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# Datasheet for the decision of 17 November 2009

**Case Number:** T 0392/07 - 3.4.03

**Application Number:** 98922427.4

**Publication Number:** 1004142

**IPC:** H01L 23/544

**Language of the proceedings:** EN

**Title of invention:**
Method and apparatus for identifying integrated circuits

**Applicant:**
Micron Technology, Inc.

**Opponent:**
-

**Headword:**
-

**Relevant legal provisions:**
-

**Relevant legal provisions (EPC 1973):**
EPC Art. 56

**Keyword:**
"Inventive step: denied - yuxtaposition of features"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0392/07 - 3.4.03

# D E C I S I O N
**of the Technical Board of Appeal 3.4.03**
**of 17 November 2009**

**Appellant**: Micron Technology, Inc.
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**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted 1 September 2006 refusing European application No. 98922427.4 pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** G. Eliasson
**Members:** V. L. P. Frank
P. Mühlens

## Summary of Facts and Submissions

I. This is an appeal from the refusal of application 98 922 427 for lack of inventive step (Article 56 EPC 1973).

II. At oral proceedings before the board, the appellant applicant requested that the decision under appeal be set aside and that a patent be granted on the basis of the main or one of the 1st, 2nd or 3rd auxiliary requests filed with the statement of grounds of appeal or of the 4th or 5th auxiliary requests filed with letter of 15 October 2009.

III. Claim 1 of the main request reads:

"1. A method of identifying an integrated circuit (10), comprising the steps of:
programming the integrated circuit (10) with an electronic identification information; and
marking the integrated circuit (10) with a machine-readable optical identification code (15; 15A) which corresponds with the electronic identification information."

Claim 1 of the 1st auxiliary request reads:

"1. A method of identifying an integrated circuit (10) accomodated in a housing (20), comprising the steps of:
programming the integrated circuit (10) with an electronic identification information; and

marking the housing (20) with an optical identification code (15; 15A) which corresponds with the electronic identification information."

Claim 1 of the 2nd auxiliary request reads:

"1. A method of identifying an integrated circuit (10), comprising the steps of:
programming the integrated circuit (10) with an electronic identification information; and
marking the integrated circuit (10) with an optical identification code (15; 15A) which corresponds with the electronic identification information;
reading the optical identification code (15; 15A); and accessing a look-up table to associate the optical identification code (15; 15A) with the corresponding electronic identification information."

Claim 1 of the 3rd auxiliary request reads:

"1. A method of identifying an integrated circuit (10), comprising the steps of:
programming the integrated circuit (10) with an electronic identification information;
marking the housing (20), in which the integrated circuit (10) is accomodated, with a first optical identification code (15B) positioned on an exterior surface of the housing and corresponding with the electronic identification information; and
further marking the integrated circuit with a second optical identification code (15A)

positioned on the integrated circuit enclosed within the housing and corresponding with the electronic identification information."

Claim 1 of the 4th auxiliary request reads:

"l. A method of identifying an integrated circuit (10), comprising the steps of:
programming the integrated circuit (10) with an electronic identification information uniquely identifying the integrated circuit;
marking the integrated circuit (10) with an optical identification code (15; 15A) which corresponds with the electronic identification information, but encodes not the same data values as the electronic identification information,
reading the optical identification code (15; 15A); and accessing a look-up table to associate the optical identification code (15; 15A) with the corresponding electronic identification information."

Claim 1 of the 5th auxiliary request reads:

"l. A method of identifying an integrated circuit (10), comprising the steps of:
programming the integrated circuit (10) with an electronic identification information uniquely identifying the integrated circuit;
marking the housing (20), in which the integrated circuit (10) is accomodated, with a first optical identification code (15B) positioned on an exterior surface of the housing and corresponding with the electronic identification information;

but which encodes not the same data values as the electronic identification information,
further marking the integrated circuit with a second optical identification code (15A) positioned on the integrated circuit enclosed within the housing and corresponding with the electronic identification information, but which encodes not the same data values as the electronic identification information and is not identical to the first optical identification code, and
accessing a look-up table to associate the first and second optical identification codes (15A, 15B) with the corresponding electronic identification information."

