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**Datasheet for the decision
of 30 November 2012**

Case Number: T 1034/11 - 3.5.02

Application Number: 05726128.1

Publication Number: 1728329

IPC: H03M 1/06

Language of the proceedings: EN

Title of invention:

Reduced complexity nonlinear filters for analog-to-digital
converter linearization

Applicant:

Netlogic Microsystems, Inc.

Opponent:

-

Headword:

-

Relevant legal provisions:

EPC Art. 109(1), 113(1)

EPC R. 103(1)(a)

Keyword:

"Right to be heard - no"

"Reimbursement of the appeal fee"

Decisions cited:

-

Catchword:

-



Case Number: T 1034/11 - 3.5.02

D E C I S I O N
of the Technical Board of Appeal 3.5.02
of 30 November 2012

Appellant: Netlogic Microsystems, Inc.
(Applicant) 3975 Freedom Circle, Suite 900
Santa Clara, CA 95054 (US)

Representative: Bosch, Matthias
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 22 December 2010
refusing European patent application
No. 05726128.1 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman: M. Ruggiu
Members: M. Rognoni
R. Moufang

Summary of Facts and Submissions

- I. The applicant (appellant) appealed against the decision of the examining division refusing European patent application No. 05 726 128.1.
- II. According to the decision under appeal (Section II. "REASONS FOR THE DECISION"), the amended claim 1 filed at the oral proceedings included subject-matter which extended beyond the content of the application as originally filed and thus did not comply with the requirements of Article 123(2) EPC.
- III. In the contested decision, under the heading "III. FURTHER REMARKS", the examining division raised, *inter alia*, the following objections:
- the subject-matter of claim 1 was not sufficiently disclosed and hence did not fulfil the requirements of Article 83 EPC;
 - claims 8 and 18 introduced subject-matter which violated Article 123(2) EPC;
 - claims 2, 4 to 18 violated Article 84 EPC;
 - as far as understood, claim 18 was not new over D3 (Article 54 EPC);
 - notwithstanding the lack of clarity objection, the subject-matter of claims 1 and 8 did not involve an inventive step with respect to D3 in combination with common general knowledge known from D2 and D7 (Article 56 EPC).

The cited documents refer to the following prior art:

D2: Hummels D. M. *et al.*: "Using adjacent sampling for error correcting analog-to-digital converters", Proceedings of the International Symposium on Circuits and Systems San Diego, May 10 - 13, 1992, Proceedings of the International Symposium on Circuits and Systems, (ISCAS), New York, IEEE, US, vol. 4, CONF. 25, 3 May 1992, pages 589-592, XP010061267;

D3: US-B1-6 351 227;

D7: A. Bernieri *et al.*: "ADC Neural Modeling", IEEE Transactions on Instrumentation and Measurement, vol. 45, no. 2, April 1996, pages 627-633, XP011024018.

IV. With the statement of grounds of appeal dated 2 May 2011, the appellant filed new claims according to a Main Request and a First Auxiliary Request and submitted a Second Auxiliary Request for oral proceedings.

Additionally, the appellant alleged that the following procedural violations had occurred in the examination proceedings:

(a) the applicant had no opportunity to consider a new document (D7) which was cited for the first time in the reasons for the decision;

- (b) a new objection under Article 83 EPC was raised for the first time at the oral proceedings before the examining division;
- (c) an amendment directed at removing a feature which the examining division considered as not disclosed in the filed application was refused.

V. In the second paragraph of a communication sent to the appellant on 4 April 2012, the Board expressed the following opinion:

- *"Having considered the appellant's submissions, the prosecution of the case by the examining division and, in particular, the fact that the present main request seems to overcome the only actual ground given in the contested decision for refusing the applicant's main request, the Board considers that, under the present circumstances, it would be appropriate to set aside the decision under appeal, to remit the case to the department of first instance for further prosecution on the basis of the appellant's main request and to order the reimbursement of the appeal fee."*

Furthermore, the Board asked the appellant to specify whether they agreed with the proposed outcome of the appeal.

VI. With a letter dated 17 April 2012, the appellant's representative replied to the Board's communication as follows:

- *"Further to your communication dated April 04 2012, I am writing to confirm that I accede to the proposals set out in paragraph two relating to the findings of the Board of Appeal".*

VII. Claim 1 according to the appellant's main request filed with the statement of grounds of appeal reads as follows:

"A method of converting an input analog signal (v) to a compensated digital signal (208), comprising:

converting the input analog signal (v) to an uncompensated digital signal (y_n),

which includes an ideal digital signal (v_n) and a distortion component (η_n);

sampling the ideal digital signal (v_n) using a plurality of sampling clocks (ph_1 ; ph_2 ; ph_n) having phase offsets relative to a phase zero clock (ph_0) to generate a plurality of fractional phase samples;

using the uncompensated digital signal (y_n) and the plurality of fractional phase samples as inputs to a distortion correction module (420) to generate a modeled distortion signal (η_n)

subtracting the modelled distortion signal (η_n) from the uncompensated digital signal (y_n) to generate a compensated digital signal (\ddot{u}_n);

wherein the distortion correction module (420) implements a transfer function that is a function of a

vector (Y_n) of the uncompensated digital signal (y_n), and includes nonlinear coefficients that are time variant nonlinear functions of the vector (Y_n) which includes integral samples, fractional samples and/or derivatives of the uncompressed digital signal (y_n)."

