CLAIMS

[Claim 1] An electrical connector assembly for connecting an integrated circuit chip to a printed circuit board, the electrical connector assembly comprising:

a socket body being made of an insulating material, the socket body having a top surface, a bottom surface, and a first plurality of cavities including a first cavity and a second cavity that extend from the top surface through to the bottom surface, the first cavity and the second cavity each having an inner surface plated with a conductive material to form a metal grounding shell;

a plurality of probes including a first probe and a second probe, the first probe being configured to be positioned within the first cavity and the second probe being configured to be positioned within the second cavity; and

one or more micro trace lines that electrically connect the metal grounding shells of the first cavity and the second cavity to form a coaxial structure.

[Claim 2] The electrical connector assembly of claim 1, further comprising:

a socket retainer being made of the insulating material and having a top surface, a bottom surface and a second plurality of cavities including a first cavity and a second cavity, the second plurality of cavities being aligned with the first plurality of cavities.

[Claim 3] The electrical connector assembly of claim 2, wherein when the first cavity and the second cavity of the first plurality of cavities are aligned with the first cavity and the second cavity of the second plurality of cavities.

[Claim 4] The electrical connector assembly of claim 1, wherein the first cavity is a signal pin cavity hole and the second cavity is a ground spring probe cavity, wherein the first probe is a signal contact probe and the second probe is a ground contact probe, wherein the ground contact probe contacts the ground spring probe cavity, wherein the signal contact probe is separated from the metal grounding shell of the first cavity by an insulative layer.

[Claim 5] The electrical connector assembly of claim 4, wherein the first plurality of cavities includes a third cavity, wherein the third cavity is a power contact cavity that is configured to encapsulate a power contact probe that provides power when inserted.

[Claim 6] The electrical connector assembly of claim 4, wherein the one or more micro trace lines electrically connect the metal grounding shell of the ground spring probe cavity and the metal grounding shell of the signal pin cavity hole to form a coaxial structure to provide controlled impedance to improve signal integrity.

[Claim 7] The electrical connector assembly of claim 4, wherein the first plurality of cavities include one or more ground needle cavities that extend through a length of the socket body.

[Claim 8] The electrical connector assembly of claim 7, further comprising:

one or more ground needles configured to filter noise, improve radio frequency performance and minimize interference of signals within the first probe, wherein the one or more ground needles are positioned in the one or more ground needle cavities and adjacent or around the signal pin cavity hole.

[Claim 9] The electrical connector assembly of claim 1, wherein the first probe has a first plunger, a second plunger, a first end, a second end and a cylindrical shell in between the first end and the second end, wherein the first plunger is on the first end and the second plunger is on the second end.

[Claim 10] The electrical connector assembly of claim 9, wherein the first probe is a spring probe and has a spring within the cylindrical shell.

[Claim 11] An electrical connector assembly for connecting an integrated circuit chip to a printed circuit board, the electrical connector assembly comprising:

an insulated body having a top surface, a bottom surface, a signal spring pin cavity hole and a ground spring probe cavity, the signal spring pin cavity hole and the ground spring probe cavity each having an interior surface plated with a conductive material to form a metal grounding shell;

a plurality of probes including a signal contact probe and a ground contact probe; and

one or more micro trace lines that electrically connect the metal grounding shell of the signal spring pin cavity hole and the ground spring probe cavity to form a coaxial structure.

[Claim 12] The electrical connector assembly of claim 11, wherein the insulated body has a power contact cavity and the plurality of probes includes a power contact probe, wherein the power contact cavity is configured to encapsulate the power contact probe to provide power when the power contact probe is inserted.

[Claim 13] The electrical connector assembly of claim 12, wherein the power contact cavity has four power contact cavities each positioned in a corner of the insulated body and the

ground spring probe cavity includes a plurality of ground spring probe cavities positioned along edges of the insulated body, wherein the plurality of ground spring probe cavities and the four power contact cavities surround the signal spring pin cavity hole.

[Claim 14] The electrical connector assembly of claim 11, wherein the insulated body has one or more ground needle cavities that extend through a length of the insulated body.

[Claim 15] The electrical connector assembly of claim 14, further comprising:

one or more ground needles configured to filter noise, improve radio frequency performance and minimize interference of signals within the first probe, wherein the one or more ground needles are positioned in the one or more ground needle cavities and adjacent or around the signal pin cavity hole.

[Claim 16] The electrical connector assembly of claim 11, wherein the signal contact probe has a first plunger, a second plunger, a first end, a second end, a spring and a cylindrical shell in between the first end and the second end, wherein the first plunger is on the first end and the second plunger is on the second end and the spring is within the cylindrical shell.

[Claim 17] The electrical connector assembly of claim 16, wherein the first plunger is configured to electrically contact with a conductive pad of an integrated circuit through the top surface and the second plunger is configured to electrically contact with a conductive pad of a printed circuit board through the bottom surface.

[Claim 18] A method of forming or fabricating an electrical connector assembly, comprising:

(a) machining or drawing one or more holes on an insulated body to form a first cavity and a second cavity;

(b) depositing a layer of conductive material on the insulated body on:

(i) an inner surface of the one or more holes to form metallic ground shells within at least the first cavity and the second cavity; and

(ii) one or more micro trace lines that electrically connect the metallic ground shells of the first cavity and the second cavity to form a coaxial structure;

(c) depositing a thin layer of insulative material on the layer of conductive material on a top surface of the insulated body;

(d) machining or drawing one or more additional holes on the insulated body to form a third cavity; and

(e) positioning or assembling one or more probes into the first cavity, the second cavity and the third cavity.

[Claim 19] The method of claim 18, wherein the first cavity is a signal spring pin cavity hole, the second cavity is a ground spring probe cavity and the third socket is a power contact cavity.