

Integrated Photonics

Figures and Images for Instructors

Module 3

III-V Semiconductor Devices

Optics and Photonics Series



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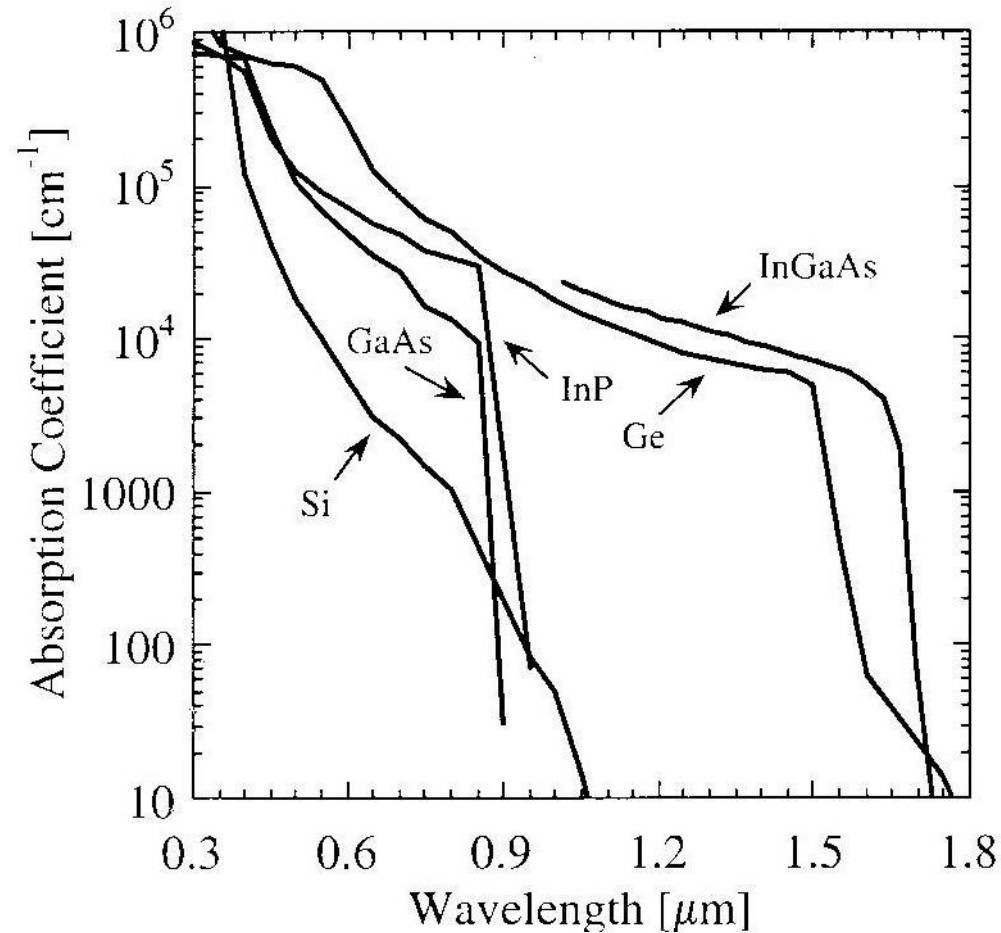


Figure 3-1 *Absorption coefficients of different semiconductor materials vs. wavelength*

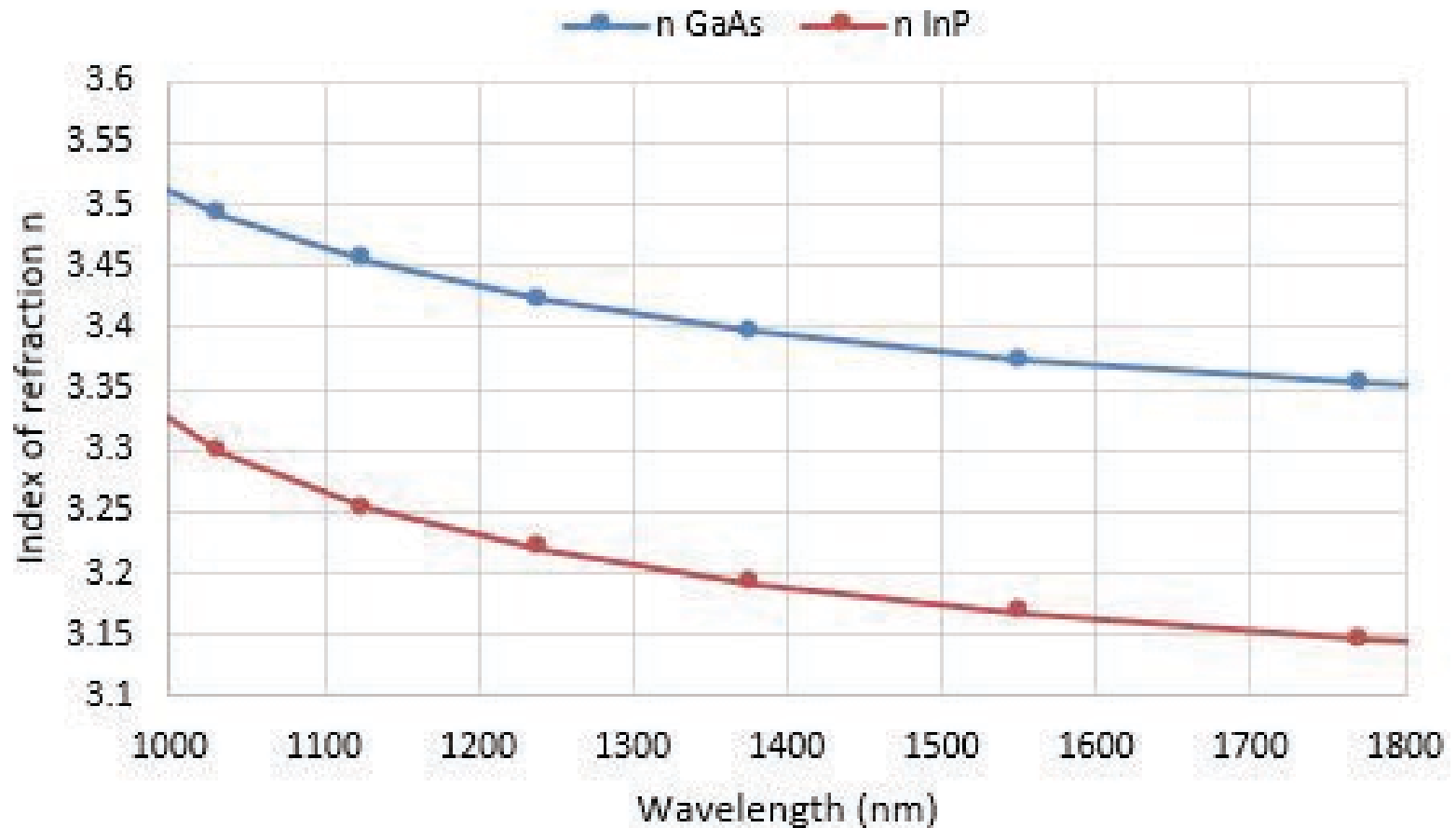


Figure 3-2 *Index of refraction of gallium arsenide and indium phosphide vs. wavelength*

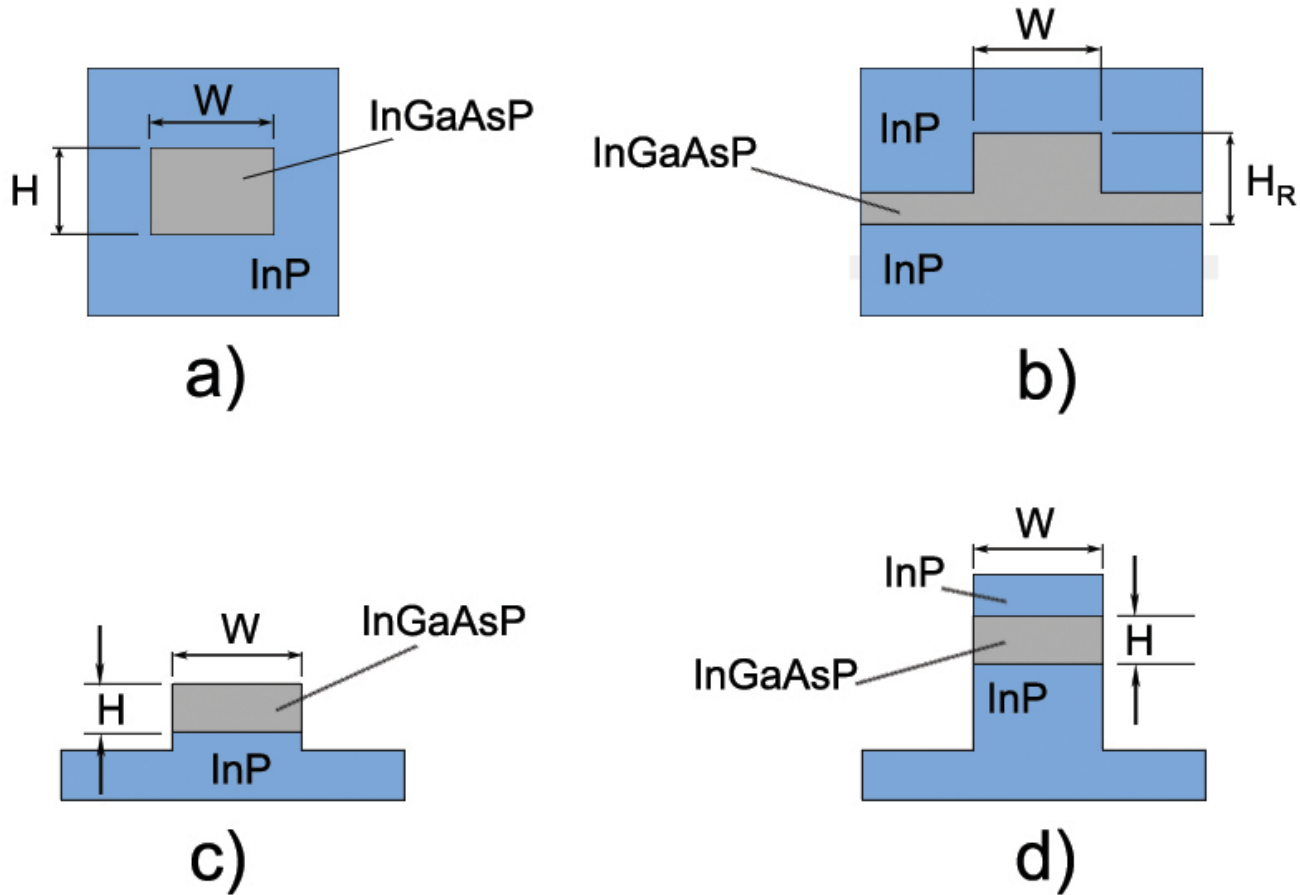


Figure 3-3 **a)** *Buried channel waveguide*; **b)** *Buried rib waveguide*; **c)** *Ridge or raised strip waveguide*; **d)** *Deep ridge waveguide*

