.S. Patent Application No. 10/776,426, filed on February 11, 2004.

Purdy is directed to “a battery charger that may be used with numerous types of portable devices and associated batteries, and yet which may account for differences between the charging parameters thereof.” EX1005, [0007]. For example, Purdy discloses that “different types of batteries may have different voltage and/or current limits than one another, and different devices may similarly have different voltage and/or current limits as well.” *Id.* at [0009]. Thus, a controller may be used to “advantageously select one or more actual charging parameters to charge the rechargeable battery based upon a comparison of the different portable device and battery charging parameters to avoid damaging one or the other.” *Id.* at [0009].

Specifically, the controller disclosed in Purdy may, for example, be configured to: “cause the portable device to identify a battery charge level of the rechargeable battery,” *id.* at [0011]; “select an actual charging parameter such as charging time based upon the charge level of the battery and a maximum charging time for the battery,” *id.* at [0011]; or “provide[] identification signal[s],” *id.* at

[0031].

Unlike the '204 Patent, Purdy does not disclose or relate “to inductive electrical power transfer.” EX1001, 1:19-20. Rather, Purdy is directed to a “charger 23 [that] . . . includes a **charger connector 24** to be coupled to a corresponding device connector 25 of the portable device 21,” as illustrated below in Figure 1. EX1005, [0024] (emphasis added); *see also id.* at [0026] (explaining that “the portable device 21 may be a USB compatible device, and the device connector 25 a USB connector”).



Purdy, FIG. 1.

3. Baarman392 (EX1006)

U.S. Patent Pub. 2008/0079392 (“Baarman392”) is entitled “System and

Method for Inductively Charging a Battery.” Baarman392 was filed on September 14, 2007 and was published on April 3, 2008. Baarman392 claims priority to U.S. Provisional Application No. 60/827,586, filed on September 29, 2006.

Baarman392 describes an inductive charging system designed to charge batteries, particularly those with nonlinear charging profiles such as Li-Ion batteries, using a primary and secondary coil setup. EX1006, [0032]. The system includes a charger circuit with a primary coil and a secondary circuit with a secondary coil, which receives power inductively from the primary coil. *Id.* The charger circuit features a frequency controller that adjusts the frequency of the power applied to the primary coil based on feedback from the secondary circuit. *Id.* This feedback mechanism helps optimize the charging process and prevent overcharging in order to maintain the health and longevity of Li-Ion batteries. *Id.* at [0014].

Baarman392 further describes adjusting the operating frequency of the inductive pair in response to the feedback indicating the over-voltage or over-current state of the battery. *See id.* at [0014]. While power transfer is at its highest when operating at resonance, such as in a tightly coupled system, Baarman392 describes that when the primary coil and the secondary coil are loosely coupled, “significant power transfer can occur when the inverter is operating off-resonance.” *Id.* at [0038]. For example, when a feedback signal is not received, then Baarman392 will decrease

the frequency, moving the system towards resonance. *Id.* at [0055]. So long as no feedback signal is received, then “the frequency is repeatedly reduced [moving closer to resonance] so as to maximize power transfer to the battery” (at resonance). *Id.* at [0058]; *see also id.* at [0038]. Accordingly, the operating frequency can be adjusted based on feedback from the secondary coil.

4. Tocci (EX1009)

Ronald J. Tocci, et al., *Digital Systems: Principles and Applications*, Pearson Education International, 10th Edition (2007) (“Tocci”) is a textbook directed to the principles of digital systems.

Part of Tocci’s book is dedicated to explaining Boolean algebra. *See, e.g.*, EX1009, 18. Tocci describes the use of Boolean variables to represent the voltage levels present on wires or at the input/output terminals of a circuit. This binary representation simplifies the design and analysis of digital circuits because it abstracts away the exact voltage values, focusing instead on the logical state (*e.g.*, HIGH or LOW). *Id.*

Tocci also discloses the use of Boolean algebra to describe and analyze logic gates, such as OR, AND, and NOT. *Id.* The relationship between the inputs and outputs of these gates is often represented using truth tables. *Id.* A truth table lists all possible combinations of input values and the corresponding output values for a

given logic circuit. *Id.*

III. PERSON OR ORDINARY SKILL IN THE ART

Patent Owner disagrees with Petitioner's proposed level of ordinary skill in the art based on the lack of specific experience related to the field of wireless or inductive charging device design. *See* Pet., 6. As such, Patent Owner proposes that at the time of the '204 Patent, a POSITA would have a working knowledge of wireless charging and inductive charging. EX2009, ¶45. The person would have gained this knowledge through an undergraduate Bachelor of Science degree in electrical engineering, computer engineering, computer science, or a related field, with at least two years of experience working in the field of wireless or inductive charging device design, or testing of such wireless or inductive charging device testing, or an equivalent combination of academic study and work experience. *Id.* More education (e.g., a Master's degree) or work experience any relevant field may compensate for a deficit in one or more relevant qualifications stated above. *Id.*

IV. CLAIM CONSTRUCTION

A. “transmission frequency substantially different from said characteristic resonant frequency of said inductive couple”

1. The Board’s Preliminary Construction

In its Preliminary Response, Patent Owner offered the following construction for the term “transmission frequency substantially different from said characteristic resonant frequency of said inductive couple”:

[A]s explained by Dr. Mercier, a POSITA would define the “transmission frequency [that is] substantially different from the characteristic resonant frequency,” as recited in claim 1, to: (1) lie within the linear or [near]-linear regions of a frequency-amplitude graph, and (2) allow for some incremental change (increase or decrease) in frequency while remaining in the near-linear/linear regions of the frequency-amplitude graph.

Prelim. Resp. at 23 (citing EX2001, ¶63). In response, the Board—in its Institution Decision—held:

On this record and for purposes of this decision, we determine that—consistent with the Specification’s description of the frequency that is “[p]referably . . . selected” and applicant’s argument regarding the same during prosecution—“a non-resonant transmission frequency *substantially different* from said characteristic resonant frequency of said inductive couple” encompasses frequencies that lie within one of the near-linear regions of a frequency-amplitude graph associated

with the inductive couple. See Ex. 1001, 21:20-24; Ex. 1002, 62. At this time and for purposes of this Decision, we need not and do not reach the issue of the outer bounds of the scope of “substantially different.”

Paper 7 at 26. The Board further explained—in reference to the ’202 Patent’s discussion of the added benefit of “linear control”—that “Patent Owner has not explained adequately why such a benefit should be read into the claim term ‘substantially different,’ particularly where the quoted Specification support does not explicitly mention linear regulation.” *Id.* at 26.

2. **The term “non-resonant transmission frequency [that is] substantially different from said characteristic resonant frequency,” as recited in claim 1, should be further construed to allow for some incremental change (increase or decrease) in frequency while remaining in the near-linear regions of the frequency amplitude graph.⁷**

First, Claim 1 recites in relevant part:

said driving voltage oscillating at a non-resonant transmission frequency substantially different from said characteristic resonant frequency of said inductive couple.

⁷ Claim 10, which recites “an initial transmission frequency f_t substantially different from a characteristic resonant frequency f_R of the system” (EX1001, 29:22-24), should similarly be construed to allow for some incremental change (increase or decrease) in frequency while remaining in the near-linear regions of the frequency amplitude graph.

EX1001, 28:33-36. Claim 10 similarly recites in relevant part:

providing an oscillating voltage to said primary inductive coil at an initial transmission frequency f_t substantially different from a characteristic resonant frequency f_R of the system.

EX1001, 29:21-24.

While the Board is correct that the '204 Patent does not use the phrase “linear regulation,” (Paper 7 at 26), a POSITA would understand linear regulation/control as being a central aim of the '204 Patent. EX2009, ¶111. For example, in the summary section of the '204 Patent, it explains:

It is another **aim of the invention** to present an inductive power transfer system comprising at least one inductive power outlet comprising at least one primary inductive coil wired to a power supply via a driver; the primary inductive coil for forming an inductive couple with at least one secondary inductive coil wired to an electric load, the secondary inductive coil associated with an inductive power receiver wherein the driver is configured to provide a driving voltage across the primary inductive coil, **the driving voltage oscillating at a transmission frequency significantly different from the resonant frequency of the inductive couple.** Optionally, the driver comprises a switching unit for intermittently connecting the primary inductive coil to the power supply.

Preferably, **the transmission frequency lies within a range in which induced voltage varies approximately linearly with**

frequency. Optionally, **the driver is configured to adjust the transmission frequency in response to the feedback signals**.

EX1001, 4:1-17 (emphases added); *see also id.* at 22:45-64 (providing one example of a “power regulation method”); EX2009, ¶112.

Next, in discussing Figure 6b, the ’204 Patent explains:

[T]he frequency of transmission is selected to be in the **approximately linear region 8** of the curve between a lower frequency value of f_L , and an upper frequency value of f_U . A transmission frequency f_t , higher than the resonant frequency f_R of the system, produces an inducted voltage of V_t . The induced voltage can be increased [incrementally] by [incrementally] reducing the transmission frequency and can be [incrementally] reduced by [incrementally] increasing the transmission frequency. For example, **an increase in transmission frequency of δf produces a decrease in induced voltage of δV** .

EX1001, 21:56-67 (emphases added); *see* EX1001, 22:61-64 (“If the received feedback signal is of the first type S_a , then the transmission frequency is increased by an incremental value $+\delta f_1$. If the received feedback signal is of the second type S_b , then the transmission frequency is decreased by an incremental value $-\delta f_2$.”).

