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# Lightwaves2020 proudly announces two newcomers to our EDFA product family

New

Milpitas, CA - Lightwaves2020 Inc, a pioneer designer and manufacturer of innovative fiber optic components and subsystems, proudly announces two recently developed new EDFA products, the hot-pluggable Xenpack type EDFA and the polarization maintaining compact EDFA.

Lightwaves2020's state-of-the-art vertical integration technology is well known in the industry. Using the patented packaging technology, in 2002, Lightwaves2020 introduced the smallest compact full function EDFA to market with the footprint of only 40x70x12mm. Today, the product is still the smallest dimension in the market. There are only two integrated components instead plus the EDF fiber in the module, making the assembly process extremely simple and providing cost savings. It is priced below $1000 for volumes and customers that need economic amplifications have embraced the idea and found the particular benefits for single channel and narrowband applications.

### 1. The "hot-pluggable" XENPACK EDFA

To meet the flexibility requirements of current optical network and to adopt the "pay-as-grow" system configuration, based upon the similar vertical integration technology, Lightwaves2020 has developed the so-called "hot-pluggable" EDFA and was firstly introduced at OFC2005. Taking advantage of the XENPACK package and electric interface, the product can be upgraded without interfering the data traffic. Similarly to the compact EDFA, hybrid components are used to save space and fiber management.

With same mechanical platform as a XENPAK transceiver (121 x 36 x 17.4mm), digitalized control interface and its hot-pluggable feature, this compact EDFA module can be easily operated as a power booster at transmitter end, or an in-line amplet at bypass node, or a pre-amplifier at extended receiving end using only a small space of a transceiver slot. Its 25dB min. small signal gain and up to 15dBm saturation power cover most single or narrow band applications.

### 2. The Polarization Maintaining (PM) EDFA

The PM components such as isolators, WDM combiners with satisfactory performance and good quality usually are in premium prices as well. Utilizing the idea of hybrid design, less PM alignment is needed and structure for building the EDFA is much simplified. Lightwaves2020 recently developed the full function compact EDFA with PM option. The saturation power is similar to SM version, which is >10dBm and the small signal gain is more than 25dB. The extinction ratio is maintained greater than 20dB. Mechanical dimension has changed to 90x70mm due to the PM EDF minimum bending radius requirement. And don't forget the cost saving benefit from integration.


The PM compact EDFA can find the applications in the fiber interferometers, fiber gyroscopes, PM fiber lasers, etc... For more information of this product, please contact *sales@lightwaves2020.com*

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# Product Performance Update: Lightwaves2020's MSA EDFA is made rugged to operate under severe environment


Targeting at CATV outdoor solutions, Lightwaves2020's EDFA development team has come out with a new MSA model that has operating temperature from -40°C to 80°C.

Lightwaves2020's MSA EDFA product family offers broad options to our customers, from the gain block to full function with RS232, I²C, from the single channel, narrowband to gain flattened wideband applications, from un-cooled to cooled pumps, from the boosters to pre-amps, and now from telecom standard operating temperature range to wider outdoor temperature range.

Figure 1 & 2 show the stabilized performance under wide temperature range of -40°C to 80°C. The mechanical dimension keeps the sameas 90x70x12mm for gain block and 90x70x15mm for full function. The TEC pump is used in the product and typical power consumption is less than 6 W.

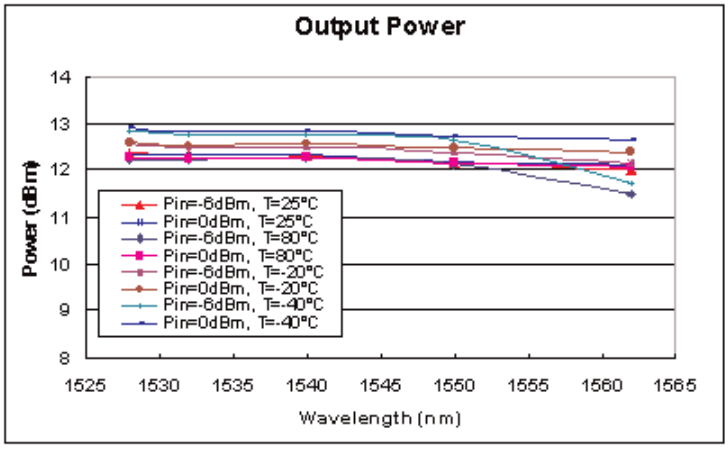


*Figure 1 MSA EDFA output power at temperature of -40°C to 80°C; target output = 12dBm*

