

UNITED STATES PATENT AND TRADEMARK OFFICE

---

BEFORE THE PATENT TRIAL AND APPEAL BOARD

---

APPLE INC.,  
Petitioner,

v.

QUALCOMM, INC.,  
Patent Owner.

---

IPR2018-01452  
Patent 7,834,591 B2

---

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 1–5, 7, 8, 10–13, 15, 17, 18, 21, 23, 24, 28, 30–32, 37, 39–41, and 44 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 these *inter partes* reviews. For the reasons discussed below, we determine that Petitioner has demonstrated the unpatentability of claims 1–5, 7, 8, 10–13, 15, 17, 18, 21, 23, 24, 28, 30–32, 37, 39–41, and 44.

### A. Procedural History

Petitioner filed a Petition challenging claims 1–5, 7, 8, 10–13, 15, 17, 18, 21, 23, 24, 28, 30–32, 37, 39–41, and 44 of the ’591 patent (Pet. 3–4), and Patent Owner filed a Preliminary Response (Paper 6). We instituted trial on all grounds of unpatentability. Paper 7 (“Dec. on Inst.”), 26. During trial, Patent Owner filed a Response (Paper 20, “PO Resp.”), Petitioner filed a Reply (Paper 25, “Pet. Reply”), and Patent Owner filed a Sur-reply (Paper 32, “PO Sur-reply”). Patent Owner filed a Motion to Exclude (Paper 33), to which Petitioner filed an Opposition (Paper 34), and Patent Owner replied (Paper 36). A combined oral hearing for this *inter partes* review and IPR2018-01283 was held on December 13, 2019, a transcript of which appears in the record in each case. Paper 39.

*B. Instituted Grounds of Unpatentability*

We instituted *inter partes* review of claims 1–5, 7, 8, 10–13, 15, 17, 18, 21, 23, 24, 28, 30–32, 37, 39–41, and 44 of the '591 patent on the following grounds:

Claims Challenged	35 U.S.C. §	References
1–5, 7, 8, 10–12, 15, 18, 21, 23, 24, 28, 30–32 37, 39–41, 44	103(a) <sup>1</sup>	Bell, <sup>2</sup> Kester, <sup>3</sup> Gong, <sup>4</sup> Martin <sup>5</sup>
4, 5, 13, 17	103(a)	Bell, Kester, Gong, Martin, Hatular <sup>6</sup>

Dec. on Inst. 6–7, 26; *see* Pet. 3–4.

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).

*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

---

<sup>1</sup> 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 '591 patent issued from an application filed before March 16, 2013, we apply the pre-AIA versions of the statutory bases for unpatentability.

<sup>2</sup> U.S. Patent No. 5,723,970, issued March 3, 1998 (Ex. 1005, “Bell”).

<sup>3</sup> Walt Kester, Ed., PRACTICAL DESIGN TECHNIQUES FOR POWER AND THERMAL MANAGEMENT, Analog Devices, 1998 (Ex. 1007, “Kester”).

<sup>4</sup> U.S. Patent No. 5,998,972, issued Dec. 7, 1999 (Ex. 1008, “Gong”).

<sup>5</sup> U.S. Patent Application Publication No. 2007/0029975 A1, published Feb. 8, 2007 (Ex. 1006, “Martin”).

<sup>6</sup> U.S. Patent No. 6,184,660 B1, issued Feb. 6, 2001 (Ex. 1021, “Hatular”).

IPR2018-01452  
Patent 7,834,591 B2

(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* reviews IPR2018-01283. Pet. 99; *see also* Paper 4, 1.

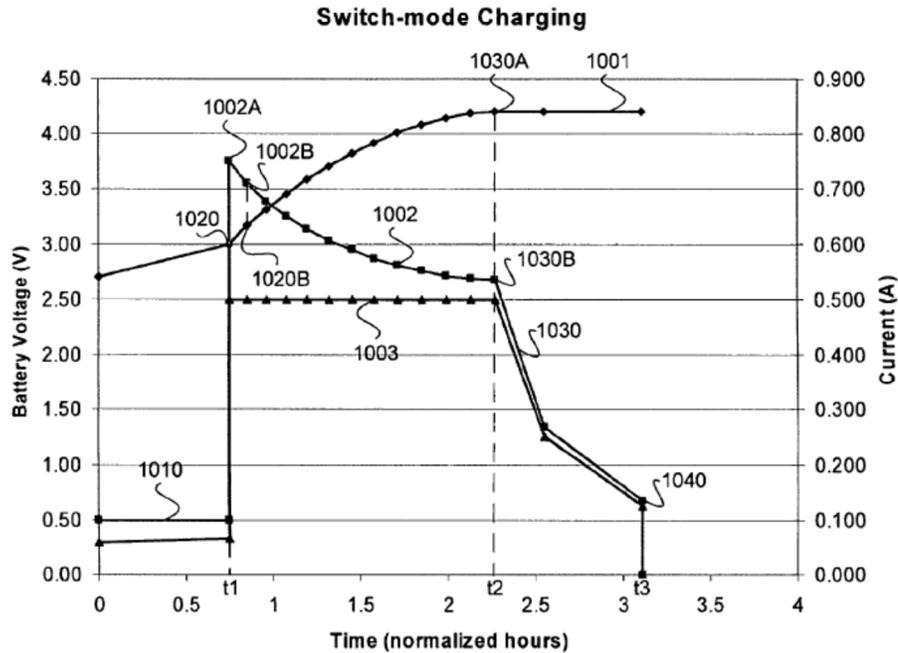
*D. The ’591 Patent and Illustrative Claims*

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, code (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.



**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<sup>+</sup> 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 current control mode may initially generate a constant precharge current 1010 (e.g., 100 mA). The constant precharge current 1010 will cause the battery voltage to start to increase. When the battery voltage increases above a precharge threshold 1020 (e.g., 3 volts), the system will increase the current sourced to the

# Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

## Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

## Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

## Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

## API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

## LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

## FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

## E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.