

CLAIMS

1. Process for the production of an electronic card formed by:

5 - an external connector (2; 50; 50a) comprising an insulating support (4; 4a) that defines an outside face and an inside face opposite one another and a plurality of external metal contact pads, which are arranged on the outside face (6) of this insulating support;

- a card body (22; 22a) having a cavity (26; 26a) for said external connector;

10 - an electronic unit and/or an antenna incorporated in the card body and electrically connected to or having a plurality of internal metal pads (34a, 34b, 34c) arranged under said cavity;

wherein this process comprises a step of machining individual cavities (38a, 38b, 38c) in said card body until the internal metal pads are
15 reached or until metal parts (36a, 36b, 36c) arranged on these internal metal pads and in electrical contact therewith are reached, and these metal parts or the internal metal pads can be partially machined;

wherein this production process is characterised in that said individual cavities have a cross-section in which at least one dimension is
20 greater than 0.5 mm (500µm) and by the following steps:

- forming said external connector with a plurality of metal projections (18a, 18b, 18c) located on the side of said inside face (8) of said insulating support and respectively connected electrically to at least one subassembly of said plurality of external metal contact pads and/or to contact pads linked
25 to a second electronic unit (14), which is arranged on the inside face of the insulating support and intended to be located in said cavity, wherein these metal projections are arranged in order to respectively face said individual cavities during the placement of the external connector in said cavity and

configured to be capable of being inserted into these individual cavities in order to fill them at least for the most part;

- subsequent to said forming of said external connector and said machining of individual cavities in the card body, placing this external
5 connector in the cavity of the card body, with said metal projections inserted into the respective individual cavities, and the initial volume of each projection is provided such that, once the connector is in place in its cavity, the volume of this projection is substantially equal to or smaller than the volume of the corresponding individual cavity;

10 - supplying energy at least partially to the metal projections to perform soldering at least on the side of said internal metal pads and form soldered contacts between these and the external connector, wherein electrical junctions are thus obtained between said internal metal pads and said at least one subassembly of the plurality of external metal contact pads
15 and/or said contact pads linked to said second electronic unit.

2. Production process according to claim 1, characterised in that said individual cavities are circular and have a diameter larger than 0.5 mm (500 μm).

3. Production process according to claim 1 or 2, characterised in
20 that a plurality of intermediate contact pads (12a, 12c) are arranged on said inside face of said external connector and electrically connected to said at least one subassembly of said plurality of external contact pads and/or to said contact pads linked to said second electronic unit, wherein these intermediate contact pads are respectively located under said metal
25 projections, and in that these metal projections are formed by a solder material, which subsequent to said supply of energy forms a solder joint (46a, 46c) between each of said internal pads and a corresponding intermediate contact pad of said intermediate contact pads.

4. Production process according to claim 1 or 2, characterised in
30 that said insulating support (4a) has a plurality of apertures (52a, 52b, 52c)

between its outside face and its inside face, wherein the apertures of this plurality of apertures are respectively closed (10a, 10b, 10c) by the external pads of said at least one subassembly of said plurality of external metal contact pads on the side of the outside face of the insulating support; in that
5 said apertures are at least partially filled by respective metal parts (54a, 54b, 54c); and in that with the respective metal projections (18a, 18b, 18c) that surmount them or extend them and after the supply of energy that is supplied to the respective metal projections and also to the metal parts, these metal parts form metal connecting bridges (62a, 62b, 62c) between
10 the rear surfaces of the respective external pads and the corresponding internal pads, wherein these metal connecting bridges each comprise a solder joint on the side of the rear surface of the corresponding external pad that assures a soldered contact to the latter.

5. Production process according to claim 4, characterised in that
15 said apertures are circular and have a diameter larger than 0.5 mm (500 μ m).

6. Production process according to claim 5, characterised in that each of said metal connecting bridges is formed substantially by a solder material that is melted by said supply of energy in order to form the same
20 single solder joint (62a, 62b, 62c) between an internal pad and the rear surface of the corresponding external pad.

7. Production process according to claim 3, characterised in that said solder material forming said metal projections is deposited on the side of the rear face of said insulating support using a thick film screen-printing
25 process.

