Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
BACKGROUND OF THE INVENTION

Field of the Invention

[0001] Embodiments of the present invention relate to a wireless charging and communication board and a wireless charging and communication device.

Description of the Related Arts

[0002] As one of radio frequency tag identification (RFID) technologies, near field communication (NFC) is a smart card type contactless communication technology using a frequency band of 13.56 MHz. As a wireless charging technology, wireless power conversion (WPC) is a contactless charging technology for charging a battery using magnetic coupling at a short range without electrical contact.

[0003] NFC is a next-generation near field communication technology which receives attention because NFC enables wireless communication between electrical devices at a short range with low power and has relatively excellent security due to the short communication range and a low price. Furthermore, it is advantageous in that NFC has a bidirectional property and a large storage memory space compared to a smart card, and the range of applicable services is wide. Also, it is advantageous in that WPC can be applied to various fields regarding battery charging because WPC enables battery charging via magnetic coupling without electrical contact.

[0004] An antenna used in the NFC or WPC system includes a coil having a fixed area and receives necessary energy for the operation of a microchip from a reader. A magnetic field is formed by alternating current power energy generated from a primary coil so that electrical currents passing through the coil of the antenna can be abandoned, and a voltage is generated by an inductance of the antenna. The voltage is used as power for data transmission or is used in charging a battery. KR20130072181A, US2011/210696A1 and US2006/266435A1 are wireless charging and communication devices according to the prior art.

[0005] As a smart terminal has widely come into wide use, the need of a device capable of providing both the NFC and WPC has been increased. Thus, the development of a device having high charging efficiency and a sufficient long recognition distance upon data communication has been required.

SUMMARY OF THE INVENTION

[0006] Aspects of the invention are set out in the appended claims.
mission coil pattern 520, 530, wherein the first transmission coil pattern 520 is a coil pattern for wireless power conversion (WPC), and the second transmission coil pattern 530 is a coil pattern for near field communication (NFC).

[0015] The first transmission coil pattern 520 is connected to a power source (not drawn), and the first reception coil pattern 120 is connected to a circuit part (not drawn).

[0016] The power source may be an alternating current power source providing an alternating current having a predetermined frequency. An alternating current flows through the first transmission coil patterns 520 by power supplied from the power source (not drawn).

[0017] When the alternating current flows through the first transmission coil pattern 520, the alternating current is also induced to the first reception coil pattern 120 spaced apart from the first transmission coil pattern 520 by electromagnetic induction.

[0018] The current induced to the reception coil pattern 120 is transmitted to the separate circuit part (not drawn) and is then rectified.

[0019] Meanwhile, the transmitter 500 according to the present embodiment of the invention may be composed of a transmission pad, and the receiver 100 may be constituted as an element for a portable terminal, a home/personnel electronic product, a transportation means and the like to which wireless power conversion is applied. The portable terminal, the home/personnel electronic product, the transportation means and the like to which wireless power conversion is applied may include only a wireless power receiver or may include both a wireless power transmitter and a wireless power receiver.

[0020] That is, the transmitter 500 may serve as a reader, and the receiver 100 may serve as a tag.

[0021] The receiver 100 may include a wireless charging and communication board and a housing 400 in which the wireless charging and communication board is received. The housing 400 may radiate heat generated from the coil pattern 120, 130 to the outside.

[0022] Meanwhile, the wireless charging and communication board may include: a soft magnetic layer 220, 230; a polymeric material layer 310, 312 disposed on one surface and the other surface of the soft magnetic layer 220, 230 and extending longer than an exposed portion of the soft magnetic layer 220, 230; the coil pattern 120, 130; and a processing hole 311 passing through the wireless charging and communication board and used in performing aligning.

[0023] Also, the polymeric material layer 310, 312 may include a first polymeric material layer 310 arranged on one surface of the soft magnetic layer 220, 230, and a second polymeric material layer 321 arranged on the other surface of the soft magnetic layer 220, 230.

