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.

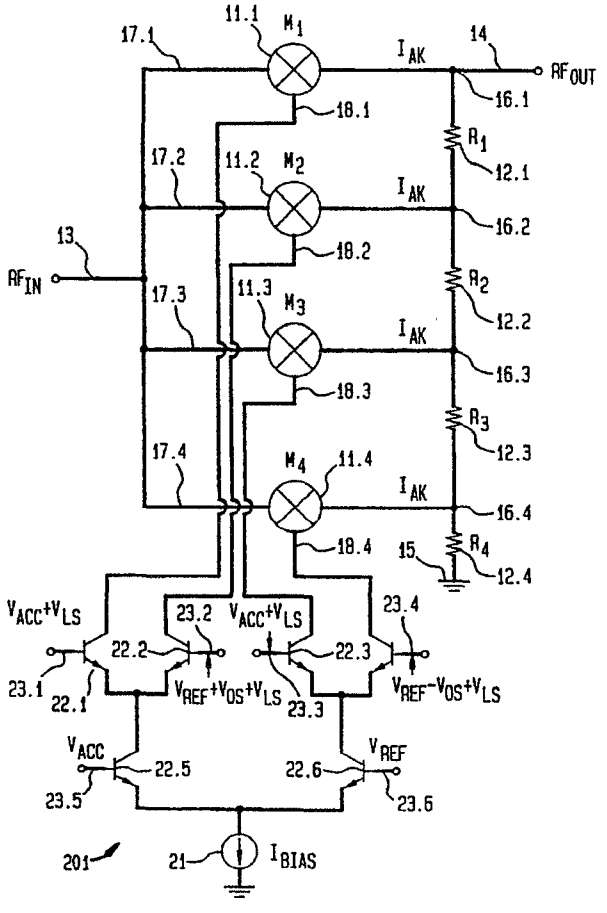
5,396,192 Mar. 7, 1995

Radio Frequency Amplifier

Inventor: Iconomos A. Koullias.
Assignee: AT&T Corp.
Filed: Dec. 29, 1993.

Abstract—An amplification arrangement comprises an electrical circuit that includes a voltage divider having a plurality of resistors connected in series between a signal output and a reference potential source and a plurality of parallel branches, each extending between a common main input and a different one of a plurality of voltage divider nodes situated between the resistors. A multiplier is interposed in each of the branches and has a multiplication factor that is connected through a switching device with an electrical signal source. The switching device routes the electrical signals from the source to the different multipliers, in dependence on the magnitude, of a gain control signal supplied to its control input and indicative of the area of the gain range in which the arrangement is to operate at that time to obtain the desired signal amplification.

6 Claims, 2 Drawing Sheets



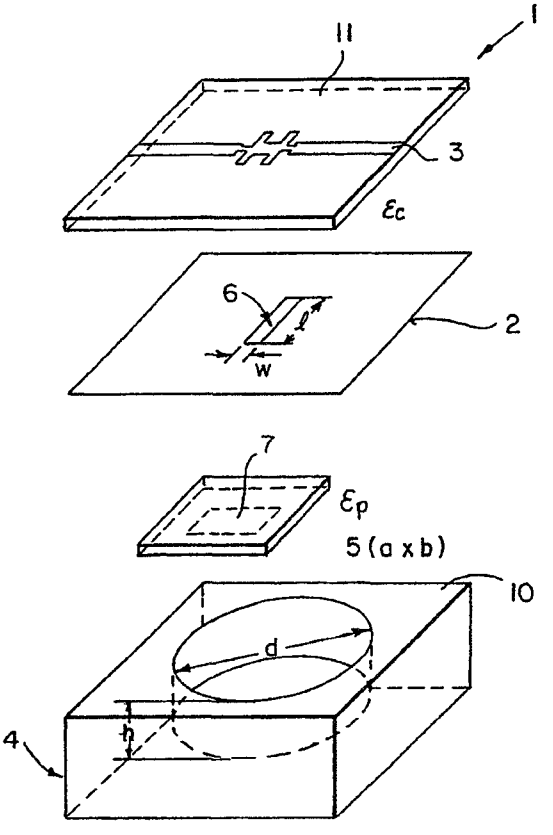
5,396,202 Mar. 7, 1995

Assembly and Method for Coupling a Microstrip Circuit to a Cavity Resonator

Inventor: Hans-Otto Scheck.
Assignee: Valtion Teknillinen Tutkimuskeskus.
Filed: Jan. 17, 1992.

