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.

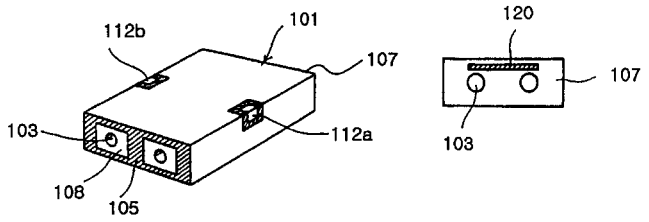
6,169,464 Jan. 2, 2001

Dielectric Filter

Inventors: Myoung Lib Moon and Jong Soo Ha.
Assignee: Samsung Electro-Mechanics Co., Ltd.
Filed: Dec. 11, 1998.

***Abstract*—**A dielectric filter is disclosed in which an open area without being spread with a conductive material is formed on the rear face of a dielectric block with a conductive material spread thereon, thereby making it possible to improve the filtering characteristics of the filter and to miniaturize the filter. That is, coupling capacitances and coupling inductances are formed between resonance holes of the rear face of the dielectric block. Further, conductor patterns are formed on the front face of the dielectric block so that coupling capacitances are formed between the resonance holes of the front face, and that loading capacitances are provided to the respective resonance holes.

30 Claims, 14 Drawing Sheets



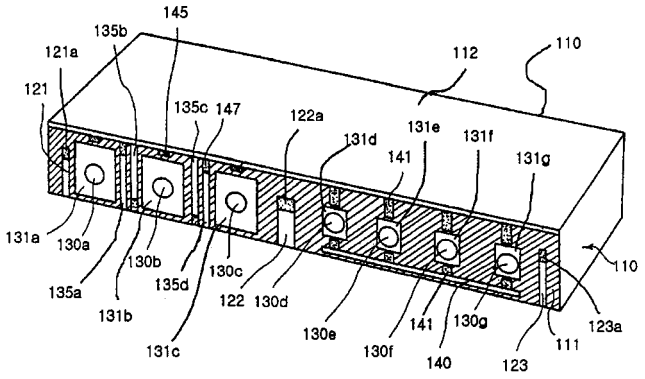
6,169,465 Jan. 2, 2001

Duplexer Dielectric Filter

Inventors: Chul Ho Kim, Jin Duk Kim, and Sang Jun Park.
Assignee: Samsung Electro-Mechanics Co., Ltd.
Filed: Dec. 16, 1998.

***Abstract*—**A duplexer dielectric filter comprises a dielectric block, a first filtering area including resonators having resonant holes disposed to pass through first and second surfaces of the dielectric block in a substantially parallel manner, a second filtering area including resonators having resonant holes disposed to pass through the first and second surfaces of the dielectric block in a parallel manner; first conductive pattern formed on the surroundings of the resonant holes of the first surface, thus to be connected with the conductive material covered with the interior of the resonant holes and for applying a loading capacitance to the resonators and an electromagnetic coupling between adjacent resonators, a second conductive pattern disposed on the first surface of the first filtering area along the arrangement direction of the resonant hole and for forming the electromagnetic coupling between the adjacent resonators, third conductive pattern disposed on the first surface of the first filtering area for forming the electromagnetic coupling between the adjacent resonators, and fourth conductive pattern disposed on the first surface for adjusting resonant frequencies of the resonators.

21 Claims, 5 Drawing Sheets



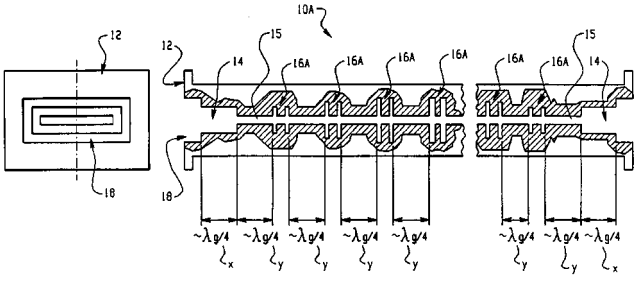
6,169,466 Jan. 2, 2001

Corrugated Waveguide Filter Having Coupled Resonator Cavities

Inventor: Rousslan Goulouev.
Assignee: COM DEV Limited.
Filed: May 10, 1999.

***Abstract*—**A corrugated waveguide filter has a plurality of coupled resonator cavities arranged in a horizontal or vertical manner. The filter may include an input transformer section and an output transformer section for matching the filter to external waveguide lines. Each resonator includes at least two extracted slots (or cavities) that are grouped in close proximity to each other, and which may be symmetrically or asymmetrically implemented in the waveguide. The resonators each contribute one reflection zero and two transmission zeros to the frequency response of the filter, the reflection zero being located within the pass-band of the filter, and the two transmission zeros located either at the high-side or low-side of the pass-band depending upon whether the resonator is a low-pass type or a high-pass type. The dimensions of each resonator, including the depth of the slots and the distance between the slots, determines the position of the reflection zero and whether the resonator is low-pass or high-pass.

