

Preface

The basics of photonics, which is an optical high-tech technology, use light sources and photodetectors and different kinds of waveguides for its applications. The bandwidth of products and devices on the market is present in every part of our daily lives. Starting from laser pointers to cash systems in the market halls down to telecommunications and lighting systems for cars and lamps, the technology has matured rapidly giving the world long-term stable devices.

Electrical and optical state-of-the-art technologies to package the devices are important to ensure high-volume, low-cost devices with high performance. So the material price of DVD is higher than the production costs of the high-volume device. Smart companies have developed inexpensive packages and automated mounting technologies for photonic products, and they have to develop robust, special packages for high-performance telecommunications and IT devices.

Optical communications technology has undergone in the last two decades, a breathtaking development that was not even in sight of the most daring augurs. In long-distance networks, fiber-optic technology was indeed already used, but the industry had been hesitant to this new technology. Researchers succeeded in just a few years to increase the transmission data rates over a glass fiber by several orders of magnitude of several gigabits/s to several terabits/s.

At the same time, developers have converted the results within short times into commercially usable products, which were then immediately installed by the major telecom companies in their networks and thus have increased the transmission capacity considerably.

The main reason for this development was two independent events:

The deregulation of the communications market by allowing competing smaller telecommunications companies and the explosive growth of the Internet.

The major telecom providers saw themselves exposed in recent years to growing competitive pressure from the start-up of many small dynamic companies. All competitors invested heavily in expanding their own networks in order to reduce the transmission cost. The suppliers were now required to quickly offer new, more effective network components. This was also only possible with massive investment in highly qualified engineers and novel instruments, which in turn significantly

revived the labor market. The exponential growth in the number of Internet users through the increased use of multimedia applications since the mid-1990s has had a strong increase in transmission rates in the data range for the result, which is still unbroken, and will probably continue to increase. Data services have now overtaken voice services in capacity and contribute even more to further the hunger for transmission capacity.

Thus, the Internet has become the medium for the development of data networks. A key concern of this book is to make this new technology transparent to a larger audience both in terms of the development of optical networks as well as on the optoelectronic structure of the fiber-optic components used.

Since the connection of optoelectronic components is a complex issue for the construction technology to the ever-increasing transfer rates, I have tried to provide readers with the construction technical side, with the theoretical foundations, as well as from the practical point of view in detail. For in-depth studies, there are numerous literature references.

A central space takes the description of the interface fiber to the chip, which is a problem of extreme importance for the understanding of optical coupling and their adjustment. After an excursion into the traditional electronic package technology with their different bonding techniques, the optical connector and the production of optical fiber lenses are described. The measurement of the near and far fields is an important part for optimal fiber–chip coupling. The different spot-size measurement techniques and their advantages and disadvantages are described in detail.

In the following section, we will consider what adjustment techniques to today's users are available. The trend is from the active techniques for self-adjusting passive adjustment, which promises a miniaturized and much more cost-effective mounting technology. The conclusion is a section with many examples of different module structures and the description of reliability tests as part of the ISO standard.

This book will serve both students of electrical engineering and related engineering courses as a teaching aid as well as professionals who need an application-oriented reference book on optical setup and connection technology for their daily work.

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