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(54) **HIGH FREQUENCY FILTER**

(57) The present invention provides a high-frequency filter, in order to ensure consistency of indexes of the filter. The high-frequency filter includes: at least one coaxial resonant cavity, at least one printed circuit board arranged at the coaxial resonant cavity, and at least one intracavity conductor on a side of the printed circuit board. A metal conductor layer for performing signal connection for a source and a load is laid on a surface of the printed circuit board, and a grounded metal conductor layer is laid on the other surface opposite to the surface laid with the metal conductor layer. One end of the intracavity con-

ductor and the coaxial resonant cavity are both grounded. The intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are coupled. With the high-frequency filter provided in the present invention, high consistency of the printed circuit board ensures batch consistency of indexes such as filter standing wave, phase, and group delay, and a volume of the filter can be reduced in comparison to an air strip line because of a relatively high dielectric constant of the printed circuit board.

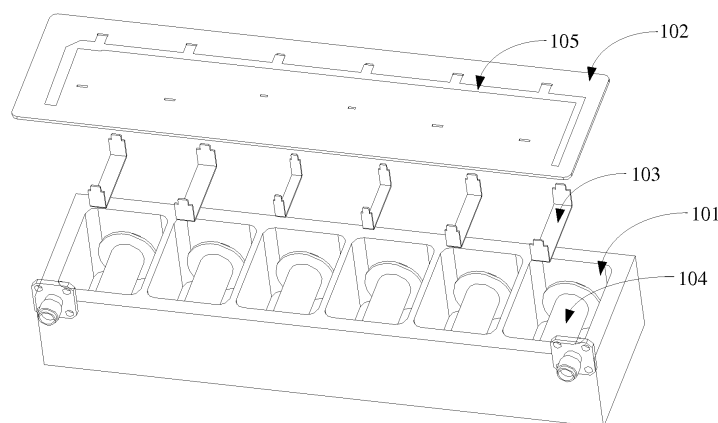


FIG. 1a

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Description

TECHNICAL FIELD

[0001] Embodiments of the present invention relate to the communication field, and in particular, to a high-frequency filter.

BACKGROUND

[0002] A filter is widely used in the modern communication field, and a basic function is: making useful signals pass on a signal link to the greatest extent, and suppressing harmful signals to the greatest extent. Classified by structure, existing high-frequency filters include micro-strip filters, strip line filters, and coaxial resonant cavity filters. A basic structural feature of a micro-strip filter is a base made of a dielectric material, where a metal conductor is laid on one surface of the base, and there is a grounded metal conductor layer at an opposite position on the other surface. A basic structural feature of a strip line filter is that a metal conductor is suspended or laid on a support made of a dielectric material, and metal conductors at corresponding positions on the top and bottom of the conductor form an outer conductor. For a coaxial resonant cavity filter, a metal conductor is placed in an enclosed metal cavity of the filter, and both ends of the conductor are coupled with the metal cavity, where coupling strength and/or an electrical length of the metal conductor determines a resonant frequency.

[0003] The coaxial resonant cavity filter provided in the prior art has a main feature that, the coaxial resonant cavity filter has many tuning structures. For example, each coaxial resonant cavity has a screw for adjusting a frequency, and there is also a screw for adjusting coupling between one coaxial resonant cavity and another coaxial resonant cavity. Since these screws are associated with each other, the coaxial resonant cavity filter provided in the prior art cannot ensure consistency of indexes such as filter standing wave, phase, and group delay.

SUMMARY

[0004] Embodiments of the present invention provide a high-frequency filter, in order to ensure consistency of indexes of the filter.

[0005] The embodiments of the present invention provide a high-frequency filter. The high-frequency filter includes: at least one coaxial resonant cavity, at least one printed circuit board arranged at the coaxial resonant cavity, and at least one intracavity conductor on a side of the printed circuit board. A metal conductor layer for performing signal connection for a source and a load is laid on a surface of the printed circuit board, and a grounded metal conductor layer is laid on the other surface opposite to the surface laid with the metal conductor layer. One end of the intracavity conductor and the coaxial res-

onant cavity are both grounded. The intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are coupled.

[0006] It can be known from the high-frequency filter provided in the above embodiments of the present invention that, each coaxial resonant cavity of the high-frequency filter is provided with at least one printed circuit board and at least one intracavity conductor on a side of the printed circuit board. Since the printed circuit board has high machining precision, and can ensure batch consistency of indexes such as filter standing wave, phase, and group delay, a volume of the filter can be reduced in comparison to an air strip line because of a relatively high dielectric constant of the printed circuit board.

BRIEF DESCRIPTION OF DRAWINGS

[0007] To describe the technical solutions in the embodiments of the present invention more clearly, the following briefly introduces the accompanying drawings required for describing the prior art or the embodiments. Apparently, the accompanying drawings in the following description show merely some embodiments of the present invention, and a person of ordinary skill in the art may still derive other drawings from these accompanying drawings.

FIG. 1a is a schematic structural diagram of a high-frequency filter provided in Embodiment 1 of the present invention;

FIG. 1b is a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity of the high-frequency filter shown in FIG. 1a; FIG. 2a is a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity of a high-frequency filter provided in Embodiment 2 of the present invention;

FIG. 2b is another schematic diagram of the structure and the relative position of each part in the coaxial resonant cavity of the high-frequency filter provided in Embodiment 2 of the present invention;

FIG. 3 is a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity of a high-frequency filter provided in Embodiment 3 of the present invention;

FIG. 4 is a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity of a high-frequency filter provided in Embodiment 4 of the present invention; and

FIG. 5 is a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity of a high-frequency filter provided in Embodiment 5 of the present invention.

