

Patent Abstracts

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6,184,758

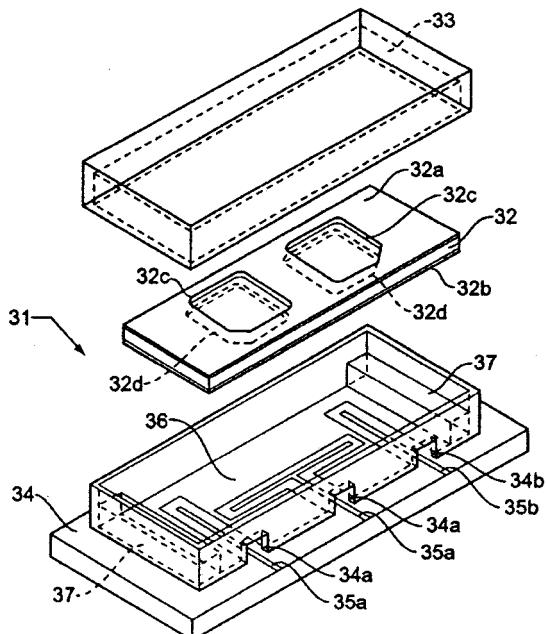
February 6, 2001

Dielectric Resonator Formed by Polygonal Openings in a Dielectric Substrate, and a Filter, Duplexer, and Communication Apparatus Using Same

Inventors: Yohei Ishikawa, Toshiro Hiratsuka, Tomiya Sonoda, Shigeyuki Mikami, Yutaka Ida, and Kiyoshi Kanagawa.
 Assignee: Murata Manufacturing Co., Ltd.
 Filed: Mar. 5, 1998.

Abstract—Proposed are a resonator which can easily establish coupling with input/output means, an external circuit, etc., and a filter, duplexer and communication apparatus each having a wide-band frequency characteristic. Electrodes having polygonal openings defined therein are formed in both principal planes of a dielectric substrate such that the openings are positioned to face each other. The dielectric substrate is arranged with the aid of spacers between a metal-made upper conductor case and a lower conductor case having a shield conductor formed therein, the upper and lower conductor cases being positioned to face each other with gaps left relative to the dielectric substrate. Portions of the dielectric substrate between pairs of the openings facing to each other serve as resonance areas and are coupled respectively with input/output electrodes.

27 Claims, 6 Drawing Sheets



6,184,759

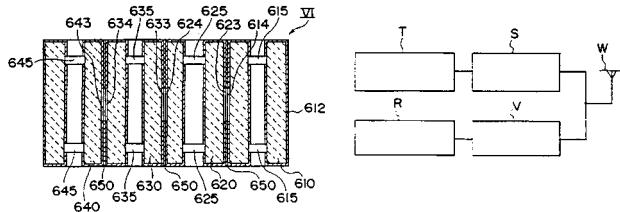
February 6, 2001

Dielectric Filter Having Inductive Coupling Windows Between Resonators, and Transceiver Using the Dielectric Filter

Inventor: Tadahiro Yorita.
 Assignee: Murata Manufacturing Co., Ltd.
 Filed: Feb. 14, 2000.

Abstract—A dielectric filter includes a first dielectric block having a through bore, substantially all of the surface area of the first dielectric block being covered with a conductive film to define a first dielectric resonator whose magnetic energy varies in the direction of an axis of the through bore. A first coupling window is formed in the conductive film on a first side surface for coupling an input signal applied thereto to the first dielectric resonator. A second coupling window is formed on a second side surface in a location wherein the magnetic energy in the first dielectric block is relatively high so that magnetic energy exits the first dielectric block via the second coupling window. A second dielectric block has a through bore and substantially all of the surface area of the second dielectric block is covered with a conductive film to define a second dielectric resonator. A third coupling window is formed on a first side surface of the second dielectric block at a location corresponding to the second coupling window such that magnetic energy leaving the first dielectric block via the second coupling window enters the second dielectric block via the third coupling window and sets up a magnetic field in the second dielectric block whose magnetic energy varies in the direction of the through bore of the second dielectric block. A fourth coupling window is formed on a second surface of the second dielectric block at a location where the resonant magnetic energy in the second dielectric block is relatively high such that magnetic energy leaves the second dielectric block via the fourth coupling window.

