



(12) **United States Patent**  
**Minoo et al.**

(10) **Patent No.:** **US 8,339,798 B2**  
(45) **Date of Patent:** **Dec. 25, 2012**

(54) **PRINTED CIRCUIT BOARDS WITH EMBEDDED COMPONENTS**

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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 194 days.

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(21) Appl. No.: **12/832,885**

(22) Filed: **Jul. 8, 2010**

(65) **Prior Publication Data**

US 2012/0008294 A1 Jan. 12, 2012

(51) **Int. Cl.**

<b>H05K 1/18</b>	(2006.01)
<b>H05K 1/03</b>	(2006.01)
<b>H05K 1/00</b>	(2006.01)
<b>H05K 1/16</b>	(2006.01)

(52) **U.S. Cl.** ..... **361/764**; 361/761; 361/777; 361/781; 200/5 A; 200/5 B; 200/516

(58) **Field of Classification Search** ..... 361/679.02, 361/679.3, 679.15, 760-767, 784-788, 794-797; 174/254-267; 200/5 A, 6 A, 512-517, 306, 200/302.2, 292, 406, 341-345, 521; 345/156-184; 455/550.1, 575.1, 556, 556.2; 29/622  
See application file for complete search history.

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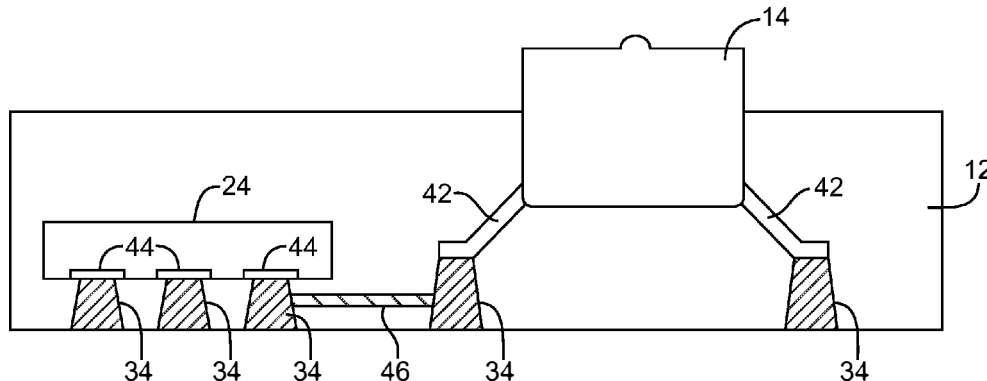
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(57) **ABSTRACT**

Printed circuit boards are provided with embedded components. The embedded components may be mounted within recesses in the surface of a printed circuit board substrate. The printed circuit board substrate may have grooves and buried channels in which wires may be mounted. Recesses may be provided with solderpads to which the wires may be soldered or attached with conductive adhesive. An integrated switch may be provided in an opening within a printed circuit board substrate. The integrated switch may have a dome switch member that is mounted within the opening. A cover member for the switch may be formed from a flexible layer that covers the dome switch member. Terminals for the integrated switch may be formed from conductive structures in an interior printed circuit board layer. Interconnects may be used to electrically connect embedded components such as switches, integrated circuits, solder pads for wires, and other devices.

