Patent Abstracts

These Patent Abstracts of recently issued patents are intended to provide the minimum information necessary for readers to determine if they are interested in examining the patent in more detail. Complete copies of patents are available for a small fee by writing: U.S. Patent and Trademark Office, Box 9, Washington, DC, 20231.

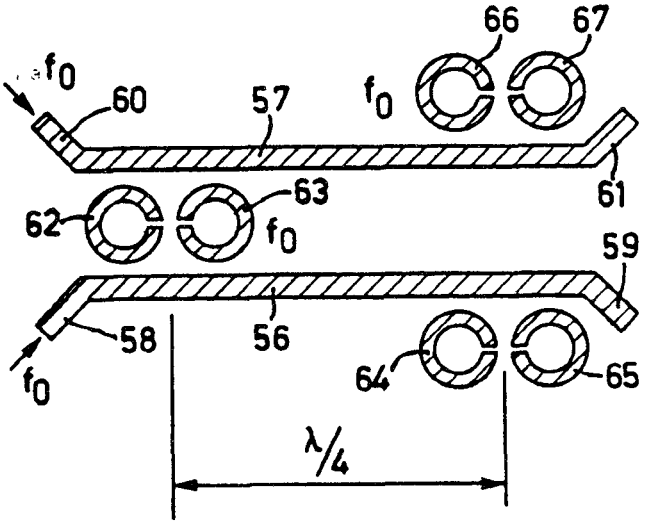
4,264,881 Apr. 28, 1981

Microwave Device Provided with a $\frac{1}{2}$ Lambda Resonator

Inventor: Frans C. De Ronde.
Assignee: U.S. Philips Corporation.
Filed: Dec. 15, 1977.

Abstract—A microwave device is disclosed comprising a microstrip line pattern including an open ring forming a $\frac{1}{2}\lambda$ resonator having a narrow gap in which the electromagnetic field is closely tied to the ring.

4 Claims, 27 Drawing Figures



4 Claims, 27 Drawing Figures

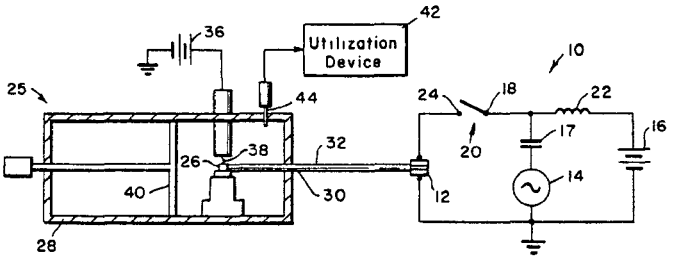
4,264,875 Apr. 28, 1981

System for Optical Injection Phase Locking and Switching of Microwave Oscillators

Inventors: Robert G. Hunsperger; Michael K. Barnoski; Huan-Wun Yen.
Assignee. Hughes Aircraft Company
Filed: Aug. 3, 1979.

Abstract—In accordance with one embodiment of the invention, a microwave signal is used to modulate a laser diode and the resultant modulated light output energy from the laser diode is applied through an optical fiber waveguide to the active solid state component in a microwave oscillator circuit such that the output signal from the microwave oscillator is phase locked to the modulation carried by the light energy. The invention allows optical injection phase locking to be achieved not only at the fundamental frequency of the modulating signal, but also at various harmonics thereof; and "on-off" switching of the microwave oscillator can be controlled simultaneously with phase locking.

18 Claims, 4 Drawing Figures



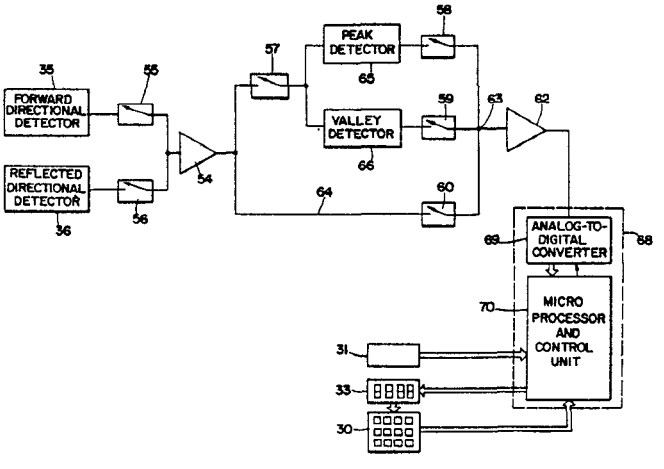
4,263,653 Apr. 21, 1981

Digital RF Wattmeter

Inventor: Frank H. Mecklenburg.
Assignee: Bird Electronic Corporation.
Filed: Jun. 4, 1979.

