Patent Abstracts

These Patent Abstracts of recently issued patents are intended to provide the minimum information necessary for readers to determine if they are interested in examining the patent in more detail. Complete copies of patents are available for a small fee by writing: U.S. Patent and Trademark Office, Box 9, Washington, DC 20231.

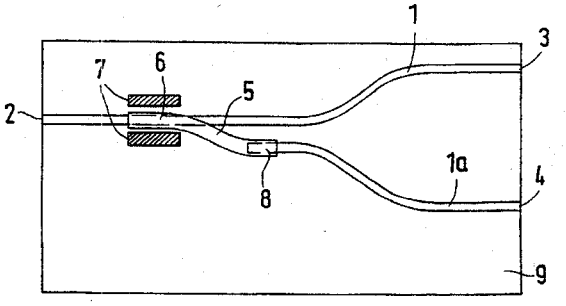
5,465,310 Nov. 7, 1995

Optical Hybrid Switch with Electrooptically Active Waveguide Structure Formed from an NLO Polymer

Inventors: Peter Kersten and Klaus-D. Matthies.
Assignee: Alcatel N.V.
Filed: Apr. 15, 1994.

Abstract—An optical hybrid switch is indicated that guides a voltage-controlled light flux supplied by an incoming passive optical waveguide (**1**) to at least one of two outgoing passive optical waveguides (**1**, **1***a*). The hybrid switch according to the invention preferably uses a NLO-polymer as the electrooptically active elements. The increased attenuation linked to the use of NLO-polymer is kept low by extending the incoming optical waveguide (**1**) without interruption as one of the outgoing optical waveguides. To steer the light flux to the other outgoing optical waveguide (**1***a*), the light is coupled out from an electrooptically active waveguide structure (**5**) by an adjustable coupler (**6**), and coupled to the other outgoing passive waveguide (**1***a*) through another fixed adjustment coupler (**8**).

8 Claims, 1 Drawing Sheet



5,465,395 Nov. 7, 1995

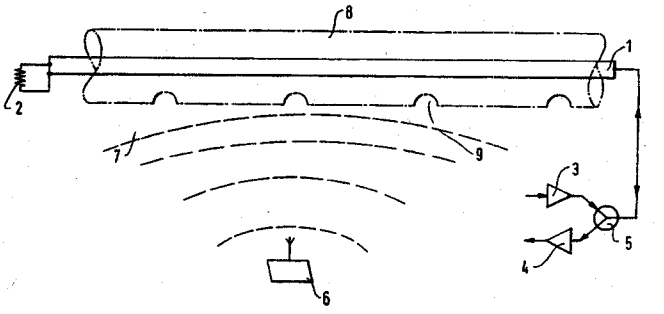
Communication Via Leaky Cables

Inventor: David V. Bartram.
Filed: Jan. 27, 1994.

Abstract—A communication system that utilizes leaky feeder cables (**1**) has a ruggedized tubular housing (**8**). The housing is preferably made of stainless steel, and to enable ingress and egress of signals the housing is provided with discontinuities. The discontinuities are preferably arranged to establish a regular pattern on the signals.

Publisher Item Identifier S 1051-8207(96)08990-8.

