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D E C I S I O N
of 2 February 2000

Case Number: T 0635/96 - 3.4.3

Application Number: 90103926.3

Publication Number: 0385450

IPC: H01L 27/06

Language of the proceedings: EN

Title of invention:
Semiconductor device with MIS capacitor

Applicant:
KABUSHIKI KAISHA TOSHIBA

Opponent:
-

Headword:
-

Relevant legal provisions:
EPC Art. 111(1)

Keyword:
"Direct remittal to the first instance (yes)"

Decisions cited:
T 0063/86, T 0186/93

Catchword:
-

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Beschwerdekammern | Boards of Appeal | Chambres de recours

Case Number: T 0635/96 - 3.4.3

D E C I S I O N
of the Technical Board of Appeal 3.4.3
of 2 February 2000

Appellant: KABUSHIKI KAISHA TOSHIBA
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 19 February 1996 refusing European patent application No. 90 103 926.3 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: R. K. Shukla
Members: M. Chomentowski
M. J. Vogel

Summary of Facts and Submissions

I. European patent application No. 90 103 926.3 (publication No. 0 385 450) was refused by a decision of the examining division dated 19 February 1996 on the ground that the subject-matter of claim 1 submitted by the applicant lacked an inventive step.

The only independent claim 1 forming the basis of the decision reads as follows:

"1. A semiconductor device with a MIS capacitor, comprising a semiconductor substrate (36; 74a, 74b) of a first conductivity type, a diffusion layer (40; 78, 78b) of the first conductivity type forming one electrode of the capacitor, and formed as a first region in the semiconductor substrate (36; 74a, 74b) an insulating film (66; 100) formed on at least a portion of the diffusion layer (40; 78a, 78b), first wiring means (W1; W11) for connecting through the insulating film, a first electrode (64, 704) formed on the insulating film, and second wiring means (W2, W12) for connecting through the insulating film, a second electrode (48; 86a), formed on the diffusion layer (40; 78a, 78b); wherein said device further comprises a well region (44; 82a, 82b) of a second conductivity type, formed as a second region in the semiconductor substrate (36; 74a, 74b) and third and fourth regions (50, 52; 90b, 92a) of the first conductivity type, formed in the well region (44; 82a, 82b) and separated at a predetermined distance from each other, and that said first wiring means (W1; W11) connects the fourth region (52; 90b) to the first electrode (64; 104) and said second wiring means (W2; W12) connects said third

region (50, 92a) to said second electrode (48; 86a) wherein said first and second wiring means (W1, W2; W11, W12) and said diffusion layer (40; 78a, 78b) of the first conductivity type are superposed on each other with the insulating film (66; 100) interposed therebetween, thereby constituting said MIS capacitor."

Dependent claim 2 concerns a particular arrangement of wiring means and of regions, *inter alia* of the well region (44; 82a, 82b), of the device of claim 1. The dependent claims 3 to 5 concern particular arrangements of wiring means and of regions of the device of claim 1. The dependent claims 6 and 7 concern particular arrangements and shapings of regions, *inter alia* of the well region (44; 82a, 82b), of the device of claim 1.

II. The applicant lodged an appeal against this decision on 11 April 1996 and paid the appeal fee on the same day.

On 1 July 1996, the applicant (appellant) filed the statement setting out the grounds of the appeal and filed therewith a new set of claims 1 to 6, a new description page 3a and replacement pages 4, 8, 12 and 13.

The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of the following patent application documents:

Description: Pages 1, 2, 5 to 7, 9 to 11, 14 and 15 as filed;
Page 3 as filed by the applicant (appellant) on 21 December 1995;

Pages 3a, 4, 8, 12 and 13 as filed by the appellant on 1 July 1996 with the statement of the grounds of appeal;

Claims: Nos. 1 to 6 as filed on 1 July 1996 with the statement of the grounds of appeal;

Drawings: Sheets 1/3 to 3/3 as filed.

Moreover, the appellant requests that, in the event that the first petition, i.e. the request here above, should not be granted, a hearing be scheduled before the Board of Appeal.

