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PROTECTION CASE OF INTELLIGENT TERMINAL AND METHOD FOR USING PROTECTION CASE OF INTELLIGENT TERMINAL

Abstract

The present application provides a protection case of an intelligent terminal. The protection case of the intelligent terminal includes a housing, a base, a RFID coil, at least one RFID chip and at least one switching element. A first surface of the housing defines a mounting groove, and a second surface of the housing defines a positioning groove. The base is disposed in the mounting groove, and the RFID coil is at least partially disposed on the base. The at least one RFID chip is disposed in the mounting groove and electrically connected to the RFID coil. The at least one switching element is disposed in the positioning groove, and one of the at least one switching element is connected to a circuit where one of the at least one RFID chip is connected with the RFID coil.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application is a Bypass Continuation of International Application No. PCT/CN2024/084410 filed on Mar. 28, 2024, which claims priority to Chinese Patent Application No. 202311129514.2, filed on Aug. 31, 2023. All the applications are hereby incorporated by reference in their entireties.

TECHNICAL FIELD

[0002] The present disclosure relates to the technical field of a protection case of an intelligent terminal, and particularly relates to a protection case of an intelligent terminal and a method for using a protection case of an intelligent terminal.

BACKGROUND ART

[0003] Nowadays, intelligent terminals such as smartphones are becoming more and more intelligent. As the functions of smartphones increase, the operation modes of smartphones become complex and diverse. Among them, smartphones are equipped with a touch screen and a virtual switching element on the touch screen is used to achieve human-computer interaction, while smartphones are also equipped with a mechanical switching element to assist consumers to directly trigger some functions, such as making an emergency call, sending information, opening a certain application software, etc.

[0004] Although a smart phone carries a mechanical switching element, the number of mechanical switching elements carried on the smart phone is generally two to three; in order to increase the mechanical switching elements which can quickly trigger a certain program or application in the smart phone, the mechanical switching element can be provided on the protection sleeve of the smart phone; the mechanical switching element and the RFID chips and the RFID coil on the protection sleeve are connected in series to form a circuit; and after being triggered, the mechanical switching element can generate an electronic tag which is able to be sensed and read by an NFC module on the smart phone.

[0005] However, the provision of a mechanical switching element, RFID chips and a RFID coil on the protection sleeve of a smart phone would lead to the complexity of the structure of the protection sleeve on the one hand and the increase of the overall size of the protection sleeve on the other hand, which should be solved urgently.

SUMMARY OF THE DISCLOSURE

[0006] The present disclosure provides a protection case of an intelligent terminal. The protection case includes a housing, a base, a RFID coil, at least one RFID chip, and at least one switching element. A first surface of the housing defines a mounting groove, a second surface of the housing defines a positioning groove, and the positioning groove is arranged opposite to the mounting groove. The base is disposed in the mounting groove. The RFID coil is at least partially disposed on the base. The at least one RFID chip is disposed in the mounting groove and electrically connected to the RFID coil. The at least one switching element is disposed in the positioning

groove, and one of the at least one switching element is connected to a circuit where one of the at least one RFID chip is connected with the RFID coil.

[0007] In some embodiments, the housing includes a back plate and a side plate extending in the same direction from an edge of the back plate, the back plate and the side plate together enclose a mounting cavity that is configured for receiving the intelligent terminal, the mounting groove is defined on a surface of the side plate close to the mounting cavity, and the positioning groove is defined on a surface of the side plate away from the mounting cavity.

[0008] In some embodiments, the back plate has a first region arranged opposite to an NFC sensing area of the intelligent terminal and a second region arranged opposite to a wireless charging sensing area of the intelligent terminal, the first region and the second region are spaced apart from each other, the mounting groove is arranged adjacent to the first region and spaced apart from the second region, and one portion of the RFID coil is arranged in the first region and the other portion of RFID coil is arranged in the mounting groove.

[0009] In some embodiments, the at least one RFID chip has a frequency in a range of 10 MHz to 15 MHz.

[0010] In some embodiments, the RFID coil is adhesively fixed to the base.

[0011] In some embodiments, the RFID coil is provided on a side, facing a groove bottom of the mounting groove, of the base; the at least one RFID chip is disposed on a side, facing the groove bottom of the mounting groove, of the RFID coil; and the at least one RFID chip is encapsulated by an encapsulation film.

[0012] In some embodiments, at least one avoidance recess is defined in the groove bottom of the mounting groove, and the at least one avoidance recess is configured for avoiding arrangement of the at least one RFID chip.

[0013] In some embodiments, the positioning groove is disposed in communication with the mounting groove; the at least one switching element includes a push-type button and a key cap, the push-type button forms a circuit in series with the RFID coil and the at least one RFID chip, and the push-type button is disposed at a position where the RFID coil is opposite to the positioning groove; and the key cap cooperates with the positioning groove and is able to reciprocate along the positioning groove, so as to press or release the push-type button.

[0014] In some embodiments, the push-type button is a snap dome button.

[0015] In some embodiments, the at least one RFID chip is arranged on a side, facing the positioning groove, of the RFID coil; and the protection case of the intelligent terminal further includes a polyester film, and the polyester film covers the base, the RFID coil, the at least one RFID chip, and the push-type button.

[0016] In some embodiments, the protection case of the intelligent terminal further includes a PET sheet; the PET sheet defines a first avoidance hole at a position corresponding to the at least one RFID chip, and the PET sheet defines a second avoidance hole at a position corresponding to the push-type button; and one side of the PET sheet abuts against the polyester film, and the other side of the PET sheet is fixed to the RFID coil.

[0017] In some embodiments, the at least one switching element is a self-resetting knob switch. Alternatively, the at least one switching element is an electronic switch, the protection case of the intelligent terminal further includes a power supply module or a power supply connector, and the electronic switch is electrically connected to the power supply module or the power supply connector.

[0018] In some embodiments, the protection case further includes a decorative plate; the decorative plate is arranged on a side, facing away from the positioning groove, of the base; and the decorative plate covers a notch of the mounting groove.

[0019] The present disclosure further provides a method for using a protection case of an intelligent terminal. The protection case of the intelligent terminal is described in any one of above embodiments. The method includes: placing the intelligent terminal in the housing and arranging

an NFC sensing area of the intelligent terminal opposite to the RFID coil; and activating one switching element of the at least one switching elements, so that a circuit where the activated switching element is located is conductive and generates an electronic tag which is able to be sensed and read by an NFC module of the intelligent terminal.