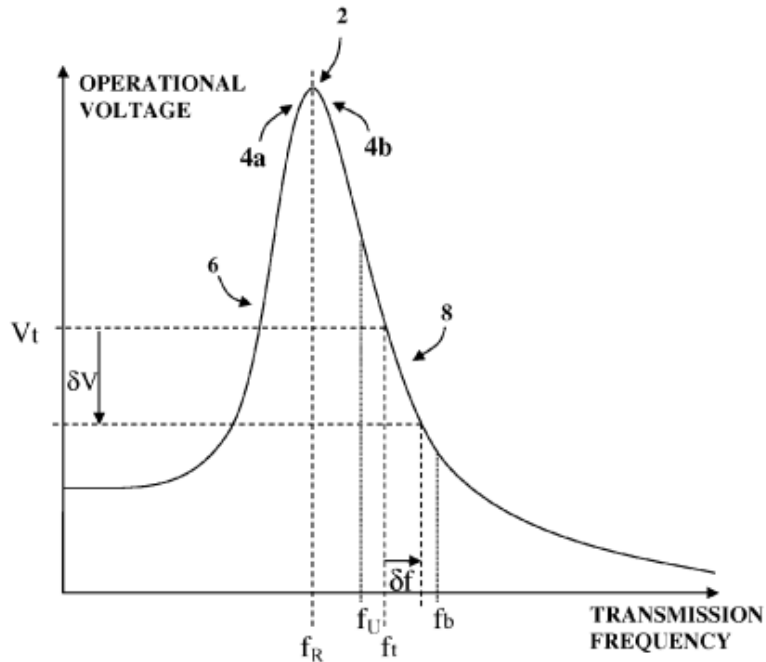


Fig. 6b

Id. at Fig. 6b.

Notably—as explained by Dr. Mercier—a POSITA would understand that frequency f_U , as illustrated in Figure 6b, is the lower bound frequency in the approximately linear region 8, which also corresponds to the frequency that yields the upper bound of the operational voltage. EX2009, ¶101. In contrast, frequency f_b , as illustrated in Figure 6b, is the upper bound frequency in the approximately linear region 8, which also corresponds to the frequency that yields the lower bound of the operational voltage. *Id.* Thus, a POSITA would understand that f_L and f_b may be regarded as referring to the same thing and may be used interchangeably. *Id.*

Finally, claim 1 of the '204 Patent further requires:

[1.7] said driver is configured to: provide less power by increasing said non-resonant transmission frequency by an incremental value when said first signal is detected by the detector, and

[1.8] provide more power by decreasing said non-resonant transmission frequency by an incremental value when said second signal is detected by the detector.

Id. at 28:41-45.⁸ In other words, the driver is configured to increase/decrease the non-resonant transmission frequency that is substantially different from said characteristic resonant frequency of said inductive couple (*i.e.*, a frequency that lies within the near-linear region of a frequency-amplitude graph). EX2009, ¶102. In reading claim 1 as a whole, a POSITA would understand that the '204 Patent is directed to a linear control technique for predictably regulating power transfer. EX2009, ¶102.

Accordingly, a POSITA would understand that the selection of a transmission frequency within the near-linear regions of a frequency-amplitude graph (*i.e.*,

⁸ Claim 13 of the '204 Patent similarly recites that “the step of said driver adjusting said non-resonant transmission frequency further comprises: said driver reducing said non-resonant transmission frequency by an incremental value df_1 when the received feedback signal is of the first type S_a , and said driver increasing said non-resonant transmission frequency by an incremental value $+df_2$ when the received feedback signal is of the second type S_b .” EX1001, 29:44-52.

selection of a transmission frequency that is substantially different from the characteristic resonant frequency) will enable a linear control technique for predictably regulating power transfer. *Id.* at ¶113. Thus, a POSITA would define claim 1's and claim 10's "transmission frequenc[ies] [that are] substantially different from [the] characteristic resonant frequency" to: (1) encompasses frequencies that lie within one of the near-linear regions of a frequency-amplitude graph associated with the inductive couple, and (2) allow for some incremental change (increase or decrease) in frequency while remaining in one of the near-linear regions of the frequency-amplitude graph. *Id.* A POSITA would further appreciate that (3) a system that has the equivalent of a pick-up frequency that is at or near the resonant frequency is distinguishable from claims 1 and 10 of the '204 Patent. *Id.*

B. "provide [less/more] power by [increasing/decreasing] said non-resonant transmission frequency by an incremental value" / "[reducing/increasing] said non-resonant transmission frequency by an incremental value [df1/+df2]"

1. The Board's Preliminary Decision to Institute Review of the '204 Patent

In its decision to institute review of the '204 Patent, the Board preliminarily held:

[E]ven if a given construction would result in the term "incremental" having little patentable weight, that appears, at this preliminary stage and on the current limited record, to be due to how the claim is

drafted rather than as a result of reading out the term, as Patent Owner implies. . . . At this early stage of the proceeding, we do not agree with Patent Owner's interpretation of "incremental value" and we decline to read into the claim concepts such as a repeating feedback loop, a series of adjustments, and the exclusion of the selection of "discrete frequency values."

Paper 7 at 31-32. The Board also encouraged the parties to "discuss the meaning of 'incremental value' in further briefing" and to "focus primarily on intrinsic evidence." *Id.* at 32.

Dr. Mercier explained that:

[A] POSITA would have interpreted "provide [less/more] power by [increasing/decreasing] said non-resonant transmission frequency by an incremental value" and "[reducing/increasing] said non-resonant transmission frequency by an incremental value [df1/+df2]" consistent with their ordinary meanings, **and** that a POSITA would not interpret the selection of a discrete value as constituting an increase or decrease by an "incremental value."

The latter excludes a system that relies solely on the selection of a finite number of discrete frequency values, as a POSITA would understand that the concept of selecting from a finite number of discrete values is different from the concept of incremental adjustment. A system that allows for both could certainly fall within the scope of a claim, but a system that **only** allows for selection of a finite number of discrete values, particularly values which are

significantly different (i.e., having large delta) would not.

EX2009, ¶¶127-128.

In other words, a POSITA would interpret claim 1 to require the **capability** to increase or decrease the non-resonant transmission frequency by way of small (incremental) adjustments. EX2009, ¶129.

This interpretation does not require a feedback loop or exclude all systems in which discrete transmission frequencies may be selected.

2. **“provide [less/more] power by [increasing/decreasing] said non-resonant transmission frequency by an incremental value” and “[reducing/increasing] said non-resonant transmission frequency by an incremental value [df1/+df2]” should be interpreted consistent with their plain and ordinary meanings.**

Claim 1 recites in relevant part:

provide less power **by increasing** said non-resonant transmission frequency **by an incremental value** when said first signal is detected by the detector, and

provide more power **by decreasing** said non-resonant transmission frequency **by an incremental value** when said second signal is detected by the detector.

EX1001, 28:40-45 (emphasis added). Claim 13 similarly recites in relevant part:

said driver **reducing** said non-resonant transmission frequency **by an incremental value df1** when the received feedback signal is of the first type Sa, and

said driving **increasing** said non-resonant transmission frequency **by an incremental value +df2** when the received feedback signal is of the second type Sb.

EX1001, 29:47-52 (emphasis added).

To begin, the use of the term “incremental” in relation to the adjusted transmission frequency is presumed to have meaning. *See Innova/Pure Water, Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1119 (Fed. Cir. 2004) (“While not an absolute rule, all claim terms are presumed to have meaning in a claim.”). In this regard, and as explained by Dr. Mercier, a POSITA would interpret “incremental” consistent with its plain and ordinary meaning. EX2009, ¶¶ 115-131; see EX2013, 47:2-10 (acknowledging that the term “incremental” narrows the scope of the claimed invention).

Outside the claims, “incremental value” appears four times in the specification, all in relation to Figure 6d. In this regard, the ’204 Patent explains that “[i]f the received feedback signal is of the [first/second] type [S_a/S_b] then the transmission frequency is [increased/decreased] by an incremental value [$+\delta f_1/-\delta f_2$].” EX1001, 22:60-64. Continuing, the specification states that “when the power received by the load is too [high/low], a series of feedback signals of the [first/second] type [S_a/S_b] will be transmitted until the power is [reduced/increased] into the acceptable range.” EX1001, 22:65-23:5.

In other words, and as characterized by Dr. Mercier, “a ‘series of feedback signals’ (S_a or S_b) is sent to the driver, resulting in **a series of incremental increases/decreases** in transmission frequency, until the power has been adjusted to be within ‘the acceptable range.’” EX2009, ¶121; *see also id.* at ¶128.

Additionally, the incremental increases and decreases to the transmission frequency are denoted in the ’204 Patent by the lowercase delta symbols $+\delta$ and $-\delta$, respectively. Both are commonly understood in engineering and mathematics to represent small, gradual changes to variables. Math Centre, *Symbols* (June 4, 2023) (EX2014) (“We sometimes refer to δx as an increment in x . For example if the value of x changes from 3 to 3.01 we could write $\delta x = 3.01 - 3 = 0.01$.”); EX2009, ¶122.

Therefore, the specification uses “incremental” consistent with its plain and ordinary meaning, which “connotes a series of small adjustments (*e.g.*, $+\delta f_1$ or $-\delta f_2$) for reaching a particular value (or frequency range in this instance), as opposed to outright selection of that value.” EX2009, ¶123; *see* EX2013, 44:24-45:10 (“Q. My question was what would it be mean in the ’204 patent merely to state that the transmission frequency is increased or decreased in response to a feedback signal without using the term ‘incremental value.’ A. The delta F is still there but the word ‘incremental’ is gone. Q. Correct. A. Then I guess a POSITA would have some – would be less certain about what magnitude is expected for delta F1.”). A POSITA

would not recognize the latter as involving the increase or decrease in frequency by one or more “incremental” values—only the former, per Fig. 6d. EX2009, ¶123.