Abstract—An assembly and a method is provided for coupling a microstrip circuit to a cavity resonator. The assembly includes a substrate, a microstrip circuit fabricated on one side of the substrate plate, a ground plane fabricated on the other side of the substrate plate, and a cavity resonator. The microstrip is coupled to the cavity resonator by a slot fabricated in the ground plane and a planar radiator disposed between the ground plane and the cavity resonator. The assembly produces a resonator that can operate for frequencies in the range of 1–100 GHz in a simplified and less expensive manufacturing process.

6 Claims, 4 Drawing Sheets



5,396,203 Mar. 7, 1995

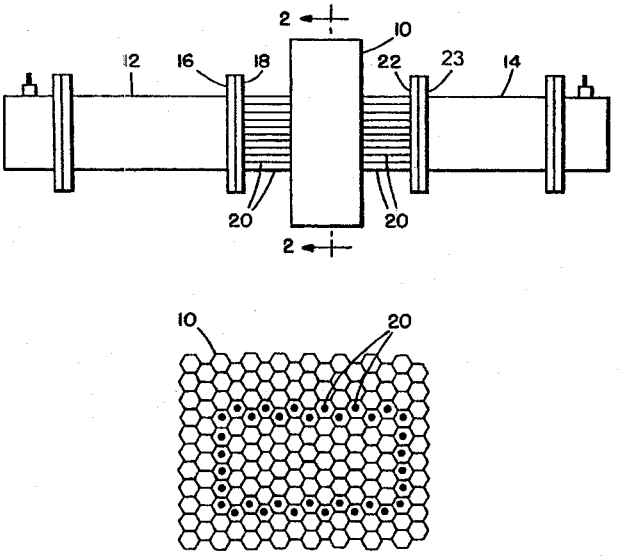
Demountable Wire Cage Waveguide for Permittivity Measurements of Dielectric Materials

Inventor: William Hant.
Assignee: Northrop Grumman Corporation.
Filed: Mar. 17, 1993.

Abstract—A fixture for determining RF characteristics of a dielectric medium comprises a first coupler having an RF through-window with input and output ports, the input port connectable to a waveguide input. A second coupler has an RF through-window with input and output ports, the output port connectable to an output waveguide. A plurality of rods are aligned with

the axes of the input and output waveguides and connect the output port of the first coupler to the input port of the second coupler. Each rod is passable through the dielectric media and mates with the input port so as to form a continuous waveguide passing through the dielectric media.

14 Claims, 2 Drawing Sheets



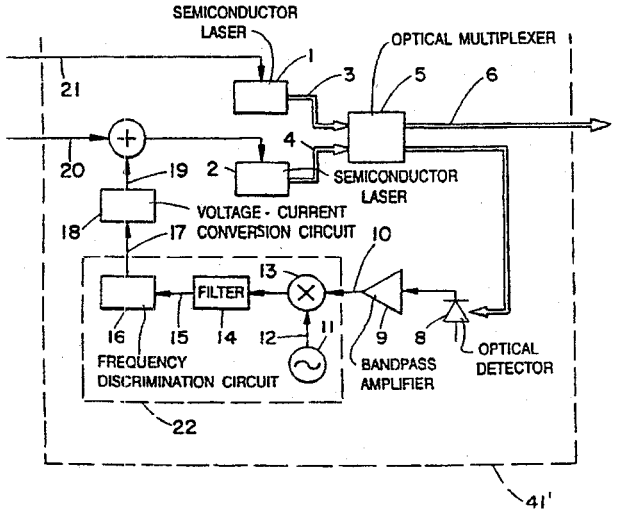
5,396,361 Mar. 7, 1995

Frequency Separation Stabilization Method for Optical Heterodyne or Optical Homodyne Communication

Inventors: Shinya Sasaki, Hideaki Tsushima, and Minoru Maeda.
Assignee: Hitachi, Ltd.
Filed: June 19, 1992.

