We comprehensively analyze the demodulation of wavelength division multiplexed (WDM) non return-to-zero differential phase-shift keying (NRZ-DPSK) signals by a single microring resonator. Simultaneous demodulation of multiple 40 Gbit/s WDM NRZ-DPSK channels is demonstrated using a single silicon microring resonator with free spectral range (FSR) of 100 GHz. Bit error measurements show very good performance for both through and drop port demodulations for all channels, and the drop port demodulation exhibits better wavelength detuning tolerance than for demodulation using a Mach-Zehnder delay interferometer (MZDI).
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