As explained by Dr. Mercier, this would exclude the selection of a finite number of discrete frequency values:

[T]he feedback loop of Figure 6d would make little sense if the system relied on the selection of a small handful of discrete frequencies. To the contrary, this embodiment relies on incremental increases or decreases (*e.g.*, $+\delta f_1$ or $-\delta f_2$) to **gradually** adjust the transmission frequency to an “acceptable range.”

Moreover, the '204 Patent explains that “the positive incremental value δf_1 may be greater than, less than or equal to the negative incremental value δf_1 .” Thus, a POSITA would recognize that the series of incremental adjustments are more than fixed discrete frequency values, having a significant delta between them.

EX2009, ¶¶124-125 (citations omitted).

Finally, this interpretation is consistent with technical and nontechnical dictionary definitions of “increment,” as acknowledged by Dr. Mercier. *See id.* at ¶123 (quoting The American Heritage Dictionary of the English Language 889 (Houghton Mifflin Co., 4th ed. 2006) (EX2006) (“increment . . . 5. *Mathematics* A small positive or negative change in the value of a variable.”); Collins English Dictionary 824 (HarperCollins Pub., 7th ed. 2005) (EX2007) (“increment . . . 1 an

increase or addition, esp one of a series”); Wiley Electrical and Electronics Engineering Dictionary 365 (IEEE Press 2004) (EX2008) (“increment 1. The process of gradually increasing a quantity or variable.”).

Therefore, “provide [less/more] power by [increasing/decreasing] said non-resonant transmission frequency by an incremental value” and “[reducing/increasing] said non-resonant transmission frequency by an incremental value [df1/+df2]” should be interpreted consistent with their plain and ordinary meanings. See EX2009, ¶¶115-131. That is, a POSITA would understand that incremental adjustments to a transmission frequency excludes simply selecting a discrete transmission frequency value. See EX2009, ¶131.

V. LEGAL STANDARD

Under 35 U.S.C. §102(a) (pre-AIA), an issued patent is invalid if “the invention [therein] was . . . described in a printed publication . . . before the invention thereof by the applicant.” This statute “embodies the concept of novelty—if a device or process has been previously invented (and disclosed to the public), then it is not new, and therefore the claimed invention is ‘anticipated’ by the prior invention.” *Net MoneyIN, Inc. v. VeriSign, Inc.*, 545 F.3d 1359, 1369 (Fed. Cir. 2008). To anticipate, “the prior art reference . . . must not only disclose all elements of the claim within the four corners of the document, but must also disclose those elements ‘arranged as

in the claim.” *Id.* (citing *Connell v. Sears Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983)).

A claim is also not patentable if the differences between the claim and the prior art are such that the subject matter as a whole would have been obvious to a person of ordinary skill in the art at the time of the invention. 35 U.S.C. §103(a) (pre-AIA). Obviousness requires assessing (1) the “level of ordinary skill in the pertinent art,” (2) the “scope and content of the prior art,” (3) the “differences between the prior art and the claims at issue,” and (4) “secondary considerations” of non-obviousness such as “commercial success, long felt but unsolved needs, failure of others, etc.” *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007) (quoting *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966)).

It is the petitioner’s burden to prove unpatentability, *E.I. DuPont de Nemours & Co. v. Synvina C.V.*, 904 F.3d 996, 1007 (Fed. Cir. 2018), and “to demonstrate both ‘that a skilled artisan would have been motivated to combine the teachings of the prior art references to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success in doing so.’” *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1367-68 (Fed. Cir. 2016) (quotations and citations omitted). However, a petitioner must first show that all of the claimed elements are disclosed in the prior art. *See Medichem, S.A. v. Rolabo*,

S.L., 437 F.3d 1157, 1164 (Fed. Cir. 2006) (considering motivation to combine and reasonable expectation of success only “if all the elements of an invention are found in a combination of prior art references”).

VI. THE PETITION FAILS TO DEMONSTRATE BY A PREPONDERANCE OF THE EVIDENCE THAT ANY CHALLENGED CLAIM IS UNPATENTABLE

The Petition is full of manifest gaps that illustrate Petitioner has not met its burden of demonstrating the claims are unpatentable by a preponderance of the evidence. Thus, the Board should confirm the patentability of the challenged claims.

A. Ground 1A: Petitioner Fails to Establish that Claims 1-6, 8, and 10-13 are Anticipated by Onishi

As explained below, Petitioner has not shown a likelihood of prevailing with respect to Ground 1A. Onishi fails to disclose at least claim limitations [1.2], [1.5], [1.7], [1.8], [10.1], and [13]. As claims 2-6, 8, and 11-13 each depend on claim 1 or 10, Petitioner cannot show that Onishi anticipates any of claims 1-6, 8, and 10-13.

1. Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [1.2]

Limitation [1.2] requires “said primary inductive coil for forming an inductive couple having a characteristic resonant frequency with at least one secondary inductive coil wired to an electric load.” Onishi does not disclose an inductive couple having a characteristic resonant frequency. EX2009, ¶134.

For example, Onishi discloses a “primary coil L1 (power-transmission-side

coil) [that] is electromagnetically couple[d] with [a] secondary coil L2 (power-receiving-side coil) to form a power transmission transformer.” Onishi, [0137]; EX2009, ¶135. However, Onishi does not disclose that the primary coil L1 and the secondary coil L2 share a characteristic resonant frequency. Rather, Onishi’s discussion of this frequency is only in the context of “the resonance characteristics of the **induction coil**” (*i.e.*, primary coil L1), *id.* at [0180], not in the context of the resonance characteristics of an inductive couple formed by an induction coil (*i.e.*, primary coil L1) **and** a secondary coil (*i.e.*, secondary coil L2). Onishi, [0135] (explaining that the resonance characteristic frequency is for “one capacitor which forms a resonant circuit together with the primary coil L1”); *id.* at [0171] (“changing the resonance characteristics of the resonant circuit by changing the inductance or the capacitance to change the resonance frequency (resonance peak)”); *see also*

EX2009, ¶135;⁹ EX2010, 8:22-10:14 (testifying that primary coil L1 and the secondary coil L2, at least as described in Onishi, have different characteristic resonant frequencies), 14:5-15 (testifying that combining the resonant frequencies of the primary coil L1 and the secondary coil L2 is not a simple sum but rather the geometric mean of the two individual resonance frequencies).¹⁰

On cross-examination, Dr. Woods admitted that primary coil L1 and the secondary coil L2 would have different characteristic resonance frequencies:

Q. Now, will an inductive couple of primary coil L1 and capacitor C1 and C2 and secondary coil L2 with capacitor CB1 have a

⁹ Onishi does disclose that “[t]he resonance characteristics of the primary coil L1 and the secondary coil L2 when the portable telephone 510 is placed on the charger 500 (cradle) (i.e., when load exists with respect to the power transmission device 10) (see FIG. 1A) have a symmetrical and broad mountain shape, as shown in FIG. 4.” Onishi, [0180]. However, in view of the preceding sentence that emphasizes “the resonance characteristics of [only] the induction coil” (i.e., primary coil L1), it is unclear if this disclosure is referring to the resonance characteristic frequency of an inductive couple or to the resonance characteristic frequency of only the primary coil L1. *See id.*

¹⁰ During cross-examination Dr. Woods acknowledged that “the meaning of Onishi is laid out in Onishi” and “can’t change.” EX2013, 26:21-24. Accordingly, Dr. Woods opinions and testimony that were provided in IPR2024-00994 regarding Onishi are equally applicable to this IPR.

characteristic resonant frequency that is different than the characteristic resonant frequency of the primary coil L1 along with capacitor C1 and C2?

A. You're asking if the coupled system has a different resonance frequency than the transmission section along with no receiver?

Q. Correct.

A. Yes.

EX2010, 8:22-10:14. Dr. Woods further testified that the resonance frequency of the inductive couple is dependent on the resonance frequencies of each individual coil:

Q. Do you agree that the characteristic resonance frequency of the inductive couple system is dependent on both the characteristic resonant frequency of the primary coil L1 resonant frequency and the secondary resonant frequency of coil L2?

A. Yes. Among other things.

Id. at 10:7-14. Moreover, combining the resonant frequencies of the primary coil L1 and the secondary coil L2 is not a simple sum but rather the geometric mean of the two individual resonance frequencies. *Id.* at 14:5-15.

Dr. Woods again acknowledged that primary coil L1 and the secondary coil L2 have different characteristic resonant frequencies, and that the characteristic resonant frequency of an inductive couple comprising these two coils would be different:

Q. Similarly, will the coupled system have a different characteristic resonant frequency than the characteristic resonant frequency of the coil and the capacitor in the reception side?

A. Yes, the two – yes, the two frequencies – right, each has a separate resonant frequency stand-alone and when you put them together there will be a resonance that is – it’s neither of those, but it’s – right, it’s related. I mean it’s usually in between them.

