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.

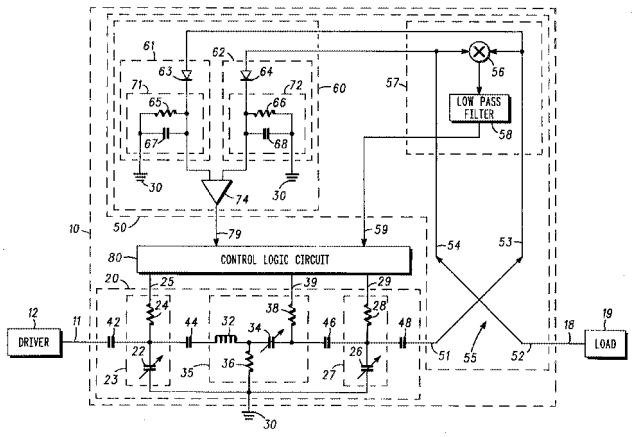
6,414,562 July 2, 2002

CIRCUIT AND METHOD FOR IMPEDANCE MATCHING

Inventors: Gerard Jean Louis Bouisse and John E. Morgan.
Assignee: Motorola, Inc.
Filed: May 27, 1997.

***Abstract*—**An impedance matching circuit (**10**) matches the impedance of a load (**19**) coupled to an RF amplifier (**12**) to that of the RF amplifier (**12**). The impedance matching circuit (**10**) samples a transmitted signal from the RF amplifier (**12**) and a reflected signal from the load (**19**). The amplitude and the phase of the sampled reflected signal are compared with those of the sampled transmitted signal to calculate the impedance mismatch. A control logic circuit (**80**) adjusts the capacitance and inductance values of variable capacitance (**23**; **27**) and inductance (**35**) elements in the impedance matching circuit (**10**), thereby matching the impedance of the load (**19**) to that of the RF amplifier (**12**).

15 Claims, 2 Drawing Sheets



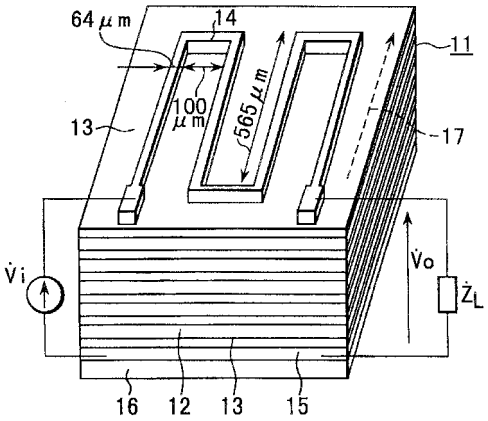
6,414,564 July 2, 2002

DISTRIBUTED CONSTANT ELEMENT USING A MAGNETIC THIN FILM

Inventors: Tetsuhiko Mizoguchi, Tetsuo Inoue, and Toshirou Sato.
Assignee: Kabushiki Kaisha Toshiba.
Filed: August 1, 2000.

***Abstract*—**The present invention is directed to a magnetic thin-film device whose operating frequency band ranges from several millihertz (MHz) to several gigahertz (GHz) and which is used as an inductor for a switching power supply, a noise filter, a reception circuit for receiving a quasimicrowave and a magnetic sensor. In this device, uniaxial magnetic anisotropy is guided to a magnetic layer, and the magnetic layer is sandwiched between dielectric layers to form a propagation path of electromagnetic wave. A microstrip line is provided on the top surface of the propagation path, while an insulative underlying substrate is formed on the bottom surface thereof with a lower grounded conductor interposed therebetween. Thus, the wavelength of the propagation path can be shortened to miniaturize the device. The device is rapidly improved in characteristics and miniaturized further, resulting in reduction in manufacturing costs.

56 Claims, 11 Drawing Sheets



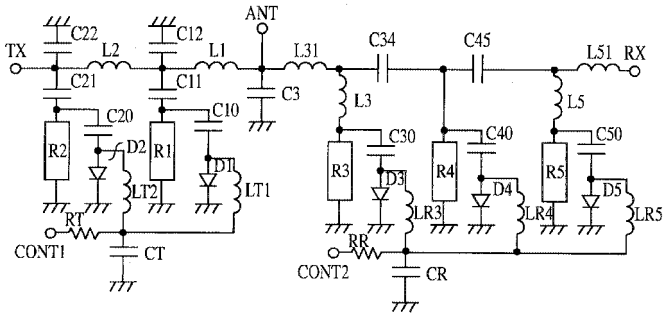
6,414,566 July 2, 2002

FREQUENCY-CHARACTERISTICS VARIABLE FILTER, DUPLEXER, AND COMMUNICATION APPARATUS

Inventor: Masayuki Atokawa.
Assignee: Murata Manufacturing Co., Ltd.
Filed: June 1, 2000.

***Abstract*—**A frequency-characteristics variable filter, a duplexer, and a communication apparatus that can be operated at reduced bias voltages that are applied to diodes provided for switching frequency characteristics without reducing the stability of frequency characteristics and without increasing the occurrence of skews. Also, the single duplexer can be used for two frequency bands. As a diode for each of resonators in a transmitting filter and the first resonator in a receiving resonator, a diode having an interterminal electrostatic capacitance in the off state smaller than that of a diode used for other resonators is used. Also, the diodes for the resonators excluding the first resonator in the receiving filter has a lower forward resistance in the on state and an Q value in the off state higher than those of other diodes.

9 Claims, 3 Drawing Sheets



Digital Object Identifier 10.1109/LMWC.2002.807807

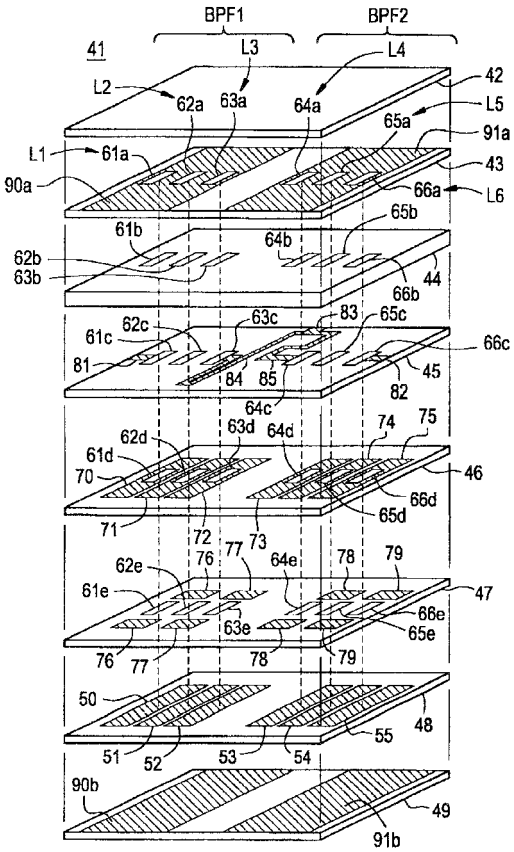
6,414,567 July 2, 2002

DUPLEXER HAVING LAMINATED STRUCTURE

Inventors: Sadayuki Matsumura, Noboru Kato, and Hiroko Nomura.
Assignee: Murata Manufacturing Co., Ltd.
Filed: December 11, 2000.