[0024] At this time, the polymeric material layer 310, 312 may be made with a black film. The polymeric material layer 310, 312 may be adhered to the soft magnetic layer 220, 230 via an adhesive layer 315. The polymeric material layer 310, 312 may contain any one material of polyethylene, polyacrylic, polyimide, polyamide, and polyurethane.

[0025] Meanwhile the soft magnetic layer 220, 230 may be configured such that, on the same plane on which the first soft magnetic layer 220 and the second soft magnetic layer 230 are arranged, the second soft magnetic layer 230 is arranged around the first soft magnetic layer 220, more specifically, the second soft magnetic layer 230 is disposed to surround the first soft magnetic layer 220.

[0026] Also, the coil pattern 120, 130 may include the first coil pattern 120 arranged in a region on the second polymeric material layer 312 corresponding to the first soft magnetic layer 220, and the second coil pattern 130 arranged in a region on the second polymeric material layer 312 corresponding to the second soft magnetic layer 230.

[0027] The transmitter 500 may include: a soft magnetic layer 550; a transmission coil pattern 520, 530 attached to the soft magnetic layer 550 via an adhesive layer 535; and a housing 600.

[0028] Accordingly, according to the present embodiment of the invention, both the constitution including the first soft magnetic layer 220 and the first coil pattern (120) and capable of enabling wireless power conversion (WPC) and the constitution including the second soft magnetic layer 230 and the second coil pattern 130 and capable of enabling near field communication (NFC) may be included, and both the WPC and NFC may be provided.

[0029] Meanwhile, in another embodiment, the first transmission coil pattern 520 may be composed of a coil pattern for near field communication (NFC), and the second transmission coil pattern 530 may be composed of a coil pattern for wireless power conversion (WPC).

[0030] FIG. 2 is a cross-sectional view of a wireless charging and communication board according to one embodiment of the present invention.

[0031] As illustrated in FIG. 2, a wireless charging and communication board according to one embodiment of the present invention may include: a soft magnetic layer 220, 230; a polymeric material layer 310 312 arranged on one surface and the other surface of the soft magnetic layer 220, 230 and extending longer than an exposed portion of the soft magnetic layer 220, 230; and a coil pattern 120, 130 arranged on the polymeric material layer 310, 312.

[0032] Also, the polymeric material layer 310, 312 may include a first polymeric material layer 310 and a second polymeric material layer 312; the soft magnetic layer 220, 230 may include a first soft magnetic layer 220 and a second magnetic layer 230; and the coil pattern 120, 130 may include a first coil pattern 120 and a second coil pattern 130.

[0033] Also, an extension length 1 of a first polymeric material layer 310, or a second polymeric material layer 312 and a thickness t of the magnetic soft material layer...
At this time, 1 represents an extension length of the first polymeric material layer 310, or the second polymeric material layer 312. \( h \) represents a thickness of the soft magnetic layer 220, 230, and \( A \) represents a constant of 0.6 to 10. When the value of \( A \) is less than 0.6, the polymeric material layer 310, 312 may not sufficiently surround the soft magnetic layer 220, 230, so that moisture can penetrate. When the value of \( A \) is more than 10, the polymeric material layer 310, 312 may excessively extend so that the polymeric material layer can be easily bent and damaged by an external impact, or a thickness can be increased because a separate receiving part should be added.

Also, the first soft magnetic layer 220 and the second soft magnetic layer 230 may be made of different materials. For example, the first soft magnetic layer 220 may be made with an amorphous ribbon, and the second soft magnetic layer 230 may be made of any one material of a composite, a ferrite, a Ni-Zn material, and a Mn-Zn material.

When the first soft magnetic layer 220 is made with an amorphous ribbon, high permeability can be implemented in an operating frequency of 100 to 200 kHz. When the second soft magnetic layer 230 is made of any one material of a composite, a ferrite, a Ni-Zn material, and a Mn-Zn material, data loss generated during communication can be reduced.

