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UNITED STATES INTERNATIONAL TRADE COMMISSION
WASHINGTON, D.C.

Before the Honorable Clark S. Cheney
Chief Administrative Law Judge

In the Matter of

CERTAIN SEMICONDUCTOR DEVICES AND METHODS OF MANUFACTURING SAME AND PRODUCTS CONTAINING THE SAME

Investigation No. 337-TA-1366

PRE-HEARING BRIEF OF THE COMMISSION INVESTIGATIVE STAFF

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TABLE OF ABBREVIATIONS

CDX	Complainant's demonstrative exhibit
CPB	Complainant's pre-hearing brief
CPX	Complainant's physical exhibit
CX	Complainant's exhibit
Dep.	Deposition
JX	Joint exhibit
RDX	Respondents' demonstrative exhibit
RPB	Respondents' pre-hearing brief
RX	Respondents' exhibit
SMB	Staff's claim construction brief
Tr.	Transcript

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I. INTRODUCTION

The Commission Investigative Staff ("Staff") respectfully submits this pre-hearing brief pursuant to the procedural schedule and Ground Rule 11.2. *See* Order No. 2, G.R. 11.2 (July 3, 2023). The evidentiary hearing will determine whether there has been a violation of Section 337 based on infringement of U.S. Patent No. 8,350,294 ("the '294 patent") or U.S. Patent No. 8,404,508 ("the '508 patent") (collectively, the "Asserted Patents"). For the reasons set forth below, the Staff expects the evidence to show that there has been a violation of Section 337 as to the '294 patent, but not as to the '508 patent.

In brief, the Staff expects the evidence to show that EPC has satisfied the economic prong of the domestic industry requirement, that the asserted claims of the '294 patent are infringed, that the asserted claim of the '508 patent is not infringed, and that the technical prong of the domestic industry requirement is satisfied as to the '294 patent but not as to the '508 patent. The Staff also expects that Innoscience will be unable to show by clear and convincing evidence that any of the asserted claims are invalid.

In the event that a violation of Section 337 is found, the Staff believes that the appropriate remedy will be a limited exclusion order and cease and desist orders.

A. Procedural History

On May 26, 2023, Complainant Efficient Power Conversion Corporation ("EPC") filed a complaint with the Commission pursuant to Section 337 of the Tariff Act of 1930, as amended, 19 U.S.C. § 1337. EPC's Complaint alleged a violation of Section 337 based on infringement of certain claims of the '294 patent, the '508 patent, U.S. Patent No. 10,312,335 ("the '335 patent"), and U.S. Patent No. 9,748,347 ("the '347 patent"). *See* 88 Fed. Reg. 42756-57 (Jul. 3, 2023)

[redacted]

("Notice of Institution of Investigation"). EPC supplemented its Complaint on June 14 and 15, 2023. *See id.*

On July 3, 2023, the Commission instituted an investigation by publication of a notice in the *Federal Register* to determine:

> whether there is a violation of subsection (a)(l)(B) of section 337 in the importation into the United States, the sale for importation, or the sale within the United States after importation of certain products identified in paragraph (2) by reason of infringement of one or more of claims 1-3 of the '294 patent; claim 1 of the '508 patent; claims 1-3 of the '347 patent; and claims 1-7 of the '335 patent, and whether an industry in the United States exists as required by subsection (a)(2) of section 337.

See 88 Fed. Reg. 42756-57 (Jul. 3, 2023).

On August 4, 2023, Respondents Innoscience (Zhuhai) Technology Company, Ltd. and Innoscience America, Inc. (collectively, "Innoscience") filed their response to the Complaint and Notice of Institution of Investigation. *See* Response to the Complaint and Notice of Investigation, EDIS Doc. ID 801747 (Aug. 4, 2023) ("Answer").

On September 22, 2023, the private parties filed their initial claim construction briefs. *See* EDIS Doc. IDs 804737 and 804739. The Staff filed its claim construction brief on September 29, 2023. *See* EDIS Doc. ID 805170. The private parties filed their responsive claim construction briefs on October 6 and 10, 2023. *See* EDIS Doc. IDs 805539 and 805559. A *Markman* hearing was held on October 13, 2023. *See* Transcript, EDIS Doc. ID 809276. The issues addressed in the briefing and at the hearing remain in dispute.

On November 26, 2023, EPC filed a motion seeking partial termination of the investigation based on withdrawal of its allegations as to the '347 patent. Mot. Docket No. 1366-004. The motion was granted on December 13, 2023, and the Commission terminated the investigation as to that patent on January 11, 2024. Order No. 9 (Dec. 13, 2023); Notice of

[redacted]

Commission Determination Not to Review an Initial Determination Terminating the Investigation as to U.S. Patent No. 9,748,347 (Jan. 11, 2024).

On February 6, 2024, EPC filed a motion seeking partial termination of the investigation based on its withdrawal of allegations as to the '335 patent. *See* Mot. Docket No. 1366-008. Accordingly, the following claims remain at issue in this investigation:

Patent Number	Asserted Claims
8,350,294	1-3
8,404,508	1

See id.

On December 28, 2023, EPC filed a motion seeking a summary determination that it satisfies the economic prong of the domestic industry requirement, and Innoscience filed a motion seeking a summary determination that the '335 patent is uneforceable.[1] *See* Mot. Docket Nos. 1366-005 and -006. On January 10, 2024, the Staff filed oppositions to both motions. *See* EDIS Doc. IDs 811780 and 811781. Those motions remain pending.

The private parties filed their pre-hearing briefs and statements on January 26, 2024. A pre-hearing conference is scheduled for February 26, 2024, and the evidentiary hearing is scheduled to be held from February 26, 2024, through March 1, 2024.

B. The Parties

1. Complainant

Complainant Efficient Power Conversion Corporation ("EPC") is a Delaware corporation having a principal place of business in El Segunda, California. Compl. at ¶ 21; CPB at 30-31.

[1] Innoscience's motion regarding the unenforceability of the '335 patent will be moot if EPC's motion for partial termination is granted. *See* Mot. Docket No. 1366-008.

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EPC is involved in the research and development, design, manufacturing, marketing, and sales of gallium nitride ("GaN") semiconductor devices. *See id.*

2. Respondents

Respondent Innocience (Zhuhai) Technology Company, Ltd. has a principal place of business in Zhuhai, Guangdong, China. *See* Answer at ¶ 22; RPB at 6. Respondent Innoscience America, Inc. is a California corporation having a principal place of business in Santa Clara, California. *See* Answer at ¶ 23; RPB at 7. Innoscience (Zhuhai) Technology Company, Ltd. and Innoscience America, Inc. are collectively referred to herein as "Innoscience." Innoscience is an intregrated device manufacturer ("IDM") of GaN semiconductor products based on technology that it licenses from Interuniversity Microelectronics Centre ("IMEC"). *See* RPB at 1.

C. The Asserted Patents

1. U.S. Patent No. 8,350,294

U.S. Patent No. 8,350.294 ("the '294 patent") is titled "Compensated Gate MISFET and Method for Fabricating the Same." JX-0014 ('294 patent). The '294 patent issued on January 8, 2013, from an application filed on April 8, 2010, claiming the benefit of a provisional application filed on April 9, 2009. *See id.* The '294 patent expires on August 9, 2030. *See* Compl. at ¶ 25. The '294 patent is assigned to EPC. *See* Compl. Exh. 5; CX-0973 ('294 patent assignment).

EPC contends that the accused Innoscience products infringe claims 1-3 of the '294 patent. *See* Notice of Institution of Investigation; CPB at 105-151. And for purposes of the technical prong of the domestic industry requirement, EPC contends that its domestic industry products satisfy each limitation of claims 1-3 of the '294 patent. CBB at 223-251. The claims at issue in this investigation read as follows:

> **Claim 1.** A column III Nitride transistor comprising:
> a substrate,

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a set of III-N transition layers above the substrate,
a III-N buffer layer above the set of transition layers,
a III-N barrier layer above the buffer layer,
a compensated GaN layer above the barrier layer, and
a gate contact above the compensated GaN layer.

Claim 2. The transistor of claim 1, wherein the compensated GaN layer contains acceptor type dopant atoms passivated with hydrogen.

Claim 3. The transistor of claim 2, where the acceptor type atoms are selected from the group consisting of Mg, Zn, Be and Ca.

JX-0014 ('294 patent) at claims 1-3.

2. U.S. Patent No. 8,404,508

U.S. Patent No. 8,404,508 ("the '508 patent") is titled "Enhancement Mode GaN HEMT Device and Method for Fabricating the Same." *See* JX-0015 ('508 patent). The '508 patent issued on March 26, 2013, from an application filed on April 8, 2010, claiming the benefit of an earlier U.S. provisional application filed on April 8, 2009. *See id.* The '508 patent expires on August 16, 2031. *See* Compl. at ¶ 33. The '508 patent is assigned to EPC. *See* Compl. Exh. 6; CX-0074 ('508 patent assignment).

EPC contends that the accused Innoscience products infringe claim 1 of the '508 patent. *See* Notice of Institution of Investigation; CPB at 151-192. And for purposes of the technical prong of the domestic industry requirement, EPC contends that its domestic industry products satisfy each limitation of claim 1 of the '508 patent. CBB at 251-281. The claim at issue in this investigation reads as follows:

Claim 1. A method of forming an enhancement mode GaN transistor, the method comprising:
nucleating and growing transition layers on a substrate;
growing an III Nitride EPI layer over the transistor layers;
growing an III Nitride barrier layer over the EPI layer;
growing a GaN layer with acceptor type dopants over the barrier layer;
depositing a gate contact layer on the doped GaN layer;
applying a gate photo resistant pattern;
etching away the gate contact layer outside the gate region;

[redacted]

etching away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact;
removing the gate photo resistant pattern;
depositing a dielectric layer;
applying a contact photo resistant pattern;
etching the dielectric layer to open the drain and source contact area;
removing the contact photo resistant pattern;
depositing an Ohmic contact metal;
applying a metal photo resistant pattern;
etching the Ohmic contact metal;
removing the metal photo resistant pattern; and
performing rapid thermal annealing to form Ohmic drain and source contacts.

See JX-0015 ('508 patent) at claim 1.

D. The Products at Issue

1. The Accused Products

EPC contends that gallium nitride ("GaN") enhancement mode transistors manufactured and/or sold by Innoscience (the "Accused Products") infringe certain claims of the asserted patents. *See* CPB at 58. The Accused Products include the following:

Category	Representative Product	Included Products
Low Voltage ("LV") Accused Products	INN100W032A	INN040W048A, INN040W080A, INN040W120A, INN040FQ012A, INN040FQ015A, INN040FQ043A, INN100W032A, INN100W027A, INN100W070A, INN100FQ016A, INN100FQ025A, INN150FQ032A, INN150LA070A, ISG3201, INN100FQ030A
High Voltage ("HV") Accused Products	INN650DA140A	INN650D140A, INN650DA140A, INN650N140A, INN650D190A, INN650DA190A, INN650N190A, INN650D240A, INN650DA240A, INN650N240A, INN650D350A, INN650DA350A, INN650N350A, INN650DA500A, INN650N500A, INN650DA600, INN650N600A, INN650N05, INN650N2K2A, INN650D080BS, INN700DC140A, INN700DC240A, INN700DC350A, INN650TA030AH

See CPB at 58; RPB at 55.

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2. The Domestic Industry Products

The domestic industry products include all of EPC's GaN enhancement mode transistors and integrated circuits (the "DI Products"). *See* CPB at 47. EPC's products include both low-voltage ("LV") DI Products and high-voltage ("HV") DI Products for a total of approximately 250 DI Products, which are listed in exhibit CX-0046C. *See* CPB at 47, n.145. The representative DI Products are as follows:

Category	Representative Product
LV DI Products	EPC2016C
HV DI Products	EPC2215

See CPB at 47.

E. Applicable Legal Standards

1. Claim Construction

Claim construction is generally a matter of law. *Markman v. Westview Instruments Inc.*, 52 F.3d 969, 976 (Fed. Cir. 1995) (en banc) ("*Markman*"), *aff'd*, 517 U.S. 370 (1996). However, claim construction may involve underlying factual determinations. *See Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 837-38 (2015). The ordinary and customary meaning of the language of a claim to one of ordinary skill in the art at the time of the invention is the starting point for the analysis. *Phillips v. A.W.H. Corp.*, 415 F.3d 1303, 1312-13 (Fed. Cir. 2005) (en banc) ("*Phillips*"); *Alloc, Inc., v. U.S. International Trade Commission*, 342 F.3d 1361, 1368 (Fed. Cir. 2003) ("*Alloc*").

Every term in a claim is presumed to have meaning and any construction that would render a claim term superfluous is discouraged. *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

[redacted]

terms are presumed to have meaning in a claim.") ("*Innova*"); *Cardiac Pacemakers, Inc. v. St. Jude Med., Inc.*, 296 F.3d 1106, 1115 (Fed. Cir. 2002) ("An alternative construction would render the first monitoring term meaningless. That construction is therefore improper; this court will not rewrite claims."). In short, "[t]he claims themselves provide substantial guidance as to the meaning of particular claim terms." *Phillips*, 415 F.3d at 1314; *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996) ("*Vitronics*"); *ACTV, Inc. v. The Walt Disney Co.*, 346 F.3d 1082, 1088 (Fed. Cir. 2003) ("*ACTV*") ("the context of the surrounding words of the claim also must be considered in determining the ordinary and customary meaning of those terms").

However, "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Phillips*, 415 F.3d at 1313. The specification may act as a dictionary, explaining the invention and defining the terms used in the claims, but if a patentee is acting as his or her own lexicographer, any special definition given to a word must be clear in the specification. *Id.* at 1316; *Vitronics*, 90 F.3d at 1582-83. Moreover, the specification (and prosecution history) should not "enlarge, diminish or vary" the limitations of the claims. *Vitronics*, 90 F.3d at 1582-83; *Markman*, 52 F.3d at 979-80; *Intel Corp. v. U.S. Int'l Trade Comm'n*, 946 F.2d 821, 836 (Fed. Cir. 1991) ("Where a specification does not require a limitation, that limitation should not be read from the specification into the claims.").