31 Claims, 14 Drawing Sheets



Publisher Item Identifier S 1531-1309(01)06649-1.

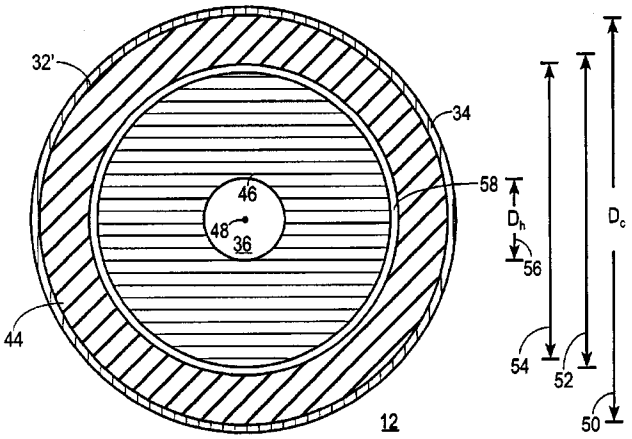
6,169,467 Jan. 2, 2001

Dielectric Resonator Comprising a Dielectric Resonator Disk Having a Hole

Inventor: El-Badawy Amien El-Sharawy.
Filed: Dec. 18, 1998.

***Abstract*—**A $TE_{0\gamma\delta}$ mode dielectric resonator (**12**) includes a cylindrical dielectric disk (**32**, **32′**, **32″**) having top and bottom ends (**20**, **22**) spaced apart by a closed curve wall (**24**). The dielectric disk has an effective dielectric constant greater than 40. An axially aligned hole (**36**) is formed through the disk (**32**) between the top and bottom ends (**20**, **22**). A conductive wall (**34**, **34″**) is formed at or slightly beyond the wall (**24**) but does not cover the top and bottom ends (**20**, **22**). The hole (**36**) has a preferred diameter between 0.21 and 0.4 times the diameter of the disk (**32**, **32′**, **32″**). The disk may be configured as a heterogeneous composite of dissimilar materials which exhibit increasing dielectric constant at increasing radial distance and increasing Q at decreasing radial distance.

21 Claims, 5 Drawing Sheets



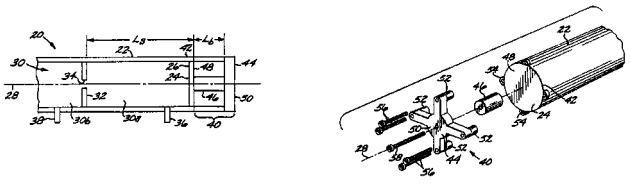
6,169,468 Jan. 2, 2001

Closed Microwave Device with Externally Mounted Thermal Expansion Compensation Element

Inventor: John T. Chavez.
Assignee: Hughes Electronics Corporation.
Filed: Jan. 19, 1999.

***Abstract*—**The thermal expansion of a microwave device such as a microwave resonator is partially or completely compensated by an externally mounted thermal expansion element. The microwave device includes a sidewall and an endwall affixed at its periphery to the sidewall. The thermal expansion compensation element is disposed external to the microwave device, between the endwall of the microwave device and a rigid external support. As the sidewall lengthens with increasing temperature, the thermal expansion compensation element expands to flex the endwall in the opposite direction to the growth in length of the sidewall, so that the central portion of the endwall remains in approximately the same position regardless of the temperature change.

18 Claims, 1 Drawing Sheet



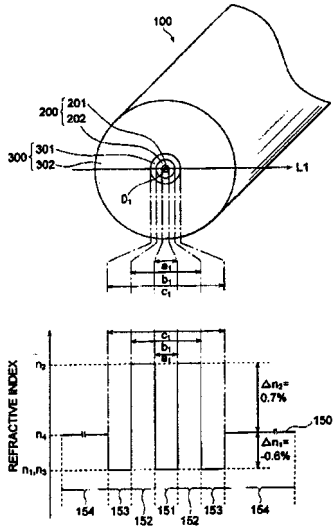
6,169,837 Jan. 2, 2001

Dispersion-Flattened Optical Fiber

Inventors: Takatoshi Kato, Hitoshi Hatayama, Eisuke Sasaoka, and Masayuki Nishimura.
Assignee: Sumitomo Electric Industries, Ltd.
Filed: Jul. 29, 1998.

***Abstract*—**The present invention aims at providing a dispersion-flattened optical fiber which is suitable for wavelength-division multiplexing soliton transmission utilizing an optical amplifier and the like and has a structure for effectively restraining nonlinear optical phenomena from occurring. The dispersion-flattened optical fiber according to the present invention has, as characteristics at a wavelength of 1550 nm, a dispersion with an absolute value of 5 ps/nm/km or less, an effective cross-sectional area of $45\mu n^2$ or more, a dispersion slope of 0.03 ps/nm^2/km or less, and a cutoff wavelength of 1.0 μm or more at a length of 2 m.

