PASSIVE COMPONENTS AND FIBER-BASED DEVICES pdf

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A passive component is a module that does not require energy to operate, except for the available alternating current AC circuit that it is connected to. A passive module is not capable of power gain and is not a source of energy. A typical passive component would be a chassis, inductor, resistor, transformer, or capacitor. Generally, passive components are not able to increase the power of a signal nor are they able to amplify it. However, they can increase current or voltage by an LC circuit that stores electrical energy from resonant frequencies or by a transformer that acts like an electrical isolator. In the context of electronic technology, there are stricter guidelines for the term passive component. Electronic engineers view this term usually in correlation with circuit analysis, which involves methods of finding the currents through and the voltages across every component in the network. Free Webinar Register Today! A module that is not passive is called an active component. Passive components can be divided into two types: Does not have the capacity to absorb power from an external circuit over a period of time. A classic example would be a resistor. Does not have an input or output net power flow. This type includes components such as inductors, capacitors, transformers, and gyrators. The majority of passive components that have two terminals are usually defined as a two-port parameter, which is an electric circuit or module that has two pairs of terminals linked together by an electric network. Two-port parameters comply with the standards of reciprocity. A two-port network would be a transistor, electronic filters, or impedance matching networks. A transducer or switch would not be a two-port parameter because it is a closed system. Although active components typically have more than two terminals, they are not classified as a two-port parameter because they lack the properties. Passive components that use circuit architecture would include inductors, resistors, voltage and current sources, capacitors, and transformers. Likewise, passive filter are comprised of four elementary linear elements that include an inductor, capacitor, resistor, and transformer. Some high-tech passive filters can have non-linear elements like a transmission line.

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Fiber material systems, high-performance fiber designs, silica-based fiber reliability issues and fabrication processes, fiber passive components, fiber-based optical amplifiers and lasers, and.

Both these electronic components are different from each other. This article explains all about active and passive electronic components and the difference between the two. What are Active Electronic Components? Active electronic components are those that can control the flow of electricity. Most electronic printed circuit boards have at least one active component. Some examples of active electronic components are transistors, vacuum tubes, silicon-controlled rectifiers SCRs. What are Passive Electronic Components? Examples of passive electronic components are capacitors, resistors, inductors, transformers, and diodes. Electronic Components What is a Resistor? A Resistor is an electrical device that resists the flow of electrical current. It is a passive device used to control, or impede the flow of, electric current in an electric circuit by providing resistance, thereby developing a drop in voltage across the device. Resistor What is a Capacitor? The ability of a capacitor to store charge is measured by its capacitance. Capacitors are used in electronic circuits as energy storage devices. They are also be used to differentiate between high-frequency and low-frequency signals. Capacitor What is a Diode? A diode is a one-way valve for electricity. Diodes allow flow of electricity in one direction. Most diodes have a painted line on one end showing the direction or flow. The negative side is normally white. Integrated Circuits are package of several complex circuits. ICs are available in a wide variety of packages and sizes. Their applications are as varied as their packages. IC What are Transistors? A transistor is a semiconductor device. It is the fundamental building block of the circuitry in mobile phones, computers, and several other electronic devices. A transistor has very fast response and is used in a number of functions including voltage regulation, amplification, switching, signal modulation, and oscillators. Transistors may be packaged individually or they can be a part of an integrated circuit. Some of the ICs have billion of transistors in a very small area. Transistor Electronic Components Electronic components, both active and passive, are lifeline of any printed circuit assembly. They both play vital roles in the functioning of any electronic device. Electronic Components are intended to be connected together, usually by soldering to a printed circuit board PCB , to create an electronic circuit with a particular function.

3: Electronic component - Wikipedia

Components incapable of controlling current by means of another electrical signal are called passive devices. Resistors, capacitors, inductors, transformers, and even diodes are all considered passive devices.

