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D E C I S I O N
of 20 August 1997

Case Number: T 0277/94 - 3.4.1

Application Number: 90203310.9

Publication Number: 0434141

IPC: H01L 23/544

Language of the proceedings: EN

Title of invention:
Method for encoding identification information on circuit dice using step and repeat lithography

Applicant:
Philips Electronics N.V.

Opponent:
-

Headword:
Method for encoding identification information/N. V. Philips

Relevant legal provisions:
EPC Art. 83

Keyword:
"Sufficiency of the disclosure for carrying out the invention as claimed - yes (after amendments to the claim)"

Decisions cited:
-

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0277/94 - 3.4.1

D E C I S I O N
of the Technical Board of Appeal 3.4.1
of 20 August 1997

Appellant: Philips Electronics N.V.
Groenewoudseweg 1
5621 BA Eindhoven (NL)

Representative: Houbiers, Ernest Emile Marie Gerlach
Internationaal Octrooibureau B.V.
Prof. Holstlaan 6
5656 AA Eindhoven (NL)

Decision under appeal: Decision of the Examining Division of the European Patent Office posted 25 November 1993 refusing European patent application No. 90 203 310.9 pursuant to Article 97(1) EPC.

Composition of the Board:

Chairman: G. D. Paterson
Members: R. K. Shukla
U. G. O. Himmler

Summary of Facts and Submissions

I. This European patent application relates to a method for encoding identification information on circuit dice, and was refused by a decision of the Examining Division on the ground that the application (including claim 1 filed on 12 January 1993) did not comply with the requirement of Article 83 EPC.

The above claim 1 of the application has the following wording:

"A method of encoding identification information onto each of a plurality of circuit dice (12) on a semiconductor wafer (10) comprising the steps of:

(a) forming a plurality of electrically readable identification elements (16) on each of said plurality of circuit dice on said semiconductor wafer; and

(b) removing, by a photolithographic method, selected ones of said identification elements from each of said circuit dice such that a different one or ones of said plurality of identification elements remains on each circuit die, so that each circuit die can be distinguished from one another electrically,

said step of removing comprising;

(i) covering said plurality of circuit dice with a photoresist mask ;

(ii) positioning a step and repeat mask (22) above the photoresist mask to cover at least one of said identification elements of the first circuit die and

(iii) exposing all unmasked identification elements of the first circuit die;

(iv) moving said step and repeat mask over a second different one or ones of said identification elements on a second circuit die on said semiconductor wafer;

(v) exposing all unmasked identification elements of said second circuit die; and

(vi) repeating steps iv) and v) for each circuit die in said semiconductor wafer so that different unexposed identification elements remain on each circuit die, so that each circuit die on said wafer can be distinguished from one another, after the photolithographic process is completed."

II. During the examination proceedings pursuant to Article 96(2) EPC, claim 1 having the following wording was considered as meeting the requirements of the EPC:

"A method of encoding identification information onto each of a plurality of circuit dice (12) on a semiconductor wafer (10) comprising the steps of:

(a) forming a plurality of electrically readable identification elements (16) on each of said plurality of circuit dice on said semiconductor wafer; and

(b) removing, by a photolithographic method, selected ones of said identification elements from each of said circuit dice such that a **different one** of said plurality of identification elements remains on each circuit die, so that each circuit die can be distinguished from one another electrically,

said step of removing comprising,

(i) **covering said plurality of circuit dice with a photoresist mask (18) which includes a plurality of openings (20) for each of the identification elements;**

(ii) positioning a step and repeat mask (22) above the photoresist mask to cover **one** of said identification elements of the first circuit die and

(iii) exposing all unmasked identification elements of the first circuit die;

(iv) moving said step and repeat mask over a second different **one** of said identification elements on a second circuit die on said semiconductor wafer;

(v) exposing all unmasked identification elements of said second circuit die; and

(vi) repeating steps iv) and v) for each circuit die in said semiconductor wafer so that a different unexposed identification **element** remains on each circuit die, so that each circuit die on said wafer can be distinguished from one another, after the photolithographic process is completed."

In the above wording of the claim, the features which differ from the corresponding features in the rejected claim 1 are underlined.

