



100G APD ROSA sensitivity update (IEEE 802.3ca meeting)

2016-11-8

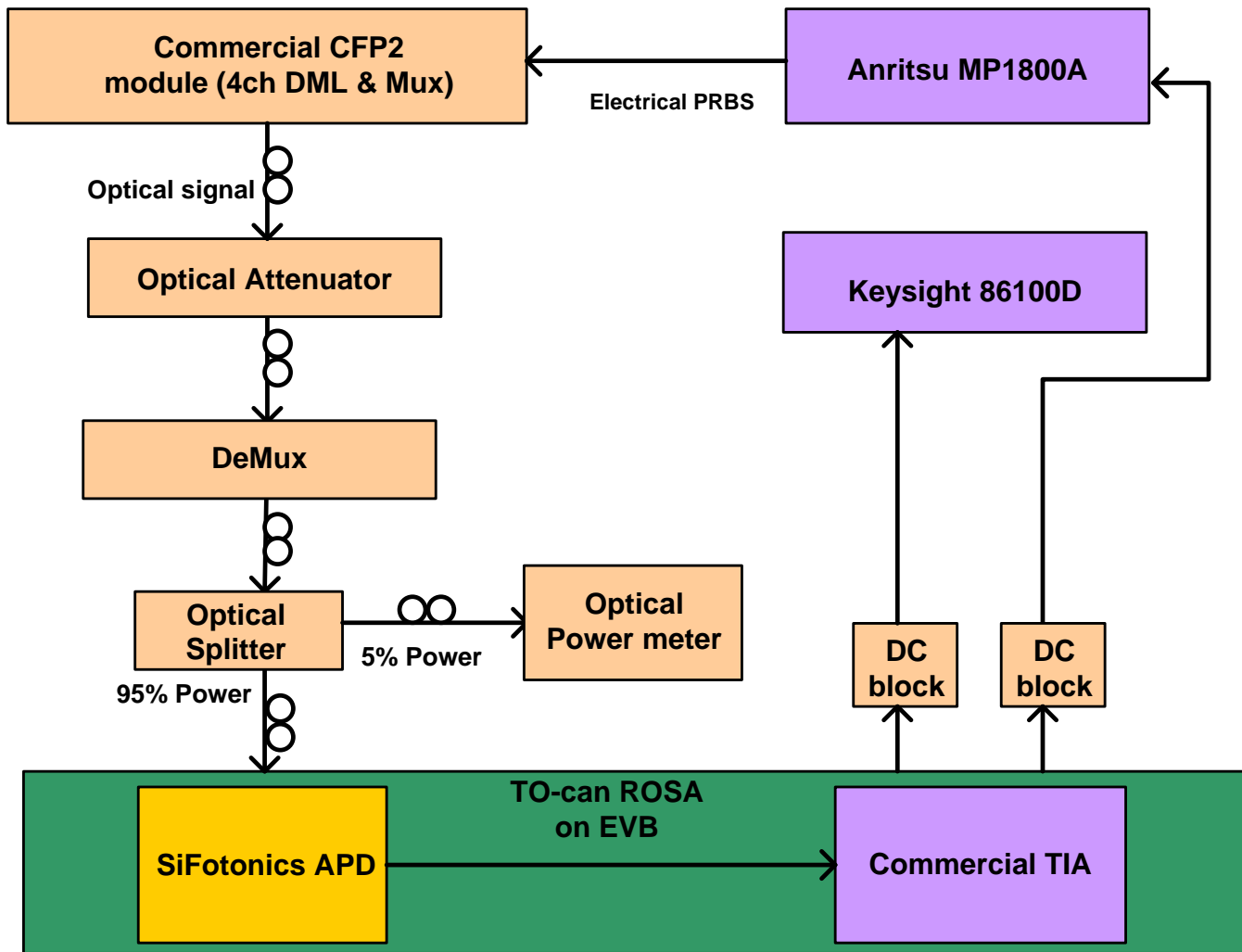


Contributors

- SiFotonics Technologies
 - Pengfei Cai
 - Wang Chen
 - Ching-yin Hong
 - Mengyuan Huang
 - Su Li
 - Dong Pan
 - Tzung-I Su
 - Liyuan Zhao