In addition, the prosecution history "provides evidence of how the PTO and the inventor understood the patent." *Phillips*, 415 F.3d at 1317. As such, "it may inform the meaning of the claim language by demonstrating how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower

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than it would otherwise be." *Id.*; *Vitronics*, 90 F.3d at 1582-83; *see also Chimie v. PPG Indus., Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005) ("The purpose of consulting the prosecution history in construing a claim is to exclude any interpretation that was disclaimed during prosecution.").

Extrinsic evidence may also be considered, if needed, to assist in determining the meaning or scope of technical terms in the claims. *Phillips*, 415 F.3d at 1317-18; *Vitronics*, 90 F.3d at 1582-83. Expert testimony may be useful to "provide background on the technology at issue, to explain how an invention works, to ensure that the court's understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field." *Phillips*, 415 F.3d at 1318. However, it remains the intrinsic record, including the specification and prosecution history, that is the most significant evidence and thus determinative for interpreting the legally operative meaning of patent claim language. *Id.* at 1317.

In addition, "[b]ecause claims delineate the patentee's right to exclude, the patent statute requires that the scope of the claims be sufficiently definite to inform the public of the bounds of the protected invention, *i.e.*, what subject matter is covered by the exclusive rights of the patent. Otherwise, competitors cannot avoid infringement, defeating the public notice function of patent claims." *Halliburton Energy Services, Inc. v. M-I LLC*, 514 F.3d 1244, 1249 (Fed. Cir. 2008). Thus, a patent can be held invalid under 35 U.S.C. § 112, ¶ 2 for indefiniteness "if its claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

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2. Infringement

A determination of patent infringement involves a two-step analysis: first, the claims must be properly construed, and second, the properly construed claims must be compared to the allegedly infringing device. *See, e.g.*, *Hearing Components, Inc. v. Shure Inc.*, 600 F.3d 1357, 1370 (Fed. Cir. 2010). The first step, claim construction, is a matter of law, but the second step, comparison of the claims to the accused product, is a question of fact. *See, e.g., id.* Complainant has the burden of demonstrating infringement by a preponderance of the evidence. *Ultra-Tex Surfaces, Inc. v. Hill Bros. Chem. Co.*, 204 F.3d 1360, 1364 (Fed. Cir. 2000) ("it is axiomatic that the *patentee* bears the burden of proving infringement") (emphasis in original); *see also, e.g., Applied Med. Resources Corp. v. United States Surgical Corp.*, 448 F.3d 1324, 1333 (Fed. Cir. 2006) ("As the party asserting infringement, [patentee] ultimately bears the burden of proof.").

In order to prove direct infringement under 35 U.S.C. § 271(a), "the [complainant] must establish by a preponderance of the evidence that one or more claims of the patent read on the accused device literally or under the doctrine of equivalents." *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1310 (Fed. Cir. 2005). "Literal infringement requires that each and every claim limitation be present in the accused product." *Abraxis Bioscience, Inc. v. Mayne Pharma (USA) Corp.*, 467 F.3d 1370, 1378 (Fed. Cir. 2006). "If any claim limitation is absent from the accused device, there is no literal infringement as a matter of law." *Amgen, Inc. v. F. Hoffman-La Roche Ltd.*, 580 F.3d 1340, 1374 (Fed. Cir. 2009). But, even if an accused product does not literally infringe the asserted claim, infringement may still be found under the doctrine of equivalents. *See Graver Tank & Mfg. Co. v. Linde Air Prods. Co.*, 339 U.S. 605, 608 (1950).

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In addition to direct infringement, a violation of Section 337 may also be found based on induced infringement under 35 U.S.C. § 271(b) or contributory infringement under 35 U.S.C. § 271(c). *See, e.g., Certain Hardware Logic Emulation Systems and Components Thereof*, Inv. No. 337-TA-383, Comm'n Op. at 18-19, (Mar. 1998) ("*Hardware Logic*") (interpreting Section 337 to cover indirect infringement). A finding of inducement requires "knowledge that the induced acts constitute patent infringement." *Global-Tech Appliances, Inc. v. SEB S.A.*, 131 S.Ct. 2060, 2068 (2011); *see also Commil USA, LLC v. Cisco Systems, Inc.*, 135 S.Ct. 1920, 1926 (2015). The Federal Circuit has upheld the Commission's authority to cover "goods that were used by an importer to directly infringe post-importation as a result of the seller's inducement." *Suprema, Inc. v. Int'l Trade Comm'n*, 796 F.3d 1338, 1352-53 (Fed. Cir. 2015) (en banc). Similarly, "[i]n order to succeed on a claim of contributory infringement, in addition to proving an act of direct infringement, plaintiff must show that defendant knew that the combination for which its components were especially made was both patented and infringing and that defendant's components have no substantial non-infringing uses." *Cross Med. Prods., Inc.*, 424 F.3d at 1312 (internal quotation marks omitted).

3. Domestic Industry (Technical Prong)

Section 337 declares unlawful the importation, the sale for importation, or the sale within the United States after importation of articles that infringe a valid and enforceable U.S. patent only if "an industry in the United States, relating to articles protected by the patent … concerned, exists or is in the process of being established." 19 U.S.C. § 1337(a)(2). The requirement that an industry exists includes both an economic prong (*i.e.*, there must be an industry in the United States) and a technical prong (*i.e.*, that industry must relate to articles protected by the patent at issue). *See, e.g., Certain Ammonium Octamolybdate Isomers*, Inv. No. 337-TA-477, Comm'n

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Op. at 55 (Jan. 2004). The complainant bears the burden of proving the existence of a domestic industry. *See, e.g., Certain Methods of Making Carbonated Candy Products*, Inv. No. 337-TA-292, Comm'n Op. at 34-35 (Jun. 1991).

The technical prong of the domestic industry requirement is satisfied when it is determined that the complainant practices at least one claim of each asserted patent. *Alloc, Inc. v. Int'l Trade Comm'n*, 342 F.3d 1361, 1375 (Fed. Cir. 2003). The test for determining whether a complainant practices a claim of a patent at issue is essentially the same as that for infringement, i.e., it requires that a complainant's domestic product practice each limitation of a claim. *Id.*

4. Invalidity

a) Anticipation

A determination of whether a prior art reference anticipates a claim under 35 U.S.C. § 102 is a two-step inquiry: the first step is the proper construction of the claims, and the second step is the comparison of the properly construed claims to the prior art. *See, e.g., Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928, 933 (Fed. Cir. 2003). "'Anticipation requires the presence in a single prior art disclosure of all of the elements of a claimed invention arranged as in the claim.' The requirement that the prior art elements themselves be 'arranged as in the claim' means that claims cannot be 'treated . . . as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning.'" *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (citation omitted). However, the disclosure of the prior art reference may be inherent rather than express – "if the prior art necessarily functions in accordance with, or includes, the claim's limitations, it anticipates." *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1376 (Fed. Cir. 2005) (internal quotation

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[redacted]

marks omitted). Anticipation is a question of fact. *Finisar Corp. v. The DirecTV Group, Inc.*, 523 F.3d 1323, 1334 (Fed. Cir.), *cert. denied*, 129 S. Ct. 754 (2008).

b) Obviousness

With respect to obviousness, the key question for purposes of determining whether claims are invalid is whether "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a). This analysis hinges on the four Graham factors – (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966); s*ee also, e.g., Scanner Technologies Corp. v. ICOS Vision Sys. Corp*., 528 F.3d 1365, 1379-80 (Fed. Cir. 2008). The ultimate conclusion as to whether the claimed invention is obvious is a question of law based on these underlying facts. *See, e.g., Pharmastem Therapeutics, Inc. v. Viacell, Inc.*, 491 F.3d 1342, 1359 (Fed. Cir. 2007), cert. denied, 552 U.S. 1258 (2008).

The U.S. Supreme Court has explained that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 416 (2007). Thus, "[t]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents." *Id*. at 419. Nevertheless, the analysis must still identify "an apparent reason to combine known elements in the fashion claimed by the patent at issue." *Id*. at 418.

[redacted]

II. STATUTORY AUTHORITY AND IMPORTATION

A. Personal Jurisdiction

By filing a complaint and participating in this investigation, EPC has consented to personal jurisdiction before the Commission in this investigation. *See Certain Toner Cartridges, Components Thereof, and Systems Containing the Same*, Inv. No. 337-TA-1174, Initial Determination at 34-35 (Jul. 20, 2020), *not reviewed*, Comm'n Notice (Sept. 8, 2020). Respondents have also consented to personal jurisdiction by, among other things, responding to the complaint and Notice of Institution of Investigation, participating in discovery, and appearing before the Chief ALJ at case management conferences and a *Markman* hearing. Furthermore, Respondents do not dispute that the Commission has statutory authority over the investigation. *See* RPB at 62.

B. *In Rem* Jurisdiction

The Accused Products are manufactured in China and imported into the United States through various channels. *See infra* Section IV; *see also* JX-0036C at 98:18-99:4; CX-0513C to CX-0533C; CX-0034; CX-0802C to CX-0831C. The Commission therefore has statutory authority over the accused products. *See, e.g., Sealed Air Corp. v. United States Int'l Trade Comm'n*, 645 F.2d 976, 985-86 (C.C.P.A. 1981).

III. OWNERSHIP

EPC is the owner by assignment of the Asserted Patents. *See* CPB at 72; CX-0973 ('294 patent assignment); CX-0044 ('508 patent assignment). The recording "creates a presumption of validity as to the assignment." *SiRF Tech., Inc. v. Int'l Trade Comm'n*, 601 F.3d 1319, 1328 (Fed. Cir. 2010). Respondents do not dispute that EPC owns the asserted the '294 and'508 patents in this investigation. *See* RPB at 62. Accordingly, the Staff expects the evidence to show that EPC is the owner of the asserted patents.

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[redacted]

IV. IMPORTATION

To prove a violation of section 337, the complainant must show "[t]he importation into the United States, the sale for importation, or the sale within the United States after importation by the owner, importer, or consignee" of products accused of infringement. 19 U.S.C. §§ 1337(a)(1)(A)-(B). The evidence is expected to show that Innoscience has imported [redacted] Accused Products into the United States. *See* CPB at 73-74; CX-0513C to CX-0533C; CX-0802C to CX-0831C; CPX-0001C; CPX-0121C; CX-0015; CX-0515; CX-0042C; CX-843C; CX-0847C; CX-0837C. Moreover, Innoscience does not contest that the importation requirement of Section 337 is satisfied. *See* RPB at 62.

V. U.S. PATENT NO. 8,350,294

U.S. Patent No. 8,350.294 ("the '294 patent") is titled "Compensated Gate MISFET and Method for Fabricating the Same." *See* JX-0014 ('294 patent). The '294 patent relates to enhancement mode gallium nitride ("GaN") transistors. *See id.* at 1:14-15. According to the patent, "[t]hese types of devices can typically withstand high voltages, e.g., 100 Volts, while operating at high frequencies, e.g., 100 kHz-10 GHz." *Id.* at 1:31-33. Enhancement mode devices (as opposed to depletion mode devices) are desirable for many applications because they are off, blocking current flow, unless a positive gate bias is applied. *Id.* at 1:50-54. This provides added safety and requires simpler, less expensive drive circuitry. *Id.* Although GaN transistors are inherently depletion mode devices, they can be made to operate as enhancement mode devices by using a p-doped GaN semiconductor ("p-GaN") layer as the gate material. *Id.* at 1:45-54. Conventional enhancement mode GaN transistors, however, exhibit undesirable leakage current due to gate charge injection. *Id.* at 2:3-6.

[redacted]

The '294 patent seeks to reduce leakage current by using either a compensated GaN layer or a semi-insulating layer beneath the gate contact of the transistor. *Id.* at 2:7-19. Fig. 2 of the '294 patent shows an embodiment of the claimed invention with a compensated semiconductor layer 38 as the gate material below the gate contact 37.

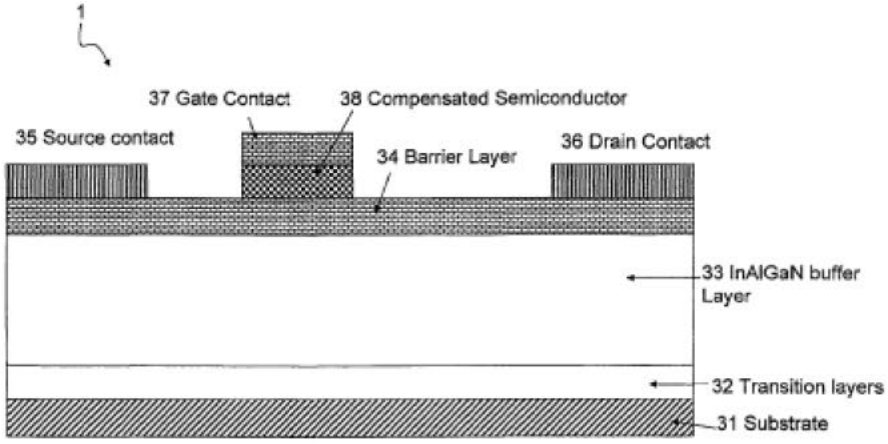


FIG. 2

In a preferred embodiment, the compensated semiconductor layer 38 is formed of "AlGaN or GaN with a deep level passivated p-type impurity such as, for example, Mg, Zn, Be, Cd, or Ca." *Id.* at 3:10-12. According to the patent, this "leads to low gate leakage during device operation" and "the insulating nature of compensated layer 38 reduces the gate capacitance of the device," thus providing an improved enhancement mode GaN transistor. *Id.* at 3:17-21.

