

layer 3, an electrically insulating layer 2, for example made of silicon oxide, and metal lines L intended to conduct the signal. The polycrystalline silicon layer 3 performs the charge-trapping function by virtue of the presence of grain boundaries at which electric charges present under the electrically insulating layer are able to be trapped.

Figure 1C illustrates a perspective view of a radiofrequency circuit with what is termed a 'double BOX' (or 'double buried oxide') structure, that is to say successively comprising a silicon substrate 1 with high electrical resistivity, a first electrically insulating layer 2a (for example made of silicon oxide), a polycrystalline silicon layer 3, a second electrically insulating layer 2b (for example made of silicon oxide), and metal lines L intended to conduct the signal.

Although substrates of 'trap rich' type give good results in radiofrequency applications, increasing the requirements in terms of circuit performance makes it necessary to develop additional means for minimizing the generation of parasitic harmonics.

DISCLOSURE OF THE INVENTION

Embodiments of the invention seek to design a method for controlling a radiofrequency circuit that may make it possible to reduce harmonic distortion and/or intermodulation distortion caused by the non-linearity of the substrate on which said circuit is formed.

An aspect of the present invention provides a method for minimizing harmonic distortion and/or intermodulation distortion of a radiofrequency signal propagating in a radiofrequency circuit formed on a semiconductor substrate coated with an electrically insulating layer, wherein a curve representing said distortion as a function of a power of the input or output signal exhibits a trough around a given power, said method being characterized in that it comprises applying, between the radiofrequency circuit and the semiconductor substrate, an electrical potential difference chosen so as to move said trough towards a given operating power of the radiofrequency circuit.

Particularly advantageously, said electrical potential difference is chosen so as to comply with the following equation: $V_{pk} = |V_{GB} - V_{FB}|$, where V_{pk} is the peak voltage of the radiofrequency signal and V_{FB} is the flat band voltage of the metal (semiconductor lines of the radiofrequency circuit) - insulator - semiconductor structure.

According to one embodiment, the semiconductor substrate has an electrical resistivity of greater than 500 $\Omega \cdot \text{cm}$.

According to one form of implementation, a polycrystalline silicon layer is arranged between the semiconductor substrate and the electrically insulating layer.

Optionally, an additional electrically insulating layer may be arranged between the semiconductor substrate and the polycrystalline silicon layer.

According to one embodiment, the semiconductor substrate is made of silicon.

According to one form of implementation of the invention, the method comprises adjusting the electrical potential difference applied between the semiconductor substrate and the radiofrequency circuit depending on the operating power of the radiofrequency circuit.

Advantageously, the method may furthermore comprise measuring the temperature of the radiofrequency circuit, and adjusting the electrical potential difference applied between the semiconductor substrate and the radiofrequency circuit depending on the measured temperature.

The curve representing the distortion of the signal is typically a curve of the level of generation of the second or of the third harmonic of the input signal or of the output signal as a function of the power of the input signal or of the fundamental component of the output signal.

Another aspect of the invention provides to a radiofrequency device comprising:

- a radiofrequency circuit formed on a semiconductor substrate coated with an electrically insulating layer,
- a contact connected electrically to the semiconductor substrate,
- a means for applying a potential difference between said contact and the radiofrequency circuit,

characterized in that said application means is configured to apply said potential difference chosen so as to move a trough around a given power in a curve representing harmonic distortion and/or intermodulation distortion of a radiofrequency signal propagating in said circuit as a function of a power of the input or output signal towards a given operating power of said radiofrequency circuit.

According to one embodiment, said means for applying the potential difference comprises a voltage generator and a voltage control module configured to adjust the voltage of said generator depending on the operating power of the radiofrequency circuit.

According to one embodiment, the semiconductor substrate has an electrical resistivity of greater than 500 $\Omega\cdot\text{cm}$.

According to one form of implementation, a polycrystalline silicon layer is arranged between the semiconductor substrate and the electrically insulating layer.

Optionally, an additional electrically insulating layer is arranged between the semiconductor substrate and the polycrystalline silicon layer.

According to one embodiment, the semiconductor substrate is made of silicon.

The device may furthermore comprise a temperature sensor coupled to the means for applying the potential difference, said means being configured to adjust said potential difference depending on the temperature measured by said sensor.

CLAIMS

1. Method for minimizing harmonic distortion and/or intermodulation distortion of a radiofrequency signal propagating in a radiofrequency circuit formed on a semiconductor substrate coated with an electrically insulating layer, wherein a curve
5 representing said distortion as a function of a power of the input or output signal exhibits a trough around a given power,
said method being characterized in that it comprises applying, between the radiofrequency circuit and the semiconductor substrate, an electrical potential difference
10 chosen so as to move said trough towards a given operating power of the radiofrequency circuit.
2. Method according to Claim 1, wherein said electrical potential difference (V_{GB}) is chosen so as to comply with the following equation: $V_{pk} = |V_{GB} - V_{FB}|$, where V_{pk} is the
15 peak voltage of the radiofrequency signal and V_{FB} is the flat band voltage.
3. Method according to either of Claims 1 and 2, wherein the semiconductor substrate has an electrical resistivity of greater than 500 $\Omega \cdot \text{cm}$.
- 20 4. Method according to Claim 3, wherein a polycrystalline silicon layer is arranged between the semiconductor substrate and the electrically insulating layer.
5. Method according to Claim 4, wherein an additional electrically insulating layer is arranged between the semiconductor substrate and the polycrystalline silicon layer.
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6. Method according to one of Claims 1 to 5, wherein the semiconductor substrate is made of silicon.
7. Method according to one of Claims 1 to 6, comprising adjusting the electrical
30 potential difference applied between the semiconductor substrate and the radiofrequency circuit depending on the operating power of the radiofrequency circuit.
8. Method according to one of Claims 1 to 7, furthermore comprising measuring the temperature of the radiofrequency circuit, and adjusting the electrical potential
35 difference applied between the semiconductor substrate and the radiofrequency circuit depending on the measured temperature.

9. Method according to one of Claims 1 to 8, wherein the curve representing the distortion of the signal is a curve of the level of generation of the second or of the third harmonic of the input signal or of the output signal as a function of the power of the input signal or of the fundamental component of the output signal.

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10. Radiofrequency device comprising:

- a radiofrequency circuit formed on a semiconductor substrate coated with an electrically insulating layer,

- a contact connected electrically to the semiconductor substrate,

- a means for applying a potential difference between said contact and the radiofrequency circuit,

characterized in that said application means is configured to apply said potential difference chosen so as to move a trough around a given power in a curve representing harmonic distortion and/or intermodulation distortion of a radiofrequency signal propagating in said circuit as a function of a power of the input or output signal towards a given operating power of said radiofrequency circuit.

11. Device according to Claim 10, wherein said means for applying the potential difference comprises a voltage generator and a voltage control module configured to adjust the voltage of said generator depending on the operating power of the radiofrequency circuit.

12. Device according to either of Claims 10 and 11, wherein the semiconductor substrate has an electrical resistivity of greater than 500 Ω .cm.

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13. Device according to Claim 12, wherein a polycrystalline silicon layer is arranged between the semiconductor substrate and the electrically insulating layer.

14. Device according to Claim 13, wherein an additional electrically insulating layer is arranged between the semiconductor substrate and the polycrystalline silicon layer.

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15. Device according to one of Claims 10 to 14, wherein the semiconductor substrate is made of silicon.

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16. Device according to one of Claims 10 to 15, furthermore comprising a temperature sensor coupled to the means for applying the potential difference, said

means being configured to adjust said potential difference depending on the temperature measured by said sensor.