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 USA.

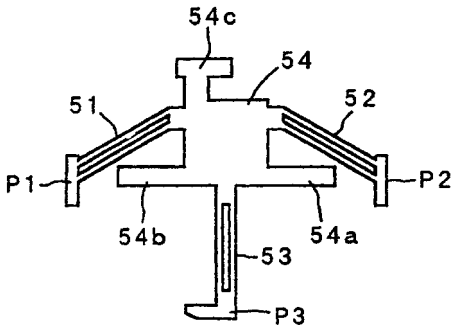
6,366,178 April 2, 2002

NON-RECIPROCAL CIRCUIT DEVICE WITH CAPACITOR TERMINALS INTEGRAL WITH THE GROUND PLATE

Inventors: Toshihiro Makino, Takashi MoriHasegawa, Masakatsu , and Takahiro Jodo.
Assignee: Murata Manufacturing Co., Ltd.
Filed: July 6, 2000.

***Abstract*—**A highly reliable nonreciprocal circuit device facilitating incorporation of matching capacitors and a communication apparatus incorporating the same are disclosed. In the nonreciprocal circuit device, central conductors are integrally extended from a ground plate abutting on the bottom of a ferrite plate to be mutually crossed on the upper surface of the ferrite plate via an insulation sheet after passing over the side surfaces of the ferrite plate. Matching capacitors are connected by soldering between capacitor-connecting terminals integrally extended from the ground plate and the ports of the central conductors in such a manner that electrode surfaces of the matching capacitors are set perpendicularly with respect to a main surface of the ferrite plate.

8 Claims, 8 Drawing Sheets



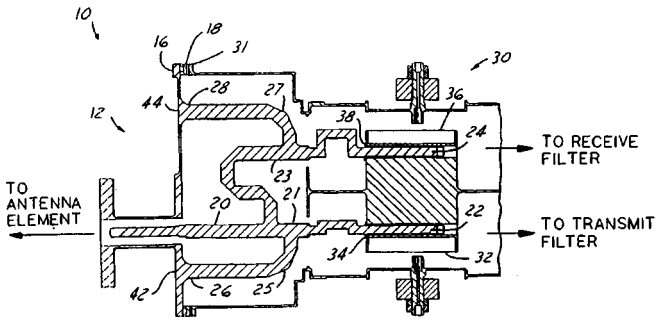
6,366,183 April 2, 2002

LOW PIM COAXIAL DIPLEXER INTERFACE

Inventors: Louis W. Hendrick, Robert L. Reynolds, and Rolf Kich.
Assignee: Hughes Electronics Corp.
Filed: December 9, 1999.

***Abstract*—**A common interface (**10**) for a PIM sensitive diplexing filter (**30**) is provided in a noncontacting, or isolated, configuration while providing PIM reliability, ESD conduction and thermal conduction, making it ideal for high power space applications. The common interface (**10**) is a one-piece construction of a diplexed, or multiplexed, coaxial, or squareax, transmission line that is constructed with a direct noncontacting (**34**, **36**), or connectionless, interface. Terminations (**26**, **28**) connect the inner conductor (**20**) to the outer conductor (**12**) of the interface (**10**) making the device one integral piece yet providing the necessary isolation through noncontacting interface with a PIM sensitive device and terminations (**26**, **28**) that provide thermal and ESD conduction necessary for PIM reliability.

11 Claims, 1 Drawing Sheet



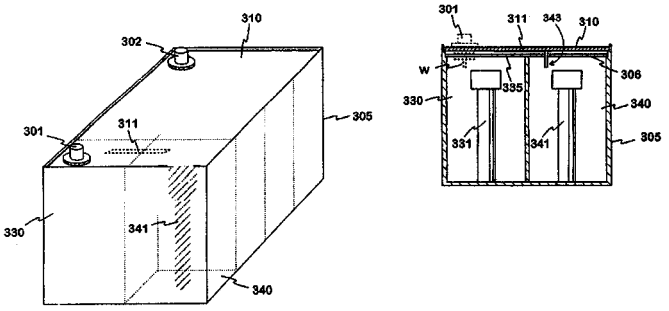
6,366,184 April 2, 2002

RESONATOR FILTER

Inventor: Jorma Ohtonen.
Assignee: Filtronic LK Oy.
Filed: March 3, 2000.

***Abstract*—**The invention comprises a filter consisting of resonators (**330**, **320**, …) with a conducting housing, particularly to be used in networks operating on microwave frequencies. The couplings between the resonators are realized outside the conducting filter housing with the aid of a printed board (**310**) over a wall (**306**) of the housing. For a particular coupling a conductor strip (**311**) extending from one resonator to another is formed on the printed board, and openings (**335**, …) are made in the resonator walls at the ends of the strips. In order to strengthen the coupling a coupling element (**343**) extending into the resonator cavity can be fastened as an extension of the strip. The filter connectors (**301**, …) are also fastened to the printed board. The open filter housing (**305**) and the inner conductors (**331**, **341**, …) or the resonators can be made as a homogenous body. The manufacturing costs and the tuning costs of a filter according to the invention are relatively low. The losses of the filter are relatively low, the filter is easy to modify, and on the printed board it is possible to realize also functions which are external to the filter.

10 Claims, 4 Drawing Sheets



Digital Object Identifier 10.1109/LMWC.2002.804911.

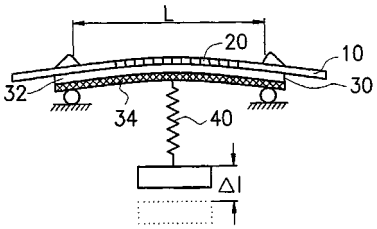
6,366,721 April 2, 2002

TUNABLE OPTICAL FIBER GRATING

Inventors: Chieh Hu, Shu-Mei Yang, and Jiun-Shyong Wu.
Assignee: Industrial Technology Research Institute.
Filed: January 21, 2000.

***Abstract*—**The invention provides a structure of tunable optical filter grating. The structure includes a bimetallic strip and a compression spring to set up suitable strain for adjusting the position of the central wavelength. The bimetallic strip can also be specially designed to compensate for any drift in central wavelength due to temperature change so that temperature monitoring and feedback control designs is obsolete. Therefore, the operating wavelength of the optical grating is adjustable yet insensitive to temperature changes.

10 Claims, 3 Drawing Sheets



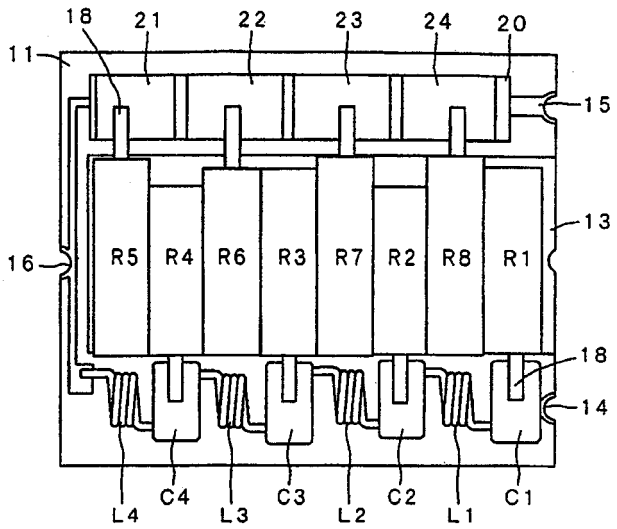
6,369,668 April 9, 2002

DUPLEXER AND COMMUNICATION APPARATUS INCLUDING THE SAME

Inventors: Masayuki Atokawa and Nobuyoshi Honda.
Assignee: Murata Manufacturing Co., Ltd.
Filed: June 25, 1999.

***Abstract*—**A duplexer comprising: λ/4-type dielectric coaxial resonators constituting a transmitting-side filter; λ/4-type dielectric coaxial resonators constituting a receiving-side filter; and coupling elements for coupling said resonators; wherein the dielectric coaxial resonators constituting the transmitting-side filter and the dielectric coaxial resonators constituting the receiving-side filter are placed in parallel; and the open end surfaces of the dielectric coaxial resonators constituting the transmitting-side filter and the open end surfaces of the dielectric coaxial resonators constituting the receiving-side filter are disposed in opposite directions, and/or are alternately disposed side-by-side.

