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Datasheet for the decision of 9 May 2012

Case Number: T 0896/11 - 3.5.06

Application Number: 07014617.0

Publication Number: 1887462

IPC: G06F 9/44

Language of the proceedings: EN

Title of invention:
Semiconductor device, memory circuit, and machine language program generation device, and method for operating semiconductor device and memory circuit

Applicant:
Semiconductor Energy Laboratory Co., Ltd.

Headword:
Conversion of executable code/SEMICONDUCTOR ENERGY LABORATORY

Relevant legal provisions:
EPC Art. 83, 84
EPC R. 43(3)

Keyword:
"Clarity (main request and first and fourth auxiliary request) - no"
"Sufficient disclosure (second and third auxiliary request) - no"

Decisions cited:
-

Catchword:
-

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Case Number: T 0896/11 **-** 3.5.06

D E C I S I O N
of the Technical Board of Appeal 3.5.06
of 9 May 2012

Appellant: (Applicant)
Semiconductor Energy Laboratory Co., Ltd.
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Representative:
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Decision under appeal:
Decision of the Examining Division of the European Patent Office posted 13 October 2010 refusing European patent application No. 07014617.0 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: D. H. Rees
Members: G. Zucka
M.-B. Tardo-Dino

Summary of Facts and Submissions

I. The appeal is against the decision by the examining division, with written reasons dispatched on 13 October 2010, to refuse European patent application 07014617.0 on the basis that the claims in the main request and auxiliary request 3 did not satisfy the requirements of Articles 84 EPC and the claims in the auxiliary requests 1 and 2 did not satisfy the requirements of Articles 84 and 123(2) EPC.

II. A notice of appeal was received on 21 December 2010, the appeal fee being paid on the same day. A statement of the grounds of the appeal was received on 22 February 2011.

III. The appellant requested that the decision of the first instance be set aside, compliance with the requirements of Article 84 and 123(2) EPC of the claims of the main request as refused or of auxiliary request 1 or 2 as filed with the grounds for the appeal be acknowledged, and the case be remitted to the first instance for further prosecution. The appellant made a conditional request for oral proceedings.

IV. The board issued a summons to oral proceedings. In an annex to the summons, the board set out its preliminary opinion on the appeal, *viz.* that none of the requests satisfied the requirements of Article 84 EPC and that, in addition, auxiliary request 1 did not satisfy the requirements of Article 123(2) EPC. The question of compliance with Article 83 EPC was also raised.

V. In response to the summons, the appellant filed a new main request and auxiliary requests 1-4, replacing all previously filed requests.

VI. The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of the claims of the main request or one of the auxiliary requests 1 to 4 as submitted with the letter received on 3 April 2012, and a description and drawings to be adapted if necessary.

VII. Claim 1 of the main request reads as follows:

"A machine language program generation device (221) comprising:

means (300) for decomposing a high-level language program into a token sequence;

means (301) for building a syntax tree by analyzing the token sequence;

means (302) for converting the syntax tree into an intermediate language;

means (303) for converting the intermediate language into an executable code;

means (304) for analyzing the executable code to create an analysis result; and

means (305) for converting the executable code using the analysis result"

VIII. Claim 1 of the auxiliary request 1 differs from claim 1 of the main request in that it ends as follows:

"...means (305) for converting the executable code **into a machine language program** using the analysis result"

IX. Claim 1 of the auxiliary request 2 differs from claim 1 of the auxiliary request 1 in that the following part is added at the end:

"**, and being configured for optimizing the executable code with respect to power consumption of a random access memory to which data obtainable by executing the machine language program are written**"

X. Claim 1 of the auxiliary request 3 differs from claim 1 of the main request in that the part at the end reads as follows:

" means (304) for analyzing the executable code **with respect to a use of a random access memory when executing the executable code** to create an analysis result; and

means (305) for converting the executable code **into a machine language program** using the analysis result, **and being configured for optimizing the executable code with respect to power consumption of the random access memory using random access memory design information**"

XI. Claim 1 of the auxiliary request 4 is the same as claim 1 of the main request of the grounds for the appeal, which was the main request refused by the examining division. It reads as follows:

"A method for operating a semiconductor device, including an arithmetic processing circuit provided with an arithmetic circuit and a control circuit, and a memory circuit provided with a ROM and a RAM having a plurality of banks, wherein the arithmetic processing

circuit and the memory circuit are connected to each other through an address bus and a data bus, comprising the steps of:

executing a machine language program stored in the ROM using the arithmetic processing circuit which applies a stack method to the RAM;

dividing processing data obtained by executing the machine language program into a plurality of stacks, which data are to be written to the plurality of banks, wherein the stacks correspond to respective addresses of the RAM, and

wherein, in the plurality of stacks, a stack of which data is not read until the machine language program is terminated is omitted, and stacks with contiguous writing are written to the same bank"

XII. At the end of the oral proceedings, the chairman announced the board's decision.

Reasons for the decision

1. *Admissibility of the appeal*

In view of the facts set out at points I and II above, the appeal is admissible, since it complies with the EPC formal admissibility requirements.

2. *Admissibility of newly filed requests*

The appellant explained during the hearing that the main request and auxiliary requests 1-3 were filed in reply to the communication sent by the board of appeal in advance of the oral proceedings. He further argued

that the subject-matter of the claims had been in the debate before the examining division and that, at that time, no clarity or Article 83 EPC objections had been raised against them.