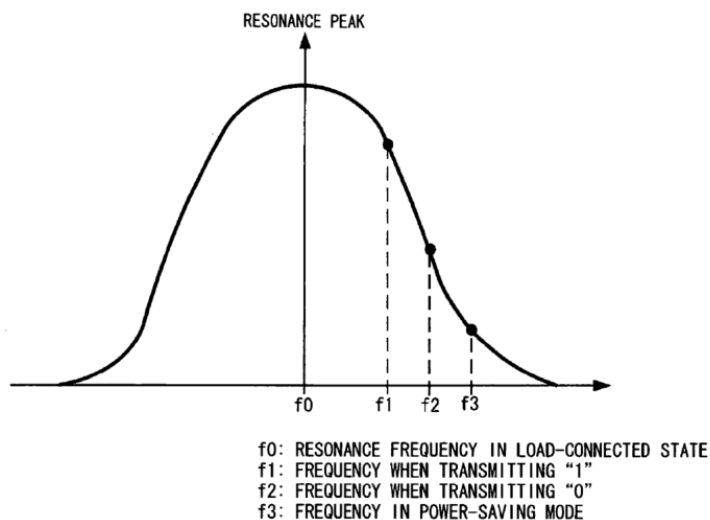
EX2010, 9:10-21. Addressing this aspect of Dr. Woods’ testimony, Dr. Mercier agreed that “each coil-capacitor pair (e.g., L1 and C1, or L2 and C2) has its own characteristic resonant frequency.” EX2009, ¶137.

In contrast, limitation [1.2] expressly requires that the characteristic resonant frequency pertain to the inductive couple (*i.e.*, based on both a primary and secondary inductors), which is consistent with the specification of the ’204 Patent and the prosecution history. *See, e.g.*, EX1001, 21:34-36 (“the **combined** inductance of the **coil pair** changes which in turn changes the resonant frequency of the **system**” (emphasis added)); EX1001, 27:17-20 (“connecting the secondary inductive coil to a transmission circuit for connecting an electric element to the secondary inductive coil thereby increasing the resonant frequency of the inductive power transfer system”); EX1002, 103 (explaining that “Malpas describes a system in which there is no one-to-one relationship between the transmitter and the receiver” because

“Malpas does not relate to the characteristic resonant frequency of the inductive couple at all, but rather to the resonant frequency of the pick-up alone”). EX2009, ¶138.

Thus, Petitioner’s argument that Onishi—allegedly by way of Figure 4—“discloses that the inductive couple between primary coil L1 and secondary L2 has a characteristic resonant frequency ‘ f_0 ’, indicated by the ‘RESONANCE PEAK’” (Pet., 19), is misplaced because Figure 4 only illustrates “a view showing the resonance characteristics **of the induction coil.**” Onishi, [0180] (emphasis added); *see also* EX2009, ¶139. Nothing in Onishi indicates that Resonance Frequency f_0 , or any other frequency identified in Onishi, is the characteristic resonant frequency of an inductive couple formed by an induction coil and a coupled secondary coil. EX2009, ¶139.

FIG. 4



Onishi, FIG. 4.

At most, Onishi is unclear as to whether Figure 4 depicts the resonance characteristics of the inductive couple, but such an ambiguous disclosure is insufficient for establishing unpatentability of a claim. *See Wasica Fin. GmbH v. Cont'l Auto. Sys., Inc.*, 853 F.3d 1272, 1284 (Fed. Cir. 2017) (“[I]t has long been understood that ambiguous references do not, as a matter of law, anticipate a claim.”); *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554 (Fed. Cir. 1983) (refusing to find claims anticipated when the prior art references were “unacceptably vague”).

Accordingly, Petitioner has not demonstrated that Onishi anticipates limitation [1.2].

2. Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [1.5]

Limitation [1.5] requires “said driving voltage oscillating at a non-resonant transmission frequency substantially different from said characteristic resonant frequency of said inductive couple.” Onishi discloses a power transmission device that is configured to operate in two principal power transmission modes—a “normal” mode for charging the battery of a power reception device, and a “power-saving” mode for when the battery is fully charged and requires little to no power (*i.e.*, for maintenance purposes). Onishi categorizes exemplary frequencies, f_1 and f_2 , as “normal” power transmission frequencies, and frequency f_3 as a “power-saving” transmission frequency. *See* Onishi, [0181], [0214], FIG. 4.

Petitioner alleges that each of frequencies f_1 , f_2 , and f_3 qualify as a “transmission frequency substantially different from said characteristic resonant frequency of the inductive couple.” Pet., 23-25. But none of frequencies f_1 , f_2 , and f_3 are described, shown, or otherwise disclosed as occurring within the near-linear regions of a frequency-amplitude graph associated with the inductive couple, as required by claim 1. EX2009, ¶142. Nor are they otherwise disclosed as substantially

different from the characteristic resonant frequency of the inductive couple.¹¹

a. Petitioner's Reliance on Onishi's Figure 4 is Improper

Petitioner asserts that Onishi discloses “a non-resonant transmission frequency (e.g., frequencies f_1 , f_2 , or f_3) substantially different from said characteristic resonant frequency (e.g., frequency f_0) of said inductive couple.” Pet., 23. In support of this assertion, Petitioner argues that “each of frequencies f_1 , f_2 , and f_3 lie in a near-linear region of the frequency-response curve and thus . . . fall within the scope of being ‘substantially different’ from the characteristic resonant frequency f_0 .” Pet., 24-25.

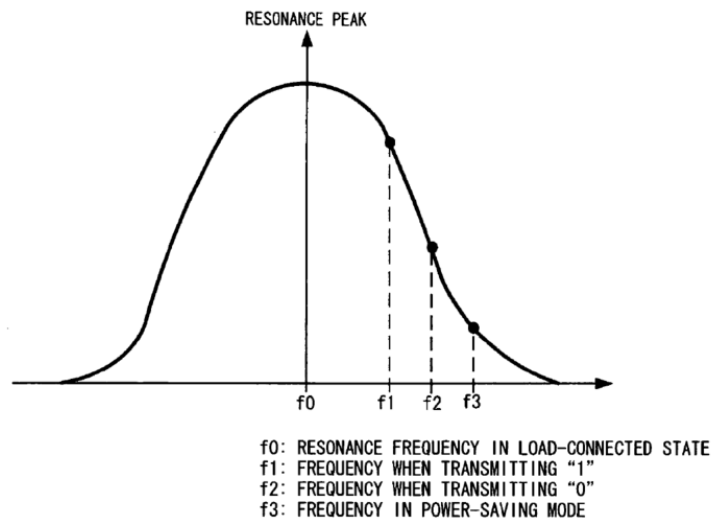
However, as explained in greater detail below, Onishi expressly discloses that the normal power transmission frequencies (*i.e.*, frequencies f_1 and f_2) are at or near the resonance frequency, *see* EX1004, [0053] (“The transmission frequency during power-saving power transmission is set at a frequency apart from the resonance frequency (resonance peak) as compared with the frequency during normal power transmission, for example.”); *id.* at [0181] (“In FIG. 4, the frequency f_1 is a frequency used when transmitted ‘1’ during normal power transmission. . . . The frequency f_2 is a frequency used when transmitting ‘0’ . . .”), and that the power-

¹¹ *See* EX2013, 53:14-15, 53:19-54:17 (acknowledging that Onishi does not provide any instruction or guidance on how to calculate frequencies f_1 , f_2 , and f_3).

saving mode frequency (*i.e.*, frequency f_3) is set apart from the resonance frequency such that only a small amount of power is transmitted. *Id.* at [0053] (“Note that power-saving power transmission only transmits only a small amount of power which merely maintains the battery charge management function of the load. . . . The transmission frequency during power-saving power transmission is set at a frequency apart from the resonance frequency (resonance peak) as compared with the frequency during normal power transmission, for example.”); *id.* at [0181] (“A frequency f_3 is a frequency used in the power-saving mode.”); *see also* EX2009, ¶144.

To counter this written disclosure in Onishi, Petitioner relies on Onishi’s illustration of frequencies f_1 , f_2 , and f_3 in Figure 4. EX1003, ¶¶67-68. The stated purpose of this illustration, however, is to show that “the relationship ‘ $f_1 > f_2 > f_3$ ’ is satisfied”—*i.e.*, as opposed to showing the actual locations of the frequencies f_1 , f_2 , and f_3 on a frequency-amplitude graph. EX1004, [0181]. EX2009, ¶145. Yet, as explained by Dr. Mercier, “even the purpose of this relationship is unclear as Figure 4 illustrates the opposite (*i.e.*, $f_3 > f_2 > f_1$). *Id.*; *see* EX2013, 59:14-17 (“[A] POSITA would understand that the way Onishi has drawn F_1 and F_2 and F_3 , the actual values of those frequencies do not satisfy the inequality in paragraph 181.”).

FIG. 4



Onishi, Fig. 4.

In fact, Onishi does not state, nor does Petitioner contend, that Figure 4 is drawn to scale, and Onishi provides no dimensions or vertical-axis labels with respect to Figure 4. See EX2010, 22:17-23:19 (acknowledging that Onishi fails to provide any quantitative measure of the values f1, f2, or f3); EX2013, 59:20-60:9 (“Q. [B]ased on the disclosure in paragraph 181 of Onishi, do you agree that it’s possible for the Y axis of figure 4 to represent frequency based on the relationship F1 being greater than F2 being greater than F3? . . . A. I think – if I understand your question, what I would say is yes, the Y values along this curve at frequencies F1 and F2 and F3 do satisfy the relationship specified by Onishi in paragraph [181].”). This lack of evidence renders Petitioner’s reliance on Onishi’s Figure 4 for element

[1.5] deficient. EX2009, ¶146; see *Hockerson-Halberstadt, Inc. v. Avia Group Int'l*, 222 F.3d 951, 956 (Fed. Cir. 2000) (“[I]t is well established that patent drawings do not define the precise proportions of the elements and may not be relied on to show particular sizes if the specification is completely silent on the issue.”).