[0020] In some embodiments, the at least one RFID chip has a frequency in a range of 10 MHz to 15 MHz, the protection case includes a plurality of switching elements, and the method further includes: activating two or more switching elements at the same time, so that circuits where the activated two or more switching elements are located are conductive at the same time and generate an electronic tag which is not able to be sensed by the NFC module of the intelligent terminal.

[0021] The present disclosure further provides a protection case of an intelligent terminal. The protection case includes a housing defining a mounting groove, a base disposed in the mounting groove, a RFID coil at least partially disposed on the base, at least one RFID chip electrically connected to the RFID coil, and at least one switching element. One of the at least one switching element is connected to a circuit where one of the at least one RFID chip is connected with the RFID coil.

[0022] In some embodiments, the housing includes a back plate and a side plate extending in the same direction from an edge of the back plate, the back plate and the side plate together enclose a mounting cavity that is configured for receiving the intelligent terminal, the mounting groove that is configured for receiving the base and at least partial RFID coil is defined on a surface of the side plate close to the mounting cavity, and a positioning groove that is configured for receiving the at least one switching element is defined on a surface of the side plate away from the mounting cavity.

[0023] In some embodiments, the back plate has a first region arranged opposite to an NFC sensing area of the intelligent terminal and a second region arranged opposite to a wireless charging sensing area of the intelligent terminal, the first region and the second region are spaced apart from each other, the mounting groove is arranged adjacent to the first region and spaced apart from the second region, and one portion of the RFID coil is arranged in the first region and the other portion of RFID coil is arranged in the mounting groove.

[0024] In some embodiments, the at least one RFID chip has a frequency in a range of 10 MHz to 15 MHz.

[0025] In some embodiments, the RFID coil is adhesively fixed to the base.

Description

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] In order to explain the technical solutions of the embodiments of the present disclosure more clearly, the following contents will briefly introduce the drawings which need to be used in the embodiments. It should be apparent that the drawings in the following description are only some embodiments of the present disclosure, and it would be obvious for a person skilled in the art to obtain other drawings according to these drawings without involving any inventive effort.

[0027] FIG. 1 is a schematic structural diagram of an embodiment of a protection case of an intelligent terminal of the present disclosure.

[0028] FIG. 2 is a schematic structural diagram of a housing in FIG. 1.

[0029] FIG. 3 is an enlarged schematic diagram of portion A in FIG. 2.

[0030] FIG. 4 is a sectional diagram of the housing in FIG. 1.

[0031] FIG. 5 is an enlarged schematic diagram of portion B in FIG. 4.

[0032] FIG. 6 is a schematic diagram of an embodiment of an RFID coil and a plurality of RFID chips and a plurality of switching elements in the protection case of an intelligent terminal of the present disclosure.

[0033] FIG. 7 is a schematic diagram of another embodiment of the RFID coil and the plurality of

the RFID chips and the plurality of the switching elements in the protection case of an intelligent terminal of the present disclosure.

[0034] FIG. **8** is an exploded diagram of a reinforcing sheet, the RFID coil, the RFID chips, the switching elements, an encapsulation film, a polyester film, and a PET sheet of the protection case of an intelligent terminal of the present disclosure.

[0035] FIG. **9** is a schematic structural diagram of a decorative plate of the protection case of an intelligent terminal of the present disclosure.

[0036] FIG. **10** is a cross-sectional diagram of the protection case of an intelligent terminal in FIG. **1**.

[0037] FIG. **11** is an enlarged schematic diagram of portion C in FIG. **10**.

[0038] FIG. **12** is a schematic flow diagram of an embodiment of a method for using a protection case of an intelligent terminal of the present disclosure.

[0039] FIG. **13** is a schematic flow diagram of another embodiment of a method for using a protection case of an intelligent terminal of the present disclosure.

REFERENCE NUMBERS

TABLE-US-00001 Reference Reference number Name number Name 100 protection case of 30 RFID Coil intelligent terminal 10 Housing 40 RFID chip 10a Mounting groove 50 Switching element 10b Positioning groove 51 Button/push-type button 10c Mounting cavity 52 Key cap 10d Avoidance recess 60 Encapsulation film 11 Back plate 70 Polyester film 11a First region 80 PET sheet 11b Second region 80a First avoidance hole 11c Wiring notch 80b Second avoidance hole 12 Side plate 90 Decorative plate 13 Positioning post 90a Fitting hole 20 Reinforcing sheet 91 Capping block 20a Positioning hole

[0040] The realization of objects, functional features and advantages of the present disclosure will be further described with reference to the accompanying drawings in conjunction with the embodiments.

DETAILED DESCRIPTION OF THE DISCLOSURE

[0041] The embodiments of the present disclosure will now be described more clearly and fully hereinafter with reference to the accompanying drawings, in which embodiments of the disclosure are shown. It is to be understood that the embodiments described are only a few, but not all embodiments of the disclosure. Based on the embodiments of the present disclosure, all other embodiments obtained by a person of ordinary skill in the art without inventive effort fall within the scope of protection of the present disclosure.

[0042] The present disclosure proposes a protection case of an intelligent terminal, so as to solve the problems of the existing protection case of an intelligent terminal being oversized and complicated in structure.

[0043] Referring to FIGS. **1** to **11**, the present disclosure provides a protection case of an intelligent terminal **100**, which is adapted to an electronic device equipped with an NFC (Near Field Communication) function, such as a mobile phone, a tablet, etc. and includes a housing **10**, a reinforcing sheet **20**, an RFID (Radio Frequency Identification) coil **30**, two or more RFID chips **40**, and two or more switching elements **50**, wherein the reinforcing sheet **20**, the RFID coil **30**, the two or more RFID chips **40**, and the two or more switching elements **50** are all provided on the housing **10**.

[0044] There are various shapes of the housing **10**, the housing **10** can be arranged in a flat plate shape, the housing **10** can be arranged in a U-shape, and the housing **10** can also be arranged in a basin shape with the surrounding high and middle low, and the shape of the housing **10** is not particularly limited here. There are various materials for forming the housing **10**, and the housing **10** can be made of flexible materials, for example, the housing **10** is made of rubber, silica gel or a flexible plastic; the housing **10** can also be made of rigid materials, for example, the housing **10** is made of a hard plastic; and the housing **10** can also be made of composite materials, which are not listed here.

