

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

MEDIATEK, INC.,

Petitioners

v.

PARKERVISION, INC.,

Patent Owner.

---

IPR2025-00030

U.S. Patent No. 8,498,593

---

**PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE**

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

## TABLE OF CONTENTS

|      |                                                                                                                                                                                                                                              |    |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| I.   | INTRODUCTION .....                                                                                                                                                                                                                           | 1  |
| II.  | CLAIM CONSTRUCTION .....                                                                                                                                                                                                                     | 2  |
| III. | THE CHALLENGED CLAIMS ARE UNPATENTABLE.....                                                                                                                                                                                                  | 8  |
| A.   | Ground 1A .....                                                                                                                                                                                                                              | 8  |
| 1.   | Hau teaches activating a switching device “in response to a power efficiency of the power supply exceeding a predetermined threshold” in claims 1, 9, and 15 .....                                                                           | 8  |
| 2.   | Hau teaches to “deactivate the switching device based on a load current at the output voltage node” (claim 2) .....                                                                                                                          | 12 |
| 3.   | The Hau-Yoshida combination teaches “an output current at a maximum power efficiency associated with the down-converted input voltage” (claims 5, 11).....                                                                                   | 13 |
| 4.   | Hau teaches “deactivat[e/ing] the switching device and pass[ing] the input voltage to the output voltage node [based on a/comprises] compar[ison of/ing] the down-converted [input] voltage to a threshold voltage” (claims 6-8, 12-14)..... | 14 |
| B.   | Ground 1B .....                                                                                                                                                                                                                              | 16 |
| 1.   | A POSITA would have been motivated to combine Sahu with Hau and Yoshida.....                                                                                                                                                                 | 16 |
| 2.   | Hau-Yoshida-Sahu renders obvious controlling the switching device “based on a probable output power point of operation for a selected modulation scheme” (claims 3-4, 10, 19) .....                                                          | 18 |
| 3.   | Hau-Yoshida-Sahu renders obvious “programming the threshold voltage based on a communication waveform efficiency” (claims 8, 13).....                                                                                                        | 19 |

|     |                                                                                                                                                                                                                                                                                         |    |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| C.  | Ground 1C: Hau-Yoshida-Lejon teaches a MISO amplifier<br>(claim 16) .....                                                                                                                                                                                                               | 20 |
| D.  | Ground 2A .....                                                                                                                                                                                                                                                                         | 20 |
| 1.  | A POSITA would have been motivated to combine<br>Canyon and Ranjan .....                                                                                                                                                                                                                | 20 |
| 2.  | Canyon in view of Ranjan renders obvious controlling<br>the switching device “in response to a power efficiency<br>of the power supply exceeding a predetermined<br>threshold” .....                                                                                                    | 26 |
| 3.  | Ranjan suggests “controlling the switching device based<br>on a probable output power point of operation for a<br>selected modulation scheme based on one or more power<br>efficiency characteristics of an electronic device coupled<br>to the power supply” (claims 3-4, 10, 19)..... | 28 |
| E.  | Ground 2B .....                                                                                                                                                                                                                                                                         | 29 |
| 1.  | Claims 6-8, 12-14.....                                                                                                                                                                                                                                                                  | 29 |
| 2.  | Canyon-Ranjan-Hau renders obvious “programming the<br>threshold voltage based on a communication waveform<br>efficiency” (claims 8, 13).....                                                                                                                                            | 29 |
| F.  | Ground 2C .....                                                                                                                                                                                                                                                                         | 30 |
| IV. | CONCLUSION.....                                                                                                                                                                                                                                                                         | 30 |

## EXHIBIT LIST

| EXHIBIT No. | DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EX1001      | U.S. Patent No. 8,498,593                                                                                                                                                                                                                                                                                                                                                                                                      |
| EX1002      | File History of U.S. Patent No. 8,498,593                                                                                                                                                                                                                                                                                                                                                                                      |
| EX1003      | Larson Declaration                                                                                                                                                                                                                                                                                                                                                                                                             |
| EX1004      | Larson CV                                                                                                                                                                                                                                                                                                                                                                                                                      |
| EX1005      | U.S. Patent No. 8,116,704                                                                                                                                                                                                                                                                                                                                                                                                      |
| EX1006      | File History of U.S. Patent No. 8,116,704                                                                                                                                                                                                                                                                                                                                                                                      |
| EX1007      | U.S. Patent No. 7,427,897 (“Hau”)                                                                                                                                                                                                                                                                                                                                                                                              |
| EX1008      | U.S. Patent 7,061,213 (“Yoshida”)                                                                                                                                                                                                                                                                                                                                                                                              |
| EX1009      | Sahu <i>et al.</i> , “A High-Efficiency Linear RF Power Amplifier With a Power-Tracking Dynamically Adaptive Buck-Boost Supply,” IEEE Transactions On Microwave Theory And Techniques, Vol. 52, No. 1, January 2004 (“Sahu”)                                                                                                                                                                                                   |
| EX1010      | Declaration of June Munford                                                                                                                                                                                                                                                                                                                                                                                                    |
| EX1011      | U.S. Patent 6,646,511 (“Canyon”)                                                                                                                                                                                                                                                                                                                                                                                               |
| EX1012      | Ranjan <i>et al.</i> , “Microwave Power Amplifiers with Digitally-Controlled Power Supply Voltage for High Efficiency and High Linearity,” 2000 IEEE MTT-S Digest (“Ranjan”)                                                                                                                                                                                                                                                   |
| EX1013      | International Patent Application Publication No. WO 2007/084033 A1 (“Lejon”)                                                                                                                                                                                                                                                                                                                                                   |
| EX1014      | Online copy of Ranjan <i>et al.</i> , “Microwave Power Amplifiers with Digitally-Controlled Power Supply Voltage for High Efficiency and High Linearity,” 2000 IEEE MTT-S Digest (“Ranjan”), obtained from <a href="https://web.archive.org/web/20031218101536id_/http://sigma.ucsd.edu:80/~mahim/mttfinal-colored.pdf">https://web.archive.org/web/20031218101536id_/http://sigma.ucsd.edu:80/~mahim/mttfinal-colored.pdf</a> |
| EX1015      | Theodore Rappaport, <i>Wireless Communications: Principles and Practice</i> , 2 <sup>nd</sup> ed. (excerpts)                                                                                                                                                                                                                                                                                                                   |

| EXHIBIT<br>No. | DESCRIPTION                                                                                                                                                                                                                                           |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EX1016         | Kassakian <i>et al.</i> , <i>Principles of Power Electronics</i> , 2 <sup>nd</sup> ed. (excerpts)                                                                                                                                                     |
| EX1017         | U.S. Patent No. 7,047,032 (“Yun”)                                                                                                                                                                                                                     |
| EX1018         | U.S. Patent Application Publication No. US2006/0001410 (“Ishikawa”)                                                                                                                                                                                   |
| EX1019         | [not used]                                                                                                                                                                                                                                            |
| EX1020         | [not used]                                                                                                                                                                                                                                            |
| EX1021         | [not used]                                                                                                                                                                                                                                            |
| EX1022         | [not used]                                                                                                                                                                                                                                            |
| EX1023         | [not used]                                                                                                                                                                                                                                            |
| EX1024         | James A. Kaehler, “Periodic-Switched Filter Networks: A Means of Amplifying and Varying Transfer Functions,” <i>IEEE Journal of Solid-State Circuits</i> , Vol. SC-4, No. 4 (August 1969)                                                             |
| EX1025         | U.S. Patent No. 8,571,135 B2                                                                                                                                                                                                                          |
| EX1026         | Guinee <i>et al.</i> , “A Novel Estimation Procedure for the Aperture Time in Asynchronous Sinusoidal PWM Systems,” The 2001 IEEE International Symposium on Circuits and Systems (Cat. No.01CH37196), Sydney, NSW, Australia, 2001, pp. 53-56 vol. 2 |
| EX1027         | <i>ParkerVision, Inc. v. MediaTek Inc. et al.</i> , Civ. No. 6:23-cv-00732, Motion for Extension of Time to Respond to Complaint (ECF No. 8) (W.D.Tex. Nov. 28, 2023)                                                                                 |
| EX1028         | Krauss <i>et al.</i> , <i>Solid State Radio Engineering</i> , 1980 (excerpts)                                                                                                                                                                         |
| EX1029         | <i>Sotera</i> Stipulation Letter dated October 18, 2025                                                                                                                                                                                               |
| EX1030         | Deposition of Transcript of David Ricketts                                                                                                                                                                                                            |
| EX1031         | Reply Declaration of Dr. Lawrence Larson                                                                                                                                                                                                              |
| EX1032         | <i>ParkerVision, Inc. v. MediaTek Inc. and MediaTek USA Inc.</i> , Civ. No. 6:23-cv-00732-ADA, email from Joshua J. Yi dated June 16, 2025                                                                                                            |

| EXHIBIT<br>No. | DESCRIPTION                                                                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EX1033         | U.S. Patent Application Publication No. 2007/0247217                                                                                                                                         |
| EX1034         | <i>ParkerVision, Inc. v. MediaTek Inc. and MediaTek USA Inc.</i> , Civ. No. 6:23-cv-00732-ADA, Plaintiff ParkerVision, Inc.’s Responsive Claim Construction Brief (ECF No. 84) (May 8, 2025) |
| EX1035         | <i>ParkerVision, Inc. v. MediaTek Inc. and MediaTek USA Inc.</i> , Civ. No. 6:23-cv-00732-ADA, Plaintiff ParkerVision, Inc.’s Sur-Reply Claim Construction Brief (ECF No. 94) (June 3, 2025) |
| EX1036         | Robert Boylestad & Louis Nashelsky, <i>Electronic Devices &amp; Circuit Theory</i> , 7 <sup>th</sup> Ed., excerpts                                                                           |

## **I. INTRODUCTION**

MediaTek's Petition showed power supplies for radio frequency (RF) transceivers with a switch to bypass a DC-DC down-converter at an efficiency threshold were not novel as of the '593 Patent's priority date. ParkerVision's Patent Owner Response ("POR") does not undermine that showing.