WDM can divide the different wavelength fiber optic light into different channels. Higher output counts are built with a box to protect the splitting components. Testing a coupler or splitter both names are used for the same device or other passive fiber optic devices like switches is little different from testing a patchcord or cable plant using the two industry standard tests, OFSTP for double-ended loss connectors on both ends or FOTP for single-ended testing. First we should define what these passive devices are. An optical coupler is a passive device that can split or combine signals in optical fibers. Some PON splitters have two inputs so it would be a 2X Here is a table of typical losses for splitters. Mode Conditioning can be very important to testing couplers. Some of the ways they are manufactured make them very sensitive to mode conditioning, especially multimode but even singlemode couplers. Singlemode couplers should always be tested with a small loop in the launch cable tied down so it does not change and set the 0dB reference with the loop. Multimode couplers should be mode conditioned by a mandrel wrap or similar to ensure consistency. Shown below is a simple 1X2 splitter with one input and two outputs. Basically, in one direction it splits the signal into 2 parts to couple to two fibers. If the split is equal, each fiber will carry a signal that is 3dB less than the input 3dB being a factor of two plus some excess loss in the coupler and perhaps the connectors on the splitter module. Going the other direction, signals in either fiber will be combined into the one fiber on the other side. The loss is this direction is a function of how the coupler is made. Some couplers are made by twisting two fibers together and fusing them in high heat, so the coupler is really a 2X2 coupler in which case the loss is the same 3dB plus excess loss in either direction. Some splitters use optical integrated components, so they can be true splitters and the loss in each direction may different. So for this simple 1X2 splitter, how do we test it? Simply follow the same directions for a double-ended loss test. Attach a launch reference cable to the test source of the proper wavelength some splitters are wavelength dependent , calibrate the output of the launch cable with the meter to set the 0dB reference, attach to the source launch to the splitter, attach a receive launch cable to the output and the meter and measure loss. What you are measuring is the loss of the splitter due to the split ratio, excess loss from the manufacturing process used to make the splitter and the input and output connectors. So the loss you measure is the loss you can expect when you plug the splitter into a cable plant. To test the loss to the second port, simply move the receive cable to the other port and read the loss from the meter. This same method works with typical PON splitters that are 1 input and 32 outputs. Set the source up on the input and use the meter and reference cable to test each output port in turn. What about the other direction from all the output ports? In PON terms, we call that upstream and the other way from the 1 to 32 ports direction downstream. Simply reverse the direction of the test. If you are tesing a 1X2 splitter, there is just one other port to test, but with a 1X32, you have to move the source 32 times and record the results on the meter. What about multiple input and outputs, for example a 2X2 coupler? You would need to test from one input port to the two outputs, then from the other input port to each of the two outputs. This involves a lot of data sometimes but it needs to be tested. There are other tests that can be performed, including wavelength variations test at several wavelengths , variations among outputs compare outputs and even crosstalk put a signal on one output and look for signal on other outputs. Once installed, the splitter simply becomes one source of loss in the cable plant and is tested as part of that cable plant loss for insertion loss testing. Fiber optic switches are devices that can switch an input to one of several outputs under electronic control. Test as you would the splitter as shown above. Switches may be designed for use in only one direction, so check the device specifications to ensure you test in the proper direction. Switches may also need testing for consistency after multiple switch cycles and crosstalk. Attenuators are used to reduce signal levels at the receiver to prevent overloading the receiver. There is a page on using attenuators that you should read. If you need to test an attenuator alone, not part of a system, use the test for splitters above by using the attenuator to connect the launch and receive cables to see if the loss is as expected. Wavelength-division multiplexers can be tricky to test because they require sources at a precise wavelenth and spectral width, but otherwise the test procedures are similar to other passive components. Fiber optic couplers or splitters are available in a wide range of styles and sizes to split or combine light with minimal loss. All couplers are manufactured using a very simple proprietary process that produces reliable, low-cost devices. They are physically rugged and insensitive to operating temperatures. Optical isolators help protect sensitive laser sources and components from back reflections while fiber couplers, WDMs, circulators, and switches are the fundamental tools to creating fiber based optical circuits. We also offer a line of components for optogenetics applications, including fiber optic cannulae, patch cords, and light sources.

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4: HUBER+SUHNER - Passive components

