achieved with a single-pump configuration since the estimated bandwidth is ~33 nm as shown in the inset of Fig. 5(a). The conversion efficiency is around −37.1 dB. We also achieved error-free operation without an error floor as shown in Fig. 6(b). All the power penalties for the wavelength-converted signal are less than 3.7 dB at the BER of 10^{-9} compared with the back-to-back case. In this case, the penalties are not only due to the residual CW pump and the limited OSNR of the converted signal, but maybe also due to the receiver sensitivity difference for signals in the C- and L-bands. Besides, the additional power penalties caused by the polarization scrambling of the signal are smaller than 1 dB. The small penalties are probably due to the polarization angles of the two pump being slightly different. We use only one polarization controller after the polarizer to adjust polarization angle for the two pumps and the polarization controller and tapered fiber to the device may be slightly wavelength dependent. As shown in Figs. 6(c)–6(f), the wavelength-converted signals have clear and open eyes, which are also comfortably error free, in all cases.

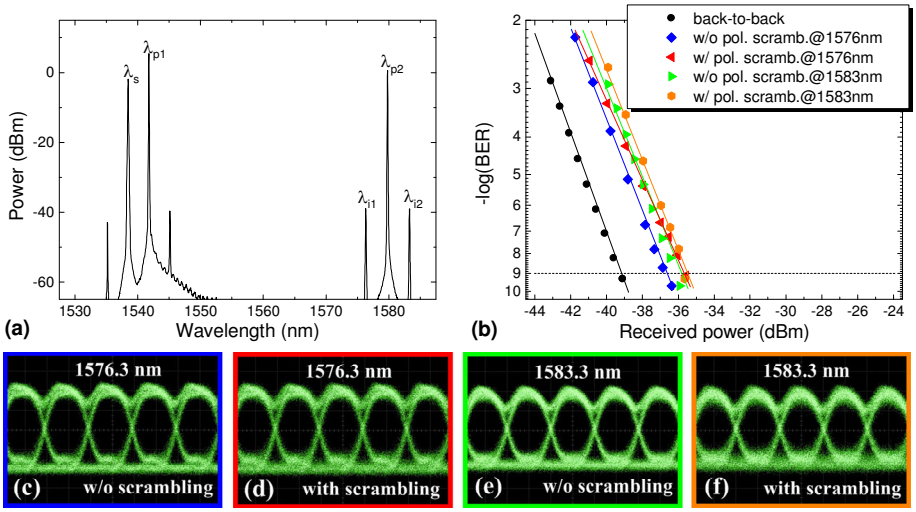

Fig. 6. (a) Measured optical spectrum at the output of the silicon waveguide for dual-pump wavelength conversion. (b) BER measurement for the 10-Gb/s DPSK back-to-back signal and the converted signal without and with the input signal being polarization-scrambled. Measured eye diagrams for the converted signal without (c, e) and with (d, f) the input signal being polarization-scrambled.

4. Conclusion

We have experimentally demonstrated polarization-insensitive AOWC of a 10-Gb/s DPSK data signal. The polarization-insensitive operation was based on angled-pump FWM in a 1-cm long dispersion-engineered silicon waveguide. Error-free performance was achieved for the wavelength converted signals regardless of whether the signal input polarization was scrambled or not in both single-pump and dual-pump configurations. The residual polarization sensitivities were very small (< 1 dB) in both cases. Polarization-insensitive AOWC with a large separation between the idler and signal was obtained with the dual-pump configuration.

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