Although ParkerVision claims to apply the plain and ordinary meaning of "power efficiency," ParkerVision interprets that term narrowly, in a manner unsupported by the intrinsic record. The claims do not require "determining" a threshold of power efficiency. Rather, the claims recite activating a bypass function "in response to a power efficiency of the power supply exceeding a predetermined threshold." In the first set of prior art grounds (Hau-Yoshida), as in the claims and the specification, that "threshold" is indicated by a voltage. And the second set of grounds (Canyon-Ranjan) meets even ParkerVision's restrictive construction.

Further, ParkerVision's POR misrepresents the cited references, suggesting descriptions of "bypass" circuit elements in two figures apply only to one of them. ParkerVision also fails to rebut the clear motivation to combine to operate Canyon's bypass switch where it creates the most efficient operation.

The Board should find MediaTek has proven claims 1-20 are unpatentable by a preponderance of the evidence.

## II. CLAIM CONSTRUCTION

ParkerVision addresses only a single term, “power efficiency,” and the related phrase “in response to the power efficiency of the power supply exceeding a predetermined threshold.”<sup>1</sup> Although ParkerVision argues it gives the term its plain and ordinary meaning, ParkerVision’s construction is unsupportable because it adds limitations that read out embodiments in the specification.<sup>2</sup>

The crux of the dispute is whether the function in elements 1[b2] and 9[c] in which the claimed aperture generator and control module (AGCM) “deactivates the switching device and passes the input voltage to the output voltage node” (the “bypass function”) requires the claimed “power supply” to directly measure or calculate the efficiency of the power supply or requires a designer do so in the design process. The plain and ordinary meaning and the specification embodiments require neither. Rather, as discussed below, the specification embodiments activate the

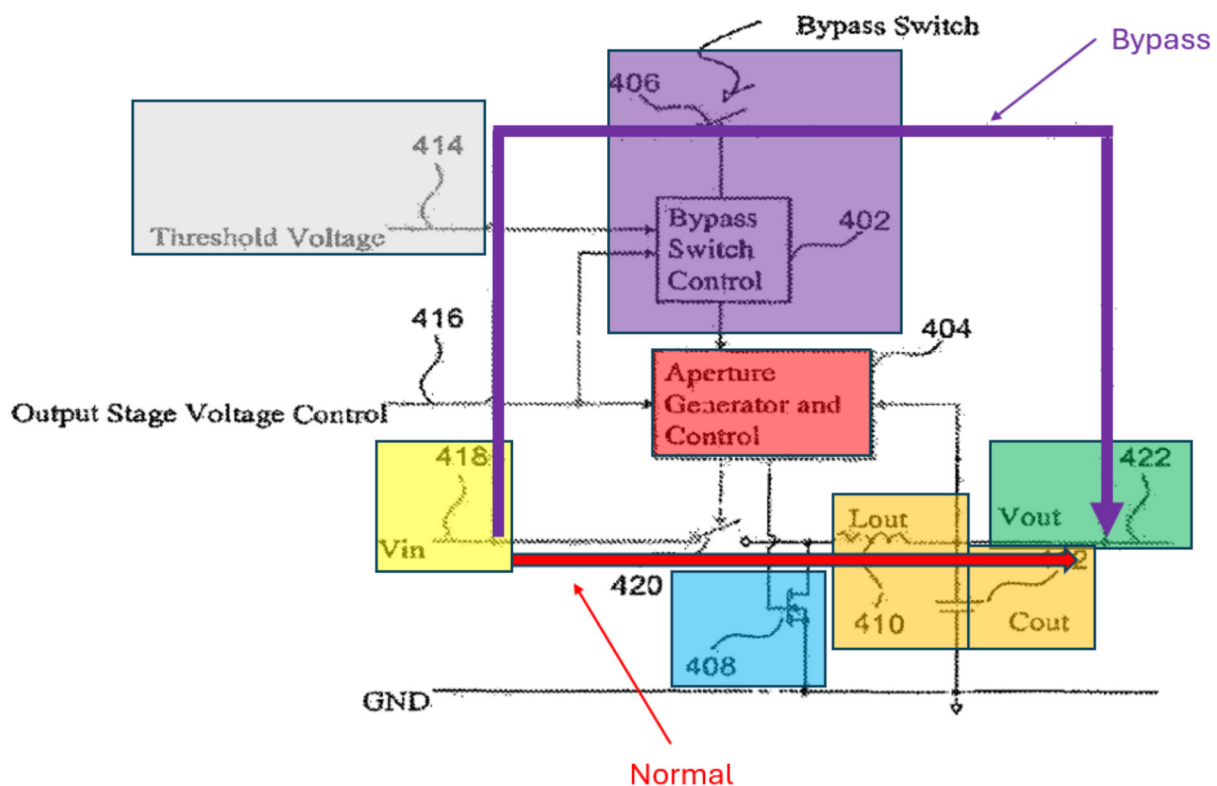
---

<sup>1</sup> No other terms require explicit construction.

<sup>2</sup> The Special Master in the related litigation provided a preliminary “plain and ordinary meaning” construction by email to the parties (EX1032), but did not elaborate on the plain and ordinary meaning or address the disputes discussed herein. No claim construction order has issued to date.

bypass function based on a threshold of *voltage* or *current*, which are indirect indicators of power efficiency.

As the Petition noted, bypass switch control 403 (annotated in purple below in Figure 4) controls whether the input power from  $V_{IN}$  (yellow) is down-converted via switching converter 408 (light blue) (red pathway) or output directly to output  $V_{OUT}$  422 (green) via bypass switch 406 (purple pathway) (Pet. 9-10):

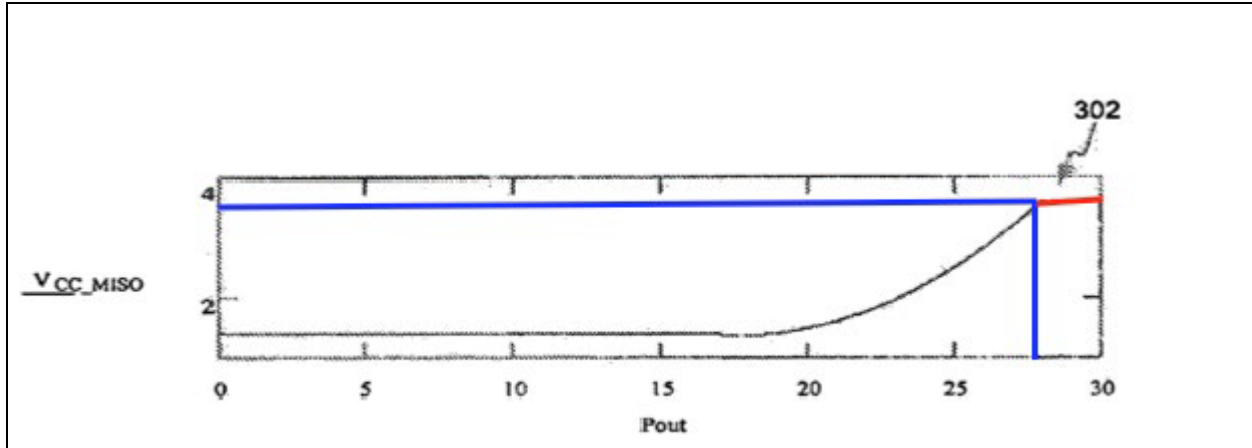


The '593 Patent describes several ways bypass switch control 402 may determine to enter bypass mode, none of which involves the circuitry calculating power efficiency (much less a ratio of power efficiency), or measuring input power to make such a comparison at all. For example, the bypass switch may be activated based on a threshold of output power (EX1001, 4:7-10) which may be determined

by output voltage (*id.*, 6:25-33, 6:36-7:3, 7:50-8:10, Fig. 4), noise power (*id.*, 4:11-13), or fixed current (*id.*, 9:37-42, Fig. 6), with or without modification by an optional load current sensing circuit (*id.*, 9:1-10), or hysteresis control switch (*id.*, 8:28-67). In Figure 6, on which ParkerVision relies (POR 18), the bypass switch activates at a 400 mA current. EX1001, 9:37-42. No embodiment describes a direct connection from the input power to the ACGM or bypass switch control (BSC) enabling either component to compare the output power to the input power, much less determine a “ratio” of output to input power, particularly in Figures 4-5. EX1031, ¶16-17.