***Abstract*—A system for stabilizing a frequency separation between two coherent light sources includes first and second current sources driving first and second semiconductor laser devices with first and second frequencies, respectively. Light from the semiconductor laser devices is combined in a multiplexer, and a portion the combined light is diverted to an optical-to-electrical transducer. Output current from the transducer is combined with an output of a local oscillator driven at a selected frequency. A combined signal is then filtered and used to form a control signal of one of the semiconductor laser devices.**

16 Claims, 12 Drawing Sheets



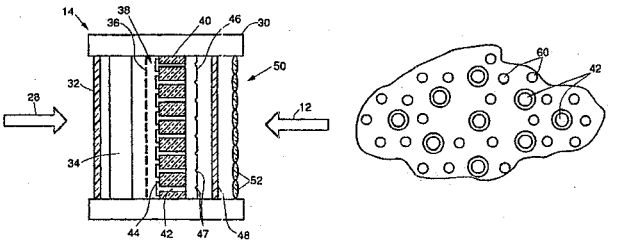
5,396,364 Mar. 7, 1995

Continuously Operated Spatial Light Modulator Apparatus and Method for Adaptive Optics

Inventors: Thomas R. O'Meara and Phillip V. Mitchell.
Assignee: Hughes Aircraft Company.
Filed: Oct. 30, 1992.

***Abstract*—A spatial light modulator that is particularly suited for adaptive optics systems includes a charge transfer plate in which accumulated charge is continuously drained from the charge transfer pins, allowing the modulator to be operated in a continuous mode with a very rapid speed of response. Charge is drained through RC circuits that consists of inherent or discrete resistors and inherent capacitances associated with the pins. A lenslet array focuses an input beam onto the curvature bases of pixels in an associated deformable mirror, thereby obtaining reflections from the mirror with generally flat wavefronts and a greatly increased optical efficiency; a companion lenslet array and mirror combination outside the SLM compensates pixel inversions produced by the first lenslet array. The charge transfer plate is made gas impervious by fabricating the charge transfer pins as thermally migrated conductors, and conductive electric shield pins are preferably also provided to shield the charge transfer pins from each other.**

26 Claims, 4 Drawing Sheets



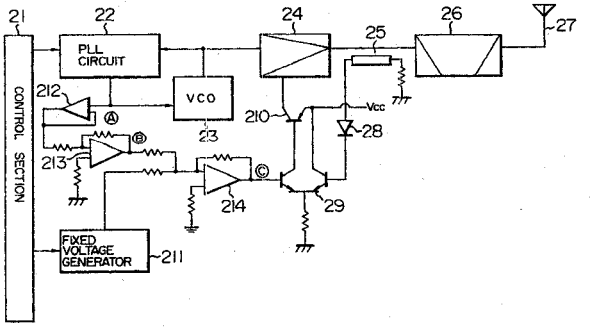
5,396,652 Mar. 7, 1995

Transmitting Power Control Unit having a Constant Output Level Throughout a Predetermined Frequency Band

Inventor: Kouichi Kunitomo.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Aug. 10, 1992.

***Abstract*—A transmitting power control unit that generates and transmits a wideband transmission signal with a power level that does not differ by frequency. This transmitting power control unit includes means for generating voltage corresponding to a frequency of a transmission signal. The power of the transmission signal is controlled by adding the voltage, which is obtained by adding the generated voltage to a fixed voltage according to power control information. The power-controlled transmission signal is transmitted from an antenna with a frequency band that is limited by a filter.**