Despite any similarities that may exist between, as Petitioner characterizes them, the “strikingly similar positions of Onishi’s frequencies f_1 , f_2 , and f_3 in the frequency-response curve” and the ’204 Patent’s “transmission frequency (e.g., f_t in FIG. 6B)” (see Pet., 25), absent quantitative values any similarities are merely speculative. See *White v. H.J. Heinz Co.*, 640 F. App’x 930, 934 (Fed. Cir. 2016) (“Absent any written description in the specification of quantitative values, arguments based on measurement of a drawing are of little value.” (quoting *In re Wright*, 596 F.2d 1124, 1127 (C.C.P.A. 1977))). Onishi is devoid of any quantitative values.

While Figure 4 of Onishi and Figure 6b of the ’204 Patent both depict parabolic like curves, without dimensions or vertical-axis labels a POSITA would not be able to draw any conclusions regarding any similarities between the two illustrations. EX2009, ¶147. For example, even assuming for the sake of argument that the vertical axis label in Figure 4 of Onishi is “RESONANCE PEAK,” Petitioner’s application of Figure 4 would still make no sense: this is not a variable

that varies with frequency, rather it is a single frequency that is achieved at “peak” impedance, voltage, current or some other electrical characteristic—it is not a variable to be used in this context as a vertical axis of a plot versus frequency. EX1004, Fig. 4; *see also* EX2009, ¶147.

If, on the other hand, we assume *arguendo* that “RESONANCE PEAK” refers to a single point on the curve, then there is no vertical axis label on the plot, and we do not know what is being represented. EX2009, ¶148. Thus, without additional information, no conclusions can be drawn regarding the teachings of Figure 4 in Onishi. *Id.*

During cross-examination Dr. Woods acknowledged that the vertical axis is unclear:

Q. And does figure – does figure 4 identify power transfer?

A. The vertical axis is – we don’t exactly know what the vertical axis is. A POSITA would take that the mean either power transferred or possibly current delivered to the load, or possibly voltage across the primary coil.

EX2013, 58:25-59:5. Dr. Woods provided additionally testimony regarding the ambiguity in Figure 4:

Q. Is the resonance peak of a system a single frequency achieved at peak impedance, voltage, current or some other electrical characteristic, or is it a variable that can vary with frequency?

A. I would say in a precise sense, a resonance frequency is what he said, it corresponds to a single point on a graph. But clearly, I mean, Onishi is kind of playing fast and loose here. He labeled the peak “resonance peak,” but – he labeled – the term “resonance peak” appears right above the Y axis. Which I think a POSITA would take to mean that that represents a title for the entire graph, which is the sold line as shown in the figure which exhibits a resonance peak at F_0 .

EX2013, 64:22-65:14.

Accordingly, Petitioner’s arguments that rely on Onishi’s illustration of frequencies f_1 , f_2 , and f_3 in Figure 4 are improper and misguided, and do not meet Petitioner’s burden. EX2009, ¶150.

Regardless, even if some value exists in a visual analysis of patent drawings that lack quantitative values, it appears—contrary to Petitioner’s assertions—that frequencies f_1 and f_3 (as illustrated in Onishi Figure 4) fall outside the near-linear region of the frequency-response curve. See Pet. 24 (arguing that “each of the frequencies f_1 , f_2 , and f_3 lie in a near-linear region of the frequency-response curve”); EX2009, ¶150 n. 10.

b. Onishi’s Normal Power Transmission Frequencies (f_1 and f_2) are Not Substantially Different from the Resonant Frequency

Neither of Onishi’s normal power transmission frequencies, f_1 and f_2 , qualify

as a transmission frequency that is “**substantially different** from the characteristic resonant frequency resonant frequency of said inductive couple,” as required by claim 1. EX2009, ¶151.

Assuming *arguendo* that the vertical axis in Figure 4 is referring to a realistic design variable such as voltage, Onishi describes frequencies f_1 and f_2 as being at or near resonant frequency (f_0 in Onishi)—similar to the Malpas reference distinguished by Applicant during prosecution, and contrary to claim 1: “The transmission frequency during power-saving power transmission is set at **a frequency apart from the resonance frequency** (resonance peak) **as compared with the frequency during normal power transmission**, for example.” Onishi, [0053] (emphases added); *see also* EX2009, ¶¶67-75, 152.

On cross-examination, Dr. Woods discussed the context of Onishi’s description of the normal power transmission and power-saving transmission modes:

Q. What does the word “apart” mean to you in the context of paragraph 53 of Onishi?

A. I guess you would say -- I guess Onishi would say distinguishable from. I think that’s a fair word a POSITA might have used at the time.

Q. What’s an antonym for “distinguishable from”?

A. Indistinguishable from.

EX2010, 17:7-14-23. This is in part because of the “**broad mountain shape**” of the

resonance curve, which results in the normal power transmission frequencies being outside the linear or near-linear region of the resonance curve. Onishi, [0180] (“The resonance characteristics of the primary coil L1 and the secondary coil L2 when the portable telephone 510 is placed on the charger 500 (cradle) (i.e., when load exists with respect to the power transmission device 10) (see FIG. 1A) have a symmetrical and **broad mountain shape**, as shown in FIG. 4, for example.”) (emphasis added); *see also* EX2009, ¶152.

Thus, Petitioner has failed to establish that the normal power transmission frequencies (f_1 and f_2) are substantially different from the resonant frequency, as required by limitation [1.5]. EX2009, ¶153.

c. Onishi’s Power-Saving Mode Frequency (f_3) is Not a Transmission Frequency that is Substantially Different from the Resonant Frequency

Onishi’s power-saving mode frequency f_3 —while “set at a frequency apart from the resonance frequency” (Onishi, [0053])—is neither described, shown, nor otherwise disclosed as a transmission frequency that is substantially different from the characteristic resonance of the inductive couple. EX2009, ¶154.

First, Petitioner has failed to demonstrate that Onishi’s power-saving mode frequency f_3 falls within the linear or near-linear regions of a “frequency-amplitude graph associated with the inductive couple,” as required by claim 1, per statements

made by the Applicant during prosecution to obtain the '204 Patent. EX2009, ¶155. Onishi merely describes the frequency f_3 as being “apart” from the resonance frequency f_0 . Simply being “apart” is not sufficient to qualify as “substantially different.” Dr. Mercier highlights the significance of being far enough from peak resonance to mitigate against large, unintended fluctuations in induced voltage:

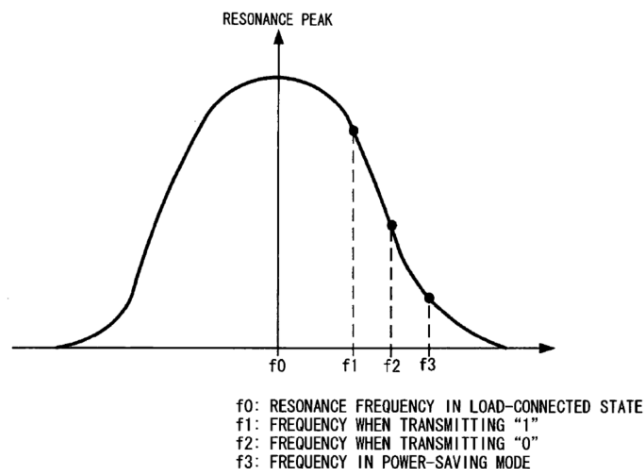
[I]t is plain from the claim language itself that the transmission frequency must be meaningfully different from the characteristic resonant frequency of the inductive couple. **A POSITA would also presume this difference to serve a purpose, e.g., over a transmission frequency that is simply “different” from the resonance frequency. The specification states the purpose and goal of this requirement quite clearly, namely, to avoid operating at or near the resonance peak to mitigate against large unintended fluctuations in induced voltage.** Such fluctuation may occur, for example, at transmission frequencies located in regions 4a or 4b of the frequency-amplitude graph depicted in Figure 6b.

EX2009, ¶98 (emphasis added).

Dr. Mercier further explains that operating at a transmission frequency that is substantially different from the resonant frequency—as opposed to simply “different” or “apart from” resonant frequency—ensures that “there is some room for the incremental fluctuation of the transmission frequency (δf) without incurring large unpredictable fluctuations of induced voltage.” *Id.* at ¶103.

Second, assuming *arguendo* that Petitioner’s reliance on Onishi’s Figure 4 is proper—which it is not—the figure is at best unclear as to whether frequency f_3 lies within a near-linear or **non**-linear region of the resonance curve, the latter being in direct contravention of the stated location of the transmission frequency on a frequency-amplitude graph. EX1002, 62 (explaining that a POSITA “would appreciate that the term ‘*substantially different from said characteristic resonant frequency*’ . . . should be interpreted to mean that the frequency of the driving voltage **is selected so as to lie within one of the near-linear regions** of a frequency-amplitude graph associated with the inductive couple” (emphasis added)); see also EX2009, ¶157.

FIG. 4



Onishi, Fig. 4. Further, operating in the non-linear region of the frequency-amplitude graph (even if not at or near resonance) would only undermine the predictability of

the system, contrary to the stated intent of the '204 Patent. EX2009, ¶157; *see also id.* at ¶58 (discussing benefits, stability, and predictability of linear control systems).

Third, Onishi describes power-saving mode frequency f_3 as corresponding to the region in which little to no power is transmitted to the receiver. Onishi, [0178] (“a small amount of power is continuously transmitted in the power-saving mode after the battery has been fully charged based on the above consideration”); *id.* at [0186] (“This causes the power transmission control device 20 of the power transmission device 10 to switch the mode from the power-saving mode to the normal charging mode so that full-power power transmission starts, for example. This enables the power reception device 40 to continue to recharge the battery 94.”); *id.* at [0053] (“The transmission frequency during power-saving power transmission is set at a frequency apart from the resonance frequency (resonance peak) as compared with the frequency during normal power transmission, for example.”); *see also* EX2009, ¶158. Assuming *arguendo* that the vertical axis of Onishi’s Figure 4 is voltage, in essence what this means is that the power-saving mode frequency falls within the range of frequencies that result in an operation voltage that is approaching zero non-linearly, where supplied power is lower, and thus the power-saving mode frequency is outside the linear and near-linear regions of the resonance curve. EX2009, ¶158.