8. Production process according to claim 4, characterised in that said solder material forming said metal projections is deposited on the side of the rear face of said insulating support by a nozzle or needle that receives the solder material from a metering device allowing the quantity of
30 solder material to be controlled precisely.

9. Production process according to claim 6, characterised in that an adhesive film (20) is deposited on the inside face (8) of said insulating support, wherein this adhesive film is provided to glue the external connector to the base of said cavity after being applied to the latter, and this
5 adhesive film is arranged on a non-stick sheet, which is located on the other side of said inside face after deposition of the adhesive film, wherein this film and the non-stick sheet have apertures traversing both; and in that these apertures are filled with solder material, and the non-stick sheet is then removed to obtain said metal projections, which exit from the
10 respective apertures of said adhesive film.

10. Production process according to claim 6, characterised in that said metal projections are preformed and placed on the side of the rear face of said insulating support by an automatic installation.

11. Production process according to claim 3, characterised in that
15 said solder material forming said metal projections is applied in paste form and is then hardened before placement of the external connector in said cavity.

12. Production process according to claim 4, characterised in that
20 said solder material forming said metal projections is applied in paste form and is then hardened before placement of the external connector in said cavity.

13. Production process according to claim 1 or 2, characterised in that the initial dimensions provided for said metal projections are such that, subsequent to the placement of the external connector in said cavity, these
25 projections for the most part fill the respective individual cavities (38a, 38b, 38c).

14. Production process according to claim 1 or 2, characterised in that it is provided to deposit an adhesive film (20) on the inside face of said
~~insulating support, wherein this adhesive film serves to glue the external~~

connector to the base of said cavity and has apertures, from which said metal projections exit.

15 15. Production process according to claim 1 or 2, characterised in that said supply of energy is achieved in a substantially localised manner in the respective regions of said metal projections through said plurality of external metal contact pads.

10 16. External connector for the production of an electronic card using the process of claim 1, comprising an insulating support (4; 4a) that defines an outside face and an inside face opposite one another and a plurality of external metal contact pads, which are arranged on said outside face (6) of this insulating support;

15 characterised in that it additionally comprises a plurality of metal projections (18a, 18b, 18c) located on the side of said inside face (8) of the insulating support and respectively connected electrically to at least one subassembly of said plurality of external metal contact pads and/or to contact pads linked to an electronic unit (14), which is arranged on the inside face of the insulating support, wherein these metal projections are intended to be inserted into individual cavities of the body of said electronic card, and metal contact pads linked to an electronic unit inside said card body and/or an antenna incorporated in this card body are located at the bottom of said cavities and in that these metal projections are configured to be capable of being inserted, during placement of this external connector, into a cavity of said card body, in said individual cavities located at the base of this cavity in order to fill them at least for the most part.

25 17. External connector according to claim 16, characterised in that a plurality of intermediate contact pads (12a, 12c) are arranged on said inside face of the external connector and respectively connected to said at least one subassembly of said plurality of external metal contact pads and/or to said contact pads linked to said electronic unit, wherein these intermediate contact pads are respectively located under said metal

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projections, and in that these metal projections are formed by a solder material.

18. External connector according to claim 16, characterised in that said insulating support (4a) has a plurality of apertures (52a, 52b, 52c) between its outside face and its inside face, wherein the apertures of this plurality of apertures are respectively closed by the external pads (10a, 10b, 10c) of said at least one subassembly of said plurality of external metal contact pads on the side of the outside face of the insulating support, in that said apertures are at least partially filled by respective metal parts (54a, 54b, 54c), which are respectively extended or surmounted by metal projections of the plurality of metal projections.

19. External connector according to claim 18, characterised in that said apertures have a cross-section, in which at least one dimension is larger than 0.5 mm (500 µm).

20. External connector according to claim 18 or 19, characterised in that said metal parts and the corresponding metal projections are substantially formed from solder material.

21. External connector according to one of claims 16 to 19, characterised in that it comprises an adhesive film (20) on the inside face of said insulating support, wherein this adhesive film has apertures, from which said metal projections exit.

