What is claimed is:

1. An article of manufacture comprising:

a non-conductive substrate having a front side and a rear side, and a plurality of through holes extending from the front side to the rear side;

a smart card contact area arranged on the front side of the substrate and having a plurality of conductive pads which are mutually insulated and close front-side ends of the through holes;

a plurality of through-hole solder pads and a plurality of conductive traces arranged on the rear side of the substrate, wherein the through-hole solder pads are arranged at rear-side ends of the through holes, wherein the conductive traces are conductively coupled to the through-hole solder pads respectively;

a solder mask at least partially overlaying the conductive traces;

a first solder arranged in a first subset of the through holes and on a first subset of the through-hole solder pads, and configured to conductively couple a first subset of the conductive pads to a first subset of the conductive traces; and

an integrated circuit (IC) chip conductively coupled to the first subset of the conductive traces by direct chip attachment, thereby conductively coupling the IC chip to the first subset of the conductive pads at least via the first subset of the conductive traces, the first subset of the through-hole solder pads, and the first solder.

2. The article of manufacture of claim 1 further comprising:

an underfill material interposed between the IC chip and the rear side of the substrate and/or an encapsulant provided on the IC chip,

wherein the rear-side ends of the through holes are substantially free of the underfill material, the solder mask and/or the encapsulant.

3. The article of manufacture of claim 2, further comprising:

a second solder arranged in a second subset of the through holes and on a second subset of the through-hole solder pads, wherein the second subset of the solder pads and the second solder are co-operable to provide a plurality of antenna-connection pads.

wherein the IC chip is conductively coupled to the second subset of the through-hole solder pads through the second subset of the conductive traces, the article of manufacture further comprising:

an antenna conductively coupled to the antenna-connection pads, thereby conductively coupling the antenna to the IC chip.

4. The article of manufacture of claim 3 further comprising:

a biometric circuitry conductively coupled to the IC chip; and/or

a light emitting diode (LED) circuitry, which includes at least one LED module and a second antenna conductively coupled thereto, wherein the second antenna is configured to be inductively coupled to a contactless reader to operate the at least one LED module.

5. The article of manufacture of any one of claim 1 to claim 4, further comprising:

surface-mount solder pads arranged on the rear side of the substrate and conductively coupled to the first subset of the through-hole solder pads through the first subset of the conductive traces;

wherein the IC chip is arranged under the smart card contact area and conductively coupled to the surface-mount solder pads.

6. The article of manufacture of any one of claim 1 to claim 5, wherein the second subset of the through holes are non-diametrically opposed with respect to the IC chip.

7. The article of manufacture of any one of claim 1 to claim 6, wherein at least some of the conductive pads are arranged in an array of rows and columns, wherein the second subset of the through holes are arranged in different rows and columns.

8. The article of manufacture of any one of claim 1 to claim 7, wherein one of the second subset of the through holes is arranged at C6 pin position according to ISO 7816.

9. The article of manufacture of any one of claim 1 to claim 8, wherein the IC chip is arranged offset with respect to the smart card contact area.

10. The article of manufacture of any one of claim 1 to claim 9, wherein the substrate is dimensioned according to ID-1 size, half ID-1 size, or quarter ID-1 size according to ISO 7810.

11. The article of manufacture of any one of claim 1 to claim 10, wherein the substrate, the smart card contact area, the through-hole solder pads, the conductive traces, the solder mask, the first solder and the second solder are provided as a printed circuit board.

12. The article of manufacture of claim 1, wherein the conductive traces include a module antenna at least partially surrounding the through-hole solder pads.

13. A smart card comprising:

a laminated core comprising a plurality of laminated layers, wherein one of the laminated layers comprises the article of manufacture of any one of claim 1 to claim 12.

14. A method for fabricating a smart card, the method comprising:

conductively coupling an antenna to the antenna-connection pads of any one of claim 3 to claim 11, thereby conductively coupling the antenna to the IC chip.

15. A method for fabricating an article of manufacture, the method comprising:

perforating a non-conductive substrate to produce through holes extending from a front side to a rear side of the substrate;

plating a smart card contact area on the front side of the substrate, the smart card contact area having a plurality of conductive pads which are mutually insulated and close front-side ends of the through holes;

plating through-hole solder pads on the rear side of the substrate, wherein the through-hole solder pads are arranged at rear-end sides of the through holes;

plating a plurality of conductive traces on the rear side of the substrate, wherein the conductive traces are conductively coupled to the through-hole solder pads;

applying a solder mask at least partially overlaying the conductive traces;