***Abstract*—**A duplexer having a laminated structure includes a first three-stage band-pass filter having parallel LC resonators, and a second three-stage band-pass filter having parallel LC resonators. The first and second three-stage band-pass filters are coupled through impedance matching patterns. An inductor of each of the resonators is defined by via-holes formed on insulator sheets which are connected in sequence in the laminating direction of the sheets.

20 Claims, 3 Drawing Sheets



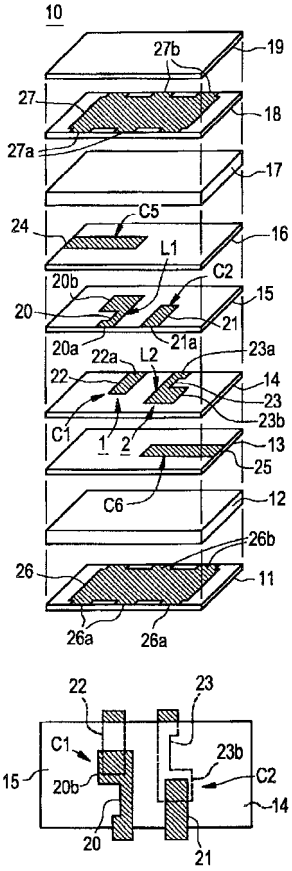
6,414,568 July 2, 2002

INTERDIGITATED, LAMINATED LC BANDPASS FILTER WITH DIFFERENT LENGTH ELECTRODES

Inventors: Sadayuki Matsumura, Noboru Kato, and Miki Sasamura.
Assignee: Murata Manufacturing Co., Ltd.
Filed: May 19, 2000.

***Abstract*—**A band pass filter includes LC resonators defined by laminated layers and is constructed such that the resonant frequencies of the LC resonators shift in the same direction when laminated layers deviate from each other. In the arrangement of the band pass filter, the inductor pattern of a first LC resonator and the capacitor pattern of a second LC resonator are disposed on a surface of a first ceramic sheet. The inductor pattern and the capacitor pattern extend to the same side of the first ceramic sheet. In addition, the capacitor pattern of the first LC resonator and the inductor pattern of the second LC resonator are disposed on a surface of a second ceramic sheet. The capacitor pattern and the inductor pattern extend to the same surface of the second sheet.

20 Claims, 7 Drawing Sheets



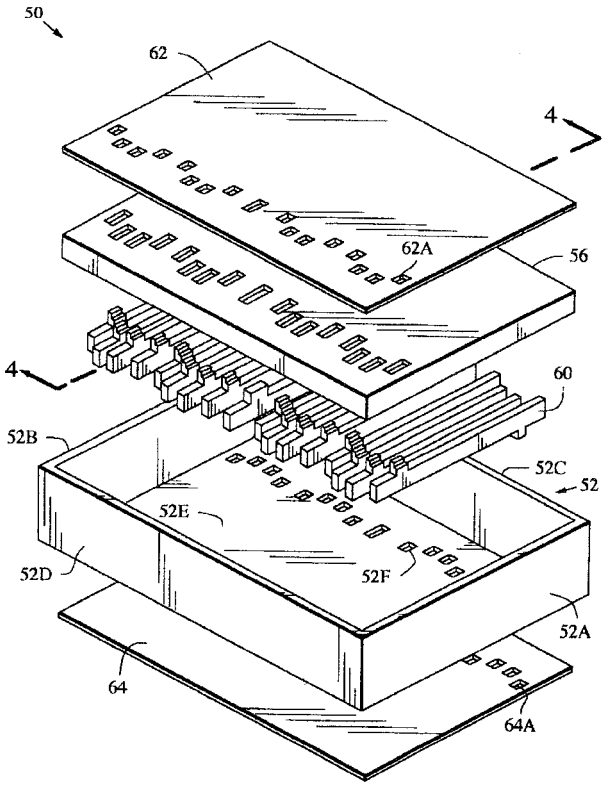
6,414,570 July 2, 2002

LOW PROFILE, HIGH ISOLATION AND REJECTION X-BAND SWITCHED FILTER ASSEMBLY

Inventors: Lawrence Dalconzo, Robert C. Allison, Tamrat Akale, James M. Harris, and Herbert K. Jew.
Assignee: Raytheon Company.
Filed: June 6, 2000.

***Abstract*—**A multi-channel microwave switched filter bank, wherein the input circuitry and output circuitry are mounted on opposite sides of the filter bank, providing a compact structure with excellent isolation. The filter bank includes a set of microwave band pass filter circuits. A housing structure provides an outer conductive peripheral frame structure. A rack structure disposed within the housing structure has a plurality of elongated slots for mounting therein corresponding ones of the plurality of filter circuits. A top dielectric substrate board is mounted adjacent a first side of the rack structure and has a first set of openings formed therein for providing access to a first set of input/output (I/O) ports of the plurality of filter circuits. A bottom dielectric substrate board is mounted adjacent a second side of the rack structure opposite the first side and has a second set of openings formed therein for providing access to a second set of input/output (I/O) ports of the plurality of filter circuits.

12 Claims, 5 Drawing Sheets



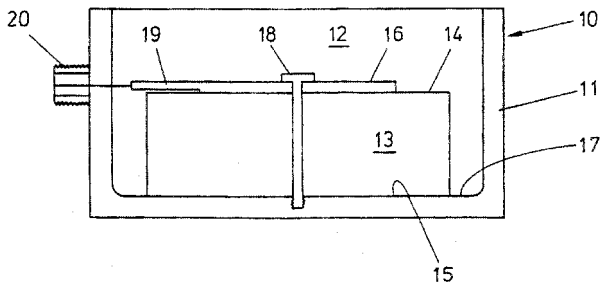
6,414,571 July 2, 2002

DUAL TM MODE COMPOSITE RESONATOR

Inventors: Ian Hunter and John David Rhodes.
Assignee: Filtronic PLC.
Filed: October 14, 1998.

***Abstract*—**A microwave frequency composite resonator comprising a metal housing having an internal surface and defining a resonator cavity, a dielectric member having a top face and a bottom face and a conducting plate. The dielectric member is located within the resonator cavity and the bottom face of the dielectric member directly abuts the internal surface of the metal housing and the conducting plate directly abuts the top face of the dielectric member.

12 Claims, 7 Drawing Sheets



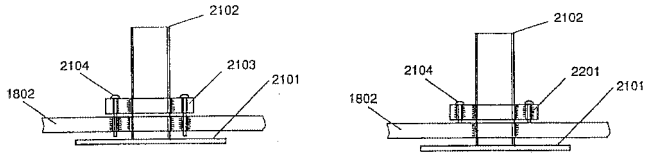
6,414,572 July 2, 2002

DIELECTRIC RESONATOR HAVING A FREQUENCY TUNING MEMBER SPIRALLY ENGAGED WITH THE CAVITY

Inventors: Yuki Satoh, Masami Hatanaka, Toshio Ishizaki, Yuji Saka, and Toshiaki Nakamura.
Assignee: Matsushita Electric Industrial Co., Ltd.
Filed: March 1, 2001.

