



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

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(54) **FLASH-DRAM HYBRID MEMORY MODULE**

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Exhibit, Decision Denying Institution of Inter Partes Review, *Smart Modular Technologies, Inc. v. Netlist, Inc.*, Case No. 4:13-cv-05889-YGR Document 309-3, filed Mar. 17, 2015, 23 pages.

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(57) **ABSTRACT**

In certain embodiments, a memory module includes a printed circuit board (PCB) having an interface that couples it to a host system for provision of power, data, address and control signals. First, second, and third buck converters receive a pre-regulated input voltage and produce first, second and third regulated voltages. A converter circuit reduces the pre-regulated input voltage to provide a fourth regulated voltage. Synchronous dynamic random access memory (SDRAM) devices are coupled to one or more regulated voltages of the first, second, third and fourth regulated voltages, and a voltage monitor circuit monitors an input voltage and produces a signal in response to the input voltage having a voltage amplitude that is greater than a threshold voltage.

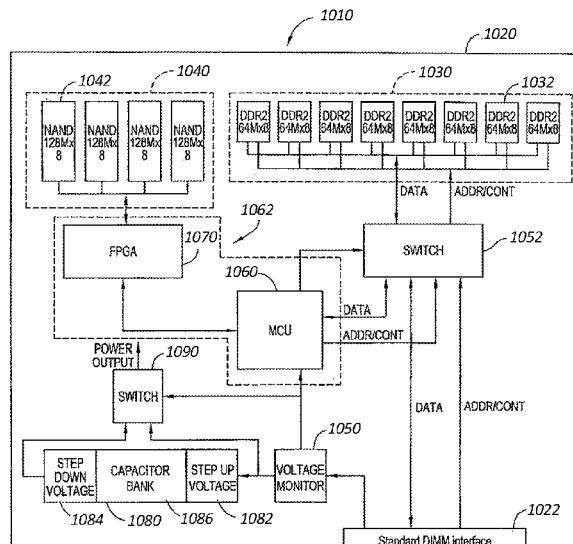
(52) **U.S. Cl.**

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 See application file for complete search history.

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