

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

APTIV SERVICES US, LLC,
Petitioner,

v.

MICROCHIP TECHNOLOGY INC,
Patent Owner.

Case No. IPR2024-00646
U.S. Patent No. 9,471,074

PATENT OWNER'S SUR-REPLY

TABLE OF CONTENTS

I.	PETITIONER IMPROPERLY CONFLATES “GM-BOOST” AND “GM-ENHANCEMENT”	2
A.	Petitioner Ignores the Actual Claim Language and Basic Claim Construction Canons	2
B.	The Patent Supports PO’s Construction.....	5
C.	Petitioner’s “No Technical Basis” Argument Rests on a False Premise	8
D.	Petitioner’s “Alternative” Argument Improperly Introduces a New Invalidity Theory and Cannot Save its Case Even if Considered	9
II.	PETITIONER FAILS TO SHOW A “BIASING CIRCUIT ... THAT] SET[S] A BIASING RATIO FOR GM-BOOST”	11
A.	Petitioner Fundamentally Misunderstands PO’s Argument, and Thus Fails to Rebut It.....	11
B.	PO Does Not Concede the Prior Art Shows the Claimed <i>Biasing Circuit</i> , Let Alone the “Same Way as the ’074 Patent”	15
C.	Petitioner’s <i>Biasing Circuit</i> Arguments Remain Flawed and Inconsistent	15
D.	Petitioner’s “Alternative” Argument Still Fails.....	17
III.	PETITIONER FAILS TO GIVE A NON-HINDSIGHT MOTIVATION TO COMBINE IVANOV AND MISUNDERSTANDS/IGNORES THE PRIOR ART TEACHINGS	18
A.	Petitioner Fundamentally Misunderstands the Prior Art and Obviousness Law.....	20
B.	Petitioner <i>Again</i> Failed to Consider Trade-offs of Modifying Rincon-Mora and Al-Shyoukh.....	23
C.	Petitioner Cannot Convert Its “Could Have” Language Into “Would Have” Language.....	28

LISTING OF EXHIBITS

Exhibit	Description
2001	U.S. Pat. 7,312,598 (“Huang”)
2002	Aptiv’s Responsive Claim Construction Brief and supporting Declaration of Stanley Shanfield, Ph.D. (March 22, 2024)
2003	Aptiv’s Sur-reply Claim Construction Brief and supporting Declaration of Stanley Shanfield, Ph.D. (May 3, 2024)
2004	U.S. Pat. 6,246,22 (“Xi”)
2005	Chronological File History for U.S. Pat. 9,471,074
2006	Aptiv’s District Court Invalidity Contentions (December 8, 2023)
2007	Microchip’s Opening Claim Construction Brief and supporting Declaration of Greg Taylor (March 1, 2024)
2008	Microchip’s Reply Claim Construction Brief and supporting Declaration of Greg Taylor (April 17, 2024)
2009	Docket in <i>Microchip Technology Inc. v. Aptiv Services US, LLC</i> , Case No. 1:23-cv-00778-JDW (D. Del.)
2010	<i>Aptiv Services US, LLC v. Microchip Technology Inc.</i> , IPR2024-00803, Paper 10 (Institution Decision) (P.T.A.B., November 7, 2024)
2011	Texas Instruments datasheet for LM2990 Negative Low Dropout [Voltage] Regulator, April, 2013
2012	ST Micro datasheet for L78MxxAB/C voltage regulator, May 2012 (from Dr. Chen deposition)
2013	’074 patent claim 1 (from Dr. Chen deposition)
2014	Rincon-Mora Biasing Circuit (Fig. 3) (from Dr. Chen deposition)
2015	Al-Shyoukh Biasing Circuit (Fig. 8) (from Dr. Chen deposition)

Exhibit	Description
2016	Texas Instruments datasheet for LM1117/LM1117I Low-Dropout Linear [Voltage] Regulator, 2012
2017	Excerpts from the Laplante Electrical Engineering Dictionary (CRC Press LLC, 2000)
2018	December 4, 2024 Deposition Transcript of Dr. Michael Chen.
2019	Microchip 300 mA CMOS LDO with Shutdown, Bypass and Independent Delayed Reset Function, 2012
2020	Fairchild KA78RXXC-Series 1A Output Low Dropout Voltage Regulators datasheet
2021	Declaration of Dr. Greg Taylor in Support of Patent Owner's Response
2022	<i>Universal Serial Bus 3.0 Specification</i> , Revision 1.0, November 12, 2008 ("USB 3.0 Specification")

TABLE OF AUTHORITIES

Page(s)

Cases

<i>CAE Screenplates Inc. v. Heinrich Fiedler GmbH & Co. KG</i> , 224 F.3d 1308 (Fed. Cir. 2000)	2, 3, 4
<i>Cambrian Sci. Corp. v. Cox Commc’n., Inc.</i> , 617 F. App’x 989 (Fed. Cir. 2015)	4
<i>Digit. Biometrics, Inc. v. Identix, Inc.</i> , 149 F.3d 1335 (Fed. Cir. 1998)	7
<i>Helmsderfer v. Bobrick Washroom Equip., Inc.</i> , 527 F.3d 1379 (Fed. Cir. 2008)	2, 3
<i>Henny Penny Corp. v. Frymaster LLC</i> , 938 F.3d 1324 (Fed. Cir. 2019)	24
<i>Intel Corp. v. PACT XPP Schweiz AG</i> , 61 F.4th 1373 (2023)	19
<i>Johnson & Johnston Assocs. v. R.E. Serv. Co.</i> , 285 F.3d 1046 (Fed. Cir. 2002)	14
<i>In re Magnum Oil Tools Int’l, Ltd.</i> , 829 F.3d 1364 (Fed. Cir. 2016)	19, 24
<i>Meiresonne v. Google, Inc.</i> , 849 F.3d 1379 (Fed. Cir. 2017)	20, 21
<i>Phillips v. AWH Corp.</i> , 415 F.3d 1303 (Fed. Cir. 2005)	7
<i>Samsung Display Co. et al. v. Polaris PowerLED Techs., LLC</i> , IPR2023-00771, Paper 40, 60 (PTAB Oct., 11, 2024)	18

Other Authorities

37 CFR §42.104(b)(2)	3
----------------------------	---

Petitioner's Reply does not change that the '074 patent's challenged claims remain patentable for three independent reasons.