***Abstract*—**A dielectric resonator of the invention includes a cavity having a first threaded hole; a dielectric block provided in the cavity; a coupling device coupled with an electromagnetic field produced in the cavity; a frequency tuning member having a screw portion which is spirally engaged with the first threaded hole of the cavity, a distance between the dielectric block and the frequency tuning member being changed by rotating the frequency tuning member, for tuning a resonance frequency of the cavity depending on the distance; and fixing means for fixing a relative positional relationship between the frequency tuning member and the cavity, wherein the fixing means prevents the frequency tuning member from rotating due to a frictional force caused between the first threaded hole of the cavity and the screw portion of the frequency tuning member, the fixing means including a lock nut having a second threaded hole which is spirally engaged with the screw portion of the frequency tuning member.

3 Claims, 27 Drawing Sheets



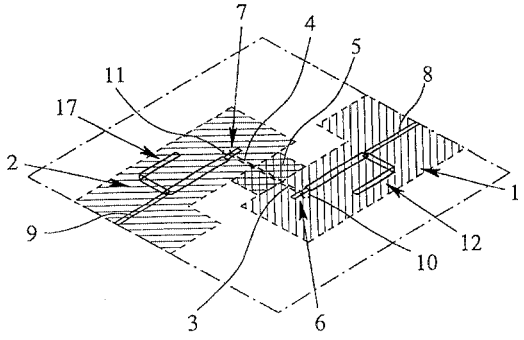
6,414,574 July 2, 2002

POTENTIAL-FREE CONNECTION FOR MICROWAVE TRANSMISSION LINE

Inventors: Reinhard Knöchel and Matthias Weiss.
Assignee: Krohne Messtechnik GmbH & Co. KG.
Filed: November 7, 2000.

***Abstract*—**A potential-free connection of a first line section of a microwave transmission line with a second line section of the microwave transmission line is described and illustrated. To obtain a broadband transfer range for the microwave signal with high breakdown voltage at the same time, it is provided for that the first line section of the microwave transmission line has a first slotted line, the second line section of the microwave transmission line has a second slotted line and the first slotted line and the second slotted line are arranged on two opposite sides of a dielectric substrate in such a way that the first slotted line and the second slotted line have a strong electromagnetic coupling but have no conductive connection to each other.

11 Claims, 3 Drawing Sheets



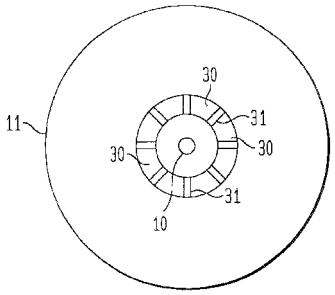
6,415,079 July 2, 2002

OPTICAL FIBER GRATINGS HAVING INTERNAL GAP CLADDING FOR REDUCED SHORT WAVELENGTH CLADDING MODE LOSS

Inventors: Geoffrey L. Burdge, Benjamin J. Eggleton, Thomas A. Strasser, Paul S. Westbrook, and Robert S. Windeler.
Assignee: Fitel USA Corp.
Filed: March 3, 2000.

***Abstract*—**The present invention is predicated on applicants' discovery that an appropriately spaced and dimensioned internal gap cladding can substantially reduce short wavelength cladding mode loss in a fiber Bragg grating. A fiber Bragg grating is provided with a ring of closely spaced, longitudinally extending gap regions in the glass peripherally surrounding the core. The gaps are spaced apart by thin glass webs having a thickness less than a wavelength of the light being transmitted and are disposed peripherally about the core at a distance of 2–10 wavelengths from the core center. The thin webs limit the passage of the light between the gaps. The combination of webs and gaps acts as an internal thin cladding which supports fewer cladding modes than conventional glass cladding and, significantly, provides increased wavelength spacing between the Bragg resonance and the first cladding mode resonance.

12 Claims, 4 Drawing Sheets



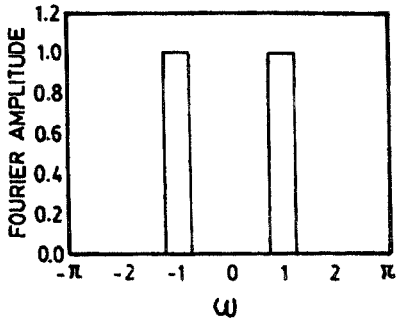
6,415,081 July 2, 2002

SYNTHESIS OF SUPERGRATINGS BY FOURIER METHODS

Inventors: Daniel Levner, Martin F. Fay, and Jingming Xu.
Filed: August 4, 2000.

***Abstract*—**The present invention relates to a method for synthesizing supergratings using Fourier analysis. The method divides the synthesis process into two stages: synthesis of an "analog" grating profile, followed by a quantization step. The method provides a generalized procedure for analog synthesis by drawing on the Fourier approximation and on finite-inpulse-response (FIR) filter design theory, while it interprets the simple threshold quantization as a "zeroth order" Delta–Sigma Modulator, which it improves. The method of designing a supergrating for a waveguide includes providing a reflectance spectrum in at least one spectral band to be produced by a supergrating in a waveguide, the reflectance spectrum having specified reflectance features, transforming the reflectance spectrum to a Fourier domain representation having Fourier-domain features, computationally synthesizing an analog refractive index profile corresponding to the Fourier-domain representation and transforming the analog refractive index profile to a binary or multi-level refractive index profile representation in such a way as to conserve Fourier-domain information within the spectral band.

16 Claims, 5 Drawing Sheets



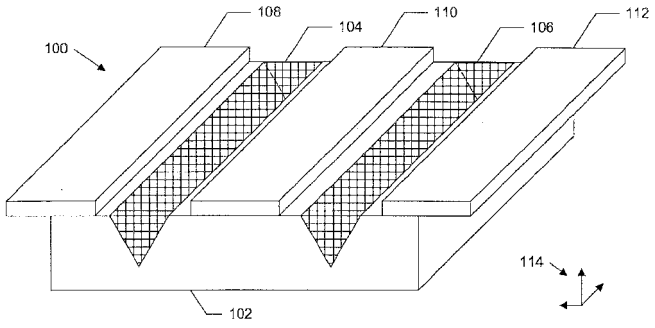
6,415,083 July 2, 2002

TRAVELING WAVE ELECTRO-OPTIC MODULATOR BASED ON AN ORGANIC ELECTRO-OPTIC CRYSTAL

Inventors: William Anderson and Timothy E. Van Eck.
Assignee: Lockheed Martin Corporation.
Filed: March 13, 2001.

***Abstract*—**An electro-optic modulator, a system including an electro-optic modulator, and a method for producing an electro-optic modulator, which provides improved modulation sensitivity and improved environmental characteristics. The electro-optic modulator, according to the present invention, comprises: a substrate having a surface, the substrate having a first index of refraction, a first optical waveguide and a second optical waveguide, the optical waveguides formed in the substrate and being co-planar, each waveguide having a second index of refraction, each waveguide operable to transmit a light signal, a first electrode disposed on the surface of the substrate between the first and second optical waveguides, the first electrode operable to receive a modulation signal, and a second electrode and a third electrode disposed on the surface of the substrate surrounding the first and second optical waveguides, the second and third electrodes connected to a common potential, whereby the light signal is modulated in accordance with the modulation signal.