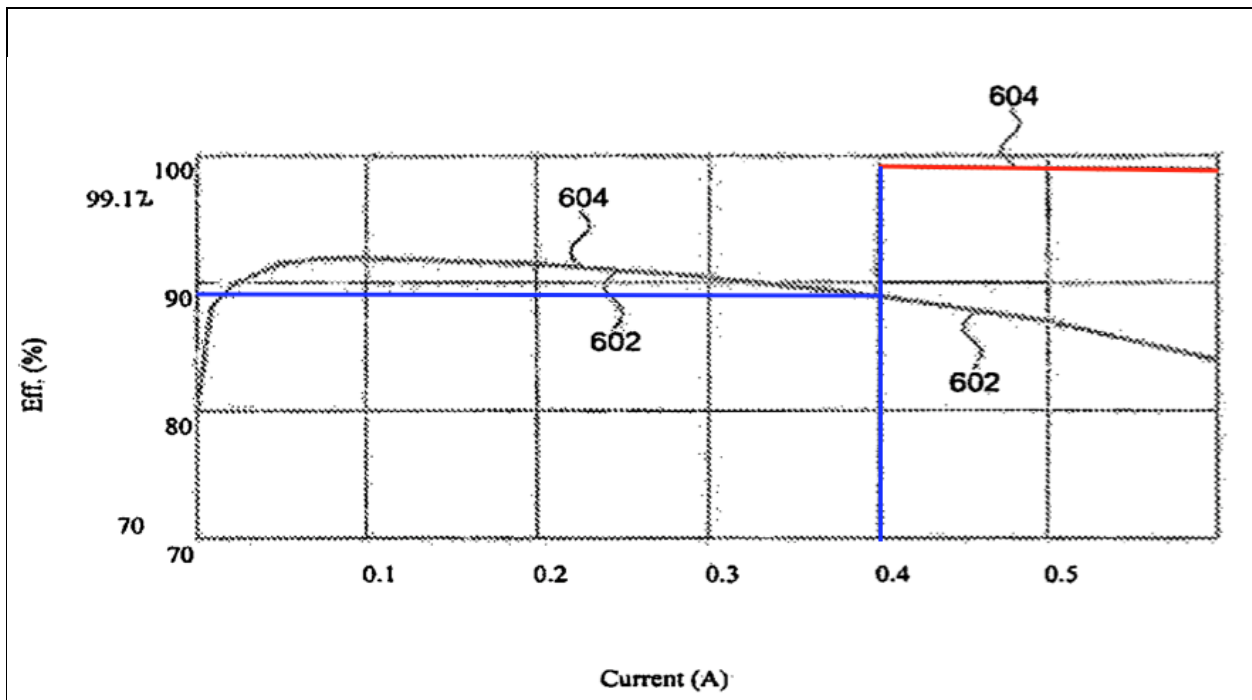
Dr. Ricketts admits the threshold used to trigger the bypass function may be a signal that indirectly indicates efficiency such as voltage or current, and the power supply need not directly calculate efficiency. EX1030, 37:22-38:23, 51:18-52:16. Although ParkerVision and Dr. Ricketts argue the threshold must nevertheless be set “based on” a determination of “power efficiency characteristics of the power supply” (EX2001, ¶74), nothing in the specification supports that construction.

Specifically, nothing in the '593 Patent relates Figure 1's efficiency curves or Figure 2's probability distribution to the threshold where the bypass switch activates. EX1031, ¶¶20-22, 30. The specification teaches the bypass switch may be activated at a fixed **voltage** of approximately 3.6V (flat red line), which is the amplifier's maximum voltage:



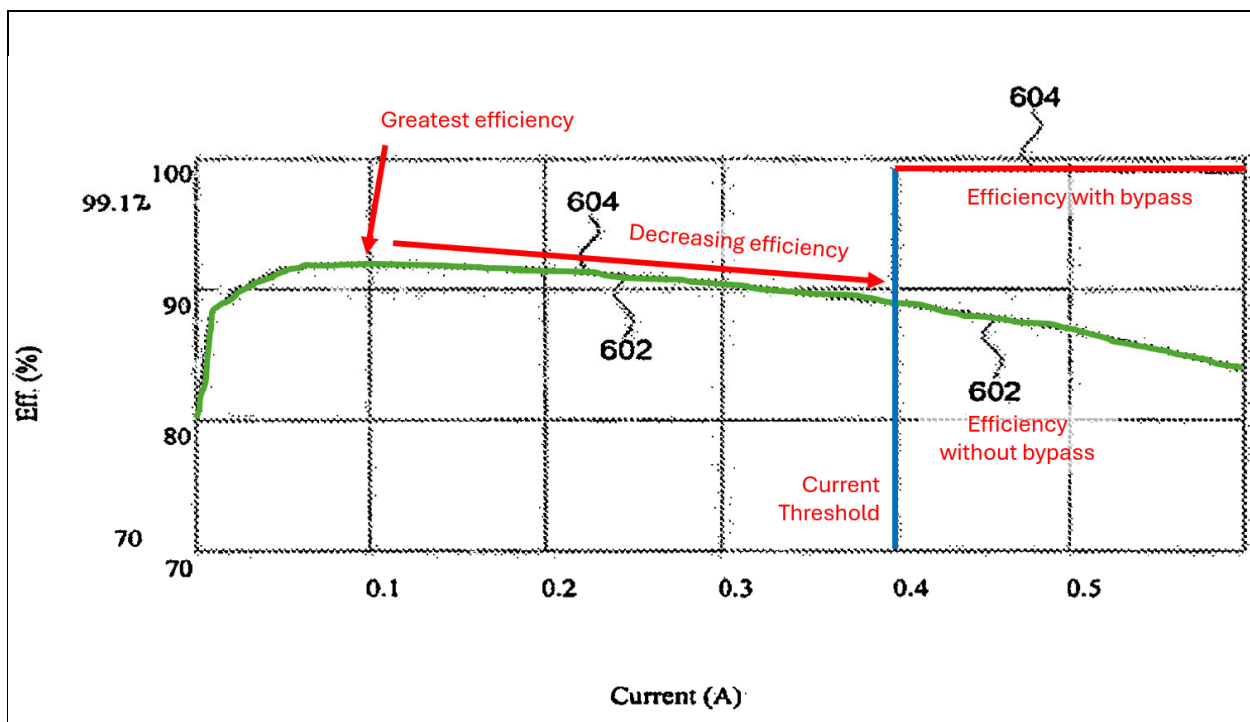
EX1001, Fig. 3 (annotated), 5:40-42, 6:28-33; EX1030, 84:24-85:19, 87:20-88:5; EX1031, ¶¶23-26.

Likewise, in Figure 6 (annotated at POR 18), the bypass switch activates (red line) at a **current** of 0.4A (vertical blue line), which both ParkerVision and Dr. Ricketts acknowledge corresponds to the amplifier's 3.6V maximum input voltage. POR, 18; EX1030, 103:19-104:1.



EX1031, ¶¶27-28, 31.

Although ParkerVision argues the current threshold for activating the bypass switch *corresponds to* a particular power efficiency and the bypass switch *results* in increased efficiency over the curve without a bypass switch, nothing in Figure 6 or the corresponding description suggests the 3.6V threshold was *based on* any calculation of power efficiency, either in the circuitry itself or in the design process. EX1031, ¶31. Indeed, in Figure 6 (annotated below), the efficiency (Y-axis) of curves 604 and 602 *decreases* with increasing current between the maximum efficiency at 0.1A and reaching the current threshold for the bypass switch:



EX1001, Fig. 6 (annotated).

The fact that the 3.6V maximum amplifier voltage (at 0.4A current) happens to occur at 89% efficiency supports MediaTek's position—indirect indicators of

power efficiency (e.g., voltage or current) show power efficiency has exceeded the claimed “threshold”—rather than ParkerVision’s additional “based on” limitation.

Even if ParkerVision were correct (it is not) that the voltage and current thresholds in the specification were based on calculations of power efficiency in the design process, construing the claimed “power supply” in claim 1 based on designer intent would be improper. *See Amazon.com, Inc. v. Barnesandnoble.com, Inc.*, 239 F.3d 1343, 1353 (Fed. Cir. 2001) (“We are not prepared to assign a meaning to a patent claim that depends on the state of mind of the accused infringer”). Claim 1 recites a “power supply,” so the elements of the claim are contained within that power supply. Claim 15 similarly recites a “system,” while claim 9 recites a method for **controlling** a power supply, not a method for **designing** one. Yet under ParkerVision’s interpretation, one power supply with a voltage or current threshold could practice any of these claims while an **identical** power supply with the same threshold might not, based solely on whether the designer calculated the corresponding efficiency. EX1031, ¶¶32-33.