When the soft magnetic layer 120 is made of a ferrite material, the soft magnetic layer may be implemented in various forms such as a pellet form, a plate form, a ribbon form, a foil form, a film form and the like. Also, the soft magnetic layer 120 may contain at least one of Fe, Ni, Co, Mn, Al, Zn, Cu, Ba, Ti, Sn, Sr, P, B, N, C, W, Cr, Bi, Li, Y and Cd.

The coil pattern 120, 130 may include the first coil pattern 120 arranged in a region on the polymeric material layer 310 corresponding to the first soft magnetic layer 220, and the second coil pattern 130 arranged in a region on the polymeric material layer 310 corresponding to the second soft magnetic layer 230.

At this time, as illustrated in FIG. 2, the coil pattern 120, 130 may be adhered to the polymeric material layer 310 via an adhesive layer 135.

FIG. 3 is a cross-sectional view of a wireless charging and communication board according to another embodiment of the present invention.

As illustrated in FIG. 3, a wireless charging and communication board according to the present embodiment of the invention includes: a soft magnetic layer 220, 230; a polymeric material layer 310, 312 arranged on one surface and the other surface of the soft magnetic layer 220, 230, and extending longer than an exposed portion of the soft magnetic layer 220, 230; and a coil pattern 120, 130 arranged on the polymeric material layer 310, 312.

However, in the embodiment of FIG. 3, the wireless charging and communication board further includes a polymeric material connector 313 intended for connecting the first polymeric material layer 310 and the second polymeric material layer 312 and surrounding the exposed portion of the soft magnetic layer 220. In this specification, a term of the polymeric material connector 313 can be used with a term of the extending portion. That is, a first extending portion (313) may be extended in the first polymeric material layer 310, and a second extending portion (314) may be extended in the second polymeric material layer 312.

Accordingly, in the embodiment of FIG. 3, the exposed portion may refer to an end exposed by a processing hole 311, and the polymeric material connector 313 surrounding the exposed portion of the soft magnetic layer 220 may prevent water penetration from the outside.

FIGS. 4 and 5 are cross-sectional views of a wireless charging and communication board according to a further embodiment of the present invention.

According to the embodiment of FIGS. 4 and 5, the polymeric material layer 310, 312 may be directly formed on the soft magnetic layer 220, 230 without forming an adhesive layer 315 for adhering the polymeric material layer 310, 312 to the soft magnetic layer 220, 230.

At this time, the polymeric material layer 310, 312 may be directly formed on the soft magnetic layer 220, 230 via thermal compression bonding.

Like the embodiment of FIGS. 4 and 5, when the polymeric material layer 310, 312 is directly formed on the soft magnetic layer 220, 230, there is no need to use an adhesive layer so that a process can be simplified, a production cost can be reduced, and the wireless charging and communication board can be more thinly produced.

Meanwhile, in the embodiments of FIGS. 2 to 6, a cross section of the processing hole of the wireless charging and communication board has been explained as an example, but the exposed portion of an end for connecting the lead frame may be also identically configured.

FIG. 6 is a top view illustrating coil patterns according to one embodiment of the present invention, more specifically, a view illustrating wireless charging and communication board included in a receiver according to one embodiment of the present invention.

FIG. 7 is a top view illustrating a soft magnetic layer according to one embodiment of the present invention and FIG. 8 is a top view illustrating a polymeric material layer according to one embodiment of the present invention.
The coil pattern 120, 130 may be adhered to the polymeric material layer 310 via the adhesive layer 135 as shown in FIG. 2, or may be disposed on a separate substrate 110 as shown in FIG. 6.

[0053] As illustrated in FIG. 6, align marks 115, 116 for enabling aligning upon the wireless charging and communication board may be formed on the substrate 110.