40 Claims, 6 Drawing Sheets



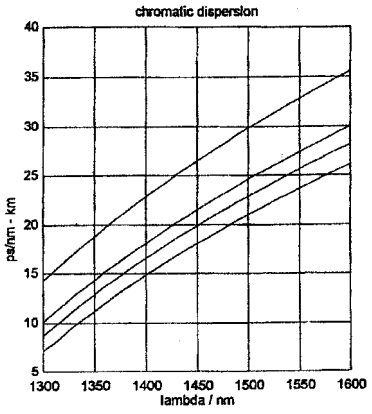
6,415,088 July 2, 2002

METHOD OF COMPENSATING THE DISPERSION OF FLUORINE-BASED FIBER LASERS IN THE SECOND OPTICAL WINDOW

Inventors: Joachim Vobian, Reiner Boness, Heinz Döring, Jens Peupelmann, and Uwe Schmietainski.
Assignee: Deutsche Telekom AG.
Filed: September 13, 1997.

***Abstract*—**A method of manipulating a compensation fiber for compensating the high negative dispersion of a fiber laser in the second optical window. The active fiber of the fiber laser is linked to a compensation fiber which consists of a step-index quartz glass core with a sheathing. By doping the compensation fiber sheathing with fluorine in a targeted manner, a positive value is set for the dispersion of the compensation fiber. Subsequent dimensioning of the length of the compensation fiber increases the set dispersion value to the positive dispersion value necessary for complete compensation of the dispersion of the fiber laser.

8 Claims, 2 Drawing Sheets



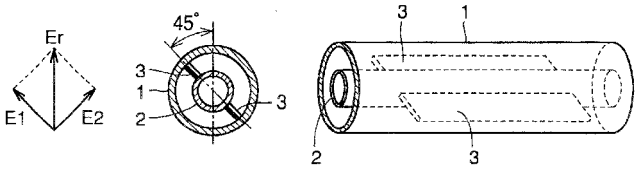
6,417,742 July 9, 2002

CIRCULAR POLARIZER HAVING TWO WAVEGUIDES FORMED WITH COAXIAL STRUCTURE

Inventor: Shunji Enokuma.
Assignee: Sharp Kabushiki Kaisha.
Filed: May 2, 2000.

***Abstract*—**A circular polarizer includes a low frequency band waveguide (f_L), a high frequency band waveguide (f_H) formed at the inner side of the low frequency band waveguide (f_L) in a coaxial structure, and a dielectric member provided to abut against the inner side of the low frequency band waveguide (f_L) and the outer side of the high frequency band waveguide (f_H), and inclined by 45° with respect to a linear plane of polarization. Since the dielectric member is provided at an angle of 45° with respect to the linear plane of polarization, the delay of the phase of the electric field passing through the dielectric member becomes greater than the phase of the electric field orthogonal to the dielectric member, whereby a circularly polarized wave can be converted into a linearly polarized wave. Since the dielectric member can be formed by a mold, a circular polarizer that is economic and fit for mass production can be provided. Adjustment of the phase characteristics and the like is no longer required since the shape of the dielectric member can be determined by experiments.

13 Claims, 4 Drawing Sheets



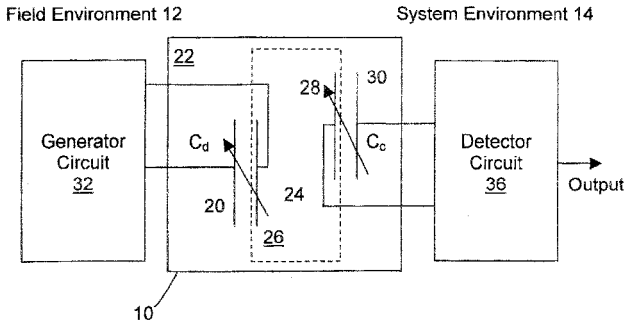
6,417,743 July 9, 2002

MICRO ELECTROMECHANICAL ISOLATOR

Inventors: Robert E. Mihailovich and Jun J. Yao.
Assignee: Rockwell Science Center, LLC.
Filed: September 21, 1999.

***Abstract*—**The present invention relates to a micro electromechanical (MEM) isolator in which an input signal induces an output signal by means of electrically insulating mechanical motion. The MEM isolator device comprises a dielectric moveable platform suspended above a substrate by flexible beams. A drive and a control capacitor each have one electrode supported by the platform and one electrode supported by the substrate. Coupling between electrical and mechanical energies is achieved by providing an input signal to the drive capacitor to induce platform motion. When the input signal is fed to the drive capacitor, it actuates electrostatic motion of the platform resulting in a change in the value of the control capacitance. The change in the control capacitance is converted via a simple electronics circuit into an output that mirrors the input but is electrically isolated therefrom. The advantages of such a device include simple electrical isolation provided by the dielectric platform, built in signal-debounce inherent to the structure mechanics, and economical integration with silicon integrated circuits.

19 Claims, 4 Drawing Sheets



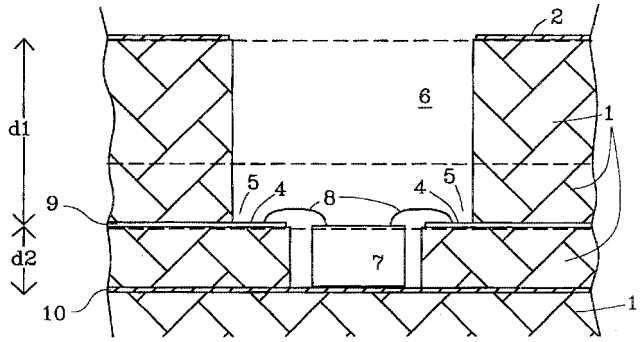
6,417,744 July 9, 2002

TRANSITION BETWEEN ASYMMETRIC STRIPLINE AND MICROSTRIP IN CAVITY

Inventors: Björn Albinsson and Thomas Harju.
Assignee: Telefonaktiebolaget LM Ericsson (publ).
Filed: June 16, 2000.

***Abstract*—**The present invention relates to a multilayer printed circuit board arrangement which results in better matching between a stripline (**9**) and a microstrip (**4**) in a cavity (**6**). The solution comprises the use of an asymmetric stripline (**9**) where the electric field is tied primarily to the lower earth plane (**10**). This results in good matching at the transition to the microstrip (**4**), whose field is tied to the lower earth plane (**10**).

12 Claims, 1 Drawing Sheet



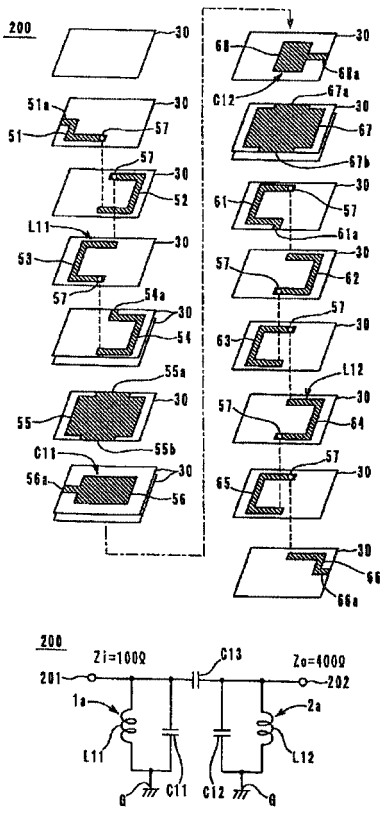
6,417,745 July 9, 2002

LC FILTER WITH A COUPLING CAPACITOR FORMED BY SHARED FIRST AND SECOND CAPACITOR PATTERNS

Inventor: Tetsuo Taniguchi.
Assignee: Murata Manufacturing Co., Ltd.
Filed: April 25, 2000.

