UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

REALTEK SEMICONDUCTOR CORP.,
Petitioner,

v.

PARKERVISION, INC.
Patent Owner.

U.S. Patent No. 9,118,528
Issue Date: August 25, 2015
Title: METHOD AND SYSTEM FOR DOWN-CONVERTING AN ELECTROMAGNETIC SIGNAL, AND TRANSFORMS FOR SAME, AND APERTURE RELATIONSHIPS

Inter Partes Review No. IPR2025-00325

PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION FOR *INTER PARTES* REVIEW OF UNITED STATES PATENT NO. 9,118,528

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I. INTRODUCTION

Pursuant to 35 U.S.C. § 313 and 37 C.F.R. § 42.107, ParkerVision Inc. ("ParkerVision") submits this Preliminary Response ("Response") and respectfully requests the Board to deny the Petition for *Inter Partes* Review ("Petition") filed by Realtek Semiconductor Corp. ("Petitioner" or "Realtek") challenging claims 1-5, 8, 9, 11-23, 26, 27, and 29-36 ("Challenged Claims") of U.S. Patent No. 9,118,528 (the "'528 patent").

The Petition fails to demonstrate the cited combination of references render the challenged claims obvious. More specifically, Realtek's assertions regarding reasons to combine are based on creating problems in prior art references that supposedly need to be resolved where no such problems exist. The PTAB has rejected these types of vacant strawman arguments. For other holes in the prior art references, Realtek argues that certain disclosures would be combined even though the references' teachings contradict each other, change the fundamental function and nature of circuit components, or are simply incompatible. In those instances, Realtek looks the other way and just ignores these battling disclosures. And Realtek also fails to show a reasonable expectation of success where its arguments are based on changes to numerous components where there are no reasons to modify those components and where Realtek fails to explain and provide

evidentiary support for whether its hindsight-based reconfigurations would actually work.

For the foregoing reasons, institution of the Petition should be denied.[1]

II. *INTER PARTES* REVIEW SHOULD NOT BE INSTITUTED BECAUSE THE PETITIONER CANNOT PREVAIL ON ANY CHALLENGED CLAIM.

Realtek has failed to demonstrate a reasonable likelihood that any of the challenged claims are unpatentable. 37 C.F.R. § 42.108(c). Each ground of the Petition is fatally flawed because Realtek has not met its burden to establish both a motivation to combine the cited references and reasonable expectation of success.

A. Ground 1A: Petitioner has not shown that a POSITA would have been motivated to combine Tayloe, TI Datasheet, and Macnally.

Realtek alleges that a POSITA would have found it obvious to combine the teachings of three references, Tayloe, TI Datasheet, and Macnally, to arrive at

[1] This Preliminary Response addresses only the merits and constitutional bases for denying institution. Consistent with Acting Director Stewart's guidance on "Interim Processes for PTAB Workload Management," dated March 26, 2025 (*See* Ex. 2001), the basis for discretionary denial is addressed in ParkerVision's Brief in Support of Discretionary Denial and Opposition to Petitioner's Motion for Joinder. *See* Paper 8; *See also* Paper 7.

claims 1, 5, 8, 9, 11-19, 23, 26, 27 and 29-36 of the '528 patent. *See, e.g.,* Pet., 1-2. In particular, Realtek suggests replacing Tayloe's commutating switch with multiplexer switches described in TI Datasheet, and implementing Tayloe's differential amplifier circuits using the fully differential operational amplifier configuration in Macnally. *See id.,* at 21-22, 25. But Realtek does not adequately explain *why* a POSITA would have been motivated or would have had a reason to combine these teachings, and no such motivation exists. *Kinetic Concepts, Inc. v. Smith & Nephew, Inc*., 688 F.3d 1342, 1366-69 (Fed. Cir. 2012).

At best, Realtek demonstrates that a skilled artisan, once presented with the three references, would have understood that they *could* be combined. But that cursory observation is not enough: that references *could* be combined does not articulate any reason or motivation to pick out those three references and combine them to arrive at the claimed invention and do so with a reasonable expectation of success. *See Belden Inc. v. Berk-Tek LLC,* 805 F.3d 1064, 1073 (Fed. Cir. 2015) ("[O]bviousness concerns whether a skilled artisan not only *could have made* but *would have been motivated to make* the combinations or modifications of prior art to arrive at the claimed invention.") (emphasis in original).