6 Claims, 3 Drawing Sheets



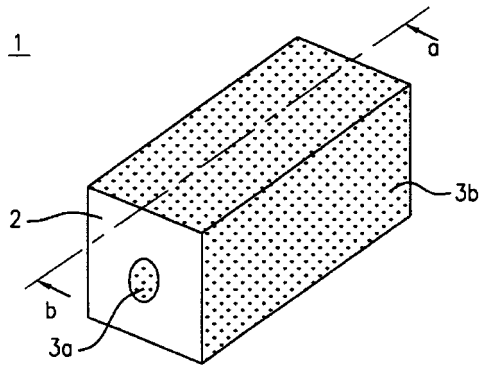
6,369,669 April 9, 2002

RARE-EARTH CERAMIC FILTER

Inventors: Tsutomu Tatekawa and Hitoshi Takagi.
Assignee: Murata Manufacturing Co., Ltd.
Filed: October 12, 2000.

***Abstract*—**High frequency dielectric ceramic compositions having a dielectric constant (ϵ_r) of 30 to 50, a Q value of 15, 000 or more at 1 GHz, and a temperature-dependent factor of resonant frequency (τf) which can be arbitrarily controlled centering around 0 (ppm/° C.) have a main crystal of the perovskite type crystal phase by $(1-x)MeTi_aO_{1+2a}$—$xLn(Ma_{1/2}Mb_{1/2})_bO_{(3+3b)/2}$, wherein Ln is a rare earth element, Ma is at least one of Mg and Zn, Mb is at least one of Sn and Zr, Me is at least one of Ca and Sr, x is the mole fraction, and $0.95 \leqq a \leqq 1.05$, $0.9 \leqq b \leqq 1.05$ and $0.3 \leqq x \leqq 0.5$.

20 Claims, 3 Drawing Sheets



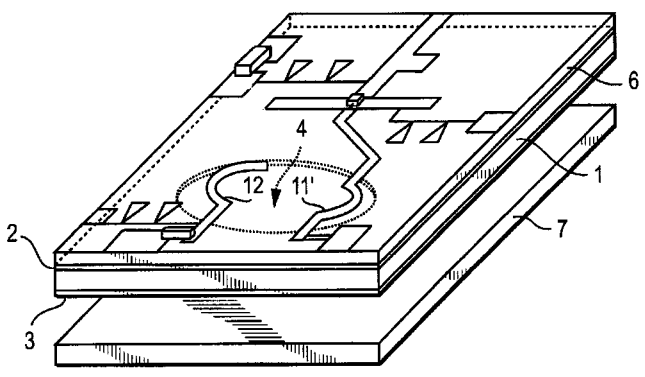
6,369,676 April 9, 2002

HIGH-FREQUENCY MODULE

Inventors: Koichi Sakamoto, Sadao Yamashita, Takatoshi Kato, Yasutaka Fujii, Kenichi Iio, and Toshiro Hiratsuka.
Assignee: Murata Manufacturing Co., Ltd.
Filed: January 29, 1999.

***Abstract*—**A high-frequency module which includes a dielectric resonator defined by a dielectric sheet; a pair of electrodes formed on each of the main surfaces of the dielectric sheet and having aligned openings which form a dielectric resonator; a substrate stacked on the sheet; and lines disposed on the substrate for being coupled to the dielectric resonator. At least one of the lines is curved and is disposed just inside the opening and runs substantially along the edges of the openings.

13 Claims, 6 Drawing Sheets



6,369,677 April 9, 2002

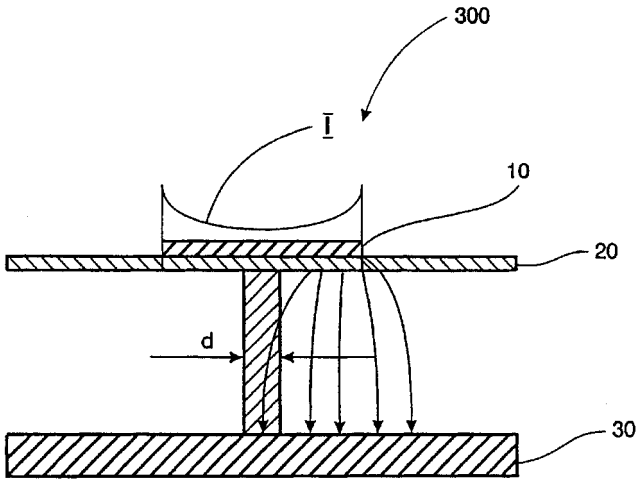
20 Claims, 2 Drawing Sheets

ARRANGEMENT FOR MORE EVEN CURRENT DISTRIBUTION IN A TRANSMISSION LINE

Inventors: Spartak Gevorgian and Leif Bergstedt.
Assignee: Telefonaktiebolaget LM Ericsson.
Filed: August 26, 1999.

***Abstract*—**More even current distribution in a transmission line is provided by an arrangement including a first conductive layer, a dielectric layer and a ground plane. The first conductive layer, the dielectric layer and the ground plane extend mainly in substantially the same direction, with the dielectric layer arranged between the first conductive layer and the ground plane. The arrangement includes an object located between the dielectric layer and the ground plane. The object can be electrically conductive or made of a dielectric material.

12 Claims, 5 Drawing Sheets

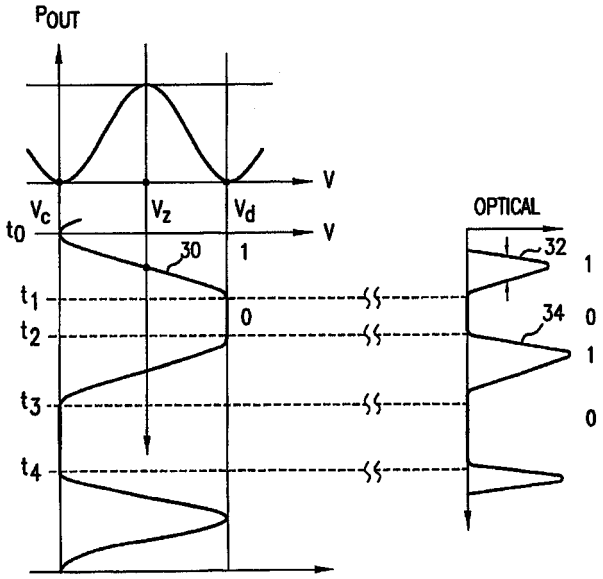


6,370,283 April 9, 2002

ELECTRO-OPTIC MODULATOR FOR GENERATING SOLITONS

Inventor: Guangning Yang.
Assignee: TyCom (U.S.) Inc.
Filed: October 29, 1998.

***Abstract*—**A method and apparatus is provided for generating optical pulses with an electro-optic amplitude modulator. The modulator includes first and second waveguides that form an optical interferometer. At least the first waveguide includes an electro-optic material such as lithium niobate and an electrode extending along a portion thereof. Input and output optical waveguides are respectively coupled to input and output junctions of the interferometer. A voltage source biases the electrode such that a modulation switching curve arises that generates two optical pulses over a complete voltage cycle.



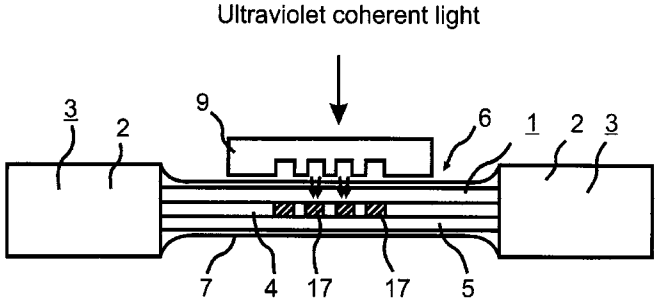
6,370,301 April 9, 2002

METHOD FOR FORMING FIBER GRATING AND FIBER GRATING FORMED BY THE SAME

Inventor: Kunio Kokura.
Assignee: The Furukawa Electric Co. Ltd.
Filed: February 9, 2000.

***Abstract*—**The present invention relates to a fiber grating formed on an optical component for processing optical signals and a method of forming the grating. After the sheath (**2**) of an optical fiber (**3**) is partially removed, the surface of the bare optical fiber (**1**) at an area where the sheath (**2**) is removed is covered by a resin film (**7**) having a thinness at which ultraviolet light permeability not hindering formation of gratings. Thereafter, by irradiating ultraviolet light (ultraviolet coherent light) via a phase mask (**9**), a grating where the refractive index of the core (**4**) of the bare optical fiber **81**) cyclically changes in the beam axis is formed. The resin film (**7**) is made of, for example, an organic material having heat resistance, which is not dissolved by ultraviolet ray irradiation, such as polyimide resin, polyamideimide resin, etc. The thickness of the resin film (**7**) is 10 μm or less to ensure that ultraviolet light sufficiently permeates and the convergence of interference light is not lowered.