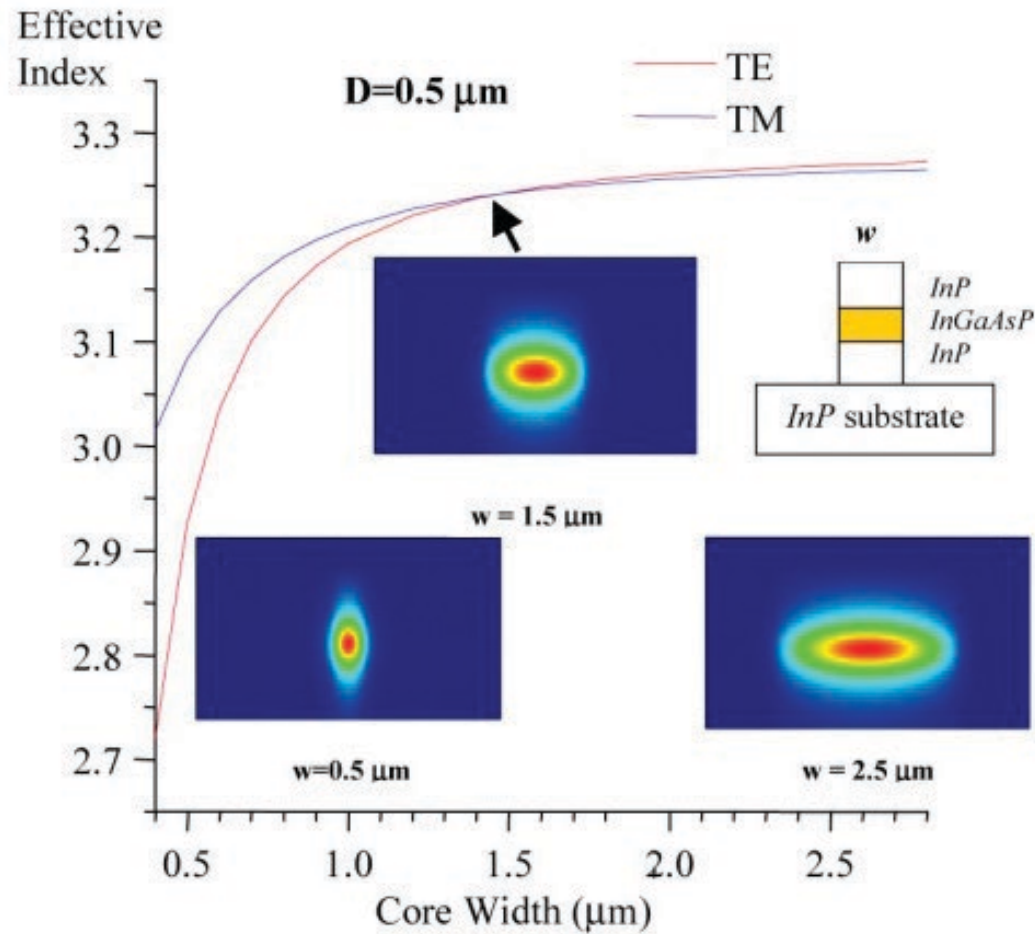


Figure 3-4 *Effective indices of TE and TM modes of a deep ridge waveguide as a function of the waveguide core width*

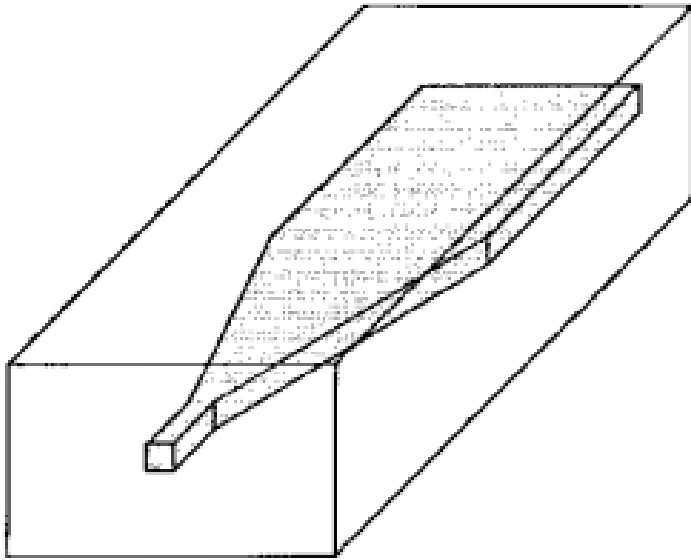


Figure 3-5 a) *Lateral down-tapered buried waveguide*

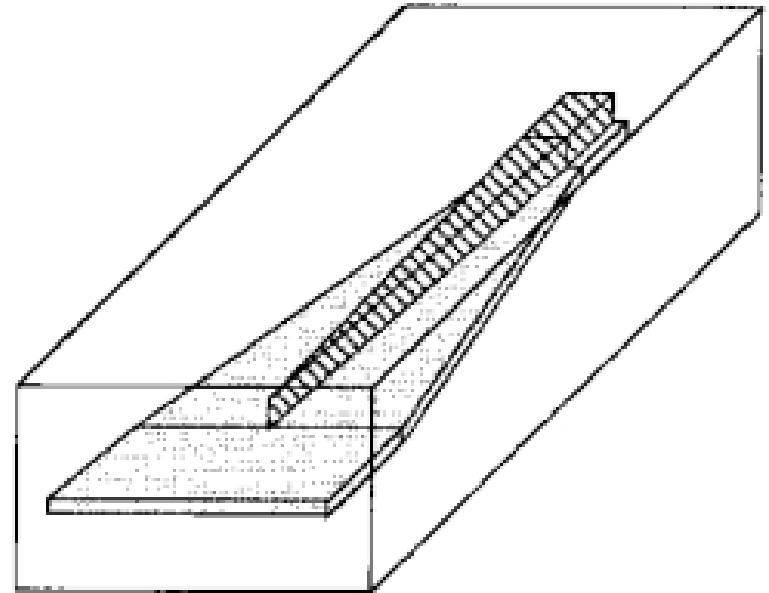


Figure 3-5 b) *Lateral down taper with second core layer under main waveguide*

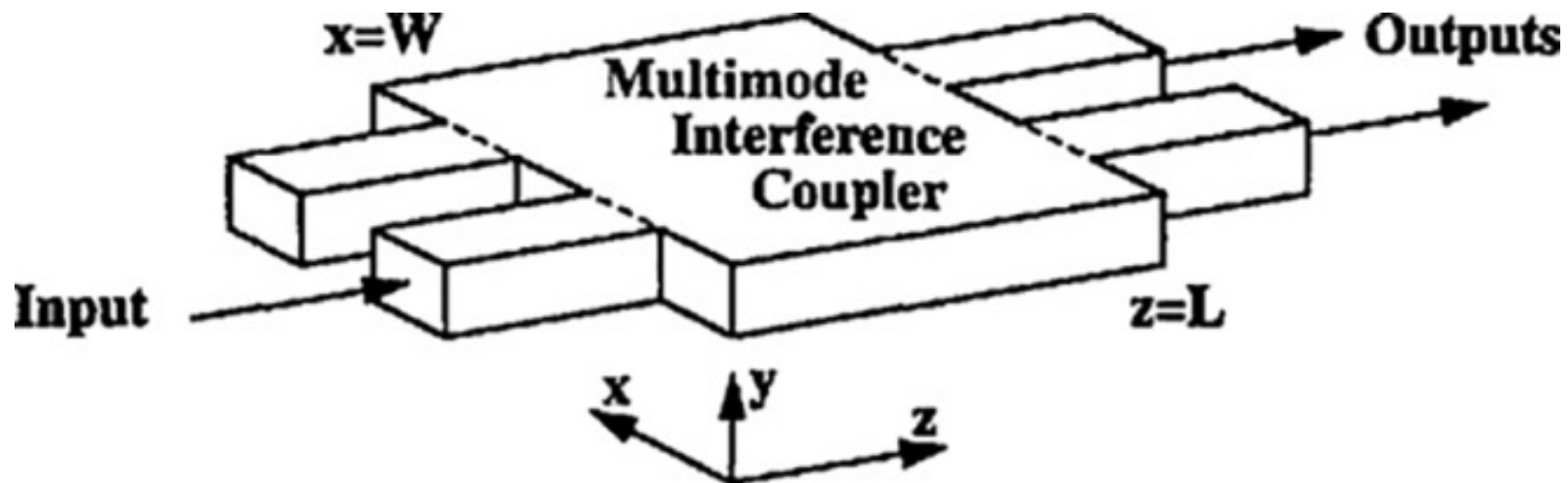


Figure 3-6 *Multimode interference coupler*

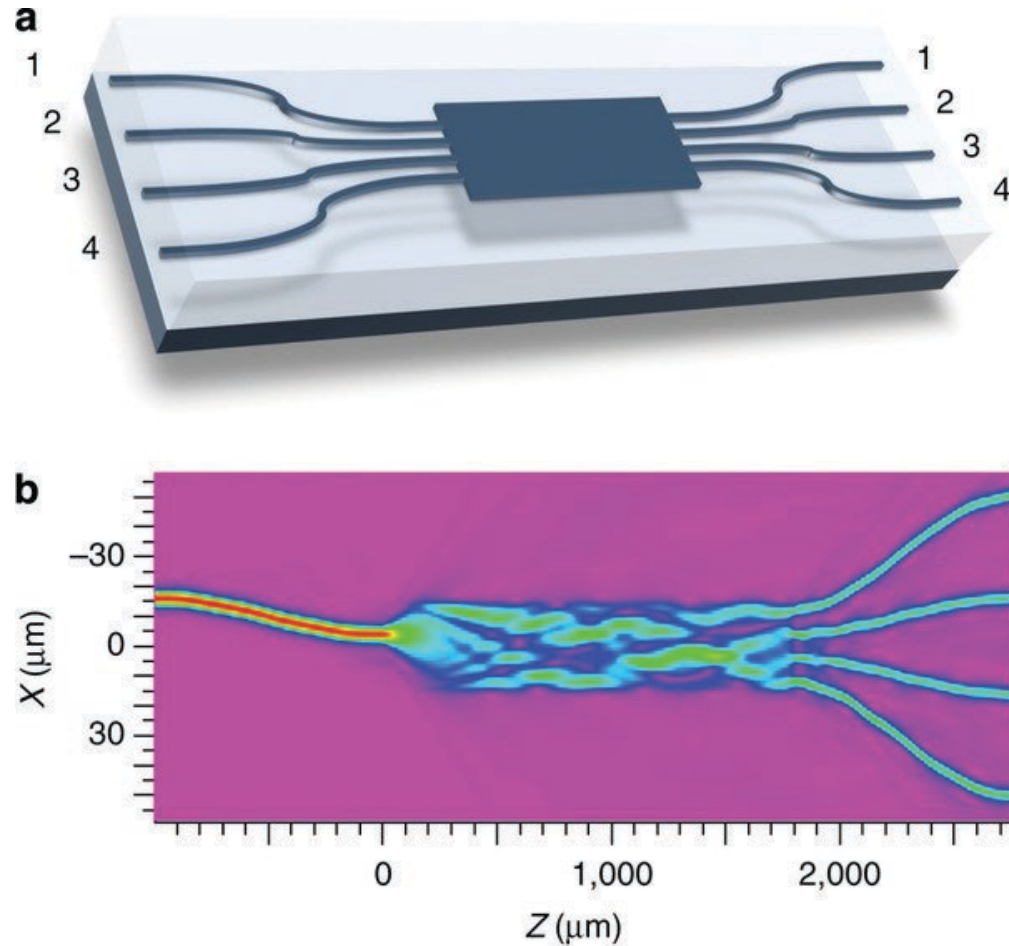


Figure 3-7 a) *Multimode interference coupler in 4 x 4 coupler configuration; b)* *Simulation of the electric field of the light wave over the length of the device*