1. Realtek fails to establish a sufficient motivation to combine Tayloe, TI Datasheet, and Macnally.

Realtek argues that "[a] POSITA would have been motivated to adapt Tayloe's system as a single-chip (i.e., integrated circuit known as IC) to meet relentless market demand for improved product size/performance, and decreased unit cost." Pet., 26. Realtek further alleges that in making this adaptation, "a POSITA would have been inspired by several known advantages of using fully differential amplifiers and Macnally's topology for baseband processing on an IC." *Id.* Realtek's argument, however, lacks a rational basis and is fundamentally flawed.

Realtek begins by setting up a strawman—creating a problem within Tayloe's system that does not exist—in order to justify its proposed combination with Macnally. But Tayloe already explicitly describes its invention as "a *simple and inexpensive* product detector," with performance benefits such as "low conversion loss" and "substantial receiver performance gains." Ex. 1004, 1:65; 3:5-6, 9-11. Thus, these features already address the issues that Realtek alleges a POSITA would seek to solve by combining Tayloe with Macnally. The Board has consistently rejected motivations to combine based on alleged deficiencies in a prior art reference that do not exist. *See, e.g., Runway Safe LLC v. Engineered Arresting Systems*, IPR2015-01921, Paper 9 at 6-8, 10 (PTAB Feb. 29, 2016) (no

motivation to combine because a POSITA would have had no reason to solve a problem that does not exist: "[b]ecause we are not persuaded that water intrusion is a problem in Gwynne's arrester system, we are not persuaded by Petitioner's proffered rationale[.]"); *id*. at 10-11 (rejecting another combination because "Petitioner's stated rationale for combining Brubaker '917 and Angley '025 is predicated on solving a problem already addressed by Angley '025.").

Realtek's reliance on the supposed "advantages" of Macnally's fully differential topology for baseband processing on an IC is similarly misguided. Realtek inexplicably attempts to replace Tayloe's amplifier with a different amplifier from Macnally, asserting that Macnally's fully differential amplifier operates on complementary signal components, thereby reducing interference by taking the difference between them. Pet., 26. But this assertion overlooks a crucial fact: Tayloe's summing amplifiers already employ differential inputs, and this means they too operate on complementary signal components, and address the same functional goal as Macnally's amplifier. Therefore, a POSITA would have no logical reason to seek out an alternative amplifier configuration (Macnally's amplifier) that performs the same function as Tayloe's existing summing amplifiers.

Realtek also misinterprets Macnally to suggest that the symmetrical layout of each fully differential amplifier on an IC inherently provides "'a fully

differential analog signal path [that] minimizes supply and substrate noise coupling [e.g., interference coupling from the substrate, power supply lines, and ground lines].'" Pet., 26 (citation omitted). But Realtek's assertion is misleading, as the supposed advantage pertains specifically to a fully differential signal path, not merely the use of a fully differential amplifier. Realtek's interpretation of Macnally distorts the original context by implying that Macnally attributes the noise minimization advantage to the fully differential amplifier itself. In reality, Macnally clearly refers to the advantage of a fully differential analog signal path as a whole, not just the amplifier. *See* Ex. 1021, 5:64-65 ("A fully-differential analog signal path minimizes supply and substrate noise coupling."). Instead, Realtek purposefully adds language—each fully differential amplifier is laid out symmetrically on an integrated circuit (IC) to provide—before Macnally's clear statement to change its meaning. This distinction is critical, as Realtek's argument attempts to retrofit Macnally's statement to support its position, which is not substantiated by Macnally's actual language.

Furthermore, Realtek relies on the Langford reference (Ex. 1027 at 1388, Fig. 12) to assert "the Rauch biquad topology [of Macnally] can achieve a given power output with lower power input and reduced noise and distortion." Pet., 26. Yet, the cited portion of Langford actually states: "The Rauch topology *minimizes the number of opamps in the transmit chain thus* lowering the power and reducing

the noise and distortion contributors." Ex. 1027 at 1388 (emphasis added). Realtek conveniently omits the fact that Langford's discussion pertains to the transmit chain, not receiver circuitry, and that the claimed benefits arise from minimizing the number of opamps in the transmit chain. Ironically, Realtek's proposed combination would increase the number of opamps in Tayloe's circuitry, contradicting the very advantage Realtek claims. Indeed, Realtek acknowledges combining Tayloe and Macnally would require additional summing amplifiers. Pet., 27. ("A POSITA would understand the subsequent on-chip components would likewise be differential as in Macnally, *e.g.*, differential inputs/outputs for I and for Q in any subsequent circuit paths, phase shifters, amplifiers, and other components, *eventually summing <u>each</u> differential pair with a summing amplifier*, like Tayloe's amplifier 60.") (emphasis added). Based on any one of the flaws and holes in Realtek's assertions above, the Board should deny institution.