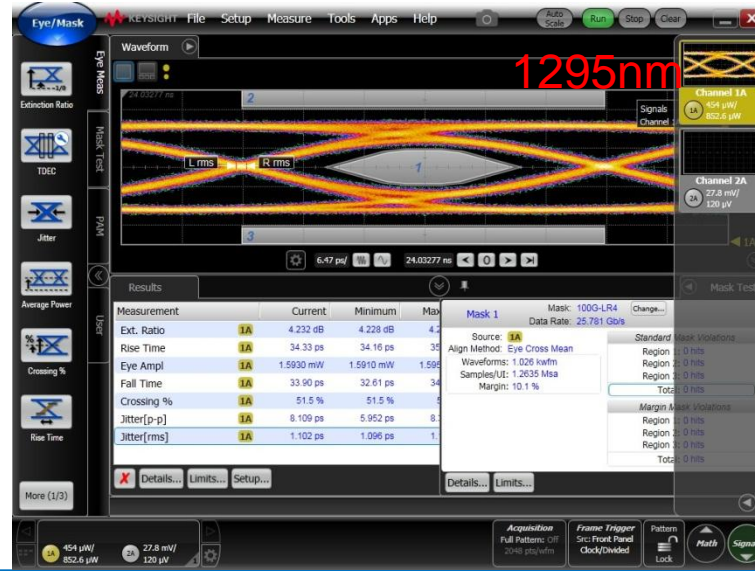
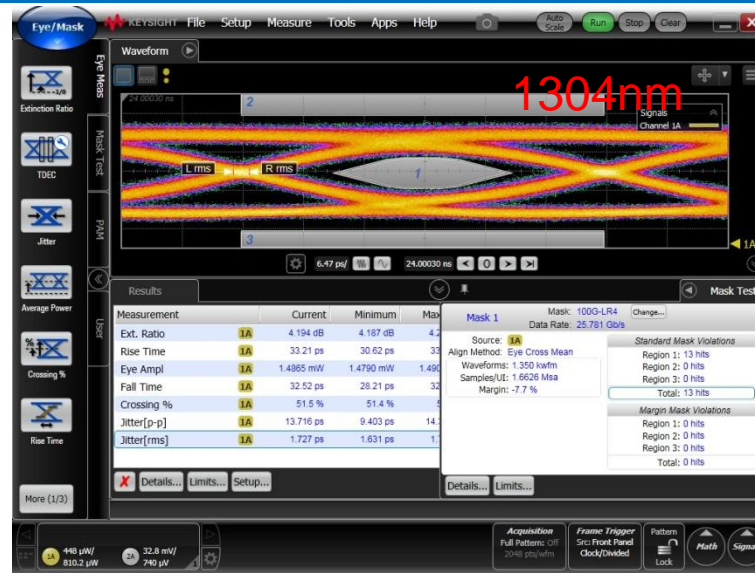


