

WHAT IS CLAIMED IS:

1. A semiconductor device with graded dopant concentration in the active region, to aid carrier movement from emitter to collector.
2. A semiconductor device with graded dopant concentration in the active region, to aid carrier movement from source to drain.
3. A semiconductor device with graded dopant concentration in the well regions, to aid carrier movement away from the active surface regions, towards the substrate.
4. A semiconductor device with graded dopant concentration in the substrate region to aid carrier movement away from the active surface regions, deeper towards the substrate.
5. A semiconductor device with at least one each of dopant concentration of both donor and acceptor, to optimize the operating performance of the device.
6. A semiconductor device with at least one graded dopant concentration fabricated with ion implantation, to provide an aiding or retarding electric field locally in a monolithic integrated circuit.
7. A semiconductor device with at least one graded dopant concentration in an epitaxial layer.
8. A semiconductor device where one layer of dopant from one wafer, is transferred to another wafer having either same polarity or different polarity dopant through wafer bonding or similar processes.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No. : TBD

Confirmation No. : TBD

Inventor : G. R. Mohan Rao

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TC/A.U. : TBD

Examiner : TBD

Title : SEMICONDUCTOR DEVICES WITH GRADED
DOPANT REGIONS

Docket No. : 0299-0001.05

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

PRELIMINARY AMENDMENT

Sir:

Please amend the above-identified application as follows:

Amendments to the Specification begin on page 2 of this amendment;

Amendments to the Claims are reflected in the listing of claims which begins on page 3 of this amendment; and

Remarks begin on page 6 of this amendment.

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Amendments to the Specification:

Please replace paragraph [0001] with the following amended paragraph:

[0001] This continuation application claims priority to and the benefit of U.S. Application Serial No. 13/854,319, filed on April 1, 2013, which is a continuation of U.S. Application Serial No. 11/622,496, filed January 12, 2007, now U.S. Patent No. 8,421,195, which is a divisional of U.S. Application Serial No. 10/934,915, filed on September 3, 2004, now abandoned, all of which are incorporated by reference.

Amendments to the Claims:

The listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

Claims 1-8 (Cancelled)

9. (New) A semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer;

a single drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants generating a first static unidirectional electric drift field to aid the movement of minority carriers from said substrate to said surface layer; and

at least one well region disposed in said single drift layer, said well region having a graded concentration of dopants generating a second static unidirectional electric drift field to aid the movement of minority carriers from said substrate to said surface layer.

10. (New) The semiconductor device of claim 9 wherein said first and second static unidirectional electric fields are adapted to respective grading of dopants to aid movements of carriers in respective active regions.

11. (New) The semiconductor device of claim 9 wherein the semiconductor device is a central processing unit (CPU).

12. (New) The semiconductor device of claim 9 wherein the semiconductor device is a DRAM device.

13. (New) The semiconductor device of claim 9 wherein the semiconductor device is a flash memory device.

14. (New) The semiconductor device of claim 9 wherein the semiconductor device is an image sensor device.

15. (New) A semiconductor device comprising:

a surface layer;

a substrate;

an active region including a source and a drain, disposed on one surface of said surface layer;

a single drift layer disposed between the other surface of said surface layer and said substrate, said drift layer having a graded concentration of dopants generating a first static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate; and

at least one well region disposed in said single drift layer, said well region having a graded concentration of dopants generating a second static unidirectional electric drift field to aid the movement of minority carriers from said surface layer to said substrate.

16. (New) The semiconductor device of claim 15 wherein said first and second static unidirectional electric fields are adapted to respective grading of dopants to aid movements of carriers in respective active regions.

17. (New) The semiconductor device of claim 15 wherein the semiconductor device is a central processing unit (CPU).

18. (New) The semiconductor device of claim 15 wherein the semiconductor device is a DRAM device.

19. (New) The semiconductor device of claim 15 wherein the semiconductor device is a flash memory device.

20. (New) The semiconductor device of claim 15 wherein the semiconductor device is an image sensor device.

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REMARKS

In the specification, paragraph [0001], has been amended to correctly reference related applications. Applicant has cancelled claims 1-8 and added new claims 9-20.

The Commissioner is authorized to charge any additional fees or deficiencies or credit any overpayments to Eugene M. Cummings, P.C., Deposit Account No. **50-4199**, with reference to attorney docket number (0299-0001.05).

Respectfully submitted,

Law Offices of Eugene M. Cummings P.C.

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