NOTE: This disposition is nonprecedential.

United States Court of Appeals for the Federal Circuit

INTEL CORPORATION,
Appellant

v.

QUALCOMM INCORPORATED,
Appellee

2022-1046, 2022-1047

Appeals from the United States Patent and Trademark Office, Patent Trial and Appeal Board in Nos. IPR2018-01154, IPR2018-01240.

Decided: June 27, 2023

JAMES MURPHY DOWD, Wilmer Cutler Pickering Hale and Dorr LLP, Los Angeles, CA, argued for appellant. Also represented by DAVID LANGDON CAVANAUGH, THOMAS SAUNDERS, Washington, DC; JAMES M. LYONS, Boston, MA.

ISRAEL SASHA MAYERGOYZ, Jones Day, Chicago, IL, argued for appellee. Also represented by ROBERT BREETZ, DAVID B. COCHRAN, JOSEPH M. SAUER, Cleveland, OH; KELLY HOLT, New York, NY; JENNIFER L. SWIZE, Washington, DC.

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Before HUGHES, STOLL, and STARK, *Circuit Judges*.

HUGHES, *Circuit Judge*.

Intel Corporation appeals two decisions of the Patent Trial and Appeal Board finding claims 10 and 15–20 of U.S. Patent No. 8,698,558 patentable. Because the Board properly construed "boosted supply voltage or the first supply voltage" to require a "selective boost" and because the Board's finding that Kwak does not anticipate is supported by substantial evidence, we affirm.

I

A

Mobile devices transmit our phone calls, text messages, and other data through radio frequency (RF) signals. To transmit data, RF signals need to travel between mobile devices and base stations in a wireless network. The further a signal must travel, the more power is required. To provide that extra power, mobile devices use a variety of power amplifiers to increase the power of the RF signal to a sufficient level. "A [power amplifier] typically receives its power in the form of a supply voltage from a power supply generator[.]" Appellant's Br. 4. The power amplifier will accept an input signal carrying data, and then produce an output signal that replicates the input signal, but with proportionally greater power.

There are several techniques available to boost the power supply that are relevant to this appeal. For example, envelope amplifiers can be used to track the RF input signal's upper bound and adjust how much power is supplied, but can be inefficient because it loses power due to heat dissipation. Similarly, switchers can also supply power at certain frequencies, but without dissipating voltage as heat. Hybrid supply generators combine features of envelope amplifiers and switchers to gain the advantages of both and can use one or the other depending on the RF

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signal. And finally, when a device's battery is too low, boost converters can be used to boost the battery voltage to a higher voltage.

B

Qualcomm Corporation owns the '558 patent, titled "Low-Voltage Power-Efficient Envelope Tracker," which describes various techniques for managing the power supply necessary to transmit RF signals, while also extending battery life. The '558 patent describes two improvements to hybrid supply generators: (1) adding an offset current to a switcher, which senses an input current and generates a switching signal to charge and discharge an inductor that provides a supply current; and (2) connecting a boost converter to an envelope amplifier, which selectively operates by using a supply voltage or a boosted voltage. '558 patent at 1:34–54, 1:61–2:2. An annotated version of Figure 5 of the '558 patent shows these elements, with the boost converter in blue, envelope amplifier in purple, switcher in yellow, and the offset current in pink:

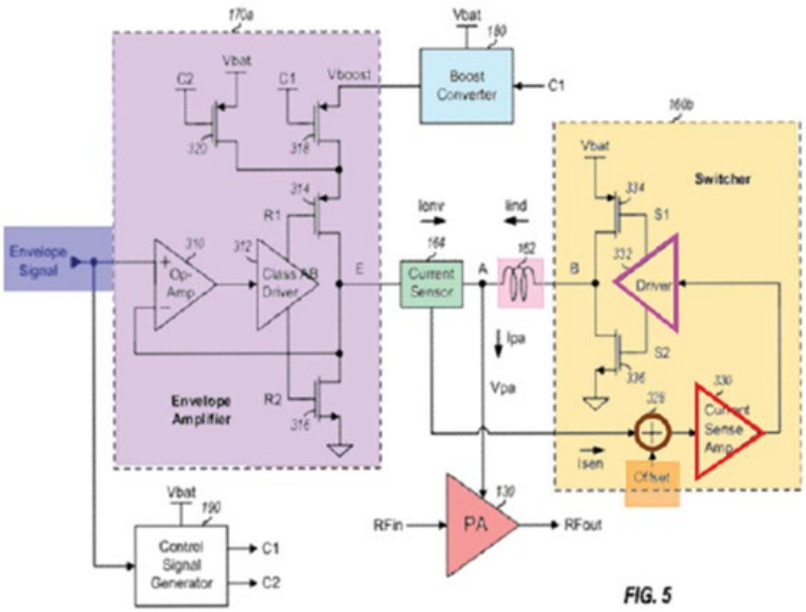

FIG. 5

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'558 patent at Fig. 5 (coloring added by parties). Claims 10 and 15 are representative of the claims at issue in this appeal:

> Claim 10:
>
> An apparatus for generating supply voltages, comprising:
>
> means for generating a boosted supply voltage based on a first supply voltage, the boosted supply voltage having a higher voltage than the first supply voltage; and
>
> means for generating a second supply voltage based on the envelope signal and the boosted supply voltage, wherein the means for generating the second supply voltage incorporates an envelope amplifier that produces the second supply voltage using an operational amplifier (op-amp) that receives the envelope signal and provides an amplified signal, a driver that receives the amplified signal and provides a first control signal and a second control signal, a P-channel metal oxide semiconductor (PMOS) transistor that receives the first control signal, *a source that receives the boosted supply voltage or the first supply voltage*, and a drain providing the second supply voltage and an N-channel metal oxide semiconductor (NMOS) transistor that receives the second control signal at a gate and provides a second supply voltage through a drain, and a source for circuit grounding.

'558 patent at 12:25–45 (emphasis added).

> Claim 15:
>
> An apparatus comprising:

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an inductor operative to receive a switching signal and provide a supply current; and

a switcher operative to sense an input current and generate the switching signal to charge and discharge the inductor to provide the supply current, the switcher adding an offset to the input current to generate a larger supply current via the inductor than without the offset, wherein the switcher comprises

a summer operative to sum the input current and an offset current and provide a summed current,

a current sense amplifier operative to receive the summed current and provide a sensed signal, and

a driver operative to receive the sensed signal and provide at least one control signal used to generate the switching signal for the inductor.

'558 patent at 13:19–34.

C

In June 2018, Intel filed two petitions for inter partes review, collectively challenging claims 10–11 and 15–20 of the '558 patent.[1] In one petition, Intel alleged that (1) claims 15, 17, 18, and 20 are anticipated by Kwak[2]; (2)

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[1] As these petitions were filed prior to November 13, 2018, the claims are given their "broadest reasonable construction." 37 C.F.R. § 42.100(b) (2016); *Personalized Media Commc'ns, LLC v. Apple Inc.*, 952 F.3d 1336, 1340 & n.2 (Fed. Cir. 2020).

[2] T.W. Kwak, et al., *A 2 W CMOS Hybrid Switching Amplitude Modulator for EDGE Polar Transmitters*, IEEE

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