

**IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF DELAWARE**

MICROCHIP TECHNOLOGY INC.,

Plaintiff,

v.

APTIV SERVICES US, LLC

Defendant.

Civil Action No. 1:23-cv-00778 (JDW)

JURY TRIAL DEMANDED

APTIV'S SURREPLY CLAIM CONSTRUCTION BRIEF

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I. '665 PATENT ARGUMENT

A. Term 1: “second voltage rail”

No.	Claim Term	Microchip’s Proposed Construction	Aptiv’s Proposed Construction
1	“second voltage rail” '665 patent, claim 1	Plain and Ordinary Meaning Alternatively, “a second voltage rail that is distinct from the third voltage rail but may or may not be distinct from the first voltage rail”	“a second voltage rail that is distinct from the first voltage rail”

Microchip contends that the terms “first voltage rail” and “second voltage rail” should be construed to refer to precisely the same structure, despite clear statements in the specification distinguishing between embodiments with two separate rails and those with a single rail performing multiple functions. In so arguing, Microchip relies on the Federal Circuit’s caution against “interpreting a claim term in a way that excludes disclosed embodiments.” (*See Reply Br. at 4, quoting Helmsderger v. Bobrick Washroom Equip., Inc.*, 527 F.3d 1379, 1383 (Fed. Cir. 2008).) But that same guidance also notes that it is “often the case that different claims are directed to and cover different disclosed embodiments. The patentee chooses the language and accordingly the scope of his claims.” *Id.* Here, the patentee did just that: recognizing in the specification that there were two distinct arrangements for the power supply rails and electing to draft some claims directed to the two-power-rail embodiment and others more broadly. The Court should give full effect to the patentee’s decision.

Microchip relies on *Linear Technology Corp. v. ITC* for the proposition that separately enumerated claim limitations do not require distinct structures and may instead share some degree of overlap. 566 F.3d 1049 (Fed. Cir. 2009). Aptiv does not disagree with this as a general matter, but the *Linear Tech.* court reached its conclusion that a “second circuit” and “third circuit” could share some circuitry in common by reasoning that “nothing in the claim language or specification . . . support[ed] narrowly construing the terms to require . . . entirely

distinct ‘second’ and ‘third’ circuits.” *Id.* at 1055. In the present case, however, there is no such silence: both the claim language and the specification support construing claim 1 to require separate and distinct voltage rails.

The ’665 patent has three independent claims. Claim 1, which is at issue here, clearly and unambiguously describes a first, a second, and a third (ground) voltage rail, implying that the patentee desired to claim each as a distinct element. *See Becton Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254 (Fed. Cir. 2010) (“Where a claim lists elements separately, the clear implication of the claim language is that those elements are distinct components of the patented invention” (quotation and modification marks omitted)). The next independent claim, claim 6, describes only two rails: a first supply rail and a second (ground) supply rail. The final independent claim, claim 14, is altogether silent on the presence of voltage rails. Thus, the differences in the structure of the independent claims suggest that while claim 1 was drafted more narrowly to require at least two distinct power rails—namely, a first and a second—the other independent claims were drafted more broadly to encompass both systems that might have only a single power rail and systems that might have more than one.

The specification bolsters this implication of the claim language and structure by recognizing that, in addition to the dual power-rail embodiment shown in Fig. 2, “alternate embodiments may be configured with a single power rail providing power to the circuit and/or system . . . shown in FIG. 2.” (’665 Patent at 5:57-65.) The patentee’s recitation of alternate embodiments in the specification makes clear that the patentee knew of two distinct embodiments when drafting the claims and elected to claim only one of those embodiments in claim 1 (while drafting other independent claims more broadly to address other embodiments). *August Tech. Corp. v. Camtek, Ltd.*, 655 F.3d 1278, 1385 (Fed. Cir. 2011) (“The mere fact that

there is an alternative embodiment disclosed in the asserted patent that is not encompassed by our claim construction does not outweigh the language of the claim.” (cleaned up)).

Microchip’s reliance on *Square D Co. v. E.I. Electronics, Inc.*, is misplaced. 685 F. Supp. 2d 864 (N.D. Ill. 2010). The claim at issue in that case was directed to a meter for measuring the amount of electricity delivered to a consumer. *Id.* at 875-76. One feature of the claimed meter was that it contained what amounted to a backup power supply that would allow the meter to operate in the event of disrupted service. *Id.* at 875. The claims described a “first power supply” for providing power during normal operation and a “second power supply” for providing power during disrupted service. *Id.* During claim construction, the court was asked to determine whether the claim required the “second power supply” to be “a second, independent source of power” or whether it need only be a “second source of power.” *Id.* In concluding that the second power supply need not be a separate structure, the court relied on the specification’s detailed disclosure of the sole embodiment of the power supply as being designed both to provide power during normal operations and being designed to provide short-term power in the event of a “power quality event.” *Id.* To have required separate physical structures for the first and second power source would effectively have read that patent’s sole embodiment out of the claims. As discussed above, there is no such risk in the present case because the preferred embodiment *does* include separate voltage rails and because there are other independent claims encompassing alternative embodiments utilizing a single power voltage rail.