[0045] The housing **10** has an inner surface and an outer surface, where the inner surface of the housing **10** is defined as the surface, adjacent to the intelligent terminal, of the housing **10** and the outer surface of the housing **10** is defined as the surface, away from the intelligent terminal, of the housing **10**. The inner surface of the housing **10** is provided with a mounting groove **10a**, and the mounting groove **10a** can be provided in an elongated shape, a circular shape, a rectangular shape and other shapes; the outer surface of the housing **10** is provided with a positioning groove **10b**, the positioning groove **10b** is arranged opposite the mounting groove **10a**, and the positioning groove **10b** can be arranged in an elongated shape, a circular shape, a rectangular shape and other shapes. The positioning groove **10b** can be arranged in communication with or not in communication with the mounting groove **10a**, and the number of the positioning grooves **10b** can be one or more. When there is one positioning groove **10b**, the positioning groove **10b** is arranged corresponding to the plurality of the switching elements **50**, and when there are a plurality of positioning grooves **10b**, the plurality of positioning grooves **10b** are arranged corresponding to the plurality of the switching elements **50** on a one-to-one basis.

[0046] The shape of the reinforcing sheet **20** can be of various types. The shape of the reinforcing sheet **20** can be provided in an elongated shape, a circular shape, a rectangular shape and other shapes; the shape of the reinforcing sheet **20** is generally adapted to the shape of the mounting groove **10a** so as to facilitate the mounting of the reinforcing sheet **20** in the mounting groove **10a** and cover a notch of the mounting groove **10a**; the reinforcing sheet **20** can be made of a metal material, a metal oxide, a composite material and other materials. Preferably, the reinforcing sheet **20** is made of a metal material (such as metal aluminium, metal copper, stainless steel, etc.), and the metal material has the advantages of high strength and good bending resistance so as to ensure the supporting performance and bending resistance of the reinforcing sheet **20**.

[0047] The RFID coil **30**, also referred to as a radio frequency antenna, mainly plays a role in energy and information transmission. The RFID coil **30** is fixedly attached to the surface of the reinforcing sheet **20**, that is to say, the RFID coil **30** can be integrally arranged in the mounting groove **10a**, and it can also be a part of the RFID coil **30** that is arranged in the mounting groove **10a**, and another part of the RFID coil **30** can be arranged on the inner surface, the outer surface or the inside of the housing **10**. It should be noted that if another part of the RFID coil **30** is arranged outside the mounting groove **10a**, the part, which is outside the mounting groove **10a**, of the RFID coil **30** is preferably arranged inside the housing **10**, so that the RFID coil **30** can be prevented from being exposed outside.

[0048] The plurality of the RFID chips **40** are all electrically connected to the RFID coil **30**, and the plurality of the RFID chips **40** are arranged in parallel; the plurality of the RFID chips **40** and the RFID coil **30** can be electrically connected via wires; or the plurality of the RFID chips **40** are integrated on the RFID coil **30**. The plurality of the RFID chips **40** are arranged in the mounting groove **10a**; the plurality of the RFID chips **40** can be fixed on a groove wall of the mounting groove **10a**; the plurality of the RFID chips **40** can also be fixed on the reinforcing sheet **20**; and the plurality of the RFID chips **40** can also be arranged on the RFID coil **30**, which is not limited thereto. The manner in which the plurality of the RFID chips **40** are fixed in the mounting groove **10a** can be regardless.

[0049] The switching element **50** is an element that controls a circuit to turn on or off, and the switching element **50** may be a mechanical switch, an electronic switch, a capacitive switch, an inductive switch, etc. and the type of the switching element **50** is not particularly limited herein. The plurality of the switching elements **50** are mounted in the positioning groove **10b**, and the plurality of the switching elements **50** are arranged correspondingly to the plurality of the RFID chips **40** on a one-to-one basis, namely, each switching element **50** is connected in series to a circuit where the corresponding RFID chip **40** is connected with the RFID coil **30**.

[0050] That is, each switching element **50** and the corresponding RFID chip **40** and RFID coil **30** are connected in series to form a circuit, the plurality of the switching elements **50** and the plurality

of the RFID chips **40** and RFID the coil **30** form a plurality of circuits, the conduction of each circuit can generate an electronic tag, and the electronic tag generated by each circuit can be sensed and read by an NFC (Near Field Communication) module of the intelligent terminal.

[0051] When the intelligent terminal is assembled to the protection case of an intelligent terminal **100**, an NFC sensing area of the intelligent terminal is arranged opposite a position on the housing **10** where the RFID coil **30** is arranged; when the intelligent terminal starts the NFC program, the NFC module of the intelligent terminal starts scanning the electronic tag; when one switching element **50** of the plurality of the switching elements **50** is conductive, a circuit formed by the conductive switching element **50** and the corresponding RFID chip **40** and the RFID coil **30** now generates an electronic tag, and after the NFC module of the intelligent terminal scans the electronic tag and reads the electronic tag, a controller of the intelligent terminal determines whether to execute a next action (such as opening a certain program, closing a certain program, suspending a certain program, closing the intelligent terminal, etc.), namely, determines whether the electronic tag is a control instruction in the intelligent terminal, and if so, a corresponding action is executed, and if not, no response is performed. With such arrangement, a shortcut instruction can be sent to the intelligent terminal through the protection case of an intelligent terminal **100**, thereby facilitating the user to operate the intelligent terminal.

[0052] It should also be noted that the plurality of the switching elements **50** on the protection case of an intelligent terminal **100** can set a shortcut instruction according to the preference of a user, and the following description is made with the intelligent terminal being a smart phone as an example: after the NFC program of the smart phone is turned on, the NFC module of the smart phone starts to scan the electronic tag, and when the first switching element of the plurality of the switching elements **50** is conductive, the conductive circuit generates the first electronic tag at this moment, and the first electronic tag can be a shortcut instruction for the browser of the smart phone to be turned on or off; when a second switching element of the plurality of the switching elements **50** is conductive, the conductive circuit now generates a second electronic tag, which may be a shortcut instruction for the smart phone to answer or hang up.