20 Claims, 16 Drawing Sheets



6,170,154 Jan. 9, 2001

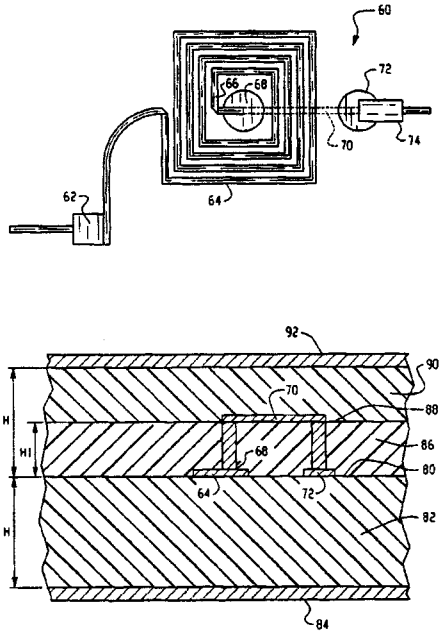
Printed Lumped Element Stripline Circuit Structure and Method

Inventor: Arvind Swarup.
Assignee: COM DEV Limited.
Filed: Apr. 2, 1999.

***Abstract*—**A novel circuit packaging structure including a combination of printed lumped elements within a multi-layer stripline architecture is provided and methods of making the same. The lumped elements are provided by printing the individual passive elements, including interdigital capacitors and spiral inductors, onto the supporting substrate and then embedding these elements into the multi-layer stripline structure. The stripline structure consists of a signal

layer sandwiched between at least two ground layers separated by two dielectric substrates of equal thickness. This ground–signal–ground approach confines the electromagnetic fields within the multi-layer structure, thereby minimizing radiation from coupling to nearby components. This approach offers a unique combination of stripline technology and printed lumped elements resulting in miniaturized radio frequency and microwave circuits at operating at frequencies well below 1 GHz, up to several GHz.

30 Claims, 9 Drawing Sheets



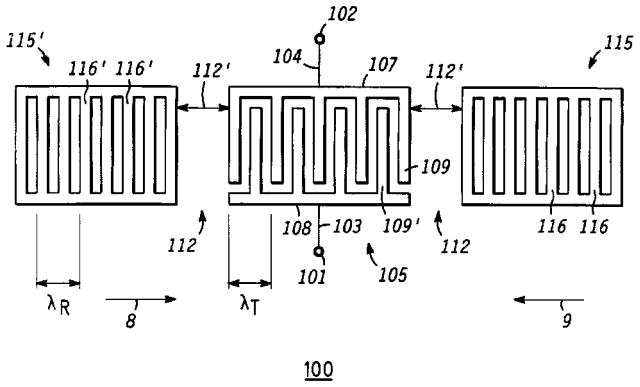
6,172,582 Jan. 9, 2001

Saw Resonator and Ladder Filter with Specified Number of Reflector Electrode Fingers

Inventor: Thomas Slocum Hickernell.
Assignee: CTS Corporation.
Filed: Feb. 20, 1996.

***Abstract*—**A method and apparatus for a ladder filter (**400**) incorporating same. The filter (**400**) includes a substrate and a first series resonator (**100**, **403**) disposed on the substrate and electrically coupled in series between the first electrical port (**401**) and a first node. The first series resonator (**100**, **403**) includes a first series acoustic reflector (**115**), a first series gap (**112**), a first series transducer (**105**, **403**), a second series gap (**112**) and a second series acoustic reflector (**115′**) collectively disposed in an in-line configuration along a principal axis of the substrate. The filter (**400**) also includes a first shunt resonator (**100**, **404**) disposed on the substrate and electrically coupled in shunt between the first node and ground. The first shunt transducer (**105**, **404**) and the first series transducer (**105**, **403**), if reflectors (**115**, **115′**) are included, have an optimized number of reflective elements (**116**, **116′**) included therein.

4 Claims, 4 Drawing Sheets



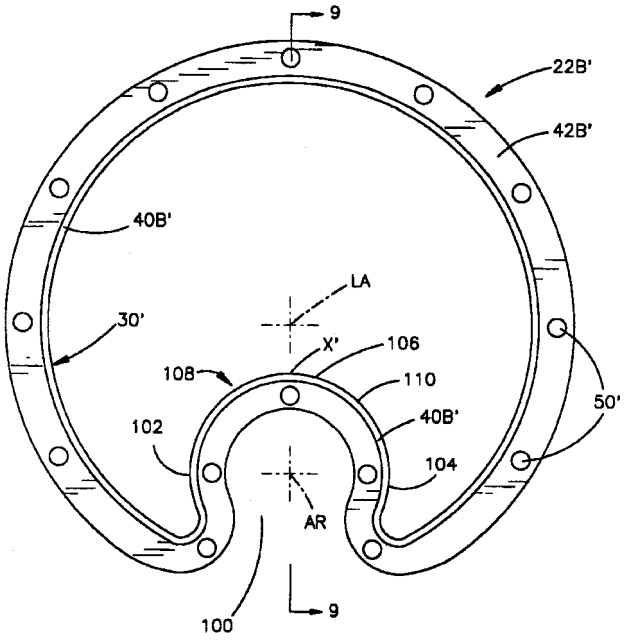
6,172,583 Jan. 9, 2001

Waveguide System Having a Trough and with Inward Extending Flanges

Inventors: Rex Leonard Niekamp and Spencer J. Smith.
Filed: Apr. 3, 1998.