***Abstract*—**An LC filter has a ratio of the inductance of an inductor to the capacitance of a capacitor, defining an input-side parallel LC resonant circuit, which is different from a ratio of the inductance of an inductor to the capacitance of a capacitor, defining an output-side parallel LC resonant circuit. The inductor of the input-side parallel LC resonant circuit includes inductor patterns. The inductor of the output-side parallel LC resonant circuit includes different inductor patterns. The capacitor of the input-side circuit includes capacitor patterns. The capacitor of the output-side circuit includes different capacitor patterns.

14 Claims, 4 Drawing Sheets



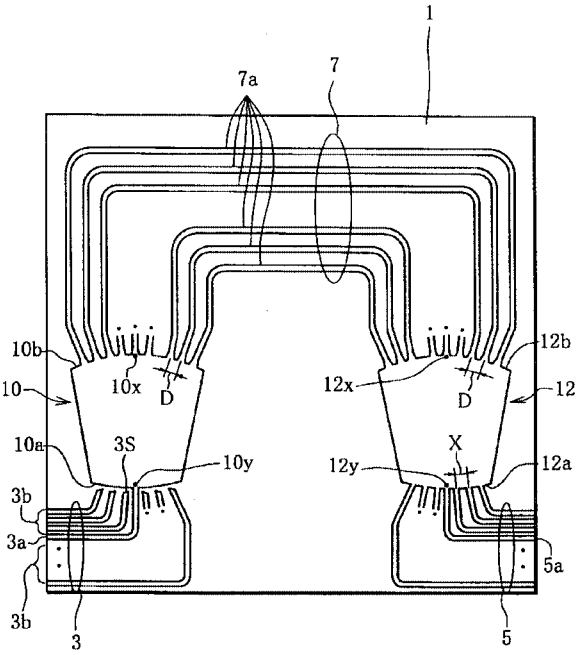
6,418,249 July 9, 2002

OPTICAL MULTIPLEXER/DEMULTIPLEXER

Inventors: Shiro Nakamura, Takeshi Nakajima, and Kanji Tanaka.
Assignee: The Furukawa Electric Co., Ltd.
Filed: October 26, 1999.

***Abstract*—**An optical multiplexer/demultiplexer including an arrayed waveguide grating having a plurality of waveguides and formed at its both end with an input-side slab waveguide and an output-side slab waveguide. A reference input waveguide and correction input waveguides are provided on the input end face of the input-side slab waveguide and a plurality of output waveguides are connected to the output end face of the output-side slab waveguide. The correction input waveguide has an output end face thereof placed apart by a distance from the input end face of the input-side slab waveguide in the lengthwise direction of the slab waveguide and has an acute angle to a plane perpendicular to the optical axis of this waveguide, thus permitting an optical signal to be input at a position apart from a light-incident position for the reference input waveguide by a distance shorter than a waveguide disposition interval, thereby optimally correcting a deviation of the center wavelength of the optical signal.

8 Claims, 4 Drawing Sheets



6,418,255 July 9, 2002

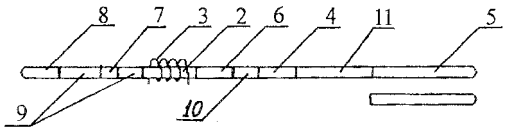
DEVICE FOR MODULATION OF OPTICAL RADIATION AND TRANSMISSION OF INFORMATION

Inventor: Alexandr Alexandrovich Maier.
Assignee: Cleomen Ltd.
Filed: June 11, 1998.

***Abstract*—**The invention concerns to area of magneto-optics, nonlinear-optics, fiber optics. The invention allow to amplify Faraday effect drastically and obtain a high level of modulation of optical radiation at very small amplitudes of modulating variable current. So it provides a very high speed of modulation of optical radiation. It also gets an opportunity of reading the information with

higher density of record. The modulator on the basis of magneto-optical Faraday effect contains optically connected: optical element made from magneto-optical material with means creating a variable magnetic field in it, a nonlinear-optical waveguide and a separator of waves having orthogonal polarizations. The possibility for rejection of atmosphere fluctuation and jamming is provided. The nonlinear-optical waveguide can be made on the basis MQW-type structure. Input/output elements, taking into account the asymmetry of cross-section of the nonlinearoptical waveguide are mounted at its input and output, as the compact nonlinear-optic module. The small current is passed across said nonlinear-optical waveguide increasing gain in modulation drastically, and decreasing pump optical power in a high degree. The device contains also Peltier element and temperature sensor which help to obtain low predetermined critical power of optical radiation necessary for obtaining large modulation gain. The modulator on the basis of magneto-optical Kerr phenomenon contains an optical element reflecting optical radiation with sites of various magnetization.

122 Claims, 4 Drawing Sheets



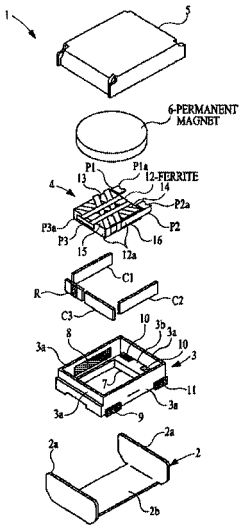
6,420,941 July 16, 2002

NONRECIPROCAL CIRCUIT DEVICE

Inventors: Takekazu Okada, Toshihiro Makino, Akihito Masuda, and Takashi Kawanami.
Assignee: Murata Manufacturing Co., Ltd.
Filed: September 15, 1998.

***Abstract*—**A nonreciprocal circuit device requires less layout space when single-board capacitors are used, and meets demands for a smaller and lighter configuration. An isolator (nonreciprocal circuit device) comprises a ferrite, a permanent magnet applying a direct current magnetic field to the ferrite, a plurality of central electrodes respectively having ports disposed on the ferrite and a single-based matching capacitor with capacitor electrodes formed on both surfaces of a dielectric substrate such that the capacitor electrodes are opposed to each other and sandwich the dielectric substrate. In various embodiments, the permanent magnet and/or; the ferrite has a square shape and the capacitor electrodes of the matching capacitors are arranged at an angle of 60 to 90 degrees with respect a mounting surface and the matching capacitors are disposed so as to surround the sides of the ferrite.