10 Claims, 3 Drawing Sheets



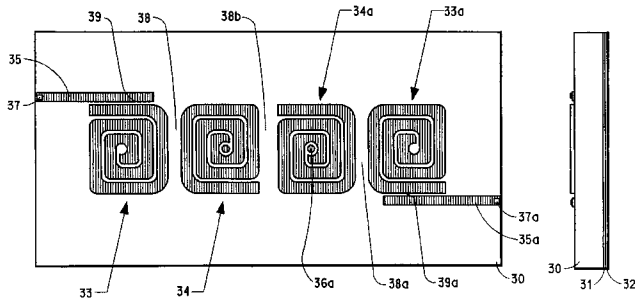
6,370,404 April 9, 2002

HIGH TEMPERATURE SUPERCONDUCTOR MINI-FILTERS AND MINI-MULTIPLEXERS WITH SELF-RESONANT SPIRAL RESONATORS

Inventor: Zhi-Yuan Shen.
Filed: June 9, 2000.

***Abstract*—**High temperature superconductor mini-filters and mini-multiplexers utilize self-resonant spiral resonators and have very small size and very low cross-talk between adjacent channels.

14 Claims, 18 Drawing Sheets



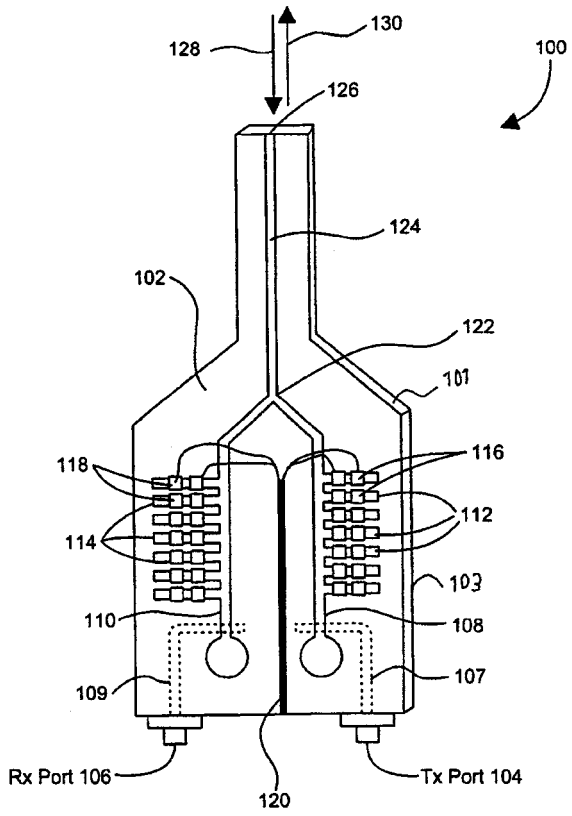
6,373,349 April 16, 2002

RECONFIGURABLE DIPLEXER FOR COMMUNICATIONS APPLICATIONS

Inventor: Roland A. Gilbert.
Assignee: BAE Systems Information and Electronic Systems Integration Inc.
Filed: March 15, 2001.

***Abstract*—**The present invention provides a reconfigurable diplexer which is well suited for use with mulitple element antenna arrays. The diplexer includes a common, slot-line transmission line adapted to carry electromagnetic signals; a pair a separate slot-line transmission lines coupled to the common transmission line; each separate slot-line transmission line having an individual filter coupled thereto, wherein each filter is adapted to selectively give its respective separate slot-line transmission line a characteristic impedance dependent upon predetermined frequencies of the electromagnetic signals; and a separate slot-line balun associated with each separate slot-line transmission line and adapted for coupling signals to and/or from its respective separate slot-line transmission line. The diplexer may be configured to operate in several different bands such as the INTELSAT frequencies (7.2–8.4 GHz) or DSCS frequencies (11.7–14.5 GHz).

11 Claims, 1 Drawing Sheet



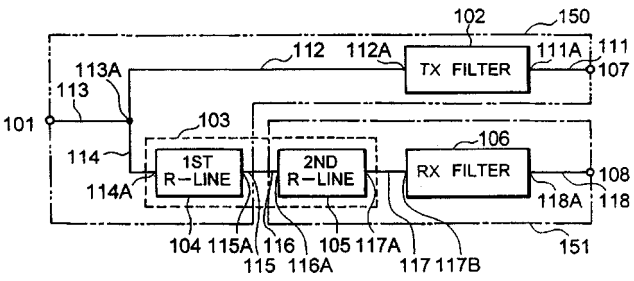
6,373,350 April 16, 2002

BRANCHING FILTER WITH SAW-RESONATOR TRANSMITTING AND RECEIVING FILTERS IN SEPARATE PACKAGES AND RECEIVING-BRANCH LINES IN BOTH PACKAGES

Inventor: Yoshiaki Fujita.
Assignee: Oki Electric Industry Co., Ltd.
Filed: December 1, 1999.

***Abstract*—**A branching filter includes a transmitting filter and a receiving filter, both of the SAW-resonator type. The transmitting filter and receiving filter are housed in separate packages. The packages also include coupling circuitry and other necessary circuit elements such as inductor-capacitor chips. Accommodation of the SAW-resonator-type filters and other circuit elements in two separate packages leads to improved performance characteristics.

7 Claims, 6 Drawing Sheets



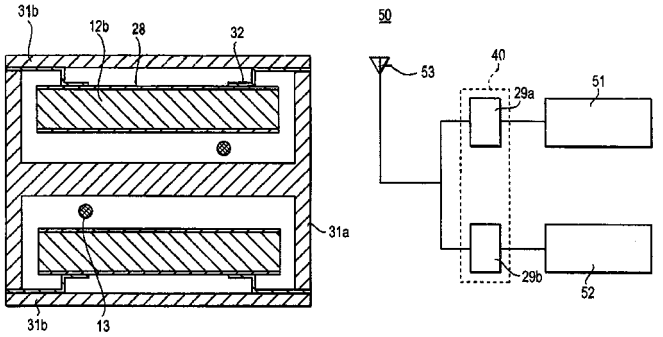
6,373,351 April 16, 2002

TM010 MODE BAND ELIMINATION DIELECTRIC FILTER, DIELECTRIC DUPLEXER AND COMMUNICATION DEVICE USING THE SAME

Inventors: Kazuhiko Kubota and Tomoyuki Ise.
Assignee: Murata Manufacturing Co., Ltd.
Filed: January 4, 1999.

***Abstract*—**A band elimination dielectric filter in which the non loaded Q is increased by substantially eliminating the actual current flowing in a shield cavity, and the height is reduced. The band elimination dielectric filter includes a conductive shield cavity **11**, a dielectric resonator **12** which is arranged in the shield cavity **11** and in which electrodes **18** are formed on two surfaces opposite to each other; and an external coupling **13** which is arranged in the shield cavity and connected to the dielectric resonator **12**.

6 Claims, 9 Drawing Sheets



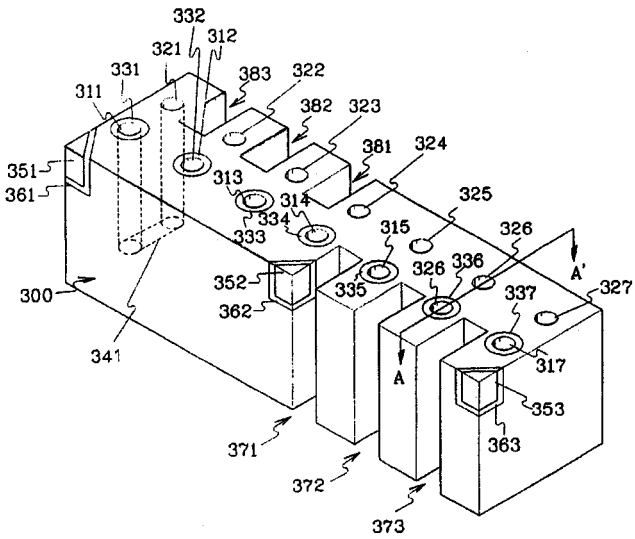
6,373,352 April 16, 2002

DUPLEXER WITH STEPPED IMPEDANCE RESONATORS

Inventors: Chang Hwa Lee, Meyng Soo Kim, Bon Hee Koo, Dong Suk Jun, Sang Seok Lee, and Tae Goo Choy.
Assignee: Electronics and Telecommunications Research Institute.
Filed: April 2, 1998.