[0053] When a third switching element of the plurality of the switching elements **50** is conductive, a conductive circuit generates a third electronic tag at this time, and the third electronic tag can be a shortcut instruction for a camera of a smart phone to open and a shutter to press; when a fourth switching element of the plurality of the switching elements **50** is conductive, the conductive circuit generates a fourth electronic tag at this time, and the fourth electronic tag can be a shortcut instruction for a smart phone to open a certain game App; when a fifth switching element in the plurality of the switching elements **50** is conductive, the conductive circuit generates a fifth electronic tag at this time, and the fifth electronic tag can be a shortcut instruction for popping an electric quantity reminding page of the smart phone; when a sixth switching element of the plurality of the switching elements **50** is conductive, the conductive circuit generates a sixth electronic tag at this moment, and the sixth electronic tag can be a switch of a smart phone to a certain instant messaging software APP. The shortcut instruction of the smart phone corresponding to each electronic tag on the protection case of an intelligent terminal **100** can be customized according to personal preferences, which are not listed one by one herein.

[0054] It should be noted that before use, the protection case of an intelligent terminal **100** needs to be communicatively connected with the intelligent terminal so as to customize the electronic tags generated when the circuits where the plurality of the switching elements **50** are located are conductive; when the electronic tags generated during conduction of the circuits where the plurality of the switching elements **50** are located are customized, the plurality of the switching elements **50** are activated successively and the corresponding circuits are conductive; the NFC module of the intelligent terminal senses successively and reads the corresponding electronic tags; and the intelligent terminal then customizes the electronic tags so that each electronic tag forms a quick instruction for the intelligent terminal to execute a certain action.

[0055] In the protection case of an intelligent terminal **100** of the present disclosure, the reinforcing sheet **20** is fixedly mounted in the mounting groove **10a**, the RFID coil **30** is attached to the reinforcing sheet **20**, the plurality of the RFID chips are arranged in parallel and are electrically connected to the RFID coil, and the plurality of the switching elements **50** are mounted in the positioning groove and are respectively connected in series to circuits where the corresponding RFID chips **40** are connected to the RFID coil **30**. With such arrangement, on the one hand, the positioning of the flexible RFID coil **30** in the mounting groove **10a** is facilitated, and on the other hand, the strength at which the housing **10** is provided with the mounting groove **10a** and the positioning groove **10b** can be increased by means of the reinforcing sheet **20**, so that the thickness of the housing **10** can be made thinner.

[0056] Referring to FIGS. **2** to **5**, in some embodiments of the present disclosure, the housing **10** includes a back plate **11** and a side plate **12** extending in the same direction from an edge of the back plate **11**, wherein the side plate **12** and the back plate **11** together enclose a mounting cavity **10c** for receiving the intelligent terminal, a surface, adjacent to the mounting cavity **10c**, of the side plate **12** is concavely provided with a mounting groove **10a**, and a surface, facing away from the mounting cavity **10c**, of the side plate **12** is concavely provided with a positioning groove **10b**. With such arrangement, it is convenient to quickly position and assemble the intelligent terminal on the housing **10**, and at the same time, it is also convenient to set the position where the housing **10** is provided with the RFID coil **30** opposite the NFC sensing area of the intelligent terminal.

[0057] It should be noted that a thickness of the side plate **12** generally corresponds to a thickness of the back plate **11**, and although the arrangement of the mounting groove **10a** and the positioning groove **10b** may result in a decrease in the strength and bending resistance capacity of a part of the side plate **12**, after the reinforcing sheet **20** is fitted into the mounting groove **10a**, since the strength and bending resistance capacity of the reinforcing sheet **20** itself are relatively high, the strength and bending resistance capacity of the side plate **12** can be improved by the reinforcing sheet **20**, so that the strength and bending resistance capacity of the side plate **12** are equivalent everywhere, that is, the arrangement of the reinforcing sheet **20** enables the thickness of the side plate **12** to be made thinner.

[0058] In addition, it should also be noted that the side plate **12** is also generally provided with a first through-hole corresponding to a key of a side face of the intelligent terminal, a second through-hole corresponding to an earphone hole of the side face of the intelligent terminal, a third through-hole corresponding to a charging hole of the side face of the intelligent terminal, and the number of the first through-hole(s), the second through-hole(s) and the third through-hole(s) can be set according to the corresponding intelligent terminal; the back plate **11** is provided with a camera window corresponding to a camera on the intelligent terminal, and the shape of the camera window can be a circle, a square, a polygon, etc.

[0059] Further, referring to FIGS. **4**, **5**, **10** and **11**, the back plate **11** has a first region **11a** arranged opposite an NFC sensing area of the intelligent terminal and a second region **11b** arranged opposite a wireless charging sensing area of the intelligent terminal, the first region **11a** and the second region **11b** are spaced apart, the mounting groove **10a** is arranged adjacent to the first region **11a** and spaced apart from the second region **11b**, a part of the RFID coil **30** is arranged in the first region **11a**, and another part of the RFID coil **30** is arranged in the mounting groove **10a**. With this arrangement, it is possible to prevent the RFID coil **30** and the reinforcing sheet **20** made of a metal material from affecting the intelligent terminal to perform wireless charging, and also to prevent the RFID coil **30** and the reinforcing sheet **20** made of a metal material from being affected by the wireless charging electromagnetic field.

[0060] Based on the above-mentioned solutions, in some embodiments of the present disclosure, the RFID chips have a frequency in the range of 10 MHz to 15 MHz; preferably, the RFID chips **40** have a frequency of 13.56 MHz; since the frequency of the RFID chips **40** is 13.56 MHz, the RFID chips **40** with this frequency do not need to be powered by a power supply in use; in addition, when

two or more switching elements **50** in the plurality of the switching elements **50** are conductive at the same time, since the energy transmitted from the intelligent terminal that the RFID coil **30** receives stays unchanged, but the conduction of two or more circuits would result in the frequency of the RFID coil **30** being too low, the electronic tags generated by the RFID chips in the two or more conduction circuits are not able to be sensed by the NFC module of the intelligent terminal; therefore, selecting the RFID chips in the above-mentioned frequency range can also achieve the effect of conduction of one RFID chip selected from the plurality of the RFID chips in parallel. [0061] That is to say, in the above-mentioned technical solution, by selecting the RFID chips **40** with a frequency within 10 MHz to 15 MHz, on the one hand, the protection case of an intelligent terminal **100** does not need to be provided with a power supply or an external power supply, which enables the thickness of the housing **10** to be made thinner, and on the other hand, one selected from the plurality of RFID chips connected in parallel is conductive, thus avoiding the problem that a user presses two or more switching elements at the same time, which results in that the intelligent terminal needs to perform two or more actions synchronously, thus affecting the normal operation of the intelligent terminal.