22 Claims, 10 Drawing Sheets



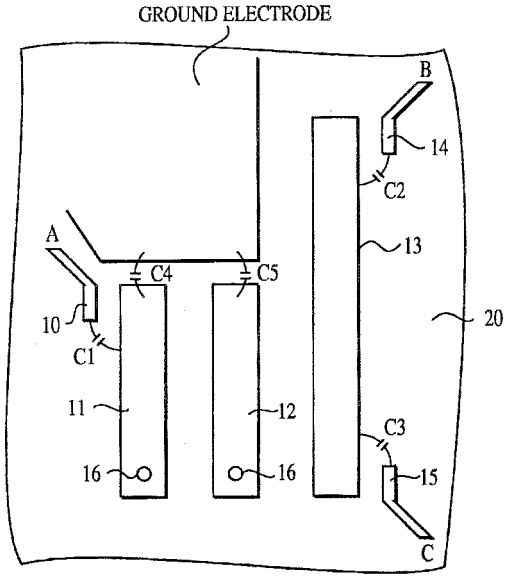
6,420,942 July 16, 2002

DIELECTRIC FILTER, DIELECTRIC DUPLEXER, AND COMMUNICATION APPARATUS

Inventors: Motoharu Hiroshima, Katsuhito Kuroda, Shohachi Nishijima, Hideyuki Kato, and Haruo Matsumoto.
Assignee: Murata Manufacturing Co., Ltd.
Filed: June 1, 2000.

***Abstract*—**A $\lambda/2$ resonator comprises an inner conductor formed hole having an inner conductor with both open-ends, formed therein, and $\lambda/4$ resonators comprise inner conductor formed holes having inner conductors with one short-circuited ends and the other open ends, respectively. The resonators are coupled, whereby a terminal electrode connected to the vicinity of the one open end of one of the $\lambda/4$ resonators functions as an unbalanced terminal, and terminal electrodes connected to both open ends of the $\lambda/2$ resonator function as balanced terminals.

11 Claims, 10 Drawing Sheets



6,420,947 July 16, 2002

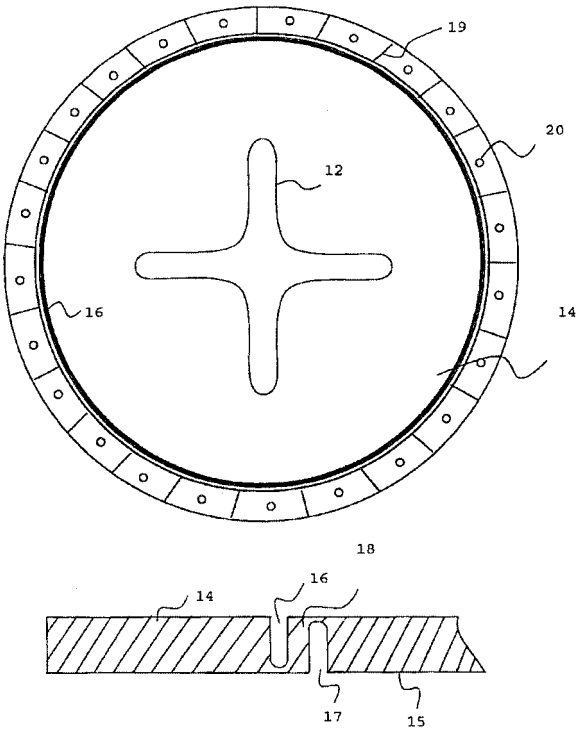
THERMAL COMPENSATION ARRANGEMENT FOR MICROWAVE FILTER

Inventors: Graham Broad and Lewis Steer.
Assignee: Alcatel.
Filed: March 26, 2001.

***Abstract*—**This invention discloses an improved thermal compensation arrangement for a microwave filter of the type comprising at least one cavity defined by a metal side wall having a low coefficient of thermal expansion, such as invar, and lightweight metal end walls, such as aluminum, having

good thermal and electrical conductivity, but a high coefficient of thermal expansion. The present invention comprises a characteristic arrangement of annular grooves and slots in the end walls that mechanically isolate the end walls from the side wall fixed thereto, to avoid distortion of the cavity with changes in temperature.

9 Claims, 4 Drawing Sheets



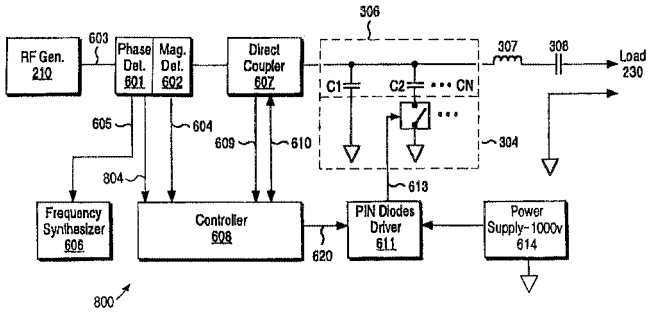
6,424,232 July 23, 2002

METHOD AND APPARATUS FOR MATCHING A VARIABLE LOAD IMPEDANCE WITH AN RF POWER GENERATOR IMPEDANCE

Inventors: Anton Mavretic and Tomislav Lozic.
Assignee: Advanced Energy's Voorhees Operations.
Filed: November 30, 1999.

***Abstract*—**Matching the variable impedance of a load with the fixed impedance of a radio frequency (RF) power generator to provide maximum power transfer. The impedance matching network further allows a RF power generator to vary the frequency of the voltage applied to a load, e.g., a plasma chamber as may be utilized in semiconductor or flat panel plasma display manufacturing processes. The impedance matching network further utilizes fixed solid state components to adjust the impedance of the attached load to provide maximum power transfer between the generator and the load. A parallel switched capacitor network is controlled by an electrical switching means such as PIN diodes to turn fixed capacitors on or off. A means for varying the frequency of the applied voltage is used to match the impedance of the load with the impedance of the RF power generator within milliseconds.

15 Claims, 7 Drawing Sheets



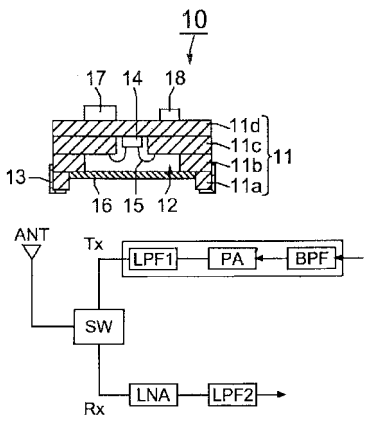
6,424,233 July 23, 2002

COMPLEX ELECTRONIC COMPONENT WITH A FIRST MULTILAYER FILTER HAVING A CAVITY IN WHICH A SECOND FILTER IS MOUNTED

Inventors: Ken Tonegawa, Harufumi Mandai, and Tomoya Bando.
Assignee: Murata Manufacturing Co., Ltd.
Filed: June 1, 2001.

***Abstract*—**The invention provides a complex electronic component, comprising; a multilayer substrate formed by laminating a plurality of dielectric layers; a first concave part being provided at least at the bottom surface of said multilayer substrate; a filter comprising at least one first passive element disposed within said multilayer substrate; an external terminal provided on at least one of the flat portion of the bottom surface and the side face of said multilayer substrate; either one of an active element or a second passive element mounted on the top surface of said multilayer substrate, a surface acoustic wave element mounted inside of said first concave portion of said multilayer substrate; and a flat cap provided at the opening of said first concave portion of said multilayer substrate so as to cover said opening said first concave portion. The size of the above complex electronic component is compact.