***Abstract*—**A duplexer using a dielectric block and having stepped impedance resonators is disclosed. The duplexer comprising open ended resonators arranged in a front side of the dielectric block, shorted resonators arranged in a rear side of the dielectric block, first grooves for controlling receiving coupling at the receiving filter, second grooves for controlling transmitting coupling at the transmitting filter, and a plurality of recesses formed at the bottom of the dielectric block, extending from a first aperture of the open ended resonators to a second aperture of the shorted resonators. The duplexer according to this invention is miniaturized by excluding external elements and has excellent attenuation characteristics, and is being manufactured by simple processes.

9 Claims, 11 Drawing Sheets



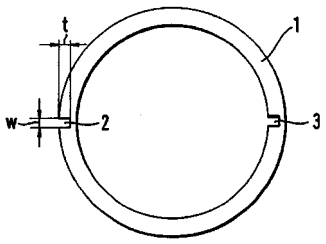
6,373,354 April 16, 2002

METHOD OF ADJUSTING A RESONANCE FREQUENCY OF A RING RESONATOR

Inventors: Martin Schallner and Willibald Konrath.
Assignee: Robert Bosch GmbH.
Filed: May 4, 1999.

***Abstract*—**The method for adjusting a resonance frequency of a ring resonator formed as a strip line ring exactly includes removing successive amounts of conducting material from one or more positions (**2**, **3**) on the strip line ring (**1**) with a laser until the ring resonator has a desired predetermined resonance frequency.

10 Claims, 1 Drawing Sheet



6,374,013 April 16, 2002

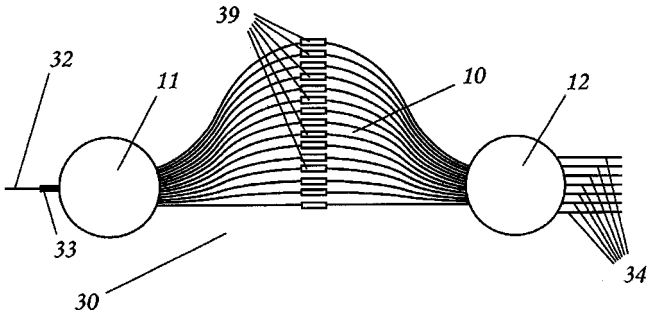
OPTICAL ARRAYED WAVEGUIDE GRATING DEVICES

Inventors: James E. Whiteaway, Alan Fielding, and Terry Bricheno.
Assignee: Nortel Networks Limited.
Filed: December 23, 1999.

***Abstract*—**It is found that the use of a multimode interference (MMI) section to flatten the pass-bands of an arrayed waveguide grating (AWG) multiplexer/demultiplexer or comb filter device introduces undesirable wavelength dispersion into those pass-bands if that MMI section mixes modes of more than two different orders, and if the grating of that device is a 'uniform' grating whose waveguides are equally (minimally) attenuating, and in which the optical path

length difference between each adjacent pair of waveguides **40** of the array is the same. This dispersion can be substantially compensated by appropriate 'tailoring' of the grating to remove such uniformity.

5 Claims, 14 Drawing Sheets



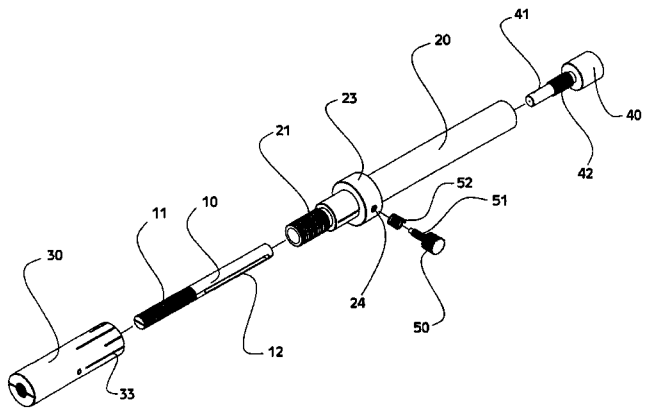
6,374,015 April 16, 2002

TEMPERATURE-COMPENSATING DEVICE WITH TUNABLE MECHANISM FOR OPTICAL FIBER GRATINGS

Inventor: I-En Lin.
Assignee: Rich Key Technologies Limited.
Filed: August 1, 2000.

***Abstract*—**A temperature-compensating device with tunable mechanism for optical fiber gratings includes a moving pin, a tube housing, a rotation sleeve, a plug and a locking screw. The moving pin has a first predetermined outer screw pitch at one end and an elongated slot at the other end for receiving the locking screw. The tube housing has a second predetermined outer screw pitch at one end and an inner screw pitch at the other end. The rotation sleeve has a first predetermined inner thread corresponding to the first predetermined outer screw pitch of the moving pin, and a second predetermined inner thread corresponding to the second predetermined outer screw pitch of the tube housing. The plug is inserted into the end of the tube housing with outer thread engaged with the inner screw pitch of the tube housing. The grating fiber is placed inside the moving pin. The slot of the moving pin is guided by the locking screw which enables the linear movement of the moving pin. When the locking screw is in position, the moving pin cannot self-rotate, so rotating the sleeve in one cycle will make the moving pin have a movement of the second predetermined outer screw pitch minus the first predetermined outer screw pitch. Once the locking screw is rotated outwardly not to guide the slot, rotating the rotation sleeve 360 degrees will result in the second predetermined outer screw pitch movement of the moving pin, which called "quick movement."

8 Claims, 7 Drawing Sheets



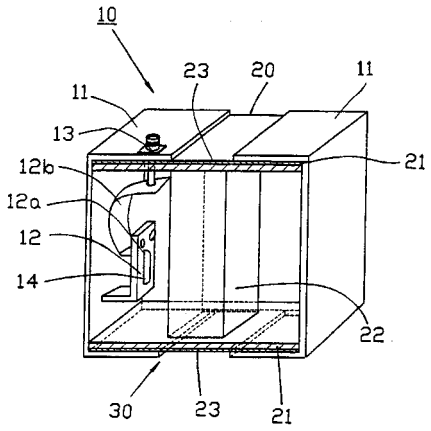
6,377,132 April 23, 2002

FILTER, DUPLEXER, AND COMMUNICATION DEVICE

Inventors: Hiroki Wakamatsu, Taiyo Nishiyama, Yukihiro Nakatani, and Yoshihiro Himi.
Assignee: Murata Manufacturing Co., Ltd.
Filed: November 4, 1998.

***Abstract*—**A filter includes a dielectric resonator, a cavity for holding the dielectric resonator therein, an external connector mounted on the cavity, and a coupling loop connected to the external connector so as to electromagnetically couple with the dielectric resonator. The coupling loop is formed by bending a metal plate nearly into the shape of an L, and is provided with a rib extending in a direction that is not parallel to the bending line.

7 Claims, 6 Drawing Sheets



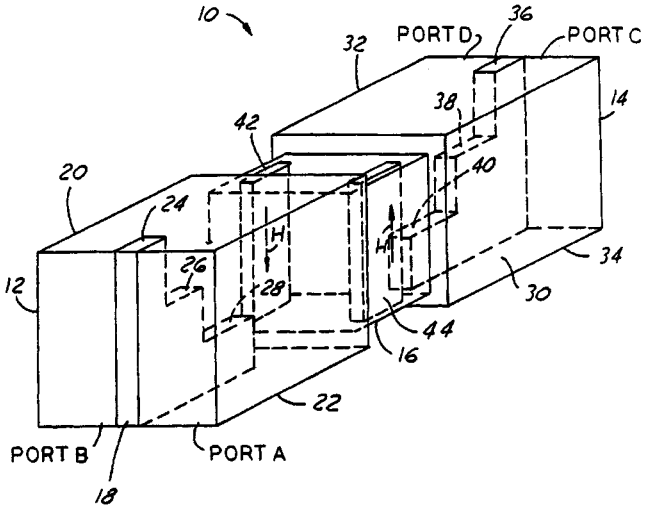
6,377,133 April 23, 2002

VARIABLE POWER DIVIDER/COMBINER

Inventors: Ralf Ihmels and Chris Trammell.
Assignee: Hughes Electronics Corporation.
Filed: March 20, 2000.

***Abstract*—**A waveguide continuously variable power divider/combiner that is capable of dividing one input signal into two output signals, with the ratio of the output signals being continuously variable between zero and infinity. The waveguide has a first septum polarizer separated from a second septum polarizer by a ferrite phase shifter. By adjusting the magnetic bias in the ferrite phase shifter, a predetermined phase differential is generated thereby modifying an input signal as desired.

