

BRIEF DESCRIPTION OF DRAWINGS

[0020] 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 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 without creative efforts.

[0021] FIG. 1 is a schematic diagram of the prior art related to the present invention;

[0022] FIG. 2 is a schematic diagram of an electronic apparatus with an integrated structure of a metal housing and an antenna of an electronic apparatus in the present invention;

[0023] FIG. 2A is a schematic diagram of magnifying a part of a micro gap set II in the integrated structure of a metal housing and an antenna of an electronic apparatus in the present invention shown in FIG. 42;

[0024] FIG. 3 is a schematic diagram of an integrated structure of a metal housing and an antenna of an electronic apparatus according to a first exemplary embodiment of the present invention;

[0025] FIG. 4 is a schematic diagram of an integrated structure of a metal housing and an antenna of an electronic apparatus according to a second exemplary ~~implementation~~ mannerembodiment of the present invention;

[0026] FIG. 5 is a schematic diagram of another form of an integrated structure of a metal housing and an antenna of an electronic apparatus according to a second exemplary ~~implementation manner~~ embodiment of the present invention;

[0027] FIG. 6 is a schematic diagram of an integrated structure of a metal housing and an antenna of an electronic apparatus according to a third exemplary ~~implementation manner~~ embodiment of the present invention;

[0028] FIG. 7 is a schematic diagram of another form of an integrated structure of a metal housing and an antenna of an electronic apparatus according to a third exemplary ~~implementation manner~~ embodiment of the present invention;

[0029] FIG. 8 is a schematic diagram of an integrated structure of a metal housing and an antenna of an electronic apparatus according to a fourth exemplary ~~implementation manner~~ embodiment of the present invention; and

[0030] FIG. 9 is a diagram of antenna return loss of the integrated structure, shown in FIG. 2, of a metal housing and an antenna of an electronic apparatus according to the present invention.

DESCRIPTION OF EMBODIMENTS

[0031] The following clearly and completely describes the technical solutions in the embodiments of the present invention with reference to the accompanying drawings in the

[0032] Referring to FIG. 2 and FIG. 2A, an exemplary implementation manner of the present invention provides an integrated structure of a metal housing and an antenna of an electronic apparatus, which includes an electronic apparatus 10. The electronic apparatus 10 includes a metal housing (not shown in the figures) and an antenna structure 20. The antenna structure 20 includes an antenna main body 21. At least one micro gap set is disposed on the metal housing. The at least one micro gap set includes micro gaps. The micro gap set divides the metal housing to form at least one metal region, and the at least one metal region is connected to the antenna main body 21 to serve as a radiating body of the antenna main body 21.

[0033] Specifically, the antenna structure 20 further includes a matching circuit 22 and a radio frequency transceiver circuit 24. The matching circuit 22 is located between the radio frequency transceiver circuit 24 and the antenna main body 21, and is electrically connected to the radio frequency transceiver circuit 24 and the antenna main body 21. The matching circuit 22 is used to adjust impedance matching of the loop antenna, so that the antenna main body 21 can better receive a radio frequency signal. The antenna main body 21 and the metal region may be connected by using a metal dome or connected by using a screw. The antenna main body is provided with a feed point 23, where the feed point 23 is disposed on the antenna main body 21. The micro gap may be formed by means of laser cutting, and run

peripheral frame of the electronic apparatus. The two micro gap sets 40 include more than two micro gaps 41. The two micro gap sets 40 are disposed at intervals to divide the peripheral frame, so as to form the metal regions 351 and 352. The antenna main body 21 is connected to the metal region 351. The metal region 351 serves as a radiating body of the antenna main body 21 to
5 implement an antenna function. Referring to FIG. 5, in another form of this ~~implementation manner~~embodiment, the metal housing 35 is a peripheral frame connected to a metal back cover. The two micro gap sets 40 divide the metal housing 35 to form metal regions 353 and 354. The antenna main body 21 is connected to either of the metal regions, which increases an area of the antenna main body 21, so as to improve performance of the antenna.

10 **[0037]** Further, in a third embodiment of the present invention, there is one micro gap set, and the micro gap set partially divides the metal housing to form one metal region. Referring to FIG. 6, the metal housing 45 is a back cover of the electronic apparatus. The micro gap set 50 includes more than two micro gaps 51. The micro gap set 50 is disposed at a corner that is on the metal housing 45 and is close to the antenna main body 21, so that the metal housing 45 becomes a
15 metal region 451 partially partitioned by the micro gap set 50. The antenna main body 21 is further provided with a ground point 26, and the ground point 26 is disposed on the metal region 451 on one side of the micro gap set 50. Referring to FIG. 7, in another manner of this embodiment, the metal housing 45 is a peripheral frame, and the micro gap set 50 partitions the peripheral frame.

20 **[0038]** Referring to FIG. 8, a fourth exemplary ~~implementation manner~~embodiment of the present invention provides an integrated structure of a metal housing and an antenna of an electronic apparatus, which includes an electronic apparatus 10. The electronic apparatus 10 includes a metal housing 12, a circuit board 14, and an antenna structure 20. The antenna structure 20 includes an antenna main body 21. At least one micro gap set 60 is disposed on the metal
25 housing 12. The at least one micro gap set 60 includes micro gaps. The micro gap set 60 divides the metal housing 12 to form at least one metal region 121.

