UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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APPLE INC.,
Petitioner,

v.

QUALCOMM, INC.,
Patent Owner.

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IPR2018-01283
Patent 7,834,591 B2

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Before TREVOR M. JEFFERSON, DANIEL J. GALLIGAN, and
SCOTT B. HOWARD, *Administrative Patent Judges*.

JEFFERSON, *Administrative Patent Judge*.

JUDGMENT
Final Written Decision
Determining All Challenged Claims Unpatentable
Denying Patent Owner's Motion to Exclude
35 U.S.C. § 318(a)

I.   INTRODUCTION

In this *inter partes* review, Apple Inc. ("Petitioner") challenges claims 1, 2, 4, 6–9, 11, 13–16, 18–21, 23–28, 30–37, 39, 42, 43, and 45 of U.S. Patent No. 7,834,591 B2 ("the '591 patent," Ex. 1001) which is assigned to Qualcomm Incorporated ("Patent Owner"). Paper 2 ("Petition" or "Pet.").

We have jurisdiction under 35 U.S.C. § 6. This Final Written Decision, issued pursuant to 35 U.S.C. § 318(a), addresses issues and arguments raised during the trial in this *inter partes* reviews. For the reasons discussed below, we determine that Petitioner has demonstrated the unpatentability of claims 1, 2, 4, 6–9, 11, 13–16, 18–21, 23–28, 30–37, 39, 42, 43, and 45.

A. Procedural History

Petitioner filed a Petition challenging claims 1, 2, 4, 6–9, 11, 13–16, 18–21, 23–28, 30–37, 39, 42, 43, and 45 of the '591 patent (Pet. 2–3), and Patent Owner filed a Preliminary Response (Paper 6). We instituted trial on all grounds of unpatentability. Paper 7 ("Dec. on Inst."), 22. During trial, Patent Owner filed a Response (Paper 20, "PO Resp."), Petitioner filed a Reply (Paper 24, "Pet. Reply"), and Patent Owner filed a Sur-reply (Paper 31, "PO Sur-reply"). Patent Owner filed a Motion to Exclude (Paper 32), Petitioner filed an opposition (Paper 33) to which Patent Owner replied (Paper 35). A combined oral hearing for this *inter partes* review and IPR2019-01452 was held on December 13, 2019, a transcript of which appears in the record in each case. Paper 38.

B. *Instituted Grounds of Unpatentability*

We instituted *inter partes* review of claims 1, 2, 4, 6–9, 11, 13–16, 18–21, 23–28, 30–37, 39, 42, 43, and 45 of the '591 patent in on the following grounds:

Claim(s) Challenged	35 U.S.C. §	References
1, 2, 4, 7, 8, 11, 15, 16, 18–21, 23–28, 30–37, 39, 42, 43, 45	103(a)[1]	Bell,[2] Kester,[3] Martin[4]
6, 9	103(a)	Bell, Kester, Sherman,[5] optionally Martin
4, 13	103(a)	Bell, Kester, Hatular,[6] optionally Martin
14	103(a)	Bell, Kester, Hatular, Sherman, optionally Martin

Dec. on Inst. 6–7, 21–22; *see* Pet. 2–3.

Petitioner relies on the Declaration of Dr. Joshua Phinney (Ex. 1003) and the Supplemental Declaration of Dr. Joshua Phinney (Ex. 1056). Patent Owner relies on the Declaration of Pradeep Lall, Ph.D. (Ex. 2007).

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[1] The Leahy-Smith America Invents Act ("AIA") included revisions to 35 U.S.C. §§ 102, 103 that became effective on March 16, 2013. Because the '558 patent issued from an application filed before March 16, 2013, we apply the pre-AIA versions of the statutory bases for unpatentability.
[2] U.S. Patent No. 5,723,970, issued March 3, 1998 (Ex. 1005, "Bell").
[3] Walt Kester, Ed., PRACTICAL DESIGN TECHNIQUES FOR POWER AND THERMAL MANAGEMENT, Analog Devices, 1998 (Ex. 1007, "Kester").
[4] U.S. Patent Application Publication No. 2007/0029975 A1, published Feb. 8, 2007 (Ex. 1006, "Martin").
[5] U.S. Patent No. 6,507,172 B2, issued Jan. 14, 2003 (Ex. 1012, "Sherman").
[6] U.S. Patent No. 6,184,660 B1, issued Feb. 6, 2001 (Ex. 1021, "Hatular").