11 Claims, 2 Drawing Sheets



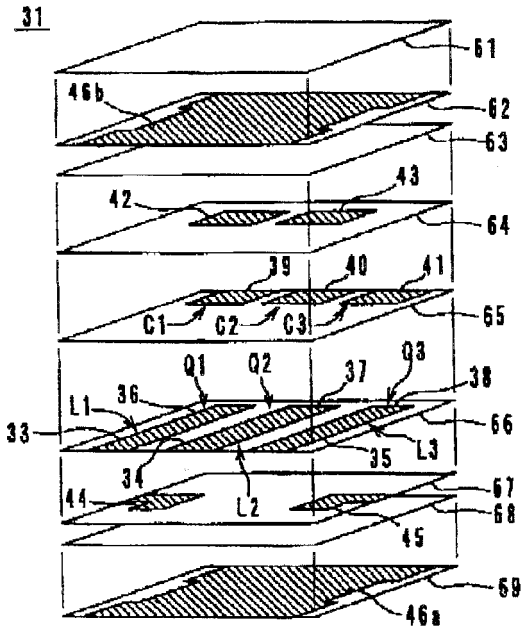
6,424,235 July 23, 2002

10 Claims, 7 Drawing Sheets

LAMINATED LC FILTER

Inventor: Noboru Kato.
Assignee: Murata Manufacturing Co., Ltd.
Filed: May 8, 2000.

***Abstract*—**A laminated LC filter has an excellent Q characteristic and includes at least three LC resonators. Each of the LC resonators includes an inductor pattern and a capacitor pattern. The pattern widths of the inductor patterns of the LC resonator located at the approximate center portion are wider than the pattern widths of the inductor patterns of the LC resonators located at both ends.



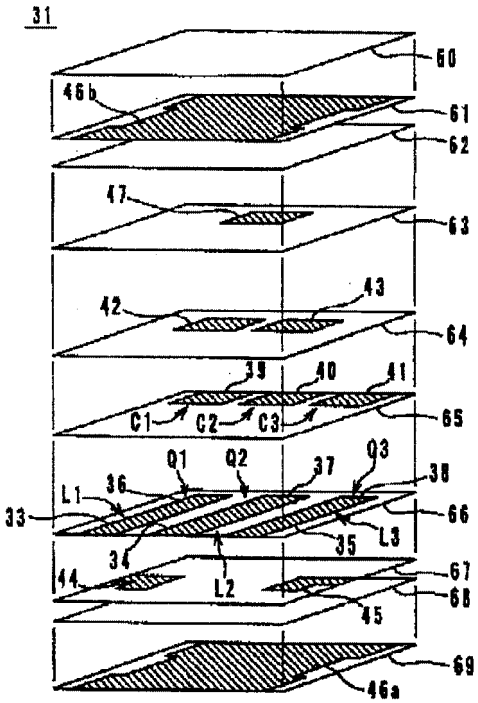
6,424,236 July 23, 2002

STACKED LC FILTER WITH A POLE-ADJUSTING ELECTRODE FACING RESONATOR COUPLING PATTERNS

Inventor: Noboru Kato.
Assignee: Murata Manufacturing Co., Ltd.
Filed: May 8, 2000.

***Abstract*—**A stacked LC filter includes a layered body defined by a plurality of insulating layers, a plurality of inductor patterns, and a plurality of capacitor patterns in a stacked arrangement At least three LC resonators are disposed in the layered body including a plurality of inductors, which are defined by the inductor patterns, and a plurality of capacitors, which are defined by the capacitor patterns disposed so as to face the inductor patterns. At least two coupling capacitor patterns are stacked in the layered body and are arranged to couple the LC resonators. A pole adjusting pattern is stacked in the layered body and faces the at least two coupling capacitor patterns.

18 Claims, 7 Drawing Sheets



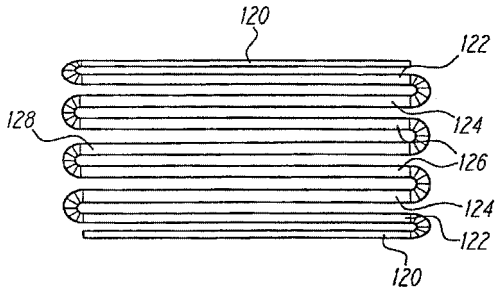
6,424,846 July 23, 2002

SPIRAL SNAKE HIGH TEMPERATURE SUPERCONDUCTING RESONATOR FOR HIGH Q, REDUCED INTERMODULATION

Inventors: Balam Quitzé Andrës Willemsen Cortés, Albert H. Cardona, Neal O. Fenzi, and Roger J. Forse.
Assignee: Superconductor Technologies, Inc.
Filed: December 13, 1999.

***Abstract*—**Novel structures and methods for forming useful high temperature superconducting devices, most particularly resonators, are provided. Structures resulting in reduced peak current densities relative to known structures achieve numerous desirable benefits, especially including the reduced intermodulation effects of earlier resonators. In one aspect of this invention, a spiral in, spiral out resonator is provided, characterized in that it has an odd number of long runs, at least equal to five long runs, where the long runs are connected by turns, and wherein there are at least two sequential turns of the same handedness, followed by at least two turns of the opposite handedness. In yet another aspect of this invention, it has been discovered that reducing the size of the input and output pads of HTS resonators increases the relative inductance compared to the capacitance. Yet another resonator structure is a spiral snake resonator having a terminal end disposed within the resonator. A wide in the middle structure and wide at peak current density resonator structures utilize enlarged width portions of the resonator in those areas where current density is largest. In yet another aspect of this invention, operation of resonators in high modes, above the fundamental mode, reduce peak current densities. Resonators operated in modes in which current in adjacent long runs are in the same direction further serve to reduce current densities, and intermodulation effects. Symmetric current structures and modes of operation are particularly advantageous where far field effects are compensated for.

36 Claims, 16 Drawing Sheets



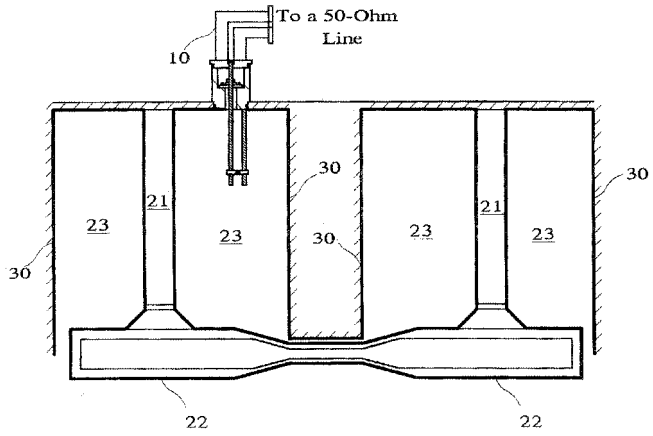
6,426,681 July 30, 2002

HIGH POWER ADJUSTABLE RF COUPLING LOOP

Inventor: Behrouz Amini.
Filed: October 23, 2001.