5 Claims, 4 Drawing Sheets



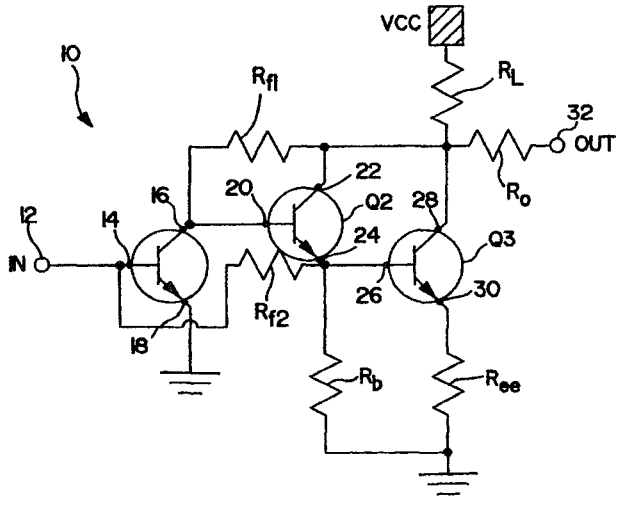
5,398,004 Mar. 14, 1995

HBT Direct-Coupled Low-Noise Wideband Microwave Amplifier

Inventor: Kevin W. Kobayashi.
Assignee: TRW Inc.
Filed: Feb. 9, 1994.

Abstract—A wideband low-noise amplifier is provided that includes an input for receiving an input signal and an output for providing an amplified output signal which may vary over a wide frequency range while exhibiting minimum noise interference. The amplifier includes a first amplification stage having a first bipolar transistor with a base connected to the input, and an emitter coupled to a ground and a collector. A second amplification stage is provided that has second and third Darlington-connected bipolar transistors. The second and third transistors each have a base, collector, and emitter, with the emitter of the second transistor connected to the base of the third transistor. A first feedback path, which includes a first feedback resistor, is coupled between each of the collectors of the second and third transistors and the base of the second transistor. The collector of the first transistor is also connected to the base of the second transistor. A second feedback path is connected between the emitter of the second transistor and the base of the first transistor. The second feedback path has a second feedback resistor with an impedance selected so as to optimize noise match, provide gain-band-width adjustment and dc bias stabilization. In addition, the second feedback path may further include an inductor for providing an inductive reactance component to further optimize the noise match. Alternately, the inductor may be coupled between the input and the base of the first transistor.

18 Claims, 5 Drawing Sheets



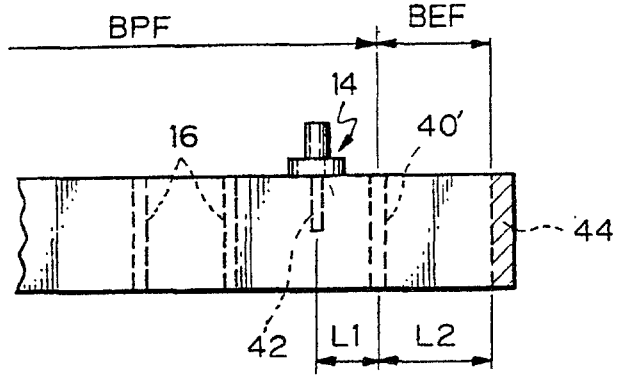
5,398,009 Mar. 14, 1995

Waveguide Filter with Coaxial/Waveguide Mode Conversion

Inventors: Kenichi Kudo, Hiroyuki Sogo, Takehiro Shimizu, and Masanori Fukuda.
Assignee: Fujitsu Limited.
Filed: Sept. 17, 1992.

Abstract—In order to improve filter loss of a waveguide filter having coaxial/waveguide mode conversion parts at its ends, conductor posts bridging a space between two long sides of the waveguide are provided between the parts and the ends. The conductor posts have sufficient thickness and remain close enough to each other and to the short ends of the waveguide that a partition plane including axes of the conductor posts can be regarded as an imaginary short plane. The conductor posts are located so that the partition plane is positioned at a distance $\lambda/4 \times n$ ($n = 1, 3, 5 \ldots$) from the coaxial/waveguide mode conversion part.

