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Verified Translation
of International Application No. PCT/EP98/02068

Interface Device for Chip Cards

The invention relates to an interface device for chip cards in standardized credit card format.

DE 43 10 517 C2 already discloses an interface device for chip cards which has a flat housing in the standardized PCMCIA format. This housing is inserted into a corresponding accommodation slot of a computer and has at its front end a plug-in socket which corresponds to a multiple contact row at the bottom of the accommodation slot in the computer. Extending from its rear end there is provided an accommodation channel for a chip card.

The breadth of a conventional housing for PCMCIA apparatus is 54 mm and is exactly the same as the standardized breadth of a chip card in the credit card format. The accommodation channel for the chip card accordingly extends over the entire breadth of the housing of the interface device so that this housing is open on the two narrow sides. In order to still ensure a lateral guidance for the chip card, the housing is provided at its rear end with a widened collar which projects out of the accommodation slot of the computer and also forms a lateral rim of the insertion slot for the chip card. This collar is considered to be indispensable to the lateral guidance of the chip card because the breadth of the chip card is identical with that of the housing of a PCMCIA device.

The invention now provides an interface device for chip cards which enables a lateral guidance for the chip card even without a collar protruding from the accommodation slot. In the interface device according to the invention, the breadth of the housing in its edge region adjoining the plug-in socket is the same as that of the standardized chip card

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format. In its condition fully inserted in the accommodation slot, the housing does not or not essentially protrude therefrom. The accommodation channel for the chip card terminates already before the edge region of the housing adjoining the plug-in socket. At least at its rear end the housing is closed on the sides and has a breadth there which only slightly exceeds that of the chip card format. At the same time the width of the accommodation channel at the rear end of the housing is about the same as the breadth of the chip card format. The invention is based on the idea that the standard breadth of the PCMCIA housing needs to be given only in the vicinity of the plug-in socket while the accommodation slot has an increased width in the region of its insertion opening to provide on the one hand for a facilitated insertion of the PCMCIA housing and on the other hand to allow the attachment of spring contacts which are fitted on the narrow sides of the accommodation slot and intended to come into contact with the metallic housing of the PCMCIA apparatus so as to establish a ground connection between the computer and the housing. Although the width of the accommodation slot in this region only slightly exceeds the breadth of the standardized credit card format, this difference is sufficient to accommodate thin side walls of the housing which are able to provide for perfect lateral guidance of a chip card. The side walls of the housing may have a thickness of up to 0.25 mm in this area, i.e. a thickness which is not less than in conventional housing designs of PCMCIA apparatus, so that the side walls may be formed integrally with the main surfaces. It is thus not necessary for separate lateral wall parts to be attached to the narrow sides of the housing, so that an additional layer of material is avoided, which could result in a local increase in the wall thickness.

It would be desirable to close the accommodation channel for the chip card on the sides over its entire length so as to firstly prevent any foreign bodies from penetrating and secondly to avoid any edges or steps on the side faces which might get interlocked with the spring contacts. It is however

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not possible to extend the side walls provided in accordance with the invention at the rear end of the housing as far as up to the region of the plug-in socket because the accommodation slot is not sufficiently wide in that region.

The measure of the invention according to which the accommodation channel terminates already before the edge region of the housing adjoining the plug-in socket makes it possible however to close the lateral intermediate region of the housing by thin edge strips the wall thickness of which may amount to about half the wall thickness of the side walls in the region of the rear end of the housing, that is, about 0.1 to 0.15 mm. Since the edge strips, owing to the reduced depth of the accommodation slot, need not be extended as far as up to the plug-in socket, the accommodation channel has a width sufficient to accommodate the edge strips in the region of their front ends.

The side walls or lateral edge strips of the housing are preferably attached not to the narrow sides, but rather to the main surfaces of the housing, more particularly to the lateral longitudinal edges of the main surfaces of the housing which are set off from the central region of the main surfaces by a step, thus providing sufficient room for accommodating a double thickness of material.

A special advantage of the configuration of the interface device in accordance with the invention resides in that in contrast to a housing designed to have open sides, it ensures a perfect contact at the side walls by means of the spring contacts provided in the accommodation slot. The side walls may in this way also provide for the lateral guidance of the housing in the accommodation slot.

In order to perfect the lateral guidance of the chip card at its front end in the accommodation channel so that its contact surfaces are precisely aligned with the contacts of the interface device, in the preferred embodiment the

accommodation channel has rounded guide surfaces at its front end adjoining the edge region of the housing, which correspond to the rounded corners of the credit card format, or rectangular guide surfaces which have an analogous guiding function.