A. Claim Construction

1. Level of Ordinary Skill in the Art

The '294 patent generally relates to the design and fabrication of enhancement mode gallium nitride ("GaN") transistors. A person of ordinary skill in this field of art would have been familiar with the electrical and structural properties of nitride semiconductors, as well as semiconductor manufacturing processes, including photolithography, the growth and deposition

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[redacted]

of materials, the etching and removal of materials, diffusion, ion implantation, metallization, etc. The Staff thus submits that such a person would have been a well-educated professional.

Consistent with the relative complexity of the asserted patents' disclosures, Innoscience asserts that a person of ordinary skill in the art at the time of the invention "would have had at least a bachelor's degree in electrical engineering, chemical engineering, physics, or material science or a closely related field and at least two years of experience in semiconductor device design or fabrication, including the processing of semiconductor materials, analysis of device operation, or the development of new device topologies as of the relevant priority date." *See* RPB at 262, *citing* RX-0126C (Lebby Rep.) at ¶ 79. Furthermore, additional relevant industry experience might compensate for lack of formal education and vice versa. *See id.* EPC does not address the level of ordinary skill in its pre-hearing brief, and has thus waived the issue. *See generally* CPB (not addressing the level of ordinary skill in the art).

Accordingly, for the reasons set forth above, the Staff expects the evidence to show that Innoscience's proposed level of ordinary skill in the art of the '294 patent is correct and should thus be adopted.

2. Disputed Term

The following term of the '294 patent remains in dispute:

Term	EPC	Innoscience	Staff
"a compensated GaN layer"	"a semiconductor GaN gate material in which one type of impurity (for example, donor) cancels the electrical effects of the other type of impurity (for example, acceptor)"	"a doped GaN layer formed with a step to passivate its impurities" Which is a "product-by-process" limitation.	"a GaN layer in which one type of impurity cancels the electric effects of another type of impurity" Not a "product-by-process" limitation.

[redacted]

	Not a "product-by-process" limitation.		

CPB at 20; RPB at 62.

Pursuant to Ground Rule 7.2, the Staff respectfully cites to the arguments set out in its claim construction brief and the arguments presented at the October 13, 2023, *Markman* hearing for its position on the dispute identified above. *See* SMB at 5-11; Tr., EDIS Doc. ID 809276 (Oct. 13, 2023).

B. Infringement

The Staff expects the evidence to show that the Accused Products infringe claims 1-3 of the '294 patent. *See* CPB at 104-151. EPC relies upon the expert opinions of Dr. E. Fred Schubert, who is expected to testify that the Accused Products satisfy each limitation of claims 1-3 of the '294 patent. *See id.* Conversely, Innoscience contends that the Accused Products do not infringe because they do not have "a compensated GaN layer" as required by the claims. *See* RPB at 67-130. This argument is addressed below.

1. Limitation 1[e]: "a compensated GaN layer above the barrier layer"

EPC contends that the Accused Products satisfy limitation 1[e] of the '294 patent, which recites "a compensated GaN layer above the barrier layer." *See* CPB 122-145. In the context of the Accused Products, a compensated GaN layer is one in which the electrical effects of magnesium ("Mg") acceptors is cancelled or passivated under any of the proposed constructions. *See id.* EPC's expert, Dr. Schubert, is expected to testify that the electrical effects of magnesium acceptors in the GaN layers at issue has been cancelled by hydrogen passivation, and thus satisfy this limitation under any of the proposed constructions. *See id.*

First, Dr. Schubert will testify that [redacted]

[redacted]

See CPB at 126-128. [redacted] *See id.* Dr. Schubert bases his opinion on his review of the epitaxial growth recipes for the representative Accused Products. *See id.* These recipes show that Innsocience uses [redacted]. *See* CPB at 127; CPX-0126C. Innoscience further [redacted] *See* CPB at 128; CPX-0126C. [redacted]. *See id.*

Second, Dr. Schubert will testify that Innoscience [redacted]. *See* CPB at 128-135. [redacted] *See id.*

Third, Dr. Schubert will testify that secondary ion mass spectrometry (SIMS) profiles of the Accused Products, when viewed in the context of the epitaxial growth recipes, [redacted]. *See* CPB at 136-139; CPX-0134C. While the SIMS profiles do not conclusively establish that the Mg acceptors are activated, [redacted] consistent with Dr. Schubert's opinions. *See id.*

Finally, Dr. Schubert will testify that the electrical characteristics of the Accused Products are consistent with the teachings of the '294 patent, which explains that by compensating the doped GaN layer, the gate turn-on voltage is shifted higher, and the gate leakage current is reduced. *See* CPB at 139-145. As with the SIMS profiles, the electrical

[redacted]

characteristics of the resulting devices does not conclusively establish that this claim limitation is met. However, it provides further evidence consistent with Dr. Schubert's analysis. *See id.*

Conversely, Innoscience contends that Dr. Schubert's analysis is flawed. *See* RPB at 67-130. Specifically, Innoscience argues that the Accused Products do not have a "compensated GaN layer" because they use a Schottky gate contact, which requires a conductive p-GaN layer. *See* RPB at 91-97. In addition, Innoscience contends that post-epitaxial processing, [redacted] causes activation of magnesium acceptors, which is consistent with the SIMS data. *See* RPB at 97-106. Finally, Innoscience argues that its testing confirms that the alleged compensated GaN layer is conductive, as opposed to compensated. *See* RPB at 106-111.

These criticisms, however, are not expected to rebut Dr. Schubert's opinion. *See* CBP at 104-151. As Dr. Schubert will explain, the testing offered by Innoscience is flawed and fails to show that that the alleged compensated GaN layer in the Accused Products is conductive. *See* CPB at 128-135. For example, the test structures used by Innoscience were created for purposes of this litigation, and fail to account for additional layers found in its commercial products. *See* CPB at 132. By failing to account for these additional layers, Innoscience's testing does not establish that the alleged compensated GaN layer is conductive. *See id.* Viewed as a whole, Innoscience's criticisms do not appear to refute Dr. Schubert's analysis and opinions. *See id.* at 104-151.

In sum, the evidence is expected to show that magnesium acceptors are passivated by [redacted] used to form a doped GaN layer in the Accused Products. *See* CPB at 126-128. Innoscience [redacted] *See* CPB at 128-135. [redacted]. *See id.* This is consistent with test data including SIMS profiles and

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[redacted]

electrical characteristics of the resulting devices. *See id.* at 136-145. The evidence is thus expected to show that the Accused Products satisfy limitation 1[e].

2. Remaining Limitations

Innoscience does not otherwise contest that the Accused Products satisfy the remaining limitations of claims 1-3 of the '294 patent. *See* RPB at 67-130. In this regard, Dr. Shubert is expected to offer unrebutted testimony that the remaining limitations of claims 1-3 of the '294 patent are met by the Accused Products. *See* CPB at 104-151. The Staff thus expects the evidence to show that the Accused Products satisfy those limitations. *See id.*

3. Conclusion

For the reasons set forth above, the Staff expects the evidence to show that the Accused Products satisfy each limitation of the asserted claims, and thus infringe claims 1-3 of the '294 patent. *See* CPB at 104-151.

C. Technical Prong

The Staff expects the evidence to show that the DI Products satisfy each limitation of claims 1-3 of the '294 patent. *See* CPB at 223-251. EPC relies upon the expert opinions of Dr. E. Fred Schubert, who is expected to testify that each limitation of claims 1-3 are satisfied by the DI Products. *See id.* Conversely, Innoscience contends that EPC fails to satisfy the technical prong of the domestic industry requirement as to the '294 patent for two reasons: (i) EPC has not shown that the DI Products have "a compensated GaN layer"; and (ii) EPC has not shown that its EPC2016C and EPC2215 products are representative of the other alleged domestic industry products. RPB at 130-155. Each of these arguments is addressed below.

1. Limitation 1[e]: "a compensated GaN layer above the barrier layer"

EPC contends that the DI Products satisfy limitation 1[e] of the '294 patent, which recites "a compensated GaN layer above the barrier layer." *See* CPB 240-247. In the context of the DI

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[redacted]

Products, a compensated GaN layer is one in which the electrical effects of magnesium ("Mg") acceptors is cancelled or passivated under any of the proposed constructions. *See id.* EPC's expert, Dr. Schubert, is expected to testify that the electrical effects of magnesium acceptors in the GaN layers at issue has been cancelled by hydrogen passivation, and thus the identified layer is a compensated GaN layer. *See* CPB at 240.

First, Dr. Schubert will testify that the [redacted] results in the passivation of magnesium (Mg) acceptors in the grown film. *See* CPB at 241-242. Dr. Schubert bases his opinion on his review of the epitaxial growth recipes for the representative DI Products. *See id.* These recipes show that [redacted]

Second, Dr. Schubert will testify that [redacted]

[redacted]

Third, Dr. Schubert will testify that secondary ion mass spectrometry (SIMS) profiles, when viewed in the context of the epitaxial growth recipes, confirms that [redacted]. [redacted] *See id.*

Finally, Dr. Schubert will testify that the electrical characteristics of the gates in EPC's DI Products are consistent with the '294 patent, which explains that by compensating the doped GaN layer, the gate turn-on voltage is shifted higher, and the gate leakage current is reduced. *See* CPB at 245-247. As with the SIMS profiles, the electrical characteristics of the resulting devices does not conclusively establish that this claim limitation is met. However, it provides further evidence consistent with Dr. Schubert's analysis. *See id.*

Conversely, Innoscience contends that Dr. Schubert's analysis is flawed. *See* RPB at 131-151. Specifically, Innoscience argues that EPC's fabrication process causes activation of Mg acceptors in the cooldown process and during post-epitaxial steps, including high-temperature anneals. *See id.* Finally, Innoscience argues that the SIMS profiles and the electrical characteristics of the gates in the DI Products do not establish that a compensated GaN layer is formed as required by the claim. *See id.* These criticisms, however, are not expected to rebut Dr. Schubert's opinion. *See* CBP at 241-247. While it is true that SIMS profiles and the electrical characteristics of the DI Products do not conclusively establish the presence of a compensated GaN layer, they are consistent with and support Dr. Schubert's analysis. *See id.* Dr. Schubert does not rely on any one single piece of evidence in forming his opinions. *See id.* To the contrary, his opinions are based on his review of the fabrication recipes and process steps used in the fabrication of the DI Products, the available test results and measurements, and his

[redacted]

conversations with knowledgeable EPC employees. *See id.* Viewed as a whole, Innoscience's criticisms do not appear to refute Dr. Schubert's analysis and opinions. *See id.*

In sum, the evidence is expected to show that [redacted]. *See* CPB at 241-242. [redacted] *See* CPB at 242-243. Accordingly, the doped GaN layer remains compensated. *See id.* As discussed above, this is consistent with test data, including SIMS profiles and electrical characteristics of the resulting devices. *See id.* at 243-247. The evidence is thus expected to show that the EPC DI Products satisfy limitation 1[e].

2. Representative Products

EPC contends that EPC2016C is representative of its low voltage products and that EPC2215 is representative of its high voltage products. *See* CPB at 47-58. And in this regard, Dr. Schubert is expected to testify that he reviewed fabrication process flows for other domestic industry products, and found that they carried out the relevant steps of his analysis and that any differences were immaterial. *See* CPB at 58. Dr. Schubert also spoke to EPC employees with relevant knowledge about the design and manufacture of the DI Products, including Dr. Lidow, Ms. Nakata, Dr. Beach, and Dr. Cao in confirming that the analyzed products are in fact representative. *See* CPB at 47-58.

Innoscience, however, contends that the DI Products "differ in composition, fabrication, and structure" and, as such, EPC has not shown that the EPC2016C and EPC2215 products are representative. *See* RPB at 152. In this regard, Innoscience's expert, Dr. Doolittle, analyzed the DI Products and identified four different gate structures that he characterizes as Types I-IV. *See id.* But while there are some differences between the DI Products, Dr. Doolittle's own analysis shows that each of the gate structures has a p-GaN layer, which is the structure identified by EPC as satisfying the disputed limitation 1[e] of the '294 patent. *See id.*; see also 130-151. Based on the expected

[redacted]

testimony of Dr. Schubert and the EPC employees, the Staff expects the evidence to show that the products analyzed by Dr. Schubert are representative of the EPC DI Products at issue in this investigation. *See* CPB at 47-58.

3. Remaining Limitations of Claim 1-3

Innoscience does not otherwise contest that the DI Products satisfy remaining limitations of claims 1-3 of the '294 patent. *See* RPB at 130-155. In this regard, Dr. Shubert is expected to offer unrebutted testimony that the remaining limitations of claims 1-3 of the '294 patent are met by the Accused Products. *See* CPB at 224-251. The Staff thus expects the evidence to show that these remaining limitations are met for the reasons set forth by EPC. *See id.*

4. Conclusion

For the reasons set forth above, the Staff expects the evidence to show that the EPC DI Products practice each limitation of claims 1-3 of the '294 patent. *See* CPB at 224-251. EPC is thus expected to satisfy the technical prong of the domestic industry requirement with respect to the '294 patent.

D. Validity

Respondents contend that all asserted claims of the '294 patent are invalid as anticipated and/or rendered obvious by certain prior art. RPB at 155-233. The patent at issue is presumed to be valid. *See* 35 U.S.C. § 282. Although Complainant has the burden of proving a violation of Section 337, it can rely upon the presumption of validity, which Respondents must overcome by clear and convincing evidence. *See, e.g., Checkpoint Sys., Inc. v. United States Int'l Trade Comm'n*, 54 F.3d 756, 671 (Fed. Cir. 1995).