5 Claims, 5 Drawing Sheets



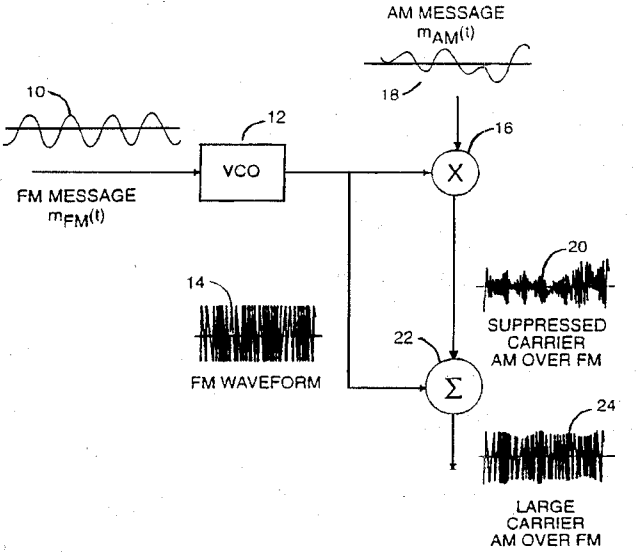
5,465,396 Nov. 7, 1995

In-Band On-Channel Digital Broadcasting

Inventors: Billie J. Hunsinger, A. J. Vigil, and Leland P. Solie.
Assignee: USA Digital Radio Partners, L.P.
Filed: Jan. 12, 1993.

Abstract—A system for combining AM and FM transmissions. In-band, on-channel, FM digital audio broadcast (IBOC FM-DAB) allows simultaneous transmission of DAB and FM over existing FM allocations without interfering with conventional analog FM signals. The utility of existing FM spectrum allocations is therefore enhanced.

17 Claims, 29 Drawing Sheets



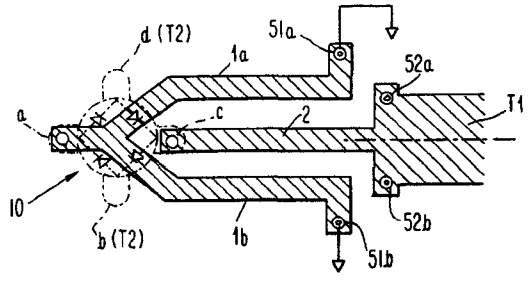
5,465,416 Nov. 7, 1995

Balanced Output High-Frequency Transducers and Mixers Using the Same with Symmetrically Located Components

Inventor: Yoshiyuki Yanagimoto.
Assignee: Hewlett-Packard Company.
Filed: Oct. 29, 1993.

Abstract—A transducer and a mixer with a double-balanced output according to the current invention are capable of frequency conversion in a microwave band with low distortion. The transducer of the mixer has symmetry of wirings. One side of a printed circuit board has branched strip lines and a single-strip line whose base portion serves as an RF input terminal, and the other side of the printed circuit board has twin-branched ground strips and a bridge-shaped ground strip. The combination of the branched strip lines and the twin-branches strips and the combination of the single strip line and the bridge-shaped ground strip serve as a transducer. One pair of diagonal terminals of the symmetrical diode ring is connected to the base portion of the branched strip lines. The other pair of diagonal terminals is connected to the tip of the single-strip line. The diode ring is connected to a transducer. One winding thereof is supplied with a local oscillator. An IF terminal is coupled to the center of the other winding thereof.

4 Claims, 6 Drawing Sheets



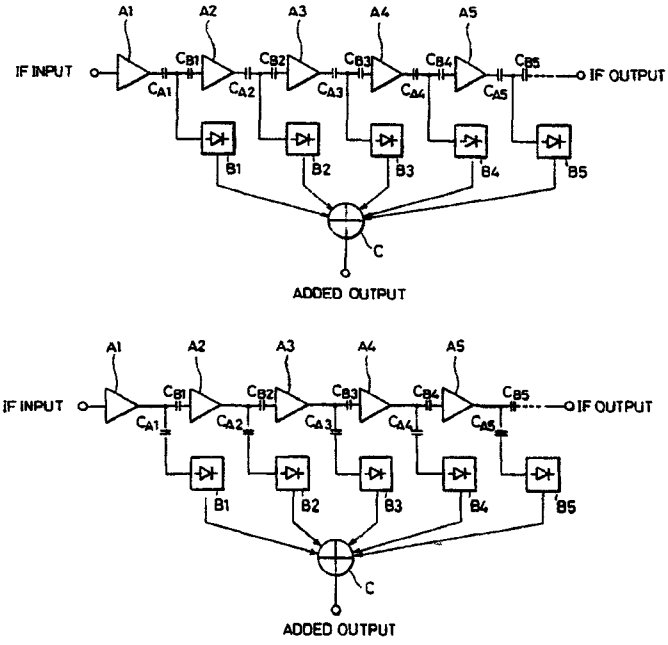
5,467,046 Nov. 14, 1995

Logarithmic Intermediate-Frequency Amplifier

Inventor: Katsuji Kimura.
Assignee: NEC Corporation.
Filed: May 22, 1992.