Further features and advantages of the invention will be apparent from the following description of a plurality of embodiments and from the drawings to which reference is made and in which:

Figure 1 shows a diagrammatic perspective view of the interface device according to the invention;

Figure 2 shows a diagrammatic longitudinal sectional view of the device in an accommodation slot of a computer;

Figures 3a and 3b show cross-sectional views of two embodiments of the device in the region of the rear end;

Figure 4 shows a cross-sectional view of the device in the central region; and

Figure 5 shows a modified embodiment of the device.

The interface device shown in Figure 1 comprises a flat housing in the generally known, standardized PCMCIA format. This housing has an upper main surface 10 having two longitudinal edges 10a, 10b which are each set off by a step, a plug-in socket 12 at its front end, a narrow rear side 14 having an insertion slot 16 for a chip card 18, two lateral narrow sides 20, 22, and a lower main surface 11 which is symmetrical to the upper main surface 10. Inside the housing a printed circuit card 24 is arranged (Figures 3 and 4) which accommodates various components of the interface device, in particular numerous electronic component parts as well as a contact group 26 for contacting the contact field 28 of the chip card 18.

Figure 2 shows an accommodation slot 30 of a computer or a module for such computer, with an interface device according to Figure 1 being almost fully inserted in this accommodation slot. A chip card 18 is inserted in the accommodation channel 32, extending from the insertion slot 16, of the interface device. The plug-in socket 12 is designed to match a multiple contact row 34 at the bottom of the accommodation slot 30.

The accommodation channel 32 has roughly the breadth of the chip card 18 and extends as far as to an edge region A of the housing, adjoining the plug-in socket 12. The accommodation channel 32 terminates at this edge region A by two rounded guide surfaces 32a, 32b, which correspond to the rounded shape at the corners of the credit card format. As an alternative, the guide surfaces 32a, 32b may be designed to be rectangular. The accommodation channel 32 ends at a distance S from the front end of the housing or the plug-in socket 12. This distance amounts to at least about 20 mm, preferably 25 mm or more.

At the rear end of the device, which comprises the insertion slot 16 for the chip card 18, the housing is closed by side walls 40, 42 which, as illustrated in Figures 3a and 3b, may be formed integrally with the housing part which constitutes either of the main surfaces of the housing (Figure 3b) or both main surfaces of the housing (Figure 3a). These side walls 40, 42 however extend only over the rear end region of the housing referenced B in Figure 2. They effect a lateral guidance of the chip card 18 which is completed by the guide surfaces 32a, 32b once the chip card 18 is fully inserted.

The intermediate region C of the housing between the front edge region A and the rear end region B is closed on the sides by narrow, thin-walled edge strips 44, 46. These edge strips 44, 46 are U-shaped in cross-section with two

legs resting on the outside on the longitudinal edges 10a, 10b of the housing and a rib connecting them, which forms the side wall of the housing in the intermediate region C thereof. The accommodation channel 32 is thus closed on the sides over its entire length. The ends of the edge strips 44, 46 which are adjacent to the plug-in socket are fitted into the narrow sides of the edge region A in order to avoid the formation of edges or steps.

On either of the narrow sides of its outer end the accommodation slot 30 has a spring contact 50, 52 accommodated in a recess but protruding into the accommodation slot from the side. These spring contacts 50, 52 are connected to ground of the computer or computer module. When the device is fully inserted, they are in contacting engagement with the side walls 40, 42. The components of the accommodation slot 30 are covered toward the outside in the usual manner by a housing wall 56 of the computer or computer module. In addition, an ejector key 58 protruding outward is provided in the usual manner next to the accommodation slot.

As can be seen from Figure 2, the length of the device in relation to the depth of the accommodation slot 30 is selected such that the housing of the device does not or not essentially protrude from the accommodation slot when it is fully inserted in the latter. This is very desirable because for instance in the case of a portable computer any parts projecting outward may be disturbing. The chip card 18, on the other hand, protrudes from the accommodation slot over a considerable part of its length. This, however, is not a shortcoming because the chip card is inserted only when in use. It is even made easier to handle it when a relatively large surface area is available for touching and holding it.

In the region which corresponds to the edge region A of the device, the accommodation slot 30 has a width which is the same as the breadth of the chip card 18. The width of the accommodation slot 30 at its outer end is somewhat larger,

thus permitting the accommodation of the side walls 40, 42 which protrude beyond the breadth of the chip card 18. More particularly, the wall thickness of the side walls 40, 42 may be about 0.2 to 0.25 mm. This wall thickness is sufficient also for the main surfaces of the housing so that a one-part or a two-part housing design is feasible, as is shown in Figures 3a and 3b.