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Often the ONU functions are separated into two parts: Each ONU only reads the content of those packets that are addressed to it. Encryption is used to prevent eavesdropping on downstream traffic. Because the optical distribution network ODN is shared, ONU upstream transmissions could collide if they were transmitted at random times. A grant is permission to use a defined interval of time for upstream transmission. The grant map is dynamically re-calculated every few milliseconds. Some services â€” POTS , for example â€” require essentially constant upstream bandwidth, and the OLT may provide a fixed bandwidth allocation to each such service that has been provisioned. DS1 and some classes of data service may also require constant upstream bit rate. But much data traffic, such as browsing web sites, is bursty and highly variable. Through dynamic bandwidth allocation DBA , a PON can be oversubscribed for upstream traffic, according to the traffic engineering concepts of statistical multiplexing. Downstream traffic can also be oversubscribed, in the same way that any LAN can be oversubscribed. The only special feature in the PON architecture for downstream oversubscription is the fact that the ONU must be able to accept completely arbitrary downstream time slots, both in time and in size. If the ONU has no traffic to send, it transmits idle frames during its excess allocation. In the upstream direction, each ONU optical network units or ONT optical network terminal burst transmits for an assigned time-slot multiplexed in the time domain. In the downstream direction, the OLT usually continuously transmits or may burst transmit. Radio frequency over glass[edit] Radio frequency over glass RFoG is a type of passive optical network that transports RF signals that were formerly transported over copper principally over a hybrid fibre-coaxial cable over PON. RFoG offers backwards compatibility with existing RF modulation technology, but offers no additional bandwidth for RF based services. Although not yet completed, the RFoG standard is actually a collection of standardized options which are not compatible with each other they cannot be mixed on the same PON. Some of the standards may interoperate with other PONs, others may not. It offers a means to support RF technologies in locations where only fiber is available or where copper is not permitted or feasible. Alternatively the wavelengths can be used collectively through statistical multiplexing to provide efficient wavelength utilization and lower delays experienced by the ONUs. PONs provide higher bandwidth than traditional copper based access networks. High cost of initial set-up, the cost of the WDM components. Temperature control is another challenge because of how wavelengths tend to drift with environmental temperatures. Work by Davey and Payne at BT showed that significant cost savings could be made by reducing the electronic equipment and real-estate required at the local exchange or wire center. For the downstream transmission, the OLT broadcasts optical signal to all the ONUs in continuous mode CM , that is, the downstream channel always has optical data signal. Use of CM would result in all of the signals transmitted from the ONUs converging with attenuation into one fiber by the power splitter serving as power coupler , and overlapping. To solve this problem, burst mode BM transmission is adopted for upstream channel. The given ONU only transmits optical packet when it is allocated a time slot and it needs to transmit, and all the ONUs share the upstream channel in the time division multiplexing TDM mode. In order to compensate the phase variation and amplitude variation in a short time for example within 40 ns for GPON [13] , burst mode clock and data recovery BM-CDR and burst mode amplifier for example burst mode TIA need to be employed, respectively. Furthermore, the BM transmission mode requires the transmitter to work in burst mode. Such a burst mode transmitter is able to turn on and off in short time. The above three kinds of circuitries in PON are quite different from their counterparts in the point-to-point continuous mode optical communication link. Fiber to the premises[edit] Main article: Fiber to the x Passive optical networks do not use electrically powered components to split the signal. Instead, the signal is distributed using beam splitters. Each splitter typically splits the signal from a single fiber into 16, 32, or up to fibers, depending on the manufacturer, and several splitters can be aggregated in a single cabinet. For example, due to the absence of switching, each signal leaving the central office must be broadcast to all users served by that splitter including to those for whom the signal is not intended. It is therefore up to the optical network terminal to filter out any signals intended for other customers. In addition, since splitters have no buffering, each individual optical network terminal must be coordinated in a multiplexing scheme to prevent signals sent by customers from colliding with each other. Two types of multiplexing are possible for achieving this: With wavelength-division multiplexing, each customer transmits their signal using a unique wavelength. With time-division multiplexing TDM , the customers "take turns" transmitting information. TDM equipment has been on the market longest. Passive optical networks have both advantages and disadvantages over active networks. They avoid the complexities involved in keeping electronic equipment operating outdoors. They also allow for analog broadcasts, which can simplify the delivery of analog television. However, because each signal must be pushed out to everyone served by the splitter rather than to just a single switching device , the central office must be equipped with a particularly powerful piece of transmitting equipment called an optical line terminal OLT. Passive optical components[edit] The drivers behind the modern passive optical network are high reliability, low cost, and passive functionality. Proposed requirements for these components were published in by Telcordia Technologies. WDMs are optical components in which power is split or combined based on the wavelength composition of the optical signal. Wavelength insensitive couplers are passive optical components in which power is split or combined independently of the wavelength composition of the optical signal. A given component may combine and divide optical signals simultaneously, as in bidirectional duplex transmission over a single fiber. Passive optical components are data format transparent, combining and dividing optical power in some predetermined ratio coupling ratio regardless of the information content of the signals. WDMs can be thought of as wavelength splitters and combiners. Wavelength insensitive couplers can be thought of as power splitters and combiners. An optical isolator is a two-port passive component that allows light in a given wavelength range to pass through with low attenuation in one direction, while isolating providing a high attenuation for light propagating in the reverse direction. Isolators are used as both integral and in-line components in laser diode modules and optical amplifiers, and to reduce noise caused by multi-path reflection in high-bitrate and analog transmission systems. An optical circulator operates in a similar way to an optical isolator, except that the reverse propagating lightwave is directed to a third port for output, instead of being lost. An optical circulator can be used for bidirectional transmission, as a type of branching component that distributes and isolates optical power among fibers, based on the direction of the lightwave propagation. Fiber optic filters are in-line, wavelength selective, components that allow a specific range of wavelengths to pass through or reflect with low attenuation for classification of filter types.