In fact, Realtek's proposed combination of Tayloe, TI Datasheet and Macnally also contradicts the very motivation Realtek asserts. In particular, Realtek argues that combining the fully differential amplifier configuration of Macnally with Tayloe would allow for a single-chip IC implementation, where all circuit components are integrated into one chip. But Realtek's reliance on the TI Datasheet directly conflicts with this assertion. The TI Datasheet pertains to a standalone chip—the SN74CBT3253 multiplexer/demultiplexer. A standalone

chip, by definition, is not part of a single-chip IC; instead, it exists as its own discrete component. Thus, under Realtek's alleged motivation to implement Macnally's fully differential amplifier (i.e., single-chip IC implementation), a POSITA would not logically also consider the teachings of the TI Datasheet (a standalone chip). This internal inconsistency undermines Realtek's proposed motivation.

For at least the foregoing reasons, the Board should reject Realtek's obviousness argument based on Tayloe, TI Datasheet, and Macnally and deny institution.

2. Realtek fails to provide a sufficient reasonable expectation of success in combining Macnally and Tayloe.

"[W]here a party argues a skilled artisan would have been motivated to combine references, it must show the artisan 'would have had a reasonable expectation of success from doing so.'" *Arctic Cat Inc. v. Bombardier Rec. Prods. Inc*., 876 F.3d 1350, 1360–61 (Fed. Cir. 2017) (quoting *In re Cyclobenzaprine Hydrochloride Extended-Release Capsule Patent Litig*., 676 F.3d 1063, 1068–69 (Fed. Cir. 2012)). Realtek fails to meet this burden; therefore, institution should be denied.

Realtek alleges that combining Macnally with Tayloe "would have been a simple substitution of one known element (fully differential amplifier circuit of

Macnally) for another (summing amplifier circuit of Tayloe) to obtain predictable results (e.g., improved linearity and reduced power consumption for on-chip performance), and hence would have had a reasonable expectation of success." Pet., 27. Not so. Realtek overlooks significant structural and functional differences between Tayloe and Macnally's amplifiers.

The proposed replacement of Tayloe's summing amplifiers with Macnally's fully differential amplifiers is not a mere substitution, as Realtek suggests, but instead, it requires fundamental restructuring of Tayloe's circuit. Tayloe's summing amplifiers 50, 52 use a differential input and a single-ended output. *See* Ex. 1004, Figure 3. In contrast, Macnally's fully differential amplifiers use differential inputs *and* differential outputs. *See* Ex. 1021, Figure 3. Implementing Macnally's fully differential amplifier into Tayloe's circuit would require a fundamental redesign to accommodate Macnally's differential output configuration. Indeed, Realtek acknowledges that a POSITA would need to adapt all subsequent on-chip components (circuitry after Macnally's amplifier) to match Macnally's differential configuration, including phase shifters and amplifiers. Pet., 27. Those changes to such a number of components would not necessarily lead to a reasonable expectation of success.

Moreover, "combinations that change the 'basic principles under which the prior art was designed to operate,' or that render the prior art 'inoperable for its

intended purpose' may fail to support a conclusion of obviousness." *Plas-Pak Industries v. Sulzer Mixpac A*G, 600 Fed. Appx. 755, 757-58 (Fed. Cir. 2013). But Realtek's proposed combination does just that—replacing Tayloe's summing amplifier with Macnally's fully differential amplifier configuration would alter the fundamental operation of Tayloe's circuit. Tayloe's summing amplifiers are designed to differentially sum various signals to produce baseband in-phase and quadrature signals. *See* Ex. 1004, 2:56-62. Macnally's fully differential amplifiers, on the other hand, also perform the additional operation of low-pass filtering. Ex. 1021, 7:17-19.