3 Claims, 7 Drawing Sheets



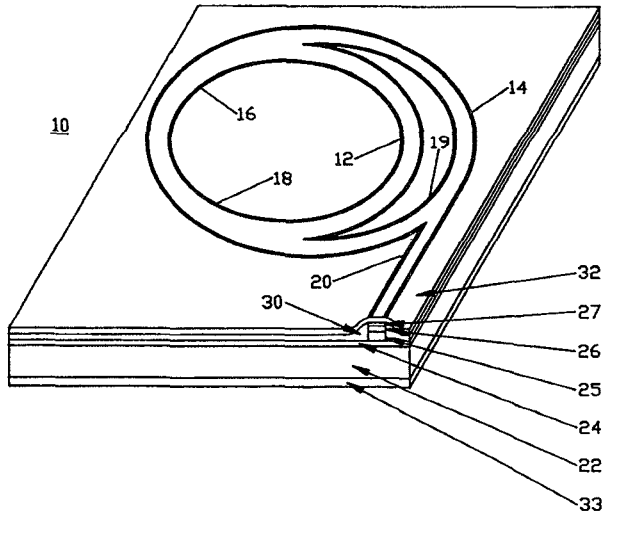
5,398,256 Mar. 14, 1995

Interferometric Ring Lasers and Optical Devices

Inventors: John P. Hohimer and David C. Craft.
Assignee: The United States of America as represented by the United States Department of Energy.
Filed: May 10, 1993.

Abstract—Two ring diode lasers are optically coupled together to produce tunable, stable output through a Y-junction output coupler, which may also be a laser diode or can be an active waveguide. These devices demonstrate a sharp peak in light output with an excellent side-mode-rejection ratio. The rings can also be made of passive or active waveguide material. With additional rings, the device is a tunable optical multiplexer/demultiplexer.

18 Claims, 7 Drawing Sheets



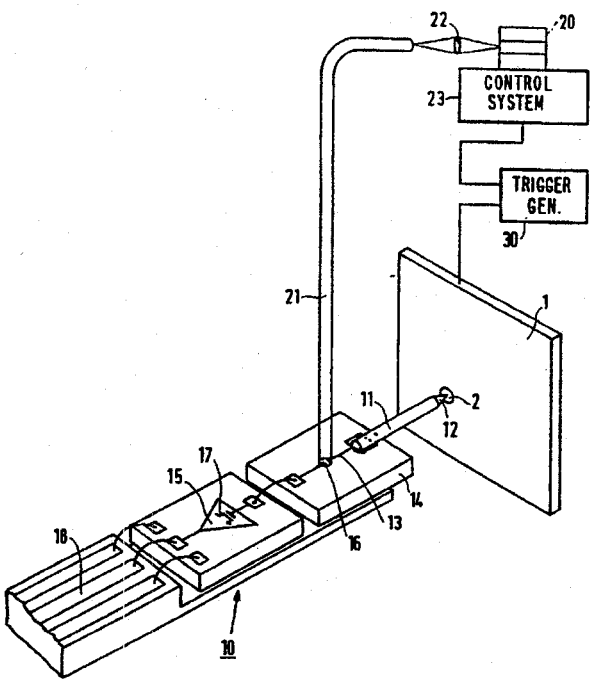
5,399,978 Mar. 21, 1995

Probe Apparatus and Method for Measuring High-Frequency Signals

Inventors: Cornelis G. C. M. De Kort, and Joris J. Vrehen.
Assignee: U.S. Philips Corporation.
Filed: Feb. 26, 1993.

Abstract—A probe apparatus includes a probe contact conected to a storage capacitance via a photoconductive switch. The photoconductive switch can be operated at high speed by means of a pulsed laser. The laser pulses (L) are synchronized with a moment in the operation cycle of the circuit at which moment the voltage at the point under test is to be measured. After a number of pulses and operation cycles, the storage capacitance is charged to the voltage value (V) to be measured. Then, the capacitance does not form a load o the point under test and the voltage (V) can be determined accurately.

15 Claims, 2 Drawing Sheets



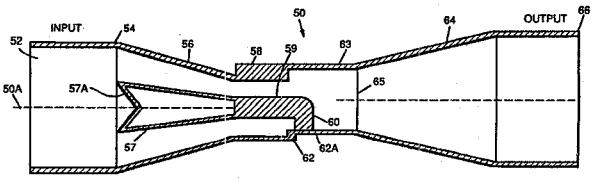
5,399,999 Mar. 21, 1995

Wideband TM_{01}-TO-TE_{11} Circular Waveguide Mode Convertor

Inventor: Robert L. Eisenhart.
Assignee: Hughes Aircraft Company.
Filed: Feb. 8, 1993.