First, Petitioner fights a losing battle against well-established claim construction canons (*e.g.*, different claims terms connote different meanings and primacy of the claim language) to argue that the terms **gm enhance[ment]** (element 1[b]) and **gm-boost** (element 1[c]) are synonymous. Having ignored these fundamental principles in the Petition, Petitioner should not be allowed to introduce a new invalidity theory in reply. But even if Petitioner's new theory (Reply, §II.E) is considered, Petitioner fails to show how Al-Shyoukh *re-allocates* current to satisfy **gm enhance[ment]**.

Second, to the extent Petitioner identifies any **biasing circuit** at all, Petitioner's mapping is inconsistent between elements 1[c] and 1[d]. Regardless, nothing Petitioner points to in Rincon-Mora, Al-Shyoukh, or Ivanov **set[s] a biasing ratio for gm-boost of the current buffer driver** as element 1[c] requires. At most, Petitioner shows a false equivalency to the wrong '074 circuitry and discusses an arbitrary comparison that includes a fixed component (*viz.*, a static bias current) and a varying component (I_{boost}), making the concept of **set[ting] a biasing ratio for gm-boost** meaningless.

Third, Petitioner continues to rely on impermissible hindsight to manufacture a motivation to add enable/disable functionality to references that

explain why they do not need it. The state of the art (reflected in various regulator datasheets) confirms this. Moreover, like the Petition, the Reply fails to consider drawbacks/trade-offs of combining Ivanov, which is fatal given Petitioner’s burden of proving obviousness.

I. PETITIONER IMPROPERLY CONFLATES “GM-BOOST” AND “GM-ENHANCEMENT”

A. Petitioner Ignores the Actual Claim Language and Basic Claim Construction Canons

It is a fundamental, long-standing tenet of claim interpretation that different claim terms typically connote different meanings. *See, e.g., Helmsderfer v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1382 (Fed. Cir. 2008) (“different claim terms are presumed to have different meanings.”); *CAE Screenplates Inc. v. Heinrich Fiedler GmbH & Co. KG*, 224 F.3d 1308, 1317 (Fed. Cir. 2000). The claim terms **gm-boost** and **gm enhanced** are plainly different even on their face, and are thus presumed to have different meanings. Nothing in the specification changes that. To the contrary, the specification confirms they are different.

The Petition (lacking a claim construction section altogether) ignored this fundamental claim construction canon and—without explanation—treated **gm-boost** and **gm enhanced** as synonymous, improperly collapsing the two

requirements into one.¹ Pet., 16-21 (Al-Shyoukh), 58-62 (Rincon-Mora). IPR petitions must address claim terms requiring construction. 37 CFR §42.104(b)(2). Petitioner hand-waved past this requirement at its own peril.

Petitioner must justify treating the separate **gm-boost** and **gm enhanced** limitations as synonymous. 37 CFR §42.104(b)(2); *CAE Screenplates*, 224 F.3d at 1317; *Helmsderfer*, 527 F.3d at 1382. Instead, Petitioner ignored the distinction and sought a tactical advantage by shifting the burden to PO of explaining the terms in the first instance. The Board should reject such gamesmanship.²

Tellingly, in its Reply, Petitioner focuses on arguing **against** PO's construction rather than justifying why **gm-boost** and **gm enhance[ment]** should be

¹ Petitioner asserts PO “forfeited its opportunity to identify intrinsic evidence support.” Reply, 3 (fn.1). That is absurd. PO expressly relied on the claim language itself and specification. POR, §V (4-page discussion with patent figures).

² This differs from when a petitioner cannot reasonably anticipate claim construction. Here, Petitioner knew (or should have known) the age-old claim construction canon that different terms mean different things.

construed to mean the same thing.³ Reply, §II. The reason is simple—Petitioner has no legitimate basis for doing so. Indeed, Petitioner’s expert tacitly concedes separate gm mechanisms are at play, disputing only the extent of their respective impacts on gm. EX1028, ¶7 (describing **gm-enhance[ment]** impact as “negligible”).

“Claim construction starts with the language of the claim itself.” *CAE Screenplates*, 224 F.3d at 1316. Indeed, courts “look [first] to the claim language, as [t]he actual words of the claim are the controlling focus.” *Cambrian Sci. Corp. v. Cox Commc’n., Inc.*, 617 F. App’x 989, 992 (Fed. Cir. 2015) (internal quote omitted). Petitioner either forgot or ignored this fundamental principle, failing to recognize it anywhere in its briefing. As noted, the terms **gm-boost** and **gm enhanced** differ on their face. Having set off on the wrong foot (*viz.*, beginning by assuming identity), it is unsurprising Petitioner continues down the wrong path.

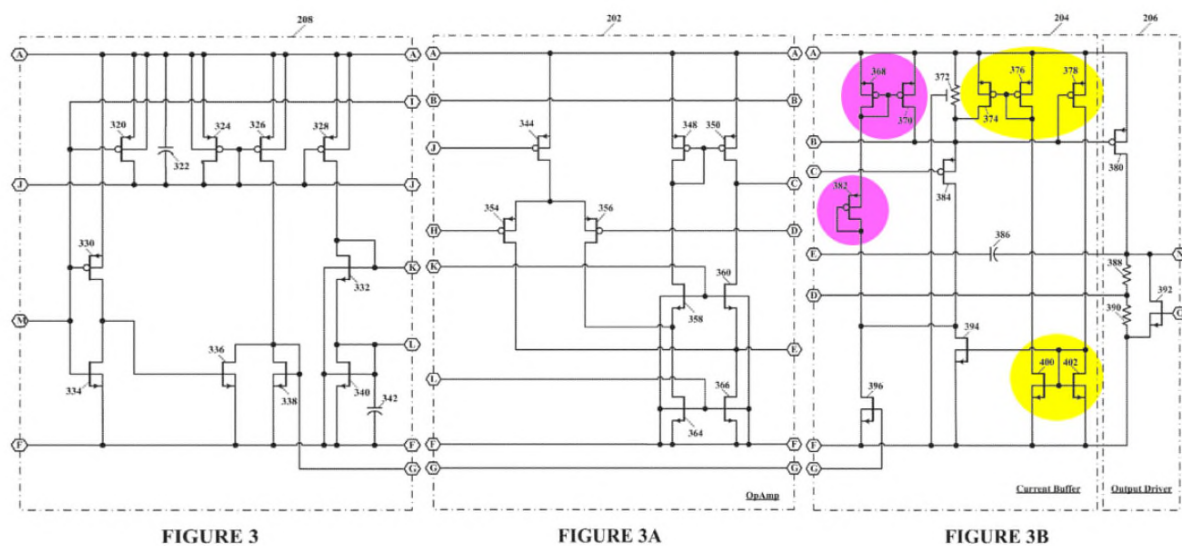
But, as the POR (and Dr. Taylor) explain at length, **gm-boost** and **gm enhance[ment]** are different concepts achieved via different circuit techniques, akin to increasing the overall speaker volume (**gm-boost**) versus re-balancing