3 Claims, 23 Drawing Sheets



6,184,760

February 6, 2001

Half-Wavelength Resonator Type High Frequency Filter

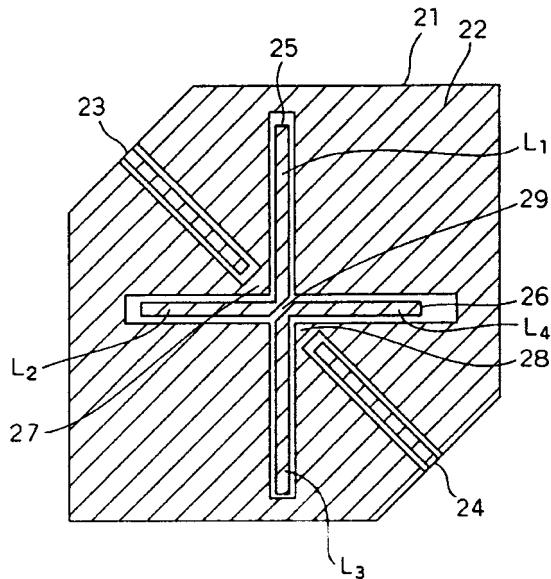
Inventors: Kouji Wada, Ikuo Awai, and Toshio Ishizaki.
 Assignee: Matsushita Electric Industrial Co., Ltd.
 Filed: May 24, 1999.

Abstract—A half-wavelength resonator type high frequency filter has N half-wavelength resonators (where N is an integer not smaller than 2); an input terminal; an output terminal; first matching part for matching the first of the resonators to the input terminal; second matching part for matching the N th of the resonators to the output terminal; and $(N-1)$ interstage coupling part for coupling the resonators with one another, and wherein excitation positions of the first of the resonators and the N th of the resonators are displaced from the center positions of the respective resonators toward an end thereof, and at least one of the interstage coupling part is electrically connected to its associated resonators at positions other than both ends thereof.

7 Claims, 6 Drawing Sheets

6,185,441

February 6, 2001



6,185,354

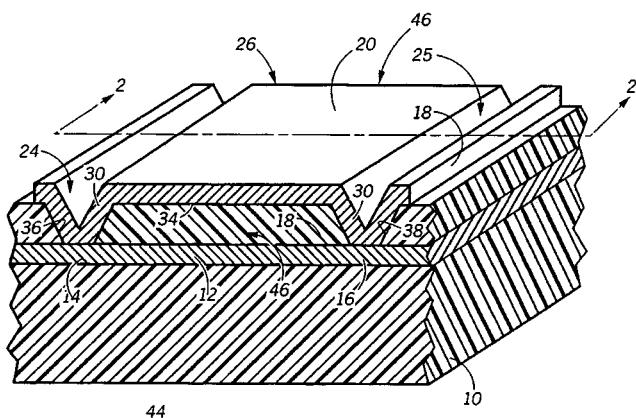
February 6, 2001

Printed Circuit Board Having Integral Waveguide

Inventors: Jason Andrew Kronz and Roger J. Forse.
 Assignee: Motorola, Inc.
 Filed: May 15, 1998.

Abstract—A printed circuit board comprises a metallic layer (12) cooperating with a metallic plate (26) to form a generally polygonal cross-section (48) of an integral waveguide (46) filled with a solid dielectric layer. The metallic layer (12) is on a substrate (10). The metallic layer (12) has a first strip (14) and a second strip (16) spaced apart from the first strip (14). A solid dielectric layer (18) overlies the metallic layer (12). The solid dielectric layer (18) has a first channel (36) exposing the first strip (14), a second channel (38) exposing the second strip (16), and a land (34) disposed between the first channel (36) and the second channel (38). A metallic plate (26) overlies the land (34), extends through the first channel (36) to the first strip (14), and extends through the second channel (38) to the second strip (16).

