Lightvision

A publication of Lightwaves2020 Dec. 15, 2004

Lightwaves2020 and United Optronics is committed to providing high quality, low-cost, "one stop" solution for all your fiber optic needs.

Inside This Issue

Lightwaves2020

1323 Great Mall Drive,
Milpitas, CA 95035-8037
Tel. 408-503-8888 Fax. 408-503-8988
www.lightwaves2020.com

The Fiber Optics Dream Team

Dr. J.J. Pan, a pioneer in fiber optics technology and mentor to many of the leaders in the fiber optics industry today, founded Lightwaves2020 in 1999. Lightwaves2020's mission is to develop the next generation of dynamic optical networks and reduce the cost of optical communication through innovative technology. We have developed a full array of integrated and intelligent fiber optic components and subsystems ranging from Ultra Compact EDFAs, Liquid Crystal-Based VOAs, to Miniature Optical Power monitors and integrated function modules. These products were all developed to meet the diverse needs of our customers.

Lightwaves2020 understands that product quality, flexible technical service, and accurate customer support are extremely important elements for new technologies and newly introduced products. We are proud to have all our products manufactured here in the United States in the heart of the Silicon Valley by our highly trained and skilled technicians. Through innovative design and advanced fabrication processes, we are able to achieve high efficiency and scalability. We are committed to passing on costs savings to our customers while maintaining the highest quality standards in our products.

Many customers seeking standardized fiber optic component solutions face a challenge today. Asia based manufacturers are now able to produce mature products like isolators, circulators, and thin film WDM devices at low costs, but often customers are not satisfied with product quality and lack of technical support.

In 2002, Dr. Pan founded United Optronics Inc. (UOI) to solve this dilemma. While Lightwaves2020 is dedicated to providing products and solutions for the next generation of optical networks, United Optronics's mission is to provide its customers the most cost efficient products and solutions backed by a highly trained and knowledgeable technical support staff. UOI's key advantage is an international network of trusted OEM manufacturers that meets or exceeds our high standards of quality. We have long-term relationships with these manufacturers and know their staff, design, and manufacturing processes intimately.

Lightwaves2020 and United Optronics are committed to being your partner for the next generation of fiber optics networks and providing cost efficient solutions to fit your needs.