II. ’074 PATENT ARGUMENT

A. Term 3: “an enable/disable function to enable/disable the biasing circuit for reducing standby current”

No.	Claim Term	Microchip’s Proposed Construction	Aptiv’s Proposed Construction
3	“an enable/disable	Not subject to 35 U.S.C. § 112 ¶ 6.	Indefinite; Subject to 35 U.S.C. § 112 ¶ 6

function to enable/disable the biasing circuit for reducing standby current” '074 patent, claim 1	To the extent the court determines that § 112 ¶ 6 applies: Function: to enable/disable the biasing circuit for reducing standby current Structure: enable/disable signal input line (Node M)	without any corresponding structure
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Microchip contends that Aptiv offers no affirmative evidence that the term “an enable/disable function to enable/disable the biasing circuit for reducing standby current” would not be recognized by a POSITA as a name for structure. This argument ignores the testimony of Aptiv’s expert Dr. Shanfield, who explains why a POSITA would not have such an understanding in the context of the claims and the disclosure of the ’074 patent. Microchip’s arguments in reply also mischaracterize Dr. Shanfield’s explanation that its own documentary evidence supports a finding that the claim term is not a name for a class of structure. Far from “show[ing] consistent use of ‘enable’ terminology in the art” (Reply Br. at 5), the technical documents instead reveal inconsistent use in the art of the term “enable” and related terms to refer to a mix of logic, signals, and input lines. In light of this record, the rules of means-plus-function claiming should be found to apply. Moreover, this evidence also supports the conclusion that the bare input line “Node M” identified by Microchip is insufficient structure to “enable/disable the biasing circuit for reducing standby current,” even under Microchip’s narrowed reading of the function, such that the term should be found invalid for indefiniteness.

1. The evidence supports that the “enable/disable function” is not a sufficiently definite name for a class of structures, overcoming the presumption against means-plus-function claiming.

Aptiv relies on testimony from Dr. Shanfield in support of its argument that the claimed “enable/disable function” would not be understood by a POSITA as a name for a class of

structure, such that the rules of means-plus-function claiming should apply even in the absence of the use of the term “means.” (*See* Shanfield Resp. Decl. ¶¶ 57-63.) In addition to explaining that techniques to enable and disable a circuit are not necessarily interchangeable and do not necessarily rely on a single control input both to enable or disable (*id.* ¶¶ 61-63), Dr. Shanfield explains why the evidence cited by Microchip’s expert Dr. Taylor “do[es] not support Microchip’s theory that the claim term is a name for a class of structures that can perform this function” (*id.* ¶ 60). Critically, Dr. Shanfield did not rely for his opinion solely on Exhibit 5 to the Taylor Declaration, as Microchip’s argument suggests. (*See* Reply Br. at 7.) Rather, his testimony was that the examples in the art of technical documentation from voltage regulators that were cited by Dr. Taylor (1) use terms other than the language of the claims—“enable/disable function”—and (2) inconsistently apply those other terms both to two different types of physical structures—namely logic circuitry and input lines—and to voltage signals rather than structure. (*See* Shanfield Resp. Decl. ¶ 60.) This inconsistent usage of terms other than the language of the claims across the exhibits cited by Microchip and Dr. Taylor supports Aptiv’s position that the claim language itself is not a sufficiently definite name for a class of structure such that means-plus-function rules should apply.

Microchip’s response (1) focuses solely on the subset of usages of terms in the exhibits that refer only to physical pins and/or wires and (2) disputes Dr. Shanfield’s explanation that the usage of “enable e” and “e” in Taylor Ex. 5 refers instead to a **signal** on such a wire. (*See* Reply Br. at 6-7.) As to the former, the “enable/disable function” language in the claims differs materially from all of the examples in the art that are used to refer to physical pins and/or wires through which a signal may be sent—namely, “enable,” “enable pin,” “enable input,” “EN,” or “EN pin.” In fact, none of the examples Dr. Taylor relies on shows any use of the actual claim

term “enable/disable function.” Microchip argues that evidence of usage of a variant of the disputed claim could support a finding that the disputed term would be recognized by a POSITA as the name for sufficiently definite structure (*see* Reply Br. at 7-8 (quoting from *Greenberg v. Ethicon Endo-Surgery, Inc.*, 91 F.3d 1580, 1583 (Fed. Cir. 1996), the use in the art of the term “detent” as relevant to construction of the term “detent mechanism”). But here, Exhibits 1-5 from Dr. Taylor’s declaration do not even use the term “enable/disable” on its own, much less as “enable/disable function.” And the use of other variants of the disputed term is inconsistent and conflicting, supporting only the conclusion that “enable/disable function” does not have a sufficiently definite meaning as the name for a class of structure. (*See* Shanfield Resp. Decl. ¶ 60.) The record in this case thus differs significantly from *PACT XPP Schweiz AG v. Intel Corporation*, No. 1:19-CV-01006-JDW, 2020 WL 5821723, at *6 (D. Del. Sept. 30, 2020), on which Microchip also relies. In *PACT*, the Court found “repeated” and “wide use” in the literature of the precise claim term “instruction dispatch unit” that was used in the claim language. *Id.* By contrast, none of the examples from the literature here use the disputed claim term.