DESCRIPTION OF EMBODIMENTS

[0008] The following clearly and completely describes the technical solutions in the embodiments of the present

invention with reference to the accompanying drawings in the embodiments of the present invention. Apparently, the described embodiments are merely a part rather than all of the embodiments of the present invention. All other embodiments obtained by a person skilled in the art based on the embodiments of the present invention shall fall within the protection scope of the present invention.

[0009] A high-frequency filter provided in the embodiments of the present invention includes at least one coaxial resonant cavity, at least one printed circuit board (Printed Circuit Board, PCB) arranged at the coaxial resonant cavity, and at least one intracavity conductor on a side of the printed circuit board. One end of the intracavity conductor and the coaxial resonant cavity are both grounded. A metal conductor layer for performing signal connection for a source and a load is laid on a surface of the printed circuit board, and a grounded metal conductor layer is laid on the other surface opposite to the surface laid with the metal conductor layer for performing signal connection for the source and the load. Further, the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are coupled.

[0010] Referring to FIG. 1a, FIG. 1a is a schematic structural diagram of a high-frequency filter provided in Embodiment 1 of the present invention. The high-frequency filter shown in FIG. 1a includes at least one grounded coaxial resonant cavity 101, at least one U-shaped coupling piece 103, at least one columnar intracavity conductor 104, and at least one printed circuit board 102 covering a cavity opening of the coaxial resonant cavity 101.

[0011] FIG. 1b shows a schematic diagram of a structure and a relative position of each part of the coaxial resonant cavity of the high-frequency filter shown in FIG. 1a. A metal conductor layer 105 for performing signal connection for a source and a load is laid on a surface of the printed circuit board 102, and a grounded metal conductor layer is laid on the other surface opposite to the surface laid with the metal conductor layer 105 for performing signal connection for the source and the load. In this embodiment, for the other surface opposite to the surface laid with the metal conductor layer 105 for performing signal connection for the source and the load, the grounded metal conductor layer may be laid on the whole surface, or the grounded metal conductor layer is at least laid on a portion contacting with the coaxial resonant cavity 101. In this way, the coaxial resonant cavity 101 is also grounded. In addition to ensuring signal circulation, the metal conductor layer 105 for performing signal connection for the source and the load may further has a function of coupling a signal connected by the metal conductor layer 105 to the columnar intracavity conductor 104. A screw 106 arranged on the columnar intracavity conductor 104 is configured to adjust a frequency.

[0012] The columnar intracavity conductor 104 may be fixed on a cavity wall of the coaxial resonant cavity 101, and one end of the columnar intracavity conductor 104

contacts with a side wall of the coaxial resonant cavity 101 to implement grounding. An axial direction or a center line direction of the columnar intracavity conductor 104 is parallel to the surface of the printed circuit board 102 laid with the metal conductor layer 105 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer. For example, if the columnar intracavity conductor 104 is a cylindrical intracavity conductor, the axial direction of the columnar intracavity conductor 104 is parallel to the surface of the printed circuit board 102 laid with the metal conductor layer 105 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer; and if the columnar intracavity conductor 104 is a prismatic intracavity conductor, the center line direction of the columnar intracavity conductor 104 is parallel to the surface of the printed circuit board 102 laid with the metal conductor layer 105 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer.

[0013] One end of the U-shaped coupling piece 103 is connected to the metal conductor layer 105, and the other end is connected to the grounded metal conductor layer. The function of the U-shaped coupling piece 103 is similar to that of an inductor. A magnetic field generated by the U-shaped coupling piece 103 excites a magnetic field of the coaxial resonant cavity 101. The columnar intracavity conductor 104 is coupled with the metal conductor layer 105 for performing signal connection for the source and the load via the magnetic field in the coaxial resonant cavity 101 excited by the U-shaped coupling piece 103, and this type of coupling is also called inductance coupling.

[0014] A high-frequency filter provided in Embodiment 2 of the present invention includes at least one grounded coaxial resonant cavity, at least one printed circuit board covering a cavity opening of the coaxial resonant cavity, and at least one U-shaped intracavity conductor.

[0015] FIG. 2a shows a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity 201 of the high-frequency filter provided in Embodiment 2. A metal conductor layer 204 for performing signal connection for a source and a load is laid on a surface of the printed circuit board 202, and a grounded metal conductor layer is laid on the other surface opposite to the surface laid with the metal conductor layer 204 for performing signal connection for the source and the load. In this embodiment, for the other surface opposite to the surface laid with the metal conductor layer 204 for performing signal connection for the source and the load, the grounded metal conductor layer may be laid on the whole surface, or the grounded metal conductor layer is at least laid on a portion contacting with the coaxial resonant cavity 201. In this way, the coaxial resonant cavity 201 is also grounded. In addition to ensuring signal circulation, the metal conductor layer 204 for performing signal connection for the source and the load may further

has a function of coupling a signal connected by the metal conductor layer 204 to a U-shaped intracavity conductor 203. The U-shaped intracavity conductor 203 may be curved prismatic or curved cylindrical. One end of the U-shaped intracavity conductor 203 contacts with the grounded metal conductor layer to implement grounding, and the other end is embedded in the printed circuit board 202, and does not contact with the metal conductor layer 204 for performing signal connection for the source and the load. A screw 205 arranged on the U-shaped intracavity conductor 203 is configured to adjust a frequency.

