accurately. Thus, the proposed software-based synchronization technique could be used for the BER estimation as well as the phasor monitoring.

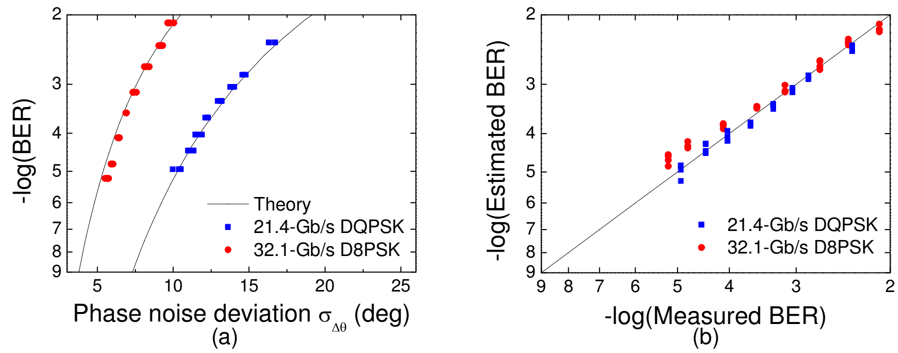

Fig. 8. Estimated BERs for 10.7-GSymbol/s DQPSK and D8PSK signals. (a) Measured BER vs. phase noise deviation of the symbols obtained from the constellation diagram. The solid curves represent the theoretically calculated values. (b) Measured BER vs. estimated BER by using the proposed phasor monitor.

4. Conclusion

A potentially inexpensive phasor monitor for DxPSK signals was developed by utilizing the non-coherent detection technique with low-speed, free-running A/D converters and the software-based synchronization technique based on the novel phase-reference detection algorithm. This algorithm enabled us to properly rearrange the asynchronously sampled data into one symbol frame by using the relation between the symbol rate and the sampling rate. Thus, by using the proposed phasor monitor, we could obtain the constellation diagrams of the 10.7-Gsymbol/s DQPSK and D8PSK signals (and estimate their BERs as well) from the asynchronously sampled data. The accuracy of this phasor monitor was not deteriorated even when the sampling rate was reduced to be as low as 156 KS/s. Thus, we concluded that the effect of the sampling rate on the performance of the proposed phasor monitor was negligible, which, in turn, facilitated the use of inexpensive low-speed A/D converters.

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