NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

NETLIST, INC.,
Appellant

v.

MICRON TECHNOLOGY, INC., MICRON SEMICONDUCTOR PRODUCTS, INC., MICRON TECHNOLOGY TEXAS, LLC,
Appellees

2024-1859, 2024-1863

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2022-00996, IPR2022-00999, IPR2023-00405, IPR2023-00406.

Decided: September 2, 2026

RAYINER HASHEM, MoloLamken LLP, Washington, DC, argued for appellant. Also represented by JENNIFER ELIZABETH FISCHELL, KAYVON GHAYOUMI, JEFFREY A. LAMKEN, LIDIYA MISHCHENKO; ELIZABETH KATHLEEN CLARKE, Chicago, IL; CATHERINE MARTINEZ, New York, NY; JONATHAN M. LINDSAY, Irell & Manella LLP, Newport Beach, CA; JASON SHEASBY, HONG ANNITA ZHONG, Los

Angeles, CA; PHILIP J. WARRICK, Washington, DC.

MICHAEL RUECKHEIM, King & Spalding LLP, San Francisco, CA, for appellees. Also represented by JUAN C. YAQUIAN, Houston, TX.

Before REYNA, LINN, and STARK, *Circuit Judges*.

LINN, *Circuit Judge*.

Netlist, Inc. ("Netlist") appeals two consolidated final written decisions of the Patent Trial and Appeal Board ("Board"), which held all challenged claims unpatentable as obvious. *See Samsung Elecs. Co., Ltd. v. Netlist, Inc.*, No. IPR2022-00996, 2023 WL 8525632 (P.T.A.B. Dec. 6, 2023) ("*'918 Decision*"); *Samsung Elecs. Co., Ltd. v. Netlist, Inc.*, No. IPR2022-00999, 2023 WL 8446338 (P.T.A.B. Dec. 5, 2023) ("*'054 Decision*").[1] For the following reasons, we *affirm*.

BACKGROUND

Netlist owns U.S. Patent No. 11,016,918 ("'918 patent") and U.S. Patent No. 11,232,054 ("'054 patent"). The '918 and '054 patents concern memory modules used in computer systems, such as dual in-line memory modules

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[1] Micron Technology, Inc., Micron Semiconductor Products, Inc., and Micron Technology Texas, LLC (collectively, "Micron") filed petitions for *inter partes* review challenging the same claims of the '918 and '054 patents using the same prior art asserted by Samsung Electronics Co., Ltd. ("Samsung") in its petitions. *In re Micron Technology, Inc.*, Nos. IPR2023-00405, IPR2023-00406. Micron and Samsung's petitions for each respective patent were consolidated before the Board. Samsung has since settled with Netlist and withdrawn from this appeal. This opinion therefore refers to Micron as "Appellees."

("DIMMs"), that supply regulated voltage to memory devices mounted on the module. The patents describe memory modules that include voltage converters located on the module itself that receive power from a host system and generate regulated voltages for components on the module.

The petitions for *inter partes* review challenged claims 1–30 of the '918 patent and claims 1–30 of the '054 patent as unpatentable under 35 U.S.C. § 103 over combinations of U.S. Patent Pub. No. 2006/0174140("Harris"), the JEDEC Fully Buffered Dual In-Line Memory Module ("FBDIMM") standards, U.S. Patent No. 7,724,604 ("Amidi"), and U.S. Patent No. 6,856,556 ("Hajeck"). *918 Decision*, 2023 WL 8525632, at *4; *'054 Decision*, 2023 WL 8446338, at *3. The parties treated claim 1 of the '918 patent as generally representative; we do likewise.

The petitions asserted the representative claim would have been obvious over a combination of Harris and the FBDIMM standards. *'918 Decision*, 2023 WL 8525632, at *4; *'054 Decision*, 2023 WL 8446338, at *3.

Certain dependent claims of the '918 and '054 patents further recite circuitry for monitoring voltage conditions and responding to detected anomalies. '918 patent at col. 38 ll. 61–67, col. 39 ll. 31–36.