As to the usage of the terms “enable signal,” “enable signal e,” “enable e,” and “e” in Taylor Ex. 5, these examples demonstrate that “enable” was often used in the art to refer to an electronic signal rather than the structure on which such a signal was carried. Microchip argues that Taylor Ex. 5 presents no inconsistency with the prior exhibits because it “shows ‘e’ being applied to physical enable/disable signal input lines controlling transistors to enable or disable the flow of current through the circuitry.” But by inserting a reference to “enable/disable signal lines”—a term that is not used in Taylor Ex. 5—Microchip assumes what it seeks to prove: namely, that “enable” is used with sufficiently definite meaning as a term of art to refer solely to

an input line (and does not refer to a signal sent on such a line or to circuitry that enables/disables functionality based on such a signal). As Dr. Shanfield explains in his surreply declaration, Taylor Ex. 5’s use of “enable e” and “e” clearly refer to signals rather than the lines on which signals are carried. (*See* Declaration of Stanley Shanfield, Ph.D ISO Aptiv’s Surreply Claim Construction Brief (“Shanfield Surreply Decl.”) ¶ 3.) Dr. Shanfield’s testimony, combined with the usage examples from the art, demonstrate that the term “enable/disable function” was not understood as a sufficiently definite name for a class of structure, such that means-plus-function rules govern construction of the disputed term.

2. The claim is indefinite for failure to disclose adequate structure to perform the recited functions of “enabl[ing]/disabl[ing] the biasing circuit for reducing standby current.”

Microchip argues that even if mean-plus-function claiming applies, the term “enable/disable function” is not indefinite because the specification’s disclosure of the “Node M” line is sufficient structure to perform the claimed function “to enable/disable the biasing circuit for reducing standby current.” Dr. Shanfield explains by reference to the specification that “[w]hen the ’074 patent discusses the process of disabling a section of circuitry to reduce standby current, it refers to structure that includes multiple transistors—numbered ‘320, 330, 334 and 336’—that ‘may be shut off during disabling/power down operation to make sure this circuit will consume substantially no DC current.’” (*See* Shanfield Resp. Decl. ¶ 65.) Microchip appears not to dispute that that “transistors controlled by Node M” are required to perform the function disabling the biasing circuit based on a signal carried on Node M. (Reply Br. at 10; *see also* Taylor Reply Decl. ¶ 14). Instead, Microchip argues that even if the rules of mean-plus-functioning claiming apply, the claim is not indefinite because the specification discloses such transistors. (Reply Br. at 10.) But in a footnote, Microchip seeks to avoid the necessary implication that the scope of the “enable/disable function” limitation is thus properly confined to

require structure that includes the “transistors controlled by Node M” and their equivalents. (*Id.* at 10 n.3.) Dr. Taylor similarly opines that he “disagree[s], however, that the exact arrangement of transistors is required for the disclosed function” because a “POSITA would understand that the *specific arrangement* of biasing transistors is a function of the particular biasing circuitry used in a regulator.” (Taylor Reply Decl. ¶ 14 (emphasis in original).) But the statutory quid-pro-quo of means-plus-function claiming is precisely that “such [a] claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof.” 35 U.S.C. § 112(f). Accordingly, in the event that the Court finds that means-plus-function rules apply and that the claim is not indefinite because sufficient structure is disclosed to perform the claimed function, the claim scope should be limited to Node M, arranged with transistors “320, 330, 334 and 336” of Figure 3, and equivalents thereof.

However, because the law requires “disclos[ure of] adequate corresponding structure to perform all of the claimed functions,” *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1351-52 (Fed. Cir. 2015), Microchip’s argument in support of adoption of its identified structure of “enable/disable signal input line (Node M)” and against a finding of indefiniteness further relies on pruning back what Microchip characterizes as “unclaimed functions.” Microchip contends that the claimed functions do not include either “*enabling* the bias circuit to reduce standby current” (Reply Br. at 9) or “the creation of this [enable/disable] signal, switching this signal on and off, or logic for evaluating when to apply this signal” (*id.* at 10). Even assuming that Microchip is correct that the “enabl[ing]” function of the claim does not refer to turning *on* the biasing circuit “for reducing standby current,” Microchip’s sole argument that the claimed function to “enable/disable the biasing circuit to reduce standby current” does not require creating and controlling the sending of an enable/disable *signal* is Dr. Taylor’s bare assertion

that “the claim is silent on those functions.” (Taylor Reply Decl. ¶ 15.) By contrast, Dr. Shanfield explains that a person of skill in the art would recognize that performance of the function of “enabling/disabling the biasing circuit” would require not just carrying a signal, but also creating, controlling, and acting on such a signal. (Shanfield Surreply Decl. ¶ 5.) Because the ’074 patent undisputedly does not disclose structure to perform the creating and controlling functions, the claim term should be found indefinite.