***Abstract*—**A waveguide system that includes a plurality of waveguide sections, each taking the form of an elongated longitudinally extending tubular member having a substantially circular shaped wall in cross section which coaxially surrounds a longitudinal axis. The wall has a longitudinally extending trough portion extending radially inward toward the longitudinal axis. The trough portion is defined by a pair of circumferentially spaced wall portions extending inwardly and joined together by a connecting wall portion. The wall portions together define a ridge having an inner surface on the interior side of the wall and an outer surface on the exterior side of the wall. Each waveguide section has opposing ends with each end having a longitudinally extending peripheral lip at the ridge. The wall has at each said end an annular mounting flange extending essentially radially outward from the exterior side of the wall. A plurality of spaced apart fastening means interconnect the annular mounting flanges of adjoining waveguide sections together in such a manner that at least one of interconnecting means is located in trough portion.

17 Claims, 6 Drawing Sheets



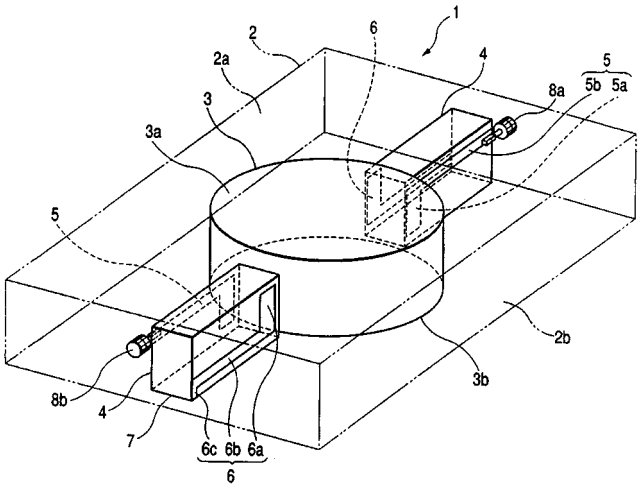
6,175,286 Jan. 16, 2001

Dielectric Resonator and Dielectric Filter Using the Same

Inventor: Moriaki Ueno.
Assignee: Alps Electric Co., Ltd.
Filed: Apr. 6, 1999.

***Abstract*—**A dielectric resonator which is not easily influenced by vibration and can stably obtain excellent performance is disclosed. A dielectric resonator comprises an exciting means in which a pillar-shaped dielectric block housed in a conductive casing in a state where the block is electrically connected to the casing and which produces a magnetic field on the plane perpendicularly crossing the axial direction of the dielectric block through which a current is passed, wherein the exciting means is comprised of a supporting member fixed to the casing and electrode patterns each of which is connected to an input terminal or an output terminal and is formed on the supporting member.

5 Claims, 8 Drawing Sheets



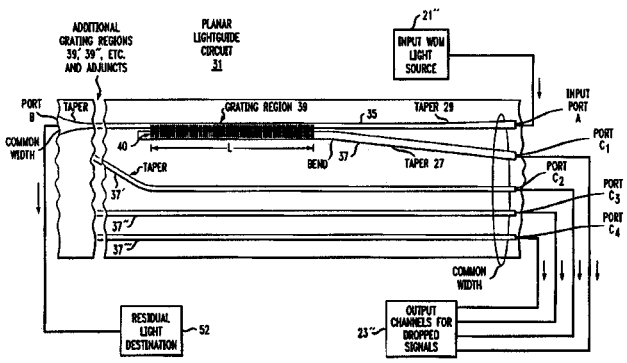
6,175,670 Jan. 16, 2001

Planar Lightguide Circuit Having a Planar Grating

Inventor: Ernest Eisenhardt Bergmann.
Assignee: Lucent Technologies, Inc.
Filed: Mar. 23, 1998.

***Abstract*—**A planar lightguide circuit having a grating coupler to backward couple a elected wavelength from among a plurality of optical signals. A cascaded arrangement of such couplers provides multiplexing or demultiplexing. In its simplest form, a planar lightguide circuit has in close proximity on a substrate first and second planar lightguides having differing effective indices of refraction in a first region. Preferably, the lightguide having the higher effective index of refraction parallels in dose proximity in the first region the lightguide having the lower effective index of refraction, the latter propagating a plurality of multiplexed signals. Typically, this relationship of effective indices of refraction is provided by differences in widths of the lightguides rather than by differences in material composition or differences in layer thicknesses. Optionally, all inputs and outputs have appearances at a common edge of the substrate. Preferably, the lightguide having the higher effective index of refraction bends toward a second region of larger separation. In the second region, at least one of the lightguides tapers toward a nominal guide width. A first planar grating in coupling proximity to said first and second planar lightguides in the first region backward couples a first signal of a selected wavelength from one of said first and second lightguides to the other of said first and second lightguides. The coupling will work in either direction to provide either demultiplexing or multiplexing of optical signals of differing wavelengths. A multiplicity of lightguides like the second lightguide will provide dense demultiplexing or multiplexing of the differing wavelengths.