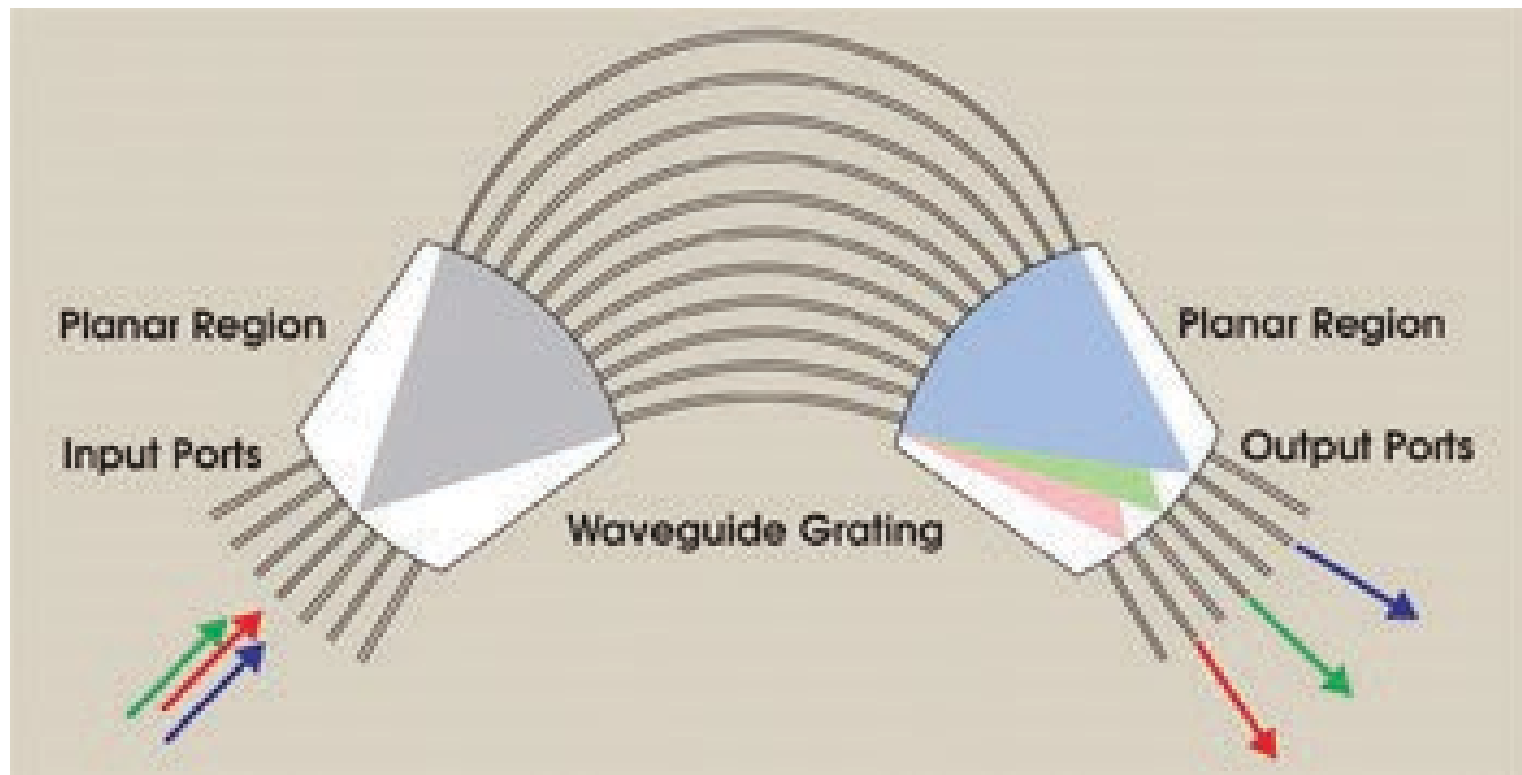


Figure 3-8 *Arrayed waveguide grating*

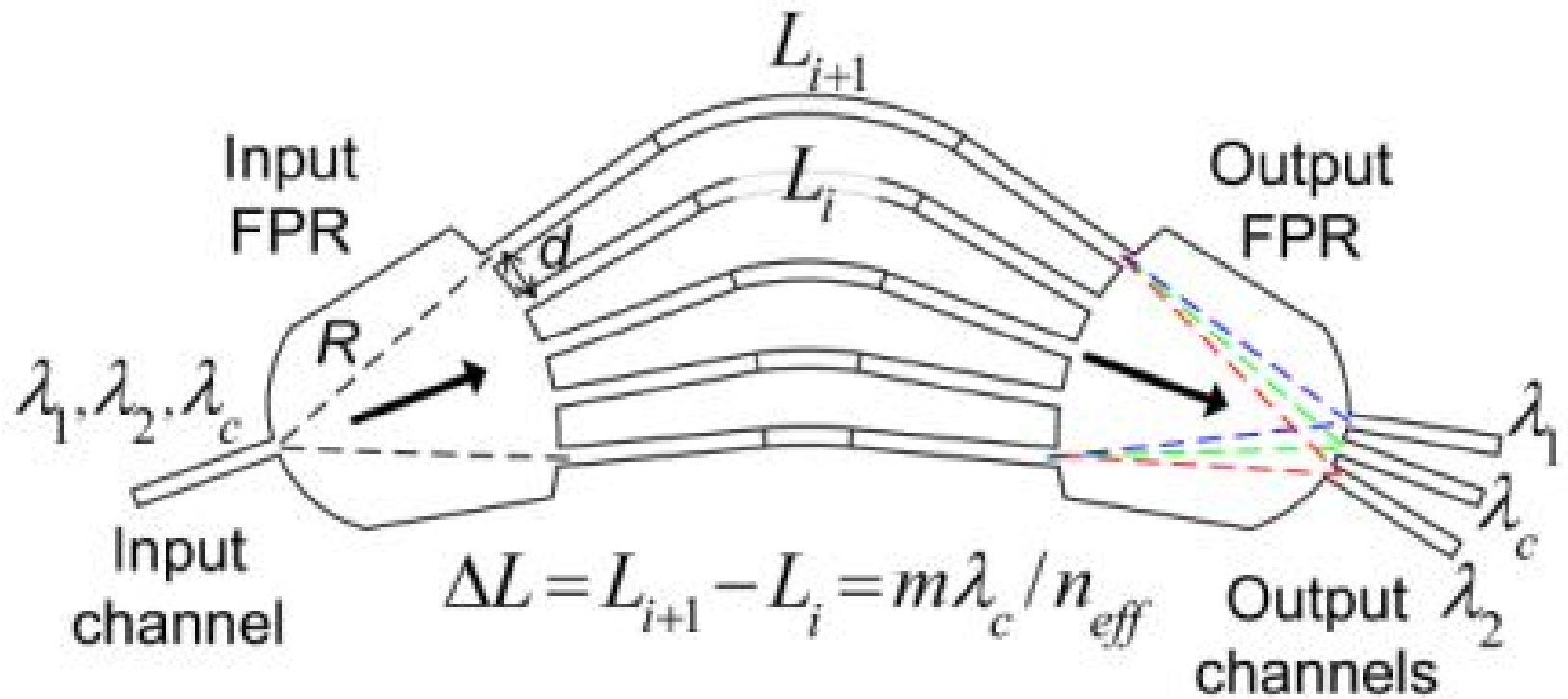


Figure 3-9 *Arrayed waveguide grating*

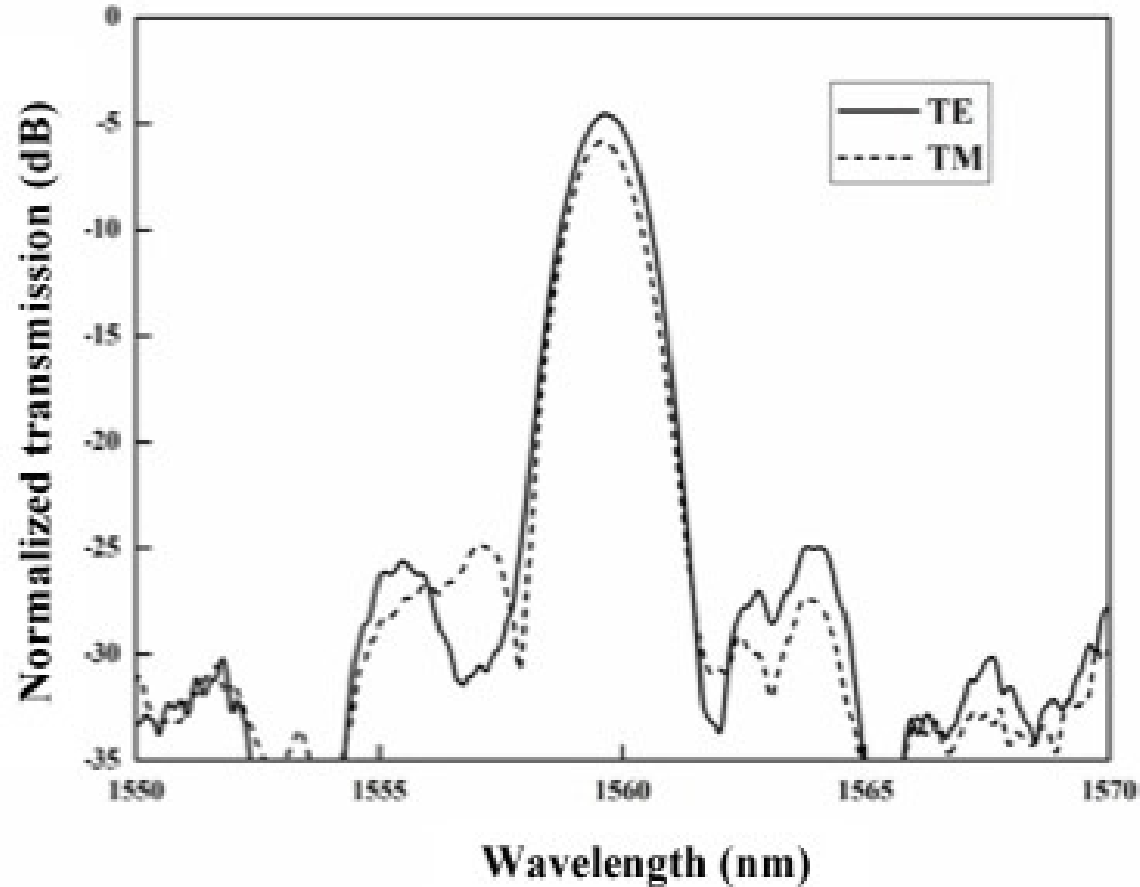


Figure 3-10 *Transmission vs. wavelength for one output of an arrayed waveguide grating, for TE and TM polarizations*