For these limitations, the petitions relied on combinations of Harris, the FBDIMM standards, and Amidi or Harris, the FBDIMM standards, Amidi and Hajeck. *'918 Decision*, 2023 WL 8525632, at *30–34; J.A. 356–57, 362–63; *'054 Decision*, 2023 WL 8446338, at *22–26, *29–31; J.A. 347–50.

The Board instituted review and ultimately determined that the petitioners had shown by a preponderance of the evidence that all challenged claims of both patents would have been obvious over the asserted combinations of references. *'918 Decision*, 2023 WL 8525632, at *35; *'054 Decision*, 2023 WL 8446338, at *31.

The Board found that Harris discloses a memory module with voltage converters located on the module and that the FBDIMM standards teach DIMMs that receive power from a host system through edge connections. The Board further determined that a skilled artisan would have implemented Harris's converters to generate the regulated voltages required by the FBDIMM architecture. With respect to the dependent claims, the Board found that Amidi and Hajeck disclose monitoring input voltage conditions and responding to detected anomalies in a manner satisfying the remaining claim limitations. The Board therefore concluded that the challenged claims were unpatentable as obvious.

Netlist appeals. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

DISCUSSION

Netlist raises four main issues on appeal. First, Netlist contends: (a) that the Board departed from the petition in finding that the Harris-FBDIMM combination teaches a DIMM with voltage regulators that receive a voltage input from the mother board; and (b) that such finding lacks substantial evidence support. Second, Netlist challenges the Board's determination that the prior art teaches the claimed configuration of multiple voltage converters. Third, Netlist challenges the Board's finding that the prior art teaches the voltage-monitoring limitations recited in dependent claims such as claims 5 and 12 of the '918 patent. Fourth, Netlist argues that the Board inadequately addressed certain dependent claims in violation of the Administrative Procedure Act. We address these arguments in turn.

I

A

Netlist first argues that the Board improperly relied on a combination of Harris and the FBDIMM standards for

the portion of claim 1 requiring that the memory module interface "includ[e] a plurality of edge connections configured to couple power . . . between the memory module and the host system." '918 patent col. 38 ll. 19–24. Netlist contends that the petition relied only on Harris to satisfy this limitation. Netlist asserts that the petition included only a single bullet point addressing "power," which cited a specific embodiment of Harris that differs from what the Board used in its analysis.

Appellees respond that the Board simply relied on the same theory advanced in the petitions—namely, that the combination of Harris and the FBDIMM standards teaches the claimed interface, including its ability to couple power between the module and the host system. Appellees further note that the petition consistently identified the combination of references as the asserted ground and that Netlist addressed that combined theory throughout the proceedings before the Board.

The petitioner's contentions define the scope of IPR proceedings, and it is error for the Board to find a claim unpatentable on a ground absent from the petition. *IBM v. Zillow Grp., Inc.*, 160 F.4th 1360, 1366 (Fed. Cir. 2025). "We review the Board's judgments concerning what arguments are fairly presented in a petition . . . for abuse of discretion." *Netflix, Inc. v. DivX, LLC*, 84 F.4th 1371, 1376 (Fed. Cir. 2023); *see also Corephotonics, Ltd. v. Apple Inc.*, 84 F.4th 990, 1002–03 ("We review the Board's assessments of what has been argued to and put before it in an IPR for abuse of discretion."). The Board did not abuse its discretion in considering the combination of Harris and the FBDIMM standards.[2]

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[2] Netlist attempts to characterize this issue as a legal question of whether the Board relied on a new ground absent from the petition, which we review de novo. *See In re*

Here, as Appellees note, the petition expressly identified "Ground 1" as the combination of Harris and the FBDIMM standards. J.A. 309; J.A. 11893. The limitation-by-limitation analysis of representative claim 1 includes statements that the limitations are taught by the combination of the two references. *See, e.g.*, J.A. 309, 314–317; J.A. 11893–901. The petition's discussion of the full limitation at issue repeatedly cites Harris together with the FBDIMM standards when describing the coupling between the memory module and the host system, including specific reference to the background section of Harris teaching power configuration. J.A. 316 (citing Harris ¶ 2 in view of the FBDIMM standards); *see also '918 Decision*, 2023 WL 8525632, at *19.