Accordingly, the power-saving mode transmission frequency f_3 is not a transmission frequency that is substantially different from the resonant frequency, and thereby does not satisfy the requirements of the claim limitation. *Id.* at ¶159.

d. Petitioner has Not Established that Onishi Discloses a Transmission Frequency that is Substantially Different from the Characteristic Resonant Frequency of the *Inductive Couple*

Claim limitation [1.5] requires a “driving circuit . . . configured and operable to produce said oscillating driving voltage at a transmission frequency substantially different *from said characteristic resonant frequency of said inductive couple.*” As demonstrated above in Section VI.A.1 regarding limitation [1.4], Onishi’s discussion of resonance characteristics, including its description of Figure 4, is limited to the context of the individual coil(s). Therefore, for at least the reasons stated above in Section VI.A.1, Petitioner has failed to demonstrate that Onishi discloses a transmission frequency substantially different from the characteristic resonant frequency **of the inductive couple**, as required by limitation [1.7]. EX2009, ¶160. Petitioner has effectively only addressed each of frequencies f_1 , f_2 , and f_3 relative to the characteristic resonant frequency of the individual coil(s), not of the inductive couple as required by element [1.7]. *Id.*

3. Petitioner Fails to Demonstrate that Onishi Anticipates Limitations [1.7] and [1.8]

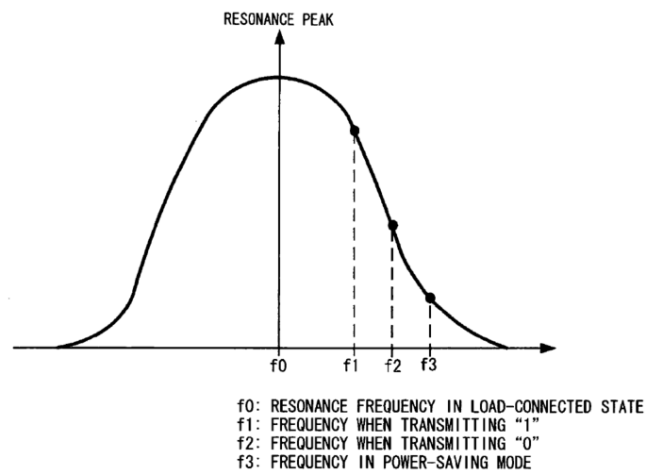
Limitation [1.7] requires “said driver is configured to: provide less power by

increasing said non-resonant transmission frequency by an incremental value when said first signal is detected by the detector,” and limitation [1.8] requires “[said driver is configured to:] provide more power by decreasing said non-resonant transmission frequency by an incremental value when said second signal is detected by the detector.” Petitioner alleges that Onishi discloses (1) “provid[ing] less power by increasing the non-resonant transmission frequency by an incremental value from ‘f1’ or ‘f2’ to ‘f3,’” Pet., 33-34, and (2) “provid[ing] more power by decreasing the non-resonant transmission frequency by an incremental value from ‘f3’ to ‘f1’ or ‘f2.’” *Id.* at 35. These arguments fail for several reasons.

First, Petitioner fails to identify any actual disclosure in Onishi of an **incremental** adjustment to a non-resonant transmission frequency, or any frequency for that matter. EX2009, ¶163; EX2013, 67:25-68:3 (“Q. Does Onishi ever use the term “increment” or “incremental”? A. Let me check. It doesn’t appear in my text search.”). Petitioner’s cited disclosure identifies three preset frequencies—f1, f2, and f3. Pet., 33-34 (citing Onishi, [0053], [0171], [0181]). Onishi explains that “frequency f1 is a frequency used when transmitting ‘1’ during normal transmission,” “frequency 2 is a frequency used when transmitting ‘0,’” and “frequency f3 is a frequency used in the power-saving mode.” *Id.* at [0181]. Accordingly, each is a discrete frequency—with a large delta—having a distinct

purpose. EX2009, ¶¶128, 163. Moreover, even if a difference between frequencies f_1 and f_2 (i.e., $f_2 - f_1$) or between frequencies f_2 and f_3 (i.e., $f_3 - f_2$) or between frequencies f_1 and f_3 (i.e., $f_3 - f_1$) were interpreted as an incremental value, Onishi does not disclose transitioning from one of frequencies f_1 , f_2 , or f_3 by adding or subtracting such a difference to or from any one of f_1 , f_2 , or f_3 . *Id.* at ¶163.

FIG. 4



Onishi, Fig. 4.

Onishi does not disclose any intervening frequencies, much less incrementally adjusting the transmission frequency to reach any of frequencies f_1 , f_2 , or f_3 . EX2009, ¶164; *see* EX2013, 66:22-67:17 (acknowledging that Onishi does not disclose any intervening frequencies between f_1 and f_2 or f_2 and f_3). In fact, Onishi

appears to preclude any other operating frequencies,¹² suggesting that these discrete values are selected, rather than reached through incremental adjustments:

The secondary-side (power-receiving-side) control circuit 52 determines that the battery 94 has been fully charged when the light-emitting device (LEDR) has been turned OFF (step S205) for five seconds, for example (step S210), and transmits the save frame to the primary-side instrument **when the frequency is other than the frequency f3 during power-saving power transmission (i.e., high frequency f1 or f2 during normal power transmission shown in FIG. 4) (step S212).**

Onishi, [0214] (emphasis added); *see also* EX2009, ¶164.

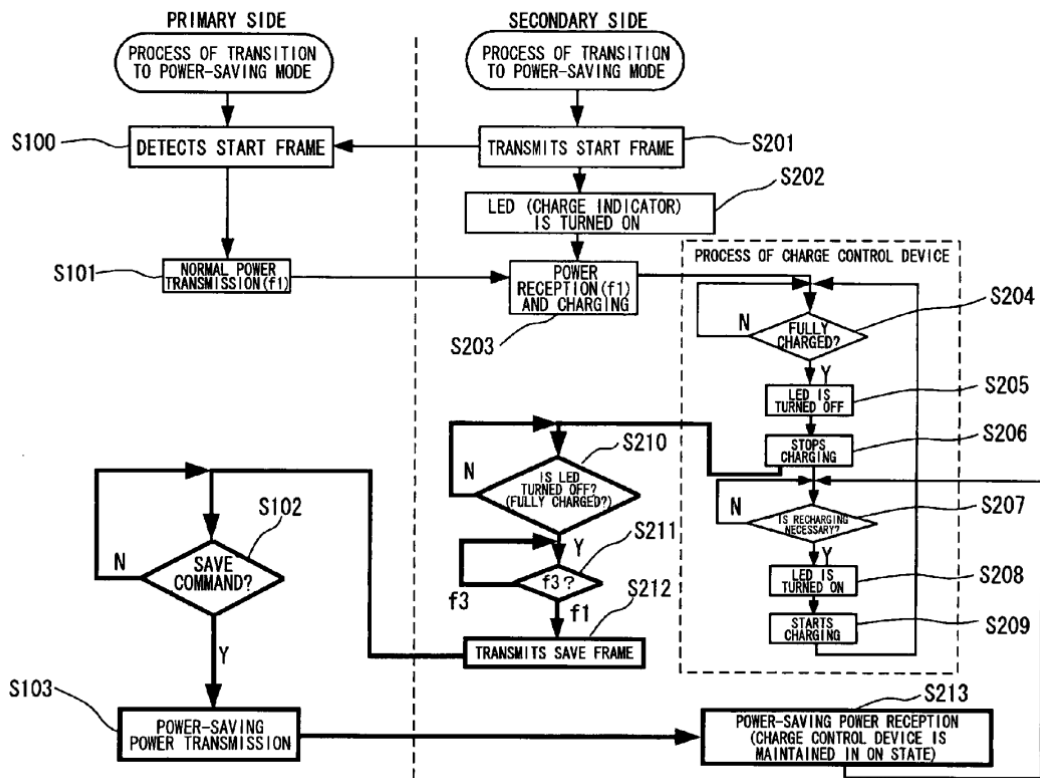
For example, the '204 Patent's claimed "incremental value" (*e.g.*, δf as illustrated in Fig. 6b of the '204 Patent) allows any frequency between f_U and f_b to be selected in the linear region, for example by using different incremental values. EX2009, ¶165; *see* EX1001, 23:5-7 ("It is noted that the positive incremental value δf_1 may be greater than, less than or equal to the negative incremental value δf_2 ."). In contrast, assuming *arguendo* that δf is equal to half the difference between frequencies f_2 and f_1 (*see* Onishi, Fig. 4),

¹² Onishi, Figure 4, shows frequency f_0 ; however, this frequency is depicted as the "resonance frequency," as opposed to a "non-resonant transmission frequency," as required by claim 1. EX2009, ¶ 164, n. 11.

a positive incremental adjustment of δf starting, for example, from frequency f_1 would result in the selection of a frequency between f_1 and f_2 . EX2009, ¶165. This functionality is not disclosed nor is it achievable by Onishi. *Id.* Similarly, assuming *arguendo* that δf is equal to half the difference between frequencies f_3 and f_2 (see Onishi, Fig. 4), a negative incremental adjustment δf would result in the selection of a frequency between f_2 and f_3 , which is not allowed by Onishi. *Id.*

Yet, even if frequency f_2 were interpreted as an incremental change between frequencies f_1 and f_3 , Onishi discloses—as illustrated below in Figure 7—that power transmission can switch from frequency f_1 to frequency f_3 without stepping through frequency f_2 . See, e.g., Onishi, [0226] (“The secondary-side instrument **performs normal power reception (frequency f_1)**, and supplies power to the load 90 to effect recharging When the battery has been again fully charged . . . , the secondary-side instrument checks that the power transmission frequency is not the power-saving transmission frequency (f_3) . . . , and transmits the save frame (including save command) to the primary-side instrument **This causes power-saving power transmission to again start**”); EX2009, ¶166. Thus, Onishi does not disclose implicitly or explicitly increasing/decreasing the non-resonant transmission frequency by an incremental value. EX2009, ¶166.