[0054] Also, as illustrated in FIGS. 7 and 8, the wireless charging and communication board may further include a lead frame 140 connected to the coil pattern 120, 130, and the second soft magnetic layer 230 may be disposed to surround the lead frame 140.

[0055] More specifically, as shown in FIG. 4, the second soft magnetic layer 230 may be disposed to surround the lead frame 140 at a regular interval of 1 to 3 mm. As such, when the second soft magnetic layer 230 is disposed to surround the lead frame 140 at the regular interval, even though the lead frame 140 is disposed, the problem of a reduction in transmission efficiency upon charging or a reduction in a recognition distance upon data communication can be prevented.

[0056] Also, in the exposed portion of an end for connecting the lead frame 140, the polymeric material layer 310, 312 extending longer than the soft magnetic layer 220, 230 may be formed as shown in FIG. 2, or the polymeric material connector 313 surrounding an end of the polymeric material layer 310, 312 may be formed as shown in FIG. 3.

[0057] The polymeric material layer 310, 312 of FIG. 8 may be disposed on one surface and the other surface of the first and second soft magnetic layers 220, 230. The polymeric material layer 310, 312 may be disposed to be adhered to the first and second magnetic layer 220, 230 via the adhesive layer 315.

[0058] Also, the processing hole 311 may be formed in the polymeric material layer 310, 312 and the soft magnetic layer 220.

[0059] The processing hole 311 may perform aligning with the align marks 115, 116 of FIG. 6 upon manufacturing the wireless charging and communication board.

[0060] FIGS. 9 and 10 are cross-sectional views of a wireless charging and communication board according to yet another embodiment of the present invention.

[0061] The wireless charging and communication board according to the present embodiment of the invention of FIGS. 9 and 10 may be configured such that the soft magnetic layer 220, 230 is adhered onto one surface and the other surface of the adhesive layer 223, respectively.

[0062] According to the embodiment of the invention of FIGS. 9 and 10, the soft magnetic layer 220, 230 may be added in plural numbers so that transmission efficiency upon charging can be adjusted or improved, a recognition distance upon data communication can be adjusted.

[0063] FIGS. 11 to 13 are view illustrated for explaining transmission efficiency and a recognition distance of the wireless charging and communication board according to one embodiment of the present invention.

[0064] More specifically, FIG. 11 is a table showing the comparison of the changes in transmission efficiency and a recognition distance according to a conventional art and the embodiment of the present invention, FIG. 12 is a graph illustrating a change in transmission efficiency resulting from a change in a diameter of the processing hole according to the embodiment of the present invention, and FIG. 13 is a graph illustrating a change in transmission efficiency resulting from a distance of the soft magnetic layers according to the embodiment of the present invention.

[0065] According to the present embodiment of the invention, as illustrated in FIG. 11, comparing embodiment A in which the second soft magnetic layer does not surround around the lead frame, and a processing hole is not formed, and embodiment B in which the second soft magnetic layer surrounds around the lead frame, and the processing hole is formed, there is a slight difference in transmission efficiency and there is no difference in a recognition distance.

[0066] Also, as illustrated in FIG. 12, when a diameter of the processing hole is changed to the range of 1 to 3 mm, the effect of an increase in transmission efficiency is generated. As illustrated in FIG. 13, when the soft magnetic layer (the second soft magnetic layer) surrounds around the lead frame, transmission efficiency is slightly reduced, so there is no large difference in transmission efficiency.

[0067] As set forth above, according to some embodiments of the present invention, the wireless charging and communication board may enable both the wireless power conversion (WPC) and near field communication (NFC).

[0068] According to some embodiments of the present invention, the portion of the soft magnetic layer exposed to the atmosphere is minimized so that the inflow of a foreign substance to the outside can be minimized, and the soft magnetic layer is disposed to surround the lead frame at a regular interval so that the problems of a reduction in transmission efficiency upon charging and a reduction in a recognition distance upon data communication can be overcome even though the lead frame is disposed.

