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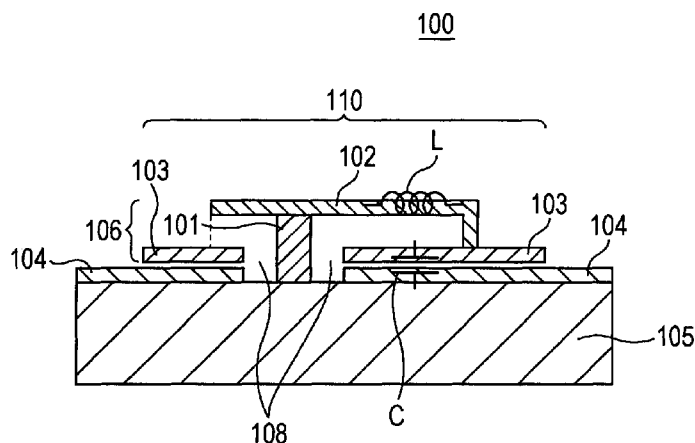
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(54) Title: ELEMENT FOR GENERATING OR DETECTING ELECTROMAGNETIC WAVES WHICH INCLUDES A RESONANCE UNIT AND A DIFFERENTIAL NEGATIVE RESISTANCE

FIG. 1



(57) Abstract: An oscillation element that oscillates an electromagnetic wave includes a negative resistance element (101) and a resonator (110) including a first conductor (106) and a second conductor (104), in which the negative resistance element and the resonator are arranged on a substrate (105), the negative resistance element is electrically connected to the first conductor and the second conductor, the first conductor and the second conductor are capacitively coupled to each other, and when a capacitance between the first conductor and the second conductor is set as C, an inductance of the first conductor and the second conductor is set as L_1 , a speed of the oscillated electromagnetic wave in vacuum is set as c_0 , a relative dielectric constant of the substrate is set as ϵ_r , and a diagonal line length of the substrate is set as d, a series resonant frequency f_1 of the resonator satisfies $f_1 = 1/(2\pi\sqrt{L_1C})$, and $f_1 < C_0/[d\sqrt{(1+\epsilon_r)/2}]$. The resonator may be of distributed constant type, wherein the resonator includes a first conductive layer (102), a second conductive layer (103), and a third conductive layer, wherein the first conductive layer is short-circuited to the second conductive layer, wherein the negative resistance element is connected to the first conductive layer and the third conductive layer, and wherein the second conductive layer and the third conductive layer are arranged opposite each other and are also capacitively coupled to each other to form a capacitance (C).



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AMENDED CLAIMS

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- [1] (Amended) An oscillation element that oscillates an electromagnetic wave, the oscillation element comprising:
- a negative resistance element; and
 - a resonator of a distributed constant type, wherein the resonator includes a first conductive layer, a second conductive layer, and a third conductive layer, wherein the first conductive layer is short-circuited from the second conductive layer, wherein the negative resistance element is electrically connected to the first conductive layer and the third conductive layer, wherein the second conductive layer and the third conductive layer are arranged opposite each other and are also capacitively coupled to each other, and wherein the first conductive layer, the second conductive layer and the third conductive layer are arranged at different positions in a thickness direction of the third conductive layer.

- [2] The oscillation element according to Claim 1,
wherein the series resonant frequency f_1 is lower
than 3 GHz.
- [3] The oscillation element according to Claim 1,
wherein the series resonant frequency f_1 is higher
than or equal to 100 MHz.
- [4] The oscillation element according to Claim 1,
wherein an oscillation frequency f_{osc} of the
oscillated electromagnetic wave is lower than or
equal to 0.1 THz, and
wherein the capacitance C is higher than or
equal to 0.1 nF.
- [5] The oscillation element according to Claim 1,
wherein an oscillation frequency f_{osc} of the
oscillated electromagnetic wave is lower than or
equal to 1 THz, and
wherein the capacitance C is higher than or
equal to 1 nF.
- [6] The oscillation element according to Claim 1,
wherein an oscillation frequency f_{osc} of the

oscillated electromagnetic wave is lower than or equal to 10 THz, and

wherein the capacitance C is higher than or equal to 10 nF.

[7] The oscillation element according to Claim 1, wherein the substrate is conductive.

[8] (Deleted)

[9] (Deleted)

[10] (Deleted)

[11] (Deleted)

[12] (Deleted)

[13] An oscillator comprising:
the oscillation element according to Claim 1;
and

a power supply circuit that supplies a bias voltage to the oscillation element, the power supply circuit including a power supply and a

conductor that electrically connects the power supply to the oscillation element.

[14] The oscillator according to Claim 13,
 wherein the conductor that electrically connects the power supply to the oscillation element is an electric wire.

[15] The oscillator according to Claim 13, further comprising:

 a shunt element,

 wherein the shunt element is connected to the electric wire between the power supply and the oscillation element, and

 wherein a length of the electric wire between the oscillation element and the shunt element is $1/4$ or shorter of a wavelength corresponding to the series resonant frequency f_1 of the oscillation element.

[16] The oscillator according to Claim 13,
 wherein, when a negative resistance of the negative resistance element of the oscillation element is set as $-R_d$, a series resistance of the

electric wire is set as R_{s2} , and an inductance of the electric wire is set as L_2 , the power supply circuit satisfies a relationship of $R_d > R_{s2} > L_2/CR_d$.

[17] (Deleted)

[18] (Deleted)

[19] (Deleted)

[20] (Deleted)