ParkerVision also fails to reconcile its interpretation with dependent claims 2 and 6. POR 19. It is irrelevant that the phrase “power efficiency” does not appear **again** in either claim, because both depend from claim 1. Claims 2 and 6 recite the bypass function (“deactivate[] the switching device”), which claim 1 requires to be “in response to a power efficiency of the power supply exceeding a predetermined

threshold,” and add that the function must be based on a load current (claim 2) or down-converted input voltage (claim 6). Therefore, such voltage or load-based determinations are within the scope of the “power efficiency” threshold in claim 1. EX1031, ¶¶35-36.

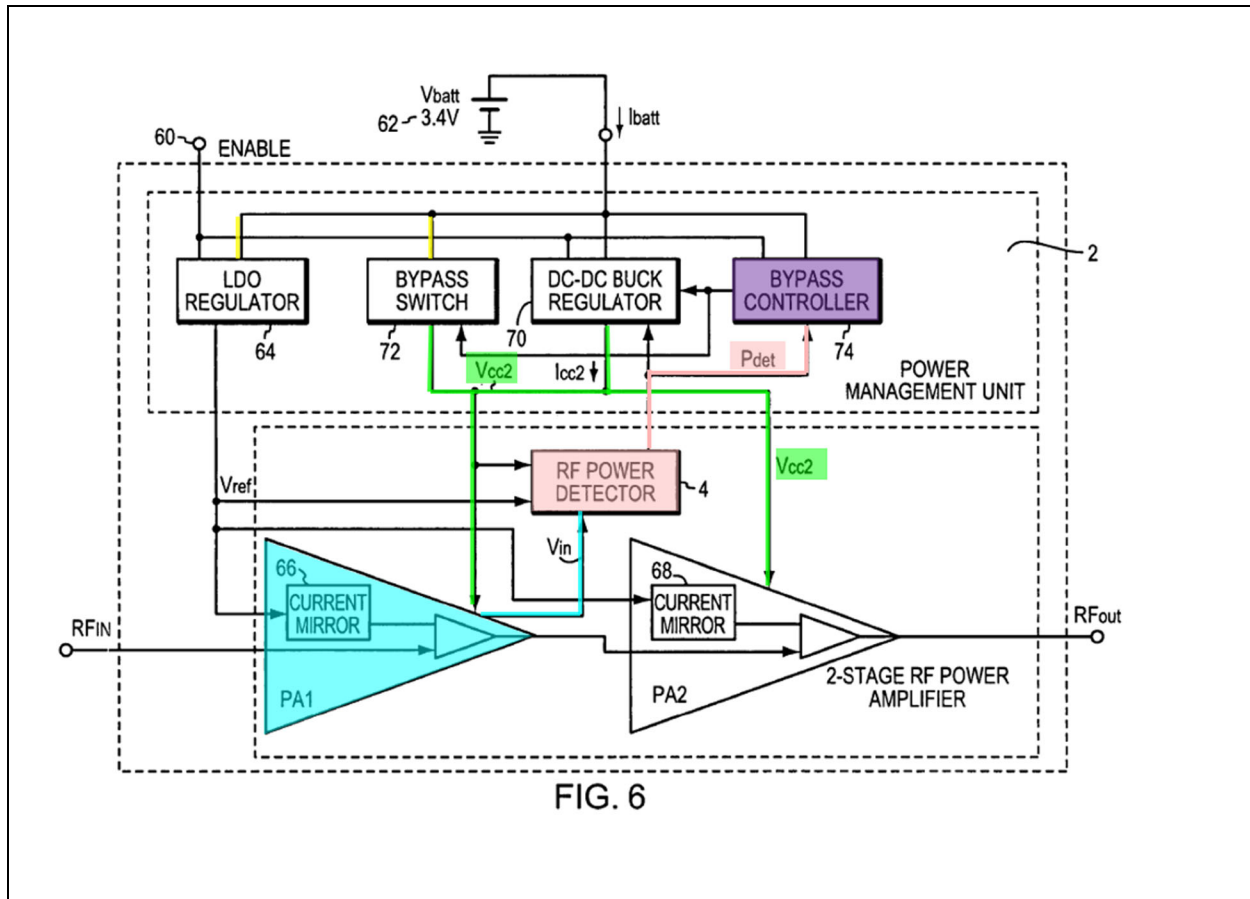
### III. THE CHALLENGED CLAIMS ARE UNPATENTABLE

#### A. Ground 1A

1. **Hau teaches activating a switching device “in response to a power efficiency of the power supply exceeding a predetermined threshold” in claims 1, 9, and 15**

ParkerVision’s *only* argument the Ground 1 Hau-Yoshida combination does not teach the independent claims (1, 9, and 15) relies on the element of controlling a switching device “in response to a power efficiency of the power supply exceeding a predetermined threshold.” That argument fails.

*First*, ParkerVision’s argument the Petition “conflates RF power and supply power” (POR 29) is wrong. As the Petition explained (Pet. 29), and the POR does not address, Hau’s signal Pdet (pink line annotated below in Figure 6) is proportional to the power output of amplifier PA1 (light blue) and supply voltage Vcc2 (green). EX1007, 6:22-44; EX1003, ¶¶122-123.

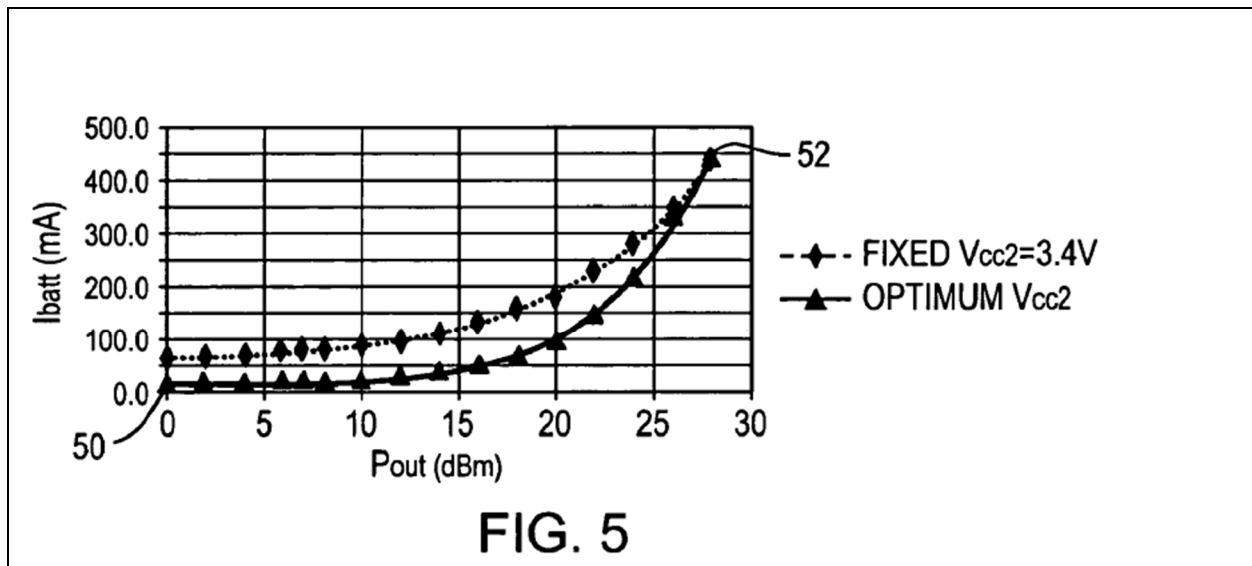


EX1007, Fig. 6 (annotated).

Specifically, Hau explains “the maximum output power from the power amplifier is...directly proportional to the square of  $V_{cc2}$ ” and a “linear relationship between  $P_{det}$  and  $V_{cc2}$  is achieved.” EX1007, 6:33-37, Fig. 8; EX1031, ¶¶40-41. Because  $V_{cc2}$  is the supply voltage for the power amplifier (EX1007, 6:22-25),  $P_{det}$  likewise indicates the power supplied to the power amplifier. EX1031, ¶¶40-41. The RF input to PA1 is the *signal* that is amplified by PA1, not its power supply. EX1031, ¶42. As for ParkerVision’s argument that  $P_{det}$  is based on  $V_{in}$  (an AC signal),  $P_{det}$  is a DC signal (EX1007, 6:27-28) and the independent claims do not

specify whether the claimed “threshold” must be based on an AC or DC signal. EX1031, ¶43.

**Second,** ParkerVision’s argument about “variations in input and output current” (POR 29-30) is misplaced and requires an interpretation of the claim term that would read out embodiments in the specification. As noted above (§II), the ’593 preferred embodiments do not measure input currents, and at least one embodiment (EX1001, Fig. 4, 7:46-8:8) relies solely on a voltage threshold to indicate output power without considering either input or output current. EX1031, ¶44. Even if the claims required accounting for “variations in input and output current,” as ParkerVision argues, Hau teaches exactly that. Figure 5 shows a plot of input current ( $I_{BATT}$ ) against output power in dBm for both a fixed voltage  $V_{cc2}$  and the optimum voltage provided by embodiments in Hau:



EX1007, Fig. 5, 3:56-57, 4:66-5:22. Because Hau's battery voltage is fixed and Hau's Figure 5 provides output current for every power level, a POSITA would have understood a given power level (including the threshold at which the bypass switch is activated) corresponds to an ascertainable power efficiency. EX1031, ¶¶45-47. Therefore, activating a bypass switch at a given voltage threshold (correlated to output power) satisfies the limitation of activating the bypass function "in response to a power efficiency of the power supply exceeding a predetermined threshold." EX1031, ¶47.