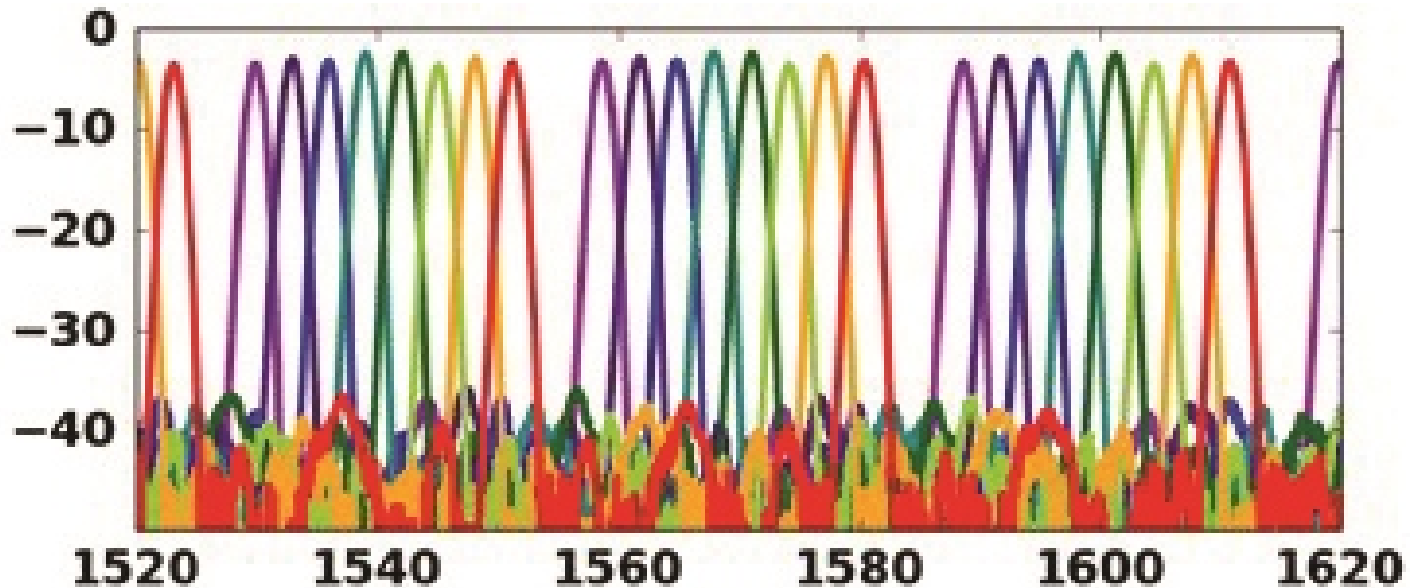


Figure 3-11 *Eight-channel, 200 GHz arrayed waveguide grating transmission vs wavelength. The FSR of the AWG is about 30 nm.*