Abstract—An electronic instrument is disclosed for measuring directional RF power levels and power function levels on a coaxial transmission line. The instrument includes an inductive sensing loop for sensing the RF voltage level on the transmission line and producing a voltage level proportional thereto. An analog-to-digital conversion means is connected to the sensing loop for converting the voltage level from the sensing loop to binary voltage data. A microcomputer means is associated with the conversion means for performing arithmetic operations upon the binary voltage data to calculate power data and power function data. Means connected to the microcomputer means are also provided for displaying the calculated power data and power function data. The instrument provides a direct readout in digital form of RF power data and data for various power and voltage functions such as VSWR.

22 Claims, 12 Drawing Figures



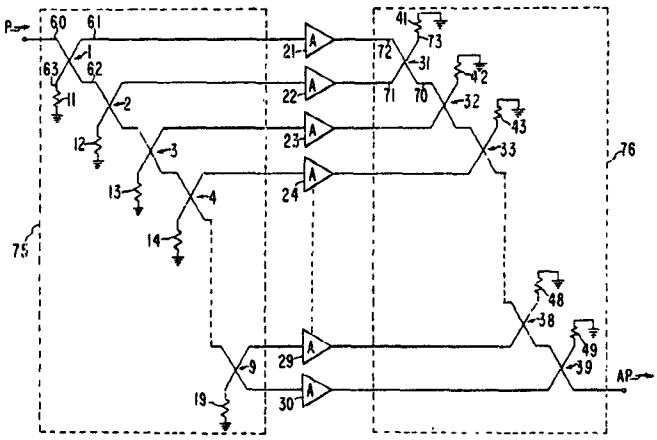
4,263,559 Apr. 21, 1981

N-Way Series Connected Quadrature Power Divider and Combiner

Inventor: Pang T. Ho.
Assignee: Ford Aerospace & Communications Corporation.
Filed: Jan. 26, 1979.

Abstract—This circuit divides power from an input source equally among N different paths, where N is an arbitrary number. These individual path powers can then be amplified separately to take advantage of the full output power ratings for the individual amplifiers, then the outputs from the amplifiers are combined. A combiner circuit, which is the reverse of the divider circuit, then combines the individual powers to a single output. In each of the combiner and divider circuits, the phase angles of the output ports vary from each other by 90 degrees sequentially down the entire chain of N−1 couplers. Each combiner and divider network utilizes N−1 series-connected couplers, preferably interdigitated ones. The interdigitated couplers utilize preselected power division ratios based upon N.

8 Claims, 2 Drawing Figures



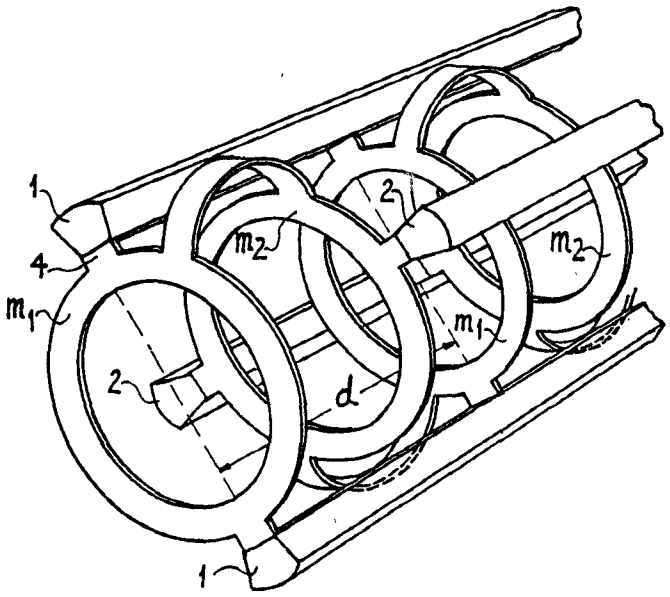
4,263,532 Apr. 21, 1981

Microwave Delay Line

Inventor: Philippe Gosset.
Assignee: Thomson-CSF.
Filed: Dec. 18, 1979.