Netlist's argument isolates a single bullet within the discussion of the full claim limitation. But that "power" bullet appears within a section that, as a whole, asserts obviousness in view of the "Ground 1" combination, including the broader teachings of Harris and the FBDIMM standards that were acknowledged by the Board. J.A. 314–17; J.A. 11898–901; *see also '918 Decision*, 2023 WL 8525632, at *18–19. Nothing in the petition cabins the discussion of "power" to exclude the FBDIMM standards. To the contrary, the "power" bullet is directly preceded by an express reference to the FBDIMM standards. J.A. 316 ("Grounds 1A-1C teach the edge connections in Harris, consistent with JEDEC's FBDIMM Standards, are 'configured to couple power, data, address and control signals between the memory module and the host system': '*power*': EX1023, ¶[0012] ('power'/'+12V' 'pins'); *id.*, ¶¶[0010, 19] & Fig.1A (104, below)." (emphasis original)).

Nuvasive, Inc., 841 F.3d 966, 970 (Fed. Cir. 2016). But even under the less deferential standard, our disposition would not differ.

Netlist's argument is thus predicated on ignoring the surrounding language in the petition, which more generally relies on the combination of Harris with the FBDIMM standards to render the limitation, including the discussion of "power," obvious. Because the Board's understanding was consistent with the petition as a whole, *see* J.A. 314–17, we reject Netlist's argument and conclude that the Board did not abuse its discretion in considering this combination.

B

Netlist additionally argues that the Board lacked substantial evidence to find that Harris teaches or suggests receiving power through the DIMM edge connectors when considered in view of the FBDIMM standards. According to Netlist, Harris instead requires a separate "external" power source and therefore teaches away from supplying power through the host-system interface.

Appellees respond that substantial evidence supports the Board's finding, as Harris expressly identifies FBDIMM modules as a preferred embodiment and it is undisputed that FBDIMM modules conventionally receive power through the DIMM's edge connector from the host system. Appellees further argue that Harris's references to an "external voltage source" refer to a source external to the memory module itself, not external to the host system, and therefore do not exclude power supplied through the module interface.

Substantial evidence supports the Board's finding that a skilled artisan would have understood Harris, in view of the FBDIMM standards, to teach receiving power through the module's edge connections.

First, the Board relied on Harris's own disclosures identifying fully buffered DIMMs as an embodiment. *'918 Decision*, 2023 WL 8525632, at *16 (citing Harris ¶ 9). As the Board recognized, Harris permissively teaches that

DRAM devices "may be 'powered from system board or main board voltage sources,'" indicating that power could originate from the host system. *Id.* at *19 (citing Harris ¶ 2). Because it is undisputed that the FBDIMM standards teach receiving power through their edge connectors, that disclosure supports the Board's finding that Harris contemplates the same power-delivery path when implemented in that architecture. *See id.* at *16–19.

Second, the Board credited expert testimony that, at the time of the invention, it was conventional for DIMM modules to receive power from the host system through the edge connector alongside address, data, and control signals. *Id.* at *19 ("The experts agree that it was common at the time for the host system to provide the regulated 12V power supply to the FBDIMM."). The Board found this testimony consistent with the FBDIMM standards, which describe DIMMs using edge connections to couple signals and power between the host system and the module. *Id.* In view of this record evidence, it was reasonable for the Board to find that a skilled artisan would have understood Harris's module—implemented in view of the FBDIMM standards—to receive power through the interface.

In sum, substantial evidence supports the Board's conclusion that the combination of Harris, in view of the FBDIMM standards, teaches receiving power through the module's edge connections as claimed.