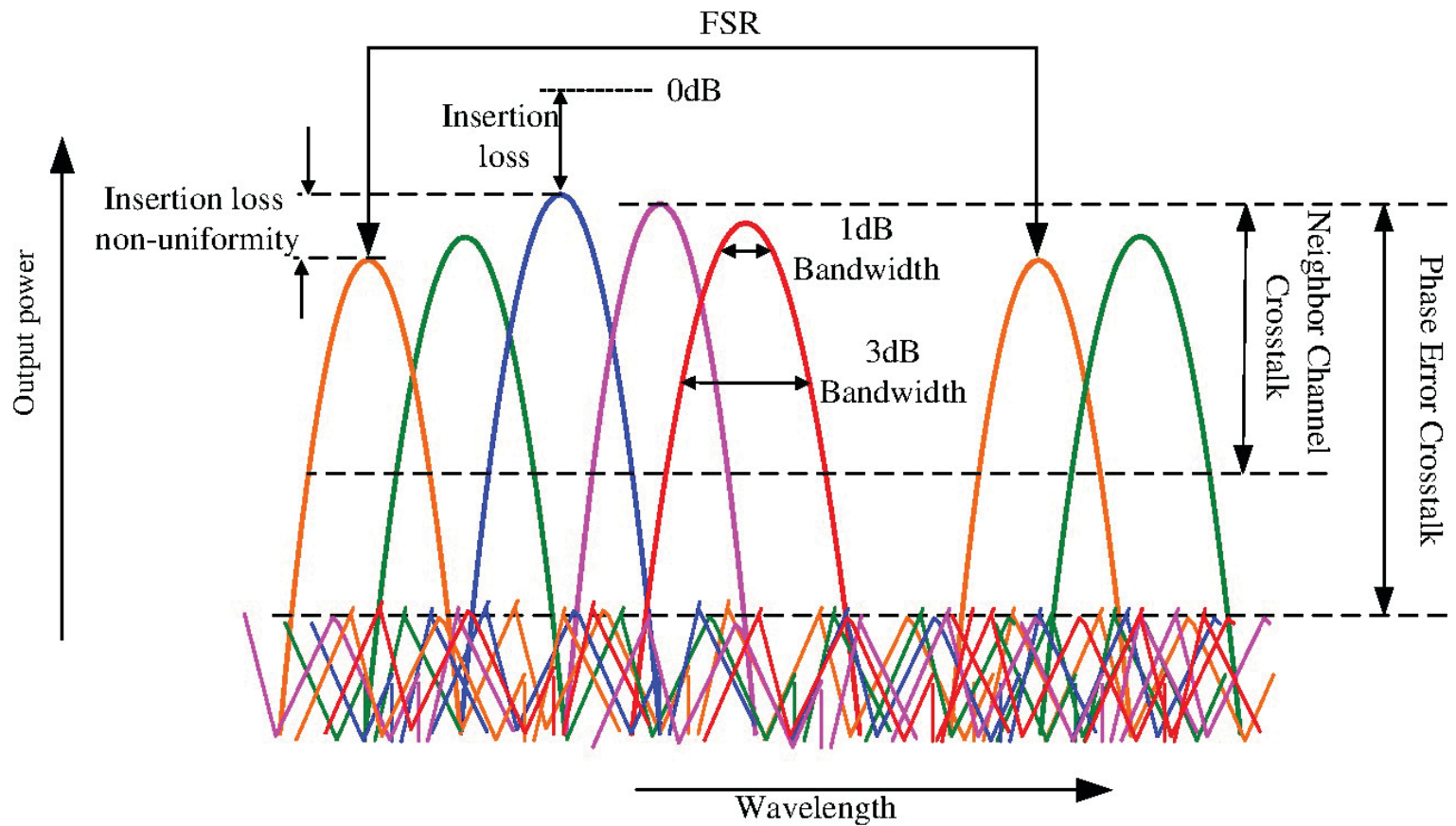


Figure 3-12 *AWG parameters*

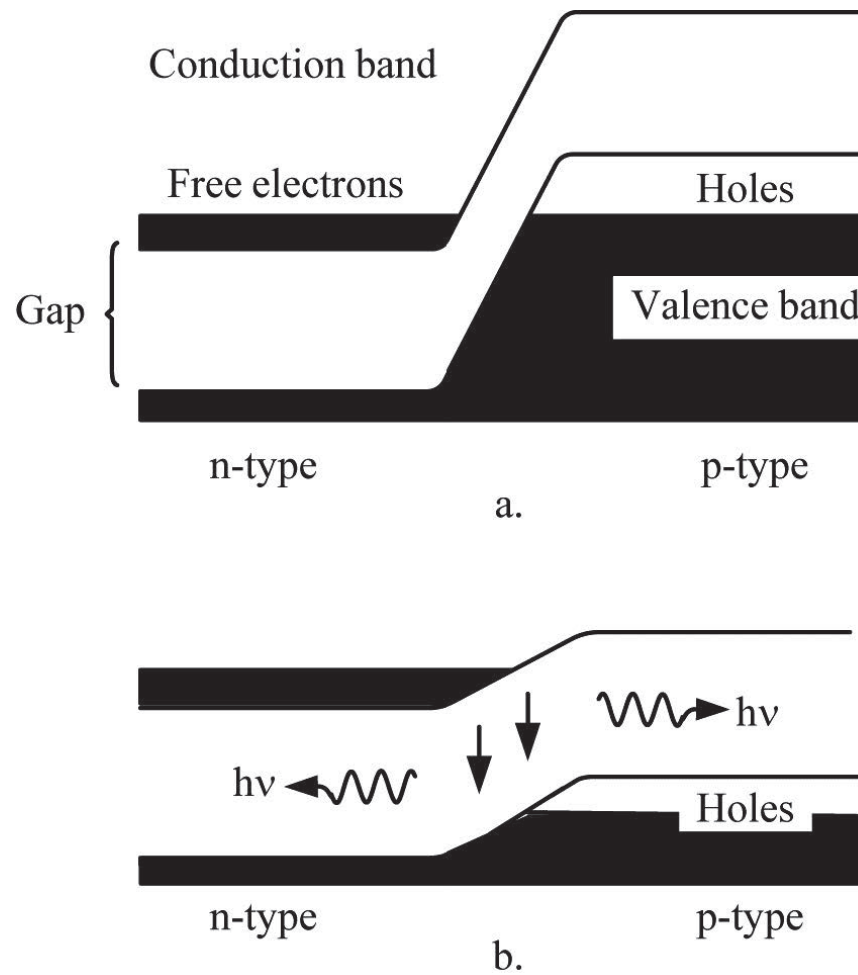


Figure 3-13 *Energy-level diagram of a semiconductor diode*

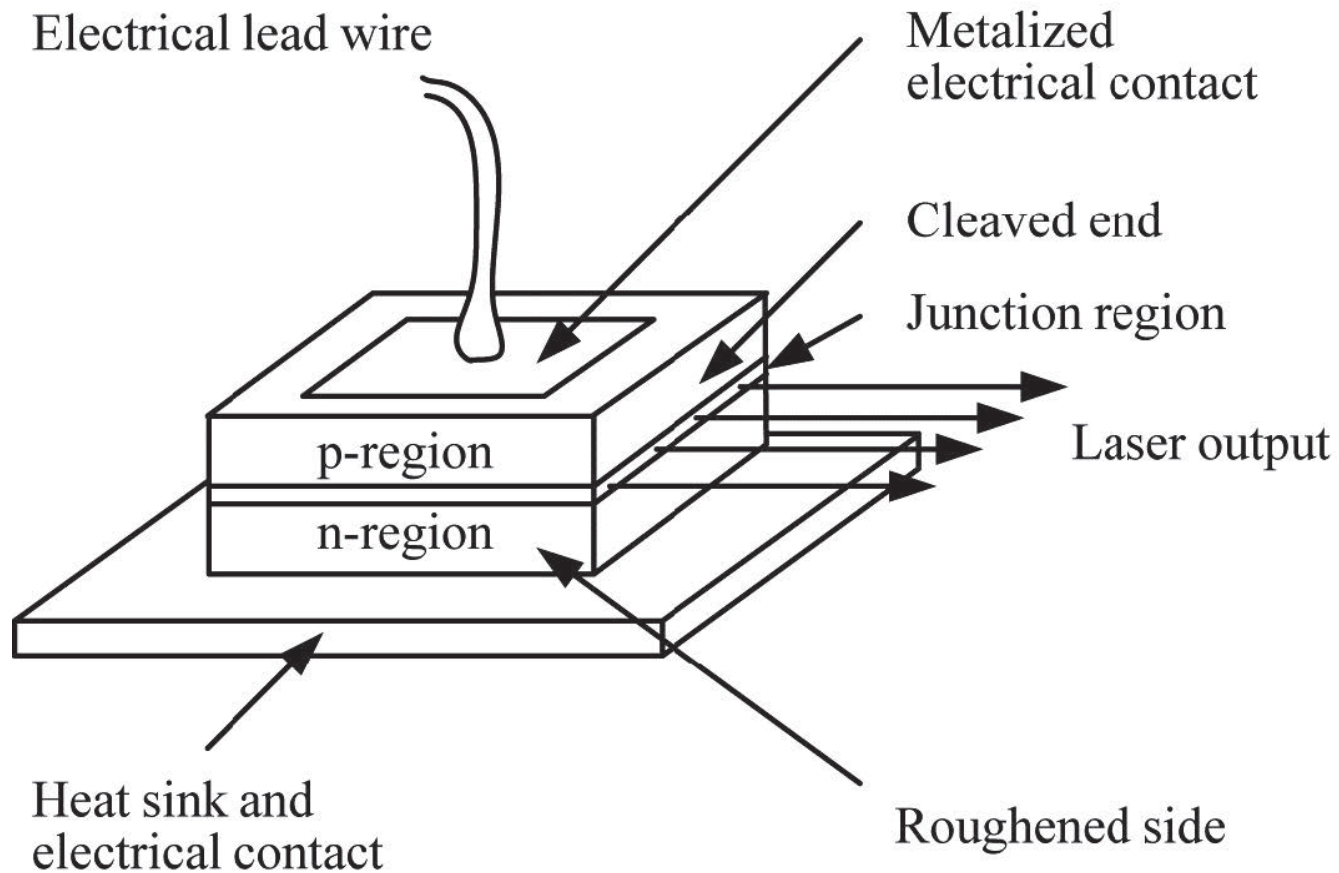


Figure 3-14 *Gallium arsenide laser diode*

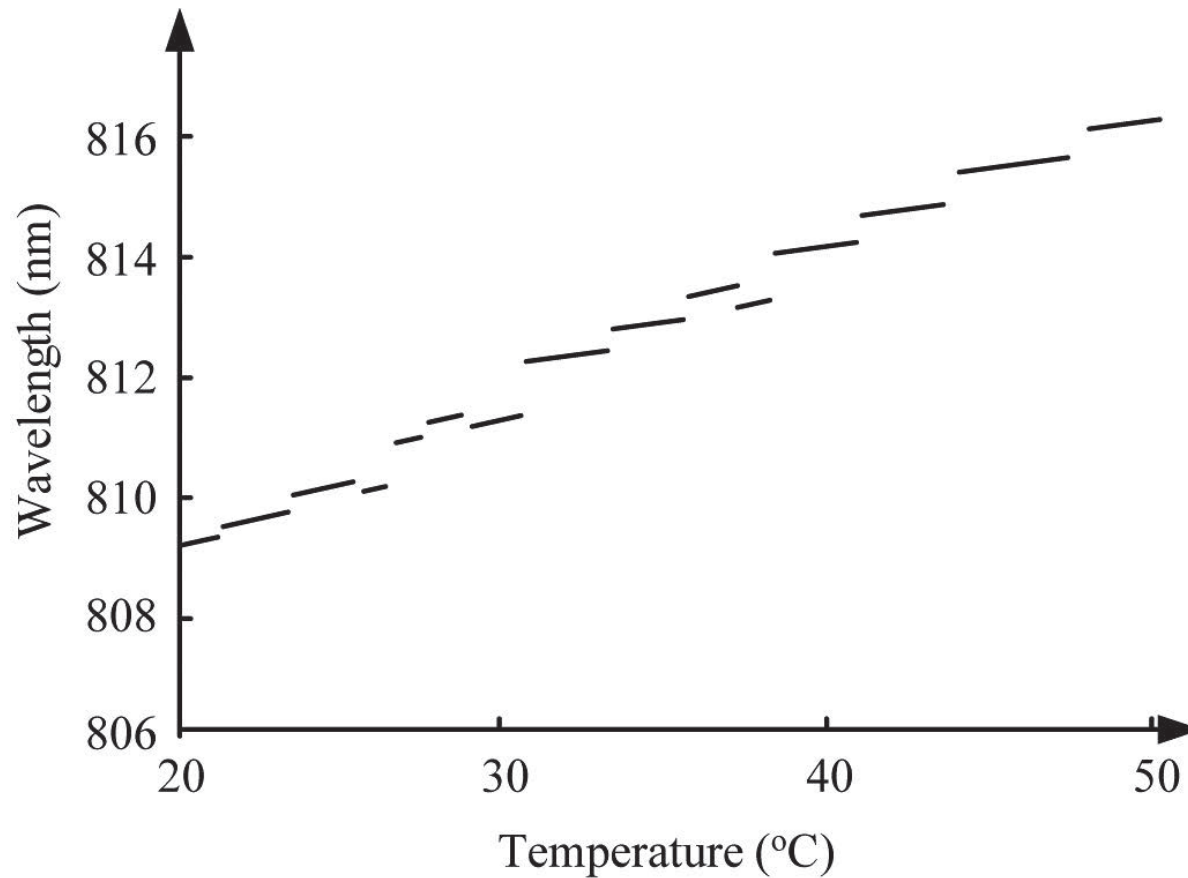


Figure 3-15 *Variation of the wavelength of a commercial semiconductor laser with temperature*

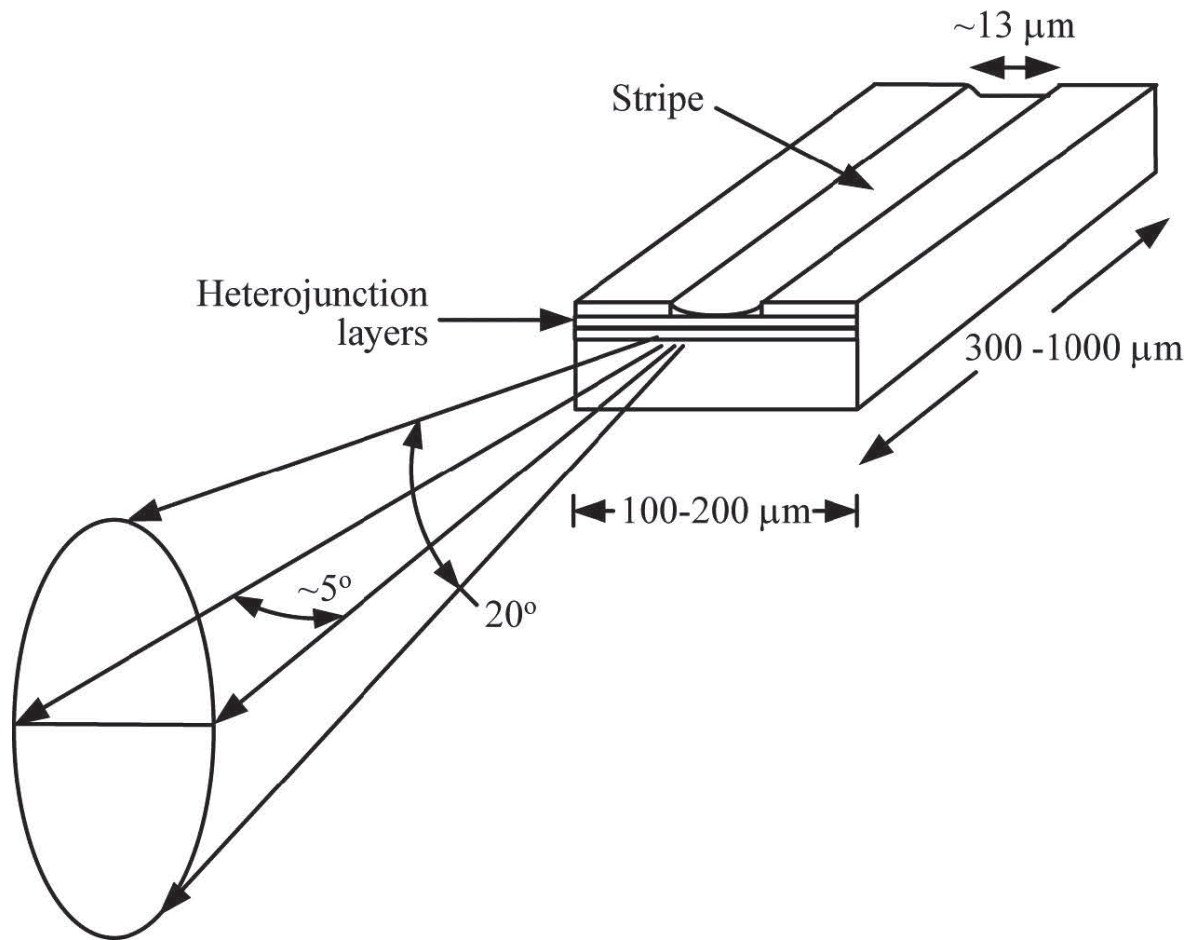


Figure 3-16 *Beam profile from a stripe geometry heterojunction semiconductor laser*