[0039] A difference between this ~~implementation manner~~embodiment and the foregoing three implementation manners lies in that: the at least one metal region 121 is connected to ground of the circuit board 14 of the electronic apparatus 10, to serve as reference ground of the antenna
30 main body 21. Implementation manners of the micro gap set 60 and the metal

CLAIMS

What is claimed is:

1. An integrated structure of a metal housing and an antenna of an electronic apparatus, wherein the electronic apparatus comprises the metal housing and an antenna structure, the antenna structure comprises an antenna main body, at least one micro gap set is disposed on the metal housing, each micro gap set of the at least one micro gap set comprises multiple micro gaps, the at least one micro gap set divides the metal housing to form at least one metal region, and one metal region of the at least one metal region is connected to the antenna main body to serve as a radiating body of the antenna structure.

~~2. An integrated structure of a metal housing and an antenna of an electronic apparatus, wherein the electronic apparatus comprises the metal housing and an antenna structure, the antenna structure comprises an antenna main body, at least one micro gap set is disposed on the metal housing, the at least one micro gap set comprises micro gaps, the at least one micro gap set divides the metal housing to form at least one metal region, and one metal region of the at least one metal region is connected to ground of a circuit board of the electronic apparatus.~~

32. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 1-~~or~~ 2, wherein there is one micro gap set, and the micro gap set divides the metal housing into two independent metal regions.

43. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 1-~~or~~ 2, wherein there are two micro gap sets, and the micro gap sets divide the metal housing to form two metal regions.

54. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 1-~~or~~ 2, wherein there is one micro gap set, and the micro gap set partially divides the metal housing to form one metal region.

65. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 32, wherein the metal housing is a back cover, a front housing, or a back cover having a metal frame that are of the electronic apparatus, and the micro gap set laterally

or longitudinally runs through the metal housing to divide the metal housing into the two metal regions.

76. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 43, wherein the metal housing is a peripheral frame of the electronic apparatus or a peripheral frame connected to a metal back cover, and the two micro gap sets are disposed at intervals to divide the peripheral frame into the two metal regions.

87. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 54, wherein the metal housing is a back cover of the electronic apparatus, a back cover connected to a metal frame, or a peripheral frame.

98. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 1 to 87, wherein the antenna structure further comprises a matching circuit and a radio frequency transceiver circuit, and the matching circuit is located between the radio frequency transceiver circuit and the antenna main body, and is electrically connected to the radio frequency transceiver circuit and the antenna main body.

109. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 1 to 98, wherein the antenna structure further comprises a feed point, and the feed point is disposed on the antenna main body.

110. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 1 to 109, wherein the micro gap set is formed by arranging the multiple micro gaps at intervals.

1211. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 1 to 110, wherein the micro gap set is formed by crosswise disposing the multiple micro gaps.

1312. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 11-10 or 1211, wherein a nonmetal material fills ~~between~~in the multiple micro gaps.

1413. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 1 to 1312, wherein a width of the micro gap is less than 0.5 millimeter.

1514. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 1 to 1413, wherein the antenna main body and the metal region

may be connected by using a metal dome or connected by using a screw.

15. An integrated structure of a metal housing and an antenna of an electronic apparatus, wherein the electronic apparatus comprises the metal housing and an antenna structure, the antenna structure comprises an antenna main body, at least one micro gap set is disposed on the metal housing, each micro gap set of the at least one micro gap set comprises multiple micro gaps, the at least one micro gap set divides the metal housing to form at least one metal region, and one metal region of the at least one metal region is connected to ground of a circuit board of the electronic apparatus.

16. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 15, wherein there is one micro gap set, and the micro gap set divides the metal housing into two independent metal regions.

17. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 15, wherein there are two micro gap sets, and the micro gap sets divide the metal housing to form two metal regions.

18. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 15, wherein there is one micro gap set, and the micro gap set partially divides the metal housing to form one metal region.

19. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 16, wherein the metal housing is a back cover, a front housing, or a back cover having a metal frame that are of the electronic apparatus, and the micro gap set laterally or longitudinally runs through the metal housing to divide the metal housing into the two metal regions.

20. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 17, wherein the metal housing is a peripheral frame of the electronic apparatus or a peripheral frame connected to a metal back cover, and the two micro gap sets are disposed at intervals to divide the peripheral frame into the two metal regions.

21. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 18, wherein the metal housing is a back cover of the electronic apparatus, a back cover connected to a metal frame, or a peripheral frame.

22. The integrated structure of a metal housing and an antenna of an electronic apparatus

according to any one of claims 15 to 21, wherein the antenna structure further comprises a matching circuit and a radio frequency transceiver circuit, and the matching circuit is located between the radio frequency transceiver circuit and the antenna main body, and is electrically connected to the radio frequency transceiver circuit and the antenna main body.

5 23. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 15 to 22, wherein the antenna structure further comprises a feed point, and the feed point is disposed on the antenna main body.

10 24. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 15 to 23, wherein the micro gap set is formed by arranging the multiple micro gaps at intervals.

15 25. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 15 to 24, wherein the micro gap set is formed by crosswise disposing the multiple micro gaps.

20 26. The integrated structure of a metal housing and an antenna of an electronic apparatus according to claim 24 or 25, wherein a nonmetal material fills in the multiple micro gaps.

25 27. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 15 to 26, wherein a width of the micro gap is less than 0.5 millimeter.

30 28. The integrated structure of a metal housing and an antenna of an electronic apparatus according to any one of claims 15 to 27, wherein the antenna main body and the metal region may be connected by using a metal dome or connected by using a screw.