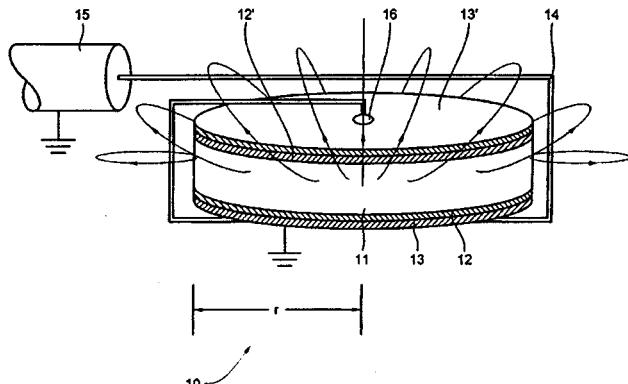
30 Claims, 3 Drawing Sheets

**Arrangement and Method Relating to Coupling of Signals To/From Microwave Devices**

Inventors: Erland Wikborg, Erik Carlsson, and Spartak Gevorgian.
 Assignee: Telefonaktiebolaget LM Ericsson.
 Filed: Apr. 17, 1998.

Abstract—An arrangement for coupling electro magnetic waves, particularly microwaves, into and/or out of a device which includes a dielectric resonator having a nonlinear dielectric substrate with a high dielectric constant and a coupling loop. The dimensions of the resonator and the coupling loop are related to the resonant frequency of the resonator. The coupling loop is so arranged in relation to the resonator that the magnetic field lines around the coupling loop match the internal film distribution of at least one mode, which has been selected to be excited, so that only that mode is excited. Coupling is provided only for this mode. The length of the coupling loop is comparable to or larger than the dimensions of the resonator.

26 Claims, 7 Drawing Sheets



6,188,299

February 13, 2001

Dielectric Filter and Method of Manufacturing the Same

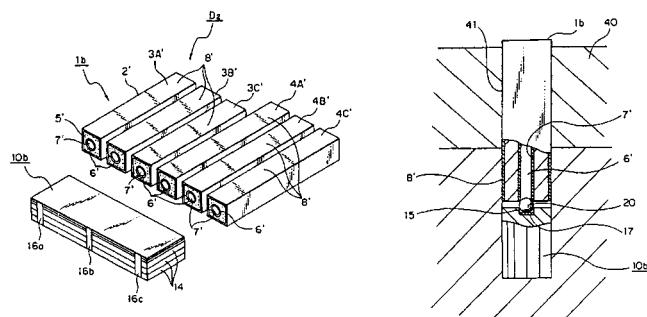
Inventors: Hirotsugu Kawase and Hikaru Achiha.
 Assignee: NGK Spark Plug Co., Ltd.
 Filed: Mar. 9, 1999.

Abstract—A dielectric filter device comprising a resonator body formed by arranging a plurality of resonators in parallel in a same direction and a laminated circuit arrangement to be bonded to an open-circuit end surface of the resonator body, wherein a bonding means is provided to mechanically bond them with a sufficient strength and establish required electric connections between them, said bonding means includes solder balls (20) for electrically connecting the resonator body (1a) and the laminated circuit arrangement (10a) bonded to the open-circuit end surface of the resonator body (1a) to produce solder sections p having a uniformly dotted profile. Unlike conventional techniques using an electrically conductive adhesive agent, such solder sections p provide a sufficient bonding strength without requiring any cumbersome operation.

4 Claims, 9 Drawing Sheets

6,191,665

February 20, 2001



Coupling Circuit to Reduce Intermodulation Distortion in Radiofrequency Receivers

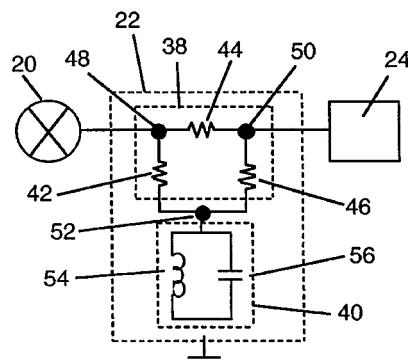
Inventors: Sek Loon Chan and Sin Hooi Cheah.

Assignee: Motorola, Inc.

Filed: May 12, 1999.