[0062] In some embodiments of the present disclosure, the RFID coil **30** and the reinforcing sheet **20** are adhesively fixed to by a double-sided adhesive, wherein both sides of the double-sided adhesive have adhesive properties, so as to facilitate the bonding and fixing of the reinforcing sheet **20** and the RFID coil **30**; in addition, the double-sided adhesive tape has an insulating property, and when the reinforcing sheet **20** is made of a metal material, the double-sided adhesive tape can also insulate and connect the reinforcing sheet **20** with the RFID coil **30**, thus avoiding the reinforcing sheet **20** affecting the operation of the RFID coil **30**; in addition, the space between the reinforcing sheet **20** and the RFID coil **30** can be adjusted according to the actual situation by using the double-sided tape, so that the space of the mounting groove **10a** can be fully utilized to ensure the mounting of the RFID chips **40**, the switching elements **50** and other structural members.

[0063] Referring to FIGS. **8** and **11**, in some embodiments of the present disclosure, the RFID coil **30** is provided on a side, facing a groove bottom of the mounting groove **10a**, of the reinforcing sheet **20**, the plurality of the RFID chips **40** are provided on a side, facing the groove bottom of the mounting groove **10a**, of the RFID coil **30** and the plurality of the RFID chips **40** are encapsulated by an encapsulation film **60**. With this arrangement, on the one hand, it is avoided that the RFID chips **40** are exposed from a notch of the mounting groove **10a**, and on the other hand, the RFID chips **40** are fully covered by the encapsulation film **60**. A thickness of the encapsulation film **60** itself is relatively thin, and thus when the encapsulation film **60** covers the RFID chips **40**, the space occupied by the RFID chips **40** is hardly affected. At the same time, the arrangement of the encapsulation film **60** can avoid the problem that the RFID chip **40** is in direct contact with the groove bottom of the mounting groove **10a** and is worn away.

[0064] Further, referring to FIGS. **3**, **5** and **11**, in some embodiments of the present disclosure, a plurality of avoidance recesses **10d** are concavely provided in the groove bottom of the mounting groove **10a**, and each of the plurality of avoidance recesses **10d** is used to avoid the RFID chips **40**. It should be noted that the avoidance recesses **10d** and the RFID chips **40** may be arranged on a one-to-one basis, so that the problem that the plurality of the RFID chips **40** directly contact with the groove bottom of the mounting groove **10a** and are worn away is avoided.

[0065] In addition, it should be noted that although the groove bottom of the mounting groove **10a** is provided with a plurality of avoidance recesses **10d**, which further reduces the thickness of the housing **10** at the position where the mounting groove **10a** is opened, the mounting groove **10a** is internally provided with the reinforcing sheet **20**, the reinforcing sheet **20** itself has a relatively high strength, and the reinforcing sheet **20** also has a relatively high bending resistance, thus ensuring the strength and bending resistance of the housing **10** at the position where the mounting groove **10a** and the positioning groove **10b** are opened.

[0066] With reference to FIGS. **8** and **11**, in some embodiments of the present disclosure, the

positioning groove **10b** is provided in communication with the mounting groove **10a**, and each switching element **50** includes a push-type button **51** and a key cap **52**, wherein each push-type button **51** forms a circuit in series with the RFID coil **30** and the corresponding RFID chip **40**, each push-type button **51** is provided at a position opposite the positioning groove **10b** of the RFID coil **30**, each key cap **52** cooperates with the positioning groove **10b**, and the key cap **52** can reciprocate along the positioning groove **10b** so as to abut against or release the corresponding push-type button **51**; thus, the corresponding push-type button **51** is turned on or off from the circuit in which the corresponding RFID chip **40** and the RFID coil **30** are located.

[0067] It should be noted that the above-mentioned push-type button **51** may be a soft rubber button, a film button, a snap dome button and other types of buttons, which are not listed here. Preferably, the push-type button **51** is a snap dome button, and a thickness of the snap dome button is relatively small, so that a thickness of the RFID coil **30** and the snap dome button as a whole can be made 0.3 mm or less, so that a depth of the mounting groove **10a** can be made relatively small, and further, a thickness of the housing **10** can be made relatively thin. In addition, the snap dome button can be automatically reset when an external force is removed, thus making the switching elements **50** easy to operate and suitable for use by a special population such as the elderly.

[0068] Referring to FIG. **11**, in some embodiments of the present disclosure, the protection case of an intelligent terminal **100** further includes a polyester film **70** for covering the reinforcing sheet **20**, the RFID coil **30**, the RFID chips **40**, and arrangement of the push-type button **51**. With this arrangement, on the one hand, it is possible to provide a dustproof function by the polyester film **70**, and on the other hand, since the polyester film **70** itself has a relatively good moisture resistance, it is possible to prevent moisture in the outside air from entering the mounting groove **10a** through the positioning groove **10b** and affecting the normal operation of the RFID coil **30**, the RFID chips **40** and the button **51**.

[0069] In addition, a thickness of the polyester film **70** is very thin, and the polyester film **70** encapsulating the reinforcing sheet **20**, the RFID coil **30**, the RFID chips **40** and the button **51** does not cause a thickness of the whole body to vary too much, and specifically, an overall thickness of the reinforcing sheet **20**, the RFID chips **40**, the RFID coil **30** and the snap dome button encapsulated with the polyester film **70** is 0.8 mm or less, that is, the polyester film **70** does not cause the thickness of the housing **10** to increase.