FIG. 7



Onishi, FIG. 7.

Second, Petitioner’s interpretation of claim 1 effectively reads out “incremental” from the claims. EX2009, ¶167; see EX2013, 47:2-10 (acknowledging that the term “incremental” narrows the scope of the claimed invention). Claim 1 requires increasing/decreasing the non-resonant transmission frequency by an “incremental value.” If any increase or decrease (*e.g.*, from frequency f1 to frequency f2, or from frequency f2 to frequency f3, as Petitioner

proposes) would qualify as an “incremental” increase/decrease, then the term is rendered superfluous. *Id.* Any increase/decrease in a non-resonant transmission frequency—no matter the size—would constitute an incremental change. EX2009, ¶167.

Such an interpretation is inconsistent with the plain and ordinary meaning of the term “incremental” because, as explained by Dr. Mercier:

[T]he use of the term in relation to the adjusted transmission frequency is presumed to mean more than simply increasing or decreasing (reducing) the transmission frequency. Rather, the incremental changes to the non-resonant transmission frequency must be small or gradual. At a minimum, this would require a suitably small delta between each of frequencies f_1 , f_2 , and f_3 such that a change from one frequency (e.g., f_1) to another (e.g., f_2) is necessarily an “incremental” change. Dr. Woods has not established why this would be the case. Indeed, Onishi contains no such disclosure. There is no indication that f_1 , f_2 , and f_3 are only “incrementally” different. In fact, a POSITA would interpret Onishi as suggesting the latter, in view of the vastly different functions of each of frequencies f_1 , f_2 , and f_3 .

EX2009, ¶168.

Accordingly, the change from frequency f_1 to frequency f_2 , frequency f_1 to frequency f_3 , or frequency f_2 to frequency f_3 (or frequency f_3 to frequency f_2 ,

frequency f_3 to frequency f_1 , or frequency f_2 to frequency f_1)—as disclosed by Onishi—does not satisfy the requirements of limitations [1.7] and [1.8]. EX2009, ¶169.

4. Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [10.1]

Limitation [10.1] requires “providing an oscillating voltage to said primary inductive coil at an initial transmission frequency f_t substantially different from a characteristic resonant frequency f_R of the system.” Petitioner’s argument that this limitation is disclosed by Onishi relies on its argument for limitation [1.5]. Pet., 42. Thus, for at least the reasons explained above in Section VI.A.2, Petitioner has not demonstrated that Onishi anticipates limitation [10.1]. EX2009, ¶171.

5. Petitioner Fails to Demonstrate that Onishi Anticipates Limitation [13]

Limitation [13] recites: “The method of claim 10 wherein the step of said driver adjusting said non-resonant transmission frequency further comprises: said driver reducing said non-resonant transmission frequency by an incremental value df_1 when the received feedback signal is of the first type S_a , and said driver increasing said non-resonant transmission frequency by an incremental value $+df_2$ when the received feedback signal is of the second type S_b .” As explained above in Section VI.A.1, Onishi does not disclose an incremental change in the non-resonant transmission frequency. Thus, for similar reasons explained above, Onishi’s alleged

disclosure of “reduc[ing] the non-resonant transmission frequency by an incremental value df_1 (e.g., from f_3 to f_1)” and “increas[ing] the non-resonant transmission frequency by an incremental value $+df_2$ (e.g., from f_1 or f_2 to f_3)” fails to satisfy the requirement of limitation [13]. EX2009, ¶172; *see* Pet., 47.

B. Ground 1B: Petitioner Fails to Establish that Claims 1-6, 8, and 10-13 are Rendered Obvious by Onishi in View of Purdy

Ground 1B differs from Ground 1A only in that Purdy is used for claim limitations [1.6]-[1.8], [2]-[4], and [10.4]-[10.5], but not for claim limitations [1.2], [1.5], and [10.1]. Accordingly, for the reasons that Ground 1A fails with respect to claim limitations [1.2], [1.5], [10.1] (and therefore all dependent claims), Ground 1B fails as well. EX2009, ¶173. Purdy fails to cure the above described deficiencies of Onishi, nor has Petitioner made such an allegation. *Id.*

C. Ground 2: Petitioner Fails to Establish that Claims 1-6, 8, and 10-13 are Rendered Obvious by Baarman392 in View of Tocci

Ground 2 fails because Petitioner has failed to show with particularity how the combination of Baarman392 and Tocci would render obvious claim elements [1.5], [1.7], [1.8], [10.1], and [13]. EX2009, ¶175. Further, a POSITA would not be motivated to combine Baarman392 and Tocci. *Id.* As such, Ground 2 fails. *Id.*

1. Baarman392 and Tocci Do Not Render Obvious Claim Element [1.5]

Claim [1.5] requires “said driving voltage oscillating at a non-resonant

transmission frequency substantially different from said characteristic resonant frequency of said inductive couple.” For this limitation, Petitioner relies solely on alleged disclosures in Baarman392. Specifically, Petitioner cites Baarman392’s discussion of an inverter operation at “off-resonance.” Pet., 67. However, the Petition fails to demonstrate that Baarman392 operating “off-resonance” is the claimed “transmission frequency substantially different from said characteristic resonant frequency.” EX2009, ¶176.

First, Baarman392 describes the general operation of its inverter as in the range between frequency A and frequency B, where frequency B “is somewhat less than the resonant frequency.” EX1006, [0038]. However, frequencies “somewhat less than the resonant frequency” are—by definition—not substantially different from the resonant frequency, as claimed. EX2009, ¶177.

During cross-examination, Dr. Woods attempted to equate the concepts, but in doing so effectively read out “substantially” from the claim:

- Q. Is it your opinion that frequencies that are somewhat less than the resonant frequency are substantially different than the resonant frequency.
- A. I don’t know about in general, but I would say frequency B is - we know it’s not on resonance. Baarman says so. So I would say that makes it substantially different.

EX1007, 33:12-20.¹³ Put differently, Dr. Woods stated that because frequency B “is **not on [i.e., different from]** resonance . . . that makes it **substantially** different”—*i.e.*, that “different” and “substantially different” are the same. EX2009, ¶178. Not only does this conflict with the common usage of “substantial,”¹⁴ it ignores the specification, which expressly excludes off-resonant regions 4a and 4b (described as “to either side of the resonance peak 2”) in Figure 6b from the scope of what is “substantially different from the resonant frequency of the inductive couple.” EX1001, 21:6-8 and 21:16-20; EX2009, ¶178. It also ignores one of the fundamental cannons of claim construction that all terms are to be afforded weight and meaning.

Per above, and as explained by Dr. Mercier, claims 1 and 10 require a “transmission frequency [that is] meaningfully different from [said/a] characteristic

¹³ During cross-examination Dr. Woods acknowledged that “the Baarman ’392 reference says what it says” and that “I believe that everything I’ve said about Baarman is internally consistent.” EX2013, 27:25-29:6. Accordingly, Dr. Woods opinions and testimony that were provided in IPR2024-00994 regarding Baarman392 are equally applicable to this IPR.

¹⁴ See, *e.g.*, The American Heritage Dictionary of the English Language 1376 (Houghton Mifflin Co., 4th ed. 2002) (EX2011) (“substantial . . . 5. Considerable in importance, value, degree, amount, or extent: *won the election by a substantial margin.*”); Webster’s II Dictionary 699 (Houghton Mifflin Co., 3rd ed. 2005) (EX2012) (“substantial . . . 5. Considerable <a *substantial* snowfall>”).

resonant frequency” in order “to mitigate against large unintended fluctuations in induced voltage.” EX2009, ¶¶98, 179. Accordingly, and per the specification and prosecution history of the ’204 Patent, a POSITA would interpret the transmission frequency of claims 1 and 10 to lie within the near-linear of a frequency-amplitude graph. *Id.* at ¶¶95, 98, 103, 179.

Here, Baarman392 does not describe or conclusively show by a preponderance of evidence either of frequencies A or B as lying within such a region. If anything, Baarman392 suggests a system lacking in the stability and predictability that the claims of the ’204 Patent attempt to achieve due to the express inclusion of a near (or “somewhat less than”) resonant frequency within the operable transmission frequency range. EX2009, ¶180. Accordingly, Baarman392 suggests operation at or near resonant frequency, similar to prior art systems, such as Malpas, distinguished by the Applicant (per Examiner agreement) during prosecution. *Id.*; *see also id.* at ¶¶67-71.

Next, where Petitioner would describe the range between frequency A and frequency B as “near-linear,” Baarman392 describes its power transfer curve for this range as “piece-wise linearized by a software lookup table.” EX1006, [0038].

During cross-examination, Dr. Woods explained:

Q. What is piecewise linearization.

A. Well, to a POSITA, piecewise linearization would have meant **taking a curve** and fitting it with a series of straight lines – approximating it with a series of straight line segments.

...

Q. ... If we're looking at a graph and there's a linear line on the graph, would a person of skill use piecewise linearization for a linear line represented on a graph?