Abstract—A coupling circuit (22) for a radiofrequency (RF) receiver (10) has an attenuator (38) and a resonator (40). Three resistors (42, 44, 46) of attenuator (38) provide a lossy resistive isolation between a first mixer (20) and a crystal filter (24) of (RF) receiver (10) for undesired signals such as noise and harmonics. Thus, signal reflections between first mixer (20) and crystal filter (24) are absorbed for these undesired signals. However, for desired signals at an intermediate frequency (IF), resonator (40) has an inductor (54) and a capacitor (56) to resonate with such desired signals at the IF. As a result of resonance, resistors (42, 46) are isolated to alleviate attenuation of the desired signals.

6 Claims, 1 Drawing Sheet



6,191,664

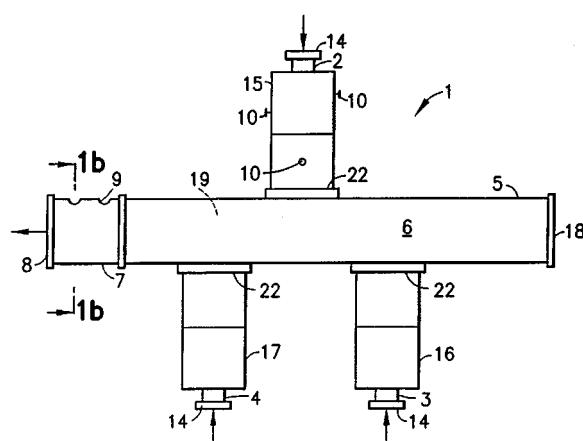
February 20, 2001

Microwave Multiplexer With Tunable Manifold and Method of Adjustment

Inventors: Slawomir J. Fiedzuszko and David J. Dunker.
Assignee: Space Systems/Loral, Inc.
Filed: May 24, 1999.

Abstract—A manifold is constructed with a primary manifold section to which the input wave guides are connected and a tuning section attached to the output of the primary manifold section. The tuning section is constructed of a deformable material which allows the dimpling of the internal wall to alter the impedance of the waveguide system for the purpose of fine tuning the impedance matching of the manifold.

10 Claims, 3 Drawing Sheets



6,191,666

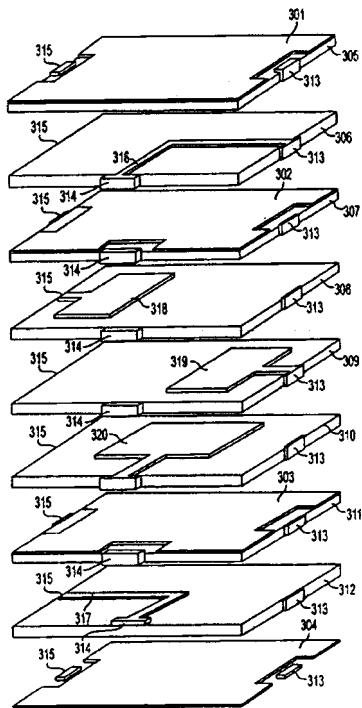
February 20, 2001

Miniaturized Multi-Layer Ceramic Lowpass Filter

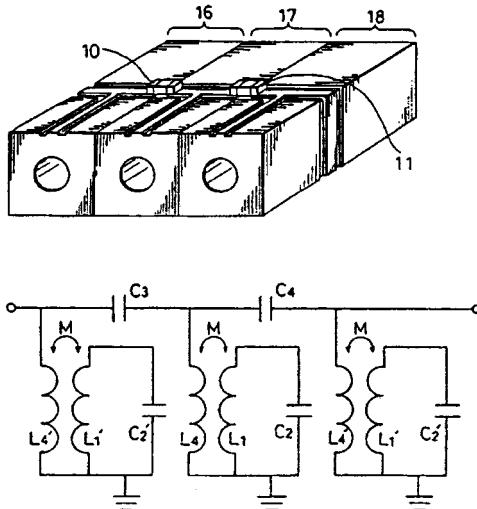
Inventor: Jyh-Wen Sheen.
Assignee: Industrial Technology Research Institute.
Filed: Mar. 25, 1999.