The edge strips 44, 46 in the intermediate region C are, however, provided as separate parts because they need to be fabricated of a thinner material the wall thickness of which amounts to only about 0.1 to 0.15 mm, but they may be made of sheet metal just like the other components of the housing. All housing connections are formed on the main surfaces of the housing. On the narrow sides there are no junction points which could result in a local increase in the wall thickness.

The embodiment of the interface device as described is intended for only one chip card. But the same principle may be employed to realize an interface device which is intended for two or more chip cards. One such embodiment is depicted in Figure 5.

As can be seen in Figure 5, the accommodation channel 32 has a height which is designed for accommodating two chip cards 18, 18a lying directly one on top of the other. The accommodation channel 32 has a first part 32a of a length which is greater than that of its second part 32b so that the chip cards 18, 18a are inserted to different depths. In particular, the chip card 18a is inserted only so far that it will not cover up the contact field 21 of the chip card 18. A plate spring 7 secured under the upper main surface presses a singly inserted chip card downward into the part 32a of the accommodation channel to ensure a unique allocation.

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Claims

1. An interface device for chip cards in standardized credit card format, comprising a flat housing in likewise standardized PC card format intended for insertion into a corresponding accommodation slot (30) and having a plug-in socket (12) at its front end and, extending from its rear end, an accommodation channel (32) for at least one chip card (18),

the breadth of the housing in its edge region (A) adjoining the plug-in socket (12) being the same as that of the standardized chip card format;

characterized in that:

(a) in its condition fully inserted in the accommodation slot (30), the housing does not or not essentially protrude therefrom,

(b) the accommodation channel (32) terminates before the edge region (A) of the housing adjoining the plug-in socket (12),

(c) the housing is closed on the sides at least at its rear end and has a breadth there which only slightly exceeds that of the chip card format, and

(d) the width of the accommodation channel (32) at the rear end of the housing is about the same as the breadth of the chip card format.

2. The device according to claim 1, characterized in that an intermediate region (C) of the housing, located between the rear end (B) closed on the sides and the edge region (A) adjoining the plug-in socket (12), is likewise closed on the sides.

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3. The device according to claim 2, characterized in that the side walls of the housing have a thinner wall thickness in its intermediate region (C) than at its rear end (B).

4. The device according to claim 3, characterized in that the side walls of the housing are extended beyond the intermediate section as far as into the edge region (A) adjoining the plug-in socket and are fitted into the narrow side of the housing in that region.

5. The device according to any of the preceding claims, characterized in that the accommodation channel (32) has rounded guide surfaces (32a, 32b) at its front end adjoining the edge region (A) of the housing, which correspond to the rounded corners of the credit card format.

6. The device according to any of the preceding claims, characterized in that a main surface (11) of the housing in the region of its rear end (B) is formed of a continuous sheet metal part integrally with at least one bent side wall (42) and a wall strip (10b) which is bent from the side wall (42) and extends on the opposite main surface (10) of the housing.

7. The device according to any of the preceding claims, characterized in that the main surfaces of the housing in the intermediate region (C) thereof are formed by sheet metal plates having lateral longitudinal edges (10a, 10b) over which the wings of a thin-walled edge strip (44, 46) reach which is U-shaped in cross-section, the wings being connected with the longitudinal edges (10a, 10b) of the sheet metal plates on the main surfaces (10, 11) of the housing.

8. The device according to any of the preceding claims, characterized in that the breadth of the housing at its rear end (B) exceeds that of the standardized credit card format by 0.4 to 0.5 mm.

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9. The device according to any of the preceding claims, characterized in that the breadth of the housing in its intermediate region (C) exceeds that of the standardized credit card format by 0.2 to 0.3 mm.

10. The device according to any of the preceding claims, characterized in that the accommodation channel (32) ends at a distance (S) of at least 20 mm, preferably 25 mm, before the front end of the housing.

11. The device according to any of the preceding claims, characterized in that the accommodation channel (32) is dimensioned for a plurality of chip cards (18, 18a) which are inserted lying directly one on top of the other.

12. The device according to claim 11, characterized in that two of the chip cards (18, 18a) are insertable into the accommodation channel (32) to different depths such that neither chip card covers up the contact surfaces (19, 19a) of the other chip card.

13. The device according to any of the preceding claims, characterized in that the side walls (40, 42) closing the housing on the sides effect a guidance of the housing in the accommodation slot (30).

14. The device according to claim 13, characterized in that a spring (7) is arranged in the accommodation channel (32) such that it biases a singly inserted chip card against a main surface of the housing.

15. The device according to any of the preceding claims, characterized in that the side walls (40, 42) closing the housing on the sides are adapted to be contacted by resilient ground contacts (50, 52) of the accommodation slot (30).

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