[0016] As another embodiment of the present invention, in the high-frequency filter shown in FIG. 2a, the printed circuit board may further be arranged inside the coaxial resonant cavity 201, a cavity opening of the coaxial resonant cavity 201 may be shielded by using a shield plate, and the U-shaped intracavity conductor 203 may be curved cylindrical, as shown in FIG. 2b. One end of the U-shaped intracavity conductor 203 contacts with the grounded metal conductor layer laid on the printed circuit board 202, and the other end is embedded in the printed circuit board 202, but does not contact with the metal conductor layer 204 for performing signal connection for the source and the load. A horizontal portion of the U-shaped intracavity conductor 203 is parallel to the surface of the printed circuit board 202 laid with the metal conductor layer 204 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer. In the high-frequency filter shown in FIG. 2a or FIG. 2b, since the U-shaped intracavity conductor 203 does not contact with the metal conductor layer 204 for performing signal connection for the source and the load, the U-shaped intracavity conductor 203 may be coupled with the metal conductor layer 204 for performing signal connection for the source and the load by using the printed circuit board 202 as a medium, and this type of coupling is capacitance coupling.

[0017] In the high-frequency filter shown in FIG. 2a or FIG. 2b, the structure and the relative position of each part in the coaxial resonant cavity may further be that: one end of the U-shaped intracavity conductor is connected to the grounded metal conductor layer, and the other end is embedded in the printed circuit board, and contacts with the metal conductor layer for performing signal connection for the source and the load. The horizontal portion of the U-shaped intracavity conductor is parallel to the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer. Since one end of the U-shaped intracavity conductor directly contacts with the metal conductor layer for performing signal connection for the source and the load, coupling between the U-shaped intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is current coupling.

[0018] A high-frequency filter provided in Embodiment 3 of the present invention includes at least one grounded

coaxial resonant cavity, at least one L-shaped intracavity conductor, and at least one printed circuit board covering a cavity opening of the coaxial resonant cavity.

[0019] FIG. 3 shows a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity 301 of the high-frequency filter provided in Embodiment 3. A metal conductor layer 304 for performing signal connection for a source and a load is laid on a surface of a printed circuit board 302, and a grounded metal conductor layer is laid on the other surface opposite to the surface of the printed circuit board 302 laid with the metal conductor layer 304 for performing signal connection for the source and the load. In addition to ensuring signal circulation, the metal conductor layer 304 may further has a function of coupling a signal connected by the metal conductor layer 304 to an L-shaped intracavity conductor 303.

[0020] The L-shaped intracavity conductor 303 may be curved prismatic or curved cylindrical, and a screw 305 on it is configured to adjust a frequency. One end of a vertical portion of the L-shaped intracavity conductor 303 is embedded in the printed circuit board 302, but does not contact with the metal conductor layer 304 for performing signal connection for the source and the load. In this embodiment, for the other surface opposite to the surface laid with the metal conductor layer 304 for performing signal connection for the source and the load, the grounded metal conductor layer may be laid on the whole surface, or the grounded metal conductor layer is at least laid on a portion contacting with the coaxial resonant cavity 301. In this way, the coaxial resonant cavity 301 is also grounded. One end of a horizontal portion of the L-shaped intracavity conductor 303 contacts with a side wall of the coaxial resonant cavity 301. Since the coaxial resonant cavity 301 is grounded, the end of the horizontal portion of the L-shaped intracavity conductor 303 is equivalent to being grounded. The horizontal portion of the L-shaped intracavity conductor 303 is parallel to the surface of the printed circuit board 302 laid with the metal conductor layer 304 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer.

[0021] In the high-frequency filter shown in FIG. 3, since the L-shaped intracavity conductor 303 does not directly contact with the metal conductor layer 304 for performing signal connection for the source and the load, the L-shaped intracavity conductor 303 may be coupled with the metal conductor layer 304 for performing signal connection for the source and the load by using the printed circuit board 302 as a medium, and this type of coupling is capacitance coupling.

[0022] In Embodiment 3 of the present invention, the structure and the relative position of each part in the coaxial resonant cavity may further be that: the end of the vertical portion of the L-shaped intracavity conductor is embedded in the printed circuit board, and contacts with the metal conductor layer for performing signal connection for the source and the load. In this embodiment, for

the other surface opposite to the surface laid with the metal conductor layer for performing signal connection for the source and the load, the grounded metal conductor layer may be laid on the whole surface, or the grounded metal conductor layer is laid on the portion contacting with the coaxial resonant cavity. In this way, the coaxial resonant cavity is also grounded. The end portion of the horizontal portion of the L-shaped intracavity conductor contacts with the side wall of the coaxial resonant cavity. Since the coaxial resonant cavity is grounded, the end portion of the horizontal portion of the L-shaped intracavity conductor is equivalent to be grounded. The horizontal portion of the L-shaped intracavity conductor is parallel to the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer. Since the end of the vertical portion of the L-shaped intracavity conductor directly contacts with the metal conductor layer for performing signal connection for the source and the load, coupling between the L-shaped intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is current coupling.

[0023] A high-frequency filter provided in Embodiment 4 of the present invention includes at least one grounded coaxial resonant cavity, at least one columnar intracavity conductor, at least one metal wire, and at least one printed circuit board covering a cavity opening of the coaxial resonant cavity.

[0024] FIG. 4 shows a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity 401 of the high-frequency filter provided in Embodiment 4. A columnar intracavity conductor 402 may be a cylindrical intracavity conductor or a prismatic intracavity conductor. A metal conductor layer 404 for performing signal connection for a source and a load is laid on a surface of a printed circuit board 403, and a grounded metal conductor layer is laid on the other surface opposite to the surface laid with the metal conductor layer 404 for performing signal connection for the source and the load, or the grounded metal conductor layer is at least laid on a portion contacting with the coaxial resonant cavity 401. In this way, the coaxial resonant cavity 401 is also grounded. In addition to ensuring signal circulation, the metal conductor layer 404 for performing signal connection for the source and the load may further has a function of coupling a signal connected by the metal conductor layer 404 to the columnar intracavity conductor 402. The columnar intracavity conductor 402 may be fixed in the coaxial resonant cavity 401, and one end of the columnar intracavity conductor 402 contacts with a side wall of the coaxial resonant cavity 401 to implement grounding. A screw 407 arranged on the columnar intracavity conductor 402 is configured to adjust a frequency.