Abstract—In a stripline configuration, a laminated lowpass filter circuit includes first through fifth dielectric substrates arranged in that order in a stack, first and second groundplane conductor layers disposed on the outer surfaces of the stack, and a shielding conductor layer formed on the third dielectric layer. First and second side electrodes are formed on sides of the stack. A stripline providing an inductive element is formed on the fourth dielectric layer, and first and second conductor plates providing capacitive elements are formed on the first and second dielectric layers. The terminal of the first conductor plate and a first end of the stripline are connected to the first side electrode. A terminal of the second conductor plate and a second end of the stripline are connected to the second side electrode. The first and second side electrodes constitute input and output terminals of the laminated lowpass filter circuit. The lowpass filter circuit can also be formed in a microstrip line configuration and a hybrid stripline and microstrip line configuration.

12 Claims, 18 Drawing Sheets



7 Claims, 18 Drawing Sheets



6,191,669

February 20, 2001

Laminated Filter

Inventor: Hiroshi Shigemura.

Assignee: Matsushita Electric Industrial Co., Ltd.

Filed: Jan. 20, 1999.

Abstract—A laminated filter comprising a laminated body created by laminating a plurality of dielectric sheets, a resonator electrode disposed on an inner part of the laminated body, and an input-output electrode disposed on the inner part of the laminated body at a position facing the resonator electrode through the dielectric sheet. A stub electrode is connected to the input-output electrode.

4 Claims, 2 Drawing Sheets

6,191,668

February 20, 2001

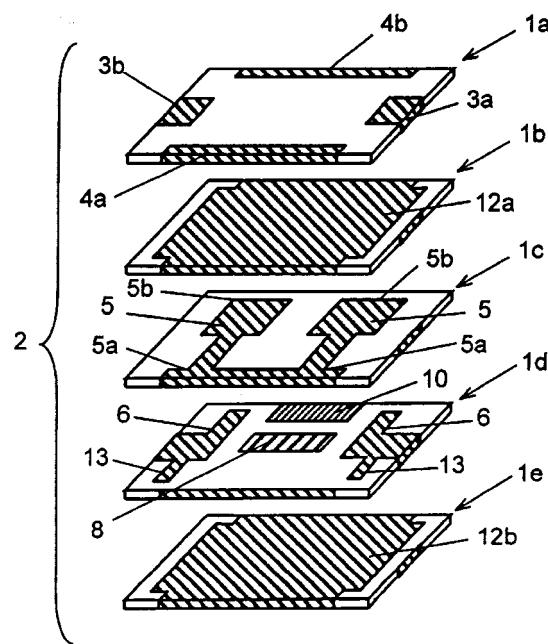
Coaxial Resonator and Dielectric Filter Using the Same

Inventors: Kousuke Takeuchi, Yasumi Kobayashi, Yasuhiro Hirao, Kenichi Shibata, and Kazuhiro Kuroki.

Assignee: Sanyo Electric Co., Ltd.

Filed: Sep. 22, 1998.

Abstract—A coaxial resonator according to the present invention has an outer conductor on an outer peripheral surface of a dielectric block having at least four side surfaces and having a through hole provided in its approximately central part and an inner conductor on an inner peripheral surface of the through hole, and one of two end faces perpendicular to the through hole is opened and the other end face is short-circuited. A pair of an input electrode and an output electrode which are not brought into electrical contact with the outer conductor and are independent of each other is provided in a position in proximity to the opened end face on the outer peripheral surface of the dielectric block, and respective portions of both the electrodes are extended to the side surfaces, which are respectively adjacent to the electrodes, of the dielectric block. Consequently, the input electrode and the output electrode are capacitively coupled to each other, and the input electrode and the output electrode are respectively capacitively coupled to the inner conductor. Coupling capacitance can be adjusted by the areas of the electrodes.



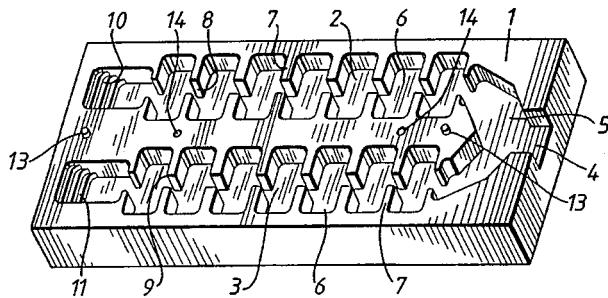
6,191,670

February 20, 2001

Low-Loss Duplexer Without Settings

Inventor: Alain Nguyen.
Filed: May 18, 1999.