B. Term 4: “wherein the gm-boost circuit enables the current buffer driver to have a large gm value”

No.	Claim Term	Microchip’s Proposed Construction	Aptiv’s Proposed Construction
4	“wherein the gm-boost circuit enables the current buffer driver to have a large gm value” ’074 patent, claim 4	Not Indefinite. Plain and Ordinary Meaning. Alternatively, “wherein the gm-boost circuit increases the gm value of the current buffer driver”	Indefinite

Microchip’s reply highlights why its interpretation of “large gm value” is unsupported.

The parties agree that the specification does not provide an express definition for the claim term.

But as Microchip notes, the phrase “large gm” appears in four instances:

[1] A voltage regulator has a large gm current buffer driver added between a first stage of an operation amplifier and a last stage power transistor. This current buffer **allows a significant reduction in the maximum internal and external compensation capacitances** needed for regulator stability.

[2] [A] voltage regulator may comprise a large gm (transconductance) current driver (low impedance current buffer amplifier) [T]he current buffer, according to the teachings of this disclosure, **offers the circuit designer a wider range of external capacitor sizes** to choose from.

[3] **The key to being able to use smaller value internal and external capacitances** is to have a large gm current driver buffer amplifier 204 between the first stage OpAmp 202 and the last stage power output driver 206.

[4] [T]he current buffer driver 204 pushes this pole to a high frequency beyond unity-gain frequency due to its low-impedance characteristics **in order to get the pole-splitting effect**. To achieve this, it is necessary to provide a fairly large gm value of the current buffer driver 204.

(’074 patent, Abstract; *id.* at 3:29-41, 3:58-62, 4:11-15 (emphasis added).) Yet each invocation of “large gm” describes a different result, undermining Microchip’s contention that a POSITA would necessarily conclude that a “large gm value” is one sufficient to create pole-splitting. Microchip fails to explain why a POSITA would not instead conclude that the value is one sufficient to (1) allow a significant reduction in the maximum internal and external compensation capacitances (2) offer the circuit designer a wider range of external capacitor sizes to choose from or (3) enable smaller value internal and external capacitances. (’074 patent, Abstract; *id.* at 3:29-41, 3:58-62.) The patent describes not only the amount of gm inconsistently (*i.e.*, “fairly large gm value” vs. “large gm value”), but also provide materially different descriptions of the results (*i.e.*, “significant reduction”, “smaller,” and “wider range”). (’074 patent, Abstract; *id.* at 3:29-41, 3:58-62, 4:11-15 (emphasis added).)

Even if Microchip’s interpretation were supported, tying the definition of “large gm value” to pole-splitting is an inadequate metric because the locations of the poles depend on the load being driven by the voltage regulator. (Shanfield Surreply Decl. ¶ 12.) The claim is directed to a voltage regulator wherein the gm-boost circuit enables the current buffer driver to have a “large gm value.” (’074 Patent, claim 4.) But the same exact voltage regulator will behave differently when connected to different loads. (Shanfield Surreply Decl. ¶ 12.) For example, for a given load (*i.e.*, the resistance of the device powered by the regulator), a regulator’s gm value could be sufficient to achieve pole-splitting. (Shanfield Surreply Decl. ¶¶ 7-8.) Connect a different load, however, and the same gm value is too small to achieve pole-splitting resulting in an unstable system. (Shanfield Surreply Decl. ¶¶ 9-10.) Thus, under

Microchip’s proposed construction the very same regulator would be infringing under some conditions and not under others.¹ As discussed in the following section, this renders the term indefinite.

Contrary to Microchip’s assertions, Aptiv does not suggest that “large gm value” must be defined with numerical precision. (*See* Reply Br. at 13.) This problem could have been addressed, for example, by defining the range of loads supported by the claimed invention. Without more information in the patent, however, a POSITA cannot determine if a regulator’s buffer driver has the “large gm value” required by claim 4. Accordingly, the claim is indefinite because the patent fails to provide a POSITA with reasonable certainty as to claim scope.