³ Petitioner asserts “it is sufficient for the Board to reject [PO]’s proposed construction.” Reply, 6. But, again, this improperly shifts the burden onto PO when Petitioner bears the burden of establishing synonymy.

existing sound output between left and right speakers (*gm-enhance[ment]*). POR, §§IV.A (“One (gm-boost) acts to increase gm by **adding current** through transistor 384, while the other (gm-enhancement) increases gm by **steering current** around transistor 384.”), V (“gm-boost changes the overall **magnitude** of the standing current, whereas gm-enhancement changes the **allocation** of where the current is deployed”), VII.A.

B. The Patent Supports PO’s Construction

Petitioner’s response to PO’s explanation is that “[PO] never explains where the patent describes this mechanism” (Reply, 2). This is odd given that the POR expressly states “[t]he separate gm-boost and gm-enhancement circuits are most easily seen in [’074] Figs. 3, 3A, and 3B,” and “[t]he gm-boost circuitry is highlighted in yellow, and the gm enhancement circuitry in pink.” POR, 17.



POR, 17-18 (annotating ’074 Fig. 3/3A/3B). And Dr. Taylor explains gm-boost

and gm-enhancement in further detail.

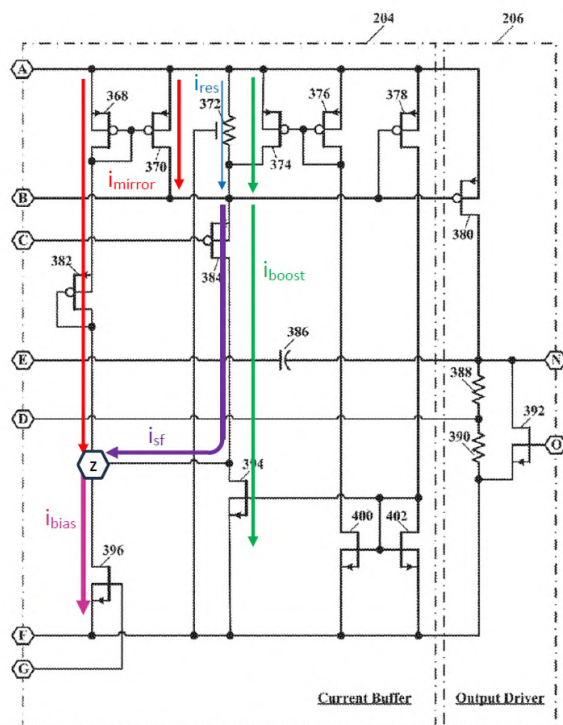


FIGURE 3B

Taylor, ¶¶75-81 (discussing Fig. 3B, annotated). Given these explanations (POR, §§IV.A, V), Petitioner’s arguments that PO has “Zero Evidence” (Reply, §II.A) and “No Technical Basis” (*id.*, §II.C) for its construction is baseless.

Petitioner’s criticism that PO relies on “a single patent figure” (Reply, 2) is both incorrect (PO also relies on claim language, expert testimony, and Rincon-Mora to inform its construction)⁴ and disingenuous. In advancing numerous

⁴ The ’074 specification’s disclosure and Petitioner’s reliance on extrinsic evidence (*e.g.*, Dr. Taylor and Rincon-Mora) distinguishes *Uniloc* and *Baran*. Reply, 6.

submarine claim constructions, Petitioner repeatedly cites Figs. 3/3A/3B to show the prior art discloses limitations “in the same way the patent does.” Pet., 17-19, 32, 59. Petitioner thus employs a double standard, attempting to show invalidity by referencing the patent’s figures but denying PO recourse to those same figures to inform claim construction.

Petitioner’s one-sided approach is improper, including because patent figures are indisputably intrinsic evidence. *E.g.*, *Phillips v. AWH Corp.*, 415 F.3d 1303, 1324-1325 (Fed. Cir. 2005). Petitioner also ignores that claim construction—and how the patent disclosure is understood—requires a POSITA’s perspective. *Phillips*, 415 F.3d at 1313. Petitioner reasons that because the patent **text** does not explain **gm-enhance[ment]** in more detail than the claim, that **gm-enhance[ment]** must be the same as **gm-boost**. Reply, 5. Putting aside that Petitioner’s logic is circular, Petitioner’s argument merely underscores the importance of a POSITA’s perspective when analyzing a circuit diagram, like the ’074 patent’s primary embodiment. Thus, when considering the ’074 patent holistically—and from a POSITA’s perspective—there is not “only one way” (Reply, 6) of increasing gm.

As the saying goes, a picture is worth a thousand words. That applies here, where the only circuit diagram (spanning Figs. 3, 3A, and 3B) is the primary disclosure illustrating the actual circuit configuration and operation. *Digit.*

Biometrics, Inc. v. Identix, Inc., 149 F.3d 1335, 1338 (Fed. Cir. 1998) (“The pictures in the specification are particularly helpful”). Given that the ’074 figures confirm two different mechanisms increase gm—which a POSITA would recognize as the claimed **gm-boost** and **gm-enhance[ment]**—the claim construction inquiry should end.

Even when Petitioner considers the circuit diagram, Petitioner at best quibbles over precisely which transistors contribute to **gm-boost** and **gm-enhance[ment]** (Reply, 3-5 (discussing transistors 368, 370, and 382)), but nothing prohibits some overlap of **gm-boost** and **gm-enhance[ment]** circuitry. In this regard, Petitioner misses the broader point, to wit, that the **mechanism or way** gm increases is different. Thus, whether certain transistors **also** contribute to **gm-boost** does not change the fundamental distinction between increasing gm by changing the overall current *magnitude* versus current *allocation*.