16 Claims, 1 Drawing Sheet



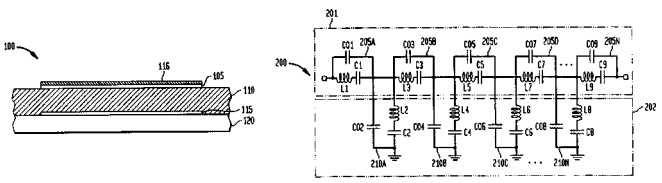
6,377,136 April 23, 2002

THIN FILM RESONATOR FILTER HAVING AT LEAST ONE COMPONENT WITH DIFFERENT RESONANT FREQUENCY SETS OR ELECTRODE CAPACITANCE

Inventors: George E. Rittenhouse and Michael George Zierdt.
Assignee: Agere Systems Guardian Corporation.
Filed: February 4, 2000.

***Abstract*—**A thin film resonator (TFR) filter circuit including a plurality of TFRs connected in a series-shunt or shunt-series arrangement between input and output ports of the filter. A method is provided that allows for the shifting of resonant frequency sets in each TFR in respective series arms and shunt legs of the TFR filter circuit, as opposed to a conventional concatenating approach using a plurality of chained-up building blocks of TFRs, where resonant frequency sets in each of the series arms are equal, and where resonant frequency sets in each of the shunt legs are equal. Additionally, each TFR in the filter may have a unique parallel plate electrode capacitance, as opposed to the conventional concatenating approach where all series arm electrodes in the root filter design have equal capacitance, and where all shunt leg electrodes have equal capacitance. By shifting the resonant frequency sets and/or varying the electrode capacitance of the TFRs, a wider passband width may be achieved for a given return loss performance, as compared to conventionally designed filter circuits.

24 Claims, 8 Drawing Sheets



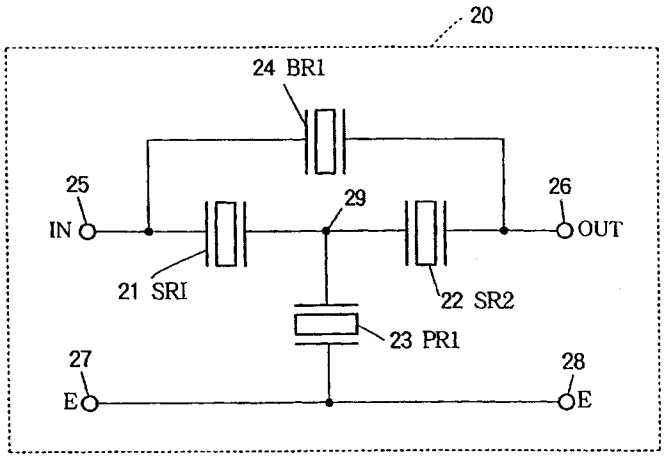
6,377,140 April 23, 2002

SAW RESONATOR FILTER WITH BRIDGED-T CONFIGURATION

Inventors: Hisanori Ehara, Hajime Shimamura, Yoshiaki Fujita, and Tomokazu Komazaki.
Assignee: Oki Electric Industry Co., Ltd.
Filed: March 15, 2000.

***Abstract*—**A surface-acoustic-wave filter has a pair of series-arm surface-acoustic-wave resonators and a shunt-arm surface-acoustic-wave resonator coupled in a T configuration. An additional bridging surface-acoustic-wave resonator is coupled between the input and output terminals, in parallel with the series arm. The bridging surface-acoustic-wave resonator provides enhanced attenuation of spurious signals at multiples of the passband frequency.

16 Claims, 4 Drawing Sheets



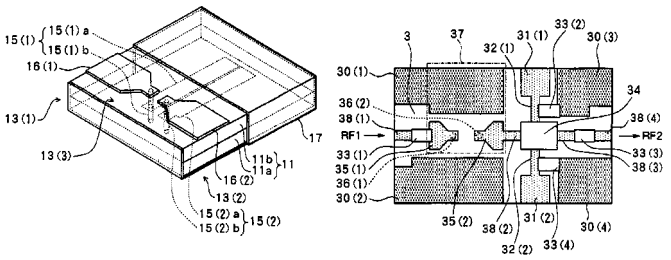
6,377,141 April 23, 2002

DISTRIBUTED CONSTANT FILTER, METHOD OF MANUFACTURING SAME, AND DISTRIBUTED CONSTANT FILTER CIRCUIT MODULE

Inventor: Takayuki Hirabayashi.
Assignee: Sony Corporation.
Filed: February 28, 2000.

***Abstract*—**A distributed constant filter capable of being connected to a wiring pattern and the like while simultaneously achieving miniaturization, stable performance and assurance of the reliability and a manufacturing method of the distributed constant filter are provided. In a triplate structure band-pass filter, in place of a high impedance pattern which is, in the prior art, formed on the same face as that of a low impedance pattern in an inner layer, conductor patterns extending in the thickness direction of a stacked substrate are formed. Each of the conductor patterns functions as a via pattern connecting the low impedance pattern in the inner layer and a wiring pattern in the surface layer and also functions as a high impedance line. As long as the filtering characteristic is the same, the line overall length (distance in a plane) of the conductor patterns can be made shorter than the conventional line overall length and the area occupied by the conductor patterns can be reduced. A change in the filtering characteristic which occurs when via patterns are separately provided does not occur.

7 Claims, 9 Drawing Sheets



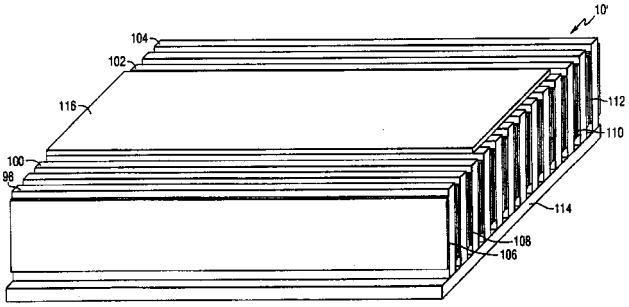
6,377,142 April 23, 2002

VOLTAGE TUNABLE LAMINATED DIELECTRIC MATERIALS FOR MICROWAVE APPLICATIONS

Inventors: Luna H. Chiu, Yongfei Zhu, Xubai Zhang, Steven C. Stowell, Andrey Kozyrev, Somnath Sengupta, and Louise Sengupta.
Assignee: Paratek Microwave, Inc.
Filed: October 15, 1999.

***Abstract*—**A tunable dielectric structure includes a first layer of dielectric material, a second layer of dielectric material positioned adjacent to the first layer of dielectric material, with the second layer of dielectric material having a dielectric constant that is less than the dielectric constant of the first layer of dielectric material, and electrodes for applying a controllable voltage across the first dielectric material, thereby controlling a dielectric constant of the first dielectric material, wherein at least one of the electrodes is positioned between the first and second layers of dielectric material. The dielectric materials can be formed in various shapes and assembled in various orientations with respect to each other. The tunable dielectric structure is used in various devices including a coaxial cables, cavity antenna, microstrip lines, coplanar lines, and waveguides.

19 Claims, 5 Drawing Sheets



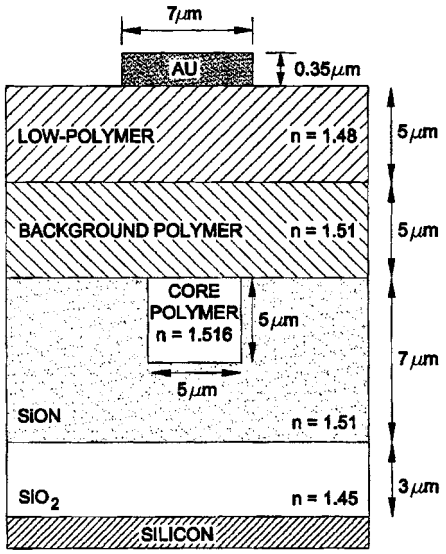
6,377,716 April 23, 2002

OPTICAL INTENSITY MODULATOR AND SWITCH COMPRISING THE SAME

Inventors: G. J. Veldhuis, P. V. Lambeck, M. Diemeer, and T. H. Hoekstra.
Assignee: JDS Uniphase Inc.
Filed: September 16, 1999.

***Abstract*—**An optical intensity modulator is disclosed which comprises a waveguide containing a core adjacent to at least one cladding layer and exhibits a refractive index n(core) different from the refractive index n(cl) or the cladding layer, where the waveguide is a bent channel waveguide and the intensity modulator contains a heater or cooler for altering the temperature at or near the bend. The core and the cladding layer exhibit different thermo-optic coefficients at the bend such that the contrast between n(core) and n(cl) can be changed by altering the temperature. The optical intensity modulator is more compact in size and more efficient with regard to energy consumption. The invention also pertains to thermo-optic switches and thermo-optic cascaded switches comprising the optical intensity modulator and to the use of the optical intensity modulator as a tunable attenuator.