5: Active & Passive Components

The above mentioned network components can be broadly divided in to two categories - Active Components and Passive Components. Active Components are those devices which required to be supplied with external power (AC/DC/POE etc) in order to function.

Volume Author s: Hui Cao ; Junqiang Sun ; Weicheng Chen ; Dexiu Huang Show Abstract Widely tunable All-optical wavelength conversion between picoseconds pulses based on Four-wave mixing is proposed and experimentally demonstrated in cascaded highly nonlinear fiber. The signal pulse with GHz repetition rate and 1. The converted idler wavelength can be tuned continuously from No obvious changes of the pulse shape and width, also no chirp are observed in the converted idler pulse. The experimental results show that, with the clock pumping, the conjugated FWM component has higher intensity than that with the CW pumping. The reason behind it is that SBS process is greatly quenched with the clock pumping, so most power of the pumping light contributes to nonlinear interaction with the probe signal during the propagation through DSF. As a result, the FWM components have lower intensity, and the pump and probe signal spectrum is also much less broadened. The measurement shows that, the improvement of FWM efficiency is negligible when the pump power is less than 10dBm. But when the pump power is greater than about 11dBm, the improvement becomes significant and increases with the increased pump power. When pump power reaches 17dBm, the improvement is increased to about 9dB. Shenping Li ; A. Boh Ruffin ; Dmitri V. Nolan Show Abstract In this paper, we studied SC generation in fiber lasers and in optical fibers pumped by different light sources which include fs and ps pulse sources, and continuous-wave CW amplified spontaneous emission ASE light sources. First, we demonstrated SC generation with a 10dB spectral bandwidth of nm in a fiber ring laser with conventional nonlinear fiber. A bandwidth of nm at dB level with an average spectral density of 2. Various approaches to flattening the spectrum and increasing the spectral width were also studied. A spectral bandwidth of over nm was demonstrated. Finally, the generation of broad comb-like-spectral light based on the pulse compression of 40GHz optical pulses in a new nonlinear dispersion-decreasing fiber with high SBS threshold was studied. A continuum light source with over channels and a channel spacing of 40 GHz was achieved. Haiyan Chen ; Dingxiong Tao; Xiaoliang Ma Show Abstract In this paper, we report on a method of developing a fiber pressure sensor using a conceptually new approach: This system consists of three parts: The pressure sensor part consists of single-mode fiber resonator SMFR with stress pressure, birefringent resonator and a polarizer. The elementary theoretical results are given. It is demonstrated the validation of the proposed solution. To validate the theoretical results that the fluid coefficient of viscosity has great influence on the maximum sensitivity at the resonant frequency, the acoustic sensitivity frequency response of the fiber-optic hydrophone has been measured in a standing-wave tank filled with castor oil. The viscosity coefficient of castor oil will change with the variation of the temperature. Experimental Results show that the fiber-optic hydrophone frequency responses of different temperature have identical form except that the maximum sensitivities are different. While the maximum sensitivities near the measured resonant frequency of Hz go down with the fall of the temperature, i. This fiber-optic hydrophone is a prototype device for a class of sensors that used to eliminate aliasing in the future sonar systems. Dichlorotris 1, phenanthroline ruthenium II was used as an oxygen indicator, which was coated on to the surface of a 1mm diameter U-shaped POF. Phase modulation technique is used to measure fluorescence lifetime. We study the characteristics of this sensor based on intensity detection. The result is linear in the measurable range. The sensing sensitivities of temperature is 0. The sensitivity reaches 8. There is a good linear relationship between the force and the wavelength shift. The advantages of the sensor include simple structure, high sensitivity, low cost, and good repeatability, etc. Min Wang ; Fufei Pang ; Tingyun Wang Show Abstract The fiber-optic evanescent wave temperature sensor is investigated experimentally, for which the sensing probe consists of a fiber-optic coupler. The coupling visibility fluctuation of the fiber coupler probe was measured when the environmental temperature shifted center wavelength of the LD light source. From the experimental results, with the center wavelength of LD shift to longer wavelength, the transmission loss increased, and the wavelength shift of LD was about 0. By using the supermode theory, the effect of wavelength shift of light source on the fiber coupler sensor was discussed. Fini Show Abstract As fibers with ever increasing mode area are used to enable high power fiber amplifiers and lasers, it important to use realistic models of bending in fiber design. The standard approach is to consider only the bend-induced losses and mode-coupling when designing an amplifier, even though changes in mode shape are well known in principle. But even coiling a fiber to fit into a reasonable package size produces large bend-induced distortion for fibers with large mode area. Here, several recent results are reviewed. Distortion significantly impacts amplifier performance by reducing the area, and can further degrade the interaction of light with the gain. Scaling rules for the distortion are derived from an intuitive sensitivity model. Bend distortion considerations lead to new strategies for large mode area fiber design, and cast existing strategies in a new light. Finally, the ratio of GeO_2 to SiO_2 should be controlled to obtain long fluorescence lifetime for fabricating highly ytterbium-doped fiber with required numerical aperture. Walton ; Luis A. Zenteno Show Abstract Suppressing nonlinear effects such as stimulated Brillouin scattering SBS , stimulated Raman scattering SRS in high power fiber amplifiers and lasers is crucial for scaling up output power well beyond kW levels. The paper uses a sophisticated model to analyze many different fiber amplifier designs and compare their performance. The systematic modeling reveals many interesting results and shows that a co-pumped amplifier can be