

What is Claimed:

1. A process for manufacturing a transaction device having top and bottom surfaces, the process comprising the steps of:

forming a metal frame defining an outer periphery, an inner periphery defined by an opening, and at least one body discontinuity from the outer periphery to the inner periphery of the metal frame;

inserting at least one electronic component into the opening, the electronic component comprising an RFID module;

disposing a non-conductive material about the electronic component;

and

forming a hole extending between the top and bottom surfaces of the device; and

disposing at least one additional layer over the non-conductive material,

wherein the opening extends entirely through the card body, and the at least one additional layer comprises a first additional layer disposed on one side of the opening before inserting the at least one electrical component, and the step of disposing the non-conductive material about the at least one electronic component comprises disposing a first layer of non-conductive material in the opening between the at least one additional layer and the at least one electronic component and disposing a second layer of non-conductive material on top of the at least one electronic component.

~~2. The process of claim 1, wherein the opening extends partially or entirely through the metal frame.~~

~~3. The process of claims 1 or 2, wherein the opening is a pocket in the metal frame and the step of disposing the non-conductive material about the at least one electronic component comprises disposing the non-conductive material onto at least a top surface of the at least one electronic component.~~

~~4.2. The process of any one of claims 1-3~~claim 1, wherein the RFID module comprises an antenna connected to or configured to inductively couple to an RFID chip.

~~5. The process of any one of claims 1-4, further comprising disposing at least one additional layer over the non-conductive material.~~

6.3. ~~_____~~ The process of ~~claim 5~~claim 1, wherein the at least one additional layer is a printing layer.

7.4. ~~_____~~ The process of ~~claim 5~~claim 1, wherein the step of disposing the at least one additional layer over the non-conductive material comprises adhesively
5 attaching the one additional layer or laminating the at least one additional layer over the non-conductive material.

8. ~~_____~~ ~~The process of claim 5, wherein the opening extends entirely through the metal frame, and the at least one additional layer comprises a first additional layer disposed on one side of the opening before inserting the at least one electrical~~
10 ~~component, and the step of disposing the non-conductive material about the at least one electronic component comprises disposing a first layer of non-conductive material in the opening between the at least one additional layer and the at least one electronic component and disposing a second layer of non-conductive material on top of the at least one electronic component.~~

9.5. ~~_____~~ The process of ~~claim 8~~claim 1, further comprising disposing a second additional layer on top of the second layer of non-conductive material.

10.6. ~~_____~~ The process of any one of ~~claims 1-9~~claims 1-5, wherein the hole extends through the metal frame between the inner periphery and the outer periphery.

11.7. ~~_____~~ A transaction device manufactured according to the process of any one of ~~claims 1-10~~claims 1-6.

12.8. ~~_____~~ A transaction device having top and bottom surfaces, comprising:
a metal frame defining an outer periphery, an inner periphery defined by an opening in the metal frame, and at least one body discontinuity from the outer
25 periphery to the inner periphery of the metal frame;

at least one electronic component in the opening, the electronic component comprising an RFID transponder chip;

a non-conductive material disposed about the electronic component; and

a hole extending between the top and bottom surfaces of the device.

13.9. ~~_____~~ The transaction device of claim 12, wherein the opening extends partially or entirely through a card body.

14.10. ~~_____~~ The transaction device of claim 12, wherein the opening is a pocket in the card body and the non-conductive material is disposed on at least a top surface of the at least one electronic component.

~~15.11.~~ The transaction device of claim 12, further comprising a module antenna connected to or configured to inductively couple to the RFID transponder chip module.

5 ~~16.12.~~ The transaction device of claim 15, wherein the RFID transponder chip and module antenna are disposed in a substrate.

~~17.13.~~ An RFID device comprising:
 a metal frame having first and second opposite surfaces, an outer periphery, and an opening in the metal frame defining an inner periphery and extending from at least one of the opposite surfaces for a depth;
10 a chip layer disposed inside the opening, the chip layer comprising a substrate, an RFID transponder chip mounted to the substrate, and an module antenna in the substrate connected to the RFID transponder chip;
 at least one fill layer disposed in the opening of the frame between the chip layer and one of the surfaces of the metal frame; and
15 at least one layer laminated over at least one surface of the metal frame,
 wherein the depth of the opening extends from the first surface for less than a thickness of the metal frame such that the opening comprises a pocket having a bottom, the device further comprising a ferrite layer disposed between a first surface of the chip layer and the pocket bottom, wherein the fill layer is disposed on a
20 second surface of the chip layer.

~~18.— The RFID device of claim 17, wherein the depth of the opening extends from the first surface for less than a thickness of the metal frame such that the opening comprises a pocket having a bottom, the device further comprising a ferrite layer disposed between a first surface of the chip layer and the pocket bottom, wherein the fill layer is disposed on a second surface of the chip layer.~~
25 ~~19.14.~~ The RFID device of claim ~~18~~claim 8, wherein the device has only a single laminated layer extending over the first surface of the metal frame and the fill layer.