12 Claims, 6 Drawing Sheets



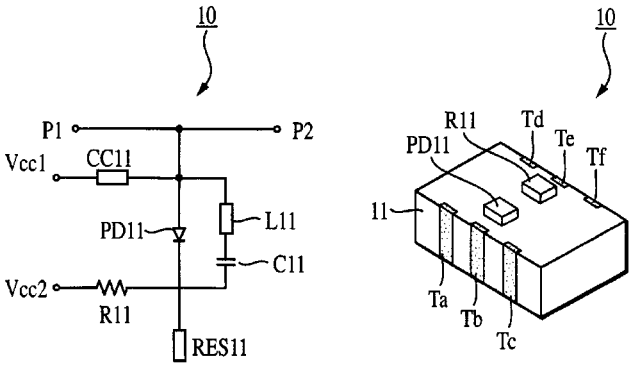
6,177,850 Jan. 23, 2001

Two Frequency Filter Comprising an Inductance Device, a Resonator, and a Switching Device

Inventors: Koji Furutani, Norio Nakajima, and Ken Tonegawa.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Jan. 13, 1999.

***Abstract*—**The invention provides a filter, comprising: at least one inductance device, at least one resonator, and at least one switching device. The inductance device may be connected in parallel with said switching device, and the resonator may be connected in series with the switching device. The above filter is small in size that is capable of functioning for high-frequency signals of plural frequency bands which are relatively adjacent to each other.

4 Claims, 7 Drawing Sheets



6,177,852 Jan. 23, 2001

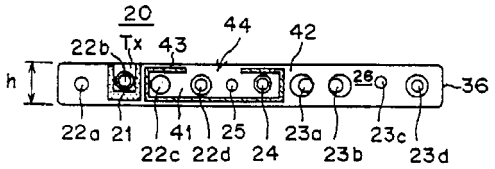
Dielectric Filter, Dielectric Duplexer, and Transceiver

Inventors: Hitoshi Tada and Hideyuki Kato.
Assignee: Murata Manufacturing Co., Ltd.
Filed: May 20, 1999.

***Abstract*—**The present invention provides a dielectric filter and a dielectric duplexer, each including a plurality of dielectric resonators. The dielectric filter and the dielectric duplexer each comprising: a dielectric block having a first surface and a second end surface opposite to each other; at least three resonator holes passing through the first end surface to the second end surface of the dielectric block; inner conductors disposed on the inner wall surfaces of the resonator holes; an outer conductor disposed on the external surface of the dielectric block; the outer conductor on the first end surface of the dielectric block

being separated into an inner part and a peripheral part by a nonconductive portion; the inner part including the openings of at least three of the resonator holes adjacent to each other; a peripheral part being arranged around the inner part; and the inner part and the peripheral part being connected by a microinductance-generating means.

16 Claims, 7 Drawing Sheets



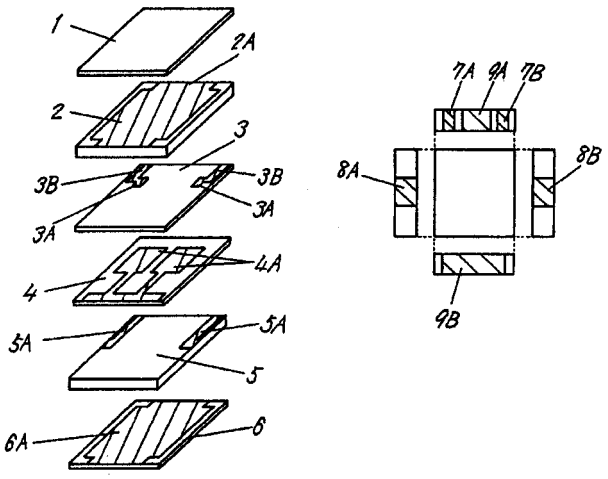
6,177,853 Jan. 23, 2001

Multilayer Filter with Electrode Patterns Connected on Different Side Surfaces to Side Electrodes and Input/Output Electrodes

Inventors: Yoshitaka Nagatomi, Naoki Yuda, Toshio Ishizaki, Shoichi Kitazawa, and Toru Yamada.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Dec. 26, 1997.

***Abstract*—**A small multilayer filter, in which a phase shifter may be constituted without increasing overall size of the filter. The overall size may be reduced without deteriorating the characteristics. Above the open end of a plurality of strip lines **4**A provided on a dielectric layer **4**, a coupling sector **3**A of input/output pattern is placed to face it with a dielectric layer **3** interposed. An inductance L**1**, L**2** is formed by connecting a side electrode **7**A, **7**B with a continuity sector **3**B of input/output pattern; and said side electrode **7**A, **7**B with an input electrode **8**A, output electrode **8**B, respectively, by means of an electrode pattern **5**A.

