

THIS OPINION WAS NOT WRITTEN FOR PUBLICATION

The opinion in support of the decision being entered today was not written for publication in a law journal and is not binding precedent of the Board.

Paper No. 18

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte LARRY D. WEBSTER and EHUD PARDO

Appeal No. 1997-2057
Application No. 08/287,670

ON BRIEF

Before THOMAS, KRASS, and GROSS, Administrative Patent Judges.
GROSS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 7 through 9, which are all of the claims pending in this application.

Appellants' invention relates to a power management apparatus for controlling the use of electrical energy in an internal functional circuit. The apparatus includes a variable power source for passing a low (or reduced) voltage

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to the functional circuit when the functional circuit ceases to perform its useful function such that power is saved while information stored in the integrated circuit is retained. The apparatus also

includes I/O switches which protect the integrated circuit against externally induced latch-up and provide for the effective electrical isolation of the internal functional circuit from external circuitry. Claim 7 is illustrative of the claimed invention, and it reads as follows:

7. A power management apparatus for regulating the use of electrical energy in an internal functional circuit, the power management apparatus comprising:

an integrated circuit substrate whereon electrical circuits which perform the functions of 1) the internal functional circuit, 2) a variable power source means, and 3) a switching means are constructed, wherein electrical power is controllably passed from an external power supply through the variable power source means to the internal functional circuit, wherein one or more first electrical signals are controllably passed between an external functional circuit and the internal functional circuit via the switching means, and wherein a second externally generated electrical signal controls the value of the electrical power output by the variable power source means via a first control input of the variable power source means and further controls the coupling action in the switching means via a second control input of the switching means,

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the integrated circuit substrate being a means for constructing and interconnecting electrical circuits,

the internal functional circuit being a means for performing an electrical function,

the variable power source means for converting a voltage within a specified range of values present at the a power input terminal to a first electrically selectable voltage with a specified range of values at a power output terminal in response to the assertion of said second externally generated electrical signal, the power input terminal being connected to said external power supply and the power output terminal being connected to one or more power input networks of the internal functional circuit,

and for converting the voltage within a specified range of values present at the power input terminal to a second electrically selectable voltage with a specified range of values

at the power output terminal in response to the deassertion of said second externally generated electrical signal, the power input terminal being connected to said external power supply and the power output terminal being connected to one or more power input networks of the internal functional circuit, the second electrically selectable voltage being of a value less than the first electrically selectable voltage,

the switching means for coupling said first electrical signals passed between the external functional circuit and the internal functional circuit in response to the assertion of said second externally generated electrical signal,

and for uncoupling said first electrical signals passed between the external functional circuit and the internal functional circuit in response to the deassertion of said second externally generated electrical signal,

the improvement allowing the management of power to be distributed and decentralized onto the individual integrated circuit substrate where the application of power is to be

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managed, and allowing the retention of information stored in the integrated circuit when the integrated circuit is operated in a reduced power mode, and allowing submicrosecond recovery of internal functional circuit function upon the assertion of the second externally generated electrical signal.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Chase et al. (Chase) 1986	4,593,349	Jun. 03,
Itano et al. (Itano) 1990	4,906,862	Mar. 06,
Takada 1990	4,950,921	Aug. 21,
Bolan et al. (Bolan) 1990	4,952,817	Aug. 28,
Faucher et al. (Faucher) 04, 1995	5,404,543	Apr.

(filed May 29, 1992)

Claims 7 through 9 stand rejected under 35 U.S.C. § 103 as being unpatentable over Takada in view of Bolan and Faucher, and further in view of Itano for claim 8 or Chase for claim 9.

Reference is made to the Examiner's Answer (Paper No. 17, mailed January 7, 1997) for the examiner's complete reasoning in

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support of the rejections, and to appellants' Brief (Paper No. 16, filed November 25, 1996) for appellants' arguments thereagainst.