~~20.— The RFID device of claim 17, wherein the depth of the opening is coextensive with the thickness of the metal frame and the metal frame comprises a discontinuity in the form of a discontinuity extending between the first and second opposite surfaces and outer and inner peripheries, the device further comprising first and second fill layers on opposite sides of the chip layer and first and second layers~~
30 ~~21.— The RFID device of claim 17, wherein the depth of the opening is coextensive with the thickness of the metal frame and the metal frame comprises a discontinuity in the form of a discontinuity extending between the first and second opposite surfaces and outer and inner peripheries, the device further comprising first and second fill layers on opposite sides of the chip layer and first and second layers~~

~~laminated over the opposite surfaces of the metal frame and the respective first and second fill layers.~~

~~21.15.~~ The RFID device of ~~claim 17~~claim 8, further comprising a hole extending between the top and bottom surfaces of the device.

5 ~~22.16.~~ The RFID device of ~~claim 21~~claim 10, wherein the device comprises a component of a key ring or key chain, further comprising a member disposed in the hole, the member comprising a component of an apparatus configured to hold one or more keys.

10 ~~23.17.~~ The RFID device of ~~claim 17~~claim 8, wherein the RFID transponder chip comprises a dual interface chip having a contact pad, and the contact pad is accessible from an outer surface of the device.

~~24.18.~~ The RFID device of ~~claim 17~~claim 8, wherein the RFID transponder chip is completely surrounded by non-conductive material.

~~25.—The RFID device of claim 24,~~

15 19. An RFID device comprising:

a metal frame having first and second opposite surfaces, an outer periphery, and an opening in the metal frame defining an inner periphery and extending from at least one of the opposite surfaces for a depth;

20 a chip layer disposed inside the opening, the chip layer comprising a substrate, an RFID transponder chip mounted to the substrate, and a module antenna in the substrate connected to the RFID transponder chip;

at least one fill layer disposed in the opening of the frame between the chip layer and one of the surfaces of the metal frame; and

25 at least one layer laminated over at least one surface of the metal frame, wherein the depth of the opening is coextensive with the thickness of the metal frame and the metal frame comprises a discontinuity in the form of a discontinuity extending between the first and second opposite surfaces and outer and inner peripheries, the device further comprising first and second fill layers on opposite sides of the chip layer and first and second layers laminated over the
30 opposite surfaces of the metal frame and the respective first and second fill layers.

20. An RFID device comprising:

a metal frame having first and second opposite surfaces, an outer periphery, and an opening in the metal frame defining an inner periphery and extending from at least one of the opposite surfaces for a depth;

a chip layer disposed inside the opening, the chip layer comprising a
5 substrate, an RFID transponder chip mounted to the substrate, and an module
antenna in the substrate connected to the RFID transponder chip;

at least one fill layer disposed in the opening of the frame between the chip
layer and one of the surfaces of the metal frame;

at least one layer laminated over at least one surface of the metal frame;
10 wherein the RFID transponder chip is embedded in a non-conductive
substrate, and has a laminated fill layer in contact with at least one surface of the
RFID transponder chip embedded in the non-conductive substrate.

~~26-21.~~ The RFID device of ~~claim 25~~claim 15, wherein the laminated fill layer,
a ferrite layer in contact both upper and lower surfaces of the RFID transponder chip
15 embedded in the non-conductive substrate.

~~27-22.~~ The RFID device of claim 15~~claim 25~~, comprising the laminated fill
layer in contact with only one surface of the RFID transponder chip embedded in the
non-conductive substrate, and a ferrite layer in contact with an opposite surface of
the RFID transponder chip module embedded in the non-conductive substrate.

~~28-23.~~ A process for manufacturing a transaction device, the process
20 comprising the sequential steps of:

(a) forming a metal frame defining an outer periphery, an inner periphery
defined by an opening, and at least one body discontinuity from the outer periphery
to the inner periphery of the metal frame, the opening extending entirely through
25 the metal frame;

(b) disposing a first overframe layer over the metal frame on one side of
the opening ;

(c) inserting at least one electronic component into the opening, the
electronic component comprising an RFID module;

30 (d) disposing a non-conductive material about the electronic component
by disposing a first fill layer of non-conductive material in the opening between the

first layer and the at least one electronic component and disposing a second fill layer of non-conductive material on top of the at least one electronic component.

~~29.24.~~ The process of ~~claim 28~~claim 18, further comprising disposing a second overframe layer on top of the second layer of non-conductive material.

5 ~~30.25.~~ The process of claim 19~~claim 29~~, further comprising forming a hole extending between the top and bottom surfaces of the device.

~~31.26.~~ A transaction device manufactured according to the process of any one of ~~claims 28-30~~claims 18-20.