

HIGH IMPEDANCE TYPE HIGH FREQUENCY ANTENNA

TECHNICAL FIELD

The present invention relates to a high impedance type high frequency antenna, and in particular, to an improved high impedance type high frequency antenna by which the antenna is not influenced by an external factor when a human body or the like approaches the antenna by enabling a high impedance by decreasing a reactance component and increasing a resistance component, whereby it is possible to fabricate a compact size product.

BACKGROUND ART

The conventional antenna of a mobile phone, a wireless phone, a PCS (Personal Communication System), or the like is lengthy, thus causing inconvenience. Therefore, it is needed to fabricate a shorter antenna of the system.

In order to overcome the above-described problem, in an impedance ($R \pm jX$), the resistance R should be preferably 250Ω , and the reactance X should be preferably $-350 \sim -450$. However, when the above-described values are actually adopted, the antenna is easily influenced when a human body or the like approaches the same due to the resistance R and the reactance X , thus degrading the SWR (Standing Wave Ratio) and an antenna characteristic, whereby the lengthy of the antenna of a high frequency broad band wireless instrument becomes about 16~18 cm.

Figures 1 through 4 are schematic diagrams illustrating conventional antennas. As shown therein, there are known four kinds of loading type antennas in which $1/2\lambda$ and $1/4\lambda$ are used.

Namely, the helical antenna of $1/4\lambda$ and the monopole antenna of $1/2\lambda$

monopole antenna of $1/2\lambda$ is generally used. Conventionally, the capacity of antenna is indicated as a R and jX, and in the monopole antenna of $1/2\lambda$, the value of R is 200~300Ω, and the value of X is -300~-400Ω.

5 However, in the conventional antenna, in the antenna of $1/4\lambda$, it is possible to reduce the length of the same. However, since the inductance component is high, the efficiency is increased due to a thermal loss.

In addition, since the monopole antenna has a lower resistance (R: 200~300Ω) and a reactance component (X: -300~-400Ω), the antenna is influenced when a human body or the like approaches the same. The 50Ω
10 matching state when the antenna is not influenced by the human body or the like due to the lower resistance component and the reactance component becomes electrically unstable, thus degrading the SWR (Standing Wave Ratio), whereby the efficiency of the antenna is decreased.

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DISCLOSURE OF THE INVENTION

Accordingly, it is an object of the present invention to provide a high impedance type high frequency antenna which overcomes the aforementioned problems encountered in the conventional art.

It is another object of the present invention to provide an improved high
20 impedance type high frequency antenna by which the antenna is not influenced by an external factor when a human body or the like approaches the antenna by enabling a high impedance by decreasing a reactance component and increasing a resistance component, whereby it is possible to fabricate a compact size product.

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It is another object of the present invention to provide an improved high impedance type high frequency antenna which is capable of reducing the length of the antenna by using a smith chart.

It is another object of the present invention to provide an improved high impedance type high frequency antenna which is capable of providing an improved antenna having a highest pure resistance.

To achieve the above objects, there is provided a high impedance type high frequency antenna which includes an RF module having an input and output capacity of 50Ω , and a matching circuit connected between the antenna and the RF module for outputting 50Ω of an impedance and having a smith chart at a $1/4\lambda$ helical portion so that a $1/2\lambda$ monopole antenna is matched with a 50Ω RF module, wherein the matching circuit includes a condenser having a capacity of 1PF and an inductor having a capacity of 18mH, and the impedance of the $1/2\lambda$ monopole is $400\sim 500\Omega$, and a reactance of the same is 0, wherein the matching circuit includes a condenser having a capacity of 1PF and an inductor having a capacity of 18mH, and the impedance of the $1/2\lambda$ monopole is $400\sim 500\Omega$, and the reactance of the same is 0.

