CLAIMS

1. An optical modulator, comprising:

two RF electrodes for applying one pair of differential signal voltages;

at least one fixed potential electrode for applying a fixed potential;

a first conductive semiconductor layer and a second conductive semiconductor layer abutted to the two RF electrodes or the fixed potential electrode; and

a light modulation unit including two optical waveguides branched from one optical waveguide that are arranged along a pn junction unit functioning as a boundary between the first and second conductive semiconductor layers, wherein:

the modulation unit of the optical modulator has a first region positioned at the input side of a light propagation direction and a second region positioned at the output side, the connection of the first region and the second region has a structure having a multi-level crossing such that one of the two RF electrodes has a multi-level crossing with one of the two optical waveguides on each side, and the two optical waveguides both have the positional relation of the semiconductor doping status in the first region and the second region that is provided in a reversed position viewed in the light propagation direction in the respective optical waveguide, and

the two optical waveguides have a structure of not multi-level crossing with respect to each other, and the two RF electrodes have a structure of not multi-level crossing with respect to each other.

2. The optical modulator according to claim 1, wherein: the modulation unit of the optical modulator has one or two of multi-level crossing structure(s) in each of the two optical waveguides.

3. The optical modulator according to claim 1, wherein: the modulation unit of the optical modulator has, in the part of multi-level crossing structure, no via connecting the at least one of the two RF electrodes and the semiconductor layer.

4. The optical modulator according to claim 3, wherein: the first region has the entire length in the light propagation direction that is shorter than the entire length of the second region in the light propagation direction.

5. The optical modulator according to claim 3, wherein: at least one of the first region and the second region is divided to two or more regions provided alternately in the light propagation direction.

6. The optical modulator according to claim 5, wherein: the first region is divided to two regions so as to interpose the second region so that a length ratio of 1:2:1 is provided thereamong in the light propagation direction.

7. The optical modulator according to any one of claims 1 to 6, wherein:

the optical modulator is of a dual electrode structure, and the fixed potential electrode comprises at least one ground electrode provided between the two RF electrodes and two ground electrodes provided, respectively, at outer sides of the two RF electrodes.

8. An optical modulator, comprising:

two RF electrodes comprising a first RF electrode and a second RF electrode for applying one pair of differential signal voltages;

at least one fixed potential electrode for applying a fixed potential;

a first conductive semiconductor layer and a second conductive semiconductor layer abutted to the first RF electrode, the second RF electrode or the fixed potential electrode; and

a light modulation unit including two optical waveguides comprising a first optical waveguide and a second optical waveguide that are branched from one input optical waveguide, and that are arranged along a pn

junction unit functioning as a boundary between the first and second conductive semiconductor layers, wherein:

the light modulation unit of the optical modulator has a first region positioned at the input side of a light propagation direction and a second region positioned at the output side, and

the two optical waveguides both have the positional relation of the semiconductor doping status in the first region and the second region that is provided in a reversed position viewed in the light propagation direction in the respective optical waveguide, and

the first RF electrode only modulates the first optical waveguide that does not multi-level cross with other optical waveguide, and the first RF electrode is configured to multi-level cross with the first optical waveguide in the connection of the first region and the second region,

the second RF electrode only modulates the second optical waveguide that does not multi-level cross with other optical waveguide, and the second RF electrode is configured to multi-level cross with the second optical waveguide in the connection of the first region and the second region.