Abstract—A microwave delay line, which has a periodic geometrical structure involving more particularly the repetition of first and second meshes so that the amplitude of the inverse mode of transmission is reduced compared with that of a helical line, which comprises rods made from a dielectric and good heat conducting material, arranged parallel to the line axis and regularly distributed over its periphery. These rods are equally subdivided into first and second groups, which are regularly distributed over the line periphery. The rods of the first group are brazed to the first meshes of the line and insulated from the second meshes and the rods of the second group are brazed to the second meshes of the line and insulated from the first meshes.

3 Claims, 2 Drawing Figures



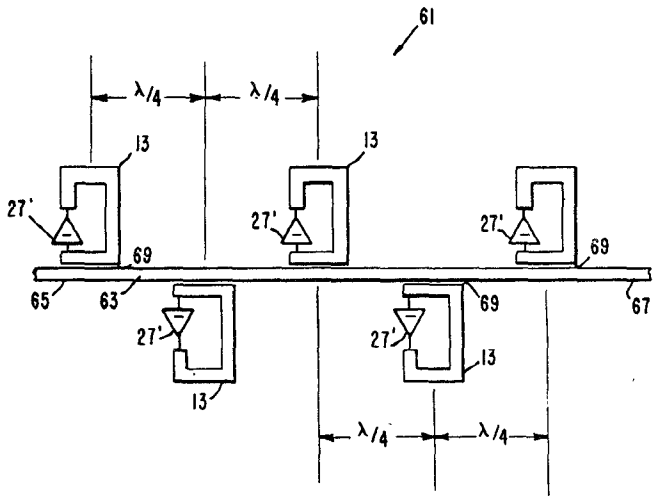
4,262,269 Apr. 14, 1981

Q Enhanced Resonator

Inventors: Edward L. Griffin; Frederick A. Young; Harvey M. Endler.
Assignee: Hughes Aircraft Company.
Filed: Dec. 10, 1979.

Abstract—An active microwave filter for use in both bandpass and notch filter applications is herein described, the filter incorporating a distributed resonator to which is coupled an amplifier which provides a positive feedback and cancels the net dissipation in the resonator.

10 Claims, 4 Drawing Figures



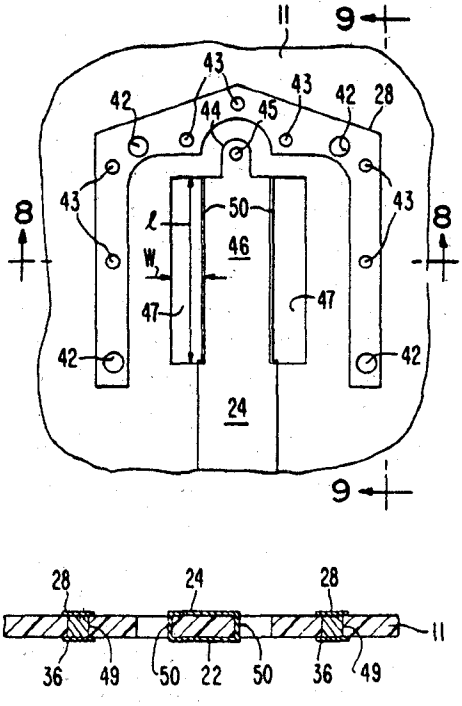
4,262,265 Apr. 14, 1981

Side-Launch Transition for Air Stripline Conductors

Inventors: Evert C. Nygren; Ching C. Han; Edgar W. Matthews, Jr.; Jack E. Kelly; Paul D. Frank.
Assignee: Ford Aerospace & Communications Corporation.
Filed: Mar. 29, 1979.

Abstract—This device provides for a substantially orthogonal transition or connection point between a strip transmission line configuration (one conductor, or two conductors sandwiched around a dielectric support, positioned in air between two ground planes such as might be used in a microwave antenna feed network) and a coaxial line section. The particular construction of the "side-launch transition" suppresses spurious parallel plate modes, and, in the case of two conductors surrounding a dielectric, trapped modes which occur between the two conductors. A U-shaped upper "dam" and corresponding lower "dam," electrically interconnected at several points, surround the termination of the stripline conductor(s) and provide suppression of parallel plate molding at the transition. In the case of two conductors surrounding a dielectric, electrical interconnection at the terminal point of the stripline conductors suppresses the trapped modes before they can be launched. The system has been found to provide extremely low voltage standing wave ratios over a wide range of microwave frequencies.