Lightwaves2020's LC VOA Product Portfolio Update and Selection Guidance

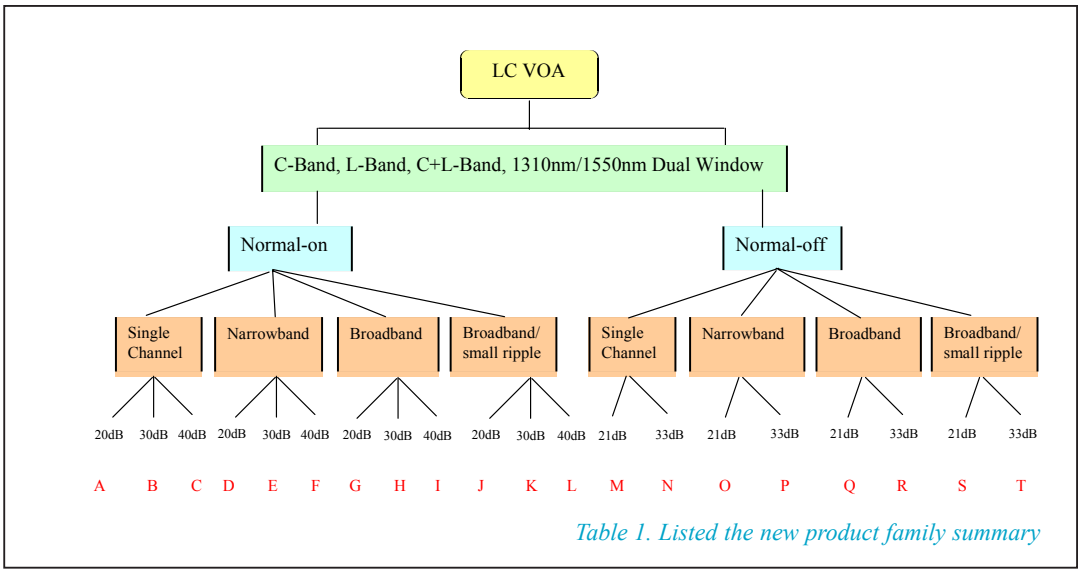

Table 1. Listed the new product family summary

Lightwaves2020's state-of-the-art Liquid Crystal based VOA products have recently added new family members in order to meet customers' versatile applications.

Lightwaves 2020 is one of the few fiber optic component manufacturers to bring to market the benefits of using Liquid Crystal technology in VOA components. Our proprietary device structure and laser-welded packaging guarantees the simplified assembly with high alignment accuracy and reliability. There is no moving part during the adjustment process. Lightwaves 2020's LC VOA offers many advantages including static charge resistance, continuous tuning, low PDL, high attenuation, low WDL and ripple, voltage controllability, and low power consumption. It is also capable of high power handling, the critical parameter for optical amplifier applications. Due to our LC VOA's innovative design and high manufacturing standards, it is extremely stable and insensitive to vibrations of nearly all frequencies and mechanical shock.

Applicant Examples

Example 1. Regulate line card optical power

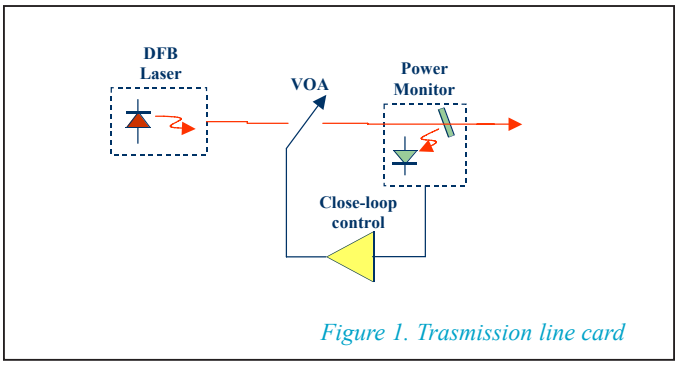

Figure 1. Trasmission line card

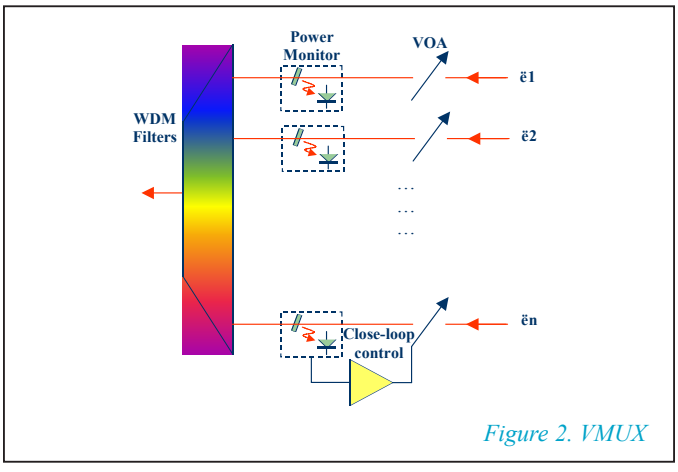

Figure 2. VMUX

The output power of line card needs to be adjustable in order for the system balance. Varying the laser current is going to affect the center wavelength and is not a feasible way for adjustment. For this application, the critical characteristics include low PDL, low insertion loss and output power stability. LC VOA model A or M are fitting this application. There are two options to implement the VOA feature. As shown in Figure 1 and 2, the VOAs can be before the transmitter or put together with DWDM module. Combining with Lightwaves2020's integrated power monitor, a close-loop control is set up to maintain the power stability. In the case of open-loop environment, we can use look-up table for adjustment with high accuracy of 0.5dB over all operating temperature range. Since this is single channel application, the customers get the most cost benefits