4 Claims, 12 Drawing Sheets



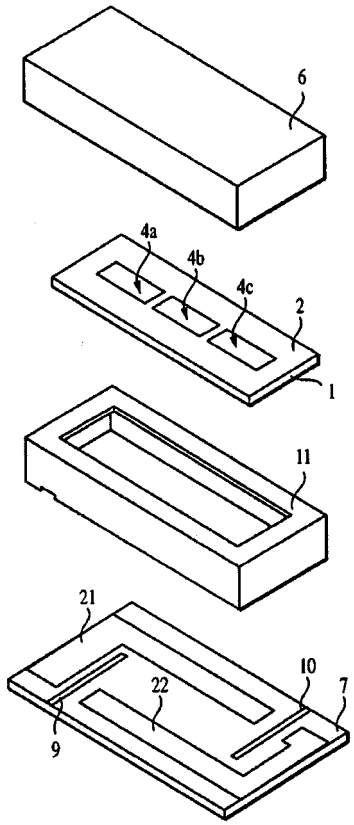
6,177,854 Jan. 23, 2001

Dielectric Resonator Device

Inventors: Shigeyuki Mikami, Toshiro Hiratsuka, and Tomiya Sonoda.
Assignee: Murata Manufacturing Co., Ltd.
Filed: Apr. 1, 1999.

***Abstract*—**A dielectric resonator device having characteristics of a plane circuit type dielectric resonator device applicable to miniaturization. Non-loading QD of a resonator is increased so as to decrease insertion loss in the case of forming a band pass filter, or the like. Changes in filter characteristics with respect to changes in structural dimensions of the length of the resonator, the gap between the resonators, or the like, are reduced. There is an increase in the freedom in adjustment of resonant frequency to enhance production efficiency. In this arrangement, on each main surface of a dielectric plate is disposed an electrode having mutually opposing openings, which serve as a rectangular-slot mode dielectric resonator; in which the length of the resonator is longer than a half-wave length at the resonant frequency being used so as to resonate in a higher mode.

8 Claims, 13 Drawing Sheets



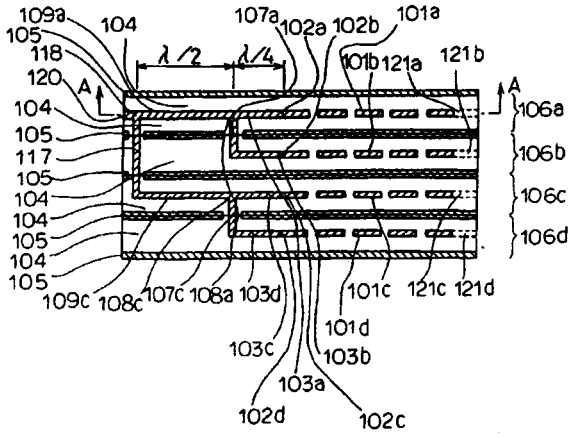
6,178,339 Jan. 23, 2001

Wireless Communication Filter Operating at Low Temperature

Inventors: Masahiro Sakai, Hidetaka Higashino, and Kentaro Setsune.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: Apr. 8, 1996.

***Abstract*—**A high power filter apparatus which is used in a mobile communication base station or the like is provided wherein the temperature stability and frequency selection are excellent, an insertion loss is small, the size is small, power consumption is low and costs are low. A shield case block comprises signal input and output portions, and a plurality of closed spaces which house a filter element connected between the signal input and output portions. A cooling plate is provide in a heat insulating container which houses the shield case block. The shield case block is fixed to the cooling plate in the thermal contact state. Each filter element is place almost in parallel. A cylindrical hole having an axis which is almost parallel with the face of the filter element penetrates the shield case block. A ground rod made of a conductor which changes the volume of the closed space is provided on the inner end portion of a movable member which moves in the axial direction of the cylindrical hole.

12 Claims, 13 Drawing Sheets



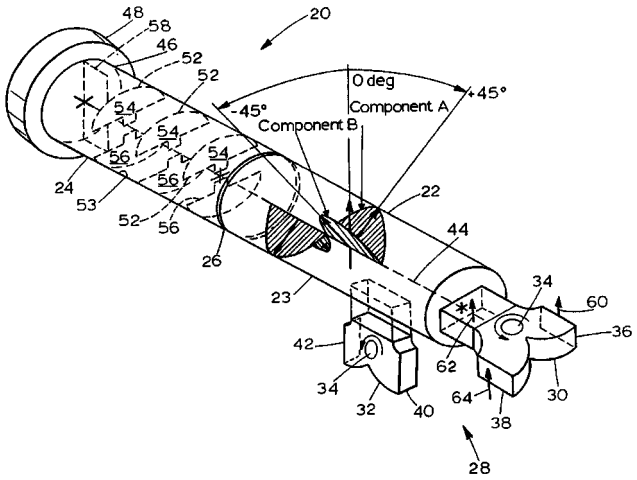
6,181,221 Jan. 30, 2001

Reflective Waveguide Variable Power Divider/Combiner

Inventors: Rolf Kich and James M. Barker.
Assignee: Hughes Electronics Corporation.
Filed: Oct. 6, 1998.