Abstract—A C-MOS logarithmic IF amplifier is provided that comprises a plurality of IF amplifiers cascade-connected to each other through a first coupling capacitor, a plurality of rectifiers each receiving a signal from the corresponding one of the plurality of IF amplifiers through a second coupling capacitor different in capacity from the first coupling capacitor, and an adder for adding the output signals of these rectifiers to each other. The first and second coupling capacitors are preferably connected in series to cascade-connect those IF amplifiers therethrough. Each of the rectifiers is applied with an output signal of the corresponding one of the IF amplifier from the connection point of the corresponding first and second coupling capacitors. By setting the first and second capacitors at optimum capacitive values, respectively, the IF amplifiers each makes it possible to cut off the low band side of its frequency band and the rectifiers each makes it possible to expand its frequency band to the low band side.

6 Claims, 10 Drawing Sheets



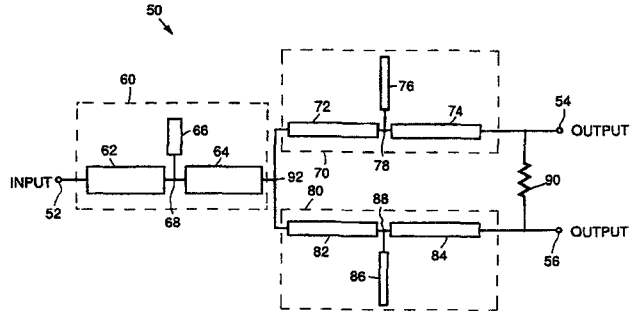
5,467,063 Nov. 14, 1995

Adjustable Microwave Power Divider

Inventors: Richard W. Burns and Darren E. Atkinson.
Assignee: Hughes Aircraft Company.
Filed: Sept. 21, 1993.

Abstract—An adjustable microwave power divider circuit (**50**), providing the capability of adjusting the power division ratio after the device has been fabricated. The device includes three 90-degree transmission line networks (**60**, **70**, **80**) incorporating open transmission line stubs (**66**, **76**, **86**), two networks (**70**, **80**) as power division networks, and the third network (**60**) as an input impedance-matching network. A series isolation resistor (**90**) is connected across the outputs of the power division networks. In operation, an input signal is split between the two power division networks (**70**, **80**) with equal voltage and phase. The power split between the two outputs is adjusted by adjusting the open stub length, thereby varying the characteristic impedance level between the two power division networks. Any signal reflected back into any one of the power divider networks is absorbed by the isolation resistor. The stub length can be trimmed after device fabrication using a laser or abrasion system.

10 Claims, 3 Drawing Sheets



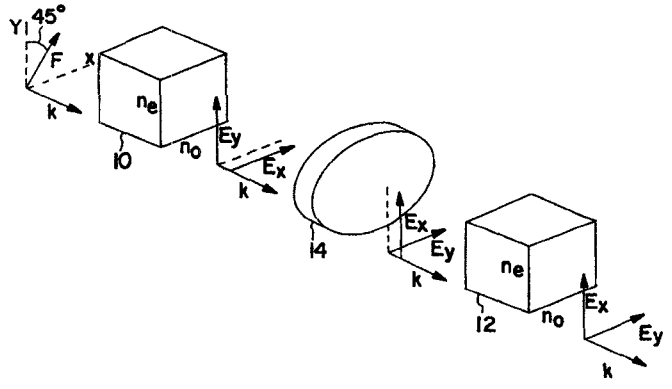
5,467,214 Nov. 14, 1995

Birefringence-Compensated Alignment-Insensitive Frequency Doubler

Inventors: Lee O. Heflinger, William W. Simmons, Randall J. St. Pierre, and Hagop Injeyan.
Assignee: TRW Inc.
Filed: Nov. 12, 1993.