IV. The following documents are mentioned in this decision:

D1: GB 2 244 339 A

D5: US 5 301 143 A

D7: JP 57071151 A & corresponding Patent Abstracts of Japan

D8: US 5 380 998 A

V. The examining division rejected the application, since the claimed method of identifying an integrated circuit was a juxtaposition or aggregation of features known from the prior art and did therefore not involve an inventive step.

VI. The appellant applicant argued essentially as follows:

– Documents Dl or D5 disclosed an integrated circuit having an identification circuit for storing chip identification information. They did not disclose marking either the chip or the package with an optical identification code which corresponded to the electronic identification information stored in the identification circuit. As stated in the present application, there existed a number of manufacturing process steps during which the physical contact required for retrieving the electronically readable identification information did not occur. Hence, a traceable identification of the individual integrated circuit chips through the various manufacturing processes was quite difficult. Thus, starting from document Dl or D5, it was the objective technical problem to create a technique which enabled traceable identification of the individual integrated circuit chips through the various manufacturing process steps. In view of this objective technical problem, none of the cited prior art documents disclosed or anyhow suggested to provide an IC chip or alternatively an IC chip and its housing or package, with both identification information in the form of both of an electronically readable identification information and an optically readable optical information code, which were functionally interrelated such that they corresponded with each other. Rather, in the prior art integrated circuits, only one type of information about the integrated circuit could be obtained by electronically reading the programmed electronic identification information, and another

type of information about the integrated circuit could be obtained by viewing the optical identification code on the integrated circuit package (D7) or the integrated circuit chip (D8).

– Another aspect which emphasized the functional interrelationship between the electronic identification information and the optical identification code according to the invention was that the claimed integrated circuit and method provided greater security than the above mentioned prior art approaches. For example, even if an unauthorized person could electrically read the programmed identifying information and even if that unauthorized person could read the optical identification code, doing so would be of little value unless the unauthorized person knew which optical identification codes corresponded to the electrically programmed identifying information. The use of a look-up table provided this information. Therefore, the ability to provide this information linking the optical identification codes with the electrically programmed identifying information provided an interaction between the optical identification codes and the electrically programmed identifying information, and had a synergistic effect. This effect of functionally interrelated features concerning the combined different types of codes was not addressed in the prior art documents.

## Reasons for the Decision

1. The appeal is admissible.

2. In the application and, for consistency, in this decision the following expressions are used in a slightly unusual manner.

*"Integrated circuit"* (IC) means the semiconductor die with a circuit formed on it, while *"integrated circuit chip"* means the IC accommodated in a housing.

3. *Main request – Inventive step (Article 56 EPC 1973)*

3.1 Document D5 discloses a method of identifying an integrated circuit or die by programming the integrated circuit with an electronic identification information. The data stored may include the date of manufacture, identification of a particular wafer from which the die was obtained or identification of the location of a die on a wafer. This information uniquely identifies the IC (Abstract; column 1, lines 7 to 12 and 26 to 30). Document D5 is also cited in the application as an example for a programmable identification circuit according to the invention (page 4, lines 9 to 12). It is for these reasons that the board considers document D5 as the closest prior art.

3.2 The method of claim 1 differs from the identifying method disclosed in D5 in that the IC is additionally marked with a machine readable optical identification code which corresponds with the electronic identification information.

3.3 The appellant applicant argued that it was the objective technical problem to create a technique which enabled traceable identification of the individual

integrated circuit chips through the various manufacturing process steps (see also the application, page 2, lines 14 to 19). The board understands this statement of the problem as being directed to the identification of the integrated circuits and not to the identification of the integrated circuit chips, as the latter are not a feature of claim 1 and, in particular, since an identification mark on the IC can hardly be seen once the IC is encapsulated in its housing.

3.4 Document D8 discloses a dense bar code, particularly useful in the identification of semiconductor wafers and/or chips in very large scale integrated circuit manufacturing processes where space on chips and wafers is at a premium (Abstract; column 1, lines 17 to 23; column 2, lines 17 to 25 and lines 37 to 40; column 3, lines 37 to 40).

3.5 Documents D5 and D8 hence disclose tools for identifying ICs either electronically, as in D5, or optically, as in D8. They are concerned with the tools themselves, ie how the coding of the information is done in each case. When to use these tools, whether or not to use more than one tool and how to combine these tools when more than one is used, these questions are left open in these documents to the discretion of the skilled person facing a specific situation.