CLAIMS

1. Process for the production of an electronic card formed by:

5 - an external connector (2; 50; 50a) comprising an insulating support (4; 4a) that defines an outside face and an inside face opposite one another and a plurality of external metal contact pads, which are arranged on the outside face (6) of this insulating support;

- a card body (22; 22a) having a cavity (26; 26a) for said external connector;

10 - an electronic unit and/or an antenna incorporated in the card body and electrically connected to or having a plurality of internal metal pads (34a, 34b, 34c) arranged under said cavity;

wherein this process comprises a step of machining individual cavities (38a, 38b, 38c) in said card body until the internal metal pads are
15 reached or until metal parts (36a, 36b, 36c) arranged on these internal metal pads and in electrical contact therewith are reached, and these metal parts or the internal metal pads can be partially machined;

wherein this production process is characterised in that said individual cavities have a cross-section in which at least one dimension is
20 greater than 0.5 mm (500µm) and by the following steps:

- forming said external connector with a plurality of metal projections (18a, 18b, 18c) located on the side of said inside face (8) of said insulating support and respectively connected electrically to at least one subassembly of said plurality of external metal contact pads and/or to contact pads linked
25 to a second electronic unit (14), which is arranged on the inside face of the insulating support and intended to be located in said cavity, wherein these metal projections are arranged in order to respectively face said individual cavities during the placement of the external connector in said cavity and

configured to be capable of being inserted into these individual cavities in order to fill them at least for the most part;

- subsequent to said forming of said external connector and said machining of individual cavities in the card body, placing this external
5 connector in the cavity of the card body, with said metal projections inserted into the respective individual cavities, and the initial volume of each projection is provided such that, once the connector is in place in its cavity, the volume of this projection is substantially equal to or smaller than the volume of the corresponding individual cavity;

10 - supplying energy at least partially to the metal projections to perform soldering at least on the side of said internal metal pads and form soldered contacts between these and the external connector, wherein electrical junctions are thus obtained between said internal metal pads and said at least one subassembly of the plurality of external metal contact pads
15 and/or said contact pads linked to said second electronic unit.

2. Production process according to claim 1, characterised in that said individual cavities are circular and have a diameter larger than 0.5 mm (500 μ m).

3. Production process according to claim 1 or 2, characterised in
20 that a plurality of intermediate contact pads (12a, 12c) are arranged on said inside face of said external connector and electrically connected to said at least one subassembly of said plurality of external contact pads and/or to said contact pads linked to said second electronic unit, wherein these intermediate contact pads are respectively located under said metal
25 projections, and in that these metal projections are formed by a solder material, which subsequent to said supply of energy forms a solder joint (46a, 46c) between each of said internal pads and a corresponding intermediate contact pad of said intermediate contact pads.

4. Production process according to claim 1 or 2, characterised in
30 that said insulating support (4a) has a plurality of apertures (52a, 52b, 52c)

between its outside face and its inside face, wherein the apertures of this plurality of apertures are respectively closed (10a, 10b, 10c) by the external pads of said at least one subassembly of said plurality of external metal contact pads on the side of the outside face of the insulating support; in that
5 said apertures are at least partially filled by respective metal parts (54a, 54b, 54c); and in that with the respective metal projections (18a, 18b, 18c) that surmount them or extend them and after the supply of energy that is supplied to the respective metal projections and also to the metal parts, these metal parts form metal connecting bridges (62a, 62b, 62c) between
10 the rear surfaces of the respective external pads and the corresponding internal pads, wherein these metal connecting bridges each comprise a solder joint on the side of the rear surface of the corresponding external pad that assures a soldered contact to the latter.

5. Production process according to claim 4, characterised in that
15 said apertures are circular and have a diameter larger than 0.5 mm (500 μ m).

6. Production process according to claim 5, characterised in that each of said metal connecting bridges is formed substantially by a solder material that is melted by said supply of energy in order to form the same
20 single solder joint (62a, 62b, 62c) between an internal pad and the rear surface of the corresponding external pad.

7. Production process according to claim 3, characterised in that said solder material forming said metal projections is deposited on the side of the rear face of said insulating support using a thick film screen-printing
25 process.