Abstract—Apparatus and a related method for generating a second harmonic frequency optical output from a fundamental frequency input beam, without significant birefringence. The apparatus includes two Type II doubler crystals of equal length arranged with their corresponding axes parallel to each other and a polarization rotator positioned between the doubler crystals to rotate the polarization angle of a residual fundamental frequency component of an output beam from one of the crystals by 90° or an odd multiple of 90°. Random birefringence introduced into one of the doubler crystals is virtually cancelled in the other, and the assembly of the two crystals and the polarization rotator may be angularly adjusted as needed for phase matching or tuning, without detracting from the birefringence compensation capability. The invention is also disclosed in the context of a phase conjugated master oscillator power amplifier (PC MOPA) system.

9 Claims, 1 Drawing Sheet



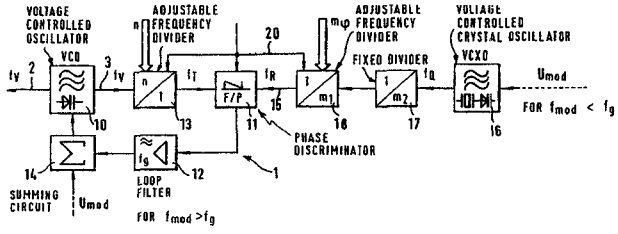
5,467,373 Nov. 14, 1995

Digital Frequency and Phase Modulator for Radio Transmission

Inventor: Hans-Peter Ketterling.
Assignee: Robert Bosch GmbH.
Filed: Jan. 15, 1993.

Abstract—For digital transitions from one binary logic level to another by frequency or phase shift of an electric carrier wave, the modulation sidebands are reduced by performing each transition by means of several phase steps at small intervals. Equal phase steps at varying intervals are preferred over equal intervals between varying phase steps although both procedures can provide a low-bandwidth transition. This procedure is readily incorporated at low cost in frequency synthesizers. The use of a higher-frequency master oscillator (**16**) followed by a fixed-ratio frequency divider (**17**) ahead of a variable-ratio frequency divider (**18**) makes it easy to shift phase or frequency digitally by small quick steps. Another variable-ratio frequency divider (**13**) is desirable by not essential in the final PLL between an ultimately controlled oscillator (**10**) and a loop filter (**12**) connected to a phase discriminator (**11**). The discriminator (**11**) and the two variable-ratio frequency dividers (**17, 13**) require simultaneous or coordinated initialization (line **20**). A binary digital signal produces GMSK modulation by means of a processor in which the divider ratios and their timings and sequence are stored. The steps are small enough for the loop filter to provide adequate bandwidth reduction. Steps each produced by a divisor one unit higher than the divisor that keeps the phase constant for the nominal frequency are produced by one cycle of the reference frequency, which corresponds to a number equal to the overall divisor of cycles of the master oscillator.

17 Claims, 4 Drawing Sheets



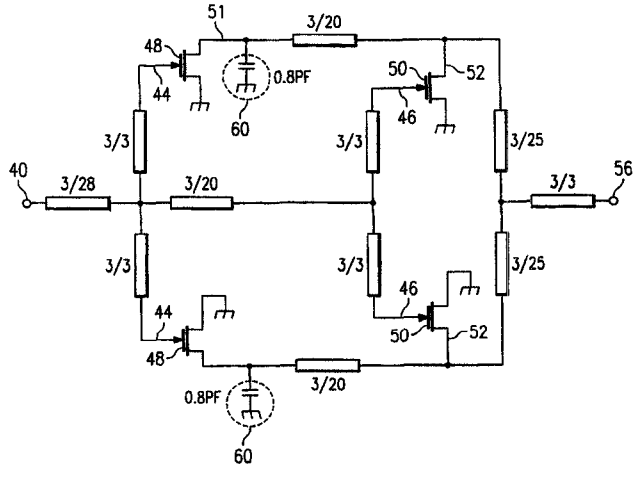
5,469,108 Nov. 21, 1995

Reactively Compensated Power Transistor Circuits

Inventor: Hua Q. Tserng.
Assignee: Texas Instruments Incorporated.
Filed: Aug. 15, 1994.