**19 Claims, 21 Drawing Sheets**



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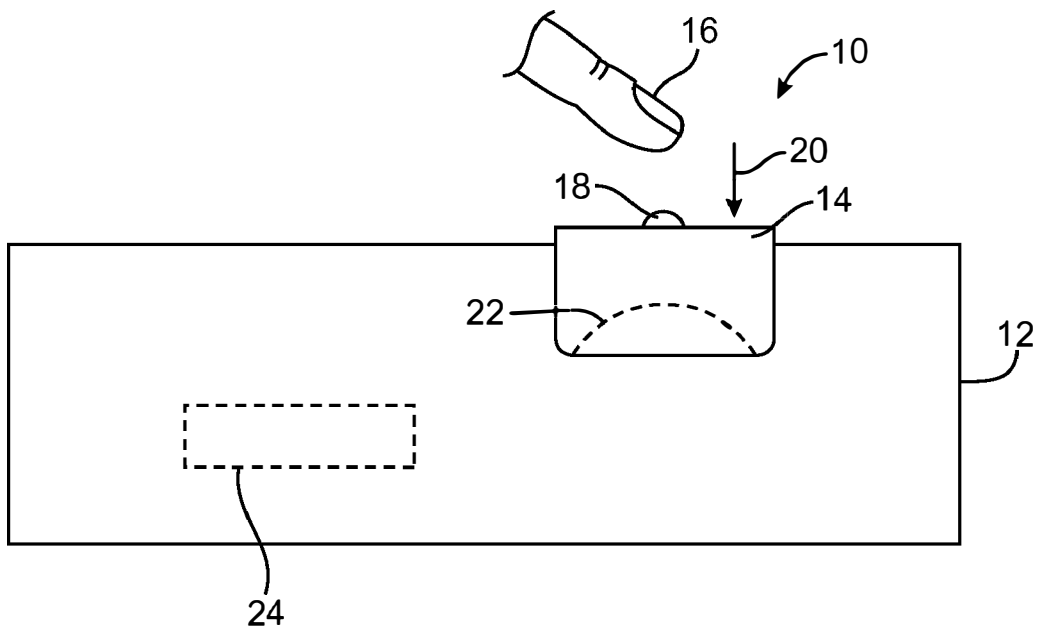