7 Claims, 10 Drawing Figures



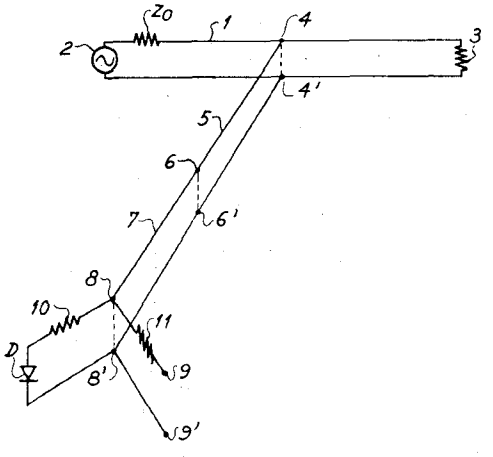
4,262,250 Apr. 14, 1981

Microwave Measuring Device

Inventors: Philippe Legendre; Claude Van Kerrebroeck.
Assignee: Thomson-CSF.
Filed: Jan. 10, 1979.

Abstract—A device for measuring the power in a microwave transmission line and for providing a measuring port at the output of a microwave signal generator or transmitter. First and second quarter wavelength transmission line sections, coupled in series with one another and having characteristic impedances Z_2 and Z_1 respectively, where $Z_2 \gg Z_1$, are coupled at the first section to a predetermined point on a transmission line to be monitored. A port at the free end of the second section allows for the connection of two independent measuring circuits to the transmission line.

3 Claims, 1 Drawing Figure



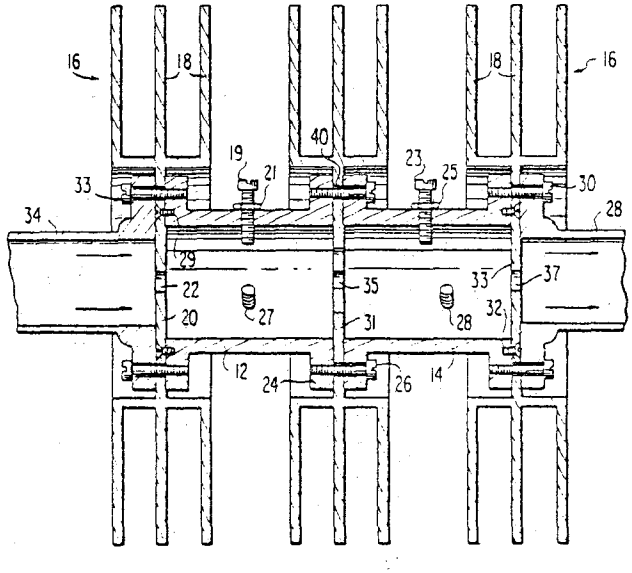
4,260,967 Apr. 7, 1981

High Power Waveguide Filter

Inventor: Howard W. Flieger.
Assignee: Communications Satellite Corporation.
Filed: Mar. 26, 1979.

Abstract—A waveguide filter capable of operating at high power levels while retaining substantially constant filter characteristics over a wide temperature range. Two cylindrical body portions of a metal having a low temperature coefficient expansion are sandwiched between three highly thermally conducting iris members, each of which has an aperture of predetermined dimensions for determining the wave modes which propagate through the filter. Each iris member extends beyond the adjacent bodied portion to heat dissipating means which may either be cooling fins through which air is circulated or cooling coils through which a cooling fluid is circulated. Because the proportion of the total filter length occupied by the iris members is much smaller than that of the body portion, very little elongation takes place as the filter cavity is heated thus resulting in temperature-stable filter characteristics.

