CLAIMS

What is claimed is:

1. An integrated electro-absorption modulator comprising:

a layered diode structure formed above a device layer of a substrate, the diode structure comprising a bottom diode layer, an intrinsic diode layer, and a top diode layer;

a waveguide formed in the device layer underneath the layered diode structure to couple light in and out of the intrinsic diode layer;

electrical terminals contacting the top and bottom diode layers, wherein an extent of the electrical terminals along a length of the layered diode structure defines an active region of the electro-absorption modulator;

a driver circuit connected between the electrical terminals and configured to apply a direct-current bias voltage and an alternating-current signal voltage across the layered diode structure; and

a heater disposed at a rear end of the electro-absorption modulator to heat a rear portion of the active region, wherein light propagates through the waveguide from an optical input at a front end of the active region to an optical output at the rear end of the active region.

2. The integrated electro-absorption modulator of claim 1, wherein a heater power setting is optimized for an optical modulation amplitude associated with the integrated electro-absorption modulator.

3. The integrated electro-absorption modulator of claim 1, wherein the heater comprises winding heater filaments arranged laterally on both sides of the diode structure.

4. The integrated electro-absorption modulator of claim 1, wherein the waveguide is a silicon waveguide and the layered diode structure is made from III-V semiconductor material.

5. The integrated electro-absorption modulator of claim 1, wherein:

the electrical terminals comprise multiple pairs of electrical terminals contacting the top and bottom diode layers in multiple contact regions within the active region, the multiple contact regions separated by isolating regions; and

the driver circuit is connected between the multiple pairs of electrical terminals and configured to apply multiple respective direct-current bias voltages across the layered diode structure in the respective contact regions.

6. The integrated electro-absorption modulator of claim 1, wherein a material composition of the intrinsic diode layer varies between a front end of the active region and a rear end of the active region, resulting in an optical absorption coefficient that is greater at the rear end than at the front end.

7. The integrated electro-absorption modulator of claim 1, wherein the waveguide comprises a down-tapered section overlapping with the active region.