[0070] Further, referring to FIGS. **8** and **11**, in some embodiments of the present disclosure, the protection case of an intelligent terminal **100** further includes a PET (polyethylene glycol terephthalate) sheet **80**, wherein the PET sheet **80** is penetratingly provided with a first avoidance hole **80a** at a position corresponding to the RFID chips **40**, the PET sheet **80** is penetratingly provided with a second avoidance hole **80b** at a position corresponding to the button, one side of the PET sheet **80** is connected to the polyester film **70**, and the other side of the PET sheet **80** is adhesively fixed to the RFID coil **30** via a double-sided adhesive.

[0071] It should be noted that the first avoidance hole **80a** on the PET sheet **80** can be arranged corresponding to one or more RFID chips **40**, and the second avoidance hole **80b** on the PET sheet **80** can be arranged correspondingly to one or more buttons **51**, that is to say, the button(s) **51** on the RFID coil **30** and a periphery of the RFID chip(s) **40** are closed by the PET sheet **80**, and the PET sheet **80** has relatively good gas, water, oil and odor-barrier properties; and using the PET sheet **80** and the polyester film **70** in cooperation can further improve the effects of waterproof and dustproof. In addition, the PET sheet **80** has a thickness that ensures that the RFID chips **40** on the RFID coil **30** are spaced from the groove bottom of the mounting groove **10a**.

[0072] Obviously, the above-mentioned switching elements **50** can also be another type of switching elements **50**. In some embodiments of the present disclosure, the switching element **50** is a reset knob switch, the reset knob switch includes a knob switch and a reset toggle wheel, the reset toggle wheel is rotatably mounted on the housing **10**, a reset torsion spring is further provided between the reset toggle wheel and the housing **10**, the reset toggle wheel drives the knob switch to

rotate together under the action of an external force, and when the knob switch rotates by a preset angle and is conductive, the knob switch is conductive with the corresponding RFID chip **40** and the RFID coil **30** and generates an electronic tag. When the reset toggle wheel is released, the reset toggle wheel is reset to the initial position under the action of the reset torsion spring, and the knob switch is also switched from the on state to the off state.

[0073] It should be noted that the above-mentioned switching element **50** can also be another type of switching element **50**, for example, the above-mentioned switching element **50** can be an electronic switch, and the types of the electronic switch include all the electronic components with a switch function, such as a MOS tube, a triode, a relay, a solid state relay, an opto-electric coupler, an analogue switch, etc. and at this time, the protection case of an intelligent terminal **100** further includes a power supply module or a power supply connector, and the electronic switch is electrically connected to the power supply module or the power supply connector, and the electronic switch can be conductive by means of tapping, shaking, pressing and touching.

[0074] With reference to FIGS. **3** and **8**, in some embodiments of the present disclosure, the mounting groove **10a** is provided in an elongated shape, the groove bottom of the mounting groove **10a** is provided with two positioning posts **13**, and the two positioning posts **13** are arranged at an interval in a length direction of the mounting groove **10a**; the reinforcing sheet **20** is provided in a long strip shape, two ends of the reinforcing sheet **20** in a longitudinal direction are both penetratingly provided with positioning holes **20a**, and the two positioning holes **20a** are in plug-fit with the two positioning posts **13** on a one-to-one basis. This is provided to facilitate the positioning and mounting of the sheet **20** in the mounting groove **10a**, thereby facilitating the fitting of the reinforcing sheet **20** in the mounting groove **10a**.

[0075] It should be noted that a side, facing the notch of the mounting groove **10a**, of the reinforcing sheet **20** can be filled with foam and rubber; with reference to FIGS. **5** and **7**, a side, facing the notch of the mounting groove **10a**, of the reinforcing sheet **20** can also be covered with a decorative plate **90** made of polycarbonate (PC) material; the decorative plate **90** can be fixed by bonding with the side plate **12** via glue; the decorative plate **90** can also be fixedly connected with the side plate **12** via ultrasonic welding; and the decorative plate **90** can also be fixedly connected with the side plate **12** in other manners, which are not listed here one by one. Since the decorative plate **90** itself has a high strength, this makes it possible to further enhance the strength where the housing **10** is opened with the mounting groove **10a**.

[0076] Further, referring to FIGS. **3** and **5**, in some embodiments of the present disclosure, fitting holes **90a** are provided at both ends of the decorative plate **90** in a longitudinal direction, the two fitting holes **90a** cooperate with the two positioning posts **13**, the decorative plate **90** and the reinforcing sheet **20** are fixed via bonding by a double-sided adhesive, and the decorative plate **90** is used to cover the mounting groove **10a**, so that the decorative plate **90** is conveniently located and mounted on the side plate **12** of the housing **10**, thereby facilitating the fixed mounting of the decorative plate **90** on the side plate **12**.

[0077] Furthermore, with reference to FIGS. **3**, **5** and **9**, a wiring notch **11c** communicating with the mounting groove **10a** is provided at a position, adjacent to the mounting groove **10a**, of the back plate **11**, a capping block **91** is provided at a side, adjacent to the back plate **11**, of the decorative plate **90**, and the capping block **91** cooperates with the wiring notch **11c** and covers the wiring notch **11c**. With such arrangement, on the one hand, the RFID coil **30** can be hidden inside the housing **10**, and on the other hand, when the decorative plate **90** is assembled with the side plate **12**, the capping block **91** can also play a foolproof function. In addition, the engagement of the capping block **91** with the wiring notch **11c** also limits the decorative plate **90** along the length direction of the mounting groove **10a**.

[0078] With reference to FIG. **12**, the present disclosure also proposes a method for using a protection case of an intelligent terminal **100**, wherein the protection case of an intelligent terminal **100** is as described above in various embodiments, and the method for using the protection case of

an intelligent terminal **100** includes:

[0079] step **S10**: placing the intelligent terminal in the housing and arranging an NFC sensing area of the intelligent terminal opposite the RFID coil; and

[0080] step **S20**: activating one switching element of the plurality of the switching elements so that a circuit where the activated switching element is located is conductive and generates an electronic tag which is able to be sensed and read by an NFC module of the intelligent terminal.