C. Term 5: “low gain and high bandwidth amplifier”

No.	Claim Term	Microchip’s Proposed Construction	Aptiv’s Proposed Construction
5	“low gain and high bandwidth amplifier” '074 patent, claims 8, 9	Not Indefinite. Plain and Ordinary Meaning. Alternatively, “amplifier optimized for high bandwidth with a commensurate reduction of gain”	Indefinite

Microchip’s proposed alternate construction for “low gain and high bandwidth amplifier” would effectively read the term “low gain” from the patent entirely, instead requiring only that there be a “commensurate reduction of gain.” Far from clarifying the scope of the claim, this adds yet another layer of ambiguity. That this is the most reasonable construction Microchip was able to offer highlights why there is no “plain and ordinary meaning” for this term that would

¹ “[M]ethod claims require the performance of steps; claims that describe physical components of a whole are system, or apparatus, claims.” *Jazz Pharms., Inc. v. Avadel CNS Pharms., LLC*, 60 F.4th 1373, 1379 (Fed. Cir. 2023). And “apparatus claims cover what a device *is*, not what a device *does*.” *Hewlett-Packard Co. v. Bausch & Lomb, Inc.*, 909 F.2d 1464, 1468 (Fed. Cir. 1990).

inform a POSITA, with reasonable certainty, of what it is the patentee claims. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

Contrary to Microchip’s contention, Aptiv does not argue that numerical certainty is required to render a claim definite. However, Microchip’s proposed guidance—that the amplifier must provide “sufficient bandwidth to form a single pole” and “sufficient gain to drive [a] current buffer”—would potentially cover the full range of potential amplifiers, regardless of where along the gain-bandwidth spectrum they fall. (Shanfield Surreply Decl. ¶ 16.)



Microchip itself recognizes that the “requisite ‘low gain’ and ‘high bandwidth’ are *context-dependent values* that depend on the specific circuitry employed.” (Reply Br. at 15) (emphasis added). But the context is not limited to the circuitry of the voltage regulator itself; as discussed in the previous section, the point at which a single pole is formed also depends on the load that is being powered by the voltage regulator. (Shanfield Surreply Decl. ¶ 15.) For this reason, a POSITA cannot determine at what point bandwidth is sufficient under Microchip’s proposed formulation without knowing the range of loads that the voltage regulator is intended to power. (*Id.*) Because the claims and specification are silent regarding any such range, and because there conceivably exists a load for which a single pole could be generated at almost any bandwidth, the effect of adopting Microchip’s “objective boundaries” would be to read the entire limitation out of the claim. (*Id.* ¶ 16.)

This ambiguity is particularly troubling given the term’s inclusion in a system claim, which differs fundamentally from claimed methods. *In re Kollar*, 286 F.3d 1326, 1332 (Fed.

Cir. 2002) (recognizing the “distinction between a claim to a product, device, or apparatus, all of which are tangible items, and a claim to a process, which consists of a series of acts or steps.”). A method claim is only infringed by performance of all steps of the claimed method. *Ricoh Co., Ltd. v. Quanta Comput., Inc.*, 550 F.3d 1325, 1333 (Fed. Cir. 2009). Thus, for any given performance there is a specific application (and therefore a specific associated load) from which a POSITA may conceivably calculate whether that specific performance of steps is infringing based on whether there would be sufficient bandwidth to form a single pole. System claims are different, however, because they may be infringed simply by making or selling a product. To determine whether an accused voltage regulator infringes the asserted system claim, a POSITA must determine whether it satisfies the claim limitations without any information regarding the load that it will drive when it is used.

A similar problem was addressed by the Federal Circuit in *Halliburton Energy Services, Inc. v. M-I LLC*, 514 F.3d 1244 (Fed. Cir. 2008). There, the Court considered a claim directed to a “fragile gel” drilling fluid. *Id.* at 1250. The patent owner argued that a “fragile gel” was one that “forms a gel structure that allows it to suspend drill cuttings and weighting materials for delivery to the well surface.” *Id.* at 1251. Whether a drilling fluid was capable of performing this function, however, was determined in part by a wide variety of potential factors, including “formation geology, wellbore size, depth, angle, etc.” *Id.* at 1254-55. On this basis, the Federal Circuit determined that the term was indefinite, holding that “[w]hen a proposed construction requires that an artisan make a separate infringement determination for every set of circumstances in which the composition may be used, and when such determinations are likely to result in differing outcomes (sometimes infringing and sometimes not), that construction is likely to be indefinite.” *Id.* at 1255. The same is true in the present case. Here, Microchip’s proposed

construction would inject a use- and context-specific requirement into a system claim. As a result, an accused apparatus could “simultaneously infringe and not infringe the claims,” depending on the load being supplied. *Id.* at 1254 (quoting *Geneva Pharms., Inc. v. GlaxoSmithKline PLC*, 349 F.3d 1373, 1384 (Fed. Cir. 2003)). Such a result, the Federal Circuit cautions, is “the epitome of indefiniteness.” *Id.*

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**IN THE UNITED STATES DISTRICT COURT
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MICROCHIP TECHNOLOGY INC.,