*Third*, it is irrelevant whether the bypass function "involve[s] power efficiency determinations" (POR 31) because the claims do not require a **determination**, only activating the bypass function when power efficiency exceeds a threshold. EX1031, ¶49. It is irrelevant whether Hau's voltage threshold for activating the bypass switch is activated based on the performance requirements of a DC-DC buck converter because the independent claims say nothing about the purpose of the bypass function. *Id.*, ¶50. The '593 Patent itself teaches a preferred embodiment with a bypass threshold based on the amplifier's maximum voltage. *Id.*, ¶51. It also does not matter whether the bypass determination "involve[s] any calculation of...power efficiency" (POR 32-33) because as ParkerVision admits, the claims do not require the circuitry to calculate power efficiency (*id.*, 15). All that matters is that such a function is activated "in response to a power efficiency of the

power supply exceeding a predetermined threshold,” which in Hau (as in the preferred ’593 embodiments) is identified by voltage. EX1031, ¶51.

**2. Hau teaches to “deactivate the switching device based on a load current at the output voltage node” (claim 2)**

As the Petition explained (Pet. 33-34), Hau explicitly teaches monitoring output power based on output current was known in the art. ParkerVision does not dispute this, but argues that Hau “discourages” the known prior art use of monitoring load current. POR 33-35. That argument fails because a known/obvious teaching “does not become patentable simply because it has been described as somewhat inferior to some other product for the same use.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994). Even if Hau teaches advantages of its preferred embodiment over known prior art devices that “monitor[] the output power of the power amplifier through the current in the voltage bias line to the power amplifier” (EX1007, 2:1-11), that does not change the fact that such devices were well-known. EX1031, ¶¶53-54.

Further, ParkerVision’s argument that using current measurements to monitor output power would require excessive changes to the structure of Hau (POR 35-37) ignores a POSITA’s skill level. Methods of monitoring current load at a known point (discussed as prior art in Hau) and comparing that load to a known threshold would have been well within the skill of a POSITA at the relevant time. EX1030, 69:20-70:14; EX1031, ¶¶52-55.

**3. The Hau-Yoshida combination teaches “an output current at a maximum power efficiency associated with the down-converted input voltage” (claims 5, 11)**

ParkerVision argues Hau does not teach this element because the Petition (Pet. 34) relies on Hau’s disclosure of providing “the most efficient current consumption for each power output level” (EX1007, 4:51-53), which according to ParkerVision “conflates current consumption with power efficiency.” POR 37-38. This argument ignores the direct relationship between these terms. Although “power efficiency” is not *limited* to calculating a “ratio” of input to output power ( $P_{OUT}$ ), the term undisputedly *encompasses* such a ratio. The input power is battery current ( $I_{BATT}$ ) multiplied by voltage ( $V_{BATT}$ ), so efficiency can be expressed as  $\frac{P_{OUT}}{(V_{BATT} \times I_{BATT})}$ . Because Hau’s battery has a fixed voltage of 3.4V (EX1007, Figs. 1, 6, 4:7-10, 4:23-26), maximum efficiency for a given  $P_{OUT}$  is achieved when  $I_{BATT}$  is minimized. EX1031, ¶¶56-57. The plain language of “power efficiency” does not require “minimiz[ing] the output current” (POR 38), nor does it say anything about the shape of the curve of efficiency vs. output current (*id.*, 39). The AGCM in the Hau-Yoshida system (using Yoshida’s pulse-width modulation circuitry as the DC-DC buck regulator of Hau, *see* Pet. 21-23) provides an output current and maximizes the power efficiency for a given power level shown by  $V_{cc2}$  (the *down-converted input voltage*) by minimizing the input current and therefore input power. EX1031, ¶57. Therefore, Hau-Yoshida teaches this limitation.

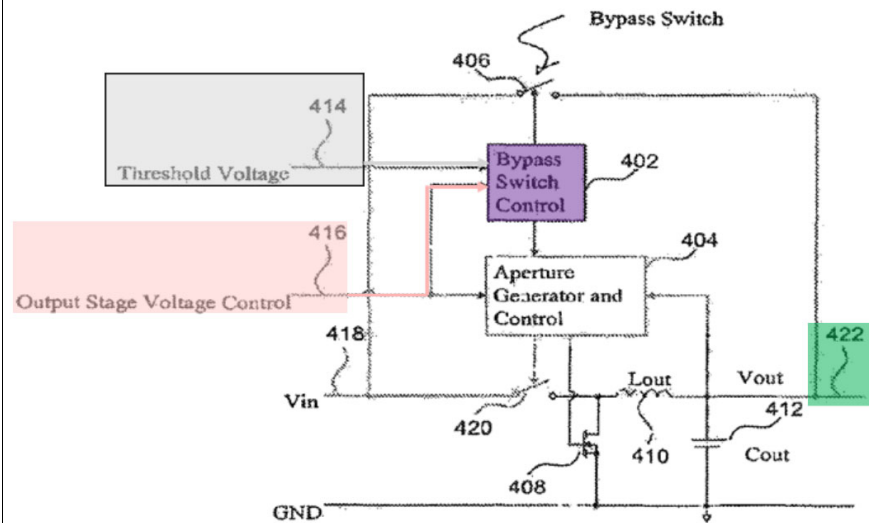
**4. Hau teaches “deactivat[e/ing] the switching device and pass[ing] the input voltage to the output voltage node [based on a/comprises] compar[ison of/ing] the down-converted [input] voltage to a threshold voltage” (claims 6-8, 12-14)**

ParkerVision does not dispute Hau teaches its bypass function is controlled by comparing the determined power signal  $P_{det}$  to a threshold voltage, nor that  $P_{det}$  is directly correlated with  $V_{cc2}$ . Pet. 35. Instead, ParkerVision suggests (POR 40-42) the claim language excludes any indirect comparison, even one with a nearly perfectly linear relationship with the down-converted input voltage (EX1007, Fig. 8). However, the plain language (comparison/comparing) does not *exclude* any indirect comparison, and ParkerVision never explains why it does. *Cf. Linear Tech. Corp. v. Int’l Trade Comm’n*, 566 F.3d 1049, 1056 (Fed. Cir. 2009) (rejecting argument that “control signal...to cause both transistors to be OFF” required a direct control signal or precluded intermediate signals).

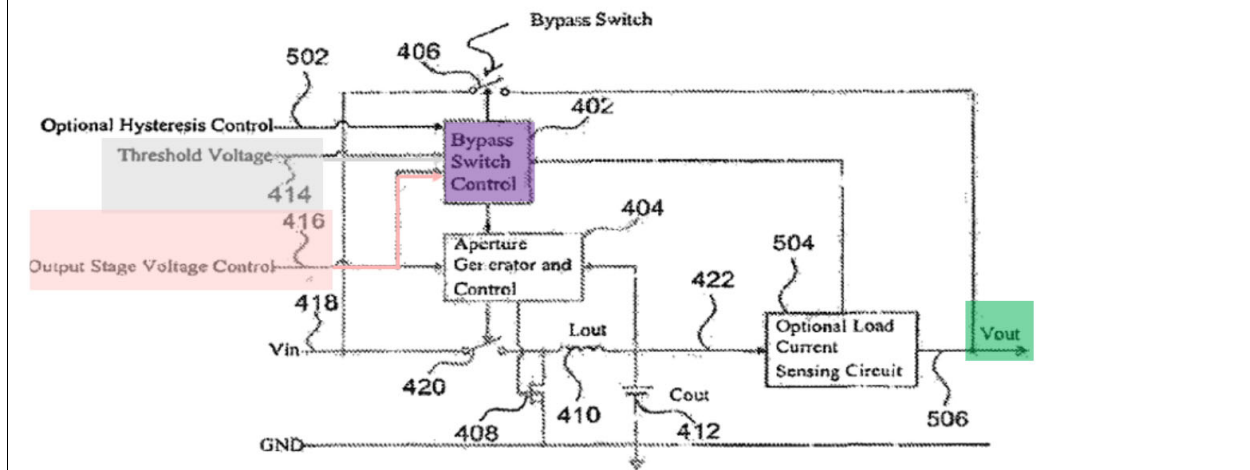
ParkerVision’s narrow interpretation conflicts with the ’593 specification, which teaches bypass switch control module 402 (“BSCM,” annotated purple in Figures 4-5 below), controlling the bypass function, receives Output Stage Voltage Control 416 (“OSVC,” pink) from a control module, and compares OSVC (or the sum of OSVC and optional hysteresis control signal) to a threshold (grey) to determine whether to switch to bypass mode. EX1001, 6:46-51, 7:50-8:10, 8:36-60. The specification never shows or describes a direct connection from the  $V_{OUT}$  422 (green) to BSCM, and does not describe how OSVC is generated, other than saying

it “includes information about the target power supply output voltage and thus allows [BSCM] 402 to determine the value of the power supply output voltage.” EX1001, 7:54-58:

EX1001, Fig. 4 (annotated):



EX1001, Fig. 5 (annotated):



Therefore, the '593 specification, which includes an indirect comparison to a signal indicative of output stage voltage, is consistent with the plain language that does not exclude such indirect comparisons. Because Hau's Pdet has a known linear relationship with  $V_{cc2}$ , Hau compares its down-converted voltage  $V_{cc2}$  (although indirectly) with a threshold. EX1031, ¶¶56-61.