Claims 2 to 5 are dependent on claim 1.

Claim 6 reads as follows:

"A distortion compensating analog to digital converter (ADC), comprising means for implementing the method of any one of claims 1 to 5."

Claims 7 and 8 are dependent on claim 6.

Claim 9 reads as follows:

"A computer program product for converting an input analog signal (v) to a compensated digital signal (\ddot{u}_n), the computer program product being embodied in a computer readable medium and comprising computer instructions for executing the method of any one of claims 1 to 5."

The claims according to the First Auxiliary Request are not relevant to the Board's decision.

VIII. The appellant's arguments relevant to the decision can be summarised as follows:

The examining division had objected that the phrase "*by transformation of the ideal digital signal*" added subject-matter to the original application. This phrase

was deleted from the claims in all of the current requests thus obviating the objection.

D7 was cited for the first time in the reasons for the decision. The applicant had thus been given no opportunity to consider this document, to comment on its relevance during the examination procedure, to have any such comments taken into account in the decision reached by the examining division, or to have any such comments incorporated into the public file. In fact, the examiner's comments regarding D7 had unilaterally become part of the public file without any opportunity being given to the applicant to comment without paying the considerable appeal fee. This should be considered a procedural violation since it put the applicant at a disadvantage. In any case, it was inequitable and totally unjustified for a further search to be conducted by the examiner after the oral proceeding.

Apart from the late citation of D7, an objection under Article 83 EPC was raised for the first time at the oral proceedings held before the examining division. It seemed that up to that date the examining division had considered the requirements of Article 83 EPC to be met. The technology involved in this subject matter was highly specialised and, if this objection had been raised at a much earlier stage, the applicant's representative would have had the opportunity to obtain supporting technical background or evidence that a skilled person would find the disclosure sufficient.

Furthermore, during the oral proceedings, the examining division alleged that the claims of the application were so unclear that they could not determine the scope

of the invention claimed until after certain amendments had been made during the oral proceedings (cf. paragraph 17 of the decision). However, the examining division had apparently understood the invention well enough to conduct the supplementary European search in 2007 and in fact the first examination report dated May 2007 declared clarity objections only against dependent claims. The first examination report did raise a novelty objection and the examiner at that time evidently had a sufficient understanding of the invention to be able to identify all the features in a prior art document.

The objection of added subject-matter, which ultimately was the reason for refusal of the application, was raised solely against an amendment to claim 1 made during the oral proceedings. The representative, while believing that there was basis for the amendment, nonetheless immediately requested removal or amendment of the phrase which gave rise to the objection. However, the request was refused on the alleged basis that ample opportunity had already been provided for amendments.

Such a refusal was inequitable because the deletion of the offending phrase would have immediately overcome the added subject-matter objection. It was also procedurally inefficient because the refusal had the direct effect that it was necessary for the applicant to file an appeal. Removal of the feature from the claim would have immediately removed this ground of refusal and therefore should have been allowed in the course of the oral proceedings.

In summary, several procedural violations had occurred in the prosecution of this application and, moreover, the EPO had failed to abide by the well established principle of good faith.

Reasons for the Decision

1. The appeal is admissible.
- 2.1 As stated in Section II., paragraph 13 of the contested decision, the amendment filed during the oral proceedings of 19 November 2010 introduced subject-matter which extended beyond the content of the application as filed. In particular, the examining division found that the following feature did not comply with Article 123(2) EPC:
 - *"using the uncompensated digital signal (y_n) and the plurality of fractional phase samples as inputs to a distortion correction module (420) to generate a modelled distortion signal by transformation of the ideal digital signal (v_n)".*

According to the examining division, paragraph [0029] of the description, which the applicant had cited in support of the above amendment, related to the transformation of the ideal digital signal v_n by the function $1 + \eta_n$, whereby η_n referred to the distortion function and not to the modelled distortion signal.

In paragraph 14 of the decision, the examining division concluded that, since the application did not meet the requirements of the EPC, the application was refused.

2.2 Claim 1 according to the appellant's main request differs from claim 1 considered in the contested decision in that the expression *"by transformation of the ideal digital signal"* has been removed. The amended claim submitted with the ground of appeal is thus clearly directed to overcoming the only objection raised in section II. ("REASONS FOR THE DECISION") of the decision for refusing the application.