Abstract—A duplexer for microwave signals that requires no system of settings by screws. The duplexer includes two tunnels, each having a longitudinal passage and compartments demarcated by transversal partition walls. The compartments, the longitudinal passages and the common part are hollowed out in the plane upper surface of a monolithic block. The tunnels are closed on the top by a lid that adheres uniformly to the plane surface.

14 Claims, 3 Drawing Sheets

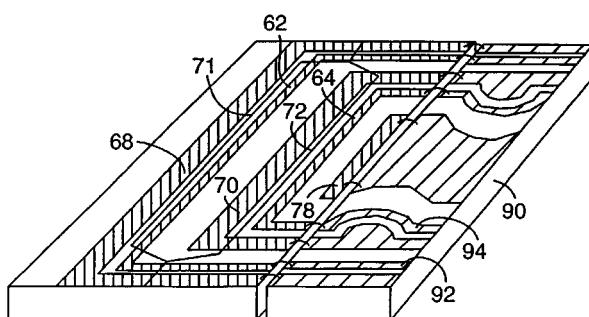
6,192,167

February 20, 2001

Differential Drive Optical Modulator

Inventors: Karl Kissa, Gregory McBrien, and Edward Wooten.
Assignee: Uniphase Telecommunications Products.
Filed: July 24, 1998.

Abstract—A differential input optical modulator, suited for an electrical driver with complementary outputs is provided by the present invention. One embodiment uses a X-cut LiNbO₃ substrate, with or without a buffer layer, to reduce cost of manufacture in comparison to some known devices that employ a Z-cut LiNbO₃ substrate. These prior art devices require both buffer and charge bleed-off layers. The present invention also includes a quasisymmetric electrode structure in which the applied fields run parallel to the surface of the substrate.

28 Claims, 7 Drawing Sheets

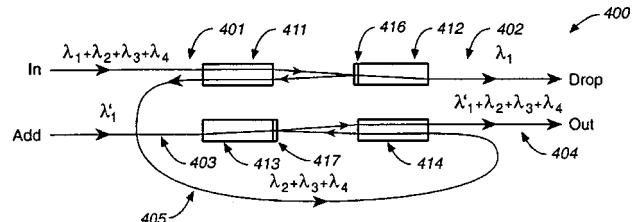
6,192,174

February 20, 2001

Wavelength Selection Switches for Optical Application

Inventor: Ho-Shang Lee.
Assignee: Dicon Fiberoptics, Inc.
Filed: Dec. 21, 1999.

Abstract—At least one filter may be employed between two input channels and two output channels to selectively switch wavelengths of radiation between the input and output channels. In one configuration, a switch member having two different filters thereon is moved between two positions. In the first position, all of the wavelengths carried by a first input channel are reflected or transmitted through a first filter at the switch member to one of two output channels, and radiation of an additional wavelength is conveyed from a second input channel to the remaining output channel. When the switch member is moved to a different second position, the radiation from the input channels impinge on the second filter which causes all of the wavelengths except one from the first input channel to be conveyed to the one of the two output channels along with radiation of the additional wavelength from the second input channel that causes radiation of the one wavelength that is not conveyed to the one output channel to be conveyed to the remaining output channel. In a first embodiment, the filters may be coatings on a switch member. In a second embodiment, instead of using a switch member with filters thereon, the filters may be coatings in the input or output channels and the switch member may be simply a prism that deflects the radiation between the input and output channels.

17 Claims, 5 Drawing Sheets

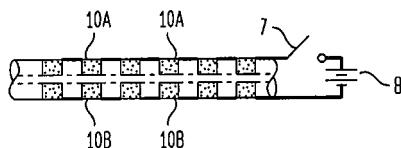
6,192,177

February 20, 2001

Electrically Modifiable Optical Grating Devices

Inventors: Karl R Amundson, Benjamin John Eggleton, John A. Rogers, and Jefferson Lynn Wagener.
Assignee: Lucent Technologies Inc.
Filed: July 17, 1998.

Abstract—In accordance with the invention, an electrically modifiable optical fiber grating device is made by providing a fiber including a grating and forming a plurality of electrically conductive elements along the grating. In response to an electrical signal, the conductive elements modify the grating. In a preferred embodiment, a fiber grating is provided with a plurality of heating elements spaced to selectively heat different portions of the grating. This chirps the spacing between elements of the grating and thereby increases the bandwidth of the device.