II

Netlist next argues that Harris does not disclose the claimed arrangement of three buck converters and a converter circuit and argues that the Board reconstructed Harris by adding converters that the reference itself does not describe without a reason to do so.

Appellees respond that substantial evidence supports the Board's finding that a skilled artisan would have been motivated to modify Harris's module with the claimed

three or four on-module converters. Appellees contend that Harris teaches on-module voltage regulation for FBDIMM embodiments and does not limit the module to only one regulator or only two voltages, while the FBDIMM standards identify at least four required voltages. Appellees argue that, therefore, the Board reasonably found that using multiple buck converters to generate those voltages would have been a suitable implementation, particularly in light of the evidence that separate converters could provide benefits such as independent power control, reduced noise coupling, cost savings, and accommodation of space constraints.

We agree with Appellees that substantial evidence supports the Board's finding. Harris itself explains that voltage regulation may be performed on the memory module to generate the operating voltages required by the devices and circuitry mounted on the module. Harris ¶¶ 9–12, 16, 19–20. The Board considered this disclosure together with the FBDIMM standards, which identify multiple voltage rails used by DRAM devices and associated components. *'918 Decision*, 2023 WL 8525632, *15–16 (citing FBDIMM at 9, 15). Based on those teachings, the Board reasonably found that a skilled artisan implementing Harris's architecture within an FBDIMM system would have provided separate converters to generate the required regulated voltages. *Id.* at *14–16.

The Board also credited expert testimony explaining that a skilled artisan would have used separate buck converters for the regulated voltages. *Id.* at *14. Both Samsung's expert, Dr. Wolfe, and Netlist's expert, Dr. Mangione-Smith, testified that separate converters could provide practical benefits, including sequencing the power, turning power on and off independently, saving cost, eliminating cross-coupling of noise, and solving space constraints. J.A. 7463–65 112:12–114:8; J.A. 7485–87 134:22–136:21; J.A. 7545–46 194:23–195:7; J.A. 1907–08 ¶ 255. In view of that evidence, the Board reasonably found that configuring the module with multiple

converters—such as the three buck converters and converter circuit recited in the claims—would have been a straightforward implementation of Harris's on-module regulation within the FBDIMM architecture. *'918 Decision*, 2023 WL 8525632, at *14–16.

For the foregoing reasons, we conclude that the Board's reading of Harris, the FBDIMM standards, and the supporting testimony is supported by substantial evidence.

III

Netlist next challenges the Board's obviousness determinations with respect to dependent claims directed to transferring data from volatile memory to non-volatile memory in response to overvoltage. Specifically, claims 5 and 12 additionally require "a voltage monitor circuit configured to monitor a power input voltage" and "produce a trigger signal in response to the power input voltage" exceeding a threshold. '918 patent at col 38 ll. 61–67, col. 39 ll. 31–32. Claim 12 further requires "perform[ing] a write operation to [a] non-volatile memory" when a controller receives the trigger signal. *Id.* at col. 39 ll. 31–36.

The Board found that Amidi discloses circuitry configured to detect abnormal voltage conditions and initiate protective actions when such conditions occur. *'918 Decision*, 2023 WL 8525632, at *27 (citing Amidi at col. 4 ll. 14–22, col. 8 ll. 23–36, Figs. 5, 14). The Board noted the petitioners' contention that Harris recognizes concerns with power reliability in memory modules and teaches the use of a redundant power source. *Id.* (citing Harris ¶¶ 12–14, 16, Figs. 1B, 2). Based on these disclosures, the Board found that a skilled artisan would have been motivated to incorporate Amidi's backup power and monitoring functionality into Harris's memory module. *Id.* at *27–28.

As an initial matter, Netlist's argument that the Board failed to adequately explain a motivation to combine is premised on the view that Amidi merely provides a solution

to power disruption already taught by Harris. Appellees respond that the Board rejected this view, finding that Amidi teaches a complementary solution to a problem left unsolved by Harris—as Harris does not disclose how to maintain operation during a system-wide power disruption and Amidi teaches a battery-backed power supply for such instances.

