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Paper 9
Entered: February 6, 2019

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,
Petitioner,

v.

QUALCOMM, INC.,
Patent Owner.

Case IPR2018-01154
Patent 8,698,558 B2

Before TREVOR M. JEFFERSON, DANIEL N. FISHMAN, and SCOTT B. HOWARD, *Administrative Patent Judges*.

JEFFERSON, *Administrative Patent Judge*.

DECISION
Institution of *Inter Partes* Review
37 C.F.R. § 42.108

I. INTRODUCTION

Intel Corporation ("Petitioner") requests *inter partes* review of claims 15–20 of U.S. Patent No. 8,698,558 B2 ("the '558 patent," Ex. 1201) pursuant to 35 U.S.C. §§ 311 *et seq.* Paper 3 ("Petition" or "Pet."). Qualcomm Incorporated ("Patent Owner") filed a Preliminary Response. Paper 8 ("Prelim. Resp."). We have jurisdiction under 35 U.S.C. § 314(a).

Institution of an *inter partes* review is authorized by statute when "the information presented in the petition . . . and any response . . . shows that there is a reasonable likelihood that the petitioner would prevail with respect to at least 1 of the claims challenged in the petition." 35 U.S.C. § 314(a). Upon consideration of the Petition and Patent Owner's Preliminary Response, we conclude the information presented shows there is a reasonable likelihood that Petitioner would prevail in establishing the unpatentability of claims 15–20 of the '558 patent.

A. Related Proceedings

Apple Inc. is identified as an additional real party-in-interest. Pet. 2.

The parties inform us that the '558 patent is presently asserted against Petitioner in the proceeding captioned *Qualcomm Inc. v. Apple Inc.*, Case No. 3:17-cv-01375-DMS-MDD (S.D. Cal.) and against Apple in a proceeding before the International Trade Commission ("ITC") captioned *In the Matter of Certain Mobile Elec. Devices and Radio Frequency Components Thereof*, Inv. No. 337-TA-1065. Pet. 2; Paper 5, 2. The parties also inform us that additional claims of the '558 patent are at issue in related *inter partes* reviews, specifically claims 1–9 of the 558 patent in IPR2018-

01153, claims 13 and 14 of the '558 patent in IPR2018-01552, and claims 10 and 11 in IPR2019-01240. Pet. 2–3; Paper 5, 2.

B. The '558 Patent

The '558 patent is titled, "Low-Voltage Power-Efficient Envelope Tracker" and discloses "[t]echniques for efficiently generating a power supply for a power amplifier" used in communication system transmitters. Ex. 1201, 1:30–31, [54]. The '558 patent discloses that,

> [a] transmitter typically includes a power amplifier (PA) to provide high transmit power for the output RF signal. The power amplifier should be able to provide high output power and have high power-added efficiency (PAE). Furthermore, the power amplifier may be required to have good performance and high PAE even with a low battery voltage.

Id. at 1:21–26. The '558 patent also discloses that the power amplifier apparatus may include: (1) in one embodiment, an envelope amplifier and a boost converter; (2) in a second embodiment, a switcher, an envelope amplifier, and a power amplifier; or (3) in a third embodiment, a switcher that may sense an input current and generate a switching signal to charge and discharge an inductor providing a supply current. *Id*. at 1:31–34; 1:51–52; 1:66–2:2.

Figure 3, below, shows an exemplary switcher and envelope amplifier. *Id*. at 4:39–42.

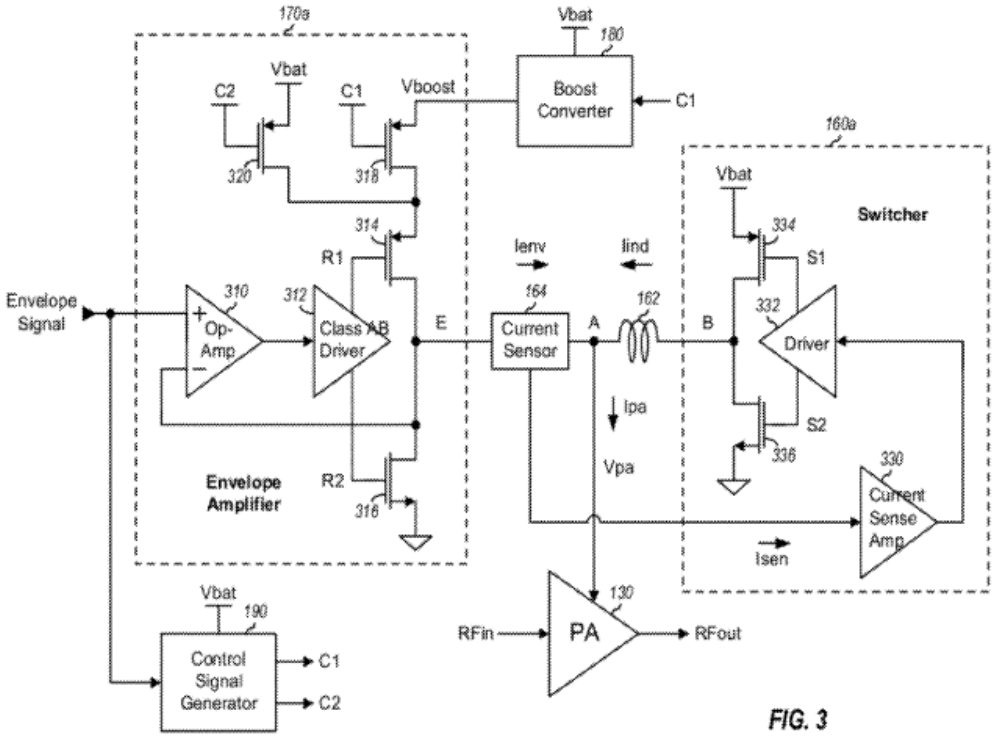

FIG. 3

Figure 3 shows switcher 160a and envelope amplifier 170a, which, in turn, includes operational amplifier (op-amp) 310 that receives the envelope signal. *Id*. at 4:42–63. Driver 312 has output (R1) coupled to the gate of P-channel metal oxide semiconductor (PMOS) transistor 314 and a second output (R2) coupled to N-channel MOS (NMOS) transistor 316. *Id*. PMOS transistor 318 in envelope amplifier 170a is connected to receive C1 control signal via Vboost voltage from Boost Converter 180. *Id*. PMOS transistor 320 in envelope amplifier 170a receives a C2 control signal and Vbat voltage. *Id*.

Within switcher 160a, current sense amplifier 330 has its input coupled to current sensor 164 and its output coupled to an input of switcher driver 332. *Id*. at 4:64–66. Vbat voltage of switcher 160a provides current to power amplifier 130 via inductor 162 when the switcher is ON, and

inductor 120 provides stored energy to power amplifier 130 during the OFF state of the switcher circuit. In the ON state, the switcher is joined with the current from the envelope amplifier 170a (Ienv) to provide a combined current (Ipa) to PA 130. *See id*. at 3:21–27.

The '558 patent also discloses another embodiment for switcher circuit of Figure 3—specifically a switcher that uses offset current to lower the Isen current from the current sensor, keeping the switcher in the ON state for a longer time and producing a larger Iind current provided to power amplifier 130. *Id*. at 7:5–48, Figure 5.

C. Illustrative Claims

Claims 15 is independent and claims 16–20 are dependent. Claim 15 is illustrative and reproduced below (Ex. 1201, 13:19–34).

> 15. An apparatus comprising:
>
> 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.

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