optimized by carefully choosing fiber lengths and applying additional heating to the fiber. It also explains why the amplifier configuration can make great impacts on SBS characteristics. The systematic modeling concludes that in general a counter-pumped fiber amplifier has the lowest nonlinear effects and is less sensitive to the fiber length comparing with the co-pumped amplifiers. However, the co-pumped amplifier is easy to integrate with an all-fiber-based pump combiner without risking LD damage and it can be heated to increase SBS threshold by a factor of 1. Woojin Shin Show Abstract We propose the novel fiber devices with laser machining technique. Diffraction beam patterns of the zeroth and the high order due to end-surface grating were observed. For the monitoring of signals in coarse wavelength division multiplexing wavelength, the measured diffraction beam patterns according to the wavelength of input light were investigated. Also, a structurally induced compact helicoidal long-period fiber grating HLPFG was fabricated by twisting a single mode fiber with CO_2 laser beam and its characteristics were experimentally investigated. The eccentricity between the core and the cladding of a fiber is introduced from the screw-type deformation. The novel peak shift of a HLPFG was analyzed with co-directional or contra-directional torsion to the helix. The general formulas of the transfer function for the multiple-cavity Fabry-Perot filters are derived with the transfer matrix method. Transmission spectrum characteristics of the filters with different number of cavities are simulated, analyzed and compared. Numerical results show that near-rectangular bandpass shape can be realized by choosing the proper index modulation depths for every forming FBGs. And the simulations clearly demonstrate that the more we increase the number of cavities the more the shape of the central transmission peak is getting rectangular. Zhu Show Abstract In this paper, special long period fiber gratings with Gauss envelope and rotary refractive index modulations, as well as ultra long period fiber grating are fabricated by using the high frequency CO_2 laser pulses exposure method. The characteristics of these LPFGs are investigated by experiment. It is anticipated that these novel LPFGs would find potential applications in optical fiber sensing and optical fiber communication due to their special optical waveguide structure. Effects of Doppler shift to SNR and band requirement of optical filter are researched in this paper. Given the wavelength is nm, strong fiber and Blackman windows function are used in designing fiber grating to satisfy the need of the inter-satellites communication system. And the simulation and experiment results show that fiber Bragg grating can be used as optical filter in optical signal communication system of satellites communication. The output power was two times higher than that in standard double-cladding fiber under the same threshold of damage. Because of its flexibility of structure design and much larger index contrast between the core and effective cladding than the conventional fibers, photonic crystal fibers PCFs are becoming to be an attractive candidate to form this kind of highly nonlinear fibers. Penty ; Ian H. White ; Jon V. DeGroot ; Terry V. Clapp Show Abstract In this work the recent interest in waveguides for use in short optical links has motivated a study of the modal noise dependence on launch conditions in short-reach step-index multimode polymer waveguides. Short optical links, especially those with several connection interfaces and utilising a restricted launch are likely to be subject to a modal noise power penalty. Our simulation results show that uniform fiber Bragg gratings with sidelobes negatively affect the Q-switched fiber laser performance. Their sidelobes introduce undesired multi-peaks and decrease the output pulses energy, while the apodized fiber Bragg grating with high sidelobe-suppression-ratio is able to eliminate the multi-peaks effectively and generate higher energy pulses with smoother profile. Experimental work has been conducted to validate the proposed model and verify the simulation results. Lin Ma ; Yuji Matsuura Show Abstract We demonstrate confinement of light in a submicron-diameter silica core by adding a Bragg multilayer cladding. The optical properties of Bragg fiber taper can be fine tuned via controlling taper diameter and multilayer structures. The proposed devices will be good candidates as polarization selection and mode conversion devices for nano-optical applications. The dual-wavelength packets are written in and read out of DLOB by single control signal. As the power of the control signal increasing, the output of the signals is better. For Raman amplifier pumps to signals noise transfer, Rayleigh backscattering and polarization fluctuations of the pump are additional noise sources, which are discussed including their impact on system performances. It was shown that the gain spectrum of B-DFRA which pump wavelengths were arranged in a geometric proportion interval sequence were flatter than one which pump wavelengths were arranged in an equal interval sequence in the same conditions. Raman amplification in fibers has found increased use in especially long-haul, high-capacity systems, mainly due to its low noise figure and versatile gain bandwidth. In this paper, we describe how Raman amplification can be used in DCF to realize discrete dispersion-compensating amplifiers, the so-called dispersion compensating Raman amplifier DCRA. The main focus is on system applications and demonstrated results using DCRAs. Comparing to the conventional rare-earth doped fiber amplifiers, RFAs have flexible signal gain band and low noise figure NF level [1]. The experiments have successfully confirmed that the pumping efficiency improvement for this kind of RFA is more efficiency than other types of RFAs. Although it is crucial to numerically predict the characteristics of RFA such as signal power and noise figure NF versus pump wavelength, pump power, gain medium characteristic and so on, the optimum design of RFA parameters has not yet been addressed. This is a typical boundary condition problem and Newton method is used. As we get the distribution of pump power and signal power along the DCF, the noise item at different frequency can be found by the relaxation method. After several iterations, all WDM channel signals and noise are convergent as predict.