[redacted]

As discussed below, the Staff does not expect the evidence to show that any asserted claim of the '294 patent is invalid under any of the proposed constructions.[2]

1. Anticipation

As discussed above, a determination of whether a prior art reference anticipates a claim under 35 U.S.C. § 102 is a two-step inquiry: the first step is the proper construction of the claims, and the second step is the comparison of the properly construed claims to the prior art. *See, e.g., Medichem, S.A. v. Rolabo, S.L.*, 353 F.3d 928, 933 (Fed. Cir. 2003). "'Anticipation requires the presence in a single prior art disclosure of all of the elements of a claimed invention arranged as in the claim.' The requirement that the prior art elements themselves be 'arranged as in the claim' means that claims cannot be 'treated . . . as mere catalogs of separate parts, in disregard of the part-to-part relationships set forth in the claims and that give the claims their meaning.'" *Therasense, Inc. v. Becton, Dickinson & Co.*, 593 F.3d 1325, 1332 (Fed. Cir. 2010) (citation omitted). However, the disclosure of the prior art reference may be inherent rather than express – "if the prior art necessarily functions in accordance with, or includes, the claim's limitations, it anticipates." *Perricone v. Medicis Pharm. Corp.*, 432 F.3d 1368, 1376 (Fed. Cir. 2005) (internal quotation marks omitted). Anticipation is a question of fact. *Finisar Corp. v. The DirecTV Group, Inc.,* 523 F.3d 1323, 1334 (Fed. Cir.), *cert. denied*, 129 S. Ct. 754 (2008).

Innoscience contends that claim 1 of the '294 patent is invalid as anticipated by U.S. Patent Publication No. 2006/0145189A1 ("Beach189") (RX-0011). Beach189 was published on July 6, 2006, which is more than one year before the earliest effective filing date of the '294

[2] In its pre-hearing brief, Innoscience raises a belated indefiniteness argument regarding the Staff's and EPC's proposed constructions of "compensated GaN layer." *See* RPB at 224-225. Innsocience, however, did not timely raise indefiniteness in the parties' Joint Claim Construction Statement (EDIS Doc. ID 804365 (Sept. 15, 20223)) as G.R. 7.1 requires. Innoscience's argument is thus waived.

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[redacted]

patent. Beach 189 thus qualifies as prior art under at least 35 U.S.C. § 102(b). For the reasons set forth below, the Staff does not expect the evidence to show that claim 1 of the '294 patent is anticipated. *See* CPB at 324-330.

Beach189 discloses a depletion mode transistor with a support body 12, a heterojunction formed by a first III-nitride semiconductor body 14 and a second III-nitride semiconductor body 16. *See id.* at ¶ 25. A gate structure is formed on a field plate 25, providing a field relaxation feature 24 as shown in the figure below. *See id.* at ¶¶ 26, 28.

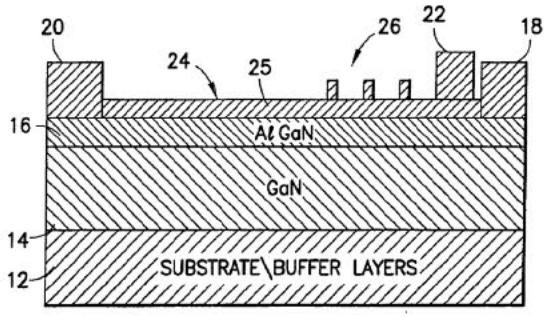


FIG.4

RX-0011 (Beach189) at Fig. 4. According to Beach189, "the field relaxation feature 24 is an ultra resistive field plate 25 formed with a highly electrically resistive material, such as, silicon rich SiN, compensated GaN or the like material." *See id.* at ¶ 26.

Innoscience contends that Beach189 teaches each limitation of claim 1 of the '294 patent. *See* RPB at 161-175. Conversely, EPC argues that Beach189 is directed to very different technology, and fails to disclose a "compensated GaN layer," as claim 1 of the '294 patent requires. *See* CPB at 324-330. As will be explained by Dr. Schubert, Beach189 provides a field plate, as opposed to a compensated layer, in a depletion mode transistor. *See* CPB at 324. The evidence is thus expected to show that Beach189 does not anticipate claim 1 of the '294 patent because it fails to disclose a "compensated GaN layer," as the claim requires. *See* CPB at 161-175.

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2. Obviousness

With respect to obviousness, the key question for purposes of determining whether claims are invalid is whether "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a). This analysis hinges on the four Graham factors – (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966); s*ee also, e.g., Scanner Technologies Corp. v. ICOS Vision Sys. Corp*., 528 F.3d 1365, 1379-80 (Fed. Cir. 2008). The ultimate conclusion as to whether the claimed invention is obvious is a question of law based on these underlying facts. *See, e.g., Pharmastem Therapeutics, Inc. v. Viacell, Inc.*, 491 F.3d 1342, 1359 (Fed. Cir. 2007), cert. denied, 552 U.S. 1258 (2008).

The U.S. Supreme Court has explained that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *KSR Int'l Co. v. Teleflex Inc*., 550 U.S. 398, 416 (2007). Thus, "[t]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents." *Id*. at 419. Nevertheless, the analysis must still identify "an apparent reason to combine known elements in the fashion claimed by the patent at issue." *Id*. at 418.

For purposes of their allegations of invalidity under 35 U.S.C. § 103, Respondents rely upon the following references: (i) U.S. Patent Publication No. 2006/0145189A1 ("Beach189") (RX-0011); (ii) U.S. Patent Publication No. 2007/0164315A1 ("Smith") (RX-0040); (iii) U.S.

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[redacted]

Patent Publication No. 2008/0087915A1 ("Uemoto") (RX-0073); (iv) Japanese Patent Publication No. JP2006253224A ("Kigami") (RX-0079); and (v) Taiwanese Patent Publication No. TW200414540A ("Sheu") (RX-0081). *See* RPB at 156. It does not appear to the Staff that the references relied upon by Respondents, either alone or in combination, render invalid as obvious any claim of the '294 patent.

a) Scope and Content of Prior Art

(1) U.S. Patent Publication No. 2006/0145189A1 ("Beach189")

As discussed in the context of anticipation, U.S. Patent Publication No. 2006/1045189A1 ("Beach189") (RX-0011) was published more than one year before the effective filing date of the '294 patent and thus qualifies as prior art under 35 U.S.C. § 102(b). *See* RX-0011 (Beach189). Beach189 discloses a depletion mode transistor with a support body 12, a heterojunction formed by a first III-nitride semiconductor body 14 and a second III-nitride semiconductor body 16. *See id.* at ¶ 25. A gate structure is formed on a field plate 25, providing a field relaxation feature 24 as shown in the figure below. *See id.* at ¶¶ 26, 28.

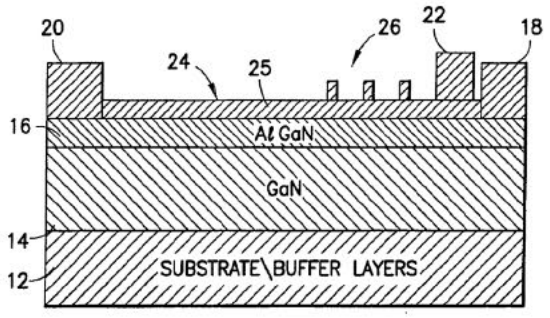


FIG.4

RX-0011 (Beach189) at Fig. 4.

[redacted]

According to Beach189, "the field relaxation feature 24 is an ultra resistive field plate 25 formed with a highly electrically resistive material, such as, silicon rich SiN, compensated GaN or the like material." *See id.* at ¶ 26.

(2) U.S. Patent Publication No. 2007/0164315A1 ("Smith")

U.S. Patent Publication No. 2007/1064315A1 ("Smith") (RX-0040) was published on more than one year before the earliest effective filing date of the '294 patent and thus qualifies as prior art under at least 35 U.S.C. § 102(b). *See* RX-0040 (Smith). Smith discloses a depletion mode device having a substrate 10, a channel layer 20, a barrier layer 22, a cap layer 24, and a gate 32, as shown in the following figure:

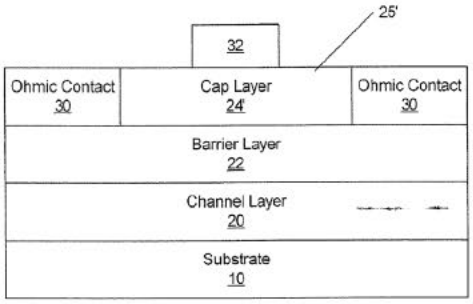


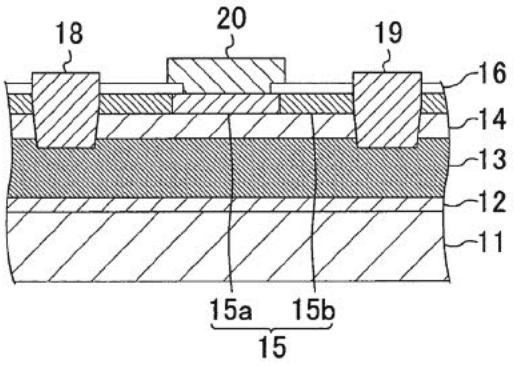
Figure 1B

RX-0040 (Smith) at Fig. 1B; *see also id.* at ¶¶ 77-82.

(3) U.S. Patent Publication No. 2008/0087915A1 ("Uemoto")

U.S. Patent Publication No. 2008/0087915A1 ("Uemoto") (RX-0073) was published more than one year before the earliest effective filing date of the '294 patent, and thus qualifies as prior art under at least 35 U.S.C. § 102(b). *See* RX-0073. Uemoto discloses an enhancement mode nitride semiconductor device using a conductive GaN layer 15a between a gate contact 20 and a barrier layer 14, as opposed to a compensated GaN layer as required by the '294 patent, as

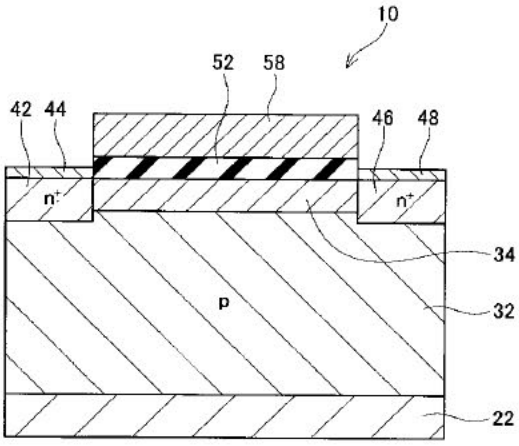
shown below. *See* RX-0073 (Uemoto) at ¶ 33 ("a control region 15a in which Mg is activated to exhibit a p-type conductivity").



RX-0073 (Uemoto) at Fig. 1.

(4) Japanese Patent Publication No. JP2006253224A ("Kigami")

Japanese Patent Publication No. JP2006253224A ("Kigami") (RX-0079) was published more than a one year before the earliest effective filing date of the '294 patent, and thus qualifies as prior art under at least 35 U.S.C. § 102(b). *See* RX-0079. As shown in the figure below, Kigami discloses an enhancement mode GaN semiconductor device having a p-GaN layer 32 doped with magnesium on a substrate 22. *See id.* at ¶ 26.



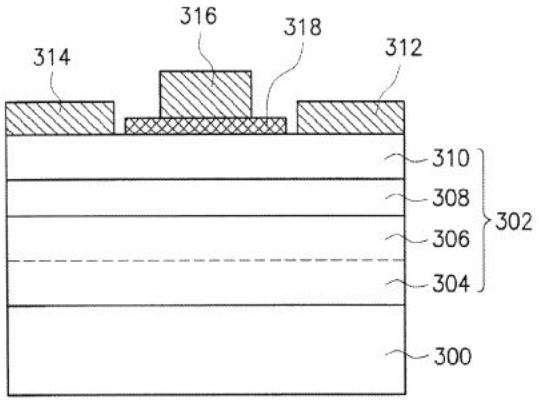
RX-0079 (Kigami) at Fig. 1.

[redacted]

After forming the p-GaN layer 32, hydrogen atoms are introduced to passivate the surface of layer 32. *See id.* The passivated portion of layer 32 is marked as local region 34. *See id.* at ¶ 27. However, this region is not a separate layer but is instead part of p-GaN layer 32. *See id.* Kigami does not teach or suggest forming a compensated GaN layer above a barrier layer as the '294 patent requires. *See id.*

(5) Taiwanese Patent Publication No. TW200414540A ("Sheu")

Taiwanese Patent Publication No. TW200414540A ("Sheu") (RX-0081) was published more than one year before the earliest effective filing date of the '294 patent and thus qualifies as prior art under at least 35 U.S.C. § 102(b). Sheu discloses a depletion-mode field effect transistor that includes a substrate 300, a buffer layer 304, a channel layer 306, a gap layer 308, a barrier layer 310, a gate insulating layer 318, and a gate 316 as shown below. *See* RX-0081 (Sheu) at 9-10.



RX-0081 (Sheu) at Fig. 5. The gate insulating layer 318 is made of aluminum indium gallium nitride and may be doped with a metal, such as carbon, magnesium, and/or iron to change resistance. *See id.* at 10. Sheu does not disclose "a compensated GaN layer" as recited by the asserted claims of the '294 patent. *See id.*; *see also* CPB at 336-337.

[redacted]

b) Comparison of the Claimed Invention and the Prior Art

To the extent that Innoscience contends that certain combinations of references and/or knowledge common to one of ordinary skill in the art render one or more of the asserted claims obvious, the Staff expects Dr. Schubert to testify that the asserted claims would not have been obvious in view of the combinations relied upon by Respondents. CPB at 324-328 Specifically, the Staff expects Dr. Schubert to testify that the prior art relied upon by Respondents fails to disclose or suggest limitation 1[e] of claim 1 of the '294 patent. *See id.* None of the prior art references discloses or suggests a compensated GaN layer as the claims of the '294 patent require. *See id.* In addition, because enhancement mode and depletion mode transistors differ significantly in their design and operation, a person of ordinary skill in the art would not have been motivated to combine features from one that would perform very differently in the other. *See id.* Accordingly, the Staff does not believe that Respondents will be able to show by clear and convincing evidence that the asserted combinations would have been obvious.

c) Objective Indicia of Non-Obviousness

EPC contends that evidence of secondary considerations of nonobviousness weigh against a finding of obviousness. *See* CPB at 366-369. In this regard, EPC bears the burden of showing that the offered evidence of secondary considerations has a nexus to the claimed invention of the '294 patent. *See WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999); *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) ("[T]here must be 'a legally and factually sufficient connection' between the evidence and the patented invention."), *citing Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988).