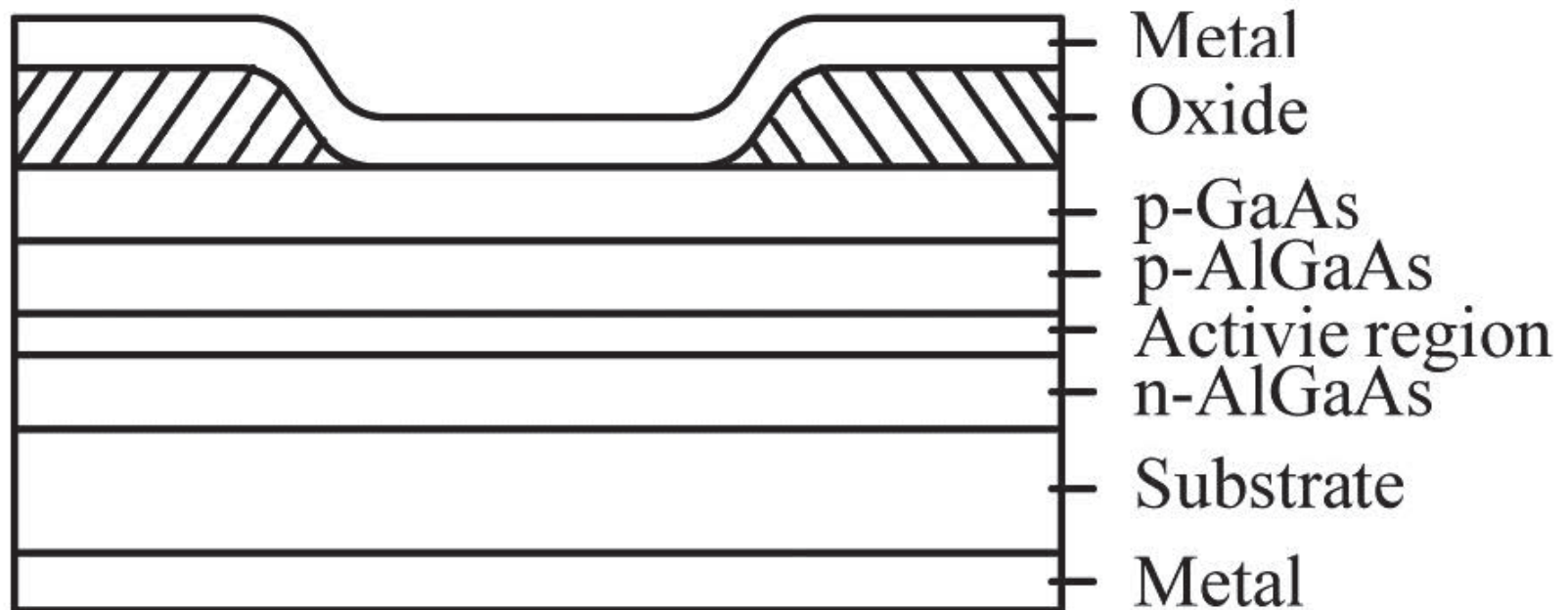


Figure 3-17 *Diagram of GaAs/AlGaAs laser with oxide stripe geometry*

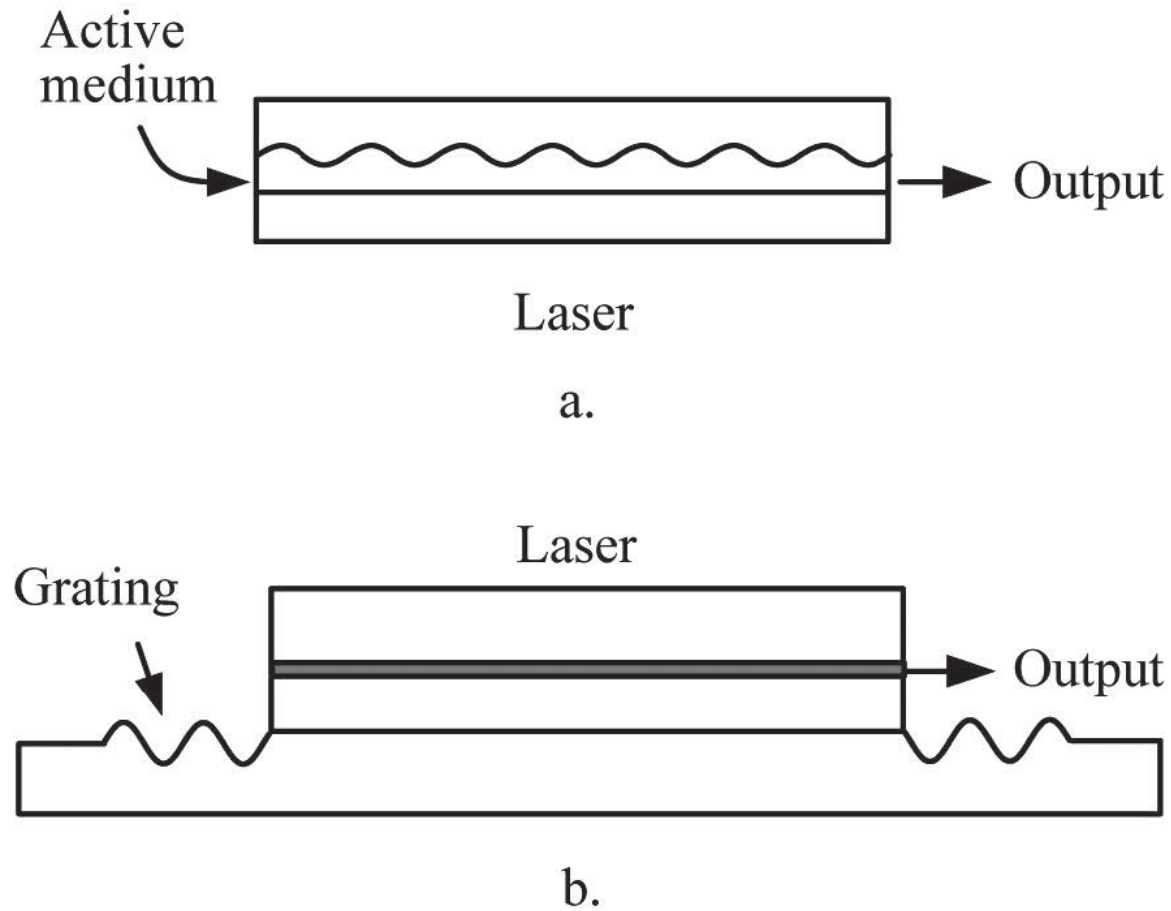


Figure 3-18 *Diagram of the side view of: a) a distributed-feedback semiconductor laser and b) a distributed Bragg reflector*

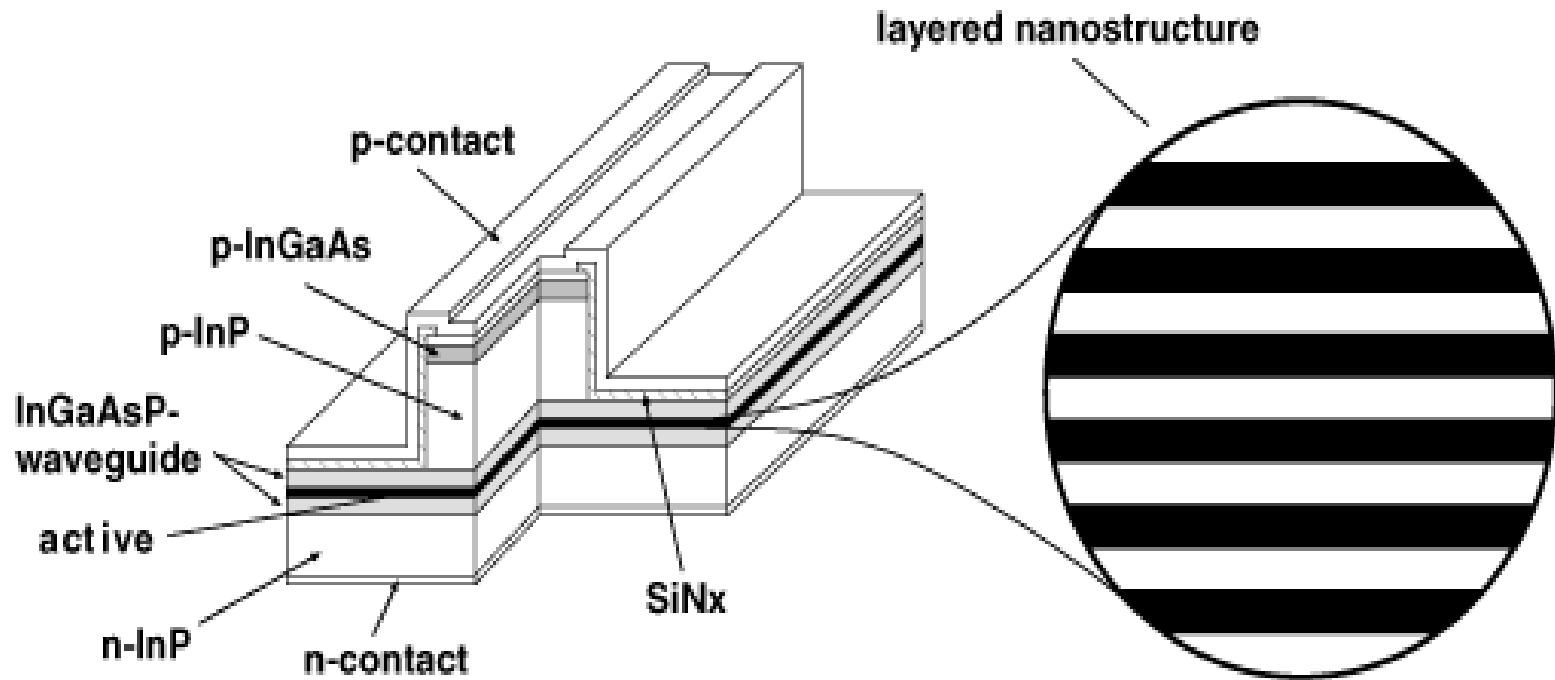


Figure 3-19 *A semiconductor laser using a multiple quantum well structure in the active region*