6: Providing Fiber-Based Business Services â€“ All Systems Broadband

The devices are used to split respectively combine power or can even be made to be wavelength sensitive and to provide a WDM functionality. Splitters Planar Lightwave Circuit (PLC) splitters follow a specific manufacturing process for optical passive network components.

The effects of the fiber cladding on the wavefronts of the UV writing beams and the interference fringes formed inside the fiber have been addressed in this study. The wavefronts of the UV beams have been analyzed and it has been demonstrated that the existence of the fiber cladding significantly alters the wavefronts of the UV beams in one plane and makes them highly astigmatic. Based on the calculated wavefront radii of the UV beams, a model has been established for prediction of the interference fringe pattern formed in the fiber core area. Young-Geun Han ; Ju Han Lee ; Sang Hyuck Kim; Sang Bae Lee Show Abstract We experimentally investigate the simultaneous measurement of bending and temperature using the phase-shifted long-period fiber gratings LPFGs based on the resonant wavelength shift and wavelength spacing change by the bending and temperature change, respectively. The UV post-exposure has the effect of inducing a positive phase shift for the core mode while decreasing the coupling strength between the core and cladding modes. The spectral evolution of the transmission thus depends on the initial coupling strength of the grating. The left and right resonant peaks shifted into the longer wavelength due to the variation of the grating period as the bending curvature increased and the wavelength spacing between two peaks was not changed by the bending. However, since the phase-shifted LPFG has two different sections with different photo-induced average indices, the wavelength spacing between left and right peaks decreases as the temperature increases. Based Consequently, it is possible to discriminate two effects between bending and temperature based on the proposed schematics. The thermal-strain cross effect can be avoided. Moreover, its pressure sensitivity is The linearity of this sensor reaches 0. Shide Song ; Qingxu Yu Show Abstract In this paper, we studied temperature characters of LPFG fabricated with a new designed system, which focuses the CO2 laser pulse beam on standard single mode fiber with azimuthally symmetric irradiation. A high temperature optical fiber sensor based on such a LPFG has average high temperature sensitivity of 0. Meanwhile, the sensor with different temperature measurement range can be easily obtained by adjusting the fabricating parameter of LPFG. The growth characteristics of grating strength and Bragg wavelength shift are investigated. During UV irradiation, the evolution of the type I grating exhibited typically different stages: With further UV exposure, the decrease of the type I grating was followed by the appearance of regenerated grating. But these phenomena were not observed under relatively low energy UV pulses. When the regenerated grating entered into saturation stage again, it became stable and had higher reflectivity and broader bandwidth than the type I grating. The wavelengths of the reflected light from nm FBGs are measured in the temperature range from 77K to K. The temperature sensitivity of FBG sensors can be reduced by more than 10 times, reaching 0. If the device is used in sensing, the temperature sensitivity of 0. Furthermore, when the FBG in the forficiform device is bonded on an aluminum substrate or a poly substrate, the temperature sensitivity can reach 0. The key component in this scheme is our linearly tunable, chirped FBG without its center wavelength shift, which was fabricated with the S-bending method using a uniform FBG. Xinyong Dong ; Ping Shum ; Xiufeng Yang ; Chi Chiu Chan Show Abstract The response of a transmission spectrum to applied axial strain for an in-fiber Mach-Zehnder interferometer that based on two tcascaded long-period fiber gratings is studied theoretically and experimentally. Linear strain-induced wavelength shift with a tuning rate of Guangqiang Yang ; Xiaomin Ren ; Jien Song ; Yongqing Huang Show Abstract In this paper, a novel structure design of all-fiber tunable compressor has been proposed which based on two cascaded uniform fiber Bragg gratings and a Piezoelectric Ceramic is used to make the compressor posses tunable function. By simulating numerically the evolution of picosecond pulses in the compressor, we have found that picosecond pulses can be compressed effectively, if the parameters of gratings and pulses were chosen properly. Additionally, the further study reveals that the width of output pulse could become narrower and the fiber gratings needed would be shorter, if the negative chirp of initial pulse were induced by pulse laser. It is characterized by single-grating structure, equal reflectivity peaks, narrow channel bandwidth, flat-top, high bandwidth utilization ratio, standard 50 GHz channel-spacing, and realizing dispersion compensation and wavelength filtration simultaneously. Based on ameliorated layer-peeling algorithm, that is adopting channel-by-channel windowing method rather than all-channel integral windowing method, this