

Title: Highly Reliable 40Gb/s Electroabsorption Modulator Grown on InP:Fe Substrate

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Abstract:

Electroabsorption Modulators are widely used in the optical fiber communication systems. 10Gb/s optical communication systems using EA modulators and EA modulator integrated distributed feedback lasers are now in practical use [1]. To meet the strong demand of increasing the transmission capacity, high-speed modulators for 40Gb/s optical fiber communication systems are required [2-5]. We have developed the Multi-Quantum-Well EA modulator integrated with transparent waveguides using InP:Fe substrate.(Fig.1) By applying the semi-insulating substrate, the parasitic capacitance was reduced to 0.07pF and the modulation bandwidth of 40GHz was obtained. (Fig.2) The extinction ratio was 15dB at 0V to -3V operation voltage. To confirm the reliability, the accelerated aging test was made at 140 °C, -5V. The dark currents at 25 °C, -3V were stable over 2100 hours of aging time. (Fig.3) The component lifetime of the devices is over 12600 hours at 140°C. Assuming the activation energy of the devices as 0.8eV, the estimated lifetime at 25°C is over 6.8×10^7 hours. This device is useful for 40Gb/s optical communication systems, where high reliability is required.

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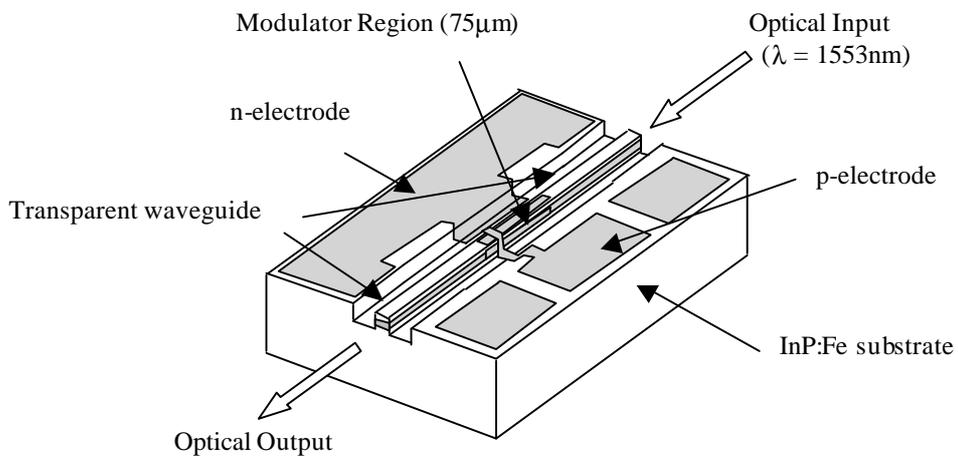


Fig.1. Device structure

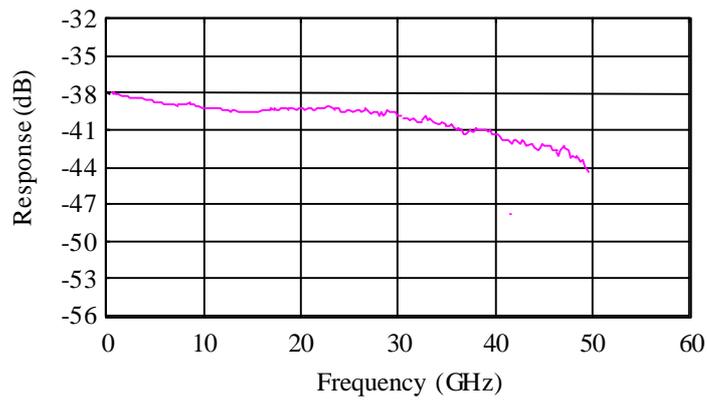


Fig.2. Frequency response

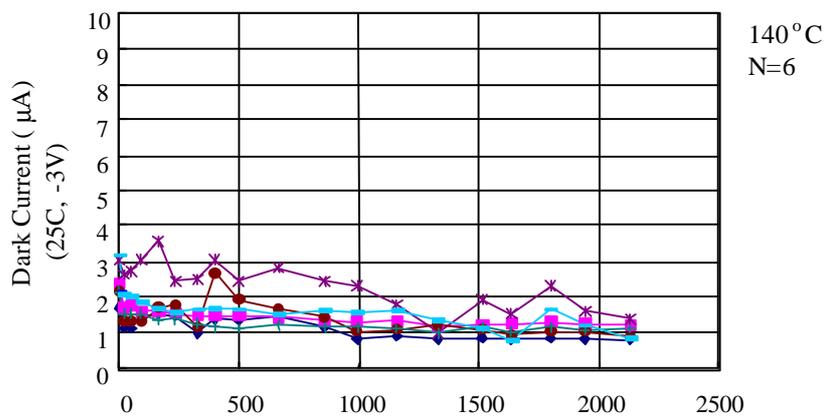


Fig.3. Aging test results