SUMMARY

[0006] According to a first aspect of the disclosure, there is provided a radio frequency (RF) assembly, including: an RF panel including a microstrip interface, the microstrip interface including a ground-signal configuration; a plate including a stripline interface, the stripline interface including a ground-signal-ground configuration; a microstrip-to-stripline transition element, which comprises a ground-signal-ground configuration that is curvilinear, operably connectable to the microstrip interface and to the stripline interface; and an additional chip element interposed between an upper surface of the RF panel and a lower surface of the plate, wherein: the microstrip and stripline interfaces are axially offset from one another with the microstrip-to-stripline transition element having an inflective curve between the microstrip and stripline interfaces, an upper ground conductor of the ground-signal-ground configuration of the microstrip-to-stripline transition element terminates at a side of the additional chip element facing the inflective curve, and the ground-signal configuration of the microstrip interface extends between the additional chip element and the RF panel.

[0007] In accordance with additional or alternative embodiments, the RF panel is frequency independent.

[0008] In accordance with additional or alternative embodiments, the RAMP-RF assembly further includes a printed circuit board (PCB) on which the RF panel is disposed.

[0009] In accordance with additional or alternative embodiments, the plate includes at least one of a structural plate and a thermal plate.

[0010] In accordance with additional or alternative embodiments, the microstrip interface includes a ground-signal configuration and the stripline interface includes a ground-signal-ground configuration, and the microstrip-to-stripline transition element includes a ground-signal-ground configuration.

[0011] In accordance with additional or alternative embodiments, the RAMP-RF assembly further includes at least one of a chip element at the microstrip interface and additional chip elements interposed between the RF panel and the plate.

[0012] In accordance with additional or alternative embodiments, the RAMP-RF assembly further includes at least one of fastening elements coupled to the RF panel and the plate to apply a compressive force to the microstrip-to-stripline transition element and solder applied to at least a mechanical interface of the RF panel and the microstrip-to-stripline transition element.

[0013] In accordance with additional or alternative embodiments, the microstrip-to-stripline transition element is at least partially curvilinear or at least partially angular.

[0014] According to a second aspect of the disclosure, there is provided a radio frequency (RF) assembly, including: an RF panel having an upper surface and including a microstrip interface at the upper surface; a plate having a lower surface and including a stripline interface at the lower surface; a microstrip-to-stripline transition element, which has a ground-signal-ground configuration which is curvilinear, having first and second ends and being operably connected at the first end thereof to the microstrip interface at the upper surface of the RF panel and at the second end thereof to the stripline interface at the lower

surface of the plate; and an additional chip element interposed between the upper surface of the RF panel and the lower surface of the plate, wherein: the microstrip and stripline interfaces are axially offset from one another with the microstrip-to-stripline transition element having an inflective curve between the microstrip and stripline interfaces, an upper ground conductor of the ground-signal-ground configuration of the microstrip-to-stripline transition element terminates at a side of the additional chip element facing the inflective curve, and the ground-signal configuration of the microstrip interface extends between the additional chip element and the RF panel.

[0015] In accordance with additional or alternative embodiments, the RF panel is frequency independent.

[0016] In accordance with additional or alternative embodiments, the RAMP-RF assembly further includes a printed circuit board (PCB) on which the RF panel is disposed.

[0017] In accordance with additional or alternative embodiments, the plate includes at least one of a structural plate and a thermal plate.

[0018] In accordance with additional or alternative embodiments, the microstrip interface includes a ground-signal configuration and the stripline interface includes a ground-signal-ground configuration and the microstrip-to-stripline transition element includes a ground-signal-ground configuration.

[0019] In accordance with additional or alternative embodiments, the RAMP-RF assembly further includes at least one of a chip element at the microstrip interface and additional chip elements interposed between the RF panel and the plate.

[0020] In accordance with additional or alternative embodiments, the RAMP-RF assembly further includes at least one of fastening elements coupled to the RF panel and the plate to apply a compressive force to the microstrip-to-stripline transition element and solder applied to at least a mechanical interface of the RF panel and the microstrip-to-stripline transition element.

[0021] In accordance with additional or alternative embodiments, the microstrip-to-stripline transition element is at least partially curvilinear or at least partially angular.

