Tests of opto-on-board layout for the Freiburg kapton hybrid

Freiburg
Birmingham
Oxford

Motivation and Concept

- Tony Smith‘s proposal to place 2 opto-chips on the forward hybrid and to connect the PIN and VCSEL via the pluggin
- possible difficulties envisaged for the kapton design (no vias)
- PCB‘s to simulate the opto-part of the hybrid and pluggin (worst case)
- measure functionality and optical characteristics before hybrid layout completion

Hardware

- 2 PCB‘s designed and manufactured in Freiburg with substansial Birmingham assistence
- DORIC, LDC, optoassembly and dogleg bonding at Birmingham
- Tests of functionality, bit-error-rate and crosstalk for various optical power in Oxford

Results

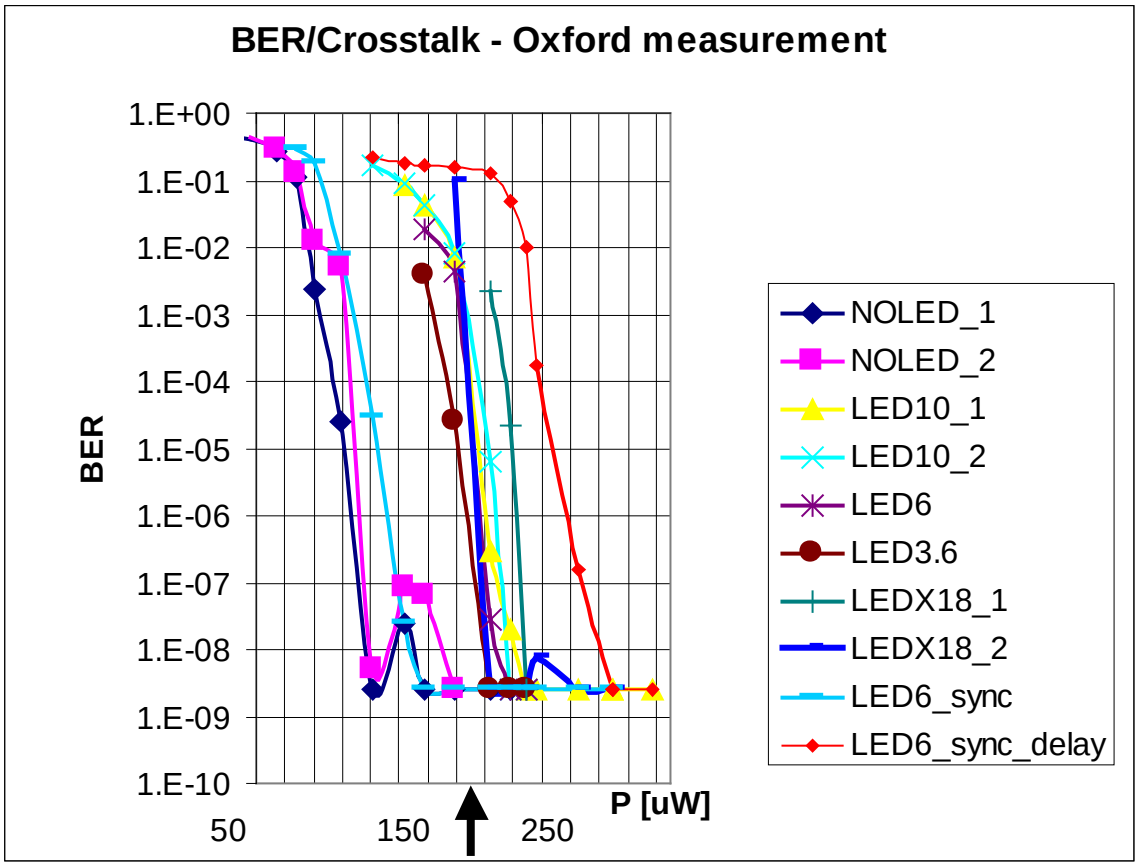
- Setup working for 22 mm PIN-DORIC distance
- BER vs. optical power looks similarly to the opto-hybrid
- when LED or LEDX is fed with asynchronous data, there is a crosstalk measurable (the recovered clock jitter increases)
- for synchronous data fed to LED(X) the crosstalk strongly depends on the phase shift

