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MICROWAVE TERMINATION

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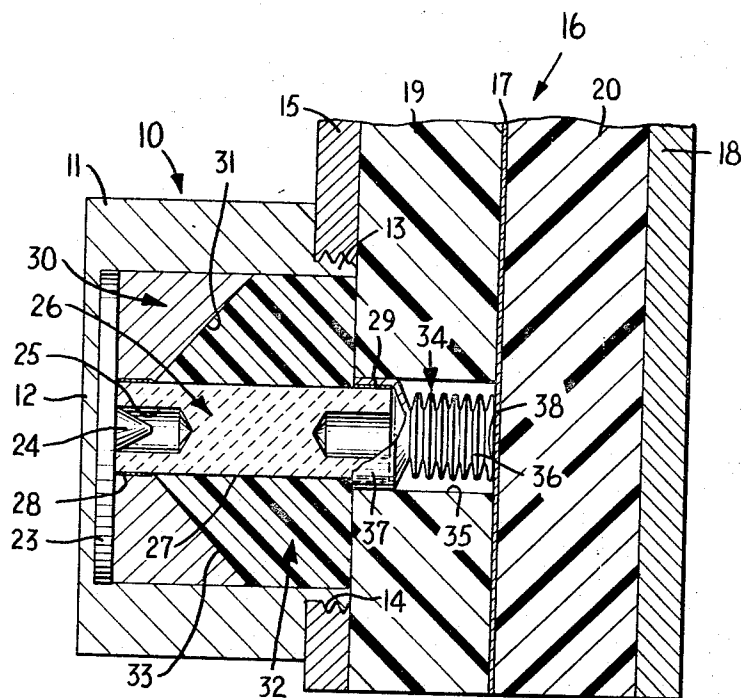
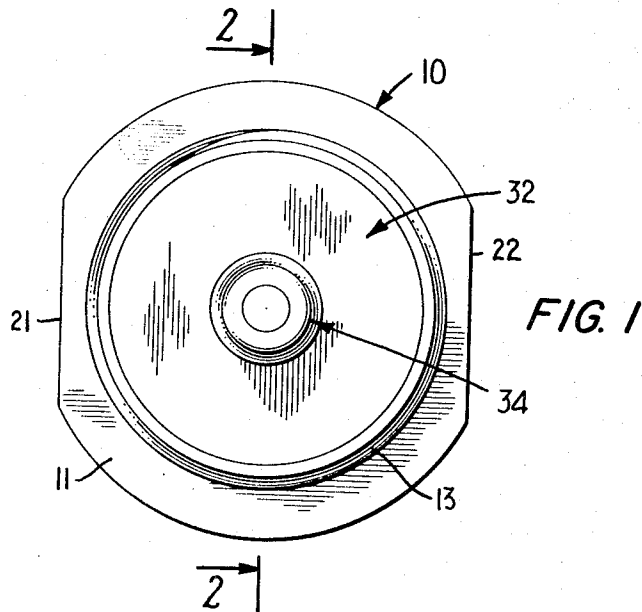


FIG. 2

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MICROWAVE TERMINATION

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4 Claims. (Cl. 333-22)

This invention relates to termination devices for microwave circuits and, more particularly, to a new and improved termination device having a compact configuration.

It is frequently necessary to provide a microwave circuit termination having the minimum possible dimensions so as to conserve space in a microwave component. Moreover, for convenience of design, it is often desirable to provide a termination which extends perpendicularly from a microwave circuit component such as stripline. At the same time, however, it is important to provide a termination having a very low standing wave voltage ratio (VSWR) over a broad range of frequencies. Heretofore, microwave terminations effective over a broad range of frequencies have required a length at least one-half the maximum wave length of the microwaves for which the termination is to be effective so that, for a termination extending perpendicularly to a circuit component, a lateral displacement of several inches resulted.

Accordingly, it is an object of the present invention to provide a new and improved microwave circuit termination which overcomes the above-mentioned disadvantages of prior termination arrangements.

Another object of the invention is to provide a microwave termination having minimum dimensions.

A further object of the invention is to provide a microwave termination adapted to be attached perpendicularly to a microwave circuit component.

An additional object of the invention is to provide a microwave circuit termination adapted for use with circuit components having a rectangular configuration such as stripline.

Still another object of the invention is to provide a microwave termination adapted to be connected to circuit components having different conductor spacings.

These and other objects of the invention are attained by providing, in a termination having first and second spaced conductors, a first conductor adapted to be connected to one conductor of a circuit component and a second conductor having resilient connecting means adapted to be connected to the other conductor of the microwave circuit component. More particularly, the termination means includes an outer conductor adapted to be connected to the outer conductor of a microwave circuit component and an inner conductor having a resilient projection adapted to engage the inner conductor of the microwave circuit component. Preferably, the resilient projection comprises a flexible bellows attached to the central pin of the termination and, in a particular embodiment, the termination includes a sleeve having a tapered internal surface and an insulative ring having a mating surface, along with a central resistive component extending through the insulative ring, to join the center conductor to the small end of the tapered internal surface.