18 Claims, 4 Drawing Figures



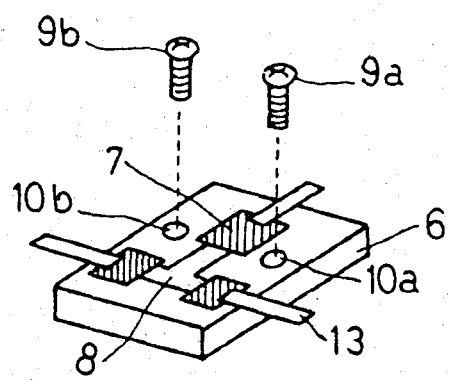
4,260,965 Apr. 7, 1981

Fixed Microwave Attenuator Having Mounting Hole Passing Through Alumina Porcelain Substrate

Inventors: Kiichi Nakamura; Takashi Iwata.
Assignee: TDK Electronics Company. Inc.,

Abstract—A fixed attenuator for microwave band comprising of a dielectric substrate, with a resistance film and a conductor film attached on said substrate so as to form an attenuation circuit. The substrate further comprises of at least one hole provided through the dielectric substrate. The attenuator is mounted on a metallic board or a printed circuit board by a screw inserted in said hole. Thus, the cooling effect of the resistance film has been improved while keeping the low manufacturing cost and stable structure, by fixing the dielectric substrate on a metallic board by screws inserted in the mentioned holes.

3 Claims, 9 Drawing Figures



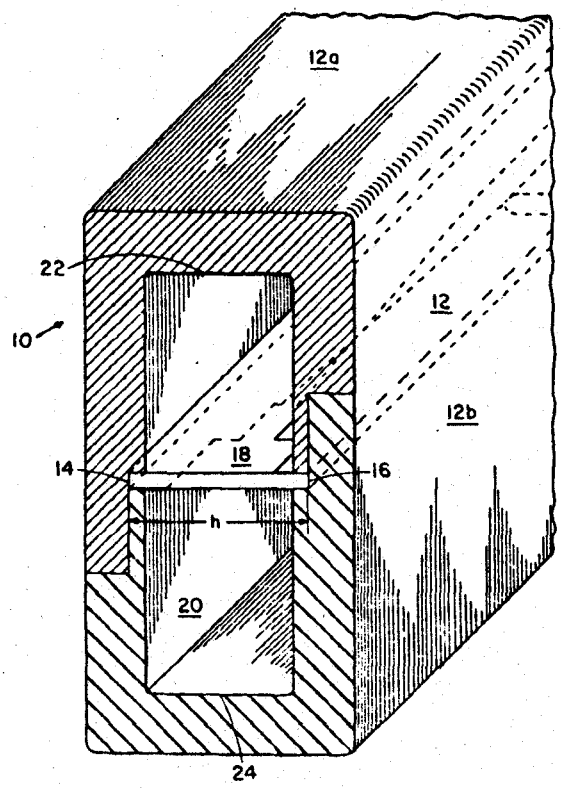
4,260,964 Apr. 7, 1981

Printed Circuit Waveguide to Microstrip Transition

Inventor: David L. Saul.
Assignee: The United States of America as represented by the Secretary of the Navy.
Filed: May 7, 1979.

Abstract—A waveguide to microstrip transition for transferring guided electromagnetic signals from dominant mode rectangular waveguide to microstrip line and vice versa. A microstrip printed circuit card is disposed in parallel to the narrow walls of a waveguide. The printed circuit card includes a microstrip stepped transformer section followed by a linear taper crossover section. The linear taper crossover section leads into a microstrip line conductor and ground plane for completing the transition.

12 Claims, 8 Drawing Figures



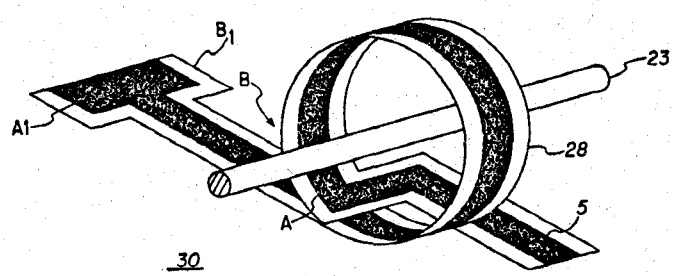
4,260,963 Apr. 7, 1981

4:1 Balun

Inventor: Michael J. Drapac.
Assignee: Rockwell International Corporation.
Filed: Oct. 18, 1979.

Abstract—A balun is constructed by rolling a strip of flexible dielectric into a loop which has conductive strips on each face.