Abstract—A circuit for compensating for the phase velocity differences caused by the layout arrangement of a high-frequency transistor circuit comprises a shunt reactive element **60** coupled to an input or output terminal **51** of a first transistor **48** in a sequence of transistors arranged between input **42** and output **54** transmission lines. The shunt reactive element provides adjustment in phase such that signals traversing various routes through the circuit add in phase at the circuit output. The circuit may also include series resonant circuits **102** between the input terminals **44** and **46** of transistors in such a sequence and between output terminals **51** and **52** of transistors in such a sequence. The series resonant circuits appear as short circuits at certain frequencies and thereby may be used to virtually eliminate the phase progression along transmission lines linking transistors in the sequence.

10 Claims, 7 Drawing Sheets



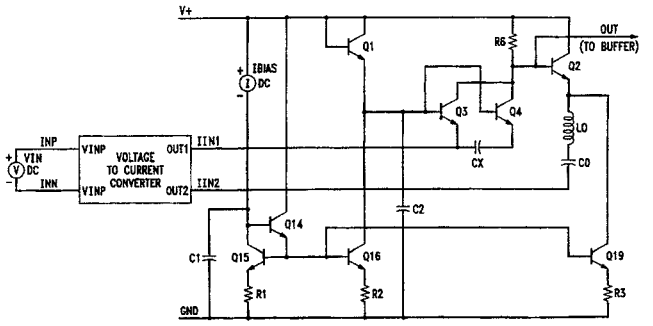
5,469,119 Nov. 21, 1995

Linear Voltage-Controlled Oscillator Using Fixed Capacitors in Lieu of Varactors

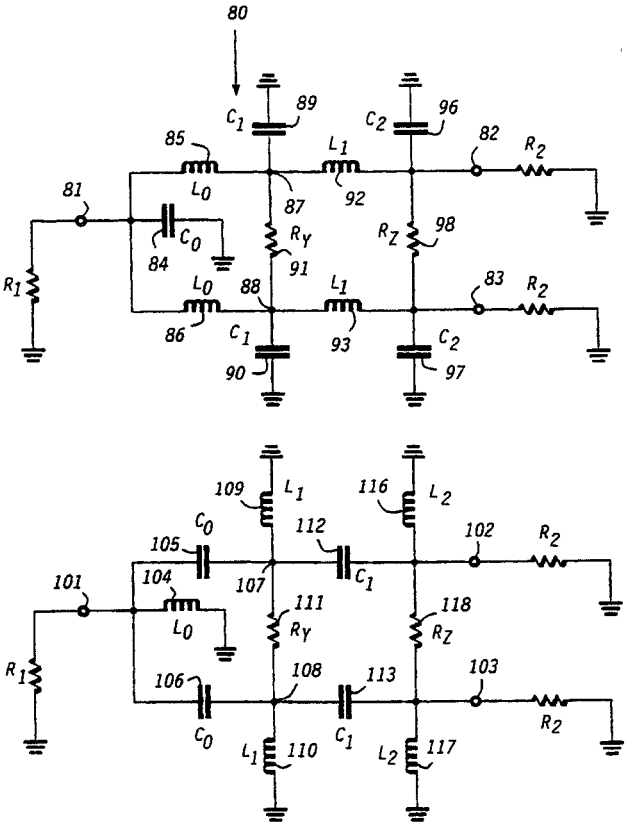
Inventor: Irving G. Post.
Assignee: AT&T Corp.
Filed: July 14, 1993.

Abstract—The frequency of a resonant circuit in the emitter path of an output transistor is caused to vary linearly with control voltage. The control voltage is applied to a circuit that constrains the ac current through the resonant circuit to be supplied through the emitters of a two-transistor current steering circuit. The sum of the two transistor's dc emitter currents is constant while the dc current through one of the two transistor's emitters varies as the square root of the control voltage.