Abstract—The mode convertor employs two intermediate modes, a coaxial TEM and a rectangular waveguide TE_{10} mode, in the transition between the TM_{01} and TE_{11} circular waveguide modes. The coaxial line provides isolation while acting as a mode filter between the device input and output ports. The rectangular waveguide provides a wide mode separation ratio between the TE_{10} and TM_{11} modes. The TE_{10} mode then transitions into the TE_{11} in the circular output waveguide. The coaxial section keeps the output TE_{11} mode from scattering back to the input, and the rectangular section keeps the TM_{01} from being excited in the output.

29 Claims, 3 Drawing Sheets



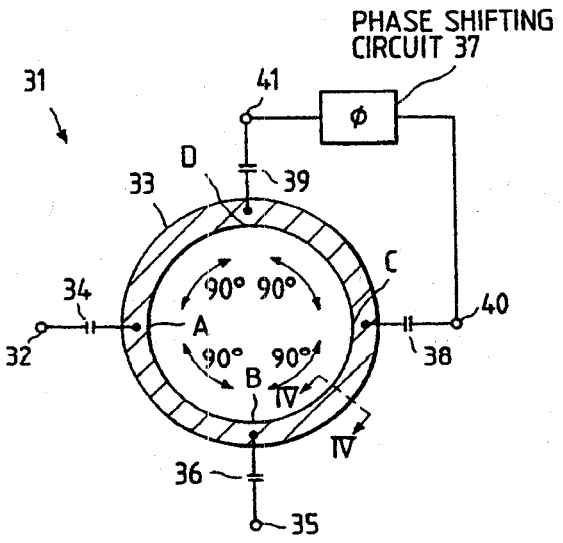
5,400,002 Mar. 21, 1995

Strip Dual-Mode Filter in which a Resonance Width of a Microwave is Adjusted and Dual-Mode Multistage Filter in which the Strip Dual-Mode Filters are Arranged in Series

Inventors: Kazuaki Takahashi, Munenori Fujimura, Hiroyuki Yabuki, and Mitsuo Makimoto.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: June 3, 1993.

Abstract—A strip dual-mode filter consists of a strip line ring resonator having an electric length equivalent to a resonance wavelength λ_o for resonating microwaves at the resonance wavelength λ_o according to a characteristic impedance thereof, an input coupling capacitor for transmitting the microwaves from an input terminal to a coupling point A of the ring resonator, an output coupling capacitor for outputting the microwaves resonated in the ring resonator from a coupling point B of the ring resonator to an output terminal, and a phase-shifting circuit connected to a coupling point C and a coupling point D of the ring resonator for changing the characteristic impedance of the ring resonator by shifting a phase of the microwave by a multiple of a half-wave length of the microwaves. The coupling point B is spaced a quarter-wave length of the microwaves apart from the coupling point A, the coupling point C is spaced the half-wave length of the microwaves apart from the coupling point A, and the coupling point D is spaced the half-wave length of the microwaves apart from the coupling point B.

13 Claims, 15 Drawing Sheets



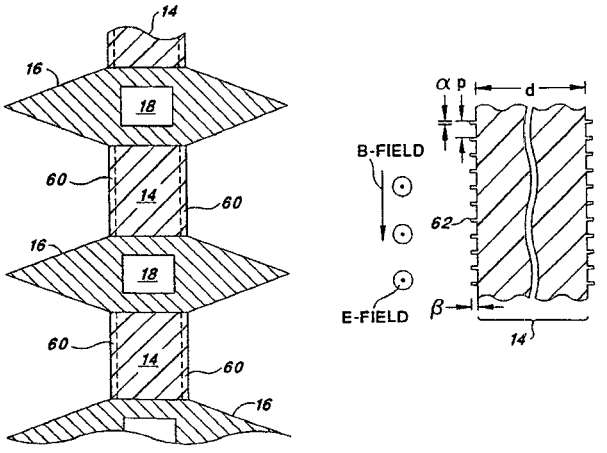
5,400,004 Mar. 21, 1995

Distributed Window for Large-Diameter Waveguides

Inventor: Charles P. Moeller.
Assignee: General Atomics.
Filed: Nov. 9, 1993.