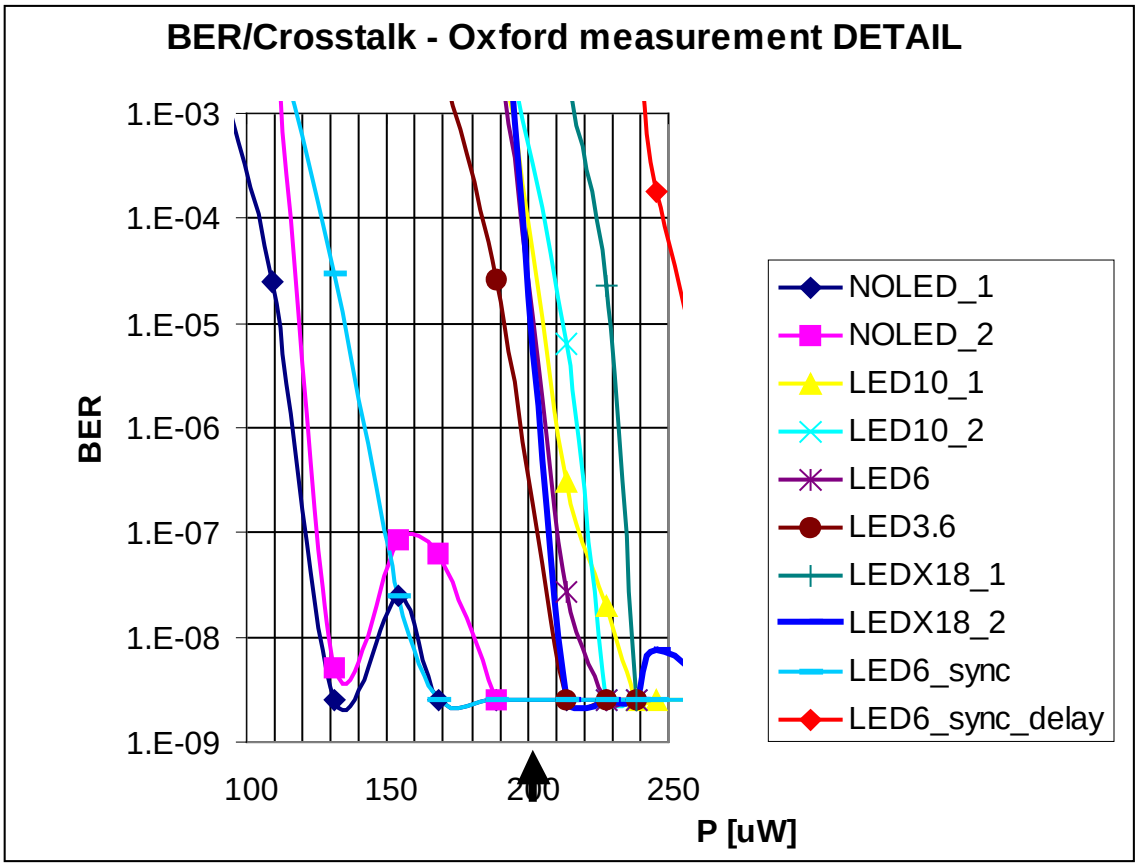
Minimal opt. power for BER~ 10^{-9}

LED on	No	LED	LED	LEDX	(18 μW)	sync
P(LED)	LED	(10 μW)	(3.6 μW)	async	sync	+10 ns
Pmin (μW)	154	228	214	250	154	260

Next steps and conclusion

- hybrid layout updated upon the test results (of both our‘s and Liverpol package)
- more care taken of the ground and shielding
- similar test should be done for the hybrid - adapter needed


BER/Crosstalk - Oxford measurement
1.E+00
1.E-01
1.E-02
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
1.E-10
BER
50
150
250
P [uW]
NOLED_1
NOLED_2
LED10_1
LED10_2
LED6
LED3.6
LEDX18_1
LEDX18_2
LED6_sync
LED6_sync_delay


BER/Crosstalk - Oxford measurement DETAIL
1.E-03
1.E-04
1.E-05
1.E-06
1.E-07
1.E-08
1.E-09
BER
100
150
200
250
P [uW]
NOLED_1
NOLED_2
LED10_1
LED10_2
LED6
LED3.6
LEDX18_1
LEDX18_2
LED6_sync
LED6_sync_delay