[0022] According to a third aspect of the disclosure, there is provided a radio frequency (RF) assembly, including: an RF panel having an upper surface and including a microstrip interface at the upper surface; a plate having a lower surface and including a stripline interface at the lower surface; and a microstrip-to-stripline transition element including: a first end operably connected to the microstrip interface at the upper surface of the RF panel; a second end operably connected to the stripline interface at the lower surface of the plate; a section which has a ground-signal-ground configuration that is curvilinear and which is connected to the first and second ends; and an additional chip element interposed between the upper surface of the RF panel and the lower surface of the plate, wherein: the microstrip and stripline interfaces are axially offset from one another with the microstrip-to-stripline transition element having an inflective curve between the microstrip and stripline interfaces, an upper ground conductor of the ground-signal-ground configuration of the microstrip-to-stripline transition element terminates at a side of the additional chip element facing the inflective curve, and a ground-signal configuration of the microstrip interface

extends between the additional chip element and the RF panel.**[0023]** In accordance with additional or alternative embodiments, the microstrip interface includes a ground-signal configuration and the stripline interface includes a ground-signal-ground configuration and the microstrip-to-stripline transition element includes a ground-signal-ground configuration.

[0024] In accordance with additional or alternative embodiments, the method further includes at least one of applying a compressive force through the RF panel and the plate to the microstrip-to-stripline transition element and applying solder to at least a mechanical interface of the RF panel and the microstrip-to-stripline transition element.

[0025] In accordance with additional or alternative embodiments, the bending includes bending the microstrip-to-stripline transition element to be at least partially curvilinear or bending the microstrip-to-stripline transition element to be at least partially angular.

[0026] Additional features and advantages are realized through the techniques of the present invention. Other embodiments and aspects of the invention are described in detail herein and are considered a part of the claimed invention. For a better understanding of the invention with the advantages and the features, refer to the description and to the drawings.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0027] For a more complete understanding of this disclosure, reference is now made to the following brief description, taken in connection with the accompanying drawings and detailed description, wherein like reference numerals represent like parts

[0028] FIG. 1 is a perspective view of a component in accordance with embodiments;

[0029] FIG. 2 is a side view of a RAMP-RF assembly of the encircled portion of the component of FIG. 1 in accordance with embodiments;

[0030] FIG. 3 is a perspective view of a microstrip-to-stripline transition element of the RAMP-RF assembly of FIG. 2 in accordance with embodiments;

[0031] FIG. 4 is a side view of a RAMP-RF assembly of the encircled portion of the component of FIG. 1 in accordance with alternative embodiments;

[0032] FIG. 5 is a perspective view of a microstrip-to-stripline transition element of the RAMP-RF assembly of FIG. 4 in accordance with alternative embodiments; and

[0033] FIG. 6 is a flow diagram illustrating a method of assembling a RAMP-RF assembly in accordance with embodiments.

DETAILED DESCRIPTION

[0034] As will be described below, a RAMP-RF assembly is provided and uses PCB substrates to transmit RF signals throughout an assembly and a bent PCB or printed wiring board (PWB) to form a microstrip-to-stripline transition that interfaces between two different boards without the use of an external connector. The RAMP-RF assembly thus integrates structural, thermal, microwave, DC and logic connections all in one plate.

[0030] With reference to FIG. 1, a component 101 is provided for use in various applications, such as a radar modular assembly (RMA) or another similar type of device. The component 101 includes multiple layers 110 and 120 and has an uppermost major surface 130

CLAIMS

1. A radio frequency (RF) assembly, comprising:

an RF panel comprising a microstrip interface, the microstrip interface comprising a ground-signal configuration;

a plate comprising a stripline interface, the stripline interface comprising a ground-signal-ground configuration;

a microstrip-to-stripline transition element, which comprises a ground-signal-ground configuration that is curvilinear, operably connectable to the microstrip interface and to the stripline interface; and

an additional chip element interposed between an upper surface of the RF panel and a lower surface of the plate,

wherein:

the microstrip and stripline interfaces are axially offset from one another with the microstrip-to-stripline transition element having an inflective curve between the microstrip and stripline interfaces,

an upper ground conductor of the ground-signal-ground configuration of the microstrip-to-stripline transition element terminates at a side of the additional chip element facing the inflective curve, and

the ground-signal configuration of the microstrip interface extends between the additional chip element and the RF panel.

2. The RF assembly according to claim 1, wherein:

the ground-signal configuration of the microstrip interface is characterized in that dielectric material insulates a signal conductor from a ground conductor and the ground conductor extends along an upper surface of the RF panel,

the ground-signal-ground configuration of the stripline interface is characterized in that dielectric material insulates a signal conductor from ground conductors along a lower surface of the plate, and

the ground-signal-ground configuration of the microstrip-to-stripline transition element is similar to that of the stripline interface with the upper ground conductor terminating at the microstrip interface.