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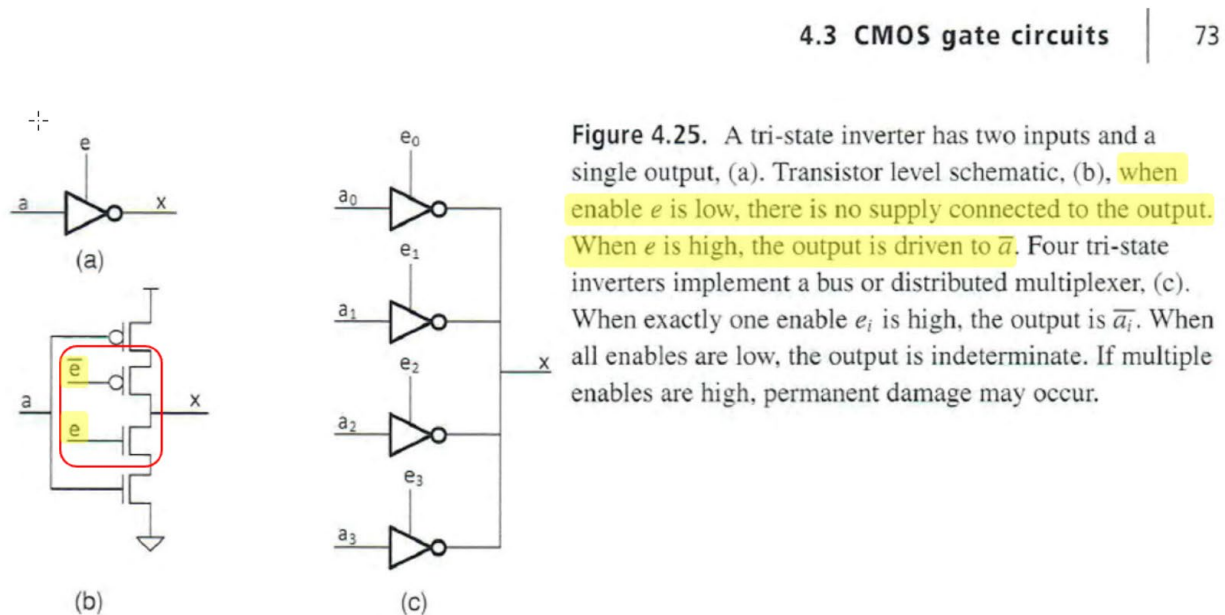
JURY TRIAL DEMANDED

**DECLARATION OF STANLEY SHANFIELD, PH.D. IN SUPPORT OF
APTIV'S SURREPLY CLAIM CONSTRUCTION BRIEF**

I. Term 3: “an enable/disable function to enable/disable the biasing circuit for reducing standby current”

1. In my first declaration, I offered my opinion that Exhibit 5 to Dr. Taylor’s first declaration, which is a digital logic textbook, uses the letter “e” and the phrases “enable signal” and “enable signal e” to refer to various voltage signals, not to refer to any structure.

2. Dr. Taylor submitted a reply declaration stating that he disagreed with my characterization and that “the textbook expressly depicts these enable inputs as controlling transistors to enable or disable the flow of current through the circuitry using physical inputs to the transistors.” Dr. Taylor’s declaration also highlighted and annotated the following excerpt of Figure 4.25:



3. A POSITA would understand that the highlighted description of Figure 4.25 confirms that “enable e ” and “ e ” clearly refers to a signal rather than an input line on which signal are carried because “enable e is low” indicates, by standard electrical engineering convention, that

the *signal* e is a low voltage and the *signal* $\bar{e}$ is a high voltage. In the same way, the signal a would be the opposite value of the signal $\bar{a}$.

4. Dr. Taylor also stated in his reply declaration that “the recited function [of the claim] is enabling/disabling the biasing circuit to reduce current; it is not the creation of this signal, or logic evaluating when to apply this signal. Rather, the claim is silent on those functions and the specification therefore need not disclose them for means-plus-function purposes.” I disagree.

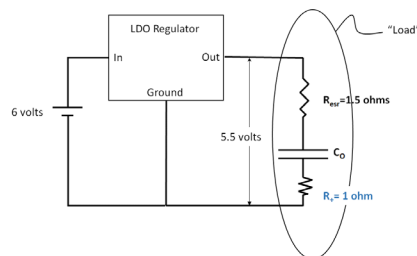
5. If person of skill in the art viewing a regulator biasing circuit schematic were asked what structure performs the function of enabling or disabling the biasing circuit, they would point to the specific structure of transistors and other circuit elements in the schematic that performed that function, which involves not just carrying a signal but creating, controlling, and acting on such a signal. They would also point to the structure that creates and controls a signal on a particular input line as additional structure that is required to perform the claimed function of enabling and disabling the biasing circuit (which structure is not disclosed by the '074 patent, as I noted in my prior declaration). Identifying solely the wire itself (“the input line”) as the element performing the enable/disable function would, in my opinion, make no sense to a person of skill in the art because a wire simply acts to conduct a signal between other structures and cannot itself create or control a signal that it transmits. Nor can an input line itself perform an enabling or disabling function based on the presence or absence of such a signal, which is what a person of skill in the art would understand the function of “enabling/disabling a biasing circuit” to require.