We agree with Appellees. The Board credited expert testimony that "Amidi recognizes that it is useful to keep data on the memory module with a backup power supply on the module itself, such as a battery supply, when the *entire system* surrounding the memory module loses power." *Id.* at *28 (citing J.A. 1850–52 ¶ 170) (emphasis added). As Harris instead provides a solution from disruptions "within the electronic system," Harris ¶ 14, the Board reasonably found that Netlist's argument that Amidi only provides a solution to a problem already solved by Harris is incorrect. *See '918 Decision*, 2023 WL 8525632, at *28.

Netlist further argues that Amidi discloses only undervoltage detection and therefore cannot teach producing a trigger signal when the voltage exceeds a threshold, as required by claims 5 and 12. While Netlist recognizes that Amidi discloses that trigger signals may be generated responsive to "power faults," Netlist contends that such faults do not encompass overvoltage conditions.

Appellees respond that Amidi's disclosure of "power faults," particularly in view of Harris and the knowledge of a skilled artisan, would have been understood to include both undervoltage and overvoltage conditions.

We agree with Appellees that substantial evidence supports the Board's finding that the combination of Harris, the FBDIMM standards, and Amidi render claims 5 and 12 obvious. The Board's findings are supported by the disclosures of Amidi and the credited expert testimony of Samsung's expert, Dr. Wolfe. *Id.* at *30–31. The Board found that Amidi uses the term "power faults" broadly,

identifying undervoltage as an example but not limiting the term to that condition. *Id.* (citing Amidi at Abstract, Fig. 14). The Board further credited Samsung's expert declaration, which "explains that overvoltage was a danger known to persons of ordinary skill in the art, citing industry datasheets that specify overvoltage parameters." *Id.* at *31; J.A. 1971–73, ¶¶ 371–73.

On this record, a reasonable factfinder could conclude that the asserted combination teaches monitoring for and responding to overvoltage conditions. Because we conclude that substantial evidence supports the Board's finding that the combination of Harris, the FBDIMM standards, and Amidi teaches the limitations added by claims 5 and 12 of the '918 patent, we need not reach the Board's alternative reliance on Hajeck.

IV

Finally, Netlist raises several procedural challenges under the Administrative Procedure Act concerning the Board's treatment of certain limitations and dependent claims. Netlist argues that the Board failed to adequately address those claims and improperly relied on citations to the petition rather than providing independent analysis.

Appellees respond that the Board's reasoning remains readily discernible from the decisions as a whole and appropriately reflected the limited arguments presented by Netlist.

Netlist's argument lacks merit. Where a party offers little or no argument on particular limitations, the Board is not required to provide an extensive discussion of those issues. *See Polaris Indus., Inc. v. Arctic Cat, Inc.*, 882 F.3d 1056, 1066–67 (Fed. Cir. 2018). Here, the record reveals that several of the challenged limitations were not substantively disputed before the Board. *See generally* J.A. 662–718; *see also generally* J.A. 12220–75. As argued by Appellees, the Board's claim-by-claim analysis was

commensurate with Netlist's presentation on the issues. *See Paice LLC v. Ford Motor Co.*, 881 F.3d 894, 905 (Fed. Cir. 2018). The Board's decisions identify the relevant claim limitations, cite the supporting portions of the prior art and expert testimony, and explain why those disclosures satisfy the challenged limitations. *See '918 Decision*, 2023 WL 8525632, at *16, *22–24, *26–27, *32; *see also '054 Decision,* 2023 WL 8446338, at *20, *24, *27–28.

Netlist has therefore not shown that the Board's treatment of the remaining claims or limitations was legally insufficient under the Administrative Procedure Act or unsupported by substantial evidence.

CONCLUSION

We have considered the parties' other arguments but do not find them persuasive. For these reasons, we *affirm*.

AFFIRMED