[0069] Furthermore, according to some embodiments of the present invention, the soft magnetic layer is added so that transmission efficiency upon charging can be adjusted or improved, and a recognition distance upon data communication can be adjusted.

Claims

1. A wireless charging and communication board, comprising:

   a plurality of soft magnetic layers (220, 230) comprising a first soft magnetic layer (220) and a sec-
ond soft magnetic layer(230);
a first polymeric material layer(310) arranged on
a first surface of the plurality of the soft magnetic layers(220, 230);
a second polymeric material layer(312) ar-
ranged on a second surface of the plurality of
the soft magnetic layers(220, 230) opposite to
the first surface; and
a coil pattern(120, 130) arranged on the second
polymeric material layer(312), wherein at least
one of the first soft magnetic layer(220) and the
second soft magnetic layer(230) is made with
one or more of an amorphous alloy, a crystalline
alloy, an amorphous alloy ribbon, a nanocryst-
alline ribbon, and a silicon steel plate,
wherein the plurality of the soft magnetic lay-
ers(220, 230) are positioned between the first
polymeric material layer(310) and the second
polymeric material layer(312),
wherein the first extending portion(313) and the
second extending portion(314) are connected
to each other.

2. The wireless charging and communication board of
claim 1, wherein a length(l) of the first extending por-
tion(313) or the second extending portion(314) and
a thickness(h) of the plurality of the soft magnetic
layers(220, 230) have a relation of the following
equation, wherein A represents a constant of 0.6 to
10:

\[ l = A \times h. \]

3. The wireless charging and communication board of
claim 1, wherein one of the first polymeric material
layer(310) and the second polymeric material lay-
ers(312) contains one or more material of polyethyl-
ene, polyacrylic, polyimide, polyamide, and poly-
urethane.

4. The wireless charging and communication board of
claim 1, further comprising an adhesive layer(315)
that adheres the first polymeric material layer(310)
and the second polymeric material layers(312) to the
plurality of the soft magnetic layers(220, 230).

5. The wireless charging and communication board of
claim 1, wherein the second soft magnetic layer(230)
is arranged adjacent to the first soft magnetic lay-
er(220).

6. The wireless charging and communication board of
claim 1, wherein the coil pattern(120, 130) includes:
a first coil pattern(120) and a second coil pat-
tern(130) which arranged to surround the side of the
first coil pattern, and wherein the first coil pat-
tern(120) is a wireless charging antenna, and the
second coil pattern(130) is a near field communica-
tion antenna.

7. The wireless charging and communication board of
claim 1, wherein the first extending portion(313) and
the second extending portion(314) contact with each
other.

8. The wireless charging and communication board of
claim 1, further comprising an adhesive layer ar-
ranged between the first extending portion(313) and
the second extending portion(314), wherein the first
extending portion(313) adheres to the second ex-
tending portion(314).

9. A portable terminal, comprising: the wireless charg-
ing and communication board of claims 1-8.

Patentansprüche

1. Drahtloslade- und -kommunikationsboard, umfas-
send:

- eine Vielzahl von weichmagnetischen Schich-
ten (220, 230) umfassend eine erste weichma-
gnetische Schicht (220) und eine zweite weich-
magnetische Schicht (230);
- eine erste Polymermaterialschicht (310), die an
einer ersten Oberfläche der Vielzahl der weich-
magnetischen Schichten (220, 230) angeordnet
ist;
- eine zweite Polymermaterialschicht (312), die an
einer der ersten Oberfläche gegenüberlie-
genden zweiten Oberfläche der Vielzahl der weich-
magnetischen Schichten (220, 230) angeordnet
ist; und
- ein Spulenmuster (120, 130), das an der zweiten
Polymermaterialschiht (312) angeordnet ist, wobei
die erste weichmagnetische Schicht
(220) und/oder die zweite weichmagnetische
Schicht (230) mit einem oder mehreren von ei-
er amorphen Legierung, einer kristallinen Le-
gierung, einem amorphen Legierungsband, ei-
inem nanokristallinen Band, und einer Silicium-
stahlplatte gefertigt ist,
- wobei die Vielzahl der weichmagnetischen
Schichten (220, 230) zwischen der ersten Poly-
mermaterialschiht (310) und der zweiten Poly-
mercianlagen (312) positioniert sind, wobei die erste Polymermaterialschicht (310) einen ersten sich erstreckenden Abschnitt (313) umfasst, der sich länger als die Vielzahl der weichmagnetischen Schichten (220, 230) erstreckt.