III. The only independent claim of the set of 6 claims filed with the statement of grounds of appeal contains, as compared to the above-mentioned former claim 1, features concerning a second well region, an inter-element isolation and a second pair of diodes, and it reads as follows:

"1. A semiconductor device with a MIS capacitor, comprising

a semiconductor substrate (74a, 74b) of a first conductivity type,

a diffusion layer (78a) of the first conductivity type, which forms one electrode of the capacitor, and is formed as a first region (74a) in a first part (74a) of said semiconductor substrate (74a, 74b),

an insulating film (100) formed on at least a portion of said diffusion layer (78a),

a first electrode (104) formed on said insulating film (100), and a second electrode (86a), formed over said diffusion layer (78a) and connected therewith through said insulating film (100), wherein said first electrode (104) and said diffusion layer (78a) are superposed on each other with the insulating film (100) interposed therebetween, thereby constituting said MIS capacitor,

a first well region (82a) of a second conductivity type, formed as a second region in said first part (74a) of said semiconductor substrate (74a, 74b), and third and fourth regions (88a, 90a) of the first conductivity type, formed in said first well region (82a) and separated at a predetermined distance from each other, thereby constituting a first pair of diodes (D11, D12) connected in opposite polarities,

a second well region (82b) of said second conductivity type, formed as a fifth region in a second part (74b) of said semiconductor substrate (74a, 74b), and sixth and seventh regions (88b, 90b) of the first conductivity type, formed in said second well region (82b) and separated at a predetermined distance from each other, thereby constituting a second pair of diodes (D13, D14) connected in opposite polarities,

wherein

said first (74a) and second (74b) parts of said substrate (74a, 74b) are separated by an inter-element isolation (76), and

said first (D11, D12) and second (D13, D14) pairs of

diodes connected in opposite polarities are series-connected between said first (104) and second (86a) electrodes of said MIS capacitor by wiring means (W11, W12, W13)."

IV. According to the statement of grounds (see page 1, paragraph 2), new claim 1 is based upon the text of claim 1 of the set of claims having formed the basis for the decision under appeal, and the disclosure of Figure 7 and the corresponding description, special attention being drawn to the disclosure on page 8, lines 36 and 37, page 12, lines 12 to 14 and page 13, lines 16 to 22.

The statement of the grounds of appeal contains the appellant's arguments concerning the patentability of the invention, wherein it is contended that the prior art documents do not mention or suggest providing an insulating element between two parts of a substrate in which wells are provided that are used for forming diode pairs.

Reasons for the Decision

1. The appeal is admissible.

2. *Remittal to the first instance*

2.1 Amended claim 1 forming the basis of the appellant's request concerns a semiconductor device comprising a second well region (82b) of a second conductivity type, formed as a fifth region in a second part (74b) of the

semiconductor substrate (74a, 74b), and sixth and seventh regions (88b, 90b) of the first conductivity type, formed in the second well region (82b) and separated at a predetermined distance from each other, thereby constituting a second pair of diodes (D13, D14) connected in opposite polarities,

wherein

said first (74a) and second (74b) parts of said substrate (74a, 74b) are separated by an inter-element isolation (76), and

said first (D11, D12) and second (D13, D14) pairs of diodes connected in opposite polarities are series-connected between said first (104) and second (86a) electrodes of said MIS capacitor by wiring means (W11, W12, W13).

Thus, none of the claims of the former sets of claims, including the set of claims of the application as filed, which were examined and refused by the examining division, concerned a semiconductor device as set out in the appellant's request.

2.2 Indeed, as mentioned above (cf. item IV), the appellant has acknowledged that the amendments to claim 1 of the set of claims having formed the basis for the decision under appeal are essentially based upon the disclosure of Figure 7 and the corresponding description, special attention being drawn to the disclosure on page 8, lines 36 and 37, page 12, lines 12 to 14 and page 13, lines 16 to 22.

2.3 Pursuant to Article 111(1) EPC, following the examination as to the allowability of the appeal, the Board shall decide on the appeal and, in this respect, it may either exercise any power within the competence of the department which was responsible for the decision appealed or remit the case for further prosecution.

In a case such as the present one where substantial amendments have been proposed which require a substantial further examination in relation to both the formal and substantial requirements of the EPC, the Board, following the established case law of the boards of appeal (cf. in particular the decision T 63/86, OJ EPO, 1988, 224, specially point 2 of the reasons and the decision T 186/93 of 22 May 1995, specially point 3 of the reasons), considers it appropriate that such further examination should be carried out by the first instance. As further stated in decision T 63/86, by remitting the case to the first instance, the applicant's right to appeal to a second instance is maintained.

It is noted that the appellant's request for oral proceedings is contingent upon the issue of an adverse decision by the Board.

Under these circumstances, the Board has decided to exercise its discretion under Article 111(1) EPC to remit the case to the first instance for further prosecution on the basis of the patent application documents on file including the documents filed with the statement of the ground of appeal.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance for further prosecution.

The Registrar: The Chairman:

D. Spigarelli R. Shukla