

Fig. 7. (a) Back-reflection induced crosstalk as a function of fiber length and (b) measured power penalties as a function of the crosstalk.

It should be noted that the penalty by dispersion induced pulse broadening is less than 1 dB. Thus, it is possible to have longer transmission distance as seen in Fig. 8, if we relocate the BLS to the remote node (RN) [13]. At the maximum injection power of -6 dBm, where the BLS output at the RN is 24 dBm, the transmission length was limited to 80 and 90 km with unpolarized and polarized RSOAs, respectively. Compared with the previous cases, the RIN of the optical signal is improved and there is no degradation of the RIN and extinction ratio by back scattering. Although the maximum injection power was increased by 14 dB compared to the previous cases, the increase in the output power of the RSOA was only 3-4 dB due to the gain saturation. Thus the improvement of transmission distance is limited even though the receiver sensitivity was improved due to the reduced noise. Since the polarized RSOA has a higher gain than the unpolarized RSOA by about 2 dB, it could provide 10 km longer reach than unpolarized one. A reduction of injection power of 10 dB (-16 dBm injection) brought about the decrease in the reach by 10 km as seen in Fig. 8(b). It should be noted that the dispersion induced power penalty was less than 1.5 dB in all cases.

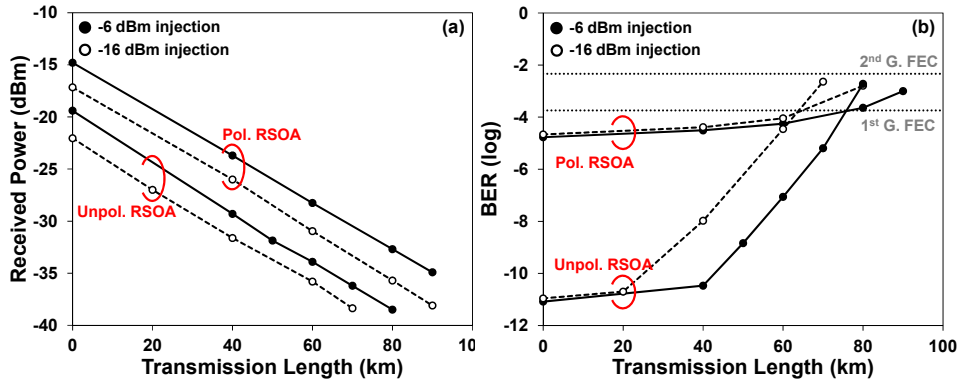


Fig. 8. (a) Measured received power and (b) BER curves as a function of transmission length after relocating the BLS to RN.

4. Conclusion

We experimentally demonstrated a 60 km reach DWDM-PON based on ASE injection seeding. The channel spacing was 25 GHz. Thus it is possible to accommodate more than 160 channels within C-band. The achieved link budget was 27.3 dB including the loss at the OLT. If we utilize a 25 GHz-spaced AWG, the interleaver with 2.5 dB loss will be replaced by the additional 10 km fiber, with an insignificant dispersion penalty. The reach was increased to 90 km by changing the location of the BLS to remote node. Further increase in transmission distance can be achieved by high gain reflective modulator.