***Abstract*—**A reflective waveguide variable power divider/combiner comprises an orthomode tee section, which includes a section of cylindrical waveguide and a rotatable reflective phase shifter section. The rotatable reflective phase shifter section is rotatably connected to the orthomode tee section by a cylindrical choke joint. The orthomode tee section includes a single orthomode tee unit. The reflective waveguide variable power divider/combiner terminates at a short circuit that separates a motor from the rotatable reflective phase shifter section. The motor is configured to rotate the rotatable reflective phase shifter section relative to the orthomode tee section.

25 Claims, 3 Drawing Sheets



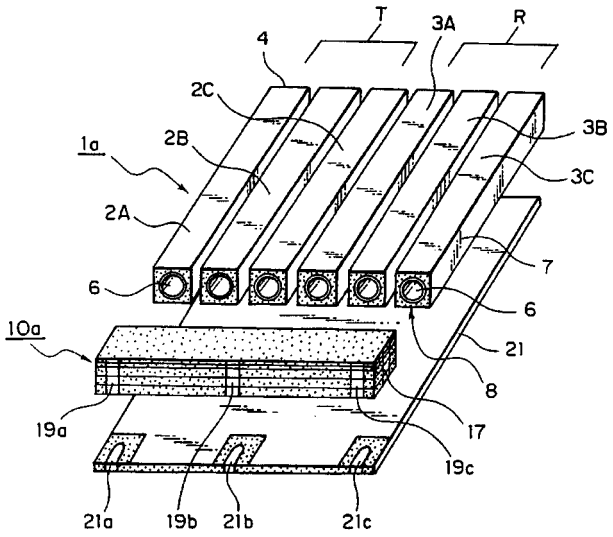
6,181,223 Jan. 30, 2001

Dielectric Duplexer Device

Inventor: Kenji Ito.
Assignee: NGK Spark Plug Co., Ltd.
Filed: Dec. 29, 1998.

Abstract*—**A dielectric duplexer device comprises a dielectric duplexer including a plurality of resonators arranged in parallel along a same direction, and a coupling circuit coupled to related ones of the resonators, and is adapted to show a surface area appropriately selected for each of capacitor electrodes, other electrodes and components to be formed on a laminated dielectric body, wherein the coupling circuit is arranged on the laminated dielectric body (**10a*; **10***b*; **10***c*) which comprises a plurality of dielectric sheet members (**10***a* through **11***e*) and is bonded to an open-circuit end surface of the dielectric duplexer (**1***a*; **1***b*; **1***c*) at a rear layered side portion to produce an intended transmission/reception circuit.

9 Claims, 8 Drawing Sheets



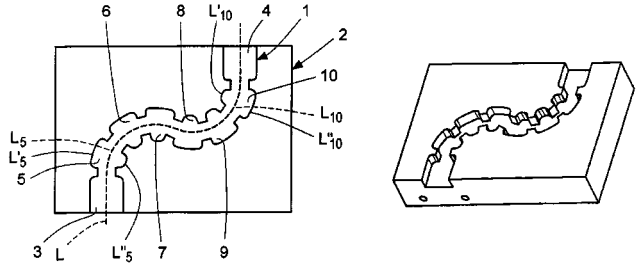
6,181,224 Jan. 30, 2001

Waveguide Filter with a Resonator Cavity Having Inner and Outer Edges of Different Lengths

Inventor: Per Olof Glinder.
Assignee: Telefonaktiebolaget LM Ericsson.
Filed: Nov. 20, 1998.

***Abstract*—**A waveguide filter includes one or more resonator cavities which extend between an input to the filter and an output from the filter. Each resonator cavity in the filter has a center line with a chosen extension and a mechanical length. The mechanical length of the center line of each resonator cavity forms one of the parameters that determine the electrical length of the resonator cavity. The filter forms part of a microwave unit. At least one of the resonator cavities of the filter has a curved extension with respect to its center line.

21 Claims, 5 Drawing Sheets



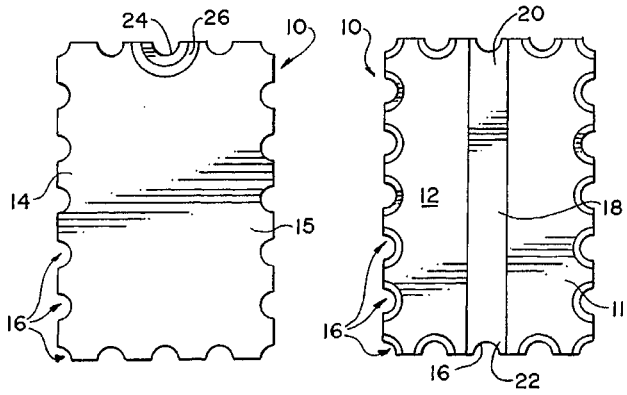
6,181,225 Jan. 30, 2001

Laser Tunable Thick Film Microwave Resonator for Printed Circuit Boards

Inventor: Allen W. Bettner.
Assignee: Itron, Inc.
Filed: Feb. 17, 1999.