20 Claims, 2 Drawing Sheets



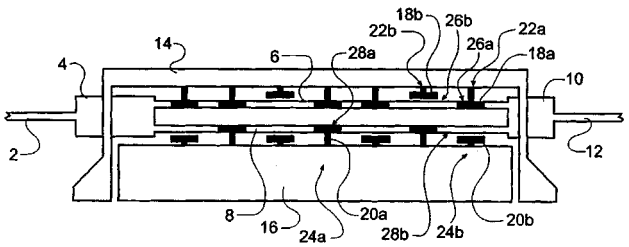
6,377,717 April 23, 2002

OPTICAL MODULATORS

Inventors: Eric Mark Kimber and Davide Frassati.
Assignee: Nortel Networks Limited.
Filed: October 4, 2000.

***Abstract*—**The optical modulator comprising an optical input signal waveguide, first and second interferometric waveguide arms, a modulated output signal waveguide, a splitter for dividing the input signal between the first and second arms, and a combiner for recombining the signals, transmitted along each of the first and second arms into the output signal waveguide. The first and second electrodes each of a segmented structure having a plurality of elements each extending from a respective one of the first and second electrodes and each terminating at position adjacent a length of corresponding one of the first and second arms wherein only a proportion of the elements terminate at positions such as to have an electro-optic effect on a signal transmitted through the corresponding one of the arms. Thus, only proportion of the elements are in active in the sense that only they induce a phase shift in the signal transmitted through the respective one of the arms.

9 Claims, 2 Drawing Sheets



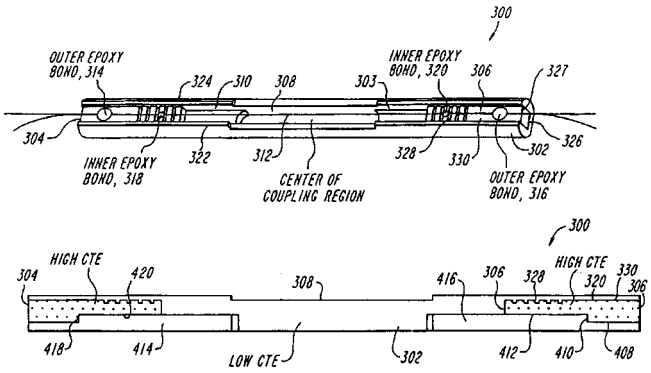
6,377,723 April 23, 2002

25 Claims, 3 Drawing Sheets

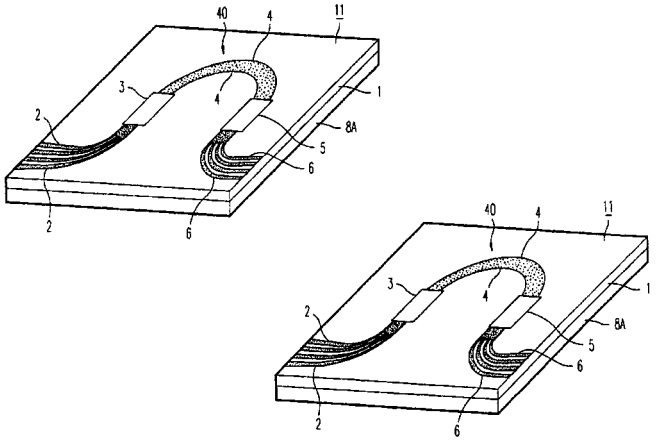
OPTICAL WAVEGUIDE CIRCUIT, AND METHOD FOR COMPENSATING THE LIGHT TRANSMISSION WAVELENGTH

Inventors: Tsunetoshi Saito and Toshihiko Ohta.
Assignee: The Furukawa Electric Co., Ltd.
Filed: September 13, 2000.

Abstract*—**A plate-shaped member (**8a*) whose linear expansion coefficient is larger than that of a substrate (**1**) is provided on the rear side of the substrate (**1**) of an arrayed waveguide diffraction grating (**11**) which divides, by a diffraction effect of an array waveguide (**40**), lights of a plurality of wavelengths from those having a plurality of wavelengths different from each other, which are inputted from an optical input waveguide (**2**), and outputs these lights from the respective optical output waveguides (**6**). A light transmission feature of the respective output lights includes a light transmission feature for causing lights to be transmitted, centering around the center wavelengths of light transmission, which are different from each other, wherein the center wavelengths of light transmission shifts to the long wavelength side by a temperature rise.



30 Claims, 19 Drawing Sheets



6,377,731 April 23, 2002

OPTICAL CROSS CONNECT UTILIZING GRATING-BASED CHANNEL ROUTERS

Inventors: Simon X. F. Cao and Olga Gorbounova.
Assignee: Avanex Corporation.
Filed: May 25, 2000.

***Abstract*—**The present invention provides an improved optical cross connect (OXC) which utilizes interleaved channel separators and grating-based channel separators. The OXC includes a plurality of de-multiplexing interleaved channel separators; a plurality of multiplexing interleaved channel separators; and a plurality of channel routers optically coupled between the plurality of de-multiplexing interleaved channel separators and the plurality of multiplexing interleaved channel separators, where each of the channel routers includes: a grating comprising an alignment surface, a first sleeve comprising a mount, the mount capable of contacting the grating, and an alignment plate coupled to an outer surface of the first sleeve, wherein the alignment plate is capable of contacting the alignment surface of the grating. This grating-based channel separator affords a quick, easy, precise and reproducible positioning and alignment of the grating block. Thus, the OXC is minimized in size while also reproducibly assembled with perfect alignment in a minimal amount of time.

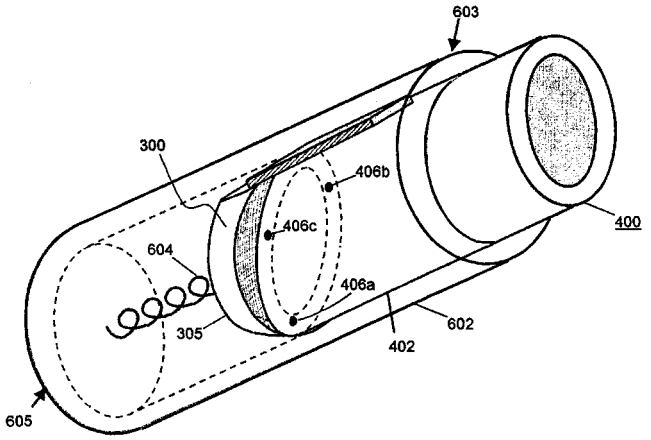
23 Claims, 16 Drawing Sheets

6,377,727 April 23, 2002

PASSIVE TEMPERATURE-COMPENSATING PACKAGE FOR FIBER BRAGG GRATING DEVICES

Inventors: Stavros Dariotis, Colm V. Cryan, Margaret Manty, and Adrian P. Pryshlack.
Assignee: Thomas & Betts International, Inc.
Filed: May 19, 2000.

***Abstract*—**A passive temperature compensating package for a fiber Bragg grating device in which the fiber Bragg grating is written to the fiber prior to the temperature compensation being set. As the temperature of the package increases the fiber is de-stressed and at the desired proper resonant frequency, the fiber containing the fiber Bragg grating is secured to the package. As the package cools and expands, the fiber is pre-stressed and maintains the desired resonant frequency.



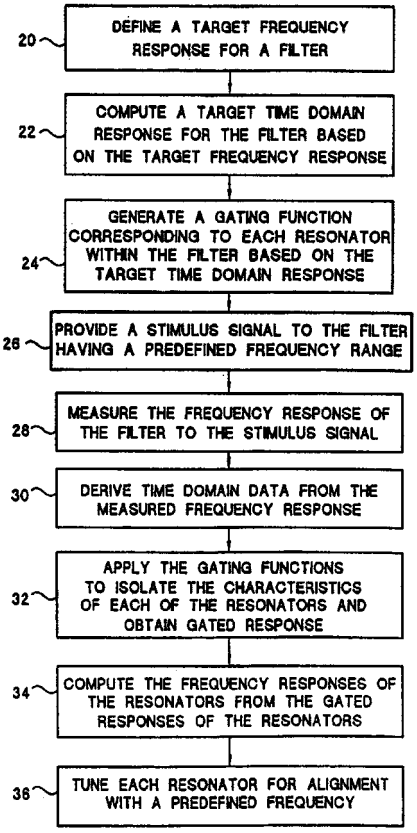
6,380,819 April 30, 2002

TUNING METHOD FOR FILTERS HAVING MULTIPLE COUPLED RESONATORS

Inventors: Joel P. Dunsmore and Thomas B. Fetter.
Assignee: Agilent Technologies, Inc.
Filed: September 10, 2001.