8. Production process according to claim 4, characterised in that said solder material forming said metal projections is deposited on the side of the rear face of said insulating support by a nozzle or needle that receives the solder material from a metering device allowing the quantity of
30 solder material to be controlled precisely.

9. Production process according to claim 6, characterised in that an adhesive film (20) is deposited on the inside face (8) of said insulating support, wherein this adhesive film is provided to glue the external connector to the base of said cavity after being applied to the latter, and this
5 adhesive film is arranged on a non-stick sheet, which is located on the other side of said inside face after deposition of the adhesive film, wherein this film and the non-stick sheet have apertures traversing both; and in that these apertures are filled with solder material, and the non-stick sheet is then removed to obtain said metal projections, which exit from the
10 respective apertures of said adhesive film.

10. Production process according to claim 6, characterised in that said metal projections are preformed and placed on the side of the rear face of said insulating support by an automatic installation.

11. Production process according to claim 3, characterised in that
15 said solder material forming said metal projections is applied in paste form and is then hardened before placement of the external connector in said cavity.

12. Production process according to claim 4, characterised in that said solder material forming said metal projections is applied in paste form
20 and is then hardened before placement of the external connector in said cavity.

13. Production process according to claim 1 or 2, characterised in that the initial dimensions provided for said metal projections are such that, subsequent to the placement of the external connector in said cavity, these
25 projections for the most part fill the respective individual cavities (38a, 38b, 38c).

14. Production process according to claim 1 or 2, characterised in that it is provided to deposit an adhesive film (20) on the inside face of said insulating support, wherein this adhesive film serves to glue the external

connector to the base of said cavity and has apertures, from which said metal projections exit.

15 15. Production process according to claim 1 or 2, characterised in that said supply of energy is achieved in a substantially localised manner in the respective regions of said metal projections through said plurality of external metal contact pads.

10 16. External connector for the production of an electronic card using the process of claim 1, comprising an insulating support (4; 4a) that defines an outside face and an inside face opposite one another and a plurality of external metal contact pads, which are arranged on said outside face (6) of this insulating support;

15 characterised in that it additionally comprises a plurality of metal projections (18a, 18b, 18c) located on the side of said inside face (8) of the insulating support and respectively connected electrically to at least one subassembly of said plurality of external metal contact pads and/or to contact pads linked to an electronic unit (14), which is arranged on the inside face of the insulating support, wherein these metal projections are intended to be inserted into individual cavities of the body of said electronic card, and metal contact pads linked to an electronic unit inside said card
20 body and/or an antenna incorporated in this card body are located at the bottom of said cavities and in that these metal projections are configured to be capable of being inserted, during placement of this external connector, into a cavity of said card body, in said individual cavities located at the base of this cavity in order to fill them at least for the most part.

25 17. External connector according to claim 16, characterised in that a plurality of intermediate contact pads (12a, 12c) are arranged on said inside face of the external connector and respectively connected to said at least one subassembly of said plurality of external metal contact pads and/or to said contact pads linked to said electronic unit, wherein these
30 intermediate contact pads are respectively located under said metal

projections, and in that these metal projections are formed by a solder material.

18. External connector according to claim 16, characterised in that said insulating support (4a) has a plurality of apertures (52a, 52b, 52c) between its outside face and its inside face, wherein the apertures of this plurality of apertures are respectively closed by the external pads (10a, 10b, 10c) of said at least one subassembly of said plurality of external metal contact pads on the side of the outside face of the insulating support, in that said apertures are at least partially filled by respective metal parts (54a, 54b, 54c), which are respectively extended or surmounted by metal projections of the plurality of metal projections.

19. External connector according to claim 18, characterised in that said apertures have a cross-section, in which at least one dimension is larger than 0.5 mm (500 μ m).

20. External connector according to claim 18 or 19, characterised in that said metal parts and the corresponding metal projections are substantially formed from solder material.

21. External connector according to one of claims 16 to 19, characterised in that it comprises an adhesive film (20) on the inside face of said insulating support, wherein this adhesive film has apertures, from which said metal projections exit.