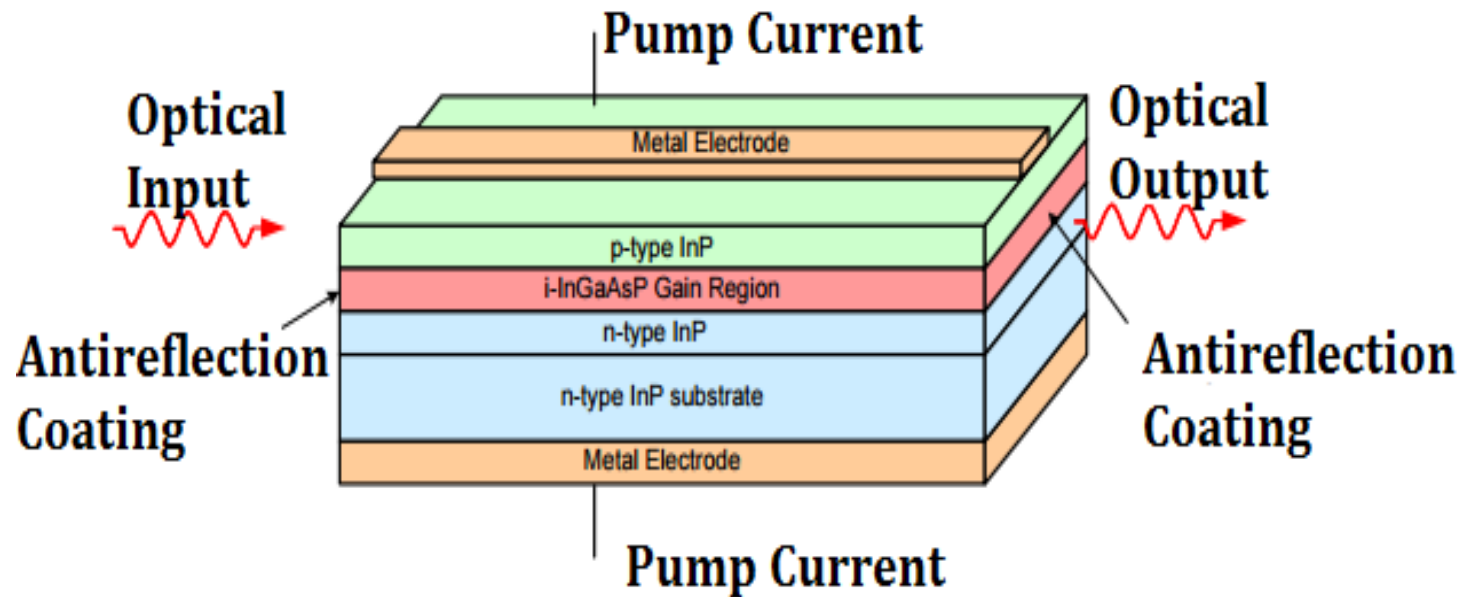


Figure 3-20 *Semiconductor optical amplifier based on InGaAsP/InP materials*

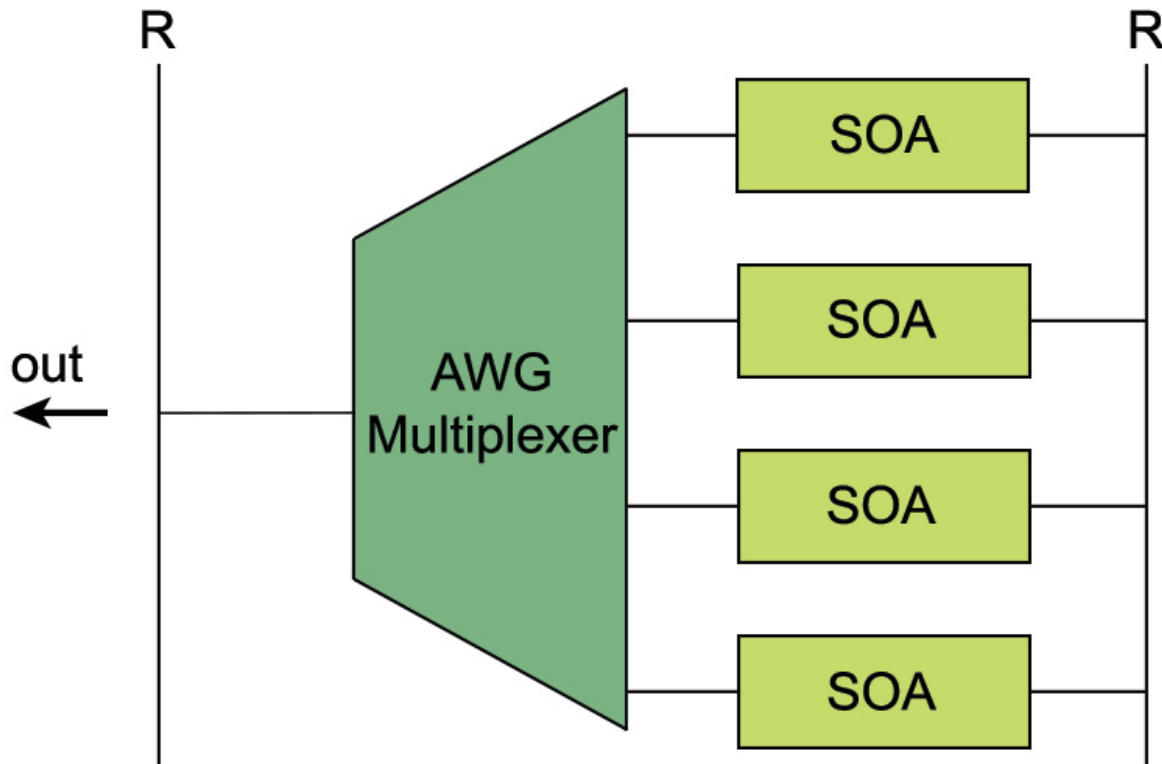


Figure 3-21 *Integrated multiwavelength laser based on SOA array and AWG multiplexer*