FIG. 1

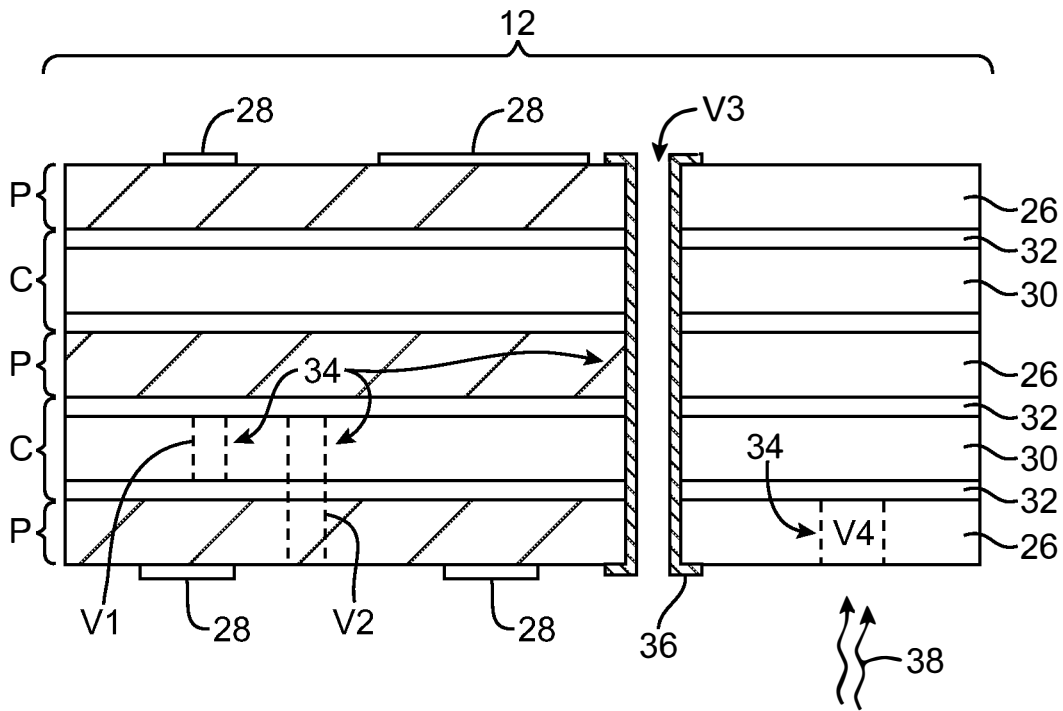


FIG. 2

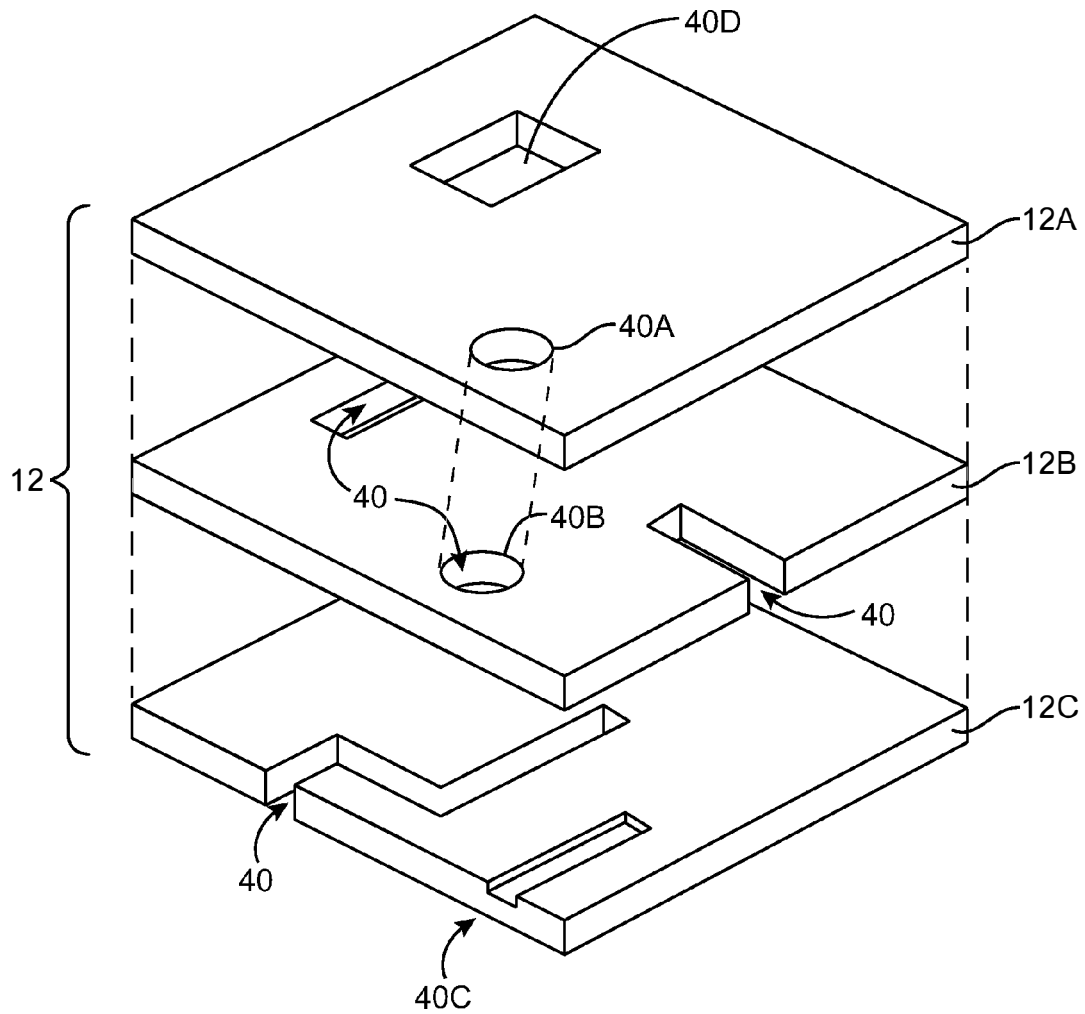


FIG. 3

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