A. If the line is sufficiently – in general, for a POSITA in this case or any similar case, if the line is already sufficiently linear for your application, then you don't have to – then you don't have to linear – you don't need piecewise linear unless you're concerned that perhaps the curve is shifting around.

EX2013, 69:8-14, 71:20-72:7 (emphasis added). Accordingly, as explained by Dr. Mercier, “a POSITA would understand that piece-wise linearization is only used if the curve being approximated is non-linear (if the curve were linear, a piece-wise approximation would be unnecessary).” EX2009, ¶182.

Thus, Baarman392 acknowledges that the curve between frequency A and frequency B is non-linear by the fact that a piece-wise linearization is required. EX2009, ¶183. Accordingly, the requirement for approximation by a piece-wise linear function demonstrates that the graph in Figure 3 of Baarman392 does not disclose “the near-linear regions of a frequency-amplitude graph associated with the inductive couple” (Pet., 8-9 (citing EX1002, 62)), as a piece-wise linear function is

specifically used here to approximate a non-linear curve. EX2009, ¶183.

Finally, assuming *arguendo* that the range between frequency A and frequency B—as disclosed in Baarman392—includes the near-linear region of a frequency-amplitude graph, operation of the inverter between frequency B and the beginning of the near-linear region of the frequency-amplitude curve is performed non-linearly. EX2009, ¶184. As explained above, a central aim of the '696 Patent relates to the linear regulation/control for predictably regulating power transfer. *Id.* However, Baarman392's disclosure of non-linear control would result in unpredictability and fluctuations in power expressly solved by the '696 Patent. *Id.* Thus, any power regulation that occurs in the non-near-linear portions of a frequency-amplitude curve (*i.e.*, portions that are not substantially different) fall outside the scope of claim element [1.7]. *Id.* Accordingly, Baarman392 does not render obvious claim element [1.7]. *Id.*

Petitioner has not relied on Tocci to cure these deficiencies in Baarman392. *Id.* at ¶185. Thus, Petitioner has not shown that claim element [1.7] is rendered obvious. *Id.*

2. Baarman392 and Tocci Do Not Render Obvious Claim Element [1.7]

Limitation [1.7] requires “said driver is configured to: provide less power by increasing said non-resonant transmission frequency by an incremental value when

said first signal is detected by the detector.” Petitioner alleges that Baarman³⁹² discloses a frequency controller that “is configured to provide less power by increasing the non-resonant transmission frequency by an incremental value when a feedback signal is detected that indicates an abnormal charging condition.” Pet., 71-72; *see* EX2009, ¶186.

This alleged increase of the transmission frequency—from frequency B to frequency A in Figure 3—would occur at or near the resonant frequency. *See* EX1006, [0038] (explaining that “[f]requency B is somewhat less than the resonant frequency,” and is thus at or near the resonant frequency); EX2010 at 33:12-20 (“Q. Is it your opinion that frequencies that are somewhat less than the resonant frequency are substantially different than the resonant frequency. A. I don’t know about in general, but I would say frequency B is -- we know it’s not on resonance. Baarman says so. So I would say that makes it substantially different.”); EX2009, ¶187. Accordingly, this adjustment is not an incremental increase to a **non-resonant** transmission frequency in the near-linear region, as required by claim element [1.7]. *See* EX1006, [0038]; EX2009, ¶187.

For example, the ’204 Patent’s claimed “incremental value” (*e.g.*, δf as illustrated in Fig. 6b of the ’204 Patent) allows any frequency between f_U and f_b to be selected in the linear region, for example by using different incremental values.

See EX1001, 23:5-7 (“It is noted that the positive incremental value δf_1 may be greater than, less than or equal to the negative incremental value δf_2 .”). However, as explained above, operation of the inverter between frequency B and frequency A is performed non-linearly. EX2009, ¶188.

Accordingly, Baarman392’s disclosure of a transmission frequency change that occurs at or near the resonant frequency does not satisfy the requirement of limitation [1.7]. EX2009, ¶189.

3. Baarman392 and Tocci Do Not Render Obvious Claim Element [1.8]

Limitation [1.8] requires “said driver is configured to: provide more power by decreasing said non-resonant transmission frequency by an incremental value when said second signal is detected by the detector.” Petitioner alleges that Baarman392 discloses a frequency controller that “is configured to provide more power by decreasing the non-resonant transmission frequency by an incremental value when there is no indication of an abnormal charging condition (e.g., an over-current or over-voltage situation).” Pet., 72; *see* EX2009, ¶190.

Rather than decreasing the frequency by an incremental value “when a second signal is detected by the signal detector,” as required by claim element [1.8], Baarman392 discloses “the charging step generally includes the steps of incrementally moving the frequency of the power applied to the primary coil closer

to resonance **until a feedback signal is received**” EX1006, [0019]; *see* EX2009, ¶191. In other words, reception of a feedback signal causes Baarman392 to stop decreasing the frequency of the power signal applied to the primary coil, rather than “decreasing said non-resonant frequency by an incremental value when said second signal is detected by the detector” as in claim element [1.8]. EX2009, ¶191; *see* EX1006, Fig. 7 (Block 150, steps 114, 116, 118, and 112). A POSITA would interpret the latter (detection of the second signal) as effectively triggering the decrease in frequency, which Baarman392 does not disclose. EX2009, ¶191; *see id.* at ¶121 (explaining that a ‘series of feedback signals’ (S_a or S_b) is sent to the driver, resulting in **a series of incremental increases/decreases** in transmission frequency, until the power has been adjusted to be within ‘the acceptable range’” (emphasis in original)).

Accordingly, Baarman392’s disclosure of a transmission frequency change that occurs at or near the resonant frequency does not satisfy the requirement of limitation [1.8]. EX2009, ¶192.

4. Barrman392 and Tocci Do Not Render Obvious Claim Element [10.1]

Limitation [10.1] requires “providing an oscillating voltage to said primary inductive coil at an initial transmission frequency f_t substantially different from a characteristic resonant frequency f_R of the system.” Petitioner’s argument that this

limitation is disclosed by Barrman392 in view of Tocci relies on its argument for limitation [1.5]. Pet., 79. Thus, for at least the reasons explained above in Section VI.C.3, Petitioner has not demonstrated that Barrman392 in view of Tocci renders obvious limitation [10.1]. EX2009, ¶193.

5. Baarman392 and Tocci Do Not Render Obvious Claim Element [13]

Limitation [13] recites: “The method of claim 10 wherein the step of said driver adjusting said non-resonant transmission frequency further comprises: said driver reducing said non-resonant transmission frequency by an incremental value df_1 when the received feedback signal is of the first type S_a , and said driver increasing said non-resonant transmission frequency by an incremental value $+df_2$ when the received feedback signal is of the second type S_b .” As explained above in Sections VI.C.2 and VI.C.3, Baarman392 does not disclose an incremental change in the non-resonant transmission frequency. EX2009, ¶194. Thus, for similar reasons explained above, Baarman392’s alleged disclosure of “reduc[ing] the non-resonant transmission frequency by an incremental value df_1 ” and “increas[ing] the non-resonant transmission frequency by an incremental value $+df_2$ ” fails to satisfy the requirement of limitation [13]. See Pet., 84. Accordingly, Petitioner has not demonstrated that Barrman392 in view of Tocci renders obvious limitation [13]. EX2009, ¶194.

VII. CONCLUSION

For at least the foregoing reasons, Petitioner has not met its burden of demonstrating the unpatentability of any challenged claim. Accordingly, Patent Owner requests the Board confirm the patentability the challenged claims.

Case IPR2024-00995
Patent No. 9,083,204
Patent Owner Response

Dated: May 21, 2025

Respectfully submitted,

/Robert G. Pluta Reg No 50970/
Robert G. Pluta (Reg. No. 50,970)
MAYER BROWN LLP
71 S. Wacker Drive
Chicago, IL 60606
Telephone: (312) 701-8641
Fax: (312) 706-8144
rpluta@mayerbrown.com

William J. Barrow (Reg. No. 62,813)
W. Brady Nash (Reg. No. 79,859)
MAYER BROWN LLP
1999 K Street NW
Washington, D.C., 20006
wbarrow@mayerbrown.com
bnash@mayerbrown.com

Case IPR2024-00995
Patent No. 9,083,204
Patent Owner Response

CERTIFICATE OF SERVICE

I hereby certify that on this 21st day of May, 2025, a copy of the attached **PATENT OWNER'S RESPONSE** was served by electronic mail to the attorneys of record, at the following addresses:

Michael T. Hawkins

hawkins@fr.com

Nicholas W. Stephens

nstephens@fr.com

Joseph W. Bauer

jbauer@fr.com

Thomas H. Reger II

reger@fr.com

IPR46570-0021IP1@fr.com

PTABInbound@fr.com

Respectfully submitted,

Date: May 21, 2025

By: /Robert G. Pluta Reg No 50970/
Robert G. Pluta (Reg. No. 50,970)

MAYER BROWN LLP

Case IPR2024-00995
Patent No. 9,083,204
Patent Owner Response

CERTIFICATION PURSUANT TO 37 C.F.R. §42.24(d)

Pursuant 37 CFR 42.24(d), the undersigned certifies that this Response complies with the type-volume limitation of 37 CFR §42.24(a). The word count application of the word processing program used to prepare this Response indicates that the Response contains 13969 words, excluding the parts of the brief exempted by 37 C.F.R. §42.24(a).

Respectfully submitted,

Date: May 21, 2025

By: /Robert G. Pluta Reg No 50,970)/
Robert G. Pluta (Reg. No. 50,970)

MAYER BROWN LLP