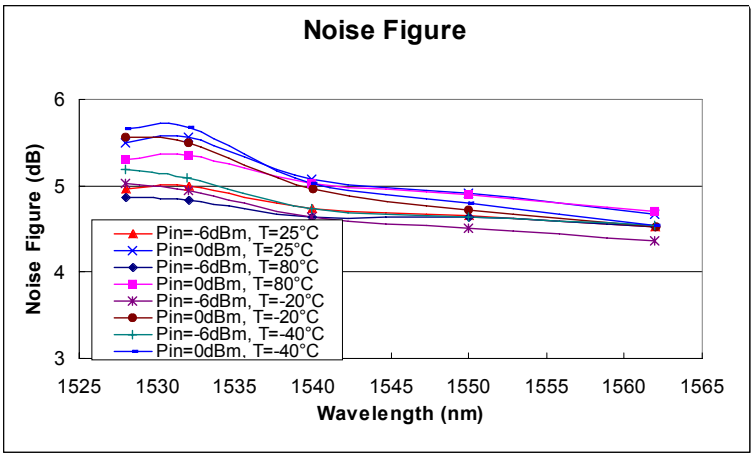


*Figure 2 MSA EDFA noise figure at temperature of -40°C to 80°C; target output = 12dBm*

As the high bandwidth demands keep increased for carrying data, voice and video signal, the optical network is pushing towards to the end user more closely now. In order to obtain wide range of cost sharing, economic amplification at the customer end is needed sometimes for longer reach and high signal quality, which means that the EDFA is no longer a luxury part sitting in the center office with well-controlled environment conditions. Lightwaves2020 newly developed EDFA is compact in size and capable of handling wide dynamic temperature ranges. It is a good solution to be embedded into the fiber node platform and hung on the electric poles or other outdoor applications. For more information, please contact *sales@lightwaves2020.com.*


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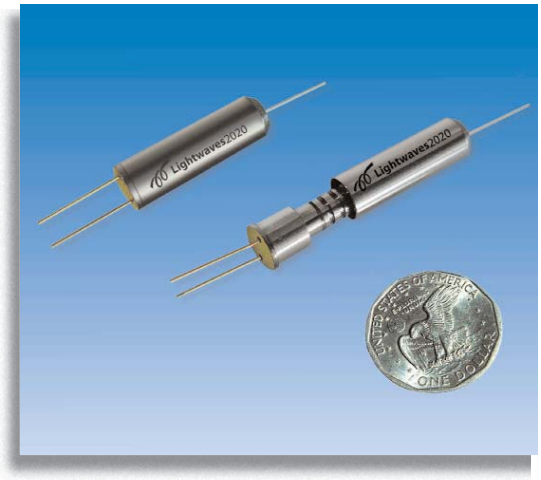
- *Lightwaves2020 has introduced a Polarization Maintaining (PM) option to its Erbium Doped Fiber Amplifier (EDFA) product family. Applications for the PM compact EDFA include fiber interferometers, fiber gyroscopes, PM fiber lasers. Lightwaves2020's vertical integration technology allows fewer PM based building blocks for the module and simplifies PM fibers management process.*
- *Lightwaves2020 has recently passed its re-certification process for the ISO9001:2000 audit for another three year term. The re-certification process included auditing quality assurance, process control, and the application of regulatory requirements. The re-certification confirms Lightwaves2020's commitment to customer satisfaction and excellent quality control and verifies that the quality system has been properly maintained.*
- *Sales backlog for the 1st quarter of 2005 of Lightwaves2020 exceeded our own aggressive quarterly sales forecast by more than 18%.. This represents more than a 50% increase above the previous quarter's revenue. Sell-through figures at customers and distributors have shown an improving trend quarter to quarter throughout the last year. Lightwaves2020 expects this upward trend to continue throughout the remainder of the year 2005.*
- *Lightwaves2020 is currently seeking to partner with qualified sales representative firms with optical market experience for domestic, Europe and Canada.*

# Lightwaves2020's new progress on high power handling capability of liquid crystal based VOA attracted significant attention at OFC2005 poster session

During the OFC2005 show held last month, we were honored to present the paper, titled as "High Power Handling Capability of Liquid Crystal Variable Optical Attenuator" at the poster session. Liquid crystal platform has been considered to be a reliable solution for its famous no-moving part adjustment scheme. Acting as a variable waveplate, its birefringent property is particular good for phase and polarization management by passing through the liquid crystal cell. Utilizing its long experience on the material, Lightwaves2020 had developed its own proprietary liquid crystal technology and turned it into telecom-standard fiber based products such as variable optical power attenuator (VOA) and polarization controller. Other than telecommunication applications, these two products can also find applications in fiber sensing, RF communication, fiber gyroscope, medical instrumentations, etc..




Recent progress on the liquid crystal demonstrate the material's capability of handling high optical power. Some misunderstanding exists in the industry that liquid crystal will degrade under strong optical power because of its organic material properties. In the paper, we showed from both theoretical and experimental methods that in fact liquid crystal is a strong material for high power handling.

The paper attracted substantial traffic during the poster session. As expected, people doing dynamic amplifier (EDFA) are the most interested group. However, we are also surprised to see quite a few interests also coming from non-telecom applications. Ultra-fast pulsed laser source at non-telecom wavelength has very high output power. The liquid crystal based VOA can be used to add adjustable power feature to the product. Because of its wide operating wavelength from visible to a few of microns, our liquid crystal technology can be easily adapted into non-telecom fields.

It was unanimously agreed from the visitors that liquid crystal technology is a more robust solution not only for its no-moving part reliable scheme, but also the high power handling capability. More experiments will be conducted as suggested by some visitors to obtain 2000 hours reference data as compared to 500 hours shown in the paper.