3.6 The board considers that a skilled person, having the task of providing a further identification on the integrated circuit, would use the optical identifier disclosed in D8, as it is an identification method specifically designed for identifying ICs. Both

identifiers, the electronic and the optical, correspond forcefully with each other, as they identify the same object. They are two pointers pointing to the same spot. Thus the functional interrelationship between both markers adduced by the appellant applicant is nothing more than the consequence of both markers identifying the same circuit. The board is unable to imagine how two identifying markers of the same object could not correspond to each other.

The problem allegedly underlying the present invention, namely traceable identification of the individual IC's through the various manufacturing process steps, is independently solved by the electronic and the optical identifiers. They differ in that for reading the former electric contact with the IC is required, while for the latter it is not. A more appropriate formulation of the problem would be therefore allowing contactless traceable identification of the individual IC's. To this problem an optical identification code is a straightforward solution.

3.7 The appellant applicant argued that the use of both identification marks provided a greater security than the prior art approaches and had thus a synergistic effect.

Apart from the fact that the application does not disclose any security concerns, the board is unable to recognize how the security would be improved by providing two points of attack. In order to interpret a code the coding has to be known. This applies to the electronic and optical identifiers of the prior art as much as to the double system of the application. The

board cannot recognize any added security in the claimed identification scheme, since the information encoded in each identifier is revealed when it is decoded. As in the prior art, each identifier encodes the information independently from the other, since one identifier has not to be decoded for accessing the other identifier. The appellant's argument that by decoding only one of the identifiers only a part of the encoded information is revealed is true, but nothing else could have been expected, since by breaking a code only the part of a message encoded with that code is revealed.

3.8 The appellant applicant further argued that the provision of the optical marking allowed identifying the IC even when the electronic information could no longer be accessed due to failure of the circuit. This, however, only underlines the independence of both identifiers and refutes the presence of a synergistic effect.

3.9 In the board's view, the identifying method of claim 1 is an aggregation of features which are in themselves known from documents D5 and D8. Although most inventions are formed by features which are in themselves known from the prior art, for a finding of non-obviousness these features would have to interact with each other to provide something that is more than the sum of the parts. Absent synergy the whole is not more than the sum of its parts, ie an aggregation of features, as correctly objected by the examining division.

3.10 The board judges, for the above reasons, that the method of claim 1 of the main request does not involve an inventive step.

4. *1st auxiliary request - Inventive step (Article 56 EPC 1973)*

4.1 In the identifying method of claim 1 of this request the IC's housing is marked with an optical identification code instead of marking the IC itself.

4.2 The problem addressed has to be therefore slightly reformulated, since the optical marking is not present during the manufacturing of the integrated circuit, ie the pre-packaging phase, but only when the IC has been encapsulated. The traceability of the IC is thus limited to the post-packaging phase of its life.

4.3 Document D7 discloses a machine readable bar code 13 representing the product number which is printed on the housing 11 of an IC for facilitating storing, delivery and automation in a manufacturing line, ie improving the IC's traceability. Besides the product number a product management information such as testing program number, manufacturing apparatus number, testing apparatus number or the like are also printed if necessary (English Abstract; Figures 1 and 2).

4.4 As it was already the case for the main request, the board is unable to recognize any synergy or any increased security by marking the IC electronically and the IC's housing optically. The reasoning on the main request applies as well to the method of claim 1 of the 1st auxiliary request.

4.5 The board judges, for these reasons, that the method of claim 1 of the 1st auxiliary request lacks the required inventive step.

5. *2nd auxiliary request - Inventive step (Article 56 EPC 1973)*

5.1 The method of claim 1 of this request differs from the method of claim 1 of the main request in that the optical identification code is read, and a look-up table is accessed to associate the optical identification code with the corresponding electronic identification information.

5.2 Although the use of a look-up table is not disclosed in any of the cited prior art documents, document D8 mentions that space on chips and wafers is at a premium and that for this reason a high density bar code was developed (Abstract; column 9, lines 2 to 10). It follows that only a very limited amount of information can be put on the IC as optical code. This code is limited to some alphanumeric characters and is the access key to any further information on the IC which has to be retrieved from a look-up table. If this information is electronically stored on the IC then the look-up table will either reproduce it, contain more information than electronically stored on the IC or provide a link to the electronic information. In any case the use of an optical code on an IC requires a lookup-table and the information obtained by accessing the look-up table is forcefully associated with the information stored electronically on the IC.