novel SFBG is synthesized successfully. According to the grating structure of the synthesized SFBG, reflectivity spectrum, group delay and group delay ripper are analyzed based on the method of transfer matrix. The results show this SFBG does an almost perfect job of reproducing the desired spectrum. Jinsong Leng ; Wei Zhang; J. Williams Show Abstract The microwave photonic responses of super-structured fibre Bragg gratings in combination with dispersive fibre are investigated theoretically and experimentally. The super-structured gratings are optimised, taking account of the spectral response of the broadband source, EDFA and optical tunable filter to achieve a filter response with side-lobe suppression of more than 60 dB. Deyuan Chang ; Shuisheng Jian Show Abstract The asymmetry index profile in the transverse plane, which could be induced during the writing of fiber Bragg gratings with UV side-exposure techniques, may cause the photo-induced birefringence, as was numerically evaluated by Kokou Dossou et al. But the impact of this photo-induced birefringence on the performance of fiber grating components remains to be determined. In this paper, we numerically analyzed this kind of impact by using a finite-element method with a full vectorial formulation and the coupled-mode equations. It shows how the birefringence affects the reflection spectrum, the group delay. This numerical method will be useful in designing and analyzing fiber gratings. Caihui Di; Changhe Zhou ; Huayi Ru Show Abstract Driven by the fast development of fiber communication networks, there exists a strong need for a dynamic coupler with a large number of output ports. In our work, we developed a dynamic optical coupler by employing a specially designed Dammann grating that consists of two areas, which are the Dammann-grating area and the blank area. When incoming beams entirely impinge on the blank area of the plate, this device achieves a low insertion loss of 0. Therefore, this device can achieve the beam splitter and combiner as a switch between them according to the relative shift between two areas of the plate. The experimental results are reported in detail in this paper. On this basis, the AOM was removed and two gratings were used as the cavity mirrors. An all-fiber F-P cavity mode-locked fiber laser was realized for the first time. Similar mode-locked pulses were observed when using two ring reflectors as the cavity mirrors. SPM effect combining with saturable absorption effect is proposed as an explanation. The all-fiber F-P cavity fiber laser provides a new method to generate mode-locked pulses. Zhi Tong ; Huai Wei ; Shuisheng Jian Show Abstract A theoretical investigation of bidirectionally dual-order pumped distributed Raman amplifiers is presented in detail, and comparisons with other Raman amplification schemes, i. The results show that symmetric bidirectional dual-order pumping can achieve the best optical signal-to-noise ratio performance by appropriate choice of the second-order pump wavelength and second-to-first-order pump power ratio for both short- and long-span conditions. Random fluctuations of holes radius and position in PCFs are introduced to analyze their effect on the guiding ability. The new fiber has excellent dispersion performance. It allows WDM technology to be applied on the range: It has relative low relative dispersion slope called as RDS, which makes high bit rate transmission system be easy to realize full dispersion compensation with low cost. Low water peak characteristics of new fiber provide necessary condition to extend operation range to E band. New fiber has moderate effective area, which makes new fiber have flexible amplification choices. Excellent PMD performance makes new fiber be suitable for higher bit rate transmission system. In the new GC-EDFA, the lasing oscillation for clamping the gain is produced between a FBG and a fiber reflection mirror, and a variable optical attenuator VOA is used to change the loss of the laser, which is filtered solely from a narrowband filter for tuning the clamped-gain, however it does not change the signal power directly. Meanwhile, the double-pass configuration enhances efficiently the gain, therefore, compared with the single-pass configuration, the maximum possible input signal power for gain-clamping is greatly extended. Furthermore, the FBG can depress the strong backward amplification spontaneous emission in double-pass configuration, so it can reduce the noise figure a certain extent. Tang; Qinghao Ye; Yuxing Xia Show Abstract A new design of all-optical gain-clamped L-band double-pass DP erbium-doped fiber amplifier EDFA has been demonstrated, in which, the input port and the odd-channel output port of interleaver are connected with a DP configuration EDF through a circulator to form lasing ring cavity for clamping gain, and the even port is utilized to export the amplified signals. A low NF can be achieved because the lasing co-propagates with the signal, and the lasing is exported separately from the amplified signal thanks to interleaver. Meanwhile, the fiber Bragg grating incorporated in DP configuration suppresses the backward ASE generation, and therefore improves efficiently the gain and lowers the