3. The RF assembly according to claim 2, wherein:

the stripline interface is longitudinally interposed between a longitudinal end of the microstrip-to-stripline transition element and a chip element at the lower surface of the plate.

4. The RF assembly according to claim 1, further comprising a printed circuit board (PCB) on which the RF panel is disposed.

5. The RF assembly according to claim 1, wherein the plate comprises at least one of a structural plate and a thermal plate.

6. The RF assembly according to claim 1, further comprising at least one of a chip element at the stripline interface and additional chip elements interposed between the RF panel and the plate.

7. The RF assembly according to claim 1, further comprising at least one of:

fastening elements coupled to the RF panel and the plate to apply a compressive force to the microstrip-to-stripline transition element; and

solder applied to at least a mechanical interface of the RF panel and the microstrip-to-stripline transition element.

8. A radio frequency (RF) assembly, comprising:

an RF panel having an upper surface and comprising a microstrip interface at the upper surface;

a plate having a lower surface and comprising a stripline interface at the lower surface;

a microstrip-to-stripline transition element, which has a ground-signal-ground configuration which is curvilinear, having first and second ends and being operably connected at the first end thereof to the microstrip interface at the upper surface of the RF panel and at the second end thereof to the stripline interface at the lower surface of the plate; and

an additional chip element interposed between the upper surface of the RF panel and the lower surface of the plate,

wherein:

the microstrip and stripline interfaces are axially offset from one another with the microstrip-to-stripline transition element having an inflective curve between the microstrip and stripline interfaces,

an upper ground conductor of the ground-signal-ground configuration of the microstrip-to-stripline transition element terminates at a side of the additional chip element facing the inflective curve, and

the ground-signal configuration of the microstrip interface extends between the additional chip element and the RF panel.

9. The RF assembly according to claim 8, wherein:

the ground-signal configuration of the microstrip interface is characterized in that dielectric material insulates a signal conductor from a ground conductor and the ground conductor extends along the upper surface of the RF panel,

the ground-signal-ground configuration of the stripline interface is characterized in that dielectric material insulates a signal conductor from ground conductors along the lower surface of the plate, and

the ground-signal-ground configuration of the microstrip-to-stripline transition element is similar to that of the stripline interface with the upper ground conductor terminating at the microstrip interface.

10. The RF assembly according to claim 9, wherein:

the stripline interface is longitudinally interposed between a longitudinal end of the microstrip-to-stripline transition element and a chip element at the lower surface of the plate.

11. The RF assembly according to claim 8, further comprising a printed circuit board (PCB) on which the RF panel is disposed.

12. The RF assembly according to claim 8, wherein the plate comprises at least one of a structural plate and a thermal plate.

13. The RF assembly according to claim 8, further comprising at least one of a chip element at the microstrip interface and additional chip elements interposed between the RF panel and the plate.

14. The RF assembly according to claim 8, further comprising at least one of:

fastening elements coupled to the RF panel and the plate to apply a compressive force to the microstrip-to-stripline transition element; and

solder applied to at least a mechanical interface of the RF panel and the microstrip-to-stripline transition element.

15. A radio frequency (RF) assembly, comprising:

an RF panel having an upper surface and comprising a microstrip interface at the upper surface;

a plate having a lower surface and comprising a stripline interface at the lower surface; and

a microstrip-to-stripline transition element comprising:

a first end operably connected to the microstrip interface at the upper surface of the RF panel;

a second end operably connected to the stripline interface at the lower surface of the plate;

a section which has a ground-signal-ground configuration that is curvilinear and which is connected to the first and second ends; and

an additional chip element interposed between the upper surface of the RF panel and the lower surface of the plate,

wherein:

the microstrip and stripline interfaces are axially offset from one another with the microstrip-to-stripline transition element having an inflective curve between the microstrip and stripline interfaces,

an upper ground conductor of the ground-signal-ground configuration of the microstrip-to-stripline transition element terminates at a side of the additional chip element facing the inflective curve, and

a ground-signal configuration of the microstrip interface extends between the additional chip element and the RF panel.

16. The radio frequency (RF) assembly according to claim 15, wherein the curvilinear section curves downwardly from the first end and upwardly to the second end.