Test setup



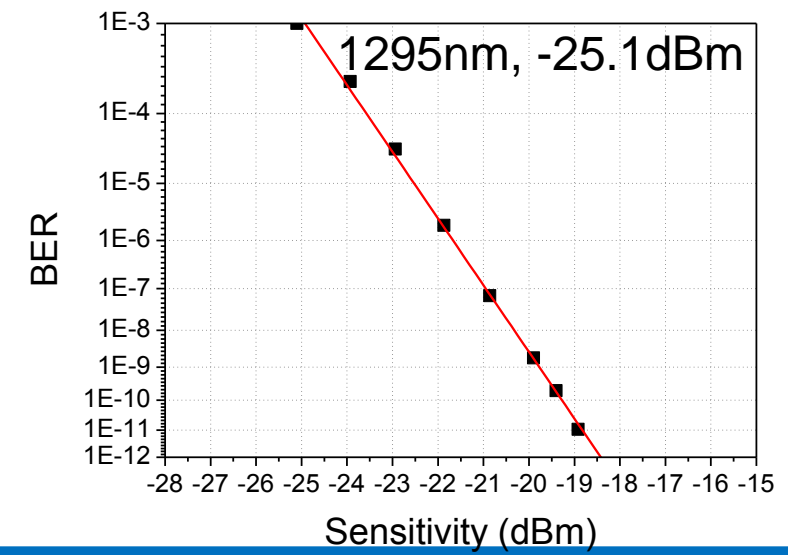
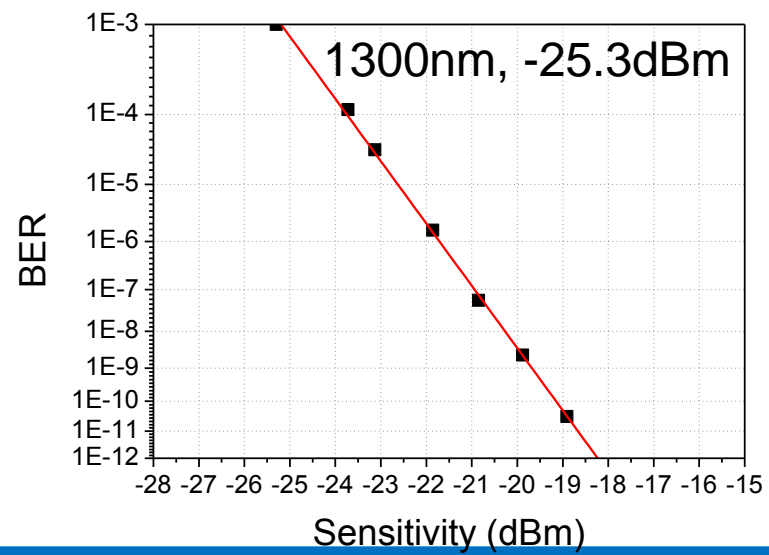
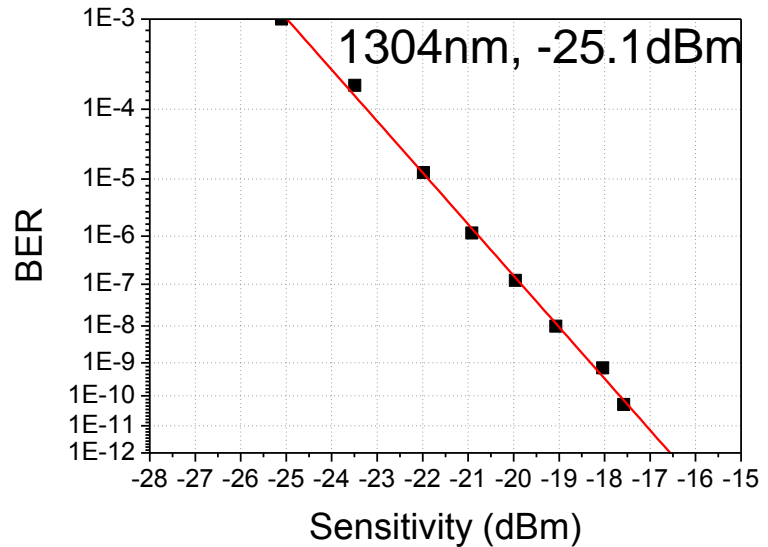
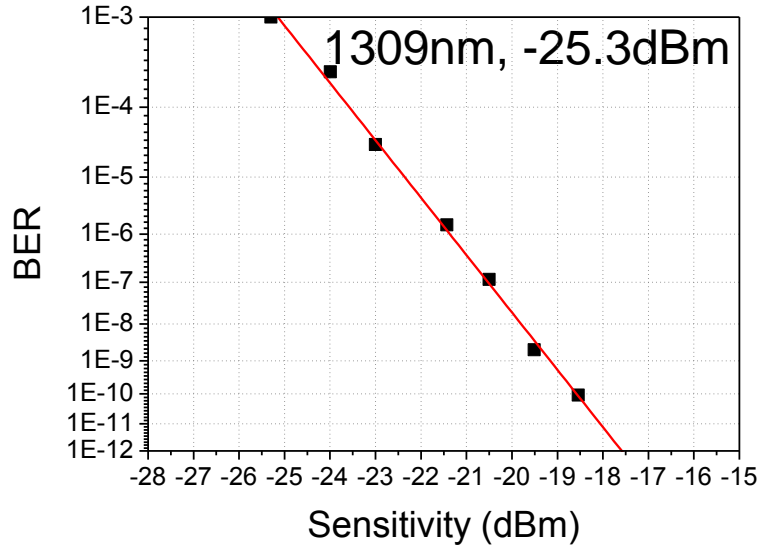