Further objects and advantages of the invention will be apparent from a reading of the following description in conjunction with the accompanying drawings, in which:

FIG. 1 is an end view of a representative termination arranged according to the invention; and

FIG. 2 is a cross-sectional view taken along the line 2-2 of FIG. 1 and looking in the direction of the arrows showing the termination of FIG. 1 attached to a microwave circuit component.

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In the typical embodiment of the invention shown in FIGS. 1 and 2, a termination 10 comprises a hollow generally cylindrical metal housing 11 having an end wall 12 and provided with a threaded projection 13 at the opposite end. The projection 13 is adapted to be mounted in a threaded opening 14 in the outer conductor 15 of a microwave component such as a segment of stripline 16. In the illustrated embodiment, the stripline includes a thin, narrow strip 17 of metal for the center conductor and another outer conductor 18, along with two layers 19 and 20 of insulative material separating the conductive components. As shown in FIG. 1, the termination housing 11 may be provided with flat portions 21 and 22 on opposite sides to conform to the outline of the stripline 16 to which it is connected.

Within the housing 11, as shown in FIG. 2, the termination includes a metal disk 23 which rests against the end wall 12 and is formed with a central conical projection 24. The projection 24 is received in a counterbore 25 at the end of a ceramic resistor 26 to aid in centralizing that element within the housing, the resistor 26 having a carbon deposit 27 on its exterior surface extending between silver plate electrodes 28 and 29 located at opposite ends which provide terminals for the resistor in the usual manner.

At the inner end of the resistor 26, a metal sleeve 30 has a conical end surface 31 slanting inwardly from approximately the center of the housing 11 toward the inner end of the resistor at an angle of about 45 degrees to the outer surface of the resistor. The remaining portion of the interior of the housing is occupied by a ring 32 of electrically insulative material having a conical projecting surface 33 complementary to the surface 31 of the sleeve 30. Preferably, the ring 32, which may be made of the material known commercially as "Raylene," for example, has an outside diameter slightly greater than the inside diameter of the housing 11 so that, when inserted, it will frictionally engage the inner wall of the housing to retain the components in position therein.

The outer end of the resistor 26 having the silver plate terminal 29 projects beyond the threaded projection 13 and the insulative ring 32 and has a resilient conductive projection 34 affixed to it so as to extend into a cylindrical recess 35 formed in the stripline 16 to engage the center conductor 17 at the bottom of the recess. In the illustrated embodiment of the invention, the resilient projection 34 comprises a bellows 36 made of thin spring metal such as beryllium-copper and formed at one end with a cap 37 shaped to fit over the terminal 29 of the outer end of the resistor 26. At its outer end, the bellows 36 is provided with a flat surface 38 adapted to engage the center conductor 17 and, in its extended condition, the bellows has a length greater than the spacing between the outer conductor 15 and the center conductor 17 so that, when the termination 10 is mounted in the threaded opening 14, the outer end surface 38 is pressed against the conductor 17 to complete the termination connection across the conductors of the stripline 16. As a result, the termination 10 may be used with various types of stripline having different spacings between the outer conductor 15 in which the housing 11 is mounted and the center conductor 17 which is engaged by the surface 38.

Although the invention has been described herein with reference to a specific embodiment, many modifications and variations therein will readily occur to those skilled in the art. Accordingly, all such variations and modifications are included within the intended scope of the invention as defined by the following claims.

I claim:

1. A microwave termination comprising a housing having a generally cylindrical hollow interior, electrically

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conductive sleeve means having an inwardly extending tapered surface disposed within the housing, insulative ring means having a complementary tapered surface disposed within the housing with the complementary tapered surface engaging the tapered surface of the sleeve means, resistor means centrally disposed within the housing and electrically connected at one end to the sleeve means and projecting resilient conductive means connected to the other end of the resistor means and projecting outside the housing to engage a conductor held in spaced relation to the housing.

2. A microwave termination according to claim 1 wherein the resilient means comprises a bellows member attached at one end to the other end of the resistor means and having at the other end a surface adapted to provide electrical contact with a conductor held in spaced relation to the housing.

3. A microwave termination comprising a housing having a generally cylindrical hollow interior, electrically conductive sleeve means having an inwardly extending tapered surface disposed within the housing, insulative ring means having a complementary tapered surface disposed within the housing with the complementary tapered surface engaging the tapered surface of the sleeve means, and resistor means centrally disposed within the housing and electrically connected at one end to the sleeve means wherein the housing is closed at one end of the hollow interior and including a disk member within the housing having a central conical projection and wherein the resistor means is formed with a recess adapted to receive the conical projection to centralize the resistor means in the housing.

4. A microwave termination comprising a metal hous-

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ing having a generally cylindrical hollow interior closed at one end and formed with a peripheral thread at the opposite end, a disk member disposed at the closed end of the housing having a central conical projection, electrically conductive sleeve means having an inwardly extending tapered surface disposed within the housing adjacent to the disk member, insulative ring means having a complementary tapered surface disposed within the housing with the complementary tapered surface engaging the tapered surface of the sleeve means, resistor means centrally disposed within the housing formed with a recess at one end to receive the conical projection of the disk member to centralize the resistor means in the housing, the same end of the resistor means being electrically connected to the sleeve means, and a resilient conductive bellows member connected to the other end of the resistor means and projecting from the open end of the housing to engage a conductor held in spaced relation to the housing.

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