[0081] When the intelligent terminal is assembled to the protection case of an intelligent terminal **100**, an NFC sensing area of the intelligent terminal is arranged opposite a position on the housing **10** where the RFID coil **30** is arranged; when the intelligent terminal starts the NFC program, the NFC module of the intelligent terminal starts scanning the electronic tag; when one switching element **50** of the plurality of the switching elements **50** is conductive, a circuit formed by the conductive switching element **50** and the corresponding RFID chip **40** and the RFID coil **30** now generates an electronic tag, and after the NFC module of the intelligent terminal scans the electronic tag and reads the electronic tag, a controller of the intelligent terminal determines whether to execute a next action (such as opening a certain program, closing a certain program, suspending a certain program, closing the intelligent terminal, etc.), namely, determines whether the electronic tag is a control instruction in the intelligent terminal, and if so, a corresponding action is executed, and if not, no response is performed. With such arrangement, a shortcut instruction can be sent to the intelligent terminal through the protection case of an intelligent terminal **100**, thereby facilitating the user to operate the intelligent terminal.

[0082] It should also be noted that the plurality of the switching elements **50** on the protection case of an intelligent terminal **100** can set a shortcut instruction according to the preference of a user, and the following description is made with the intelligent terminal being a smart phone as an example: after the NFC program of the smart phone is turned on, the NFC module of the smart phone starts to scan the electronic tag, and when the first switching element of the plurality of the switching elements **50** is conductive, the conductive circuit generates the first electronic tag at this moment, and the first electronic tag can be a shortcut instruction for the browser of the smart phone to be turned on or off; when a second switching element of the plurality of the switching elements **50** is conductive, the conductive circuit now generates a second electronic tag, which may be a shortcut instruction for the smart phone to answer or hang up.

[0083] When a third switching element of the plurality of the switching elements **50** is conductive, a conductive circuit generates a third electronic tag at this time, and the third electronic tag can be a shortcut instruction for a camera of a smart phone to open and a shutter to press; when a fourth switching element of the plurality of the switching elements **50** is conductive, the conductive circuit generates a fourth electronic tag at this time, and the fourth electronic tag can be a shortcut instruction for a smart phone to open a certain game App; when a fifth switching element in the plurality of the switching elements **50** is conductive, the conductive circuit generates a fifth electronic tag at this time, and the fifth electronic tag can be a shortcut instruction for popping an electric quantity reminding page of the smart phone; when a sixth switching element of the plurality of the switching elements **50** is conductive, the conductive circuit generates a sixth electronic tag at this moment, and the sixth electronic tag can be a switch of a smart phone to a certain instant messaging software APP. The shortcut instruction of the smart phone corresponding to each electronic tag on the protection case of an intelligent terminal **100** can be customized according to personal preferences, which are not listed one by one herein.

[0084] It should be noted that before use, the protection case of an intelligent terminal **100** needs to be communicatively connected with the intelligent terminal so as to customize the electronic tags generated when the circuits where the plurality of the switching elements **50** are located are conductive; when the electronic tags generated during conduction of the circuits where the plurality of the switching elements **50** are located are customized, the plurality of the switching elements **50** are activated successively and the corresponding circuits are conductive; the NFC module of the

intelligent terminal senses successively and reads the corresponding electronic tags; and the intelligent terminal then customizes the electronic tags so that each electronic tag forms a quick instruction for the intelligent terminal to execute a certain action.

[0085] With reference to FIG. 13, the RFID chips **40** have a frequency in a range of 10 MHz to 15 MHz, and a method for using the protection case of an intelligent terminal **100** further includes:

[0086] step **S30**: activating two or more switching elements of the plurality of the switching elements at the same time, so that circuits where the activated two or more switching elements are located are conductive at the same time and generate an electronic tag which is not able to be sensed by the NFC module of the intelligent terminal.

[0087] Since the frequency of the RFID chips **40** is 10 MHz to 15 MHz, preferably, the frequency of the RFID chips **40** is 13.56 MHz, and the RFID chips **40** with this frequency do not need to be powered by a power supply in use; in addition, when two or more switching elements **50** in the plurality of the switching elements **50** are conductive at the same time, since the energy transmitted from the intelligent terminal that the RFID coil **30** receives stays unchanged, but the conduction of two or more circuits would result in the frequency of the RFID coil **30** being too low, the electronic tags generated by the RFID chips in the two or more conduction circuits are not able to be sensed by the NFC module of the intelligent terminal; therefore, selecting the RFID chips in the above-mentioned frequency range can also achieve the effect of conduction of one RFID chip selected from the plurality of the RFID chips in parallel.

[0088] That is to say, in the above-mentioned technical solution, by selecting the RFID chips **40** with a frequency within 10 MHz to 15 MHz, on the one hand, the protection case of an intelligent terminal **100** does not need to be provided with a power supply or an external power supply, which enables the thickness of the housing **10** to be made thinner, and on the other hand, one selected from the plurality of RFID chips connected in parallel is conductive, thus avoiding the problem that a user presses two or more switching elements at the same time, which results in that the intelligent terminal needs to perform two or more actions synchronously, thus affecting the normal operation of the intelligent terminal.

[0089] In the protection case of an intelligent terminal of the present disclosure, the reinforcing sheet is fixedly mounted in the mounting groove, the RFID coil is attached to the reinforcing sheet, the plurality of the RFID chips are arranged in parallel and are electrically connected to the RFID coil, and the plurality of the switching elements are mounted in the positioning groove and are respectively connected in series to circuits where the corresponding RFID chips are connected to the RFID coil. With such arrangement, on the one hand, the positioning of the flexible RFID coil in the mounting groove is facilitated, and on the other hand, the strength at which the housing is provided with the mounting groove and the positioning groove can be increased by means of the reinforcing sheet, so that the thickness of the housing can be made thinner.

[0090] Finally, it should be noted that the above-mentioned embodiments are merely illustrative of the technical solution of the present disclosure, and are not restrictive. Although the present disclosure has been described in detail with reference to the foregoing embodiments, a person skilled in the art will appreciate that the technical solutions disclosed in the above-mentioned embodiments can still be amended, or some of the technical features thereof can be replaced with equivalents. Such modifications and substitutions do not depart the substance of the corresponding technical solution from the spirit and scope of the technical solutions of the embodiments of the present disclosure.

Claims

1. A protection case of an intelligent terminal, comprising: a housing, wherein a first surface of the housing defines a mounting groove, a second surface of the housing defines a positioning groove, and the positioning groove is arranged opposite to the mounting groove; a base, disposed in the

mounting groove; a RFID coil, at least partially disposed on the base; at least one RFID chip, disposed in the mounting groove and electrically connected to the RFID coil; and at least one switching element, disposed in the positioning groove, wherein one of the at least one switching element is connected to a circuit where one of the at least one RFID chip is connected with the RFID coil.