Realtek's expert acknowledges the lowpass filtering functionality of Macnally's amplifier. Ex. 1003, ¶ 143. But neither Realtek nor its expert address how this lowpass filtering function would impact Tayloe's circuit, especially since Tayloe achieves lowpass filtering through separate resistors and capacitors. Ex. 1004, 3:22-27 ("Resistor 32 and each of capacitors 72-78 form lowpass filters. The commutating effect of the four capacitors turns the lowpass response into a bandpass response centered on f1. The width of the bandpass is easily set by proper selection of resistor 32 and capacitors 72-78."). Realtek never even considers the principle of operation of Tayloe in its analysis. Realtek's failure to account for these operational discrepancies further undermines its argument.

Accordingly, Realtek has not met its burden of showing that a POSITA would have had a reasonable expectation of success in combining Tayloe and Macnally as proposed, and for this reason, institution should be denied.

B. Ground 1B: Petitioner has not shown that a POSITA would have been motivated to combine Tayloe, TI Datasheet, Macnally, and Cahn.

Ground 1B relies on the combination of Tayloe, TI Datasheet, Macnally, and Cahn to challenge dependent claims 2-4, and 20-22. But Ground 1B suffers from the same fundamental flaws as Ground 1A, which challenges independent claim 1 and dependent claims 5, 8, 9, 11-19, 23, 26, 27 and 29-36 based on the combination of Tayloe, TI Datasheet, and Macnally. Because Ground 1B fails to cure the defects of Ground 1A or provide any substantial new argument or evidence to address these deficiencies, Ground 1B is deficient for the same reasons. Therefore, Realtek's challenge to dependent claims 2-4 and 20-22 should also be rejected.

C. Ground 2A: Petitioner has not shown that a POSITA would have been motivated to combine Razavi and Macnally.

Realtek alleges that a POSITA would have found it obvious to combine the teachings of Razavi and Macnally to arrive at claims 1, 5, 8-9, 11-19, 23, 26-28, 30-36 of the '528 patent. *See, e.g.,* Pet., 1-2. In particular, Realtek contends that a POSITA would have found it obvious to incorporate Macnally's fully differential

amplifier circuits in Razavi's receiver to process the down-converted signal. *See* Pet., 60. Realtek is wrong.

1. Razavi teaches away from the proposed combination.

A POSITA would not have been motivated to incorporate Macnally's fully differential amplifier circuits in Razavi's receiver, as Realtek proposes, because Razavi explicitly discourages the use of (teaches away from) Macnally's low-pass filtering approach in the context of its receiver design.

A reference teaches away where a POSITA "would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.'" *Arctic Cat Inc. v. Bombardier Rec. Prod. Inc*., 876 F.3d 1350, 1360 (Fed. Cir. 2017) (quoting *Allergan, Inc. v. Sandoz Inc*., 796 F.3d 1293, 1305 (Fed. Cir. 2015)). "[E]ven if a reference is not found to teach away, its statements regarding preferences are relevant to a finding regarding whether a skilled artisan would be motivated to combine that reference with another reference." *Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1069 (Fed. Cir. 2018). That is the case here.

Razavi criticizes Realtek's proposed use of Macnally's low-pass filtering in processing the mixer output. In particular, Razavi describes the design of a single-chip 900-MHz CMOS direct conversion receiver (DCR) fabricated in digital 0.6-μm technology. Ex. 1017, 113. Razavi proposes modifications to general DCR

architecture to create a different type of direct downconverter. Figure 4 of Razavi (below) illustrates three permutations of a baseband processing for the circuit following the mixer. Each permutation includes a channel select filter, baseband amplifier A1 and analog-to-digital converter (ADC).

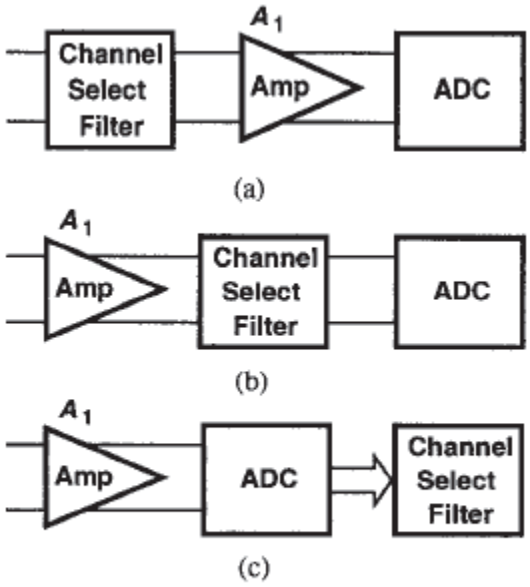

Fig. 4. Baseband processing.