C. Petitioner’s “No Technical Basis” Argument Rests on a False Premise

Petitioner asserts that “Dr. Taylor, on whom [PO] exclusively relies, rests his argument on incorrect assumptions.” Reply, 6. The opposite is true—Petitioner’s counterargument is premised on fundamentally mischaracterizing Dr. Taylor’s testimony.

Petitioner contends that “Dr. Taylor incorrectly assumes that node B [in ’074 Fig. 3B] **responds slowly**” (Reply, 7) as opposed to “fast” (*id.*, 8). In support,

Petitioner cites only its expert. *Id.* To be sure, Petitioner’s expert likewise asserts Dr. Taylor made an “especially significant error” by purportedly saying “node B ... responds slowly.” EX1028, ¶4. But the problem is Dr. Taylor never said that. Unable to tip the first domino in its chain of reasoning, Petitioner’s counterargument falls apart.

Dr. Chen (and Petitioner’s) only support for Dr. Taylor’s alleged admission is ¶79 of his declaration. EX1028, ¶4 (citing EX2021, ¶79). But Dr. Taylor merely says that “[because node B] has a lot of capacitance due to the large size of [output] driver 380, it *moves more slowly*.” EX2021, ¶79. Dr. Taylor never said node B was “slow,” only that it “moves more slowly” with increasing capacitance (a fundamental and indisputable engineering principle). This is where Petitioner’s sleight of hand emerges, equating Dr. Taylor’s relative comparison of speed being proportional to capacitance with node B actually being “slow.” Under Petitioner’s logic, any truck towing a trailer necessarily goes “slow,” even when doing 70mph on the freeway. This is plainly faulty logic. The remainder of Petitioner’s (and Dr. Chen’s) extrapolation fails due to its incorrect premise.

D. Petitioner’s “Alternative” Argument Improperly Introduces a New Invalidity Theory and Cannot Save its Case Even if Considered

A petitioner must make its case in the petition, and cannot introduce new invalidity theories in reply. 2019 Consolidated Trial Practice Guide (“CTPG”), 74. There is no dispute the Petition never pointed to Al-Shyoukh transistor Q20 for

gm-enhance[ment]. Nevertheless, recognizing its error in conflating **gm-boost** and **gm-enhance[ment]**, Petitioner’s Reply §II.E introduces a new theory—pointing to transistor Q20 for the first time—for why Al-Shyoukh⁵ satisfies **gm-enhance[ment]**. PO moved to strike Petitioner’s new Al-Shyoukh theory as untimely and improper. See Paper 27. Even if not struck, the Board should decline to consider Petitioner’s new argument for equitable reasons (*viz.*, it was foreseeable **gm-boost** and **gm-enhance[ment]** are different terms with different meanings).

Regardless, Petitioner’s new Al-Shyoukh theory (Reply, §II.E) fails on the merits. Petitioner glosses over the distinction—at the heart of PO’s construction—between raising overall current (**gm-boost**) to increase gm and re-allocating existing current (**gm-enhance[ment]**) to increase gm. Reply, 11. Instead, Petitioner reframes **gm-enhance[ment]** as merely “entail[ing] a second transistor helping to charge or discharge the source node of the driver.” Reply, 10-11. That is incomplete and insufficient.

Nor does Dr. Chen discuss the key concept of current re-allocation. EX1028, ¶¶12-15. Rather, Dr. Chen relies (¶14) on the “descri[ption] for the ’074 patent” provided Dr. Taylor’s declaration, ¶79. But this is the passage Dr. Chen

⁵ Petitioner presents no “alternative” invalidity theory for Rincon-Mora.

misunderstood (or at least mischaracterized vis-à-vis node B “respond[ing] slowly”) in his reply declaration at §I.A. Given that Dr. Chen fundamentally misunderstands the circuit’s operation and fails to address the key distinction between *gm-boost* and *gm-enhance[ment]*, his testimony (even if considered) cannot help Petitioner. Moreover, Dr. Chen’s new testimony is fundamentally inconsistent with his original testimony that “gm enhance is the outcome of the gm-boost.” EX2018 (Chen Tr.), 252:15-253:2.

II. PETITIONER FAILS TO SHOW A “BIASING CIRCUIT ... THAT SET[S] A BIASING RATIO FOR GM-BOOST”

A. **Petitioner Fundamentally Misunderstands PO’s Argument, and Thus Fails to Rebut It**

The two underlined passages in element 1[c] (*a biasing circuit coupled to the current buffer driver to set a biasing ratio for gm-boost of the current buffer driver*) are crucial here. First, there must be *a biasing circuit* (connected to the current buffer driver). Second, that same *biasing circuit* must *set a biasing ratio for gm-boost* of the current buffer driver. In other words, the two requirements are inextricably tied together. They are not separate, standalone limitations that can be divorced from one another and must be considered jointly. Of course, a proper understanding of *set[ting] a biasing ratio for gm-boost* is prerequisite to understanding whether a purported *biasing circuit* actually does such a thing. That is where Petitioner’s analysis first breaks down.

PO states that **biasing ratio** in element 1[c] refers to the ratio of current in the output transistor to the buffer driver, because that is what sets **gm-boost** for the claimed **current buffer driver**. POR, 46. Petitioner characterizes this straightforward summary—drawn from the claim language itself—as a “construction [that] is wrong.”⁶ Reply, 11. Instead, Petitioner discusses an arbitrary comparison that includes a fixed component (viz., a static bias current) and a varying component (I_{boost}), making the concept of **set[ting] a biasing ratio for gm-boost** meaningless. *E.g.*, EX1002, ¶¶56-58.

Petitioner’s shortcoming stems from its fundamental misunderstanding of **gm-boost**, and thus what it means for a **biasing circuit ... to set a biasing ratio for gm-boost**. In particular, Petitioner premises its argument on comparing the prior art to part of ’074 Fig. 3. Pet., 17-21 (Al-Shyoukh), 59-62 (Rincon-Mora). In particular, Petitioner identifies a ratio between ’074 transistors 368 and 370 as being the gm-boost biasing ratio. EX1002, ¶57. But this is problematic for three reasons.

⁶ The fact that PO provided a concrete example of **biasing ratio** in the context of the circuits at issue (*e.g.*, Al-Shyoukh) does not convert the issue into claim construction. But even if it did, PO would prevail under any reasonable construction of the plain claim language.