2.3 Dependent claims 2 to 5 according to the appellant's main request correspond essentially to former claims 4 and 7 to 9, respectively, with the only difference that the wording *"distortion modeling filter"* has been replaced by *"distortion correction module"*.

3.1 Under the heading "FURTHER REMARKS" in Section III. of the decision, the examining division raised further objections under Articles 54, 56, 83 and 84 EPC against the patentability of the application.

3.2 With reference to the following feature of claim 1:

- *"the distortion correction module (420) implements a transfer function that is a function of a vector (Y_n) of the uncompensated digital signal (y_n) , and includes nonlinear coefficients that are time variant nonlinear functions of the vector (Y_n) which includes integral samples, fractional samples and/or derivatives of the uncompensated digital signal (y_n) ",*

the examining division objected in paragraph 17.1 of the decision that the application as originally filed

did not disclose at least a way to obtain such nonlinear coefficients as time variant nonlinear functions of the vector. Hence, the application did not comply with the requirements of Article 83 EPC.

- 3.3 Furthermore in paragraph 21.3.1, the examining division observed that the subject-matter of claim 1 differed from D3 in that the distortion correction module implemented a transfer function which was a function of a vector of the uncompensated digital signal, and included nonlinear coefficients that were time variant nonlinear functions of the vector which included integral samples, fractional samples and/or derivatives of the uncompensated digital signal.

Hence, the problem to be solved by the present application could be regarded as how to provide a low complexity alternative for compensating the nonlinear distortion of an analogue-to-digital converter (see paragraph 21.3.2 of the decision).

In paragraph 21.3.3, it was then concluded that the use of correction modules which took into account integral samples, fractional samples and/or derivatives of the uncompensated digital signal was already known in the art. To support this view, the examining division referred to D2 and to a document (D7), which had "*been found in a further search*".

According to paragraph 21.3.4, the skilled person, when confronted with the above-mentioned problem, would include the common knowledge known from either D2 or D7 in order to determine the nonlinear coefficients of the

transfer function, thus arriving at the subject-matter of claim 1 without an inventive step.

Consequently claim 1 was found not to be allowable for lack of inventive step of its subject-matter (Article 56 EPC).

3.4 In summary, the examining division arrived at the conclusion that the application as originally filed did not comply with Article 83 EPC because it did not disclose how to obtain the nonlinear coefficients referred to in claim 1. On the other hand, in its argumentation against inventive step, the examining division considered that the same feature, which was regarded as not sufficiently disclosed in the application, belonged to the skilled person's general knowledge. By combining D3 with this general knowledge, the skilled person would have arrived at the claimed subject-matter without involving an inventive step.

4.1 Apart from the evident incongruity between the arguments given in the contested decision to support the lack of disclosure (Article 83 EPC) and the lack of inventive step (Article 56 EPC), the only objection that appears to have been raised at the oral proceedings after the applicant had submitted an amended claim 1 ("main request II") related to the lack of disclosure of a particular feature of this claim (see item 24 of the minutes of the oral proceedings). Indeed, the format of the decision appears to confirm that the only reason for refusing the application was the lack of compliance of the amended claim 1 with the requirements of Article 123(2) EPC.

4.2 As pointed out above, claim 1 according to the appellant's main request no longer includes the offending feature and thus overcomes the Article 123(2) EPC objection given in the contested decision as ground for refusing the application.

5.1 According to the case law of the boards of appeal, an appeal by an applicant of the European patent is to be considered well founded within the meaning of Article 109(1) EPC if the main request of the appeal includes amendments which clearly meet the objections on which the examining division's decision to refuse the application was based. In such a case the department that issued the contested decision must rectify the decision. Irregularities other than those that gave rise to the contested decision do not preclude rectification of the decision (cf. Case Law of the Boards of Appeal of the EPO, VII.E.13.1).

5.2 Despite the fact that the objection under Article 123(2) EPC given as reason for refusing the application had been overcome by claim 1 according to the main request, the examining division decided not to grant the interlocutory revision under Article 109(1) EPC. This appears to imply that the other objections raised in section III. of the decision were regarded as being integral part of the reasons for refusing the application and that these objections had not been met by the appellant's main request.

5.3 However, when a decision is based on several grounds supported by respective arguments and evidence, it is of fundamental importance that the decision as a whole meets the requirements of Article 113(1) EPC. The fact

that the appellant had no opportunity to comment on all the grounds on which the decision appears to have been based constituted a substantial procedural violation within the meaning of Article 113(1) and Rule 103 EPC.

5.4 For these reasons the decision under appeal must be set aside and the case remitted to the department of first instance for further prosecution.

5.5 In these circumstances, it is equitable to order the reimbursement of the appeal fee in accordance with Rule 103(1) (a) EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Department of first instance for further prosecution.
3. The appeal fee is to be reimbursed.

The Registrar:

The Chairman:

U. Bultmann

M. Ruggiu