## B. Ground 1B

### 1. A POSITA would have been motivated to combine Sahu with Hau and Yoshida

ParkerVision's motivation-to-combine arguments seek to move the goalposts both beyond what the claim language actually requires and what the '593 Patent itself teaches. The Petition explained (Pet. 43-45), and the POR does not dispute, Sahu teaches (1) to "calculate the average efficiency when considering the optimum PA configuration" (EX1009, 113) and (2) a fixed-supply power supply becomes

more efficient than a “dynamic-supply” power supply at a point that can be calculated for a particular system (*id.*, Fig. 8a). Therefore, a POSITA would have understood from Sahu that the performance of such a power supply can be optimized both (1) by designing the PA configuration to be most efficient at the power levels at which it is most likely to operate, and (2) setting the threshold for bypass operation to correspond to the point where a fixed supply becomes more efficient. Pet. 43-45; EX1003, ¶¶154-156; EX1031, ¶¶62-65.

ParkerVision’s arguments to the contrary are unavailing. It is simply untrue that “Sahu does not teach how to improve a system’s weighted efficiency other than using a dynamic supply system” (POR 44), because Sahu suggests to a POSITA both that the design of a power supply for a wireless system should be optimized for greatest efficiency at the power levels at which it is most likely to operate, and that bypass threshold in a system such as Hau would be set where a fixed supply becomes more efficient. EX1031, ¶66.

ParkerVision’s critique that Sahu does not teach *how* to optimize performance for a given power level fails. The claim language at issue (e.g., “control the switching device based on a probable output power point of operation for a selected modulation scheme” in claim 3) has no such requirement. EX1031, ¶66. As the Petition points out (Pet. 47-49), and to which ParkerVision does not respond, the ’593 Patent’s corresponding disclosure is notably vague, showing the entire

“controlling an output stage power supply...to operate at a substantially optimal efficiency” step in a box in a flow chart without teaching how that step is performed. Dr. Ricketts admits a POSITA would fill that gap based on their own knowledge. EX1030, 113:24-114:17.

ParkerVision’s circuit-specific teaching-away arguments (POR 46-48) are irrelevant because the combination does not rely on Sahu’s Figure 5, and the reasons for making the combination (e.g., optimizing efficiency for a probable power level and selecting an efficient bypass threshold) do not depend on how the dynamic power supply control is wired into the amplifier. EX1031, ¶¶67-68.

**2. Hau-Yoshida-Sahu renders obvious controlling the switching device “based on a probable output power point of operation for a selected modulation scheme” (claims 3-4, 10, 19)**

ParkerVision’s arguments for these claim elements are largely repetitive of its motivation-to-combine arguments and fail for the same reasons. Sahu teaches not just the use of a dynamic power supply, but that the PA configuration should be based on the expected average efficiency for a selected modulation scheme. EX1009, 118-19; EX1003, ¶152. The claims require no more, nor does the ’593 Patent itself teach more.

ParkerVision’s assertion that “Sahu...does not teach how its proposed system can be optimized for a different modulation scheme” is neither accurate nor relevant. Claim 3 does not require “optimiz[ation] for a different modulation scheme.” A

POSITA would have further recognized that although Sahu teaches CDMA as an example, Sahu teaches to determine the most probable output power of a selected modulation scheme (EX1009, Fig. 1) and optimize the PA configuration according to the average efficiency of that modulation scheme. EX1031, ¶¶69-70. Although not necessary to the claim (which CDMA alone satisfies), a POSITA would have recognized these teachings apply to other selected modulation schemes. EX1031, ¶71.

**3. Hau-Yoshida-Sahu renders obvious “programming the threshold voltage based on a communication waveform efficiency” (claims 8, 13)**

ParkerVision’s argument (POR 50-52) regarding this limitation begins by repeating its motivation-to-combine arguments, which fail for the reasons discussed above. A POSITA would have understood *Sahu* shows a fixed power supply becomes more efficient at higher power levels, and setting the threshold for a bypass (as in Hau) at the point where the fixed power supply becomes more efficient would improve the efficiency of the system. That motivation remains even if Hau describes a different reason for the bypass. EX1031, ¶72. ParkerVision is also wrong about Sahu’s Figure 8a. POR 50-51. Sahu’s experimental results are for a prototype using a CDMA signal at 915 MHz (EX1009, 117), and Figure 8 shows results using RF output power (*id.*, 118). A POSITA would therefore have recognized the output power shown in Figure 8 (including efficiency, which is derived from output power)

is RF output power using the CDMA waveform. EX1031, ¶73. ParkerVision's conclusory arguments to the contrary, parroted by its expert, fail to show otherwise.

**C. Ground 1C: Hau-Yoshida-Lejon teaches a MISO amplifier (claim 16)**

ParkerVision argues (POR 52-53) that Lejon does not teach or suggest a “multiple-input-single-output (MISO) amplifier” because Lejon teaches an amplifier system which splits a quadrature signal into two phasor fragments. However, claim 16 says nothing about the source of the amplified signals. It requires only an amplifier with multiple inputs and a single output. ParkerVision and its expert fail to address Lejon's Figs. 9 and 10, which show amplifiers with *multiple inputs* (210, 220 in Fig. 9; 310, 320 in Fig. 10) and a single output (load 290 in Fig. 9, 390 in Fig. 10). EX1031, ¶74. Moreover, a ParkerVision application incorporated by the '593 Patent explicitly describes “MISO amplifiers” that take phased components derived from a single signal as their inputs. EX1033, Fig. 71; EX1031, ¶¶75-76.

**D. Ground 2A**

**1. A POSITA would have been motivated to combine Canyon and Ranjan**

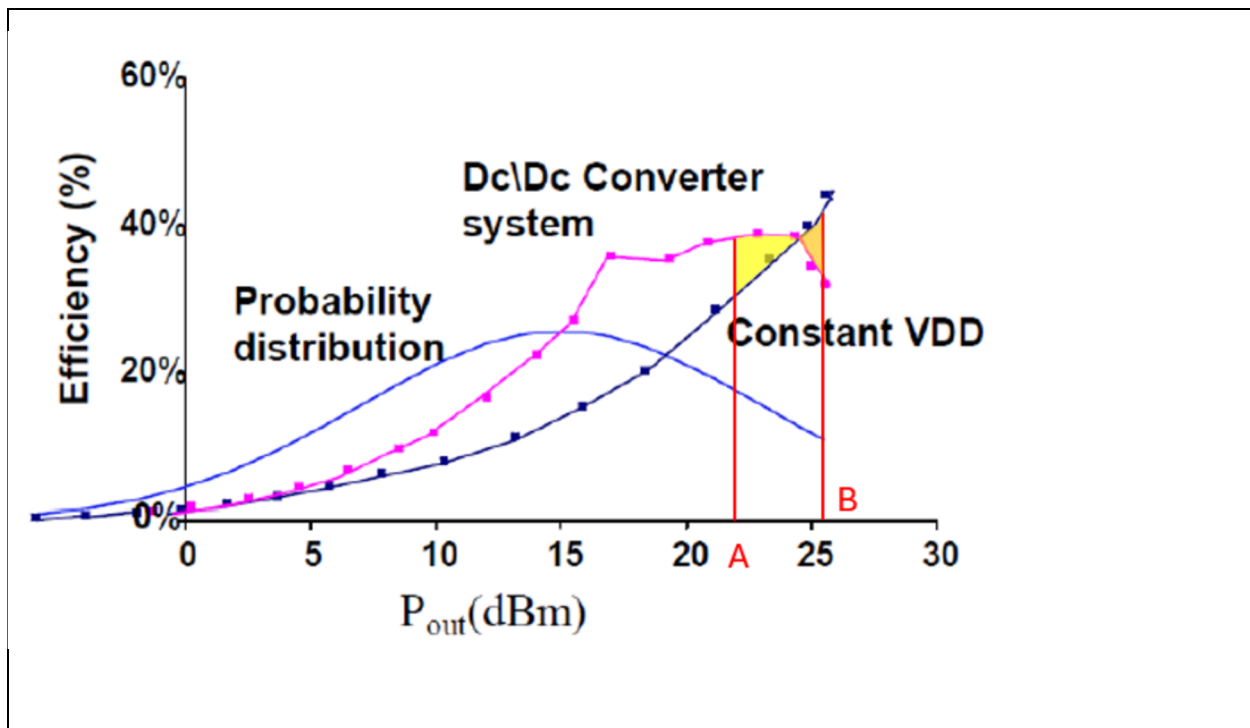
As the Petition explained (Pet. 65-68), Ranjan teaches the supply power for an amplifier for a wireless transmitter may be more efficient using DC-DC down conversion at lower power levels, but more efficient using a constant voltage at higher power levels. Therefore, a POSITA would have been motivated to set the

power threshold to trigger a switch to bypass a down-converter (as taught by Canyon) to maximize the system's efficiency. ParkerVision's arguments to the contrary are meritless.