8 Claims, 5 Drawing Figures



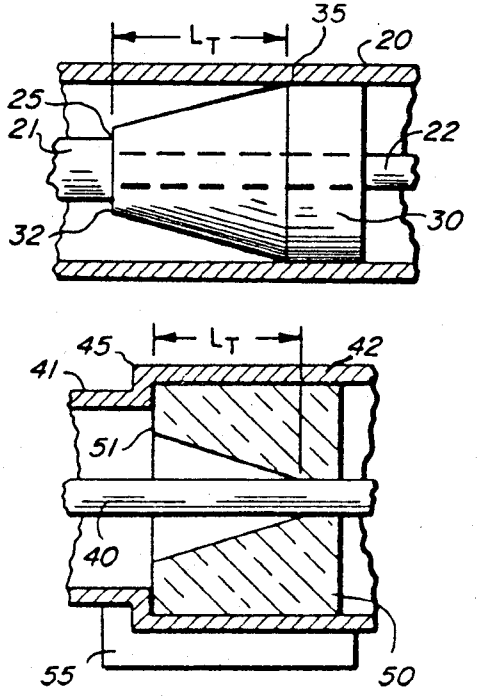
4,260,962 Apr. 7, 1981

RF Termination for Coaxial Transmission Lines

Inventor: Michael Dydyk.
Assignee: Motorola, Inc.
Filed: Aug. 6, 1979.

Abstract—A step change in the diameter of the inner conductor or the outer conductor of the transmission line with absorptive material having a shoulder abutting against the step change and tapering toward the opposite conductor with the radius of the absorptive material at the step change being sufficient to provide a characteristic impedance substantially equal to the characteristic impedance of the coaxial transmission line prior to the step change.

10 Claims, 7 Drawing Figures



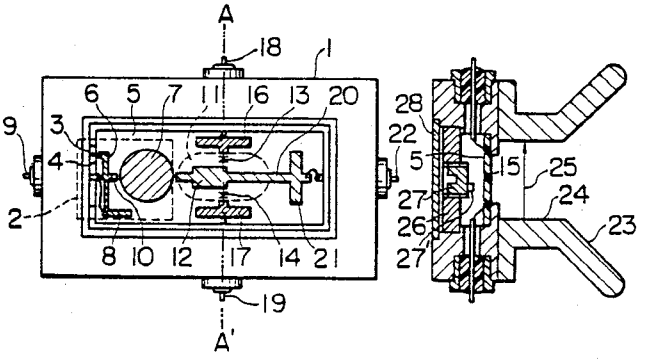
4,259,743 Mar. 31, 1981

Transmit/Receive Microwave Circuit

Inventors: Yoichi Kaneko; Kenji Sekine; Eiichi Hase; Akira Endo.
Assignee: Hitachi, Ltd.
Filed: Dec. 1, 1978.

Abstract—A microwave integrated circuit device for use in the transmitting and receiving portion of a Doppler speedometer utilizing microwaves. In order to keep the transmitting power low and the receiving sensibility high, a microwave integrated circuit plate in which a transmitting antenna line and lines for connecting mixer diodes therewith are arranged at right angles is mounted within a rectangular waveguide and in the vicinity of a short-circuit plate of the waveguide in a manner to lie at right angles with the electric field of the waveguide.

5 Claims, 4 Drawing Figures



4,259,684 Mar. 31, 1981

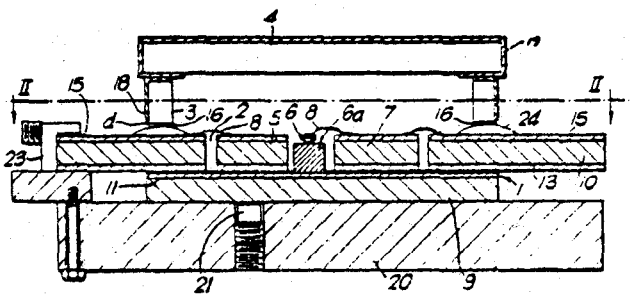
Packages for Microwave Integrated Circuits

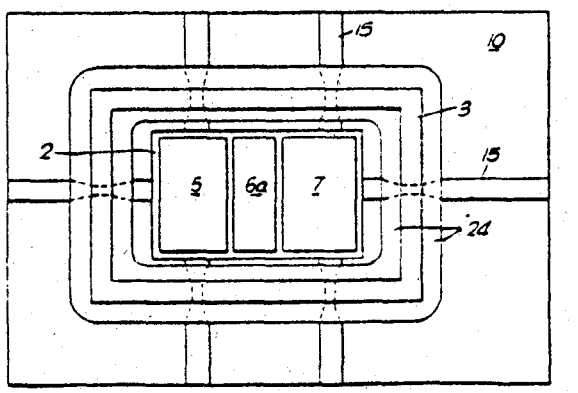
Inventors: Douglas J. Dean; Patrick F. T. Linford; John Savage.
Assignee: The Secretary of State for Defence in Her Britannic Majesty's Government of the United Kingdom of Great Britain and Northern Ireland.
Filed: Oct. 13, 1978.