Following submissions by the Applicant in his letter dated 12 January 1993 that the provision of a photoresist as set out in sub-step (i) of the rejected claim 1 was an indispensable process step in a conventional photolithographic process mentioned in the application, and was therefore disclosed in the application, the Examining Division in its communication dated 22 February 1993 did not pursue its objection with regard to the provision of a photoresist as in sub-step (i) of said claim 1, but raised an objection under Article 83 EPC having regard to the

subject-matter of the invention as claimed in step (b) and sub-steps (ii), (iv) and (vi). Following the response of the Applicant dated 28 May 1993, the application was refused.

III. According to the impugned decision, the invention as claimed in step (b) requires that by removing selected ones of identification elements, ***more than one*** identification elements remain on each die, these elements being different from each other for each die. Although such a structure is shown and described in the application with reference to Figure 3, the only method described with reference to Figures 2A to 2C in the application results in the provision of ***only one*** identification element (16) on each die. Since the use of step and repeat mask as claimed necessarily implies the use of the same mask for each die, the description and the Figures do not provide any information as to the design of such a step and repeat mask which could shield more than one different identification elements on different dice.

IV. The Applicant lodged an appeal and filed an amended new claim 1 with the grounds of the appeal. The appeal was substantiated on the ground that the amended claim 1 was brought into agreement with the disclosure in the application, and now specifies that only one element remains on each circuit die, so that all the objections raised by the Examining Division were met. The Applicant also stated that he was willing to delete the example of Figure 3 from the application, which was no longer covered by the amended claim.

V. In response to a communication from the Board informing the Applicant that claim 1 required further minor amendments for consistency, the Applicant filed a new claim 1 with his letter dated 9 June 1997, and new

pages 1 to 4 of the description with his letter dated 24 June 1994. The Applicant thus requested the grant of a patent on the following text and drawings:

Description:	pages 1 to 4 filed with the letter dated 24 June 1997;
Claims:	claim 1 filed with the letter dated 9 June 1997; and
Drawings:	sheet ½ (Figures 1 and 2A to 2C) as filed.

The new claim 1 has the same wording as the claim 1 as in paragraph II above with the exception that sub-step (i) reads as follows:

(i) covering said plurality of circuit dice with a photoresist mask;

Reasons for the Decision

1. It follows from the summary of the facts in paragraph II above that claim 1 having the wording as set out in paragraph II and containing amendments as in paragraph V above, was considered by the Examining Division as complying with the requirements of the EPC, including the requirement of Article 83 EPC. For the reasons which follow, in the Board's judgment also the application discloses the invention as claimed in the amended claim 1 in a manner sufficiently clear and complete for it to be carried out by a person skilled in the art (Article 83 EPC). In particular, the step and repeat masking process with reference to Figures 2A to 2C is described in sufficient detail in the

application so that a different ***one*** of identification elements remains on each circuit die after the sub-steps (ii) to (vi) as set out in the amended claim are carried out.

According to sub-steps (ii) and (iii) of the amended claim, the step and repeat mask (22) is positioned to cover ***one*** of the identification elements provided on a first circuit die and using the photolithographic technique, the unmasked identification elements are then exposed. These steps of masking and exposing are then repeated in sub-steps (iv), (v) and (vi) using the same step and repeat mask for a second and further dice, so that a different ***one*** of the identification elements is covered by the mask for each die. The photolithographic process is then completed whereby the unmasked identification elements from all the dice are removed.

The process as claimed above is also described in the application as filed on page 3, line 17 to page 4, line 7 with reference to Figures 2A to 2C. In particular, a step and repeat mask (22) provided with a single dark area (23) is positioned over ***one*** of the identification elements (16) on one of the dice and the unmasked elements are then exposed. The process of masking and exposing is then repeated for the next die by shifting the mask so that a different one of the identification elements is covered by the dark area. It is also disclosed that a conventional step and repeat ***photolithographic*** process is employed which necessarily implies the use of a photoresist to cover all the elements prior to exposure to radiation, and subsequent removal of the exposed photoresist (in case of a positive photoresist) and retention of the unexposed photoresist covering the identification elements which are retained on the dice.

2. The description in the application has been brought into conformity with the amended claim 1 by deletion of the embodiment of Figure 3 and Figure 3. The application with the text and the drawings as specified in the paragraph V should therefore proceed to grant.

Order

For these reasons it is decided that:

1. The decision of the Examining Division is set aside.

2. The case is remitted to the Examining Division with the order to grant a European patent with the text and drawings as specified in paragraph V above.

The Registrar: The Chairman:

M. Kiehl G. D. Paterson