Realtek's proposed combination aligns with the permutation in Figure 4(a), which involves low-pass filtering using Macnally's amplifier. Indeed, Realtek acknowledges that a POSITA would understand "channel-select filtering" as low-pass filtering in the context of Razavi and "using Macnally's fully differential amplifier circuit, a known low-pass filer, [is] consistent with one design option disclosed by Razavi." Pet., 60-61.

But Razavi specifically teaches against the use of the permutation depicted in Figure 4(a). Razavi notes that "a low-pass filter suppresses out-of-channel interferers, allowing A1, to be a nonlinear, high-gain amplifier and the analog-to-digital converter (ADC) to have a moderate dynamic range (roughly 4 to 8 bits depending on the gain control in the RF domain and the type of modulation)." Ex. 1017, 113. Razavi criticizes (and teaches away from) this permutation because "the low-pass filter design entails severe noise-linearity-power tradeoffs." *Id.* Indeed, Razavi specifies that "[t]he present design is intended for permutations in Figs. 4(b) and (c)," thereby excluding Figure 4(a) from consideration. *Id.*

Realtek fails to address the conflict between Razavi's teachings and the proposed combination, which undermines its obviousness argument. Realtek cannot selectively ignore the explicit portions of Razavi that cut against its position. *W.L. Gore & Assocs., Inc. v. Garlock, Inc*., 721 F.2d 1540, 1550 (Fed. Cir. 1983) (it is error to consider references in "less than their entireties" and "disregard[] disclosures in the references that diverge from and teach away from the invention at hand"); *Ashland Oil, Inc. v. Delta Resins & Refractories, Inc*., 776 F.2d 281, 296 (Fed. Cir. 1985) (reference must be "considered for all it taught, disclosures that diverged and taught away from the invention at hand as well as disclosures that pointed towards and taught the invention at hand").

For at least these reasons, Realtek's proposed combination of Razavi and Macnally fails, and the Board should reject Realtek's obviousness argument.

2. Realtek fails to provide sufficient reasonable expectation of success in combining Macnally and Tayloe.

Relatedly, Realtek fails to establish a reasonable expectation of success in combining the disclosures of Razavi and Macnally to arrive at the claimed invention. Realtek encapsulates its argument in a single, conclusory sentence: "The modification would have had a reasonable expectation of success because it would have been a combination of prior art elements according to known methods to yield predictable results (using Macnally's fully differential amplifier circuit, a known low-pass filter, consistent with one design option disclosed by Razavi)." Pet., 60-61. Realtek's expert declaration merely parrots this same language without providing further analysis or explanation. *Compare id. with* Ex. 1003, ¶ 229. But such conclusory statements are inadequate. *See In re Magnum Oil Tools Int'l, Ltd*., 829 F.3d 1364, 1380 (Fed. Cir. 2016) ("To satisfy its burden of proving obviousness, a petitioner cannot employ mere conclusory statements. The petitioner must instead articulate specific reasoning, based on evidence of record, to support the legal conclusion of obviousness.").

Realtek's argument falls short of the requisite evidentiary standards, particularly in light of Razavi's critique of the Figure 4(a) permutation for

involving severe noise-linearity-power tradeoffs. Independent claim 1 of the '528 patent requires, among other things, transferring portions of energy distinguishable from noise. This limitation is thus included in every dependent claim as well.

Therefore, Realtek has failed to meet its burden of proving that a POSITA would have had a reasonable expectation of success in the proposed combination of Razavi and Macnally.