Example 2. Receiver protection

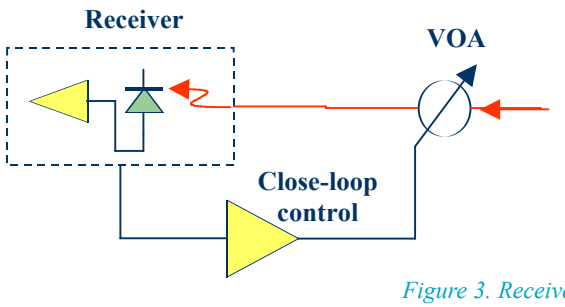

Figure 3. Receiver line card

To protect the receiver from power saturation, LC VOA model N is used. With normal-off operation mode, the receiver is well protected at the initial stage and power outrange. The high attenuation adds shut-off feature to help the system on wavelength provisions. Similar to the application at transmission line card, this model is also a cost-effective solution.

Example 3. Gain titling in two-stage EDFA

The current networks are much more flexible and provisional than before for the purpose of saving initial CAPEX and later OPEX. The design of EDFA cannot be predetermined and fixed anymore. To realize the sophisticated variable gain amplifier, the best way is to use LC VOA. Using LC VOA does not affect the overall amplifier performance such as noise figure and control accuracy but the output gain. The most critical requirements on VOA in order to sustain the amplifier performance are the high sustainable power, the wavelength dependent attenuation, the narrowband ripple, and tuning resolution. LC VOA model J or K's performance are optimized particularly for this applications.

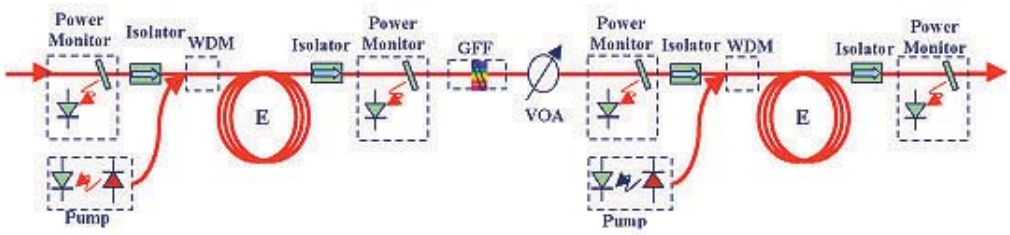

Figure 4. Gain configurable 2-stage EDFA

Example 5. Hand-held Instrumentation

LC VOA is well-known for its highest mechanical stability and reliability because of its no-moving part design . LC VOA model H or I used in hand-held attenuation instruments guarantee the no-disturbed output under different conditions.

Newswire

1. Lightwaves2020 releases $120 volume price of its VOA product at Lightreading on 11/8/2004, another commitment of low cost, high quality product to our customers.

2. United Optronics Inc. proudly announces the recent addition of a new product family to its product portfolio. In addition to high quality passive fiber optic component products, we now provide TOSA, Transceivers, BIDI, Photodiode and Laser Diode. Please visit our web site at www.unitedoptronics.com or call our sales representatives at 408-503-8888 for more details.

3. The sales & marketing department are actively seeking sales representatives and distributors to help our sales and marketing activities. Lightwaves2020, a pioneer in design and integration of components & sub-systems, welcome all interested firm and individuals . Please submit your information to sales@lightwaves2020.com

High Isolation Wideband 1310 / 1550nm WDM

1. Introduction

Lightwaves2020's high isolation wideband 1310/ 1550nm WDM devices are based on Lightwaves2020's proprietary thin film coating technology and advanced package technology. Epoxy-free on optical path design assures the high optical handling and long- term reliability.