NF. In such a way, the clamped gain of Previous researchers generally studied one-pass all-fiber frequency shifter of polarisation maintaining fiber. This paper discusses multiple-pass all-fiber frequency shifting of polarisation maintaining fiber theoretically. The solutions of coupled-mode equations for polarisation maintaining fiber when the two orthogonal modes exist is discussed, and the multiple-pass frequency shifting is analyzed. The special issue of the two-pass frequency shifter where the linearly polarized light launching into one polarisation axis of the polarisation maintaining fiber is discussed. Tingyun Wang; Xiaoyong Guo ; Zhenyi Chen Show Abstract Optical fibers for UV transmission have been under intensive development for medical, industrial and other applications during the past several years. Because of this high-speed growth, the problems associated with the damage and transmission properties of silica fibers in the UV region need to be deeply solved. In this paper, in order to make silica-core fibers with excellent transmission in a UV spectral region, an improved silica-core fiber is fabricated by a new fabrication technology of UV-transmission fibers. The technology of fabricating a UV fiber using silica glass is based on two effects of previous UV irradiation and heat treatment. The structural defects and color centers are purposefully caused in silica glass by irradiation silica glass preform with UV, then the structural defects and color centers are removed by performing heat treatment in drawing tower during drawing optical fiber process. The defect generation mechanism in the silica optical fibers is investigated in the paper, and these defects termination principle is also developed. Finally, UV fibers have been tested. From these tested results, UV fibers fabricated by proposed technology have reached the level of high characteristics. Lina Ma ; Ting Chen ; Deyuan Chang ; Shuisheng Jian Show Abstract In this paper, we demonstrate a chirped grating designed to compensate for both second- and third-order fiber dispersion. The fabrication technique of chirped gratings is the phase-mask beam scanning method by using a standard unchirped phase mask and by tapering a fiber in the region of the grating. We have made theoretical analysis on the chirp induced by linear and nonlinear taper profiles. The reflectivity and time delay curve of such fiber Bragg grating have been calculated. It consists of two intracore Bragg reflection gratings separated by an optical phase shift; the grating was formed through double exposure phase-mask method. The laser wavelengths are nm and nm, respectively, with less than 0. In this paper, we successfully demonstrated automatic and tunable compensation for first-order polarization-mode dispersion. And find a real time adaptive dispersion compensation technique based on BER feedback and fuzzy logic control. At the same time, the paper discusses the relation between BER and chromatic dispersion. To compensate the CD, the fuzzy logic control is used. We give the fuzzy logic control arithmetic in the paper, put up the rule in the fuzzy logic control. We use the Bragg Gratings to compensate the CD. At last, we summarize the paper. Based on the Fourier heat transmission principle and variable separation method, we derive the analytical transient expression of thermal field for general thermo-optic TO devices. Based on the analytical expression, time response and steady-state temperature distribution of thermal-optic devices are presented. The expansion rule of total internal reflection TIR in the thermal field is developed mathematically, and quantitative calculation is given about specific expansion value. The computer simulation results show the structure presents a high reflection coefficient indeed, the reflection loss is only The computer simulation results agree with the calculation well. Walter Yen Show Abstract The serious downturn of optical fiber communication industry in the past three years speeds up the consolidation of passive component manufacturing.

7: Ultrafast laser inscription - Edinburgh Research Explorer

Those devices or components which required external source to their operation is called Active Components. For Example: Diode, Transistors, SCR etc Explanation and Example: As we know that Diode is an Active Components. So it is required an External Source to its operation. Because, If we.

PASSIVE COMPONENTS AND FIBER-BASED DEVICES pdf

8: What is Passive Component? - Definition from Techopedia

A passive optical network (PON) is a telecommunications technology used to provide fiber to the end consumer, both domestic and commercial. A PON's distinguishing feature is that it implements a point-to-multipoint architecture, in which unpowered fiber optic splitters are used to enable a single optical fiber to serve multiple end-points.

9: Passive optical network - Wikipedia

A passive component is a module that does not require energy to operate, except for the available alternating current (AC) circuit that it is connected to. A passive module is not capable of power gain and is not a source of energy.

PASSIVE COMPONENTS AND FIBER-BASED DEVICES pdf

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