Tx optical eye-diagram (after DeMux)





4x25G APD back-to-back sensitivity





Theoretical calculation of 25G APD sensitivity

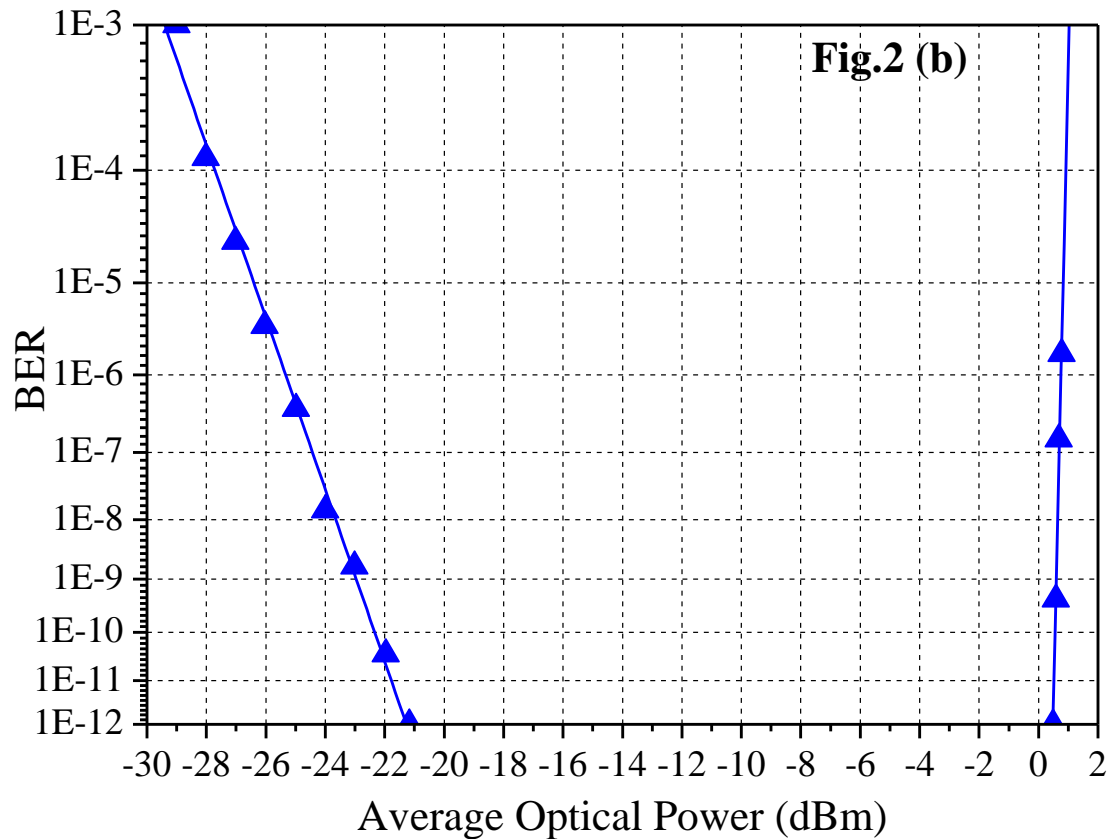
Si based APD has much lower k value (<0.2), which is the fundamental reason that Ge/Si APD can perform ultra high performance at high data rate. Following table lists the calculation results of different 25G APD performance:

Parameter at 25°C	Ge/Si APD (now)	Ge/Si APD (improved TIA)
BER	1.00E-03	1.00E-03
Extinction ratio (dB)	8	8
Input optical power (dBm)	-28.6	-29.6
Dark current @M=1 (nA)	60	60
Responsivity @M=1 (A/W)	0.7	0.7
Ionization coefficient ratio @M=12	0.13*	0.13*
Bandwidth @M=12 (GHz)	22	22
25G TIA input RMS noise (μ A)	2	1.4
APD shot noise (μ A)	1.83	1.65
Receiver total RF noise (μ A)	2.71	2.16
25G AOP Sensitivity (dBm)	-28.6	-29.6

*Only calculation data.



Update TO-can APD sensitivity and overload with EML



$\lambda=1304\text{nm}$, EML ER=9dB, data rate=25.78Gb/s, PRBS= $2^{31}-1$, NRZ, 25 °C