***Abstract*—**A tuning method for filters having multiple coupled resonators isolates the characteristics of each resonator, enabling a specified filter response to be achieved by adjusting the resonators according to response criteria. A target frequency response is defined for the filter and a target time domain response is computed based on the target frequency response. From the time domain response, a gating function is generated for each of the resonators. A stimulus signal is provided to the filter and the response to the stimulus signal is measured. The gating functions are then applied to isolate the characteristics of each resonator. Each resonator is adjusted according to response criteria chosen to achieve a specified filter response when the response criteria are satisfied.

7 Claims, 9 Drawing Sheets



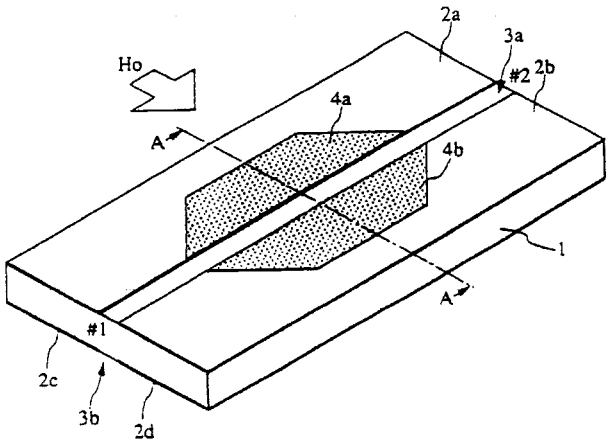
6,380,820 April 30, 2002

ISOLATOR UTILIZING A PLANAR DIELECTRIC TRANSMISSION LINE WITH A RESISTIVE FILM

Inventors: Koichi Sakamoto and Hiromu Tokudera.
Assignee: Murata Manufacturing Co., Ltd.
Filed: January 6, 2000.

***Abstract*—**A nonreciprocal circuit device includes conductive films that define a slot on the top of a magnetic member having ferrimagnetic characteristics. On the bottom of the magnetic member, other conductive films that define an opposing slot are formed. An external DC magnetic field is applied substantially parallel to the magnetic member and substantially perpendicular to the slots. Resistive films are formed alongside the slot on the top of the magnetic member. When a signal propagates in the direction from port #**2** to port #**1**, the electromagnetic field of a planar dielectric line mode is localized in the direction of the resistive films. Electrical power is consumed by the resistive films, so that the signal is prevented from propagating. When the signal propagates in the direction from port #**1** to port #**2**, no loss is caused by the resistive films. Therefore, the signal is transmitted with low loss.

10 Claims, 15 Drawing Sheets



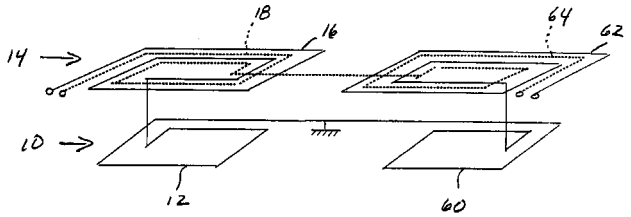
6,380,821 April 30, 2002

SUBSTRATE SHIELDED MULTILAYER BALUN TRANSFORMER

Inventors: James F. Imbornone, Jean-Marc Mourant, Daniel Shkap, and Tao Liang.
Assignee: International Business Machines Corporation.
Filed: August 24, 2000.

***Abstract*—**A balun transformer having two series connected transformers with each having a primary loop conductor disposed in a stacked configuration. One portion of each primary loop conductors is in a first layer and these two portions of the two primary loop conductors are connected in series. The second portions of the primary loop conductors are in a second layer that is spaced from the first layer with the secondary loop conductors interlaced with these portions of the primary loop conductors in the second layer.

5 Claims, 6 Drawing Sheets



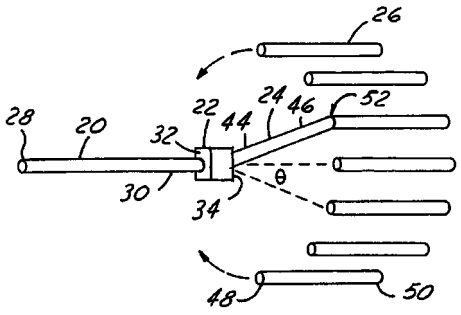
6,380,822 April 30, 2002

WAVEGUIDE SWITCH FOR ROUTING M-INPUTS TO M OF N-OUTPUTS

Inventor: Gary M. Lindgren.
Assignee: Hughes Electronics Corporation.
Filed: February 8, 2000.

***Abstract*—**A satellite signal routing system includes a satellite using one or more waveguide switches for routing M-inputs to M of N-outputs. A waveguide switch includes a first waveguide, used as a stationary input coupled to a rotary joint. A joint rotation device, such as a motor, rotates the rotary joint. A rotary waveguide is attached to the rotary joint and also rotates. Two or more second waveguides, used as stationary outputs, are coupled to the rotary waveguide through a noncontacting waveguide. A controller controls the joint rotation device to rotate the rotary joint to align the rotary waveguide with one of the second waveguides.

20 Claims, 1 Drawing Sheet



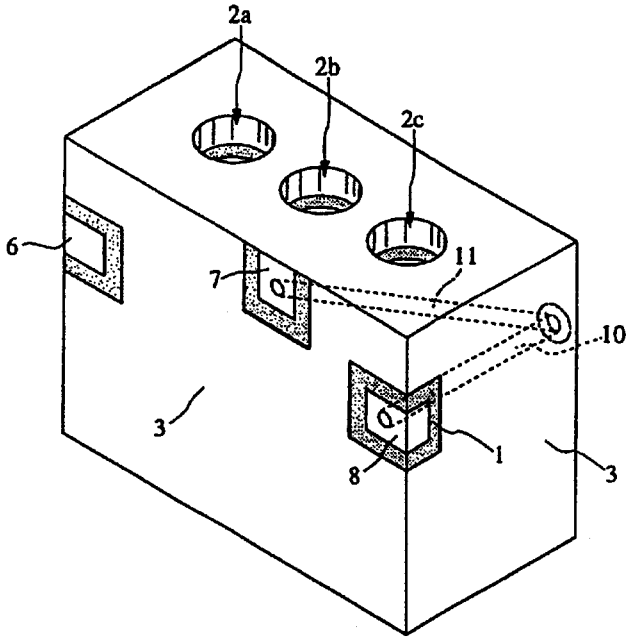
6,380,824 April 30, 2002

DIELECTRIC FILTER, COMPOSITE DIELECTRIC FILTER, DUPLEXER, AND COMMUNICATION APPARATUS

Inventors: Shohachi Nishijima, Motoharu Hiroshima, and Hideyuki Kato.
Assignee: Murata Manufacturing Co., Ltd.
Filed: September 13, 1999.

***Abstract*—**There is provided a dielectric filter comprising: a dielectric block; a plurality of resonance lines aligned substantially in parallel in the dielectric block; and a conductor line disposed in the dielectric block so as not to be parallel to the longitudinal direction of the resonance lines, the conductor line being served as a device having an inductance component which is connected to a circuit comprising the resonance lines.

16 Claims, 12 Drawing Sheets



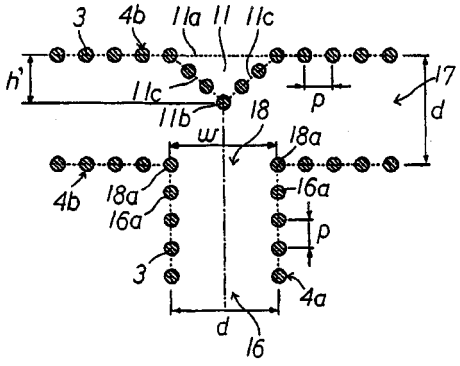
6,380,825 April 30, 2002

BRANCH TEE DIELECTRIC WAVEGUIDE LINE

Inventors: Takeshi Takenoshita and Hiroshi Uchimura.
Assignee: Kyocera Corporation.
Filed: February 3, 2000.