10 Claims, 2 Drawing Sheets



24 Claims, 4 Drawing Sheets



5,469,129 Nov. 21, 1995

Impedance Transforming Three-Port Power Divider/Combiner Using Lumped Elements

Inventor: Michael Dydyk.
Assignee: Motorola, Inc.
Filed: Aug. 29, 1994.

Abstract—An impedance transforming three-port power divider/combiner includes first, second, and third lumped elements (e.g., **54**, **55**, and **56**). The first lumped element (**54**) couples the first port (**51**) and electrical ground. The second lumped element (**55**) couples the first and second ports (**51** and **52**), and the third lumped element (**56**) couples the first and third ports (**51** and **53**). A resistor (**59**) is coupled between the second and third ports (**52** and **53**). Capacitors (**57** and **58**) couple the second port (**52**) and the third port (**53**) to electrical ground. A signal input to the first port (**51**) results in identical divided output signals at the second and third ports (**52** and **53**). Signals input to the second and third ports (**52** and **53**) result in a combined output signal at the first port (**51**).

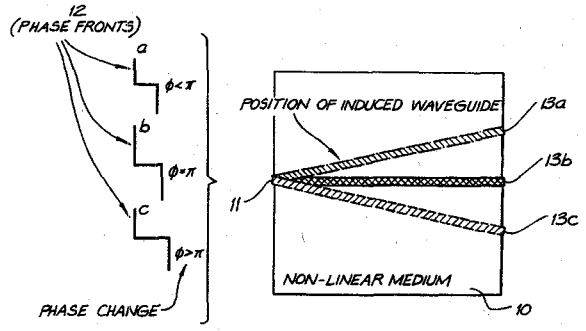
5,469,525 Nov. 21, 1995

Photonic Devices Using Optical Waveguides Induced by Dark Spatial Solitons

Inventors: Barry Luther-Davies and Yang Xiaoping.
Assignee: The Australian National University.
Filed: Dec. 7, 1994.

Abstract—Optical switching devices for use in photonics applications are created in a body of an optically transparent defocusing material having a third-order nonlinear susceptibility that is negative. The switching devices use optical waveguides that are created by the propagation through the material of dark spatial solitons, which are induced when an intense quasi-planar light wave having an amplitude or phase perturbation to at least one point or region of its wavefront is projected onto at least one location on the surface of the body to cause a change in its refractive index at the (or each) location. If the change in refractive index is rapid and transitory, an active photonic device is created. The devices created include steerable optical switches, cross-couplers, and multiport optical switchyards

16 Claims, 5 Drawing Sheets



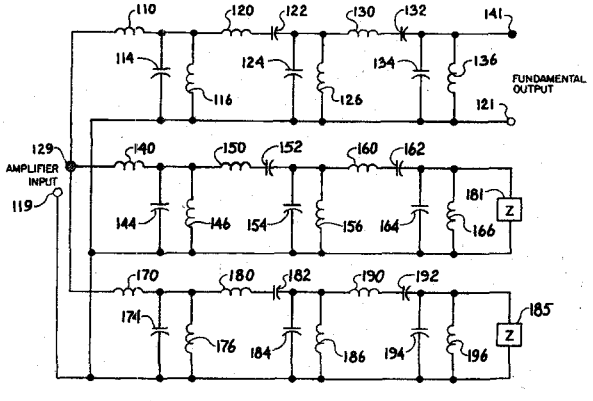
5,471,164 Nov. 28, 1995

Microwave Amplifier Linearizer

Inventor: James R. Penny.
Filed: Feb. 23, 1995.

Abstract—There is disclosed a system for linearizing an RF amplifier by the application of suitable load impedances to its second, third, and higher-order output signals, thereby reducing output distortion products and improving performance. Intermodulation distortion (IMD) reduction results from controlled termination of harmonic tuned filters produced by impedance selection and/or filter detuning. Preferably, the apparatus comprises parallel band-pass filters including a filter passing the fundamental signals only; a filter passing second harmonics; and a filter passing the third harmonics. These and optionally higher-order filters are employed for suppressing harmonic frequencies and reducing IMD. Preferably, all filters have sufficient isolation to prevent serious interaction between filters. Therefore, a selected mismatch provided at each of the harmonic output ports linearizes the amplifier's output. In some applications it is useful to mistune the filter to create a load impedance mismatch to cause the desired IMD reduction. The system may be at the front end and/or output of an RF amplifier. Utilizing a suitable probing device, the system may be used as a testing tool or for screening MIMIC RF amplifiers still in wafer form, as a testing tool or for screening MIMIC RF amplifiers still in wafer form, or to select a suitable load impedance for the MIMIC for later correction of IMD time, or for selecting MIMICS that exhibit better IMD characteristics.