First, this '074 circuitry is **not** what **set[s] a biasing ratio for gm-boost** (i.e., putting aside that the relevant comparison should be to the claim (not '074 Fig. 3), even when Petitioner compares the prior art to Fig. 3, it compares the wrong Fig. 3 circuitry). Pet., 18 (discussing '074 Fig. 3B), 60 (same). At most, the '074 circuitry Petitioner identifies pertains to **gm enhance[ment]**, not **gm-boost**.⁷ POR, 18. In this way, Petitioner establishes a false equivalency. Even after the PO explained this, rather than show how the art meets the actual claim language, Petitioner's Reply continues to make much of the fact that the '074 patent discusses other (unclaimed) biasing circuitry. Reply, 13-14. But that does not change the requirements of the **claimed** biasing circuitry. See *Johnson & Johnston Assocs. v. R.E. Serv. Co.*, 285 F.3d 1046, 1052 (Fed. Cir. 2002) (“[A] patent applicant defines his invention in the claims, not in the specification.”).

Second, to the extent one compared the currents in the '074 circuitry

⁷ The '074 bias circuitry that **set[s] the biasing ratio for gm-boost** (the ratio of boost current through source follower 384 to the regulator output current) comprises transistors 378, 380, 394, and 402. Because current is proportional to transistor width, the ratio would be $\frac{378 \cdot 394}{380 \cdot 402}$, where transistor numbers represent each transistor's respective width.

Petitioner identifies, it is an arbitrary comparison (between a fixed current and a varying current) which does not **set** a ratio. As Dr. Taylor explains (see ¶118), Petitioner’s purported **biasing circuit** in Al-Shyoukh “determines the current provided by PMOS M27,” which merely “provides a constant bias current.” Dr. Taylor provides a similar explanation for Rincon-Mora. *Id.*, ¶¶122 (“[Dr. Chen’s] bias circuit ... does not ‘set’ the bias ratio, instead it provides the quiescent current that keeps the regulator operating when there is no output current and is completely independent of the identified [bias] ratio between transistors 20 and 45.”). In other words, arbitrarily comparing two currents (one of which (I_{bias}) has a fixed component and another (I_{boost}) which varies) does not **set a biasing ratio**, as the claim requires.

Third, Petitioner’s circuitry (*i.e.*, transistors 368 and 370) is connected to—but not part of—the **biasing circuit** that Petitioner relies on elsewhere. *E.g.*, EX1002, ¶¶56, 60-70 (discussing Ivanov’s bias circuitry).

Petitioner also faults PO for detailing which transistors in Al-Shyoukh would set a **biasing ratio for gm-boost** (*i.e.*, $\frac{M25 \times M22}{M_p \times M23}$). Reply, 12. But this provided a point of contrast to Petitioner’s flawed analysis, and was not meant as “claim construction.” Petitioner further quibbles that Dr. Taylor’s counterexample “omits some [] current M22 pulls from buffer driver M21.” Reply, 13. This misses the forest for the trees. While PO maintains Dr. Taylor’s example is correct

(because I_{22} (I_{bias}) is distinct from I_{boost}), even accounting for the additional current Petitioner asserts should be included, Petitioner still loses. This is because Petitioner's additional currents do not remedy any of the three defects above. Because Petitioner makes no argument under the correct reading of the claim, the Board should find the claims not unpatentable.

B. PO Does Not Concede the Prior Art Shows the Claimed *Biasing Circuit*, Let Alone the “Same Way as the ’074 Patent”

Telling, Petitioner cites nothing *from the POR* to support its bald assertion that “[PO] does not dispute the Petition’s analysis of how both Al-Shyoukh and Rincon-Mora disclose a biasing circuit that sets a biasing ratio for gm-boost using the same topology as the patent.” Reply, 14-15. Instead, Petitioner cites the *Institution Decision*, which noted that *the POPR* did not challenge the *biasing circuit* limitation. *Id.*, 15 (citing Paper 11). But the POR plainly disputes Petitioner’s *biasing circuit* analysis, and makes no concessions in that regard. POR, 45-55.

C. Petitioner’s *Biasing Circuit* Arguments Remain Flawed and Inconsistent

Element 1[c] (which introduces *a biasing circuit*) and element 1[d] (which recites *the biasing circuit*) plainly refer to *the same biasing circuit* according to basic antecedent basis principles. But Petitioner’s Reply confirms Petitioner improperly mixes-and-matches what constitutes the *biasing circuit* depending on

which element it analyzes.

Petitioner admits element “1[d] relates to a function *within the biasing circuitry itself*,” which “Ivanov discloses.” Reply, 16. But if Ivanov discloses the biasing circuitry, Petitioner would need to have pointed to Ivanov for element 1[c] as well, which first recites the *biasing circuit*. But Petitioner did not. Indeed, Petitioner makes PO’s point when Petitioner confirms none of its element 1[c] analysis “involves Ivanov.” Reply, 15. Instead, Petitioner discussed various currents and voltages. POR, 45-47.

To excuse this error, the Reply asserts that element 1[c] “does not require that the biasing circuit take any specific form.” Reply, 15. But it does require a *circuit* (which Petitioner fails to identify anywhere in Rincon-Mora or Al-Shyoukh), and that circuit must *set a biasing ratio for gm-boost*. To justify pointing to various voltages and currents instead of actual circuits, Petitioner asserts “[PO] does not and cannot dispute that both Al-Shyoukh and Rincon-Mora use actual circuits to provide these voltages and currents.” Reply, 15. That misses the point, which is that Petitioner bears the burden in the first instance of mapping the prior art to the *biasing circuit*, including how the prior art’s alleged biasing circuit also meets the requirement of *set[ing] a biasing ratio for gm-boost*. Petitioner’s failure to do so limits PO’s ability to respond to a non-existent (or inconsistent) mapping.

To be sure, PO spent ten pages rebutting the Petition’s element 1[c] arguments. POR 45-55. Petitioner’s assertion (Reply, 15) to the contrary is baseless. Petitioner cannot have its cake and eat it too, by hand waving that the claimed **biasing circuitry** for element 1[c] must exist somewhere in the ether (while expressly disclaiming reliance on Ivanov) and then do an about face for element 1[d] by relying on Ivanov as “implement[ing the enable/disable] function” “within the biasing circuitry itself.” Reply, 16. The Board should reject such inconsistent positions.