[0025] One end of the metal wire 406 is connected to the columnar intracavity conductor 402, and the other end is connected to the metal conductor layer 404 for

performing signal connection for the source and the load. The relative relation between the printed circuit board 403 and the columnar intracavity conductor 402 may be that: the surface of the printed circuit board 403 laid with the metal conductor layer 404 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer is parallel to an axial direction or a center line direction of the columnar intracavity conductor 402. For example, if the columnar intracavity conductor 402 is a cylindrical intracavity conductor, the surface of the printed circuit board 403 laid with the metal conductor layer 404 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer is parallel to the axial direction of the columnar intracavity conductor 402; and if the columnar intracavity conductor 402 is a prismatic intracavity conductor, the surface of the printed circuit board 403 laid with the metal conductor layer 404 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer is parallel to the center line direction of the columnar intracavity conductor 402.

[0026] Since the columnar intracavity conductor 402 is connected to the metal conductor layer 404 for performing signal connection for the source and the load via the metal wire 406, coupling between the columnar intracavity conductor 402 and the metal conductor layer 404 for performing signal connection for the source and the load is current coupling.

[0027] A high-frequency filter provided in Embodiment 5 of the present invention includes at least one grounded coaxial resonant cavity, at least one columnar intracavity conductor, and at least one printed circuit board arranged inside the coaxial resonant cavity.

[0028] FIG. 5 shows a schematic diagram of a structure and a relative position of each part in a coaxial resonant cavity 401 of the high-frequency filter provided in Embodiment 5. A metal conductor layer 504 for performing signal connection for a source and a load is laid on a surface of a printed circuit board 503, and a grounded metal conductor layer is laid on the surface opposite to the surface laid with the metal conductor layer 504 for performing signal connection for the source and the load. The grounded metal conductor layer contacts with a side wall of the coaxial resonant cavity. A columnar intracavity conductor 502 may be a cylindrical intracavity conductor or a prismatic intracavity conductor, and one end of it contacts with the coaxial resonant cavity 401. Since the grounded metal conductor layer contacts with the side wall of the coaxial resonant cavity 401, the end of the columnar intracavity conductor 502 that contacts with the coaxial resonant cavity 401 is equivalent to being grounded. In addition to ensuring signal circulation, the metal conductor layer 504 for performing signal connection for the source and the load may further has a function of coupling a signal connected by the metal conductor layer 504 to the columnar intracavity conductor 502. A screw 505 arranged on the columnar intracavity conductor 502

is configured to adjust a frequency.

[0029] The relative relation between the printed circuit board 503 and the columnar intracavity conductor 502 may be that: the surface of the printed circuit board 503 laid with the metal conductor layer 504 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer 505 is perpendicular to an axial direction or a center line (if the columnar intracavity conductor 502 is a prismatic intracavity conductor) direction of the columnar intracavity conductor 502. For example, if the columnar intracavity conductor 502 is a cylindrical intracavity conductor, the surface of the printed circuit board 503 laid with the metal conductor layer 504 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer 505 is perpendicular to the axial direction of the columnar intracavity conductor 502; and if the columnar intracavity conductor 502 is a prismatic intracavity conductor, the surface of the printed circuit board 503 laid with the metal conductor layer 504 for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer 505 is perpendicular to the center line direction of the columnar intracavity conductor 502.

[0030] Since the columnar intracavity conductor 502 directly contacts with the metal conductor layer 504 for performing signal connection for the source and the load, coupling between the columnar intracavity conductor 502 and the metal conductor layer 504 for performing signal connection for the source and the load is current coupling.

[0031] It can be known from the high-frequency filter provided in the above embodiments of the present invention that, each coaxial resonant cavity of the high-frequency filter is provided with at least one printed circuit board and at least one intracavity conductor on a side of the printed circuit board. Because the plate making craft can ensure dimensional precision of the metal conductor layer for performing signal connection for the source and the load within plus or minus 1 mil (milli-inch), a dimensional tolerance of the printed circuit board and a fluctuation range of the dielectric constant can be effectively controlled, and there is no assembly tolerance. This high consistency of the printed circuit board ensures that consistency of indexes of components of the printed circuit board structure is higher than that of components assembled through pure machining. Specifically, in the high-frequency filter provided in the embodiments of the present invention, the high consistency of the printed circuit board ensures batch consistency of indexes such as filter standing wave, phase, and group delay, and a volume of the filter can be reduced in comparison to an air strip line because of a relatively high dielectric constant of the printed circuit board.

[0032] The high-frequency filter provided in the embodiments of the present invention is introduced above in detail, specific cases are applied herein to elaborate the principle and implementation manners of the present invention, and the descriptions of the above embodi-

ments are merely used to help understand the method and core concept of the present invention. Meanwhile, a person of ordinary skill in the art may change the specific implementation manners and the application scope based on the concept of the present invention. In conclusion, the contents in the specification should not be construed as limiting the present invention.