19 Claims, 3 Drawing Sheets



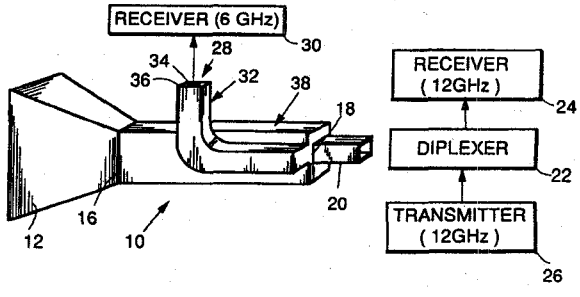
5,471,177 Nov. 18, 1995

Octave Band Gap Diplexer

Inventors: Thomas Hudspeth and Fritz Steinberg.
Assignee: Hughes Aircraft Company.
Filed: July 29, 1994.

Abstract—A diplexer (**14**) has a first rectangular waveguide (**38**) extending from a front port (**16**) to a back wall (**70**), the back wall having a rectangular opening (**72**) therein constituting a section of a second rectangular waveguide (**20**) and serving as a back port (**18**) of the diplexer. A first spectral region of electromagnetic power communicates between the front port and a side port (**28**), and a second spectral region of electromagnetic power communicates between the front port and the back port. A center frequency of the second spectral region is greater than a center frequency of the first spectral region by a factor greater than or equal approximately to two. The side port includes an aperture (**126**) disposed in a sidewall (**42**) of the first waveguide, a third waveguide (**32**), and a coupling element (**128**) extending from the third waveguide through the aperture into the first waveguide for coupling electromagnetic power at the first spectral region between the first and the third waveguides. Coupled resonators (**112, 124**) disposed within the third waveguide provide a bandpass filter characteristic at the first spectral region and inhibit propagation of electromagnetic power at the second spectral region between the first and the second waveguides. Within the inner conductor are two spaced apart cylindrical elements (**100, 112**) constituting plates of a capacitor (**102**).

19 Claims, 5 Drawing Sheets



5,471,181 Nov. 28, 1995

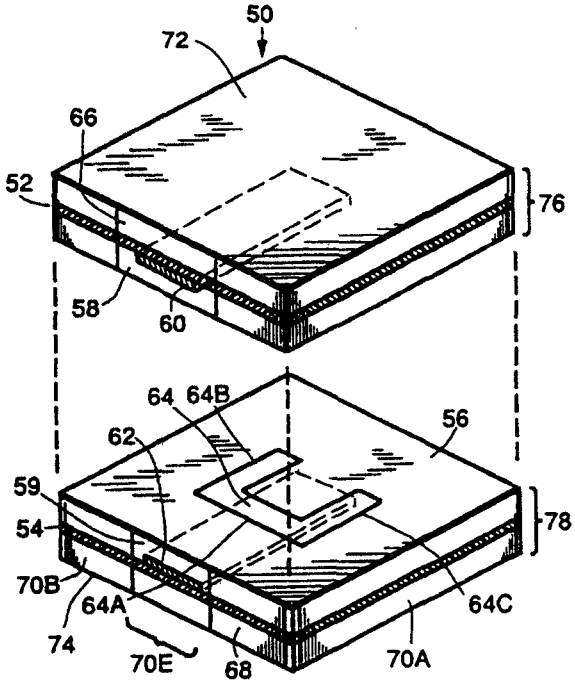
Interconnection between Layers of Striplines or Microstrip through Cavity Backed Slot

Inventor: Pyong K. Park.
Assignee: Hughes Missile Systems Company.
Filed: Mar. 8, 1994.