Additional advantages, objects and other features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realized and attained as particularly pointed out in the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus are not limitative of the present invention, and wherein:

Figures 1 through 4 are schematic diagrams illustrating the

constructions of conventional antennas;

Figure 5 is a schematic diagram illustrating the construction of a high impedance type high frequency antenna according to the present invention;

Figure 6 is a detailed circuit diagram illustrating a matching circuit
5 according to the present invention;

Figure 7 is a diagram illustrating a smith chart according to the present invention; and

Figures 8A through 8C are front views illustrating the construction of an antenna according to the present invention, of which:

10 Figure 8A is a front view illustrating an antenna according to the present invention;

Figure 8B is a front view illustrating an inductor according to the present invention; and

15 Figure 8C is a front view illustrating a condenser according to the present invention.

MODES FOR CARRYING OUT THE INVENTION

Figure 5 illustrates the construction of a high impedance type high frequency antenna according to the present invention.

20 As shown therein, the high impedance type high frequency antenna according to the present invention includes an RF module 10 having an input and output capacity of 50Ω , an antenna 20 for receiving and transmitting signals, and a matching circuit 30 connected between the antenna 20 and the RF module for outputting 50Ω of the impedance of the antenna so that the
25 signal from the antenna 20 is made identical to the impedance of the RF module 10.

Figure 6 illustrates a matching circuit according to the present invention.

As shown therein, a condenser C10 of 1pF and an inductor L10 of a 18mH are connected.

Figure 7 illustrates a smith chart according to the present invention, and Figures 8A through 8C illustrate the construction of an antenna according to the present invention, of which: Figure 8A is a front view illustrating an antenna according to the present invention, Figure 8B is a front view illustrating an inductor according to the present invention, and Figure 8C is a front view illustrating a condenser according to the present invention.

Referring to Figure 7, in the drawings, points A through C denote impedance flowing paths. Namely, such points are impedance regions in which there is not a reactance component, and the resistance component is 450~500Ω which value is known high. In addition, at the points A through C, there are not any influence from the human body or the like.

Since the output from the RF module 10 is 50Ω, the output is related to the point B in the smith chart. In order to move the point A to the point B based on the matching principle, the parallel condenser of an admittance chart and the serial inductor of an impedance chart are further needed.

Therefore, in the matching circuit 30 as shown in Figure 6, the condenser C10 having a capacity of 1pF and the inductor L10 having a capacity of 18mH are needed. The integer values may be varied based on the various environment during the experiment or test.

The high impedance of the antenna is matched with the RF module output impedance of the matching circuit 30.

In addition, the monopole antennas of the $1/4\lambda$ and $1/2\lambda$ are made shorter, and the antenna is not influenced by the human body or the like by using a high impedance antenna.

Namely, when the monopole antenna of $1/2\lambda$ is extended, the $1/2\lambda$

monopole portion becomes a high impedance by using an LC matching circuit of the helical antenna portion of $1/4\lambda$, and the $1/4\lambda$ helical antenna becomes a matching circuit.

5 As described above, in the high impedance type high frequency antenna according to the present invention, the antenna is not influenced by the human or the like by decreasing the reactance component and increasing the resistance component, for thus forming a high impedance state, and it is possible to fabricate an antenna having a length of about 8~10cm, whereby it is possible to fabricate a compact size product.

10 Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as recited in the accompanying claims.

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CLAIMS

1. A high impedance type high frequency antenna for a wire less instrument or the like, comprising:

an RF module having an input and output capacity of 50Ω ; and

5 a matching circuit connected between the antenna and the RF module for outputting 50Ω of an impedance and having a smith chart at a $1/4\lambda$ helical portion so that a $1/2\lambda$ monopole antenna is matched with a 50Ω RF module.

2. The antenna of claim 1, wherein said matching circuit includes
10 a condenser having a capacity of 1PF and an inductor having a capacity of 18mH.

3. The antenna of claim 1, wherein an impedance of the $1/2\lambda$ monopole is $400\sim 500\Omega$, and a reactance of the same is 0.

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