10 Claims

1. A high-frequency filter, wherein the high-frequency filter comprises at least one coaxial resonant cavity, at least one printed circuit board arranged at the coaxial resonant cavity, and at least one intracavity conductor on a side of the printed circuit board, wherein a metal conductor layer for performing signal connection for a source and a load is laid on a surface of the printed circuit board, a grounded metal conductor layer is laid on the other surface opposite to the surface laid with the metal conductor layer, and one end of the intracavity conductor and the coaxial resonant cavity are both grounded; and the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are coupled.
2. The high-frequency filter according to claim 1, wherein the printed circuit board covers a cavity opening of the coaxial resonant cavity, and the high-frequency filter further comprises at least one U-shaped coupling piece arranged inside the coaxial resonant cavity, wherein one end of the U-shaped coupling piece is connected to the metal conductor layer for performing signal connection for the source and the load, and the other end is connected to the grounded metal conductor layer; and the intracavity conductor is a columnar intracavity conductor, one end of the columnar intracavity conductor contacts with a side wall of the coaxial resonant cavity, and the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer is parallel to an axial direction or a center line direction of the columnar intracavity conductor.
3. The high-frequency filter according to claim 2, wherein the coupling between the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is specifically that: the columnar intracavity conductor is coupled with the metal conductor layer for performing signal connection for the source and the load via a magnetic field in the coaxial resonant cavity excited by the U-shaped coupling piece.
4. The high-frequency filter according to claim 1,

wherein the printed circuit board is arranged inside the coaxial resonant cavity, the intracavity conductor is a U-shaped intracavity conductor, one end of the U-shaped intracavity conductor is connected to the grounded metal conductor layer, the other end is embedded in the printed circuit board, and does not contact with the metal conductor layer for performing signal connection for the source and the load, and a horizontal portion of the U-shaped intracavity conductor is parallel to the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer.

5. The high-frequency filter according to claim 4, wherein the coupling between the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is specifically that: the U-shaped intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are capacitance coupled.
6. The high-frequency filter according to claim 1, wherein the intracavity conductor is a U-shaped intracavity conductor, one end of the U-shaped intracavity conductor is connected to the grounded metal conductor layer, the other end is embedded in the printed circuit board, and contacts with the metal conductor layer for performing signal connection for the source and the load, and a horizontal portion of the U-shaped intracavity conductor is parallel to the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer.
7. The high-frequency filter according to claim 6, wherein the coupling between the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is specifically that: the U-shaped intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are current coupled.
8. The high-frequency filter according to claim 1, wherein the printed circuit board covers a cavity opening of the coaxial resonant cavity, the intracavity conductor is an L-shaped intracavity conductor, one end of a vertical portion of the L-shaped intracavity conductor is embedded in the printed circuit board, and does not contact with the metal conductor layer for performing signal connection for the source and the load, one end of a horizontal portion of the L-shaped intracavity conductor contacts with a side wall of the coaxial resonant cavity, and the horizontal

portion of the L-shaped intracavity conductor is parallel to the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer.

9. The high-frequency filter according to claim 8, wherein the coupling between the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is specifically that: the L-shaped intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are capacitance coupled.
10. The high-frequency filter according to claim 1, wherein the printed circuit board covers a cavity opening of the coaxial resonant cavity, the intracavity conductor is an L-shaped intracavity conductor, one end of a vertical portion of the L-shaped intracavity conductor is embedded in the printed circuit board, and contacts with the metal conductor layer for performing signal connection for the source and the load, one end portion of a horizontal portion of the L-shaped intracavity conductor contacts with a side wall of the coaxial resonant cavity, and the horizontal portion of the L-shaped intracavity conductor is parallel to the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer.
11. The high-frequency filter according to claim 10, wherein the coupling between the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is specifically that: the L-shaped intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are current coupled.
12. The high-frequency filter according to claim 1, wherein the printed circuit board covers a cavity opening of the coaxial resonant cavity, and the high-frequency filter further comprises at least one metal wire arranged inside the coaxial resonant cavity, one end of the metal wire is connected to the intracavity conductor, and the other end is connected to the metal conductor layer for performing signal connection for the source and the load; and the intracavity conductor is a columnar intracavity conductor, one end of the columnar intracavity conductor contacts with a side wall of the coaxial resonant cavity, and the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer is parallel to an axial direction or a center line

direction of the columnar intracavity conductor.

13. The high-frequency filter according to claim 12, wherein the coupling between the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is specifically that: the columnar intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are current coupled via the metal wire. 5 10
14. The high-frequency filter according to claim 1, wherein the printed circuit board is arranged inside the coaxial resonant cavity, the intracavity conductor is a columnar intracavity conductor, one end of the columnar intracavity conductor contacts with a wall of the coaxial resonant cavity, the surface of the printed circuit board laid with the metal conductor layer for performing signal connection for the source and the load or the surface laid with the grounded metal conductor layer is perpendicular to an axial direction or a center line direction of the columnar intracavity conductor, and one end of the columnar intracavity conductor is grounded. 15 20 25
15. The high-frequency filter according to claim 14, wherein the coupling between the intracavity conductor and the metal conductor layer for performing signal connection for the source and the load is specifically that: the columnar intracavity conductor and the metal conductor layer for performing signal connection for the source and the load are current coupled. 30 35 40 45 50 55

