a deep well region in contact with the second buried layer, wherein the second well region and the second high voltage lightly-doped region are formed in the deep well region.

11. The semiconductor device according to claim **1**, further comprising:

a third doped ring structure having the second-polarity formed in the substrate and located outside the second isolation region, comprising:

a high voltage well region formed in the substrate; and

a third well region formed in the high voltage well region.

12. The semiconductor device according to claim **1**, wherein the drain region comprises:

a third high voltage lightly-doped region; and

a first heavily-doped region formed in the third high voltage lightly-doped region and having a dopant concentration higher than that of the third high voltage lightly-doped region.

13. An operating method of a semiconductor device, comprising:

providing the semiconductor device, wherein the semiconductor device comprises:

a substrate;

a source region and a drain region formed in the substrate, the drain region having a first voltage;

a gate structure formed on the substrate and between the source region and the drain region;

a first lightly-doped region formed below the source region;

an isolation doped region formed in the substrate and surrounding the source region, the drain region, and the first lightly-doped region, the isolation doped region having a second voltage; and

a doped region formed in the substrate and located outside the isolation doped region, wherein the source region and the drain region have a first-polarity, and the first lightly-doped region the isolation doped region, and the doped region have a second-polarity;

applying a positive voltage to the gate structure when the first voltage is equal to the second voltage, and the source region and the doped region are grounded; and

applying a negative voltage to the gate structure when the first voltage is different from the second voltage, the source region has a negative voltage, and the doped region is grounded.

14. The operating method according to claim **13**, wherein the positive voltage applying to the gate structure is about 1 V to 5 V.

15. The operating method according to claim **13**, wherein when the first voltage is equal to the second voltage, the first voltage is about 0 to 33 V.

16. The operating method according to claim **13**, wherein the negative voltage applying to the gate structure is about −7 V to −11 V.

17. The operating method according to claim **13**, wherein when the first voltage is different from the second voltage, the first voltage is about −12 V to 12 V.

18. The operating method according to claim **13**, wherein when the first voltage is different from the second voltage, the second voltage is about 12 V, and the negative voltage of the source region is about −12 V.

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