D. Ground 2B: Petitioner has not shown that a POSITA would have been motivated to combine Razavi, Macnally, and Cahn.

Ground 2B relies on the combination of Razavi, Macnally, and Cahn to challenge dependent claims 2-4, and 20-22. But Ground 2B suffers from the same fundamental flaws as Ground 2A, which challenges independent claim 1 and dependent claims 5, 8, 9, 11-19, 23, 26-28 and 30-36 based on the combination of Razavi and Macnally. Because Ground 2B fails to cure the defects of Ground 2A or provide any substantial new argument or evidence to address these deficiencies, Ground 2B is deficient for the same reasons. Therefore, Realtek's challenge to dependent claims 2-4 and 20-22 should also be rejected and institution denied.

For the foregoing reasons, institution of the Petition should be denied.

III. THE IPR PROCEEDING VIOLATES CONSTITUTIONAL DUE PROCESS

ParkerVision objects to the use of *inter partes* review as an unconstitutional mechanism for challenging the validity of existing patents. Specifically,

ParkerVision contends that the PTAB's rules and procedures, as applied, violate the Fifth Amendment's guarantees of due process by depriving patent owners of their vested property rights without fundamental fairness and procedural safeguards afforded by Article III courts.

First, IPR proceedings apply a preponderance of the evidence standard to determine patent validity, which is a lower burden of proof than the clear and convincing evidence standard required in district court. This discrepancy undermines the statutory presumption of validity afforded to issued patents and makes it easier to invalidate a patent in an administrative forum than in a judicial proceeding.

Second, the PTAB lacks the adjudicative independence of an Article III court. For example, the PTAB allows the USPTO Director, who is a political appointee, to exert control over IPR outcomes through practices such as panel stacking and discretionary review. Political considerations and policies, and these other practices compromise the neutrality of the adjudicative process and introduce a risk of unfair influence on decision-making.

Third, the USPTO's financial interest in IPR proceedings raises serious concerns about impartiality. The USPTO generates substantial revenue from IPR filings and institution fees, creating a structural incentive to institute IPR

proceedings and invalidate patents. This financial interest leads to a potential bias against patent owners, further undermining the fairness of the process.

Fourth, PTAB decisions are reached only on the basis of paper briefs without live witness testimony and live cross-examination. This is the case, for example, even where there are factual disputes regarding the disclosures in the prior art, explanations of technical evidence, motivations to combine, and secondary considerations of nonobviousness. There is no way for patent owners to confront witnesses and challenge their credibility, or for PTAB judges to assess witness credibility.

Finally, the inability to appeal the PTAB's institution decision to an Article III court exacerbates due process concerns. Once an IPR is instituted, it can significantly alter the patent owner's rights. But the institution decision itself is insulated from Article III review, depriving patent owners of full judicial recourse. And the same PTAB judges who determine institution are then the same PTAB judges to decide the merits.

For these reasons, ParkerVision submits that the due process violations render IPR proceedings unlawful and preserves its right to challenge the constitutionality of the IPR, including before an Article III court.

ParkerVision also submits that IPR proceedings deprive patent owners of their Seventh Amendment right to a jury trial and to have the validity of patents

determined in Article III courts in view of the Supreme Court's recent decision in *SEC v. Jarkesy*, 603 U.S. 109 (2024).[2]

IV. CONCLUSION

For all of the foregoing reasons, ParkerVision respectfully requests the Board to deny the Petition.

Dated: April 30, 2025

Respectfully submitted,

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[2] While this Preliminary Response addresses the merits and constitutional bases for denying institution—and ParkerVision's Brief in Support of Discretionary Denial and Opposition to Petitioner's Motion for Joinder addresses the discretionary basis for denying institution (*See* Paper 8)—ParkerVision reserves all additional arguments on the merits. If the Board institutes trial, ParkerVision may address the deficiencies in Realtek's invalidity arguments in greater detail, including any erroneous claim construction positions, motivations to combine, and the failures of the cited prior art to teach or render obvious the Challenged Claims.

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that this Patent Owner's Preliminary Response complies with the type-volume limitation of 37 C.F.R. § 42.24(b) because it contains 3,835 words, as determined by the word-processing program used to prepare the brief, excluding the parts of the brief exempted by 37 C.F.R. § 42.24(a)(1).

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a copy of the foregoing **PATENT OWNER'S PRELIMINARY RESPONSE TO PETITION FOR INTER PARTES REVIEW OF UNITED STATES PATENT NO. 9,118,528**, together with all exhibits filed therewith, was served in its entirety by filing these documents through the PTAB E2E System, as well as by email on the following counsel of record for Petitioner:

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