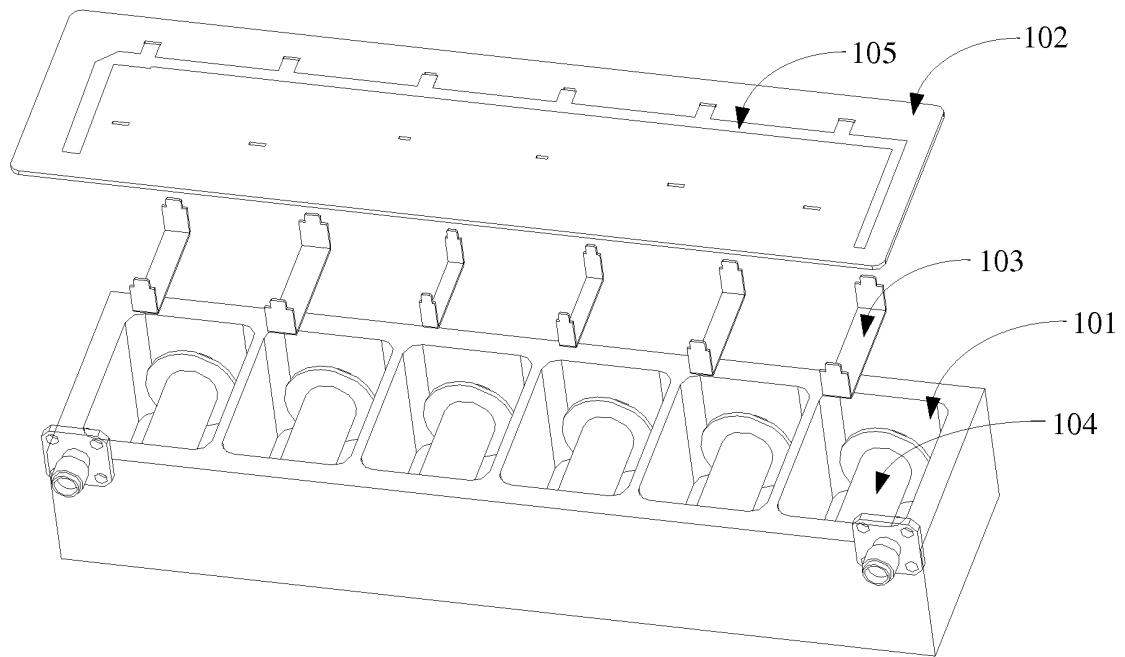


FIG. 1a

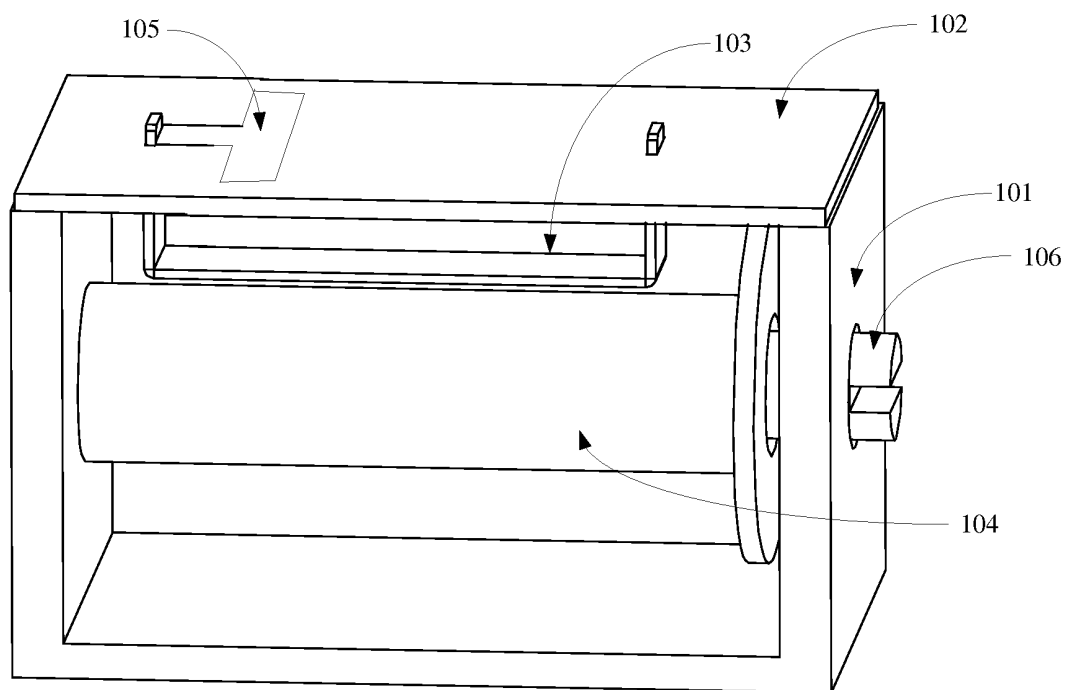


FIG. 1b

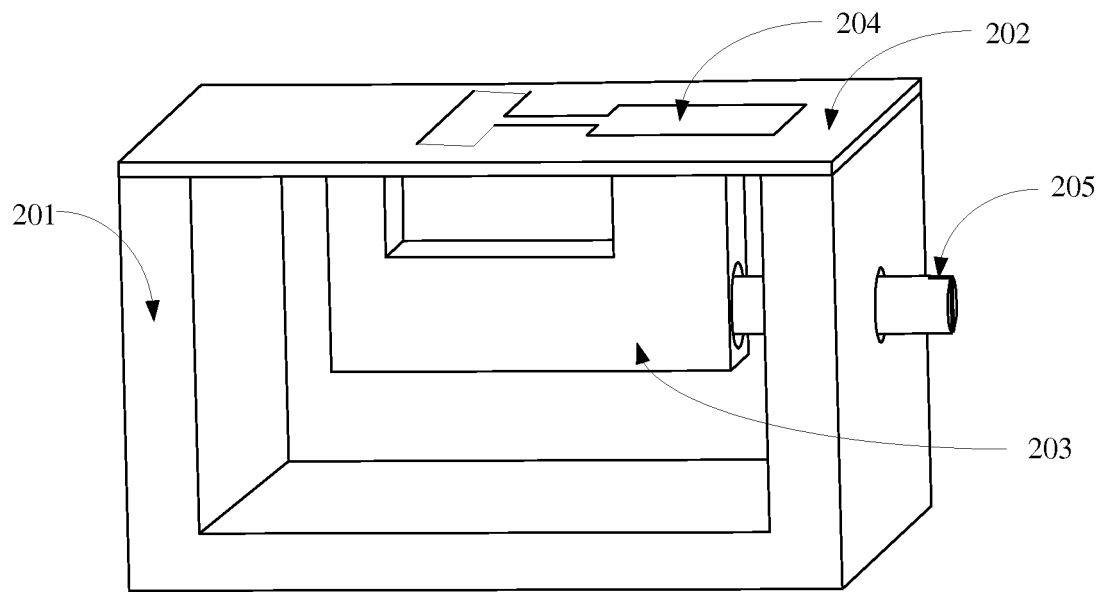


FIG. 2a

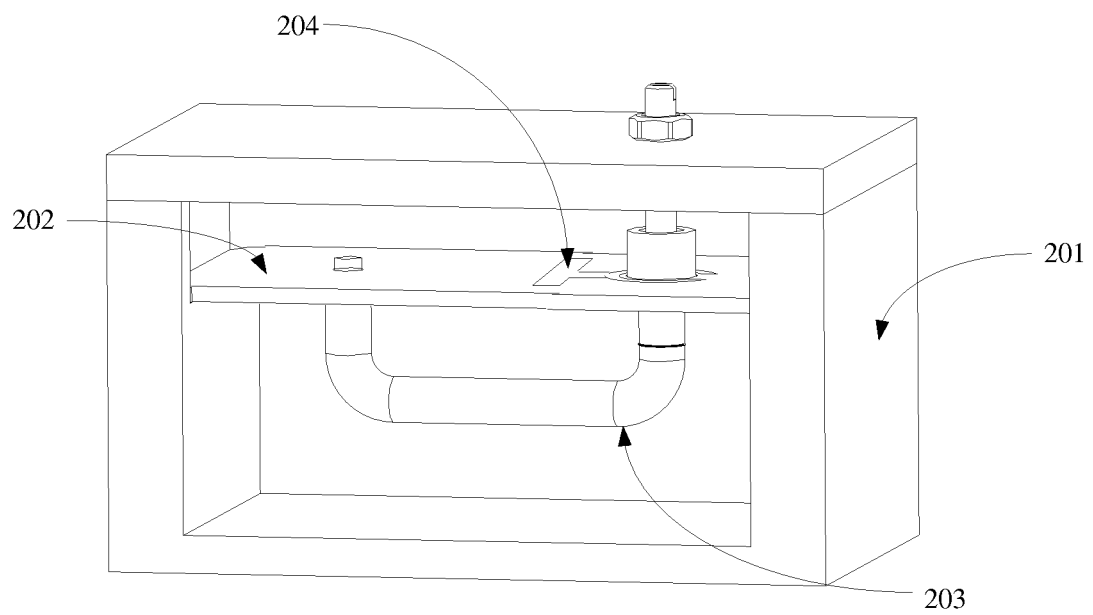


FIG. 2b

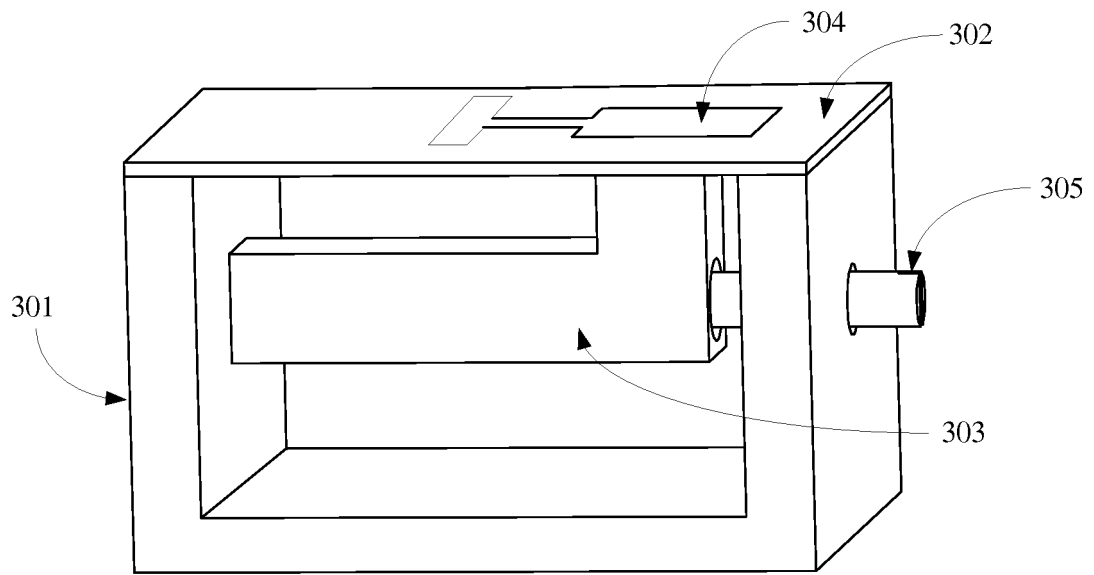


FIG. 3

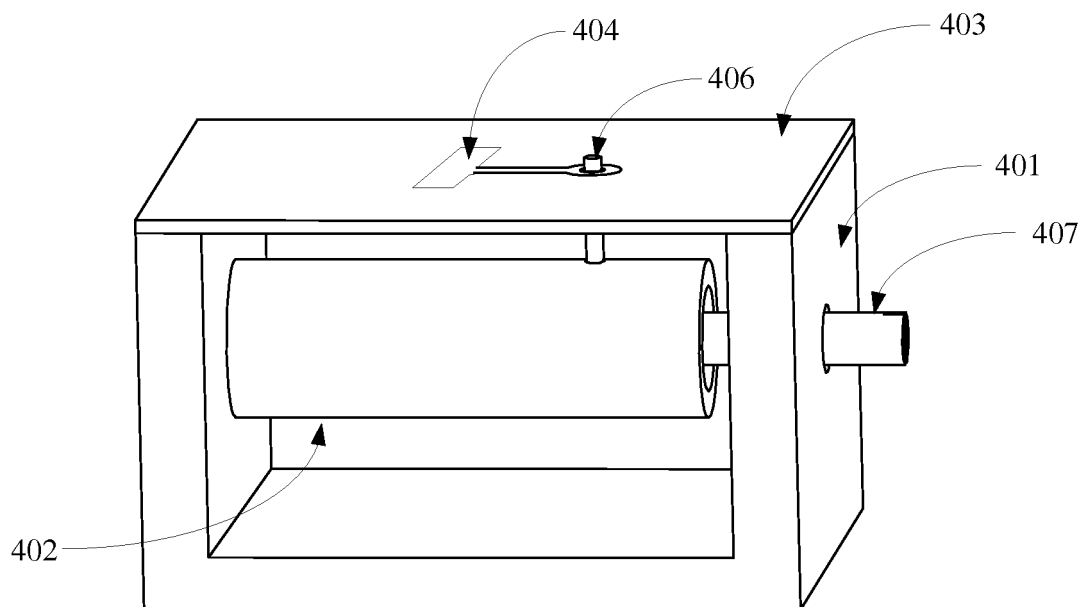


FIG. 4

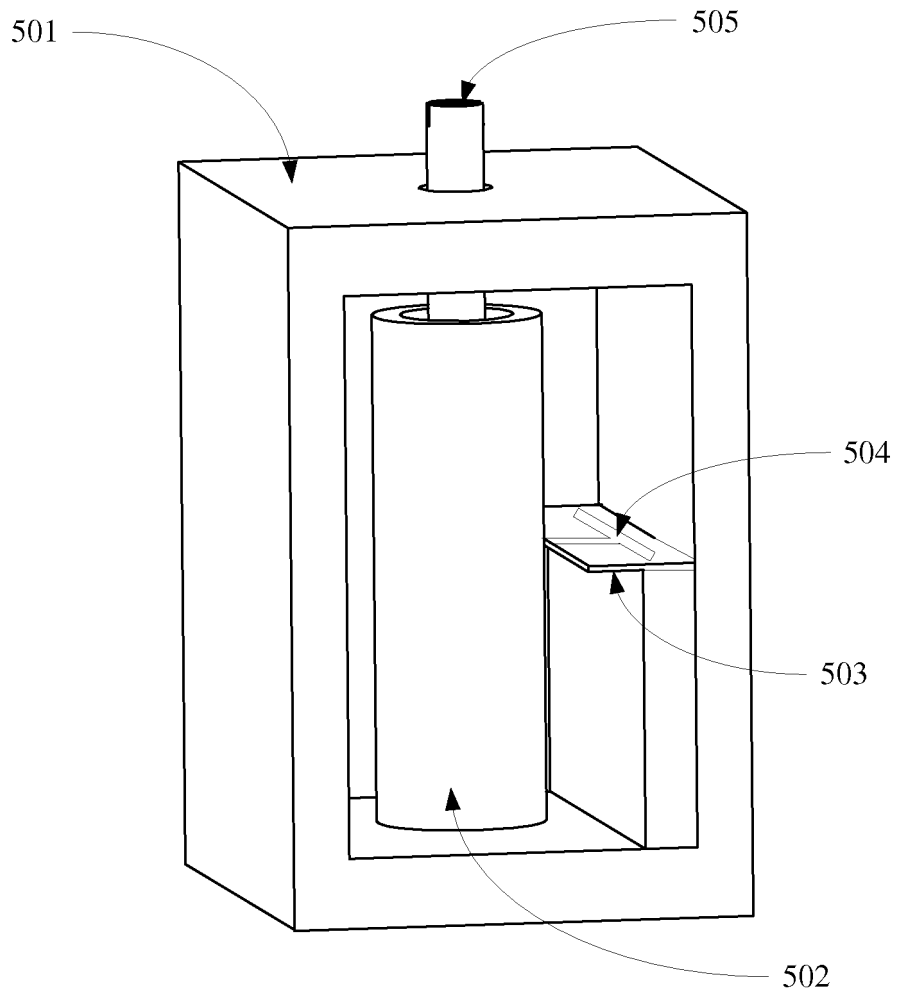


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2011/085003

A. CLASSIFICATION OF SUBJECT MATTER

See the extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: H01P 7/-, H01P 1/-,

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, WPI, EPODOC, CNKI: high, pass, frequency, filter, hollow, chamber, hpf

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN 1745498 A (THALES SUISSE SA) 08 March 2006 (08.03.2006) the whole document	1-15