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[redacted]

According to EPC, Dr. Schubert is expected to testify that the invention of the '294 patent improves upon previous enhancement-mode technology, resulting in significantly reduced gate leakage and achieving greater switching efficiency. *See* CPB at 364. This led EPC to releasing the first commercial enhancement-mode GaN transistors in 2009. *See id.* Dr. Schubert is also expected to testify that other companies tried and failed to produce an enhancement-mode GaN transistor without a compensated GaN gate. *See id.* at 365. According to EPC, the technology of the '294 patent improved the efficiency and enabled the development of a commercial product. *See id.* at 366. And finally, Dr. Schubert is expected to testify that the invention of the '294 patent is what provides the advantageous features that distinguish EPC's successful products from conventional technology. *See id.* The evidence is thus expected to show that secondary considerations of nonobviousness weigh in favor of patentability. *See id.*

d) Conclusion

For the reasons set forth above, the Staff does not believe that Respondents will meet their burden to show by clear and convincing evidence that any of the asserted claims of the '294 patent are invalid as obvious under 35 U.S.C. § 103.

VI. U.S. PATENT NO. 8,404,508

U.S. Patent No. 8,404,508 ("the '508 patent") is titled "Enhancement Mode GaN HEMT Device and Method for Fabricating the Same." *See* JX-0015 ('508 patent). The '508 patent issued on March 26, 2013, from an application filed on April 8, 2010, claiming the benefit of an earlier U.S. provisional application filed on April 8, 2009. *See id.*

The '508 patent generally relates to enhancement-mode GaN transistors. *See id.* at Abstract, 1:14-18. According to the patent, conventional transistors are fabricated using one mask for the gate metal and a second mask for the gate material. *Id.* at 1:53-56. This "two mask

process" increases manufacturing costs and leads to wider gate lengths. *Id.* at 2:5-6. To solve this problem, the patent discloses a self-aligned process in which "[t]he materials are patterned and etched using a single photo mask, which reduces manufacturing costs." *Id.* at 3:4-6. For example, the embodiment shown below in Fig. 2 of the '508 patent shows a self-aligned transistor according to the patent.

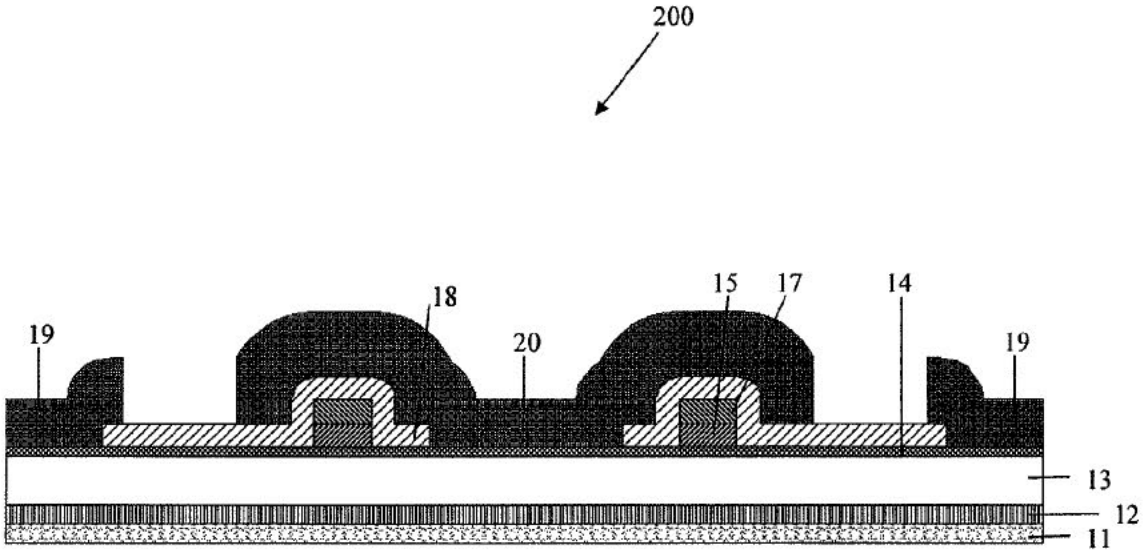


FIG. 2

JX-0015 ('508 patent) at Fig. 2.

A. Claim Construction

1. Level of Ordinary Skill in the Art for the '508 Patent

As with the '294 patent discussed above, the '508 patent generally relate to the design and fabrication of enhancement mode GaN transistors. A person of ordinary skill in this field of art would have been familiar with the electrical and structural properties of nitride semiconductors, as well as semiconductor manufacturing processes, including photolithography, the growth and deposition of materials, the etching and removal of materials, diffusion, ion

[redacted]

implantation, metallization, etc. The Staff thus submits that such a person would have been a well-educated professional.

Consistent with the relative complexity of the asserted patents' disclosures, Innoscience asserts that a person of ordinary skill in the art at the time of the invention "would have had at least a bachelor's degree in electrical engineering, chemical engineering, physics, or material science or a closely related field and at least two years of experience in semiconductor device design or fabrication, including the processing of semiconductor materials, analysis of device operation, or the development of new device topologies as of the relevant priority date." *See* RPB at 262, *citing* RX-0126C (Lebby Rep.) at ¶ 79. Furthermore, additional relevant industry experience might compensate for lack of formal education and vice versa. *See id.* EPC does not address the level of ordinary skill in its pre-hearing brief, and has thus waived the issue. *See generally* CPB (not addressing the level of ordinary skill in the art).

Accordingly, for the reasons set forth above, the Staff expects the evidence to show that Innoscience's proposed level of ordinary skill in the art of the '508 patent is correct and should thus be adopted.

2. Disputed Terms

The following terms of the '508 patent remain in dispute:

Term	EPC	Innoscience	Staff
"etching away the doped GaN layer except a portion of the doped GaN layer beneath the gate contact"	"etching away the doped GaN layer without etching beneath the gate contact"	"etching away the doped GaN layer in all regions extending outside the gate contact" or "etching away the doped GaN layer where it is not	Plain and ordinary meaning. No construction necessary. But if construed: "etching away the doped GaN layer without etching beneath the gate contact"

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[redacted]

		beneath the gate contact, without etching beneath the gate contact"	
"applying a gate photo resistant pattern; etching away the gate contact layer outside the gate region; etching away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact; removing the gate photo resistant pattern"	These are four distinct steps.	"applying a gate photo resistant pattern; using the gate photo resistant pattern to etch away the gate contact layer outside the gate region; using the gate photo resistant pattern to etch away the doped GaN layer in all regions extending outside the gate contact; removing the gate photo resistant pattern"	Steps must be performed in order.

CPB at 20-21; RPB at 233-234.

Pursuant to Ground Rule 7.2, the Staff respectfully cites to the arguments set out in its claim construction brief and the arguments presented at the October 13, 2023, *Markman* hearing for its positions on the disputes identified above. *See* SMB at 5-11; Tr., EDIS Doc. ID 809276 (Oct. 13, 2023).

B. Infringement

The Staff does not expect the evidence to show infringement of the asserted claim of the '508 patent under any of the proposed constructions. *See* RPB at 250-258. EPC contends that Innoscience's process for making the Accused Products infringes claim 1 of the '508 patent. *See* CPB at 151. In support of its position, EPC relies upon the expert testimony of Dr. E. Fred Schubert, who is expected to testify that each limitation of claim 1 of the '508 is performed by Innoscience in the manufacture of the LV and HV Accused Products. *See* CPB at 151-152.



While Innoscience does not dispute most of the Dr. Schubert's infringement analysis, it argues that it does not infringe for two reasons. *See* RPB at 250-251.

First, Innoscience contends that it does not "etch[] away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact" as the claim requires. *See* RPB at 251-254. Second, Innoscience contends that it does not perform the recited gate patterning steps in the required order. *See* RPB at 254-258. Each of these reasons is addressed below. With respect to the remaining limitations, the Staff expects Dr. Schubert's testimony to establish that Innoscience satisfies those limitations in the manufacture of the LV and HV Accused Products for the reasons set forth by EPC. *See* CPB at 151-192.

1. Limitation 1[h]: "etching away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact"

EPC contends that the Accused Products are made by "etching away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact." *See* CPB at 171-174. The evidence, however, is not expected to support EPC's position. *See* RPB at 251-254. Innoscience's expert, Dr. Doolittle, is expected to testify that Innoscience fabricates the Accused Products in a different manner than the claimed invention. *See id.* Specifically, Innsocience does not etch away the portion of the doped GaN layer that the claim requires. *See id.*

The '508 patent requires "etching away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact." JX-0015 ('508 patent) at claim 1. For example, the illustrates this step as follows:

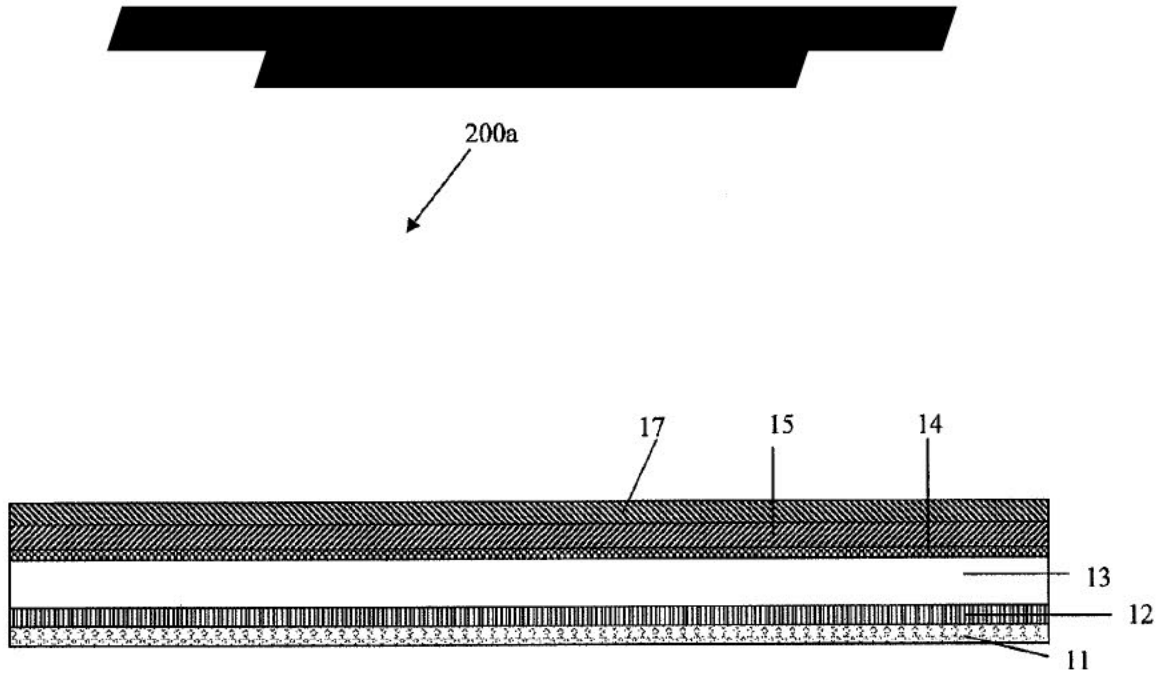


FIG. 3B

Id. at Fig. 3B. This figure shows a gate metal 17 that is deposited on a p-type GaN gate layer 15. *See id.* at 3:39-44. As the patent explains, "a single photo mask is used to pattern and etch the gate metal 17 and the p-type GaN gate layer 15, resulting in the structure shown in Fig. 3C." *Id.* at 3:45-47. As shown below in Fig. 3C, the gate metal 17 and the p-type GaN gate layer 15 are etched, followed by removal of the photoresist:

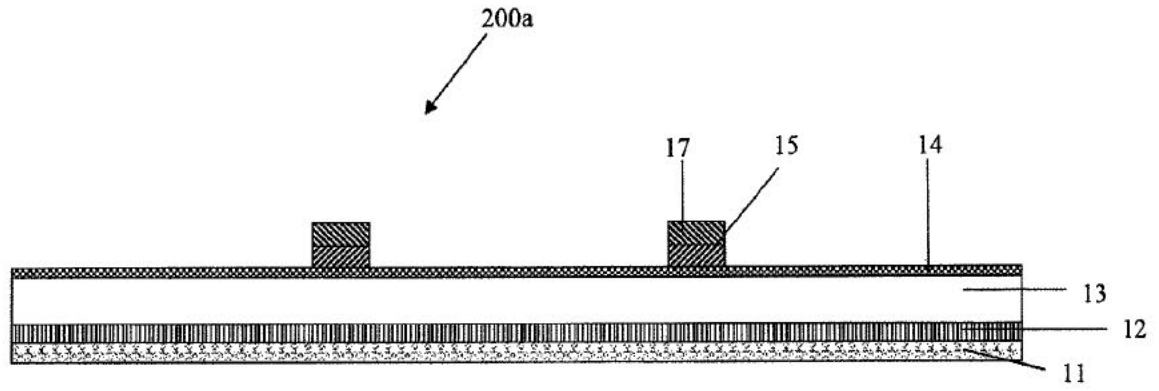


FIG. 3C

See id. at Fig. 3C, 3:47-50. The '508 patent explains, that "[t]he materials are patterned and etched using a single photo mask, which reduces manufacturing costs." *Id.* at 3:4-5.