***Abstract*—**A distributed microwave window couples microwave power in the HE_{11} mode between a first large-diameter waveguide and a second large-diameter waveguide, while providing a physical barrier between the two waveguides, without the need for any transitions to other shapes or diameters. The window comprises a stack of alternating dielectric and hollow metallic strips, brazed together to form a vacuum barrier. The vacuum barrier is either transverse to or tilted with respect to the waveguide axis. The strips are oriented to be perpendicular to the transverse electric field of the incident microwave power. A suitable coolant flows through the metallic strips. The metallic strips are tapered on both sides of the vacuum barrier, which serves to funnel the incident microwave power through the dielectric strips. The surfaces of the dielectric strips fronting the microwave power may be corrugated in a specified manner to reduce losses.

19 Claims, 4 Drawing Sheets



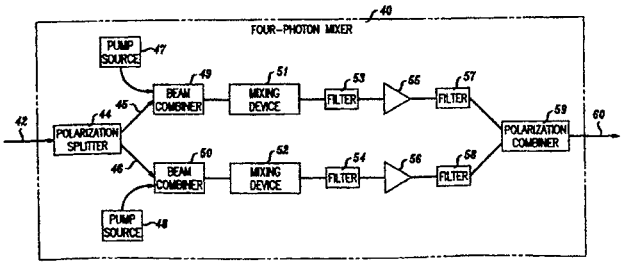
5,400,164 Mar. 21, 1995

Polarization-Insensitive Optical Four-Photon Mixer

Inventors: Christian Kurtzke and Jay M. Wiesenfeld.
Assignee: AT&T Corp.
Filed: Sep. 10, 1993.

***Abstract*—**The present invention provides an apparatus and method for performing polarization-insensitive four-photon mixing of optical signals. The polarization-insensitive optical mixer includes a polarization splitter for splitting an optical signal into parallel and perpendicular polarization components, different mixing paths for mixing a pump signal of like polarization with each of the parallel and perpendicular components in a nonlinear mixing device, and polarization combiner for combining the resulting mixing products. Certain of the mixing products represent phase conjugates of the input optical signal and are therefore useful in compensating for chromatic distortion in optical fiber.

33 Claims, 6 Drawing Sheets



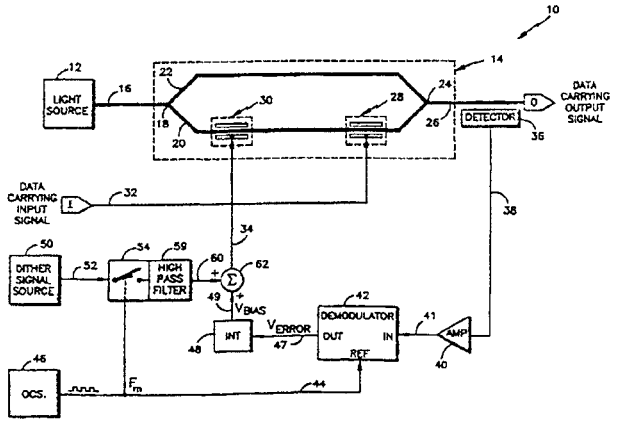
5,400,417 Mar. 21, 1995

Electrooptic Modulator Having Gated-Dither Bias Control

Inventors: David J. Allie and James D. Farina.
Assignee: United Technologies Corporation.
Filed: July 27, 1994.

***Abstract*—**An electrooptic modulator includes a closed-loop bias control system for maintining the modulator at its half-power point by modulating a time varying signal on and off at a modulation frequency f_m. The modulation frequency f_m is much lower than the frequency components within the spectrum of the time varying signal, such that energy within the time varying signal spectrum is recovered at the modulation frequency when the modulator is not operating at the half-power point. A phase-sensitive demodulator operating at the modulation frequency f_m demodulates a signal indicative of the modulator optical output signal to provide a dc voltage signal value indicative of the half-power point bias error value. The time varying voltage signal may be a dither noise signal or any other time varying signal such as a signal with a single frequency component (e.g. a sine or cosine) or a signal with a plurality of frequency components (e.g., a square wave).