Abstract—This disclosure relates to the packaging of microwave integrated circuits (MICs) whereby an MIC is hermetically sealed within an enclosure comprising a first plate of dielectric material which carries the circuit to be enclosed, a wall of dielectric material sealed to the surface of the first plate surrounding the circuit, and a second plate of dielectric material providing a lid sealed over the wall to complete the enclosure. The first plate carries planar conductors which define at least one microwave transmission line, e.g. microstrip, extending across the wall into the enclosure from outside to provide direct microwave coupling to the enclosed circuit and thereby obviating the usual need for transitions to and from coaxial cable.
Part or all of the enclosed circuit may be contained within a recess provided by forming an aperture in the first plate and sealing a third plate of dielectric material across the aperature from below.
The disclosure describes various techniques for reducing losses where the transmission line propagation paths traverse the wall on the surface of the first

plate. The entire package may be fabricated using materials and techniques compatible with those used in fabricating MIC's, for example thick film.

12 Claims, 5 Drawing Figures





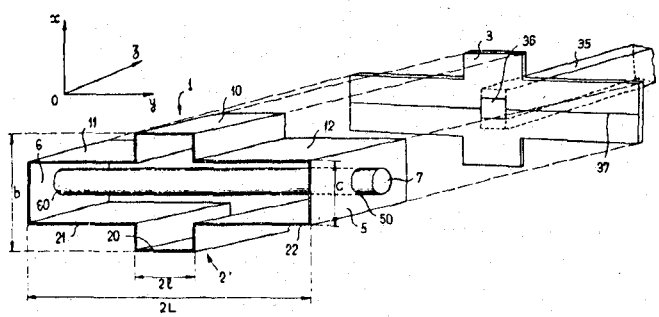
4,259,561 Mar. 31, 1981

Microwave Applicator

Inventors: Georges Roussy; André-Jean Berteaud; Jean-Marie Thiebaut.
Assignee: Agence Nationale de Valorisation de la Recherche (ANVAR).
Filed: May, 1, 1978.

Abstract—The invention provides a microwave feeder or applicator, that is to say a resonant chamber for coupling to a source of microwaves, arranged for the microwave treatment of a sample of material, comprising two main conductive walls extending parallel to a common axial direction and each having two projections and a central part joining the two projections, the projections of the two walls facing one another in pairs whereas the central parts of the two walls likewise face one another and define a region in which there is a local increase in the distance between the two main walls; a first conductive end wall forming a short-circuit and extending in a plane forming a cross-section of the main walls; a second conductive end wall forming a second short-circuit extending in a plane forming a cross-section of the main walls, and a coupling means for supplying microwave energy to the feeder, the dimensions of the cavity formed by the main end walls being arranged so that the cavity resonates almost exclusively in the TE_{11} mode, where the electric field is oriented along the cross-section of the main walls.

27 Claims, 12 Drawing Figures



Overseas Abstracts

Papers from Journals Published in Australia, India, and Japan

Compiled by Prof. E. Yamashita, University of Electro-Communications, Tokyo, Japan.

The periodicals investigated are: 1) Transactions of the Institute of Electronics and Communication Engineers of Japan (Trans. IECEJ), 2) Journal of the IECEJ, 3) Journals of the Institution of Engineers (JIE. (India)), Electronics and Telecommunication Engineering Division (Part ET), 4) Proceedings of the Institution of Radio and Electronics Engineers, (Proc. IREE (Australia)), and 5) Australian Telecommunication Research (ATR).

As for the Japanese papers in the Trans. IECEJ, which carry volume numbers J63B or J63C, single-page English summaries (1/4 page for Correspondences) will be found in the "Transactions of IECEJ, Section E" issued in the same month, where "E" denotes English. Papers carrying volume number E63 are papers