[redacted]

Contrary to the method taught by the '508 patent, the Accused Products only etch away a portion of the doped p-type GaN layer – Innscience does not "etch[] away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact" as the claim requires. *See* RPB at 251-254. The following figures illustrate the processes used in the Accused Products:

[redacted]

RX-0164C.0014 (Process Flow for HV Accused Products); RX-0164C.0021 (Process Flow for LV Accused Products). As shown in these figures, [redacted] *See id.* The is contrary to the

[redacted]

claimed invention. *See* RPB at 251-254. The evidence is thus expected to show that Innoscience does not satisfy limitation 1[h] of the '508 patent.

2. Gate Patterning Steps of Claim 1

The parties dispute whether the gate patterning steps of claim 1 of the '508 patent must be performed in the order recited. *See* RPB at 254-258. Limitations 1[f] through 1[i] recited the steps of "applying a gate photo resistant pattern; etching away the gate contact layer outside the gate region; etching away the doped GaN layer, except a portion of the doped GaN layer beneath the gate contact; [and] removing the gate photo resistant pattern." JX-0015 ('508 patent) at claim 1. As set forth in claim construction briefing and argument, the Staff is of the view that these claim limitations must be performed in the order recited. *See* SMB at 5-11; Tr., EDIS Doc. ID 809276 (Oct. 13, 2023). Innoscience's proposed construction, while different from the Staff's, also requires that these limitations be performed in the order recited. *See id.* EPC's expert, Dr. Schubert, agrees with Innoscience's expert that [redacted] *See* RPB at 255; CX-0877C at ¶¶ 309, 321-324. Accordingly, if either the Staff's or Innoscience's proposed construction is adopted, there is no infringement. *See* RPB at 254-258.

3. Conclusion

For the reasons set forth above, the Staff does not expect the evidence to show that Innoscience infringes the asserted claim of the '508 patent. *See* RPB at 251-258.

C. Technical Prong

The Staff does not expect the evidence to show that EPC satisfies the technical prong of the domestic industry requirement with respect to the '508 patent under any of the proposed claim constructions. *See* RPB at 258-260. EPC contends that its DI products are manufactured

[redacted]

using the process recited by claim 1 of the '508 patent. *See* CPB at 251. In support of its position, EPC relies upon the expert testimony of Dr. Schubert, who is expected to testify that each limitation of claim 1 is performed by EPC in the manufacture of its domestic industry products. *See* CPB at 251-281. Conversely, Innoscience contends that EPC fails to satisfy the technical prong for two reasons: (i) EPC does not perform the step of "depositing a gate contact layer on the doped GaN layer" as the claim requires; and (ii) EPC has not shown that its EPC2016C and EPC2215 products are representative of the other alleged domestic industry products. *See* RPB at 258-262. Each of these reasons is addressed below.

1. Limitation 1[e]: "depositing a gate contact on the doped GaN layer"

EPC contends that it satisfies limitation 1[e] of the '508 patent, which recites the step of "deposition a gate contact on the doped GaN layer." *See* CPB at 262-264. The evidence, however, is not expected to support EPC's position. *See* RPB at 258-260. [redacted]. *See id.* This is confirmed by the epitaxial growth recipes for the representative EPC2016C and EPC2215 products. *See id.*; CPX-0004C (EPC2016C recipe); CPX-0076C (EPC2215 recipe). Furthermore, the [redacted] *See* RPB at 259-260; CPX-0097C; CPX-0098C; CPX-0099C; CPX-0101C; CPX-0102C; CPX-0103C; CPX-0106C; CPX-0107C; CPX-0108C; CPX-0109C; CPX-0100C. According to Dr. Beach, EPC co-founder and named inventor of the '508 patent, [redacted]. *See* JX-0018C (Beach Dep. Tr.) at 113:11-13. Because [redacted]

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[redacted] *See* RPB at 258-260. The evidence is thus expected to show that EPC does not satisfy the technical prong of the domestic industry requirement with respect to the '508 patent.

2. Representative Products

As discussed above, EPC contends that EPC2016C is representative of its low voltage products and EPC2215 is representative of its high voltage products. *See* CPB at 47-58. And in this regard, Dr. Schubert is expected to testify that he reviewed fabrication process flows for other domestic industry products, and found that they carried out the relevant steps of his analysis and that any differences were immaterial. *See* CPB at 58. Dr. Schubert also spoke to EPC employees with relevant knowledge about the design and manufacture of the DI Products, including Dr. Lidow, Ms. Nakata, Dr. Beach, and Dr. Cao in confirming that the analyzed products are in fact representative. *See* CPB at 47-58. Innoscience, however, contends that EPC has not provided sufficient analysis to establish that the analyzed products are representative. *See* RPB at 260-262. Specifically, because the manufacturing processes used by EPC are continually evolving, it is not known whether EPC2016C and EPC2215 are truly representative of all DI Products. *See* RPB at 261-262. Based on the expected testimony of Dr. Schubert and the EPC employees, the Staff expects the evidence to show that the products analyzed by Dr. Schubert are representative of the EPC DI Products at issue in this investigation. *See* CPB at 47-58.

3. Conclusion

For the reasons set forth above, the Staff does not expect the evidence to show that EPC satisfies the technical prong of the domestic industry requirement with respect to the '508 patent.

[redacted]

D. Validity

Innoscience contends that claim 1 of the '508 patent is invalid as rendered obvious under 35 U.S.C. § 103 by the prior art. RPB at 262-345. The patent at issue is presumed to be valid. *See* 35 U.S.C. § 282. Although Complainant has the burden of proving a violation of Section 337, it can rely upon the presumption of validity, which Respondents must overcome by clear and convincing evidence. *See, e.g., Checkpoint Sys., Inc. v. United States Int'l Trade Comm'n*, 54 F.3d 756, 671 (Fed. Cir. 1995). As discussed below, the Staff does not expect the evidence to show that the asserted claim of the '508 patent is invalid.

1. Obviousness Under 35 U.S.C. § 103

With respect to obviousness, the key question for purposes of determining whether claims are invalid is whether "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." 35 U.S.C. § 103(a). This analysis hinges on the four Graham factors – (1) the scope and content of the prior art; (2) the differences between the prior art and the claims at issue; (3) the level of ordinary skill in the art; and (4) objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966); s*ee also, e.g., Scanner Technologies Corp. v. ICOS Vision Sys. Corp*., 528 F.3d 1365, 1379-80 (Fed. Cir. 2008). The ultimate conclusion as to whether the claimed invention is obvious is a question of law based on these underlying facts. *See, e.g., Pharmastem Therapeutics, Inc. v. Viacell, Inc.*, 491 F.3d 1342, 1359 (Fed. Cir. 2007), cert. denied, 552 U.S. 1258 (2008).

The U.S. Supreme Court has explained that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable

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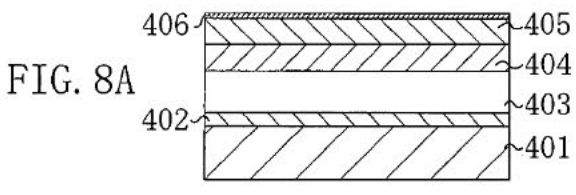
results." *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 416 (2007). Thus, "[t]he obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents." *Id.* at 419. Nevertheless, the analysis must still identify "an apparent reason to combine known elements in the fashion claimed by the patent at issue." *Id.* at 418.

For purposes of their allegations of invalidity under 35 U.S.C. § 103, Respondents rely upon the following references: (i) U.S. Patent Publication No. 2006/0273347 ("Hikita") (RX-0041); (ii) U.S. Patent No. 7,238,560 ("Sheppard") (RX-0288); (iii) International Patent Publication No. WO 2005/057624 ("Beach624") (RX-0286); and (4) U.S. Patent Publication No. 2008/0296618 ("Suh") (RX-0043). *See* RPB at 263. It does not appear to the Staff that any of the references relied upon by Respondents, either alone or in combination, would have rendered obvious any claim of the '508 patent.

a) Scope and Content of Prior Art

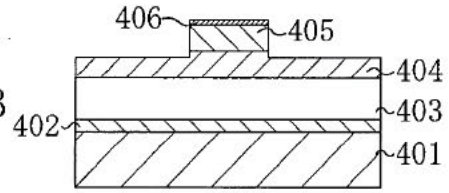
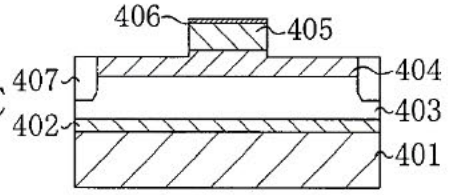
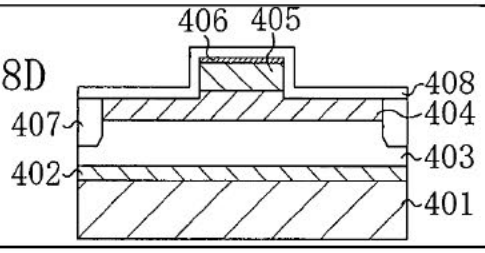
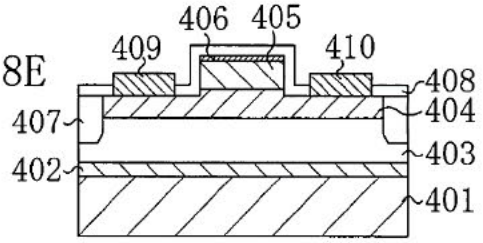
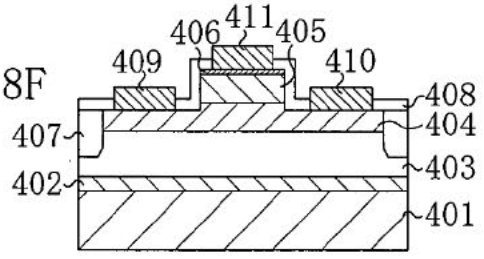
(1) U.S. Patent Publication No. 2006/0273347 ("Hikita")

U.S. Patent Publication No. 2006/0273347 ("Hikita") (RX-0041) was published more than one year before the earliest effective filing date of the '508 patent, and thus qualifies as prior art under at least 35 U.S.C. § 102(b). Hikita discloses a two-mask method for manufacturing an enhancement-mode GaN transistor as follows:

"First, as shown in FIG. 8A, an AlN buffer layer 402…, an undoped GaN layer 403…, an undoped AlGaN layer 404…, a p-type AlGaN layer 405…, and a heavily doped p-type GaN layer 406…are formed in this order on a (0001) plane of a sapphire substrate 401 by metal organic chemical vapor deposition (MOCVD)." RX-0041 at ¶ 56.	 FIG. 8A

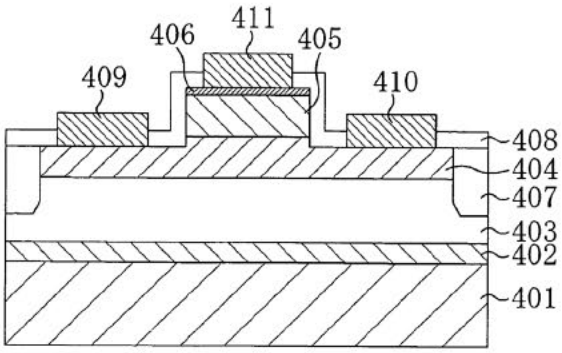
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[redacted]

"Next, as shown in FIG. 8B, parts o the heavily doped p-type GaN layer 406, the p-type AlGaN layer 405 and an upper portion of the undoped AlGaN layer 404 located in other part than the gate region are ***selectively removed***, for example, by dry etching such as ICP (inductive-coupled plasma) etching." RX-0041 at ¶ 57 (emphasis added) (use of first mask).	FIG. 8B 
"Next, as shown in FIG. 8C, with a device formation region covered with a photoresist, for example, B (boron) is ion-implanted to increase a resistance in parts of the undoped AlGaN layer 404 and the undoped GaN layer 403. Thus, an isolation region 407 is formed." RX-0041 at ¶ 58.	FIG. 8C 
"Subsequently, as shown in FIG. 8D, chemical vapor deposition (CVD) is performed using SiH_4, NH_3, and N_2, thereby forming a SiN film 408…." RX-0041 at ¶ 59.	FIG. 8D 
"Next, as shown in FIG. 8E, openings are formed in a SiN film, for example, by ICP dry etching or the like. Each of a source electrode 490 and a drain electrode 410 is formed of a Ti layer and an Al layer in an associated one of the openings, and then heat treatment is performed thereto in an N_2 atmosphere at 650°C." RX-0041 at ¶ 60.	FIG. 8E 
"Next, as shown in FIG. 8F, ***part of the SiN film 408*** provided on the heavily doped p-type GaN layer 406 is ***removed***, for example, by ICP dry etching or the like. Subsequently, a gate electrode 411 of Pd is formed in an associated one of the openings in the SiN film 408." RX-0041 at ¶ 61 (emphasis added) (use of second mask).	FIG. 8F 

See RX-0041 (Hikita) at ¶¶ 56-61; Figs. 8A-F. This method results in an enhancement-mode GaN transistor as shown below:

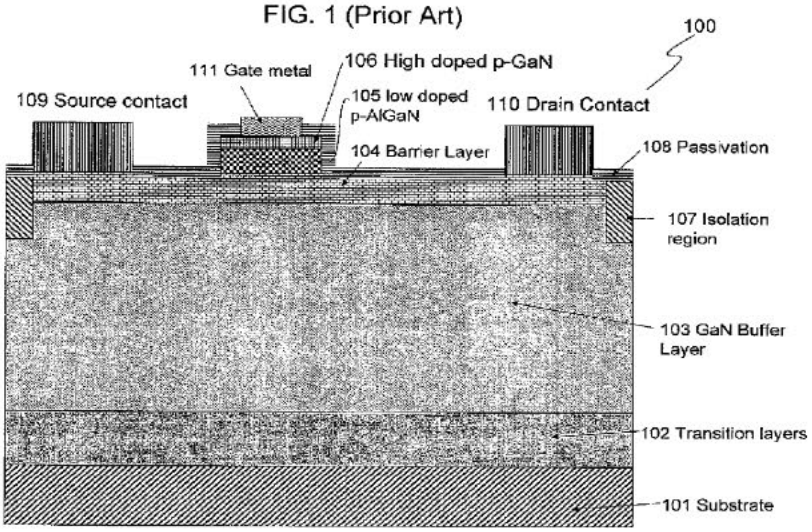
FIG. 4



See RX-0041 (Hikita) at ¶¶ 47-49, 55; Fig. 4.