dadurch gekennzeichnet, dass die zweite Polymermaterialschicht (312) einen zweiten sich erstreckenden Abschnitt (314) umfasst, der sich länger als die Vielzahl der weichmagnetischen Schichten (220, 230) erstreckt, wobei der erste sich erstreckende Abschnitt (313) und der zweite sich erstreckende Abschnitt (314) miteinander verbunden sind.

2. Drahtloslade- und -kommunikationsboard nach Anspruch 1, wobei eine Länge (I) des ersten sich erstreckenden Abschnitts (313) oder des zweiten sich erstreckenden Abschnitts (314) und eine Dicke (h) der Vielzahl der weichmagnetischen Schichten (220, 230) eine Beziehung der folgenden Gleichung aufweisen, wobei A eine Konstante von 0,6 bis 10 präsentiert:

\[
I = A \times h.
\]

3. Drahtloslade- und -kommunikationsboard nach Anspruch 1, wobei einer der ersten Polymermaterialschicht (310) und der zweiten Polymermaterialschicht (312) ein oder mehrere Materialien von Polyethylene, Polyacryl, Polylimid, Polyamid und Polyurethan enthält.

4. Drahtloslade- und -kommunikationsboard nach Anspruch 1, ferner umfassend eine Klebeschicht (315), die die erste Polymermaterialschicht (310) und die zweite Polymermaterialschicht (312) an die Vielzahl der weichmagnetischen Schichten (220, 230) anhaftet.

5. Drahtloslade- und -kommunikationsboard nach Anspruch 1, wobei die zweite weichmagnetische Schicht (230) angrenzend an die erste weichmagnetische Schicht (220) angeordnet ist.

6. Drahtloslade- und -kommunikationsboard nach Anspruch 1, wobei das Spulenmuster (120, 130) umfasst: ein erstes Spulenmuster (120) und ein zweites Spulenmuster (130), die dazu angeordnet ist, die Seite des ersten Spulenmusters zu umgeben, und wobei das erste Spulenmuster (120) eine Drahtlosladeantenne ist, und das zweite Spulenmuster (130) eine Nahfeldkommunikationsantenne ist.

7. Drahtloslade- und -kommunikationsboard nach Anspruch 1, wobei der erste sich erstreckende Abschnitt (313) und der zweite sich erstreckende Abschnitt (314) miteinander in Kontakt stehen.

8. Drahtloslade- und -kommunikationsboard nach Anspruch 1, ferner umfassend eine Klebeschicht, die zwischen dem ersten sich erstreckenden Abschnitt (313) und dem zweiten sich erstreckenden Abschnitt (314) angeordnet ist, wobei der erste sich erstreckende Abschnitt (313) an dem zweiten sich erstreckenden Abschnitt (314) anhaftet.