OPINION

We have carefully considered the claims, the applied prior art references, and the respective positions articulated by appellants and the examiner. As a consequence of our review, we will reverse the obviousness rejections of claims 7 through 9.

The examiner states (Answer, page 4) that "Takada teaches all the elements of applicant's invention with the exception of switching the I/O pins off and on, and the power management function." According to the examiner (Answer, page 4), Takada discloses in Figure 3 an internal functional circuit 2'-1 and a variable power source means composed of internal voltage generator 4 and bypass switch circuit Q2. The variable power source passes power from an external power supply 11 to the functional circuit. The variable power source passes two different voltages depending on the value of external control signal $\emptyset C$. The examiner asserts (Answer, pages 4-5) that Bolan teaches using I/O pin isolation to prevent electrical leakage and substrate pumping when a low or non-powered

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circuit is connected to a fully powered circuit, and that Faucher teaches power management by individually reducing voltage supplied to various circuits to reduce power consumption while preventing data loss.

The examiner concludes that it would have been obvious to combine the teachings of Bolan and Faucher with the disclosure of Takada for the missing limitations to reject independent claim 7.

Appellants set forth numerous arguments, only two of which we will discuss. In particular, appellants first contend (Brief, pages 13-18) that Takada fails to disclose the claimed variable power source means, since the output is always a single voltage rather than the claimed range of voltages. Appellants allege (Brief, page 13) that Takada's elements form a voltage regulator rather than a variable power source because of the single voltage output. Second, appellants argue (Brief, pages 23-24) that there is no suggestion in the references that any of the elements of Takada could or should be used for the purpose of power management.

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As to the first argument, the examiner merely states (Answer, page 8) that "the claim recites ... such things as a variable power source, an internal functional circuit, an external signal, etc. These are all found in Takada." Nowhere does the examiner address appellants' argument that Takada outputs a single voltage rather than a range of voltages and therefore is a voltage regulator instead of the claimed variable power source. Further, we find nothing in Takada that discloses an output of a range of voltages.

Regarding appellants' second argument, we agree that there is no suggestion to combine the references. Takada's functional circuit normally operates at a low voltage level, typically 3.5 volts, to protect the transistors therein. Takada's internal voltage generator (which the examiner equates to the claimed variable power source) allows a higher voltage of 5 volts to be applied to the functional circuit for an acceleration test for the semiconductor integrated circuit. Power management according to Faucher involves lowering the voltage for the functional circuit from 5 volts to 3.3 volts,

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for example, when the functional circuit is not being used (see column 7, lines 24-28).

As explained above, Takada applies a high voltage of 5 volts to the functional circuit only when running the acceleration test. At such time, the voltage must remain high, or rather cannot be reduced in accordance with the teachings of Faucher. "[A] proposed modification [is] inappropriate for an obviousness inquiry when the modification render[s] the prior art reference inoperable for its intended purpose. In re Gordon, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984)." In re Fritch, 972 F.2d 1260, 1265-1266 n. 12, 23 USPQ2d 1780, 1783 n. 12 (Fed. Cir. 1992). During the normal operating mode, the voltage is already low at around 3.5 volts. Consequently, in the normal operating mode, the power does not need to be reduced in accordance with the teachings of Faucher. Therefore, the skilled artisan would

not have found it obvious to combine Faucher's power management with Takada's system. Although Bolan also discusses power management, as set forth above it would not have been obvious to practice power management with Takada's

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system. Accordingly, we cannot sustain the rejection of claim 7.

As to claims 8 and 9, which depend from claim 7, neither Itano nor Chase cures the deficiencies of the Takada, Bolan, Faucher combination. Therefore, we must reverse the rejections of claim 8 and 9 as well.

CONCLUSION

The decision of the examiner rejecting claims 7 through 9 under 35 U.S.C. § 103 is reversed.

REVERSED

JAMES D. THOMAS)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
ERROL A. KRASS)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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