2. The protection case of the intelligent terminal according to claim 1, wherein the housing comprises a back plate and a side plate extending in the same direction from an edge of the back plate, the back plate and the side plate together enclose a mounting cavity that is configured for receiving the intelligent terminal, the mounting groove is defined on a surface of the side plate close to the mounting cavity, and the positioning groove is defined on a surface of the side plate away from the mounting cavity.

3. The protection case of the intelligent terminal according to claim 2, wherein the back plate has a first region arranged opposite to an NFC sensing area of the intelligent terminal and a second region arranged opposite to a wireless charging sensing area of the intelligent terminal, the first region and the second region are spaced apart from each other, the mounting groove is arranged adjacent to the first region and spaced apart from the second region, and one portion of the RFID coil is arranged in the first region and the other portion of RFID coil is arranged in the mounting groove.

4. The protection case of the intelligent terminal according to claim 1, wherein the at least one RFID chip has a frequency in a range of 10 MHz to 15 MHz.

5. The protection case of the intelligent terminal according to claim 1, wherein the RFID coil is adhesively fixed to the base.

6. The protection case of the intelligent terminal according to claim 1, wherein the RFID coil is provided on a side, facing a groove bottom of the mounting groove, of the base; the at least one RFID chip is disposed on a side, facing the groove bottom of the mounting groove, of the RFID coil; and the at least one RFID chip is encapsulated by an encapsulation film.

7. The protection case of the intelligent terminal according to claim 6, wherein at least one avoidance recess is defined in the groove bottom of the mounting groove, and the at least one avoidance recess is configured for avoiding arrangement of the at least one RFID chip.

8. The protection case of the intelligent terminal according to claim 1, wherein the positioning groove is disposed in communication with the mounting groove; the at least one switching element comprises a push-type button and a key cap, the push-type button forms a circuit in series with the RFID coil and the at least one RFID chip, and the push-type button is disposed at a position where the RFID coil is opposite to the positioning groove; and the key cap cooperates with the positioning groove and is able to reciprocate along the positioning groove, so as to press or release the push-type button.

9. The protection case of the intelligent terminal according to claim 8, wherein the push-type button is a snap dome button.

10. The protection case of the intelligent terminal according to claim 8, wherein the at least one RFID chip is arranged on a side, facing the positioning groove, of the RFID coil; and the protection case of the intelligent terminal further comprises a polyester film, and the polyester film covers the base, the RFID coil, the at least one RFID chip, and the push-type button.

11. The protection case of the intelligent terminal according to claim 10, wherein the protection case of the intelligent terminal further comprises a PET sheet; the PET sheet defines a first avoidance hole at a position corresponding to the at least one RFID chip, and the PET sheet defines a second avoidance hole at a position corresponding to the push-type button; and one side of the PET sheet abuts against the polyester film, and the other side of the PET sheet is fixed to the RFID coil.

12. The protection case of the intelligent terminal according to claim 1, wherein the at least one switching element is a self-resetting knob switch; or the at least one switching element is an

electronic switch, the protection case of the intelligent terminal further comprises a power supply module or a power supply connector, and the electronic switch is electrically connected to the power supply module or the power supply connector.

13. The protection case of the intelligent terminal according to claim 1, wherein the protection case further comprises a decorative plate; the decorative plate is arranged on a side, facing away from the positioning groove, of the base; and the decorative plate covers a notch of the mounting groove.

14. A method for using a protection case of an intelligent terminal, wherein the protection case of the intelligent terminal comprises: a housing, wherein a first surface of the housing is provided with a mounting groove, a second surface of the housing is provided with a positioning groove, and the positioning groove is arranged opposite to the mounting groove; a base, disposed in the mounting groove; a RFID coil, at least partially disposed on the base; at least one RFID chip, disposed in the mounting groove and electrically connected to the RFID coil; and at least one switching element, disposed in the positioning groove, wherein one of the at least one switching element is connected to a circuit where one of the at least one RFID chip is connected with the RFID coil; and the method comprises: placing the intelligent terminal in the housing and arranging an NFC sensing area of the intelligent terminal opposite to the RFID coil; and activating one switching element of the at least one switching elements, so that a circuit where the activated switching element is located is conductive and generates an electronic tag which is able to be sensed and read by an NFC module of the intelligent terminal.

15. The method according to claim 14, wherein the at least one RFID chip has a frequency in a range of 10 MHz to 15 MHz, the protection case comprises a plurality of switching elements, and the method further comprises: activating two or more switching elements at the same time, so that circuits where the activated two or more switching elements are located are conductive at the same time and generate an electronic tag which is not able to be sensed by the NFC module of the intelligent terminal.

16. A protection case of an intelligent terminal, comprising: a housing, defining a mounting groove; a base, disposed in the mounting groove; a RFID coil, at least partially disposed on the base; at least one RFID chip, electrically connected to the RFID coil; and at least one switching element, wherein one of the at least one switching element is connected to a circuit where one of the at least one RFID chip is connected with the RFID coil.

17. The protection case of the intelligent terminal according to claim 16, wherein the housing comprises a back plate and a side plate extending in the same direction from an edge of the back plate, the back plate and the side plate together enclose a mounting cavity that is configured for receiving the intelligent terminal, the mounting groove that is configured for receiving the base and at least partial RFID coil is defined on a surface of the side plate close to the mounting cavity, and a positioning groove that is configured for receiving the at least one switching element is defined on a surface of the side plate away from the mounting cavity.

18. The protection case of the intelligent terminal according to claim 17, wherein the back plate has a first region arranged opposite to an NFC sensing area of the intelligent terminal and a second region arranged opposite to a wireless charging sensing area of the intelligent terminal, the first region and the second region are spaced apart from each other, the mounting groove is arranged adjacent to the first region and spaced apart from the second region, and one portion of the RFID coil is arranged in the first region and the other portion of RFID coil is arranged in the mounting groove.

19. The protection case of the intelligent terminal according to claim 16, wherein the at least one RFID chip has a frequency in a range of 10 MHz to 15 MHz.

20. The protection case of the intelligent terminal according to claim 16, wherein the RFID coil is adhesively fixed to the base.