***Abstract*—**The resonator of the present invention is preferably made of low cost alumina offering performance in a variable frequency oscillator application that is nearly equivalent to that of a high Q dielectric design. The resonator structure is tunable over a wide range with substantially no effect on oscillator phase noise or signal amplitude. The resonator utilizes a unique geometric structure which employs a transmission line preferably on alumina, conducting via holes (called castellations) and a topside ground pattern formed with a thick film of silver and/or palladium. A plurality of resonators may be formed by a step and repeat pattern then snapped apart for low cost, high volume manufacture. The resonator may be tuned in both a vertical and horizontal direction by removing topside metal from the resonator, to raise and lower the frequency, until the desired frequency is met. Low phase noise is preferably achieved by using a slab resonator that is short in length in combination with a fairly large loading capacitor. This provides maximum phase change versus frequency, and the best phase noise response of the oscillator.

31 Claims, 11 Drawing Sheets



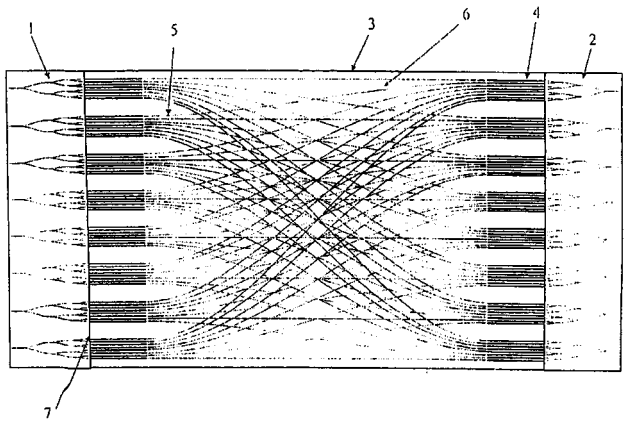
6,181,845 Jan. 30, 2001

Optical Switch Matrix

Inventors: Winfried H. G. Horsthuis and Peter M. C. De Dobbelaere.
Assignee: JDS Uniphase Photonics C.V.
Filed: Jun. 3, 1997.

***Abstract*—**The invention pertains to an optical switch matrix comprising n input channels, branching means for dividing the input channels up into p branched channels, merging means for merging the p branched channels into m output channels, and optical fibers for connecting the output channels of the branching means with the input channels of the merging means, wherein n, m, and p are natural numbers greater than or equal to 2, and wherein the branching means, the fibers, and the merging means are each attached to a separate substrate or a separate group of substrates. The optical switching matrix according to the invention is very compact and allows efficient use of the materials available for the manufacture thereof.

21 Claims, 1 Drawing Sheet



6,181,848 Jan. 30, 2001

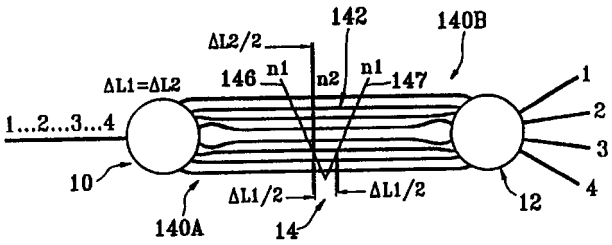
Temperature-Independent Optical Multiplexer and/or Demultiplexer

Inventors: Adrien Bruno and Arnaud Rigny.
Assignee: France Telecom.
Filed: Dec. 22, 1997.

***Abstract*—**The present invention concerns a device forming an optical multiplexer and/or demultiplexer of the type including two plane optical surfaces separated by an array of waveguides having controlled differences in length,

wherein each waveguide comprises at least two spans placed in series and having respective lengths and refractive indices that are suitable for controlling the influence of temperature variations on the device.

10 Claims, 4 Drawing Sheets



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Temperature-Compensated Optical Fiber Package

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***Abstract*—**The invention provides a package which varies the tension within a fiber Bragg grating (or other fiber-based optical device) by resilient deflection of a fiber support member through differential thermal expansion, thereby allowing the temperature/tension characteristics of the package to be tailored so as to provide the desired optical characteristics throughout a wide temperature range. The fiber tension/temperature correlation may be tailored using the linear coefficient of expansion of two different materials, by varying the resilient flexibility of a beam supporting the fiber, by varying a length of an arm extending from the beam to the fiber, by varying the resilient strength of the arm, and the like. By relying on the resilient deformation of a flexible fiber support structure, the present invention provides a large number of degrees of freedom within the package design parameters. Where such precise control over the temperature/tension correlation is not required, the invention provides alternative compensation packages which can be mass-produced easily.

13 Claims, 6 Drawing Sheets