15 Claims, 2 Drawing Sheets

6,194,981

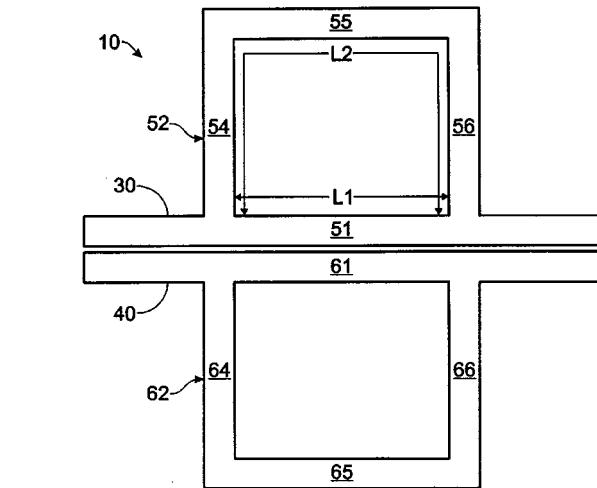
February 27, 2001

Slot Line Band Reject Filter

Inventors: Bert C. Henderson and Clifford A. Mohwinkel.
 Assignee: Endwave Corporation
 Filed: Apr. 1, 1999.

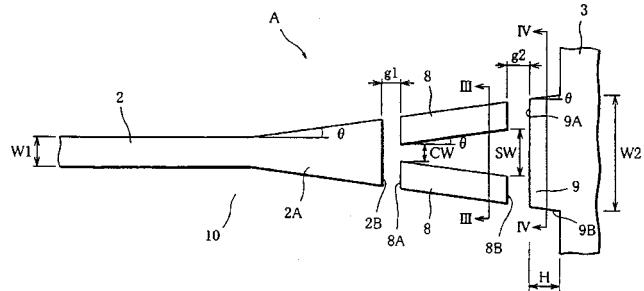
Abstract—A slot line band reject pass filter including a substrate of insulating material having slot line primary conductors formed thereon. One or more supplemental conductors are preferably coupled to the slot line primary conductors to achieve rejection of a desired frequency. Several embodiments of supplemental conductors are disclosed including substantially closed loop and non loop segments that extend in a range from parallel to perpendicular from the primary conductors. The supplemental conductors may be directly or electromagnetically coupled, or both.

22 Claims, 2 Drawing Sheets



from the end portion of the input waveguide and extending in a line with taper of the tapered end portion, and a single large-width waveguide portion arranged separately from the small-width waveguide portions.

4 Claims, 8 Drawing Sheets



6,195,481

February 27, 2001

Array Waveguide Diffraction Grating Optical Multiplexer/Demultiplexer

Inventors: Takeshi Nakajima, Hiroyuki Koshi, and Naoki Hashizume.
 Assignee: The Furukawa Electric Co., Ltd.
 Filed: Aug. 23, 1999.

Abstract—An arrayed waveguide grating type optical multiplexer/demultiplexer includes input waveguides, an input-side slab waveguide, an arrayed waveguide diffraction grating, an output-side slab waveguide, and output waveguides. A junction between each input waveguide and the input-side slab waveguide is tapered such that the end portion of the input waveguide gradually widens in the width direction of the path toward the input-side slab waveguide, and includes two separate small-width waveguide portions arranged separately

6,195,482

February 27, 2001

Waveguide Grating Router

Inventor: Corrado Pietro Dragone.
 Assignee: Lucent Technologies Inc.
 Filed: Dec. 29, 1998.

Abstract—A waveguide grating router having an improved passband flatness with lower loss is provided that includes a first optical coupling device having at least one input port, at least one mode converter, and P output ports, where P>2. A second optical coupling device is also provided that has P input ports, least one output port, and at least one mode converter. P optical paths couple the input port of the first optical coupling device to the output port of the second optical coupling device. The mode converters control the magnitudes of various transmission coefficients contributed by the optical paths of the router. The phases of the various contributions are determined by the optical path lengths, and these lengths are chosen so that certain contributions are opposite to other contributions.

4 Claims, 15 Drawing Sheets