Hikita's two-mask fabrication method is the conventional, prior art method that the '508 patent sought to improve. *See* JX-0015 ('508 patent) at 1:53-2:19. This can be seen by comparing prior art Fig. 1 of the '508 patent, reproduced below, with Fig. 4 of Hikita (shown above).

FIG. 1 (Prior Art)



JX-0015 ('508 patent) at Fig. 1.

As the '508 patent explains, "[i]n conventional enhancement mode GaN transistors, the gate metal and the p-type GaN material or p-type AlGaN material are defined using separate photo masks." JX-0015 ('508 patent) at 1:53-55. This conventional method (such as described by Hikita) results in a wider gate length, higher gate charge, wider cell pitch, higher on-

[redacted]

resistance, increased manufacturing costs, high gate leakage current, and lower gate reliability. *See id.* at 2:5-14. The '508 patent sought to improve upon conventional fabrication techniques, such as those described by Hikita. *See id.* at 2:14-18. Moreover, the Examiner considered Hikita during prosecution of the '508 patent, and found that the claim at issue was directed to patentably distinct subject matter. *See* JX-0015 ('508 patent) at References Cited.

(2) U.S. Patent No. 7,238,560 ("Sheppard")

U.S. Patent No 7,238,560 ("Sheppard") (RX-0288) issued more than one year before the earliest effective filing date of the '508 patent, and thus qualifies as prior art under at least 35 U.S.C. § 102(b). Sheppard discloses methods of fabricating nitride-based semiconductor devices such as that shown in the following figure:

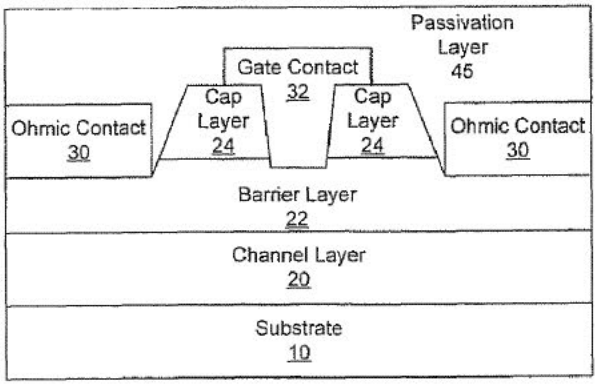


Figure 1F

RX-0288 (Sheppard) at Fig. 2B.

Innsocience relies upon Sheppard solely for its disclosure concerning transition layers between the substrate and the device. *See* RPB at 268, 276-278. In this regard, Sheppard states that "[o]ptional buffer, nucleation and/or transition layers (not shown) may be provided on substrate 10. For example, an AlN buffer layer may be provided to provide an appropriate

[redacted]

crystal structure transition between the silicon carbide substrate and the remainder of the device." *See* RX-0288 (Sheppard) at 6:58-62.

The Examiner considered the disclosure of Sheppard during prosecution of the '508 patent, and found that the claim at issue was directed to patentably distinct subject matter. *See* JX-0015 ('508 patent) at References Cited (citing a continuation of Sheppard).

(3) International Patent Publication No. WO 2005/057624 ("Beach624")

International Patent Publication No. WO 2005/057624 ("Beach 624") (RX-0286) was published more than a year before the earliest effective filing date of the '508 patent, and thus qualifies as prior art under at least 35 U.S.C. § 102(b). Beach264 generally discloses a depletion mode III-nitride semiconductor device using a residual passivation layer to enable ohmic contact fabrication with reduced damage to the semiconductor surface, as follows:

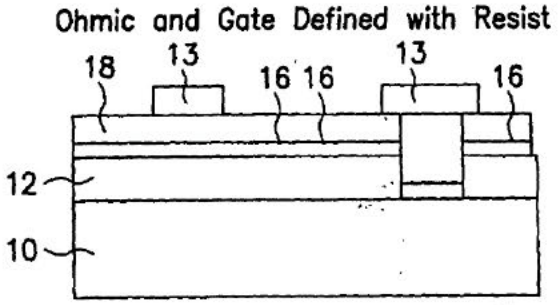


Fig. 1D

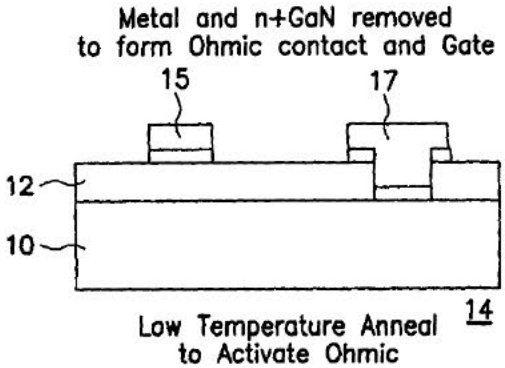


Fig. 1E

See RX-0286 at Figs. 1D, 1E; CPB at 339; RX-0286 at ¶ 17. An annealing step is conventionally performed in the fabrication ohmic contacts. *See id.* This step, however, causes nitrogen to diffuse out of layers 10 and 12 of the device, resulting in damage to the semiconductor surface and adversely impacting device performance. *See* RX-0286 at ¶ 46. Beach624 uses a nitrogen-rich, protective layer 16 to counter this outdiffusion process so as to

protect the surface of the semiconductor device, resulting an improved semiconductor device with a higher breakdown voltage. *See id.* As Dr. Schubert is expected to testify, Beach624 does not teach or suggest any claim limitations of the asserted claim related to p-type gate semiconductors. *See* CPB at 340-343.

(4) U.S. Patent Publication No. 2008/0296618 ("Suh")

U.S. Patent Publication No. 2008/0296618 ("Suh") (RX-0043) was published less than one year before the earliest effective filing date of the '508 patent but qualifies as prior art under at least 35 U.S.C. § 102(a). Suh discloses a method of fabricating an enhancement mode GaN device as shown in the following figure:

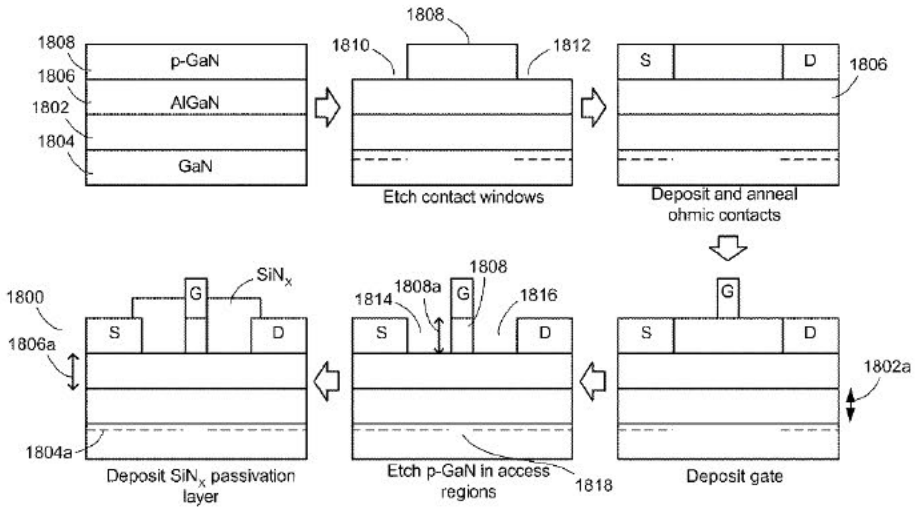


Fig. 18

RX-0043 (Suh) at ¶¶ 71-80; Fig. 18. According to Suh, the first step is depositing the following layers: (i) GaN layer 1804; (ii) AlN interlayer 1802; (iii) AlGaN layer 1806; and (iv) p-GaN layer 1808. *Id.* at ¶ 73. Next, the p-GaN layer 1808 is etched to form source and drain contact windows 1810, 1812. *Id.* at ¶ 74. Source and drain contacts are then deposited on the AlGaN layer 1806. *Id.* at ¶ 75. Then, the gate G is deposited on the p-GaN layer 1808. *Id.* at ¶ 76. Finally, the p-GaN layer 1808 is etched to form the device 1800. *Id. at 77.*

[redacted]

Innsocience acknowledges that Suh fails to disclose the following: (i) nucleating and growing transition layers on a substrate (limitation 1[a]); and (ii) masking steps to form the gate contact and the ohmic contacts (limitations 1[e] to 1[i] and limitations 1[n] to 1[r]). *See* RPB at 309-310.

b) The Level of Ordinary Skill in the Art

For the reasons set forth above in Section VI.A.1, the Staff submits that a person of ordinary skill in the art of the asserted patent would have had at least a bachelor of science degree in electrical engineering, physics, material science, or a related discipline, with at least two years of relevant work experience in the field of semiconductor fabrication. Furthermore, additional relevant industry experience might compensate for lack of formal education and vice versa. And finally, the Staff agrees that that any differences in the parties' proposals would not affect the expert opinions offered by the parties.

c) Comparison of the Claimed Invention and the Prior Art

To the extent that Innoscience contends that certain combinations of references and/or knowledge common to one of ordinary skill in the art render one or more of the asserted claims obvious, the Staff expects Dr. Schubert to testify that the asserted claims would not have been obvious in view of the combinations relied upon by Respondents. CPB at 338-345. Specifically, the Staff expects Dr. Schubert to testify that the prior art relied upon by Respondents fails to disclose or suggest a device with a p-type gate structure and ohmic contacts that are made according to limitations 1[f] to 1[i] and limitations 1[n] to 1[q] of claim 1 of the '508 patent. *See id.* Accordingly, the Staff does not believe that Respondents will be able to show by clear and convincing evidence that the asserted combinations would have been obvious.

[redacted]

d) Secondary Considerations of Non-Obviousness

EPC contends that evidence of secondary considerations of nonobviousness weighs against a finding of obviousness. *See* CPB at 366-369. In this regard, EPC bears the burden of showing that the offered evidence of secondary considerations has a nexus to the claimed invention of the '508 patent. *See WMS Gaming, Inc. v. Int'l Game Tech.*, 184 F.3d 1339, 1359 (Fed. Cir. 1999); *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1332 (Fed. Cir. 2019) ("[T]here must be 'a legally and factually sufficient connection' between the evidence and the patented invention."), *citing Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988).

According to EPC, Dr. Schubert is expected to testify that the invention of the '508 patent improves upon previous enhancement-mode technology, resulting in improved performance, reduced gate leakage, and lower manufacturing cost. *See* CPB at 366. The invention of the '508 patent allows EPC devices to operate at higher power, higher efficiency, and higher reliability. *See id.* at 366-367. The evidence is thus expected to show that secondary considerations of nonobviousness weigh in favor of patentability. *See id.*

e) Conclusion

For the reasons set forth above, the Staff does not believe that Respondents will meet their burden to show by clear and convincing evidence that the asserted claim of the '508 patent is invalid.

VII. DOMESTIC INDUSTRY – ECONOMIC PRONG

A. Legal Standard

In an investigation based on claims of patent infringement, Section 337 requires that an "industry in the United States, relating to the articles protected by the patent" exist or be in the process of being established. 19 U.S.C. § 1337(a)(2). A domestic industry, according to Section

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[redacted]

337(a)(2), consists of that portion of a complainant's (or its licensees') activities and facilities in the United States that are devoted to the exploitation of the patent rights at issue. *See Certain Integrated Circuit Chipsets and Products Containing Same*, Inv. No. 337-TA-428, Order No. 10 at 3, Initial Determination (May 4, 2000) (unreviewed) ("*Chipsets*"), *citing Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Comm'n Op. at 15 (Nov. 1996) ("*Wind Turbines*"). This requires a showing by the Complainant that the technical and economic prongs of the domestic industry requirement of Section 337(a)(3) are satisfied.

With respect to the economic prong of the domestic industry requirement under Section 337(a)(2), a complainant may show that a domestic industry exists or under any of the three statutory grounds set forth in Section 337 (a)(3), which provides:

> (3) For purposes of paragraph (2), an industry in the United States shall be considered to exist if there is in the United States, with respect to the articles protected by the patent…concerned –
>
> (A) significant investment in plant and equipment;
>
> (B) significant employment of labor or capital; or
>
> (C) substantial investment in its exploitation, including engineering, research and development, or licensing.

19 U.S.C. § 1337(a)(3). Given that these criteria are in the disjunctive, satisfaction of any one of them will be sufficient to meet the domestic industry requirement. *Certain Integrated Circuit Chipsets and Products Containing Same*, Inv. No. 337-TA-428, Initial Determination (May 4, 2000) (unreviewed), *citing Certain Variable Speed Wind Turbines and Components Thereof*, Inv. No. 337-TA-376, Commission Op. at 15 (Nov. 1996).

The economic prong relates to whether the investments are "significant" or "substantial." Satisfaction of the economic prong of the domestic industry requirement under Section 337 is not

[redacted]

determined by a rigid formula. The inquiry is an examination of the realities of the marketplace, *e.g.*., how the products at issue are sold. *Certain Double-Sided Floppy Disk Drives and Components Thereof*, Inv. No. 337-TA-215, Comm'n Op., 227 USPQ 982, 989; *Certain Telephonic Digital Added Main Line Systems, Components Thereof, and Products Containing Same*, Inv. No. 337-TA-400, Order No. 6, Init. Determination (November 14, 1997) (economic prong of the domestic industry requirement satisfied by aggregate data). Moreover, no requirement exists that the domestic industry be of any particular size. *Wind Turbines*, Commission Op. at 21; *Bally/Midway Mfg. Co., v. U.S. Int'l Trade Comm'n*, 714 F.2d 1117, 1123 (Fed. Cir. 1983), *citing In re Von Clem*, 229 F.2d 441, 444 (CCPA 1955).