***Abstract*—**A high power adjustable rf coupling loop which is used to interface a transmission line to a resonant cavity is described. The coupling loop is made entirely of metallic parts and therefore is ideal for high power rf applications. Contrary to all existing loops it does not require water cooling Among the unique features of this loop is the fact that it is adjustable. Subsequently the combined impedance of the loop and cavity can be adjusted to match perfectly with the line impedance rendering almost zero reflected power.

11 Claims, 2 Drawing Sheets



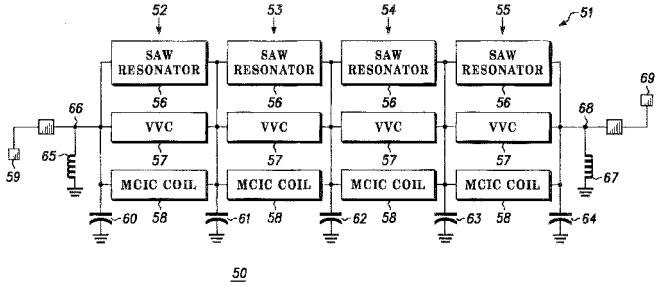
6,426,683 July 30, 2002

INTEGRATED FILTER WITH IMPROVED I/O MATCHING AND METHOD OF FABRICATION

Inventors: Wang-Chang A. Gu and Richard Stephen Kommrusch.
Assignee: Motorola, Inc.
Filed: November 9, 1999.

***Abstract*—**An integrated filter circuit and a method of fabrication are disclosed, wherein the integrated filter has an input and an output parasitic shunt impedance. Input and output electrical components are coupled to the input and output terminals, respectively, to reduce the input and output parasitic shunt impedances. The input and output electrical components each include one of a coil, a section of transmission line, a coil and tuneable capacitance connected in a series tuned circuit, or a coil and tuneable capacitance connected in a parallel tuned circuit. The integrated filter includes input and output multilayer ceramic integrated coils which may be positioned so that capacitive coupling between the coils substantially cancels inductive coupling therebetween, and/or an interlayer gridded ground wall is positioned between the input and output coils.

30 Claims, 4 Drawing Sheets



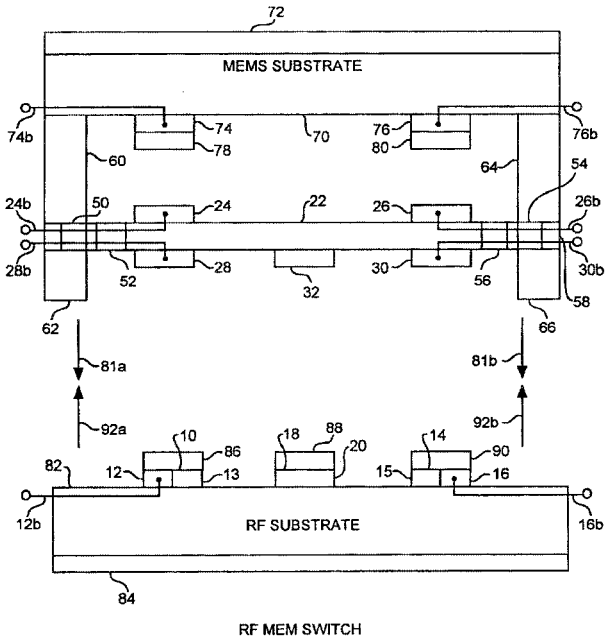
6,426,687 July 30, 2002

RF MEMS SWITCH

Inventor: Jon Victor Osborn.
Assignee: The Aerospace Corporation.
Filed: May 22, 2001.

***Abstract*—**A radio frequency (RF) microelectromechanical systems (MEMS) switch is manufactured by independent processing and subsequent bonding together of a MEMS substrate in alignment with an RF substrate. The RF MEMS switch is designed so as to encapsulate a flexing diaphragm supporting a switch electrode used with electrostatic flexing potentials to move electrodes of the MEMS substrate up and down over an RF transmission line structure of the RF substrate. The bonded combined MEMS switch structure is used to create an encapsulated RF MEMS switch suitable for direct coupling, AC coupling, and direct modulation of RF signals. The resulting MEMS RF switch device provides a reliable, minimally distorting RF transmission line geometry, free of contamination for use in high speed RF signal switching applications well suited for advance communication RF switching requirements.

18 Claims, 3 Drawing Sheets



RF MEM SWITCH

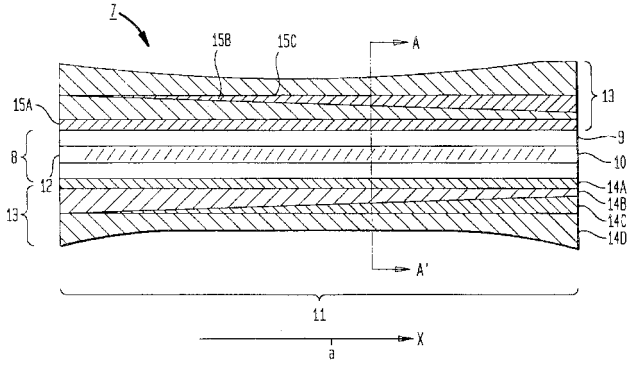
6,427,040 July 30, 2002

OPTICAL WAVEGUIDE GRATINGS DEVICE WITH ADJUSTABLE OPTICAL SPACE PROFILE

Inventors: Ashish Ahuja, Benjamin John Eggleton, Torben N. Nielson, and John A. Rogers.
Assignee: Lucent Technologies, Inc.
Filed: March 22, 2000.

***Abstract*—**In accordance with the invention, an optical waveguide grating with an adjustable optical spacing profile comprises a waveguide grating in thermal contact with one or more resistive film coatings. A coating extends along the length of the grating and its local resistance varies along the length of the grating. In one embodiment, a plurality of overlapping coatings are chosen so the resistance variation of each is different, thereby permitting a variety of heat generation profiles to be effected by independent control of the coatings. The different heat generation profiles, in turn, proportionately change the grating geometric spacing and local refractive index along the grating length, providing the desired adjustable optical spacing profile. Other embodiments use resistive films with abruptly changing or periodically changing heating variation.

11 Claims, 8 Drawing Sheets



6,427,041 July 30, 2002

ARTICLE COMPRISING A TILTED GRATING IN A SINGLE MODE WAVEGUIDE

Inventors: Thomas Andrew Strasser and Paul Stephen Westbrook.
Assignee: Fitel USA Corp.
Filed: May 31, 2000.

***Abstract*—**A refractive index grating according to this invention is a tilted grating in a single mode optical waveguide, with a photosensitivity profile that includes at least one "tuning region" in the waveguide core. Appropriate choice of the photosensitivity profile of the waveguide can result in a "supernull" in the $LP_{01,f}$ to $LP_{01,b}$ coupling. That is to say, the angular range of the tilt angle θ over which the core mode coupling is essentially zero (i.e., <-30 dB) can be substantially increased, to more than 0.1°, or even 0.2 or 0.5°, as compared to the angular range obtainable without a "tuning region" in the waveguide core. The increased angular range provides for improved manufacturability of the grating. In preferred embodiments the grating has a large cladding loss (>20 dB) and bandwidth (>20 nm). A method of trimming a grating is also disclosed.

11 Claims, 4 Drawing Sheets