***Abstract*—**A high-frequency dielectric waveguide line comprising a dielectric substrate with two conductor layers on its two surfaces, and a plurality of rows of through conductors in the substrate connecting the two conductor layers. The distances between the through conductors in each row are no more than half of the wavelength of the signal transmitted in the transmission direction of the waveguide. The waveguide line has a branching portion where a first waveguide line having a width d branches into second and third parallel waveguide lines both of width d. The portion of the waveguide at the branching point has a width of A, where $2d \leqq A \leqq 3d$. The first, second and third waveguide lines are connected without abrupt width enlargement. The branching waveguide line have small transmission losses for high-frequency signals.

8 Claims, 21 Drawing Sheets



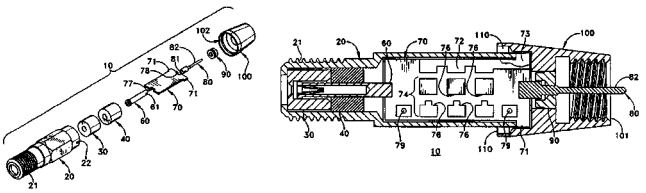
6,380,826 April 30, 2002

FILTER ASSEMBLY

Inventor: Raymond W. Palinkas.
Assignee: John Mezzalingua Associates, Inc.
Filed: March 20, 2000.

***Abstract*—**A filter assembly includes a printed circuit board having a filtering circuit and a ground plane. A body receives the printed circuit board. The printed circuit board has at least one tab, and the body has a respective slot for receiving each tab, aligning the printed circuit board with the body. The body is shaped so as to provide a first cable connector at one end. The ground plane of the printed circuit board is connected to an inner wall of the body by solder. A nut fits on an end of the body opposite the cable connector of the body. The nut provides a second cable connector at an end opposite the first cable connector. The nut is connected to the body by solder along a periphery of the nut to form a water tight seal. The solder joining the nut to the body is continuous with the solder connecting the ground plane to the body. A pair of terminals are electrically connected at opposite ends of the printed circuit board. Each of the terminals has a slot sized to receive a respective end of the printed circuit board and may form a friction fit between the printed circuit board and the terminals.

21 Claims, 4 Drawing Sheets



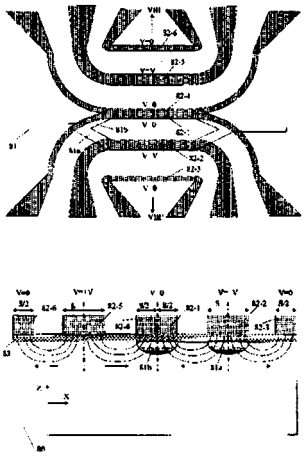
6,381,379 April 30, 2002

OPTICAL MODULATOR HAVING COPLANAR ELECTRODES FOR CONTROLLING CHIRP

Inventor: William K. Burns.
Assignee: Codeon Corporation.
Filed: February 10, 2000.

***Abstract*—**An optical modulator includes a substrate having an electrooptic effect, an optical waveguide having first and second cascading portions in the substrate, and transmitting an optical field, a first coplanar strip electrode having a first part over the first cascading portion and second and third parts extending beyond the first cascading portion, wherein the first part is approximately perpendicular to the second and third parts and has a width substantially the same as the first cascading portion, a second coplanar strip electrode having a first part over the second cascading portion and second and third parts to extend beyond the second cascading portion, and the first part being approximately perpendicular to the second and third parts, and a voltage source supplying a voltage to the first coplanar strip electrode, wherein the second coplanar strip electrode is grounded and is symmetrical to the first coplanar strip electrode.

12 Claims, 9 Drawing Sheets



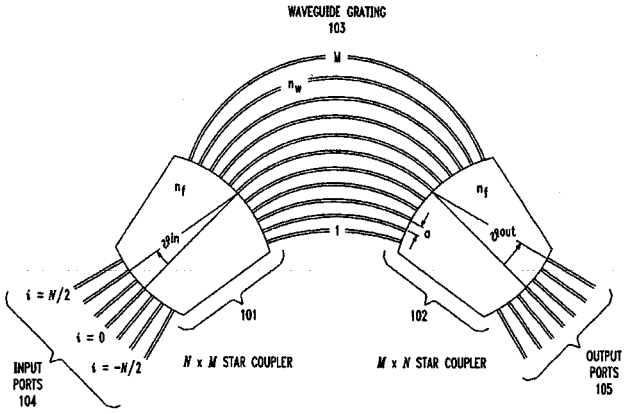
6,381,383 April 30, 2002

LARGE N × N WAVEGUIDE GRATING ROUTER

Inventors: Pietro Arturo Bernasconi, Christopher Richard Doerr, and Corrado Pietro Dragone.
Assignee: Agere Systems Guardian Corp.
Filed: April 24, 2000.

***Abstract*—**The limitation of N in an N×N Wavelength Grating Router (WGR) is determined to be because of the intrinsic diffraction characteristics of the grating that occurs when N approaches the diffraction order m at which the grating operates. The N in an N×N WGR device is maximized for input signal channels equally spaced either in frequency or in wavelength. For the wavelength case, N is increased by appropriate changes in the spacing of the output ports of the WGR and/or by slightly correcting the channels wavelengths.

8 Claims, 12 Drawing Sheets



6,381,388 April 30, 2002

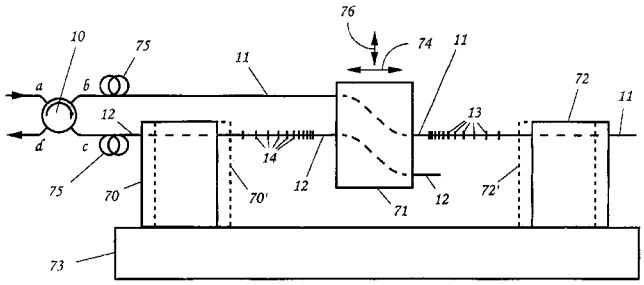
CHROMATIC DISPERSION COMPENSATION

Inventors: Richard Epworth and Julian A. Fells.
Assignee: Nortel Networks Limited.
Filed: September 1, 2000.

***Abstract*—**An optical waveguide provided with a linearly chirped Bragg reflective grating can be employed as a device that provides linear dispersion compensation. The amount of the linear dispersion thereby provided can be rendered

adjustable by adjustment of the magnitude of axial strain imposed upon the grating. If the chirp is purely linear, and if also, the strain is at all times uniform along the length of the grating, adjustment of the strain magnitude will have no such effect. This requires the presence of a quadratic chirp term, but such a term introduces its own transmission penalty. This penalty is compensated at least in part by causing the light to make a reflection in a second Bragg reflection grating identical with the first, but oriented to provide a quadratic component of chirp that has the opposite sign to that of the first Bragg reflection grating.

8 Claims, 7 Drawing Sheets



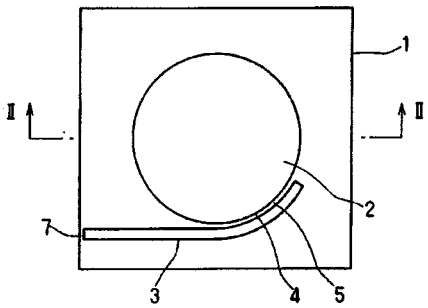
6,381,478 April 30, 2002

SUPERCONDUCTIVE HIGH-FREQUENCY CIRCUIT ELEMENT WITH SMOOTH CONTOUR

Inventors: Akira Enokihara and Kentaro Setsune.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: May 5, 1998.

***Abstract*—**A high-frequency circuit element that realizes a high degree of input–output coupling without causing an increase in loss and irregularity in impedance. A resonator made of a conductor film is formed on a substrate made of a dielectric monocrystal or the like. An input–output line made of a conductor film having a uniform line width is formed on the same surface of the substrate as the surface on which the resonator is formed. A part of the side edge of the input–output line is located along a coupling part on the peripheral part of the resonator and spaced from the resonator by a gap part.

8 Claims, 14 Drawing Sheets



RE37,680 April 30, 2002

DISPERSION SHIFTED OPTICAL WAVEGUIDE FIBER

Inventor: Venkata A. Bhagavatula.
Assignee: Corning Incorporated.
Filed: March 17, 1999.

***Abstract*—**A single mode optical waveguide fiber designed for high data rate, or WDM systems or systems incorporating optical amplifiers. The optical waveguide has a compound core having a central region and at least one annular region surrounding the central region. A distinguishing feature of the waveguide core is that the minimum refractive index of the central core region is less than the minimum index of the adjacent annular region. A relatively simple profile design has the characteristics of ease in manufacturing together with, flexibility in tailoring D_w to yield a preselected zero dispersion wavelength, dispersion magnitude over a target wavelength range, and dispersion slope. The simplicity of profile gives reduced polarization mode dispersion.

33 Claims, 3 Drawing Sheets