Lightwaves2020's high isolation, wideband 1310 / 1550 WDM devices offer high isolation (> 45dB) for both transmission and reflection band and low insertion loss (0.6 dB Typical over operating wavelength and temperature range). The 1310 / 1550 WDM devices can operate over wide operating wavelength range of 1464nm ~ 1618nm in 1550nm-band, which covers conventional 8-ch CWDM and C- and L-band, and 1270nm ~ 1350nm in 1310nm-band. Figure 1 shows the typical transmittance and reflection characteristics.

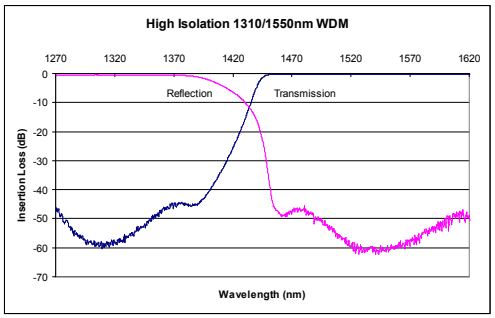

Figure 1. Testing transmission and reflection spectra of High Isolation 1310 / 1550nm WDM.

Comparing with conventional 1310 / 1550nm WDM device, which needs cascade to offer high isolation and bring high insertion loss accordingly, Lightwaves2020's high isolation 1310 / 1550nm WDM device features high isolation, low insertion loss, low cost, excellent temperature stability and high reliability.

The package size of the 1310 / 1550 WDM devices is Φ 5.5mm (diameter) x 40mm (length) with fiber pigtails of 250 µm bare fiber or 900 mm loose tube.

The high isolation 1310 / 1550nm WDM is very suitable for passive optical network, Metro and Access networks, hybrid fiber coaxial (HFC) systems, FTTH/FTTx systems.

2. Specifications

Parameters	Unit	Minimum	Typical	Maximum
1550 Band wavelength Range	nm	1464		1618
1310 Band wavelength Range	nm	1270		1350
Insertion Loss of Transmission Band	dB		0.6	1.0
Insertion Loss of Reflection Band	dB		0.6	1.0
Transmission Isolation	dB	45		
Reflection Isolation	dB	45		
PDL	dB			0.1
Directivity	dB	55		
Return Loss	dB	45		
Operating Temperature	°C	-5		+70
Storage Temperature	°C	-40		+85
Optical Power	dBm			25
Tensile Load	N			5

3. Comparison with conventional 1310 / 1550nm WDM

Conventional 3-port 1310 / 1550nm WDM devices have only 15 ~ 20dB isolation on reflection port. It is not satisfied for many applications, especially for system upgrade at receiver side. Lightwaves2020's 3-port 1310 / 1550nm devices have 45 dB isolation on reflection port that can meet most requirements for CWDM and FTTx applications.

Figure 2. is the comparison with conventional 1310 / 1550nm WDM that needs two devices to do the same function of Lightwaves2020's single device.

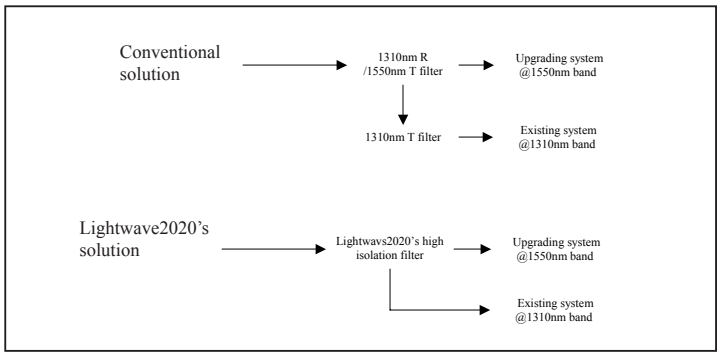

Figure 2. Functional diagram of using 1310 / 1550 WDM

Lightvision

Lightvision is a publication of Lightwaves2020 as a service to customers and sales associates.

Chairman & President **J. J. Pan**
Publisher **Joy Jiang**
Editor **King Lip**
Art Designer **Roger Kuo**