9. Tragbares Terminal, umfassend:
   das Drahtloslade- und -kommunikationsboard der Ansprüche 1-8.

Revendications

1. Une carte de charge et de communication sans fil, comprenant :

   [Gleichung]

   \[ I = A \times h. \]

2. Une carte de charge et de communication sans fil, comprenant :

   une pluralité de couches magnétiques souples (220, 230) comprenant une première couche magnétique souples (220) et une deuxième couche magnétique souples (230) ;
   une première couche de matériau polymère (310) agencée sur une première surface de la pluralité de couches magnétiques souples (220, 230) ;
   une deuxième couche de matériau polymère (312) agencée sur une deuxième surface de la pluralité de couches magnétiques souples (220, 230) ;
   au moins une parmi la première couche magnétique souples (220) et la deuxième couche magnétique souples (230) étant réalisée avec un ou plusieurs éléments suivants : un alliage amorphe, un alliage cristallin, un ruban d’alliage amorphe, un ruban nanocristallin et une plaque d’acier au silicium,
   la pluralité de couches magnétiques souples (220, 230) étant positionnée entre la première couche de matériau polymère (310) et la deuxième couche de matériau polymère (312),
   la première couche de matériau polymère (310) incluant une première partie d’extension (313) s’étendant de façon plus longue que la pluralité de couches magnétiques souples (220, 230),

   caractérisée en ce que

   la deuxième couche de matériau polymère (312) comprend une deuxième partie d’extension (314) s’étendant de façon plus longue que la pluralité de couches magnétiques souples (220, 230),
la première partie d’extension (313) et la deuxième partie d’extension (314) étant connectées l’une à l’autre.

2. La carte de charge et de communication sans fil selon la revendication 1, dans laquelle une longueur (l) de la première partie d’extension (313) ou de la deuxième partie d’extension (314) et une épaisseur (h) de la pluralité de couches magnétiques souples (220, 230) ont une relation selon l’équation suivante, dans laquelle A représente une constante de 0,6 à 10 :

\[ l = A \times h. \]

3. La carte de charge et de communication sans fil selon la revendication 1, dans laquelle l’une parmi la première couche de matériau polymère (310) et les deuxièmes couches de matériau polymère (312) contient un ou plusieurs des matériaux suivants : polyéthylène, polyacrylique, polyimide, polyamide et polyuréthane.

4. La carte de charge et de communication sans fil selon la revendication 1, comprenant en outre une couche adhésive (315) qui fait adhérer la première couche de matériau polymère (310) et les deuxièmes couches de matériau polymère (312) à la pluralité de couches magnétiques souples (220, 230).

5. La carte de charge et de communication sans fil selon la revendication 1, dans laquelle la deuxième couche magnétique souple (230) est agencée de façon adjacente à la première couche magnétique souple (220).

6. La carte de charge et de communication sans fil selon la revendication 1, dans laquelle le motif de bobine (120, 130) inclut : un premier motif de bobine (120) et un deuxième motif de bobine (130) agencé pour entourer le côté du premier motif de bobine, et le premier motif de bobine (120) est une antenne de charge sans fil, et le deuxième motif de bobine (130) est une antenne de communication à champ proche.

7. La carte de charge et de communication sans fil selon la revendication 1, dans laquelle la première partie d’extension (313) et la deuxième partie d’extension (314) sont en contact l’une avec l’autre.

8. La carte de charge et de communication sans fil selon la revendication 1, comprenant en outre une couche adhésive agencée entre la première partie d’extension (313) et la deuxième partie d’extension (314), la première partie d’extension (313) adhérant à la deuxième partie d’extension (314).

9. Un terminal portable, comprenant :

- la carte de charge et de communication sans fil selon les revendications 1 à 8.
**Figure 11**

<table>
<thead>
<tr>
<th>BEFORE TEST FOR RELIABILITY</th>
<th>AFTER TEST FOR RELIABILITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRANSMISSION EFFICIENCY(%)</td>
<td>TRANSMISSION EFFICIENCY(%)</td>
</tr>
<tr>
<td>RECOGNITION DISTANCE(mm)</td>
<td>RECOGNITION DISTANCE(mm)</td>
</tr>
<tr>
<td>69.42</td>
<td>69.38</td>
</tr>
<tr>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

**Figure 12**

**Figure 13**
REFERENCES CITED IN THE DESCRIPTION

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