C. Related Proceedings

The parties inform us that the '591 patent was asserted against Petitioner in the proceeding *Qualcomm Inc. v. Apple Inc.*, Case No. 3:17-cv-2402 (S.D. Cal.), which has since been dismissed. Pet. 99; Paper 4, 1 (Patent Owner's Mandatory Notices); Paper 18, 1 (Petitioner's Updated Mandatory Notices). Various claims of the '591 patent also are at issue in related *inter partes* review IPR2018-01452. Pet. 99; *see also* Paper 4, 1.

D. The '591 Patent and Illustrative Claims

The '591 patent is titled, "Switching Battery Charging Systems and Methods" and discloses "[t]echniques for charging a battery using a switching regulator." Ex. 1001, codes (54), (57). The '591 patent discloses that "embodiments [of the invention] include switching battery chargers that modify the battery current based on sensed circuit conditions such as battery voltage or input current to the switching regulator." *Id*. at 1:67–2:3. The '591 patent discloses that

> [i]n one embodiment, the present invention includes a Universal Serial Bus (USB) battery charger comprising a switching regulator having at least one switching transistor, the switching transistor having first input and a first output, wherein the first input of the switching transistor is coupled to a USB power source, a filter having a first input and a first output, wherein the first input of the filter is coupled to the first output of the switching transistor, and a battery coupled to the first output of the filter, wherein the switching regulator is configured to receive a USB voltage, and in accordance therewith, generate a switching signal to the control terminal of the switching transistor, and wherein a switching current and switching voltage at the output of the switching transistor are coupled through the filter to generate a filtered current and a filtered voltage to charge the battery.

Id. at 2:4–18.

Figure 10A of the '591 patent, shown below, illustrates charging a battery using a switching regulator in accordance with an embodiment of the invention. *Id*. at 18:64–66.
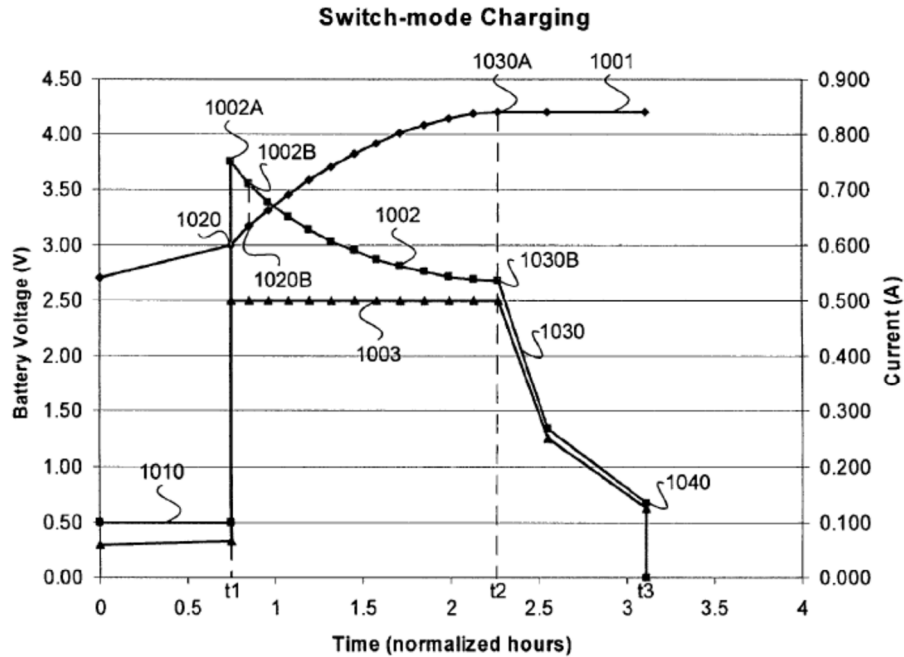

Switch-mode Charging

FIG. 10A

Figure 10A of the '591 patent shows current on the right vertical axis ("Current (A)") and voltage on the battery on the left vertical axis ("Battery Voltage (V)") versus time. *Id*. at 18:66–19:1. Battery voltage is shown by line 1001, current into the battery by line 1002, and current into the switching regulator by the line 1003. *Id*. at 19:1–4. The '591 patent specifies two modes, current control mode and voltage control mode. *Id*. at 19:6–7. Specifically, the '591 patent describes that

> [t]his example [in Figure 10A] illustrates a charge cycle for charging a deeply depleted Li+ battery. The battery is charged in two basic modes: a current control mode (t=0, t2) and a voltage control mode (t=t2, t3). In this example, the voltage on the battery is initially below some particular threshold (e.g., 3 volts), indicating that the battery is deeply depleted. Accordingly, the

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