Abstract—An interconnection between layers of stripline or microstripline in a multilayer microwave circuit assembly, through electromagnetic coupling. The adjacent layers (**52** and **54**) utilize a common ground plane layer (**56**), and a U-shaped coupling slot (**64**) is formed in the common ground plane. To eliminate undesirable coupling to other transmission line modes, the coupling slot is enclosed by a cavity (**70**) for each layer. The cavity size is selected so that no cavity mode exists and to prevent formation of unwanted transmission modes. The "U" shape of the slot reduces the size of the cavity.

The interconnection can be used with adjacent layers of stripline, microstrip line, or stripline and microstrip line.

28 Claims, 5 Drawing Sheets



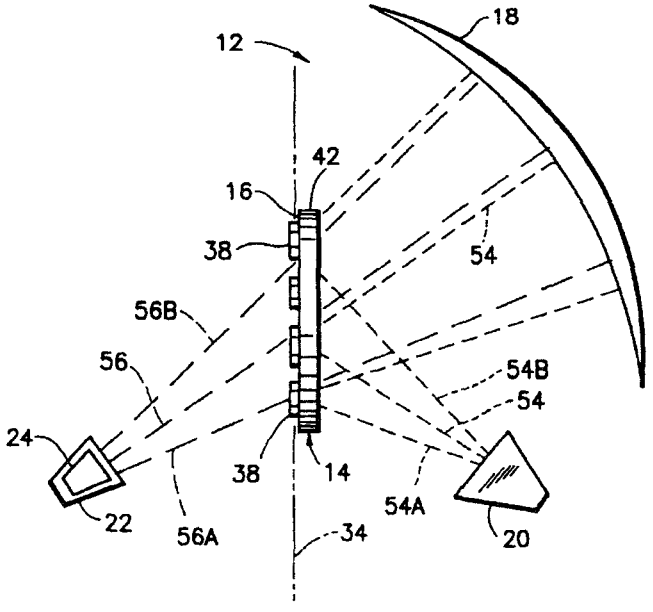
5,471,224 Nov. 28, 1995

Frequency-Selective Surface with Repeating Pattern of Concentric Closed Conductor Paths and Antenna Having the Surface

Inventor: Sina Barkeshli.
Assignee: Space Systems/Loral Inc.
Filed: Nov. 12, 1993.

Abstract—A microwave element having a frequency-selective surface (FSS) is formed of a substantially planar substrate of dielectric material that is transparent to electromagnetic radiation and supports an array of radiators wherein the radiators are arranged in a plurality of sets of radiators. In each set of radiators, in a preferred embodiment, there are three concentric radiators fabricated of an electrically conductive material. The outermost radiator has a hexagonal closed form, and the inter radiators are configured as circular annuluses. In each set, the largest radiator has a circumference equal to a wavelength of a first frequency of radiation to be reflected from the (FSS), the sets being spaced apart by a spacing equal to one-third of the foregoing wavelength in the dielectric substrate. In a two-dimensional array of the sets of the radiators, the sets are located at vertices of equilateral triangles. An antenna incorporating the FSS includes a first horn operative at radiation of the foregoing wavelength and a reflector, both of which are disposed on one side of the FSS. Additional horns operative at higher frequencies located on the opposite side of the FSS for transmittal of radiation through the FSS.

17 Claims, 4 Drawing Sheets



5,471,492 Nov. 28, 1995

Broadband Matching Network

Inventors: Rezin E. Pidgeon, Jr. and Grover H. Martin.
Assignee: Scientific Atlanta, Inc.
Filed: Dec. 1, 1992.

Abstract—A broadband matching network closely matches the output impedance of a broadband amplifier to the input impedance of a laser over a broad frequency band to facilitate efficient transfer of power therebetween. As a result, the broadband amplifier does not have to generate high output power levels that cause intermodulation distortion. The matching network includes a pair of matching transformers having toroidal cores and a filter circuit.

20 Claims, 8 Drawing Sheets