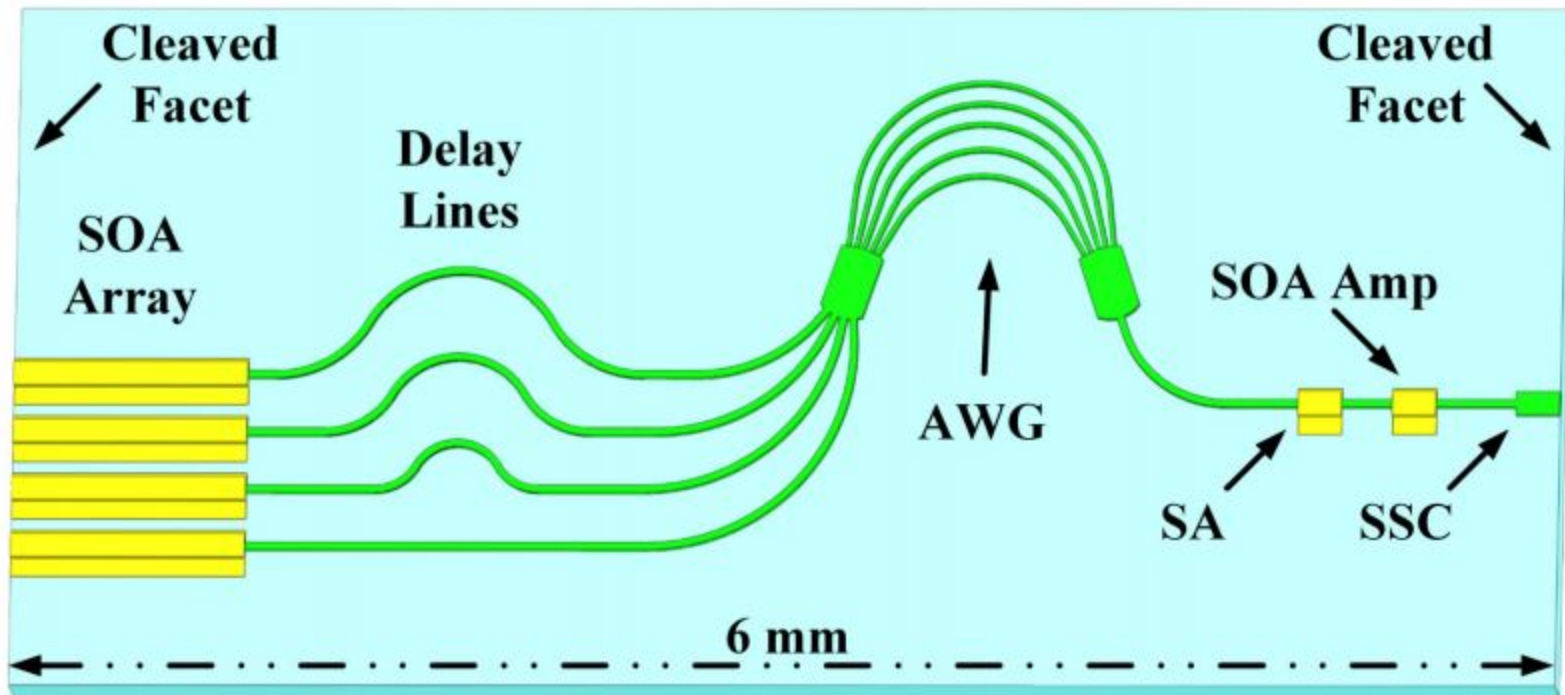


Figure 3-22 *Monolithically integrated short pulse multiwavelength laser*

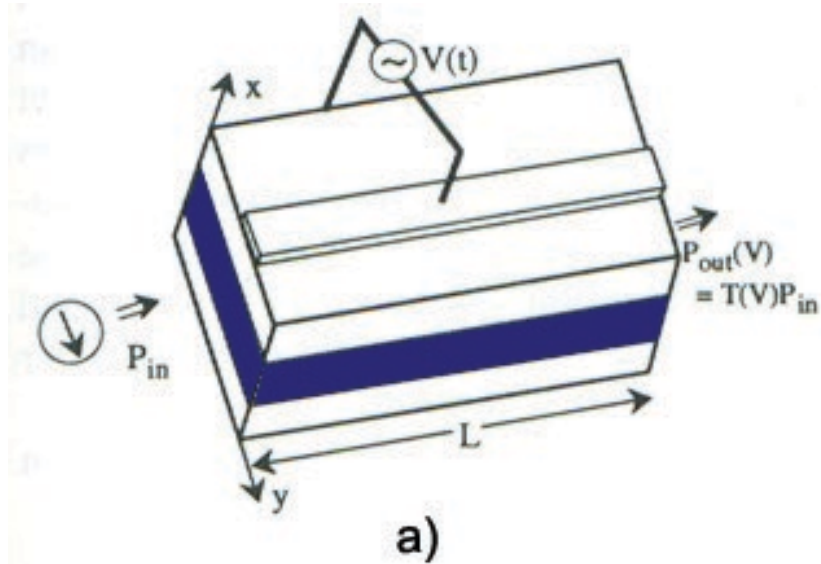


Figure 3-23 a) *Waveguide-based electroabsorption modulator*

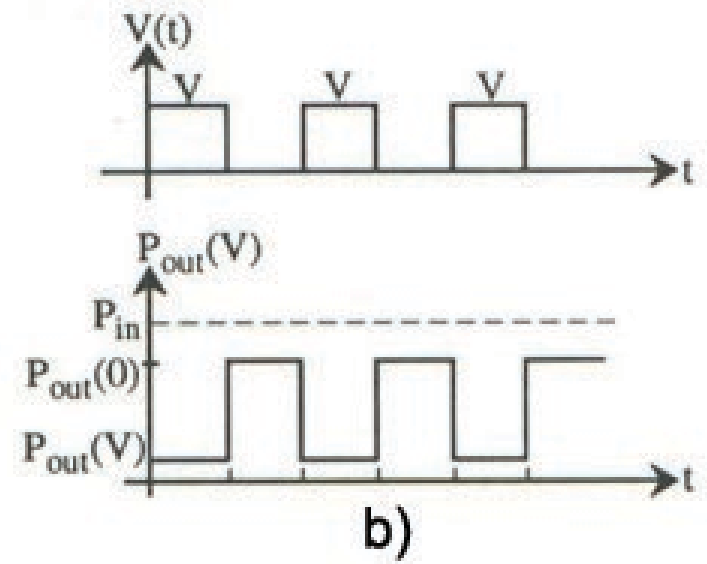


Figure 3-23 b) *Applied voltage and output optical power*

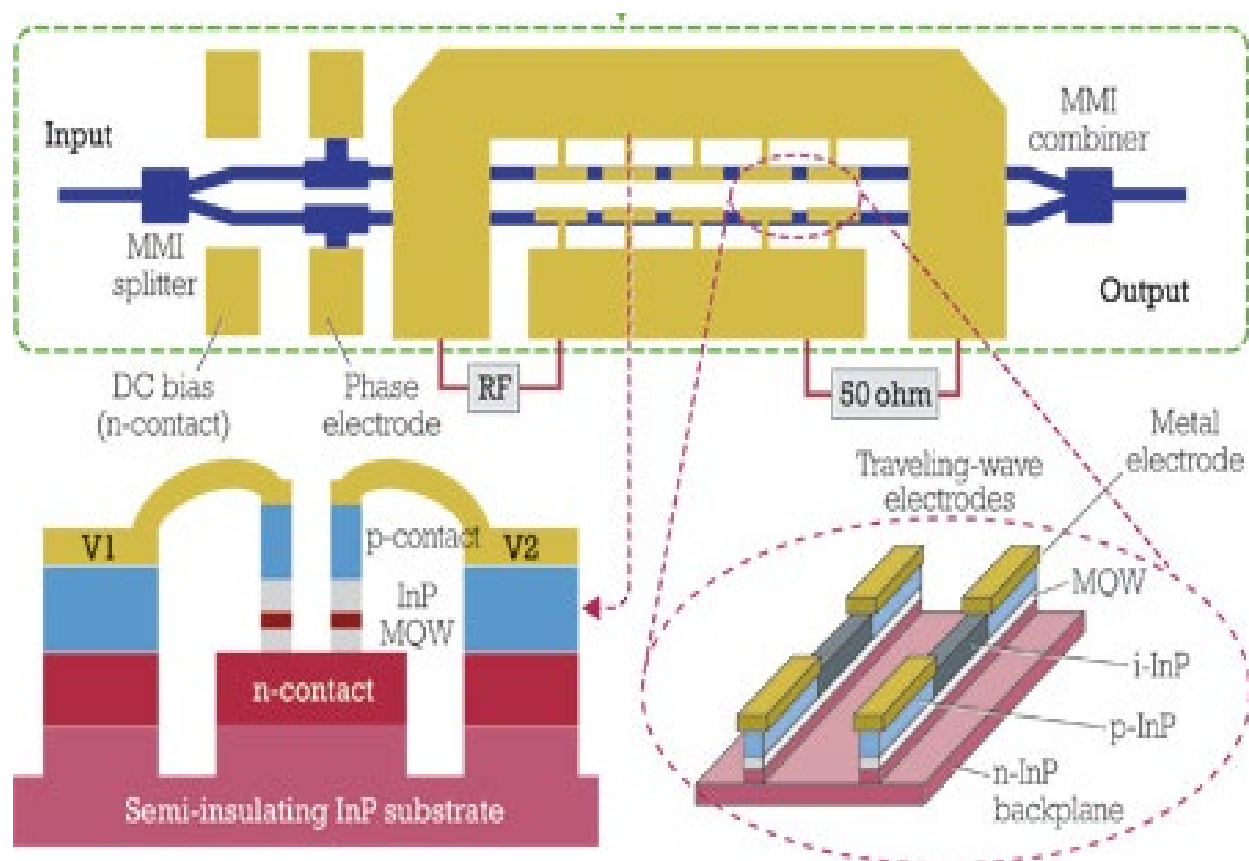


Figure 3-24 *Semiconductor Mach-Zehnder modulator configuration. The bottom half of the figure shows the waveguide structure and the traveling-wave electrode structure.*

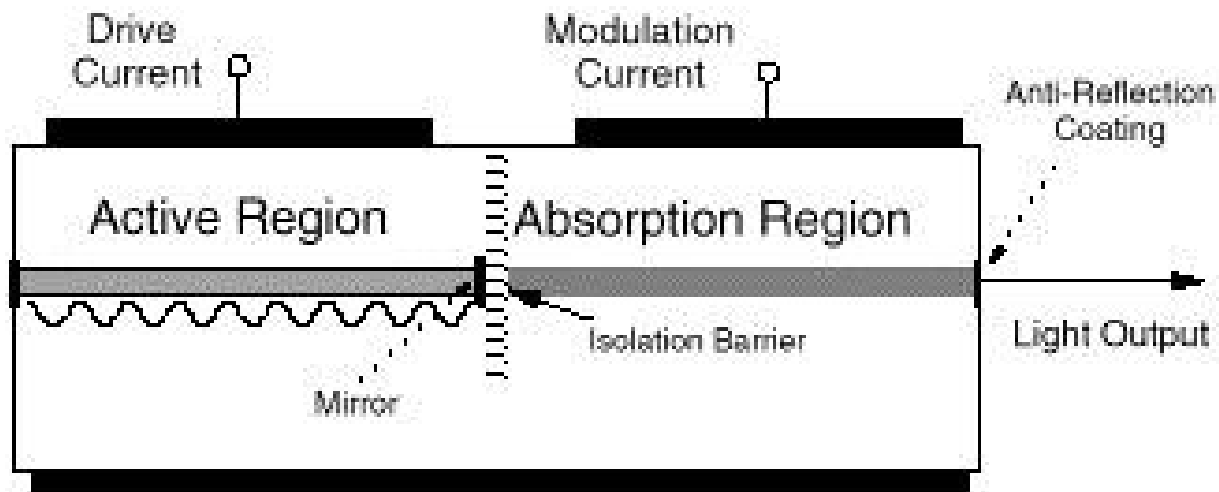


Figure 3-25 *Semiconductor DFB laser integrated with an electroabsorption modulator*

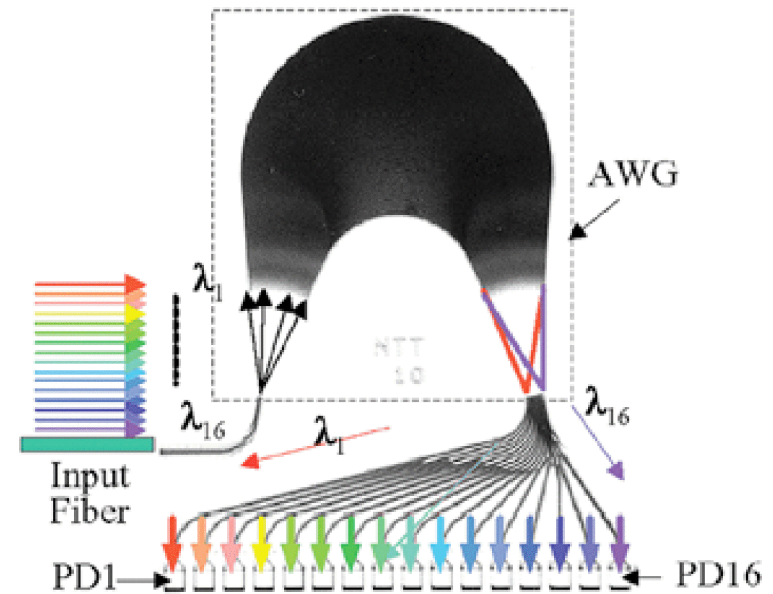
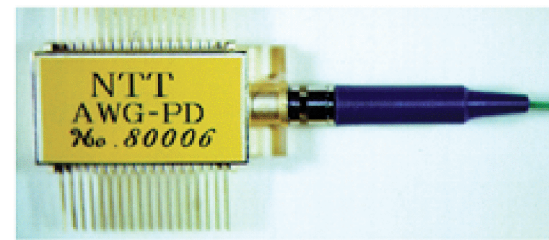
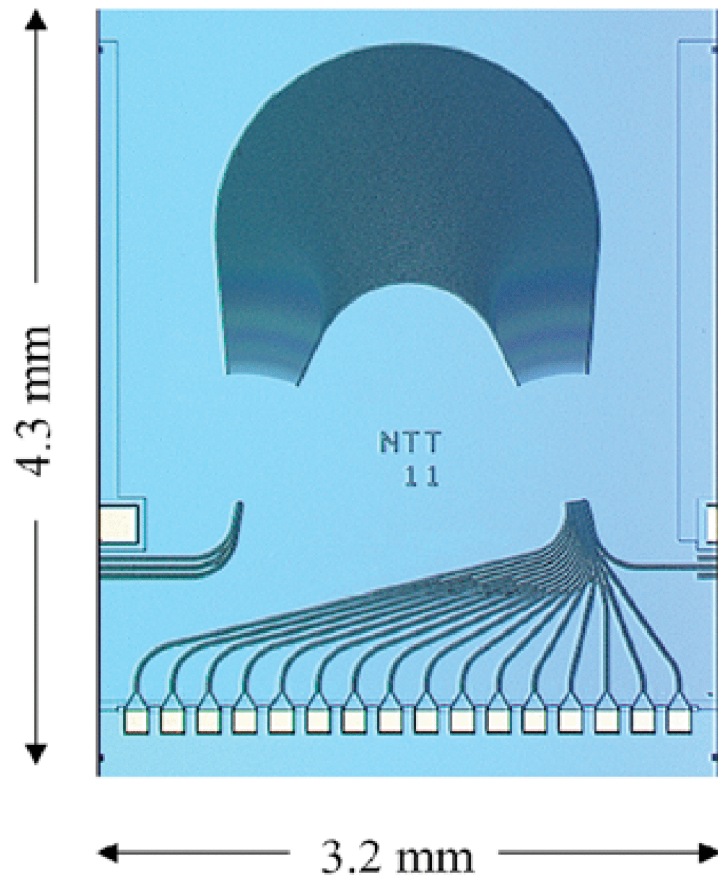


Figure 3-26 *Semiconductor AWG demultiplexer monolithically integrated with photodetectors*