A	CN 101252669 A (MEZZALINGUA JOHN ASS) 27 August 2008 (27.08.2008) the whole document	1-15
A	CN 1168006 A (MITSUBISHI ELECTRIC CORP.) 17 December 1997 (17.12.1997) the whole document	1-15
A	JP 2001-44704 A (SONY CORP.) 16 February 2001 (16.02.2001) the whole document	1-15
A	US 5004993 A (THE UNITED STATES OF AMERICA AS REPRESENTED BY THE SECRETARY OF THE NAVY) 02 April 1991 (02.04.1991) the whole document	1-15
A	US 2005/0140471 A1 (SHIH C.Y. et al.) 30 June 2005 (30.06.2005) the whole document	1-15

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	
"E" earlier application or patent but published on or after the international filing date	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	"&" document member of the same patent family

Date of the actual completion of the international search 14 September 2012 (14.09.2012)	Date of mailing of the international search report 18 October 2012 (18.10.2012)
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10)62019451	Authorized officer YUAN, Ye Telephone No. (86-10)82245819

Form PCT/ISA/210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/CN2011/085003

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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Form PCT/ISA/210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2011/085003

Continuation of : A. CLASSIFICATION OF SUBJECT MATTER

H01P 7/10 (2006.01) i

H01P 1/203 (2006.01) i