II. Term 4: “wherein the gm-boost circuit enables the current buffer driver to have a large gm value”

6. In reference to Claim 4 of the '074 patent, Dr. Taylor claims that “A POSITA would have understood that ‘large gm value’ would need to be large enough to push the output pole to or

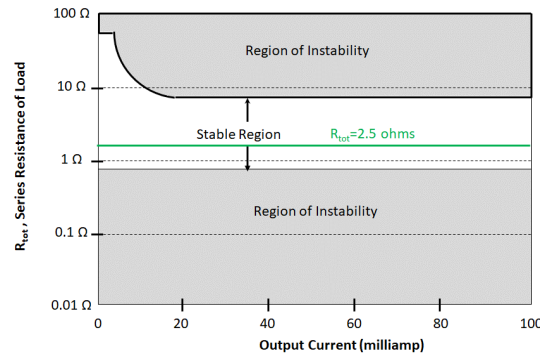
beyond the unity gain frequency of the regulator, resulting in the op-amp pole dominating the behavior of the regulator.” To clearly explain why this formulation fails to adequately supply a boundary for a “large gm value,” it is useful to consider the operation of a LDO voltage regulator’s as it relates to its ultimate purpose, i.e., providing a reliable voltage to connected circuitry. From this perspective, a POSITA would seek to determine a regulator’s regions of stability or instability based on voltage, current and the observed instability.

7. The figure below shows a representative LDO regulator operating between an input power source (represented by the battery on the left-hand side) and the load (modeled as a capacitor and an external series resistance) on the right-hand side. The battery voltage (the supply) is 6 volts, while the regulator is set to provide a very stable 5.5 volts to the external load. The load modeled by the capacitor and a total series resistance of 2.5 ohms ($= 1.5 \text{ ohms} + 1 \text{ ohm}$) could be, for example, a small battery charger charging a discharged battery.

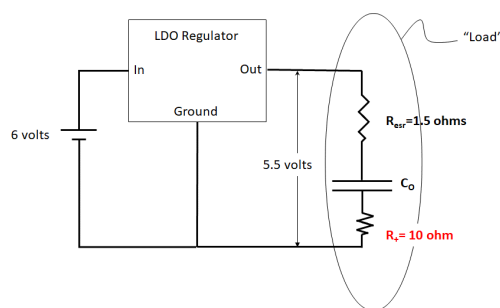


8. The figure below shows the anticipated stability behavior of the circuit pictured above (a similar diagram could be drawn for any embodiment of the ‘074 patent regulator circuit). The horizontal axis is current that the regulator can supply to the modeled load, while the vertical axis indicates the value of the series resistance in that load. The white, stable region in the figure below is what the ‘074 patent refers to as the “dreaded tunnel of death”, i.e. the region in which a series resistance that is too high or too low will cause regulator instability. If the intended load

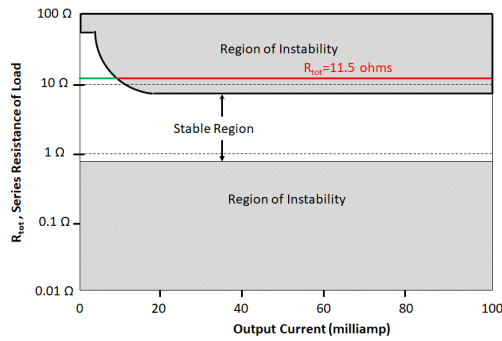
has a total series resistance of 2.5 ohms as shown in the earlier schematic, it is within the stable region and the regulator is capable of stably providing 5.5 volts with a current anywhere between 0 and 100 milliamps.



9. In contrast with the earlier circuit, the schematic below shows the same regulator now supplying a load with a different series resistance. The new load is modeled using the same capacitor and the same equivalent series resistance of 1.5 ohms, but with an additional series resistance of 10 ohms. The higher total series resistance (1.5 ohms + 10 ohms = 11.5 ohms) might represent, for example, the same battery charger mentioned in the last paragraph, but now charging a nearly full battery.

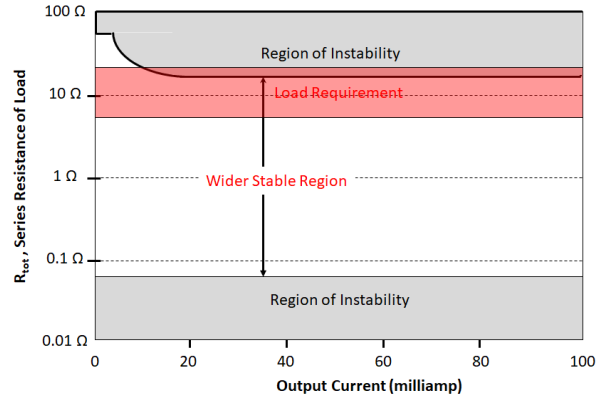


10. The consequence of this new load is shown in the same current-series resistance plot, as indicated below:



Although the regulator is stable at current levels below about 10 milliamps, it becomes unstable above that current level and is not usable for this application.