depositing a first solder in a first subset of the through holes and on the first subset of the through-hole solder pads, wherein the first solder is configured to conductively couple a first subset of the conductive pads to a first subset of the conductive traces through the first subset of the through-hole solder pads;

depositing a second solder in a second subset of the through holes and on the second subset of the solder pads, thereby allowing the second subset of the through-hole solder pads and the second solder to co-operably provide a plurality of antenna-connection pads;

depositing a third solder on a plurality of surface-mount solder pads at ends of the conductive traces which are distal from the through-hole pads;

arranging an integrated circuit (IC) chip on the rear side of the substrate; and

reflowing at least the first solder, the second solder, and the third solder, thereby conductively coupling the IC chip to the first subset of conductive pads through the first subset of

the conductive traces, and conductively coupling the IC chip to the second subset of the through-hole solder pads.

16. The method of claim 15, further comprising:

providing an underfill material interposed between the IC chip and the substrate;

providing an encapsulant on the IC chip;

maintaining the rear-side ends of the through holes substantially free of the underfill material, the solder mask and/or the encapsulant.

17. The method of claim 16, wherein the IC chip is conductively coupled to the second subset of the solder pads through the second subset of the conductive traces, the method further comprising:

conductively coupling an antenna to the antenna-connection pads, thereby conductively coupling the antenna to the IC chip.

18. An integrated circuit (IC) module for a smart card with both contact and contactless interfaces, the IC module comprising:

a non-conductive substrate having a plurality of through holes extending from a front side to a rear side of the substrate, wherein the through holes include a first subset, a second subset, and a third subset of the through holes;

a smart card contact area arranged on the front side of the substrate and having a plurality of conductive pads which include a first subset of the conductive pads arranged to respectively close the first subset of the through holes respectively, and a second subset of the conductive pads arranged to close the second subset and the third subset of the through holes;

an IC chip arranged on the rear side of the substrate;

a plurality of conductive elements traversing the first subset and the third subset of the through holes and conductively coupling the first subset and the second subset of the conductive pads to the IC chip; and

an encapsulant deposited in the first subset and the third subset of the through holes, wherein the encapsulant is further deposited on the IC chip and the conductive elements,

wherein the second subset of the through holes are separated from the third set of the through holes by the substrate,

wherein the second subset of the through holes are non-diametrically opposed with respect to the IC chip.

19. The IC module of claim 18, wherein at least some of the conductive pads are arranged in an array of rows and columns, wherein the second subset of the through holes are arranged in different rows and columns.

20. The IC module of claim 19, wherein one of the second subset of the conductive pads includes an area which traverses more than one row and column.

21. The IC module of any one of claim 18 to claim 20, wherein the encapsulant is further deposited in at least one of the second subset of the through holes.

22. The IC module of any one of claim 18 to claim 21, wherein at least one of the second subset of the through holes is adapted to receive the encapsulant.

23. The IC module of any one of claim 18 to claim 22, wherein one of the second subset of the conductive pads is arranged at C6 pin position according to ISO 7816.

24. A smart card with both contact and contactless interfaces, the smart card comprising:

a card body having an opening and an antenna; and

the integrated circuit (IC) module of any one of claim 18 to claim 23, which is disposed in the opening;

a pair of antenna-connecting elements arranged in the second subset of the through holes and conductively coupling the antenna to the second subset of the conductive pads.

25. The smart card of claim 24, wherein each of the antenna-connecting elements includes a rigid conductive or solder bump, a conductive disc, a flexible conductive bump comprising an electrically conductive adhesive, or a portion of the antenna.

26. The smart card of any one of claim 24 to claim 25, wherein each of the second subset of the through holes is adapted to receive at most one conductive element.

27. A single-side plated integrated circuit (IC) carrier tape adapted for use in smart card with both contact and contactless interfaces, the IC carrier tape comprising:

a non-conductive substrate having a plurality of through holes extending from a front side to a rear side of the substrate, wherein the through holes include a first subset, a second subset, and a third subset of the through holes; and

a smart card contact area arranged on the front side of the substrate and having a plurality of conductive pads which include a first subset of the conductive pads arranged to respectively close the first subset of the through holes, and the second subset of the conductive pads arranged to close the second subset and the third subset of the through holes;

wherein the second subset of the through holes are separated from the third set of the through holes by the substrate,

wherein the conductive pads are arranged in an array of rows and columns, wherein the second subset of the through holes are provided at some of the conductive pads which are arranged in different rows and columns.

28. The carrier tape of claim 27, wherein an area of one of the second subset of the conductive pads traverses more than one row and column.

29. The carrier tape of any one of claim 27 to claim 28, wherein one of the second subset of the conductive pads is arranged at a C6 pin position according to ISO 7816.