**First**, ParkerVision's arguments about differences between Canyon's and Ranjan's circuit structures are irrelevant because the combination does not rely on bodily incorporating of the two references. EX1031, ¶¶77-79. Instead, the proposed modification sets a bypass threshold in Canyon's system at a "crossover point" of power efficiency as taught by Ranjan. *Id.*, ¶79. ParkerVision's arguments compare the source of the signal used to control the DC-DC converter circuits in the respective references, but no modification to Canyon's DC-DC converter is required in the combination. *Id.*, ¶¶79-80.

**Second**, ParkerVision's argument that Canyon's disclosure regarding when to operate the bypass switch is "complete" is irrelevant and wrong. As the Petition noted (Pet. 66), which the POR ignores, Canyon's suggestion to close the bypass switch when at a power level greater than 22-24 dBm does not indicate how this level was derived or whether it is the most efficient value. EX1011, 4:23-26; EX1003, ¶193. Ranjan, however, teaches a POSITA that a "crossover" point can be ascertained for a transmitter where the bypass pathway becomes more efficient, and would accordingly have been motivated to set the bypass threshold at that level. EX1031, ¶¶81-85.

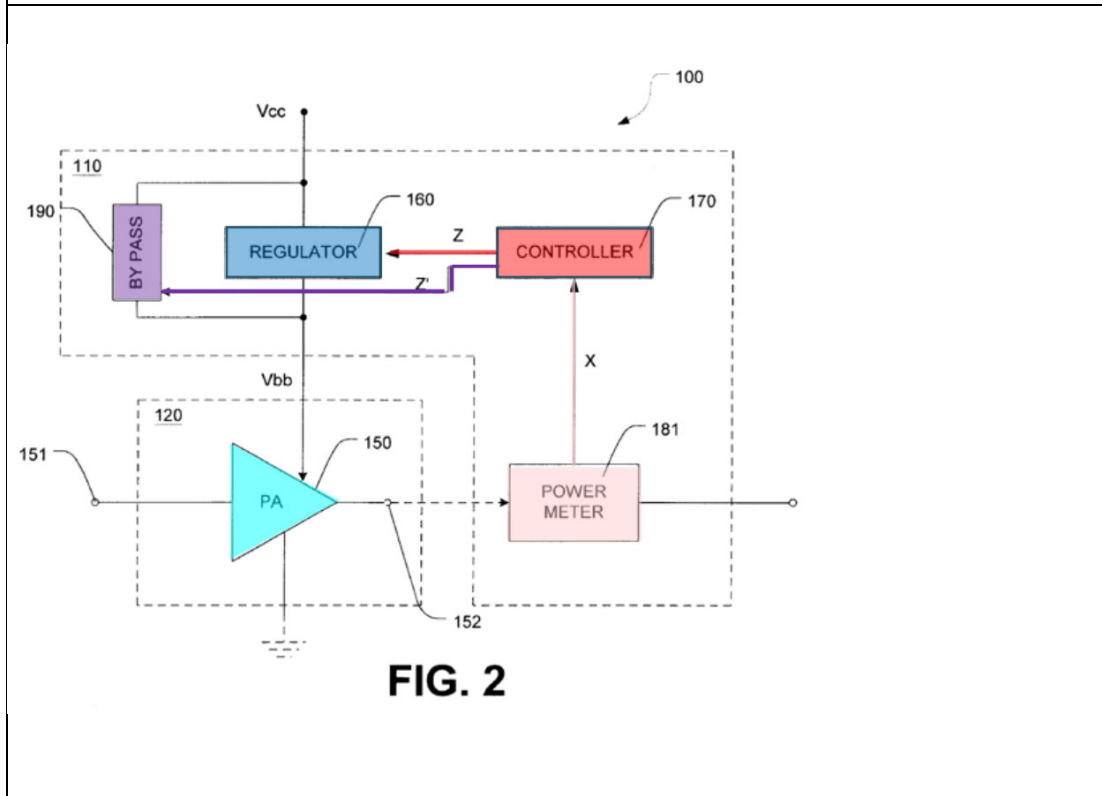
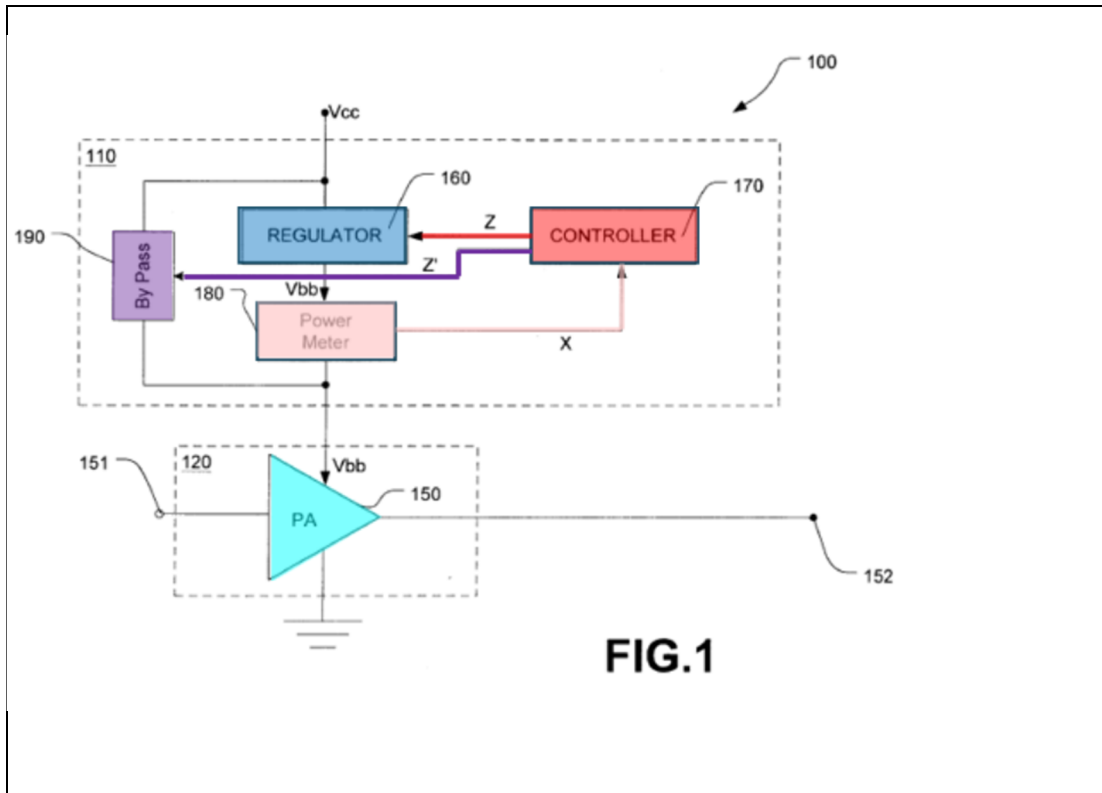
Even if Canyon's disclosure was "complete," that would not negate a motivation to *improve* the device based on a disclosure in the same technical field. *Id.*, ¶¶86-90. For example, plotting the efficiency of Canyon's device using both the down-converted and bypass pathways as taught by Ranjan would indicate whether the efficiency of system using a bypass threshold at an arbitrary but high power level could still be improved. If the threshold was set at point "A," the power supply would be made more efficient in the yellow shaded region by continuing to use a DC-DC converter system rather than switching to bypass, whereas if the threshold was set a point B, the power supply would be made more efficient in the orange shaded region by switching to bypass:



*Id.*, ¶¶84-85.

**Third**, ParkerVision’s arguments about differences between Canyon’s Figure 1 and 2 embodiments (POR 58-62) misread Canyon. ParkerVision relies heavily on its assertion (POR 58) that “Canyon describes when to open and close its bypass switch in connection with the embodiment of Figure 2” based on EX1011, 4:14-46, but then assumes that the cited passage refers **only** to Canyon’s Figure 2 embodiment. In other words, although bypass switch 190 appears identically in Figures 1 and 2, ParkerVision argues Canyon describes that switch for only one of the two figures and gives no description whatsoever for the other. That is wrong.

Figures 1 and 2 depict several identical elements, including controller 170 (red below) which receives signal X (pink) and controls (1) regulator 160 (blue) via signal Z (blue) and (2) bypass switch 190 (purple) via signal Z’ (purple). The two embodiments differ only in the placement of power meter 180/181 (pink) that generates signal X (pink), which measures power **input** to the PA (light blue) in Figure 1 (discussed at EX1011, 3:1-43) and the power **output** of the PA in Fig. 2 (discussed at *id.*, 3:44-4:13):



*Id.*, Figs. 1-2 (annotated).