D. Petitioner’s “Alternative” Argument Still Fails

Reply §III.D asserts that “[PO] Fails to Rebut Aptiv’s Alternative Argument.” But, as the POR noted, Petitioner’s so-called “alternative argument” spanned a single paragraph, generically recited what “a POSITA would have understood,” and was insufficiently developed for PO to adequately understand it. POR, 50 (Rincon-Mora, citing Pet., 61-62), 55 (Al-Shyoukh, citing Pet., 20). Moreover, Petitioner’s theory relies on “adjusting the biasing circuit to set the value of I_{bias} ” (Pet., 62), which the POR explained barks up the wrong tree entirely. POR, 48-50 (citing Taylor, ¶¶123-124). And, for Al-Shyoukh, Petitioner’s alternative theory merely extends its failed Vb1 argument to encompass Vb2, which does nothing to address the fundamental problem that neither **set a biasing ratio for gm-boost**. POR, 51-55. Nothing in the Reply changes this.

Having failed to submit PO’s infringement contentions regarding a different product—let alone explain their relevance to Rincon-Mora or Al-Shyoukh—Petitioner’s assertion that PO “feign[s] ignorance” is not well-taken. Reply, 16. At best, Petitioner misunderstands the infringement contentions which explains its inability to adequately articulate its “alternative” invalidity theory.

III. PETITIONER FAILS TO GIVE A NON-HINDSIGHT MOTIVATION TO COMBINE IVANOV AND MISUNDERSTANDS/IGNORES THE PRIOR ART TEACHINGS

At bottom, Petitioner contends it would have been obvious, and a POSITA would have been motivated, to add enable/disable functionality to reduce no-load quiescent current, when the prior art itself says it already reduced the no-load current. The law does not support this proposition. *Samsung Display Co. et al. v. Polaris PowerLED Techs., LLC*, IPR2023-00771, Paper 40, 60 (PTAB Oct., 11, 2024).

Petitioner misunderstands obviousness law, mistakenly contending that because enable/disable functionality was known for various applications/circuits, it must be obvious for the specific Rincon-Mora and Al-Shyoukh voltage regulators (which already achieved no/lower power quiescent current). Reply, 17. Petitioner paints with far too broad a brush, and ignores the actual teachings of Rincon-Mora and Al-Shyoukh, not to mention the commercial and engineering considerations and trade-offs that would go into making such a decision. In doing so, Petitioner

improperly attempts to shift its burden of proving obviousness onto PO to prove non-obviousness. *See In re Magnum Oil Tools Int’l, Ltd.*, 829 F.3d 1364, 1377-78 (Fed. Cir. 2016) (reversible error to require patentee to “prove nonobviousness”).

Citing *KSR*, Petitioner asserts its “modification would have been the ‘mere application of a known technique to a piece of prior art ready for the improvement.’” Reply, 17. But this reinforces Petitioner’s point—using a known technique applies to prior art “ready for the improvement.” Here, the prior art discloses just the opposite—viz., no need for additional enable/disable circuitry because of no/low standby current. POR, §§VI.A (Rincon-Mora), VI.B (Al-Shyoukh), VII.C (both).

Petitioner’s reliance on *Intel Corp. v. PACT XPP Schweiz AG* is also misplaced. Reply, 18. Indeed, Petitioner admits *Intel* applies to “a ‘known problem’ in the art.” Reply, 18 (citing *Intel*, 61 F.4th 1373 at 1381). Here, it was expressly known that no quiescent current problem existed in Rincon-Mora or Al-Shyoukh. POR, §§VI.A (Rincon-Mora), VI.B (Al-Shyoukh), VII.C (discussing both); EX2018, 264:13-22. Because Petitioner’s predicate fails, so does its argument. *E.g.*, Rincon-Mora, Abstract (voltage regulator “require[es] no standby or quiescent current ...”). Moreover, *Intel* dealt with *replacing* one secondary cache with another. *Intel*, 61 F.4th 1373 at 1381. No “replacement” is at issue here where both primary references lack disable circuitry altogether.

Petitioner concludes by saying “the POR does not dispute any of [Petitioner’s statements].” Reply, 18. That fails the red-face test. One wonders if Petitioner read the same POR filed by PO. The POR (and accompanying expert declaration) are replete with argument and evidence contradicting Petitioner’s baseless assertions. Analyzing the parties’ respective submissions demonstrates PO’s evidence far outweighs Petitioner’s conclusory, bare bones assertions. EX1002, ¶157 (Rincon-Mora), ¶67 (Al-Shyoukh).

This brings the motivation to combine issue full circle, with Petitioner failing to meet its burden of providing a non-hindsight driven reason a POSITA *would* have—not merely *could* have—combined Ivanov.

A. Petitioner Fundamentally Misunderstands the Prior Art and Obviousness Law

Lacking any legitimate basis to dispute the factual statements in the prior art references themselves, Petitioner argues a “far higher” standard for “teaching away,” and criticizes the POR as “devoid of authority or legal analysis.” Reply, 18. But the Board is already well-aware of obviousness law, which party (*i.e.* Petitioner) bears the burden of proof, and black-letter law regarding teaching away. Indeed, the Board need look no further than Petitioner’s *Meiresonne* case (Reply, 18), which states “[a] reference teaches away ‘when a [POSITA] ... would be led in a direction divergent from the path that was taken’ in the claim.” *Meiresonne v. Google, Inc.*, 849 F.3d 1379, 1382 (Fed. Cir. 2017) (citation omitted). *Meiresonne*

explains “[a] reference that ‘merely expresses a **general preference** for an alternative invention but does not criticize, discredit, or **otherwise discourage investigation** into’ the claimed invention does not teach away.” *Id.* The emphasized language distinguishes *Meiresonne* (mere “preference”)⁸ from the present case (discouraging enable/disable).

According to Petitioner, “Al-Shyoukh and Rincon-Mora never ‘criticize, discredit, or otherwise discourage’ enable/disable.” Reply, 18. But that is exactly what they do. POR, §§VI.A (Rincon-Mora), VI.B (Al-Shyoukh), VII.C (discussing both). The Rincon-Mora passage Petitioner cites proves PO’s point:

More particularly, the present invention relates to **a current efficient LDO voltage regulator** incorporating a transient response boost circuit ... and yet **requires no standby current** during zero output current load conditions **of the LDO voltage regulator**.