Although the Commission will occasionally look to evidence subsequent to the filing of the complaint, the Commission has held that "as a general matter, the only activities that are relevant to the determination of whether a domestic industry exists or is in the process of being established are those that occurred before the complaint was filed." *Certain Video Game Systems*, Inv. No. 337-TA-743, Comm'n Op. at 5 (January 20, 2012) *citing Certain Coaxial Connectors and Components Thereof and Products Containing Same*, Inv. No. 337-TA- 650, Commission Opinion at 51 n.17 (April 14, 2010).

B. Discussion

EPC contends that it satisfies the economic prong of the domestic industry requirement under 19 U.S.C. § 1337(a)(3)(B) based on its domestic investments in labor for research and development related to the alleged domestic industry products. *See* CPB at 305-322. EPC maintains facilities in El Segundo, Aliso Viejo, and San Jose, California, where it conducts various research and development ("R&D") activities. *See* CPB at 305. At the time of the Complaint, [redacted]. *See* CPB

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[redacted]

at 308; CPX-0011C; JX-0027C (Marabotti Dep. Tr.) at 198:8-200:1. And according to EPC, all of its products [redacted]. *See* CPB at ; JX-0027C (Marabotti Dep. Tr.) at 111:1-19; JX-0024C (Lidow Dep. Tr.) at 117:11-16. As set forth in Exhibit 37C to the Complaint and further explained by EPC Chief Financial Officer, Mr. Marabotti, at his deposition, EPC's total domestic labor investments since 2018 were as follows:

	2018	2019	2020	2021	2022	2023Q1
[redacted]						

See Complaint Exh. 37C (Marabotti Decl.) at ¶ 13; CPX-0014C at Summary!M48:R48; CPB at 308-309. Of these investments, EPC's R&D labor costs were as follows:

	2018	2019	2020	2021	2022	2023Q1
[redacted]						

See CPB at 311; CPX-0014C at Summary!M48:R48.

Dr. Vander Veen is expected to testify that a sales-based allocation is appropriate and may be calculated for each year at issue by dividing the total sales of domestic industry products by EPC's total sales of all products. *See* CPB at 307. Dr. Vander Veen's calculations are as follows:

	2018	2019	2020	2021	2022	2023Q1
[redacted]						

See CPB at 307; CX-0046C; CPX-0010C.

Using this sales-based allocation, the following portions of domestic R&D expenditures are attributable to its domestic industry products:

	2018	2019	2020	2021	2022	2023Q1
[redacted]						

[redacted]

See CPB at 307, 311; CPX-0014C at Summary!M48:R48.[3]

After Dr. Vander Veen submitted his expert report on domestic industry, he realized that additional investments could have been allocated to EPC's domestic industry. The Staff does not include these additional investments in its analysis. Thus, the Staff's calculations regarding EPC's domestic industry are smaller than those set forth in EPC's pre-hearing brief. Nonetheless, those differences do not materially affect the analysis.

According to EPC, its domestic industry investments in R&D labor attributable to its DI products are both quantitatively and qualitatively significant in several different contexts. *See* Mot. at 13. [redacted] Second, EPC's domestic R&D investments are qualitatively significant because [redacted] *See* CPB at 315; JX-0024C (Lidow Dep. Tr.) at 117:11-16. While EPC does engage in some foreign R&D activities, [redacted]. *See id.* Third, EPC's [redacted] *See* CPB at 316-317. EPC thus contends that it satisfies the economic prong of the domestic industry requirement. *See* CPB at 322.

[3] These numbers were calculated by multiplying the domestic industry allocations by EPC's total research and development costs for each year. [redacted]

[redacted]

Accordingly, for the reasons set forth above, the Staff expects the evidence to show that EPC satisfies the economic prong of the domestic industry requirement with respect to the asserted patents.

VIII. REMEDY AND BONDING

Pursuant to Commission Rule 210.42, the Judge is to issue a recommended determination on (1) the appropriate remedy in the event that the Commission finds a violation of Section 337, and (2) the amount of the bond to be posted for importation and sale of affected products during the Presidential review period. 19 C.F.R. § 210.42(a)(1)(ii). With respect to these issues, the Staff submits the following recommendations.

A. Remedial Orders

1. Limited Exclusion Order

Section 337 permits the Commission to issue either a limited exclusion order, which is directed against infringing products manufactured or imported by or on behalf of persons found in violation, or a general exclusion order, directed against all infringing products. *See* 19 U.S.C. § 1337(d). Here, EPC requests issuance of only a limited exclusion order, prohibiting Respondents from importing, selling for importation, or selling after importation any infringing articles. CPB at 407. Should a violation be found, the Staff recommends that a limited exclusion order issue.

2. Cease and Desist Order

In addition to, or instead of, an exclusion order, the Commission may issue cease and desist orders to respondents violating or believed to be violating Section 337. *See* 19 U.S.C. § 1337(f)(1). Under Commission precedent, "[c]ease and desist orders are generally issued when, with respect to the imported infringing products, respondents maintain commercially significant inventories in the United States or have significant domestic operations that could undercut the

[redacted]

remedy provided by an exclusion order." *Certain Air Mattress Systems, Components Thereof, and Methods of Using the Same*, Inv. No. 337-TA-971, Comm'n Op. at 49 (Jun. 20, 2017) (citations and footnote omitted). "A complainant seeking a CDO must demonstrate, based on the record, that this remedy is necessary to address the violation found in the investigation so as to not undercut the relief provided by the exclusion order." *Id.* at 50.

EPC requests cease and desist orders because Respondents "both maintain commercially significant inventory in the U.S., and have significant domestic operations that would undercut the remedy provided by an exclusion order." CPB at 408. In this regard, the evidence is expected to show that Innoscience [redacted] to maintain an office in Santa Clara, California, with [redacted]. *See* CPB at 408; RPB at 578; CX-0879C at ¶ 67; JX-0036C (Sun Dep. Tr.) at 54-55. In addition, Innoscience maintains sufficient inventory at its California office to conduct its commercial operations in the United States. *See* CPB at 408; CPX-0121C ([redacted]); JX-0036C (Sun Dep. Tr.) at 83:14-84:5, 84:14-15, 96:13-25. In similar situations, the Commission has issued cease and desist orders. *See Certain Electrical Connectors and Cages, Components Thereof, and Products Containing the Same*, Inv. No. 337-TA-1241, Comm'n Op. at 39 (Sept. 30, 2022) (issuing cease and desist orders where respondent maintained inventory to support sales activities in the United States).

Accordingly, should a violation be found, the Staff recommends that cease and desist orders issue as to Respondents.

[redacted]

3. Limitations and Exclusions

Should the Commission determine to issue a limited exclusion order and/or a cease and desist order, Respondents request that such remedial order be narrowly tailored. *See* RPB at 574-575. Specifically, Respondents request the following: (i) that remedial orders be delayed for sufficient time to allow Innoscience to design and implement alternative products to avoid harming U.S. consumers and the U.S. economy; (ii) that remedial orders carve-out products disclosed as within the scope of the Notice of Institution of Investigation, but not accused of infringement by EPC; (iii) that remedial orders include repair and replacement provision; and (iv) that remedial orders include a standard certification provision. *See id.* Each of Respondents requests is addressed below.

First, Innoscience has not identified any evidence that would justify delaying the effective date of any remedial orders that may issue. *See id.* Indeed, Innoscience represented in its response to the Complaint and Notice of Institution of Investigation that "[t]he United States market is [redacted] to Innoscience's direct to consumption operations" and Innoscience has shipped [redacted] that may fall within the scope of the Investigation, for the combined value of [redacted] *See* Response to the Complaint and Notice of Investigation, EDIS Doc. ID 801747, Exh. A at 1 (Aug. 4, 2023). Moreover, Innoscience does not identify any basis that would justify delaying the effect of any remedial order that may issue. *See* RPB at 574-575.

Second, Innoscience has not identified any products that are within the scope of the Notice of Institution of Investigation, but not accused of infringement by EPC. *See* RPB at 574-575. The Staff thus does not expect Innoscience to establish a basis to "carve-out" such products from any remedial orders.

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[redacted]

Third, Respondents seek a repair and replacement exemption for any remedial orders. *See* RPB at 574-575. The Commission has on occasion issued limited exclusion orders with such a carve-out. *See Certain Lithium Ion Batteries, Battery Cells, Battery Modules, Battery Packs, Components Thereof, & Processes Therefor*, Inv. No. 337-TA-1159, Comm'n Op. at 79-80 (Mar. 4, 2021) (determining that "the limited exclusion order contain an exemption to allow importation of batteries for repair, replacement, and warranty of batteries for the Kia Niro EV and Kia Soul EVs that have been sold to U.S. consumers as of the date of the Commission's remedial orders"). Here, however, Innoscience does not identify any evidence regarding its warranty and obligations, or the impact on its customers. *See* RPB at 574-575. Moreover, given that Innoscience's sales are [redacted] the impact of the requested remedial orders would be negligible. *See* Response to the Complaint and Notice of Investigation, EDIS Doc. ID 801747, Exh. A at 1 (Aug. 4, 2023).

Finally, with respect to certification, it is consistent with Commission practice to include a "certification provision to aid Customs and Border Protection ('CBP') in enforcing Commission orders." *See Certain Fitness Devices, Streaming Components Thereof, and Systems Containing Same*, Inv. No. 337-TA-1265, Comm'n Op. at 74 (Mar. 23, 2023) ("The certification provision allows persons to certify that, to the best of their knowledge and belief, the products being imported are not excluded from entry. This standard provision can only be used for products that have been explicitly adjudicated as non-infringing."). The Staff thus recommends that any remedial orders include a standard certification provision.[4]

[4] As public interest has not been delegated to the presiding ALJ in this investigation and is thus beyond the scope of this proceeding, the Staff takes no position at this time as to whether public interest factors may justify any tailoring.

[redacted]

B. Bond

If the Commission determines to enter an exclusion order and/or cease and desist orders in this investigation, the affected articles will still be entitled to entry and sale under bond during the 60-day Presidential review period. The amount of such bond must "be sufficient to protect the complainant from any injury." 19 U.S.C. § 1337(j)(3); *see also* 19 C.F.R. § 210.50(a)(3). The Commission typically sets the Presidential review period bond based on the price differential between domestic product and the imported or infringing product, or based on a reasonable royalty. *See, e.g., Certain Ink Cartridges and Components Thereof*, Inv. No. 337-TA-565, Comm'n Op. at 63 (November 2007) (setting bond based on price differentials); *Certain Plastic Encapsulated Integrated Circuits*, Inv. No. 337-TA-315, Comm'n Op. on Issues Under Review and on Remedy, the Public Interest, and Bonding, at 45, USITC Pub. 2574 (November 1992) (setting the bond based on a reasonable royalty). However, where the available pricing or royalty information is inadequate, the bond may be set at 100% of the entered value of the accused product. *See, e.g., Certain Neodymuim-Iron-Boron Magnets, Magnet Alloys, and Products Containing Same*, Inv. No. 337-TA-372, Comm'n Op. on Remedy, the Public Interest and Bonding at 15, USITC Pub. 2964 (May 1996). In addition, it is the complainant's burden to establish support for their requested bonding amount. *See*, *e.g.*, *Certain Liquid Crystal Display Devices*, Inv. No. 337-TA-631, Comm'n Op. at 28 (July 10, 2009). Should Complainant fail to meet its burden, the Commission may determine that no bond should be imposed during the Presidential review period. *Id.*

EPC contends that bond should be set at 100% because it is impractical to set bond based on price differential, and there is insufficient evidence to determine a reasonable royalty. *See* CPB at 409. In this regard, however, EPC has not shown any basis for supporting any specific

[redacted]

bond based on pricing information or reasonable royalty rates, and offers only a conclusory statement as to the competitive status of the parties without citing to any evidence. *See* CPB at 409. While EPC does offer limited pricing information regarding certain accused products, it does not compare those prices to its own domestic pricing, nor does it explain or identify any evidence to show why it would be impractical to do so. *See id.* In a similar situation, the Commission recently determined to set bond at zero percent. *See Certain Light-Based Physiological Measurement Devices and Components Thereof*, Inv. No. 337-TA-1276, Comm'n Op. at 123.

Innoscience agrees that bond should be set at zero percent. *See* RPB at 583. But in the alternative, it argues that bond should be set no higher than 5% based on its expert's analysis of [redacted]. *See id.* at 580-582. [redacted] *See id.* [redacted] *See id.*; RX-0652C at ¶¶ 506, 608; RX-0751C at ¶¶ 81-82; CX-0879C at ¶ 72. [redacted] and thus fail to establish a reasonable royalty rate. *See* Compl. at ¶¶ 26, 34, 48.

Accordingly, for the reasons set forth above, the Staff recommends that bond be set at zero percent (0%, *i.e.*, no bond) of the entered value of the articles subject to any remedial orders during the Presidential review period.

IX. CONCLUSION

For all of the foregoing reasons, the Staff expects the evidence to establish a violation of Section 337.

[redacted]

Respectfully submitted,

/s/ R. Whitney Winston

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February 9, 2024

Certain Semiconductor Devices and Methods of Manufacturing Same and Products Containing the Same | **Investigation No. 337-TA-1366**

CERTIFICATE OF SERVICE

The undersigned certifies that on February 22, 2024, he caused the foregoing public version of the **PRE-HEARING BRIEF OF THE COMMISSION INVESTIGATIVE STAFF** to be filed with the Commission and served upon the private parties in the manner indicated below:

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