11. As described in the ‘074 patent, the invention addresses the need to “...improve the range of external capacitors with small to large ESR values [i.e., series resistance values]...[], especially a low-drop out (LDO) voltage regulator.” The improvement described in the ‘074 patent can be represented in a new current-series resistance plot increasing the width of the region of stability, as illustrated below:



12. The wider stable region shown indicates that the improved regulator stably operates with a wider range of series resistances, and is therefore able to supply stable voltage to a greater range of potential circuits. As explained in the ‘074 specification, this wider stable region is obtained by using a “larger gm level of the current buffer driver” (‘074 patent, 4:11-15). However, as also shown in the example figure above, the degree to which the width of the stable

region is increased by using the “larger gm” value is not necessarily sufficient to meet all potential load requirements. In other words, even with an increased gm resulting in a larger stable region, the improved regulator still becomes unstable at higher values of series resistance. For this reason, a POSITA cannot determine what constitutes a sufficiently “large gm” without knowing the loads that the regulator must support. This information is not provided by the patent.

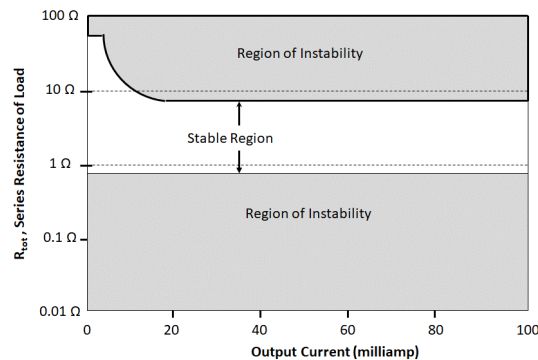
13. The previous description can also be used to illustrate why Dr. Taylor’s proposal for determining a “large gm value” (“large enough to push the output pole to or beyond the unity gain frequency of the regulator, resulting in the op-amp pole domination the behavior of the regulator”) is insufficient. Dr. Taylor’s proposed alternative construction is nothing more than a description of widening the region of stability. For a POSITA to choose the level of gm that was large enough for the specific application, they would also need to understand the range of loads (series resistance) that would need to be supplied by the improved regulator. The ‘074 does not provide any suggestion or prescription of how large a gm is needed for the regulator to accommodate a specific range of series resistance in the load. To adequately specify how large the “large gm” must be, a POSITA must know the range of the intended load.

III. Term 5: “low gain and high bandwidth amplifier”

14. I further disagree with Dr. Taylor’s claim that the boundaries of Claim 8 in the ‘074 patent, “...wherein the operational amplifier is a low gain and high bandwidth amplifier” would be readily understood by a POSITA. As with his formulation for “large gm value,” he reiterates that “the non-dominant poles need to be pushed beyond unity gain” and, because of this, concludes that “a POSITA would have understood to keep gain low to simplify effective and efficient pole splitting.” While Dr. Taylor fails to provide any detail regarding what he means by “simplifying” pole splitting, he seems to be arguing that a bandwidth sufficient to create a single

pole would inform a POSITA of the meaning of “low” gain. I disagree for at least the reasons below.

15. First, as shown in the previous paragraphs, Dr. Taylor’s statement about a single pole can be visualized in the output current – series resistance diagram, with an example shown again below.



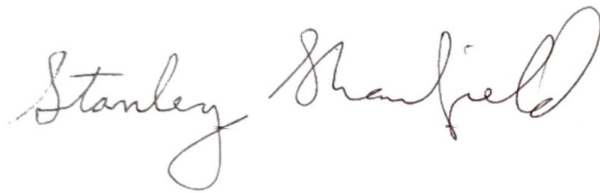
As before, the diagram makes it clear that the bandwidth sufficient to create a single pole (=stability) condition cannot be determined until a POSITA has an understanding the range of loads (series resistance) that are to be powered by the invention, something, the ‘074 patent does not provide.

16. Second, Dr. Taylor’s proposed formulation for determining “high bandwidth and low gain” is entirely unhelpful. Because amplifiers come in a wide range of gain-bandwidth products and because they can be expected to supply a wide range of potential loads, a “sufficient bandwidth to form a single pole” and “sufficient gain to drive [a] current buffer” could appear anywhere along the spectrum of gain and bandwidth. This can be illustrated by modifying the figure supplied by Dr. Taylor in his report.



Without knowing the range of intended loads, an amplifier capable of forming a single pole could exist anywhere along this spectrum, essentially rendering the requirement of “high bandwidth” and of “low gain” meaningless.

I declare under penalty of perjury that the foregoing is true and correct. Executed this 3rd day of May 2024 in Cambridge, Massachusetts.

A handwritten signature in cursive script, reading "Stanley Shanfield". The signature is written in dark ink and is positioned above a horizontal line.

Stanley Shanfield