Reply, 19 (quoting Rincon Mora, 1:12-17). This passage refers to the “LDO voltage regulator” as a whole, not just the boost circuit, as Petitioner asserts

⁸ It also distinguishes *Bayer* (Reply, 21) which merely “*avored* one disclosed option over another.” And in *Cole Kepro* (Reply, 21) the prior art teaching was too broad (generic “comfortable” seating did not discourage “additional legroom”).

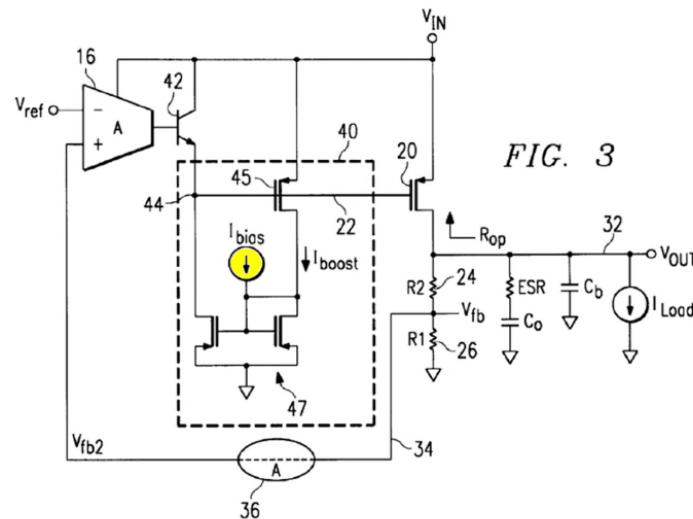
(Reply, 19).⁹

After summarizing its proposed voltage regulator, Rincon-Mora states “**some** LDO voltage regulators incorporate a separate enable terminal to switch the device into a standby mode of operation to minimize power consumption,” implicitly recognizing others do not. Rincon-Mora, 1:18-30. Rincon-Mora proceeds to contrast circuit designs needing enable/disable because they “require more quiescent current flow than is desired” (col. 1:49-53) with his voltage regulator. Thus, Petitioner’s basis for saying Rincon-Mora does not consider 23μA of quiescent current as tantamount to zero crumbles under scrutiny.¹⁰ Petitioner’s expert admitted a POSITA would consider quiescent current when determining whether to add disable functionality, but ignored that consideration in his analysis. EX2018, 264:13-265:10.

⁹ If the entire regulator has no/low quiescent current, so must the transient response circuit. Whether certain passages focus on the transient response circuit’s low/no quiescent current does not help Petitioner, and dispenses with Petitioner’s I_{boost} argument (Reply, 20).

¹⁰ Al-Shyoukh further debunks Petitioner’s “component” theory, because its 20μA quiescent current—lower than Rincon-Mora’s 23μA—is undisputedly for the entire voltage regulator, not just a component.

Petitioner next argues a purportedly “critical” distinction—that I_{boost} “is separate from the very current that Aptiv proposes disabling, I_{bias} .” Reply, 19-20. But I_{bias} (highlighted below) is **inside** the transient boost circuit (box 40) that Petitioner contends has zero quiescent current.



Rincon-Mora, Fig. 3 (annotated). Thus, Petitioner's argument is self-defeating (viz., if transient boost circuit 40 has low/no quiescent current, there would be no reason to enable/disable it).

The same argument applies *a fortiori* to Al-Shyoukh’s even lower quiescent current. POR, §§VI.C. If enable/disable functionality were so obvious (as Petitioner contends), one wonders why neither Rincon-Mora nor Al-Shyoukh disclose it. The answer is simple—neither believed it worthwhile given their already *de minimus* quiescent current.

B. Petitioner *Again* Failed to Consider Trade-offs of Modifying

Rincon-Mora and Al-Shyoukh

It is not PO's burden to prove nonobviousness, but Petitioner's burden to prove obviousness. *In re Magnum Oil*, 829 F.3d at 1377-78. Petitioner's argument that PO "[f]ails to [r]aise [a]ny [m]aterial [t]radeoff [c]oncerns" improperly attempts to shift its burden. Reply, §IV.B. This is both legal error and factually incorrect. Indeed, Petitioner admits PO identifies "various design considerations," including "speed/timing" and that "[t]he enable/disable circuitry itself consumes power." Reply, 23 (citing POR, 65-68). And Petitioner's expert acknowledged the need to account for these (and other) specific design tradeoffs (EX2018, 262:24-263:12 ("there are just so many consideration[s]"); *id.*, 261:22-262:12 ("size" is "always" a concern)) which distinguishes *Valencell* (Reply, 23).

Petitioner failed to meet its burden by ignoring not only these issues, but every drawback. *Henny Penny Corp. v. Frymaster LLC*, 938 F.3d 1324, 1331-32 (Fed. Cir. 2019) ("[T]he benefits, *both lost and gained*, should be weighed against one another.") (internal cite omitted); EX2018, 254:13-255:4 ("I did not perform [that] analysis"), *id.*, 255:5-12 ("I'm not ready to give that analysis or offer my opinions."); *id.*, 255:21-24; *id.* 257:4-13 (no analysis on "regulator speed of Rincon-Mora and Al-Shyoukh"); 257:24-258:1 ("I don't think I can offer that opinions or analysis [about] what cost that is adding."). Even after PO raised the issues, the Reply ignored countervailing considerations. Reply, §IV.B. Instead,

Petitioner’s Reply argues the law—viz., that because enable/disable functionality was “known,” it need not show anything more. Reply, 23. That is like saying that because heated driveways were known for homes in Aspen, Colorado (viz., to melt snow during winter) that it would have been obvious (or “suitable” to use Petitioner’s verbiage) to install heated driveways in Miami, Florida. Petitioner’s head-in-the-sand approach to obviousness fails. Just because installing a heated driveway (analogous to enable/disable function) was known **where a need existed and under the right circumstances**, does not make installing it obvious/suitable where **the need is not present** or is outweighed by countervailing considerations such as cost, complexity, speed/delay, expected benefit, etc.