The board accepted the main and auxiliary requests 1-3, as they were fair attempts to overcome the objections raised in its communication, they fell within the scope of the appeal because they were already part of the examining proceedings, and their admission at this stage did not result in any delay of the proceedings.

As to auxiliary request 4, filed with the grounds of appeal as the then main request, it does not follow the more usual arrangement of putting the request refused by the examining division first. The board, however, saw no procedural objection to accepting the new ranking of the requests, which the appellant considered more helpful for its case given the negative preliminary opinion on said request expressed in the board's communication.

3. *Main request and auxiliary request 1*

Claim 1 of the main request and of auxiliary request 1 does not contain all the essential features of the invention. The declared purpose of the invention is to reduce memory power consumption. Claim 1, however, does not contain any features that could result in a reduced power consumption. Admittedly, it could be envisaged that, somehow, analysing executable code and converting it into a machine language program using the analysis result *could* result in a machine language program that requires less power for the memory circuits used by the

program. However, the claim does not specify what kind of analysis should be carried out and how the executable code should be converted using the analysis result in order to achieve the desired power saving, *i.e.* it does not specify the features necessary to solve the alleged problem. In fact, even the description and drawings contain no indication that would enable the skilled person to achieve reduced memory power consumption for all possible kinds of executable code (see reasoning below for auxiliary request 2) but even if they did, it is a requirement of Rule 43(3) in combination with Article 84 EPC that the independent claims contain all the essential features of the invention. As this is not the case for the main request and for auxiliary request 1, they do not satisfy the requirements of Article 84 and Rule 43(3) EPC.

4. *Auxiliary requests 2 and 3*

The application as a whole does not disclose the invention in a manner sufficiently clear and complete for the skilled person to carry out the invention over the entire scope covered by the wording of claim 1 of the auxiliary requests 2 or 3. The skilled person will, indeed, not be able, using only the information in the application and his/her general knowledge, to implement means that will optimise all possible kinds of executable code with respect to RAM power consumption. The application gives one example of a sequence of memory writes being moved so that they all occur in one memory block, rather than straddling two blocks - see Figs. 12 and 14 and paragraphs [0052] to [0056]. However, the explanation given in the description of

the analysis which leads to this move is incomprehensible and the representative's argument that the skilled person could supply the necessary analysis from the common general knowledge in the field was, with neither explanations nor evidence to back it up, unconvincing.

Moreover, even if the appellant had succeeded in providing an explanation of an appropriate analysis for this one example, this would not of itself be sufficient to satisfy the requirements of Article 83 EPC, since the claim does not place any restrictions on the nature of the code concerned. To take one example, which was given in the appealed decision (section 6.2), if the executable code contains control flow instructions, it is not plausible that the procedure which the appellant attempted to describe in figure 12 and the corresponding passage in the description (paragraphs [0052]-[0053]) or, indeed, any procedure that the skilled person could come up with using only the information in the application and his/her general knowledge would produce an analysis result that could be used to optimise the executable code effectively, as the use of "stack elements" would, in general, be different on each program run. Therefore, the auxiliary requests 2 and 3 do not satisfy the requirements of Article 83 EPC.

5. *Auxiliary request 4*

Claim 1 of the auxiliary request 4 is not clear. In particular, the board agrees with the examining division that the term "stack" as used in the claim, is not clear. It is apparent that the term "stack" in the

claim does not necessarily have the meaning which it normally has in the field of computers, *i.e.* "a set of registers or storage locations which store data in such a way that the most recently stored item is the first to be retrieved" (Shorter Oxford English Dictionary, fifth edition, ISBN 0-19-860575-7). In the description, the term "stack" is used not only in this standard sense, but also in two further ways. Firstly, it refers to a segmentation of fixed size (whether logical or physical is not clear) of the "banks" - see *e.g.* description page 9, lines 24-31. Secondly, it also refers to a single element of what is called a "stack" according to one of the other definitions. See, for example, page 10, lines 15-17: "Therefore, when the machine language program 200 is executed, the arithmetic circuit uses subsequent *stacks of the first stack* 204 of the first bank 201 to store the processing data 210". See also the passage referred to in the appealed decision, *i.e.* page 17, lines 9-11: "1 and 2 are put into *stacks*". Another such passages is on page 17, lines 20-22: "3 and 2 are put into stacks". Whereas it could be argued, as did the appellant in the grounds for the appeal, that the use of the plural form in the latter two passages is the result of a linguistic error, this is certainly not the case for the first passage, where the term "stack" is clearly intended to have two different meanings, at least one of which not being the standard meaning. From the wording of claim 1, it is not apparent which of the meanings of the term "stack" appearing in the description is intended to be the meaning of the term as it appears in the claim.

This and a number of other objections of lack of clarity of claim 1 were put to the appellant in the

summons to oral proceedings. No counter-arguments were produced, either in writing or at the hearing.

The auxiliary request 4, therefore, does not satisfy the requirements of Article 84 EPC.

6. *Conclusion*

None of the appellant's requests are allowable.

Order

For this reason it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

B. Atienza Vivancos D. H. Rees