5.3 From the above the board concludes that access to a look-up table is required when using an optical identification code under severe space limitations and the same is true when using it together with electronic identification information. Under the present circumstances, the use of a look-up table is an implicit feature of an optical identification code on an IC, as the information associated with that code is only revealed through access to a look-up table.

5.4 The method of claim 1 of the 2nd auxiliary request does not involve an inventive step for the above reasons and the reasons advanced in relation to the main request.

6. *3rd auxiliary request - Inventive step (Article 56 EPC 1973)*

6.1 The method of claim 1 of this request is a combination of the methods of the main and the 1st auxiliary request, since the IC's housing is marked with a first optical identification code and the IC is marked with a second optical identification code.

6.2 There are thus three identification marks: the electronic identification information and the 1st and 2nd optical identification codes on the IC's housing and the IC, respectively. As already mentioned when discussing the main and 1st auxiliary requests these identification codes are each known from documents D5, D7 and D8, respectively. For the same reasons as those already presented, the board cannot recognize any synergy between these three identification codes. In particular, as the optical code on the IC can only be accessed in the pre-packaging stage, while the optical

code on the IC's housing can only be accessed in the post-packaging stage.

6.3 The board concludes therefore that the method of claim 1 of the 3rd auxiliary request does not involve an inventive step for the reasons advanced in relation to the main and the 1st auxiliary requests.

7. *4th auxiliary request - Inventive step (Article 56 EPC 1973)*

7.1 The method of claim 1 of this request differs from the method of claim 1 of the 2nd auxiliary request in that (a) the electronic identification information uniquely identifies the IC and (b) that the optical identification code does not encode the same data values as the electronic identification information.

7.2 Feature (a), namely that the electronic information uniquely identifies the IC, is disclosed in document D5, since according to D5 the data may include identification of a particular wafer from which a die was obtained or identification of the location of a die on a wafer (column 1, lines 27 to 30). This feature is therefore covered by the discussion on claim 1 of the 2nd auxiliary request (point 5) and nothing else needs to be added.

7.3 In point 5.2 the need for accessing a look-up table when using an optical identification code was discussed. Space on the IC and on the IC's housing is very limited and only a code identifying the product can be marked optically on either of them. The optical code is used to access a look-up table which reveals the information

on the IC. On the other hand, electronic identification information is stored on the IC and, although space is very valuable on an IC, more information can be stored than what is stored in the optical identification code. It is thus straightforward to the skilled person to record more information electronically on the IC than a mere identification code. The fact that different data values are encoded on the electronic identification information and on the optical identification code is therefore an obvious alternative for the skilled person, the other alternative being the limitation of the electronic identification information to the optical code. Neither one of these two alternatives generates any synergy between the electronic information and the optical code and both are considered by the board as design alternatives available to the skilled person.

7.4 The board finds for these reasons and the reasons advanced in respect of claim 1 of the 2nd auxiliary request that the method of claim 1 of the 4th auxiliary request doe not involve an inventive step.

8. *5th auxiliary request - Inventive step (Article 56 EPC 1973)*

8.1 The method of claim 1 of this request differs from the method of claim 1 of the 3rd auxiliary request in that (a) the electronic identification information uniquely identifies the IC and (b) that the data values of the first optical identification code, the data values of the second optical identification code and the data values of the electronic identification information are all different.

8.2 As already mentioned under point 7.2, document D5 discloses electronic identification information uniquely identifying the IC. Feature (a) is therefore covered by the analysis of claim 1 of the 3rd auxiliary request (point 6).

8.3 As already mentioned under point 7.3 the fact that the data values of the optical identification codes are the same or not as the data values of the electronic identification information are design alternatives available to the skilled person. The optical code applied on the IC can be read during the pre-packaging phase, while the optical code on the IC's housing is visible during the post-packaging phase. They concern different stages of the IC's life and what they encode may serve different purposes. The board is as previously unable to recognize any synergy between these features.

8.4 It is therefore the board's judgement that for these reasons and the reasons put forward with respect to the 4th auxiliary request the method of claim 1 of the 5th auxiliary request does not involve an inventive step.

## Order

## For these reasons it is decided that:

The appeal is dismissed.

Registrar | Chair

S. Sánchez Chiquero | G. Eliasson