inversion from causing. Since the stopper region covers the side face of the second alternating conductivity type layer in the peripheral region of the device, the side face of the second alternating conductivity type layer is not exposed as a dicing face of the chip, the leakage current is suppressed, the potential around the second alternating conductivity type layer in the peripheral region of the device is kept at the drain potential, the dielectric breakdown voltage of the device is stabilized, and the quality of the device is improved.

The present invention is very effective to realize a super-junction semiconductor device exhibiting a high breakdown voltage.

What is claimed is:

1. A super-junction semiconductor device comprising:

a semiconductor chip having a first major surface and a second major surface facing opposite to the first major surface, the semiconductor chip including an active region and a peripheral region that bears the breakdown voltage and surrounding the active region;

a first main electrode and a second main electrode on the first major surface on the active region;

a third main electrode on the second major surface;

a layer with low electrical resistance extending on the side of the second major surface from the active region to the peripheral region;

a first alternating conductivity type layer on the layer with low electrical resistance in the active region, the first alternating conductivity type layer providing a current path in the ON-state of the semiconductor device and being depleted in the OFF-state of the semiconductor device, the first alternating conductivity type layer comprising drift regions of a first conductivity type and partition regions of a second conductivity type, the drift regions and the partition regions being laminated alternately with each other; and

a second alternating conductivity type layer on the layer with low electrical resistance in the peripheral region, the second alternating conductivity type layer comprising drift regions of the first conductivity type and partition regions of the second conductivity type, the drift regions and the partition regions being laminated alternately with each other.

2. The super-junction semiconductor device according to claim **1**, wherein the drift regions and the partition regions in the first alternating conductivity type layer and the drift regions and the partition regions in the second alternating conductivity type layer extend in perpendicular to the first major surface.

3. The super-junction semiconductor device according to claim **1**, wherein the first alternating conductivity type layer and the second alternating conductivity type layer are continuous to each other.

4. The super-junction semiconductor device according to claim **1**, wherein the impurity concentrations in the drift regions and the partition regions in the second alternating conductivity type layer are equal to the respective net impurity concentrations in the drift regions and the partition regions in the first alternating conductivity type layer.

5. The super-junction semiconductor device according to claim **1**, wherein the drift regions and the partition regions in the second alternating conductivity type layer and the drift regions and the partition regions in the first alternating conductivity type layer are shaped with respective planar stripes extending in parallel to each other.

6. The super-junction semiconductor device according to claim **1**, wherein the drift regions in the first alternating conductivity type layer and in the second alternating conductivity type layer or the partition regions in the first alternating conductivity type layer and in the second alternating conductivity type layer are located at the lattice points of a planar polygonal lattice.

7. The super-junction semiconductor device according to claim **1**, the super-junction semiconductor device further comprising an insulation film covering at least a part of the second alternating conductivity type layer.

8. The super-junction semiconductor device according to claim **1**, the super-junction semiconductor device further comprising an insulation film covering the adjacent portion of the second alternating conductivity type layer adjacent to the first alternating conductivity type layer, the insulation film being covered by the second main electrode.

9. The super-junction semiconductor device according to claim **1**, the super-junction semiconductor device further comprising one or more insulation films on the second alternating conductivity type layer and one or more field plate electrodes on the one or more insulation films.

10. The super-junction semiconductor device according to claim **1**, the super-junction semiconductor device further comprising an insulation film on the second alternating conductivity type layer and a resistive film on the insulation film.

11. The super-junction semiconductor device according to claim **1**, the super-junction semiconductor device further comprising a channel stopper region of the first conductivity type in the outer portion of the peripheral region.

12. A super-junction semiconductor device as claimed in claim **1**,

wherein the first alternating conductivity type layer extends from the first major surface to the layer with low electrical resistance.

13. The super-junction semiconductor device according to claim **5**, wherein the widths of the drift regions and the partition regions in the second alternating conductivity type layer are almost equal to the respective widths of the drift regions and the partition regions in the first alternating conductivity type layer.

14. The super-junction semiconductor device according to claim **5**, the super-junction semiconductor device further comprising a channel stopper region of the first conductivity type, the channel stopper region extending in perpendicular to the stripes of the drift regions and the partition regions in the first alternating conductivity type layer and in the second alternating conductivity type layer.

15. The super-junction semiconductor device according to claim **10**, wherein the one or more field plate electrodes are in contact with the respective one or more partition regions in the second alternating conductivity type layer.

16. The super-junction semiconductor device according to claim **10**, wherein the one or more field plate electrodes are extended over one or more drift regions in the second alternating conductivity type layer.

17. The super-junction semiconductor device according to claim **10**, wherein the potential of each of the one or more field plate electrodes is floated.

18. The super-junction semiconductor device according to claim **10**, the super-junction semiconductor device further comprising a resistive film between the adjacent field plate electrodes.

19. The super-junction semiconductor device according to claim **16**, wherein the channel stopper region is extended deeply enough to reach the layer with low electrical resistance.