Canyon then (*id.*, 4:14-37) discusses Bypass unit/switch 190 which appears in *both* embodiments, including the more detailed illustration of the bypass switch in Figure 3. This description is the first explanation of bypass unit/switch 190 after Figure 1 is introduced. This description notes the threshold to trigger bypass switch 190 may indicate the PA is “*consuming or operating at* a high power level.” EX1011, 4:20-23 (emphasis added). As Dr. Ricketts admits, the power “consum[ed]” by the PA is the power entering from Vbb, which is measured by power meter 180 in Figure 1. EX1030, 28:9-14, 161:11-162:6. Therefore, a POSITA would have understood Canyon’s discussion at EX1011, 4:14-37 refers to both its Figure 1 and 2 embodiments. EX1031, ¶¶91-97.

Canyon therefore teaches performing the bypass function based on comparing a threshold to a signal X that may indicate either the power input to or output from the power amplifier, and both embodiments are readily available alternatives. EX1031, ¶93. As the Petition explained (Pet. 74), which ParkerVision and its expert ignore, the output power of an amplifier (e.g., in Ranjan’s Figure 3) is proportional to the bias voltage, which in Canyon’s Figure 1 is provided by the down-converted signal Vbb/Ibb, which is measured by the power meter. EX1031, ¶95. Canyon itself makes this relationship explicit, stating “for a given current flow power indicator X, there is a corresponding output power level at which the power amplifier unit 120 operates” and “[b]y monitoring the current Ibb drawn by the power amplifier unit

120, it is possible to determine the power output of the power amplifier unit 120.”  
EX1011, 3:20-30.

A POSITA would therefore have been motivated, based on Ranjan’s teaching that an amplifier using a down-converted voltage supply is more efficient up to a certain power level where constant voltage becomes more efficient, to set the bypass threshold of Canyon in *either* the Figure 1 or Figure 2 embodiment at the corresponding power level. EX1031, ¶¶94-97. Because Canyon already teaches measuring power using a power meter at the output of the down-converter (which is the input of the amplifier), a POSITA would have known how to make the combination and have had a reasonable expectation of success in doing so. EX1031, ¶97.

**2. Canyon in view of Ranjan renders obvious controlling the switching device “in response to a power efficiency of the power supply exceeding a predetermined threshold”**

ParkerVision’s argument with respect to this limitation (POR 62-64) largely regurgitates its motivation-to-combine arguments based on its misreading of Canyon. As explained above, a POSITA would have understood Canyon’s description of the operation of bypass unit/switch 190 (EX1011, 4:14-29) to apply to bypass unit/switch 190 in both Figures 1 and 2. Canyon explicitly teaches controlling the bypass switch by comparing a signal from the power input to the amplifier to a threshold, and it would have been obvious in view of Ranjan to set the

threshold based on whether a DC-DC converter or bypass was more efficient for a given power level. Pet. 67-68, 73-75; EX1003, ¶¶195-197, 210-215.

Even if a POSITA somehow misinterpreted Canyon in the same manner as ParkerVision, it would nevertheless have been obvious to a POSITA to use the output X of Power Meter 180 for controller 170 to determine when to activate bypass 190 using signal Z'. The figure itself depicts the operational relationship between these components. EX1031, ¶¶98-99. And even if the description of bypass 190 at 4:14-36 was not *already* intended to apply to Figure 1, it would have been obvious to a POSITA reading Canyon to apply the same teachings to Figure 1. EX1031, ¶99. Canyon's power meter 180 measures the power consumption of the PA. EX1011, 3:20-30; EX1031, ¶99. A POSITA would have understood the relationship between input power and output power of an amplifier along with the basic circuit concepts needed to generate a control signal (e.g., signal Z') based on comparison to a known reference or threshold, either digitally or in a circuit. EX1031, ¶99.

The combination suggests this element even according to ParkerVision's narrow interpretation. Ranjan expressly represents PA efficiency as a percentage (i.e., ratio), and a POSITA applying Ranjan's teachings about the relative efficiency of the DC-DC converter and fixed voltage supply at various power levels to set the threshold for Canyon's bypass would have set a direct threshold of efficiency. *Id.*, ¶100.

**3. Ranjan suggests “controlling the switching device based on a probable output power point of operation for a selected modulation scheme based on one or more power efficiency characteristics of an electronic device coupled to the power supply” (claims 3-4, 10, 19)**

Ranjan teaches this element. Ranjan’s Figure 3 teaches a probability distribution for power output in an electronic device using CDMA transmission, and notes in the Abstract that its experimental results were all derived in an IS-95 CDMA handset application. Pet. 76-77. Therefore, a POSITA would have understood Ranjan suggests optimizing system performance by using (controlling) the DC-DC converter system for maximum efficiency at the most likely point of operation, e.g., at the peak of the curve. ParkerVision argues Ranjan’s disclosure (EX1012, 494) that the “average efficiency *can be computed* based on power usage probabilities” does not “disclose[] controlling the switching device based on the computed average efficiency.” POR 65-66 (emphasis in original). This argument ignores the reasonable inferences a POSITA would make. A POSITA seeing Ranjan’s juxtaposition in Fig. 3 of the probability distribution of operating at a given power level with the efficiency of such a power level would recognize the need to optimize the performance of the system, including controlling the switching device, based on the power levels where it is most likely to operate. EX1031, ¶101. The ’593 Patent itself explains little about how this limitation is performed with just a box in a flowchart (EX1001, Figure 11, step. 1106), leaving a POSITA to figure out *how* to

perform the corresponding step on their own. EX1031, ¶¶102-103. A POSITA would have been equally capable of doing so from Ranjan’s teachings. *Id.*, ¶104.

**E. Ground 2B**

**1. Claims 6-8, 12-14**

ParkerVision’s arguments (POR 66-67) fail for the reasons discussed in §III.A.4. EX1031, ¶105.

**2. Canyon-Ranjan-Hau renders obvious “programming the threshold voltage based on a communication waveform efficiency” (claims 8, 13)**

Although ParkerVision (POR 67-68) criticizes the Petition’s description (Pet. 88-89) as overly vague, Petitioner’s combination suggests this element at the same level of detail as the ’593 Patent. The ’593 Patent’s “probability distribution function” 200 in Figure 2 shows the time probability of transmitting using a given output power level “according to the transmitted CDMA waveform” (EX1001, 5:10-13; 6:4-5), and briefly notes “Threshold Voltage 414 can be pre-programmed based on waveform efficiency requirements” (*id.*, 6:64-67), without explaining how. EX1031, ¶106. As the Petition noted (Pet. 88-89), Hau teaches both a “threshold setting” and that the performance characteristics are related to power requirements of a WCDA modulation scheme using a CDMA waveform. EX1007, claim 5, 1:49-51; EX1003, ¶249. The Petition further explained regarding motivation to combine for claim 1 (from which claim 6 depends) that a POSITA would have been motivated

in the Canyon-Ranjan combination to set a bypass threshold based on efficiency of output power for a wireless application. Pet. 74-75. A POSITA would have therefore understood the “crossover” point where the threshold should be set relates to the efficiency characteristics of a specified transmission scheme (including waveform efficiency), and the combination teaches this limitation at the same level of detail as the ’593 Patent. EX1031, ¶106.

**F. Ground 2C**

ParkerVision’s arguments (POR 68) fail for the reasons discussed in §III.C. EX1031, ¶107.

**IV. CONCLUSION**

Claims 1-20 of the ’593 patent are unpatentable as obvious over the prior art.

Dated: November 14, 2025

Respectfully submitted,

/ Jessica Kaiser /

Jessica Kaiser

Reg. No. 58,937

Attorney for Petitioners

Perkins Coie LLP

1900 Sixteenth Street, Ste. 1400

Denver, CO 80202-5255

**CERTIFICATE OF WORD COUNT**

I hereby certify that the foregoing **PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE** includes 5,447 words (as calculated by Microsoft Word), excluding those in a table of contents; a table of authorities; a listing of facts that are admitted, denied, or cannot be admitted or denied; a certificate of service or word count; or an appendix of exhibits. Accordingly, this Reply is under the word count limit of 5,600 words.

Dated: November 14, 2025

Respectfully submitted,

/ Jessica Kaiser /

Jessica Kaiser

Reg. No. 58,937

Attorney for Petitioners

Perkins Coie LLP

1900 Sixteenth Street, Ste. 1400

Denver, CO 80202-5255

**CERTIFICATE OF SERVICE**

I hereby certify that on November 14, 2025 true and correct copies of the foregoing PETITIONER'S REPLY TO PATENT OWNER'S RESPONSE, and EXHIBITS 1034-1036 was served via electronic mail upon the following counsel of record for Patent Owner:

Jason S. Charkow - jason.s.charkow@gmail.com  
Richard Juang - richard.juang@gmail.com  
Chandran B. Iyer - cbiyer@daignaultiyer.com  
Ronald M. Daignault - rdaignault@daignaultiyer.com  
Stephanie Mandir - smandir@daignaultiyer.com  
Scott Samay - ssamay@daignaultiyer.com  
pvlit@daignaultiyer.com

Dated: November 14, 2025

Respectfully submitted,

/ Jessica Kaiser /

Jessica Kaiser

Reg. No. 58,937

Perkins Coie LLP  
1900 Sixteenth Street, Ste. 1400  
Denver, CO 80202-5255