Again trying to burden shift, Petitioner argues PO “does not demonstrate why delay [exiting standby mode] would have been unacceptable.” Reply, 23. But the ’074 patent “relates to USB voltage regulators” (EX1001, 1:17-19), and PO provided an exemplary USB timing requirement. EX2021, ¶64 (900ns constraint to exit “U1” state). Petitioner contends “Ivanov reports a 100-150 ns start-up time” which satisfies “the 900ns exit window.” Reply, 23-24. But Petitioner fundamentally misunderstands the 900ns requirement, which is the **total** response time for the whole system to exit U1, not merely the time needed to turn on Ivanov’s external reference generation circuit (*i.e.* it includes the time required to startup the regulator). EX2022, Table 6-22, §6.9.2 (describing “Example LFPS

Handshake for U1/U2 Exit”). If you never disable the regulator, its startup time does not matter. But applying Ivanov’s disable capability requires assessing the regulator startup time, which Petitioner failed to do.

In yet another burden shifting attempt, Petitioner asserts PO “does not show how the power consumed by enable/disable circuitry would deter using it with Al-Shyoukh and Rincon-Mora.” Reply, 24. But Petitioner admits Ivanov’s enable/disable circuit requires multiple currents to operate, including 1-2 μ A “trickle charge” and up to 5 μ A through transistor M17. Reply, 24 (citing Ivanov 5:39-58). Collectively, these add 7 μ A to the system. Petitioner questions why this matters since it is “below Al-Shyoukh’s and Rincon-Mora’s 20/23 μ A.” Reply, 24. Beyond reducing any power savings, it incurs penalties in terms of circuit complexity, slower speed/startup time, bigger size, increased cost, etc. Petitioner was obligated to address such considerations, but did not. Further, Petitioner fails to explain why a POSITA would not focus on improving more power-intensive design aspects.

Rather than engage with PO’s voltage regulator datasheets (POR, 64-65), Petitioner cites two datasheets which prove nothing. Reply, 24. First, Petitioner cites EX1031 for the AP7331 voltage regulator. *Id.* Petitioner admits this part has 75 μ A quiescent current. Reply, 24-25 (citing EX1031, 151). Given this is several times larger than Rincon-Mora or Al-Shyoukh’s quiescent current, it is irrelevant.

Second, Petitioner cites the MIC3385 datasheet, which Petitioner says reports 29 μ A quiescent current. Reply, 24 (citing EX1030, 3, 6). Again, this proves nothing. To begin, MIC3385 is a hybrid device combining a “buck regulator” (having a totally different architecture) with an “LDO standby mode.” EX1030, 1. The datasheet’s first sentence explains the part is a “buck regulator that features a LOWQ® LDO *standby mode that draws only 18 μ A of quiescent current.*” *Id.* In other words, the LDO itself provides “standby mode,” and draws 18 μ A quiescent current (comparable to Al-Shyoukh and Rincon-Mora). The additional possibility of “shut[ting] down the device” altogether proves nothing. *Id.*, 2. Regardless, PO’s datasheets (which do not mix-and-match regulators) provide better data points because neither Rincon-Mora nor Al-Shyoukh employ a hybrid regulator architecture. POR, 10-11, 64 (discussing EX2011-12, EX2016, EX2019-20).

Even reading the MIC3385 datasheet as Petitioner suggests does not help because the current savings for Rincon-Mora and Al-Shyoukh’s architectures would be far lower due to manufacturing technology advances between the prior art publication dates (late 1990s for Rincon-Mora and mid-2000s for Al-Shyoukh) and the ’074 patent priority date (2013). EX2021, ¶95 (discussing 5-generation advancement); EX1029 (Taylor Tr.), 114:2-118:21 (explaining impact of manufacturing advancements on leakage/quiescent current); EX1029, 117:16-

118:1 (Dr. Taylor discussing “vast difference” between Rincon-Mora/Al-Shyoukh manufacturing technologies (2 μ m and 0.35 μ m respectively) and 2013 manufacturing). “You’re comparing an antique to a really modern process, and you could see orders of magnitude variation.” *Id.*, 117:16-118:1. Thus, in 2013 the quiescent current for Rincon-Mora and Al-Shyoukh’s voltage regulators would be much smaller than the amount considered *de minimus* when those references first published. *Id.*, 115:23-116:12 (testimony regarding “lower leakage and higher performance” in 2013), *id.* 118:11-21.

C. Petitioner Cannot Convert Its “Could Have” Language Into “Would Have” Language

As discussed *supra* and in POR §VII.C, Petitioner fails to adequately articulate a motivation to combine. The Reply confirms this when it tries to convert its pervasive use of what a POSITA “could” have done into what a POSITA “would” have done. Reply, §IV.C. Petitioner asserts that “[PO] confuses discussion of whether a POSITA had the skill and knowledge to implement a modification (a question of ‘could’) with whether a POSITA was motivated to do so (a question of ‘would’).” Reply, 26. But this is precisely *PO*’s point—*viz.*, conflating the two separate inquiries into one is improper. As the Reply concedes, when discussing various instances of “could,” “the Petition was describing a POSITA’s knowledge, not articulating a combination.” Reply, 26. And articulating a non-hindsight rationale for modifying Rincon-Mora and Al-Shyoukh

is precisely what the Petition lacks.

Respectfully submitted,

Dated: May 14, 2025

/Travis Jensen/

Travis Jensen, Reg. No. 60,087
Orrick, Herrington & Sutcliffe LLP
1000 Marsh Road
Menlo Park, CA 94025-1015

Counsel for Patent Owner

CERTIFICATE OF WORD COUNT

The undersigned certifies that pursuant to the word count limits set forth in 37 C.F.R. §42.24(b)(1), this Preliminary Response contains 5,596 words as determined using the word count feature in Microsoft Word, which was used to prepare this Sur-Reply.

Dated: May 14, 2025

/Travis Jensen/

Travis Jensen, Reg. No. 60,087
Orrick, Herrington & Sutcliffe LLP
1000 Marsh Road
Menlo Park, CA 94025-1015

Counsel for Patent Owner

CERTIFICATE OF SERVICE

The undersigned certifies that on May 14, 2025, a copy of the following was served in its entirety via electronic mail, upon the following attorneys of record for Petitioner:

Alex S. Yap Mehran Arjomand Bryan Blumenkopf Stephen Liu MORRISON & FOERSTER LLP 707 Wilshire Boulevard, Suite 6000 Los Angeles, CA 90017	ayap@mofo.com marjomand@mofo.com bblumen@mofo.com sliu@mofo.com Aptiv-Microchip-PTAB@mofo.com
---	--

/Karen Johnson/
Karen Johnson