22 Claims, 5 Drawing Sheets



5,401,912 Mar. 28, 1995

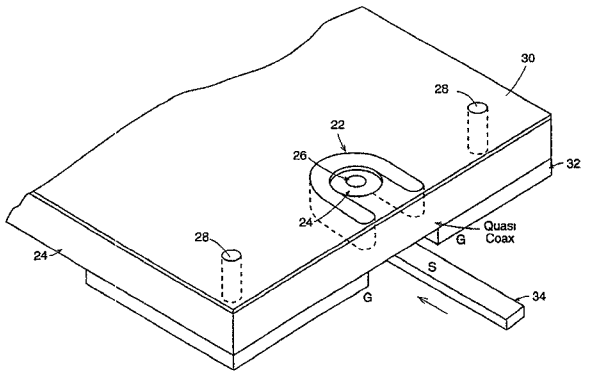
Microwave Surface Mount Package

Inventor: Carmelo J. Mattei.
Assignee: ST Microwave Corp., Arizona Operations.
Filed: June 7, 1993.

***Abstract*—**An improved surface mount package and method of making such a package is provided. A conventional surface mount package is modified by fabricating a U-shaped via around the lead via to form a quasi-coaxial transmission line through the insulating substrate. This permits the electrical

impedance in the conductive elements of the surface mount package to be controlled to reduce insertion loss and return loss and to improve isolation. The surface mount package includes a lead frame and a gold plate to which an integrated circuit in the package is attached. The package is sealed with a ring-frame and a lid. Ground vias connecting the lead-frame to the plate through the substrate may also be included. The present package is designed by modelling the various elements of the package as a coaxial transmission line, a co-planar waveguide, and a single lead in a trough transmission line in combination. In an alternative embodiment, the U-shaped via may be formed of discrete holes drilled though the substrate, rather than as a continuous U-shape.

12 Claims, 9 Drawing Sheets



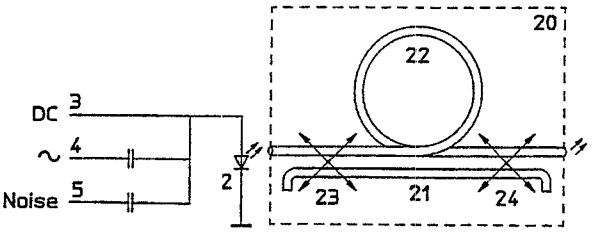
5,401,955 Mar. 28, 1995

Optical Noise Source Having Three Input Signals

Inventor: Robertus F. M. Van Den Brink.
Assignee: Koninklijke PTT Nederland N.V.
Filed: Feb. 4, 1994.

Abstract—Known optical noise sources are equipped with a light source an an interference filter, optically coupled thereto and based on path length difference, for generating an optical composition signal. If the spectrum of a photodiode to be illuminated with the optical composition signal is to be as flat as possible, said path length difference must be considerably greater than the coherence length of the light source that in present practice leads to disadvantageously large path length differences. By feeding, according to the invention, a noise signal to the light source, the coherence length of the light source decreases. As a result, it is sufficient to use considerably smaller path length differences.

17 Claims, 1 Drawing Sheet



5,402,259 Mar. 28, 1995

Linear Electroabsorptive Modulator and Related Method of Analog Modulation of an Optical Carrier

Inventors: Lawrence J. Lembo and John C. Brock.
Assignee: TRW Inc.
Filed: Apr. 23, 1993.

Abstract—Apparatus, and a corresponding method for it use, for directly modulating an optical carrier with a radio-frequency (rf) electrical signal. A semiconductor electroabsorptive modulator is operated at an optical wavelength and electrical bias voltage carefully selected to provide a near-linear electrical-to-optical transfer characteristic and to keep rf insertion loss low. Further reduction of insertion loss is achieved by use of an extremely short device, or a single quantum-well device configuration, or both. Linearity is further optimized by choosing an appropriate combination of optical polarization mode, optical reflectivity of the device facets, and the number and physical properties of multiple quantum-wells.

22 Claims, 10 Drawing Sheets