Apple Inc. (Petitioner) v. Masimo Corp. (Patent Owner)

Petitioner's Demonstratives

Case No. IPR2022-01299
U.S. Patent No. 7,761,127
Before Hon. JOSIAH C. COCKS, GEORGE R. HOSKINS, and ROBERT A. POLLOCK
Administrative Patent Judges

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’127 Patent Overview

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Overview of the ’127 Patent

US007761127B2

(12) **United States Patent**
Al-Ali et al.

(10) **Patent No.: US 7,761,127 B2**
(45) **Date of Patent: Jul. 20, 2010**

(54) **MULTIPLE WAVELENGTH SENSOR SUBSTRATE**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 1154 days.

(21) Appl. No.: **11/366,209**

(22) Filed: **Mar. 1, 2006**

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Related U.S. Application Data

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(51) **Int. Cl.**
A61B 5/145 (2006.01)

(52) **U.S. Cl.** **600/310**; 362/84

(58) **Field of Classification Search** 600/310, 600/331, 333, 336

See application file for complete search history.

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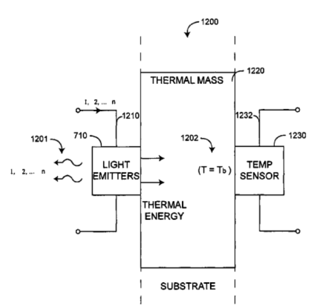
(57) **ABSTRACT**

A physiological sensor has emitters configured to transmit optical radiation having multiple wavelengths in response to corresponding drive currents. A thermal mass is disposed proximate the emitters so as to stabilize a bulk temperature for the emitters. A temperature sensor is thermally coupled to the thermal mass. The temperature sensor provides a temperature sensor output responsive to the bulk temperature so that the wavelengths are determinable as a function of the drive currents and the bulk temperature.

30 Claims, 48 Drawing Sheets



APPLE-1001 (’127 Patent), Cover Page

- The ’127 Patent was filed March 1, 2006, and its earliest claimed priority date is March 1, 2005.
- The ’127 Patent includes 30 claims.
- The Petition challenges claims 1-30, of which claims 1, 7, 13, 20, and 26 are independent.

Overview of the '127 Patent

bstrate

FIG. 12 illustrates light emitters **710** configured to transmit ical radiation **1201** having multiple wavelengths in ponse to corresponding drive currents **1210**. A thermal ss **1220** is disposed proximate the emitters **710** so as to bilize a bulk temperature **1202** for the emitters. A tempera-e sensor **1230** is thermally coupled to the thermal mass **20**, wherein the temperature sensor **1230** provides a tem-rature sensor output **1232** responsive to the bulk tempera-e **1202** so that the wavelengths are determinable as a func-n of the drive currents **1210** and the bulk temperature **1202**. In one embodiment, an operating wavelength λ_a of each ht emitter **710** is determined according to EQ. 3

$$\lambda_{a=f(}T_b, I_{drive}, \Sigma I_{drive}) \quad (3)$$

ere T_b is the bulk temperature, I_{drive} is the drive current for articular light emitter, as determined by the sensor control- **4500** (FIG. **45**), described below, and ΣI_{drive} is the total ve current for all light emitters. In another embodiment,

APPLE-1001, 10:21-39.
Paper 46 (Reply), 21-22.
Paper 2 (Petition), 20-21.

FIGS. **13-18** illustrate one embodiment of a substrate **1200** configured to provide thermal conductivity between an emitter array **700** (FIG. **8**) and a thermistor **1540** (FIG. **16**). In this manner, the resistance of the thermistor **1540** (FIG. **16**) can be measured in order to determine the bulk temperature of LEDs **801** (FIG. **8**) mounted on the substrate **1200**. The substrate **1200** is also configured with a relatively significant thermal mass, which stabilizes and normalizes the bulk temperature so that the thermistor measurement of bulk temperature is meaningful.

FIGS. **13-14** illustrate a substrate **1200** having a component side **1301**, a solder side **1302**, a component end **1305** and a connector end **1306**. Alignment notches **1310** are disposed between the ends **1305**, **1306**. The substrate **1200** further has a component layer **1401**, inner layers **1402-1405** and a solder layer **1406**. The inner layers **1402-1405**, e.g. inner layer **1402** (FIG. **18**), have substantial metallized areas **1411** that provide a thermal mass **1220** (FIG. **12**) to stabilize a bulk temperature for the emitter array **700** (FIG. **12**). The metallized areas **1411** also function to interconnect component pads **1510** and wire bond pads **1520** (FIG. **15**) to the connector **1530**.

APPLE-1001, 10:62-11:15.
Paper 46 (Reply), 21-22.
Paper 2 (Petition), 20-21.

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