

## Microassembly of an ultra-wideband electro-optical modulator with an integrated laser

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*Authors present the results of development of an ultra-wideband electro-optical modulator assembly containing an integrated laser. The microassembly is designed for use in fiber-optic systems for transmitting analog signals at 1.31  $\mu\text{m}$  optical carrier wavelength. The microassembly is based on a semiconductor chip containing electroabsorption modulator and laser. The maximum output power of laser exceeds 10 mW at 90 mA bias current. The operating frequency range of the modulator is 100 kHz – 20 GHz.*

*Keywords:* electro-optical modulator, microassembly.

### REFERENCES

1. Seeds A., Microwave photonics, IEEE Trans. Microw. Theory Tech. **50** (3), 877–887 (2002).
2. Cox C., Analog Optical Links. Cambridge, U.K., Cambridge Univ. Press, 2004.
3. Cox C. H., Ackerman E. I., Betts G. E. and Prince J. L., Limits on the Performance of RF-Over-Fiber Links and Their Impact on Device Design, IEEE Trans. Microw. Theory Tech. **54** (2), 906–920 (2006).
4. Jianping Yao, Microwave Photonics, J. Lightwave Technol., № 27, 314–335 (2009).
5. Klein H., Integrated InP Mach-Zehnder Modulators for 100 Gbit/s Ethernet Applications using QPSK Modulation. Doctoral dissertation, Berlin Institute of Technology, Berlin, Germany, 2010.
6. Hui-Tao W., Dai-Bing Z., Rui-Kang Z., Dan L., Ling-Juan Z., Hong-Liang Z., Wei W. and Chen J., Optimization of 1.3- $\mu\text{m}$  InGaAsP/InP Electro-Absorption Modulator. Chin. Phys. Lett. **32** (8), (2015).