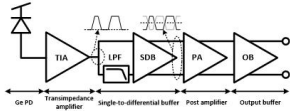
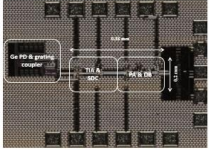

김현규

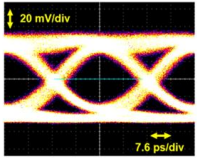
(2017.03 - 2024.02)

2024년도 동계 워크샵

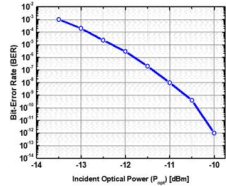
● Photonics Conference



<Chip microphotograph & block diagram of monolithic optical receiver>



<Eye diagram & BER performance>

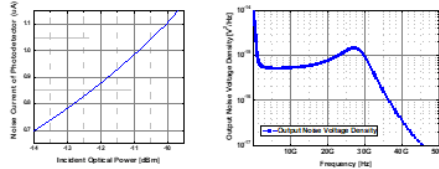


$$\overline{I_{noise,rms,PD}^2} = 2q(I_{signal,average,PD} + I_{dark,average,PD})BW_{noise}$$

<Shot noise of photodetector>

$$\overline{I_{noise,rms,circuit}^2} = \int_{10MHz}^{BW_{max}} \frac{V_{noise,one,circuit}^2(f)}{\{R_T(f)\}^2} df$$

<Input referred noise of receiver circuit>



<Calculated photodetector shot noise> <Simulated circuit output noise voltage density>

- Noise simulation using each equations
 - Photodetector shot noise current : 1.1 μA_{rms} at -10 dBm
 - Circuit input referred noise current : 4.9 μA_{rms}

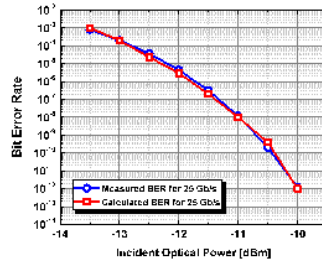
$$SNR = \frac{I_{signal,pp,PD}}{\sqrt{I_{noise,rms,PD}^2 + I_{noise,rms,circuit}^2}}$$

<SNR of optical receiver>

$$BER = \frac{1}{2} \operatorname{erfc}\left(\frac{\alpha \cdot SNR}{2\sqrt{2}}\right) \quad (\alpha : \text{BER decreasing constant})$$

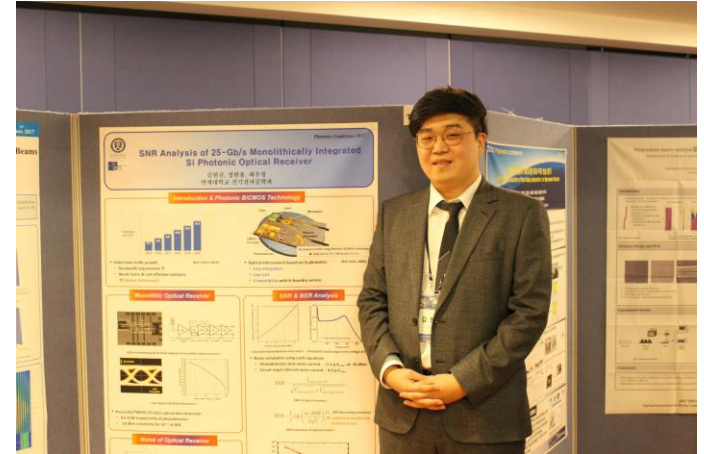
→ caused by bandwidth limit of optical receiver

<BER estimation of optical receiver>

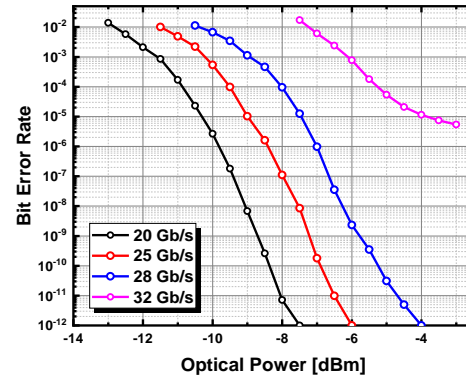
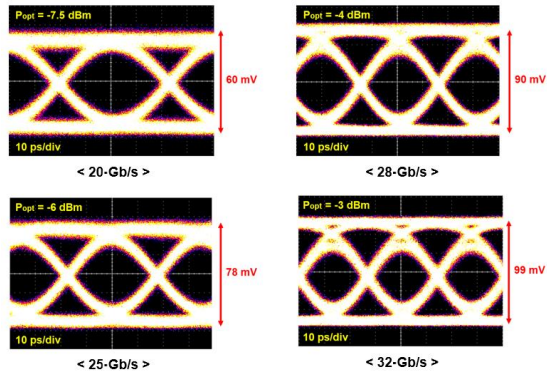
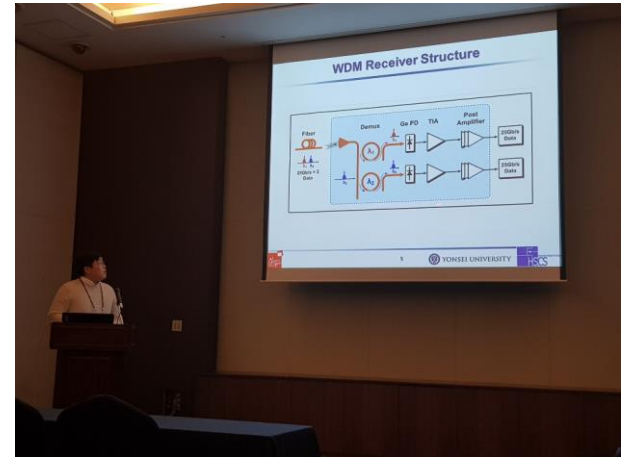
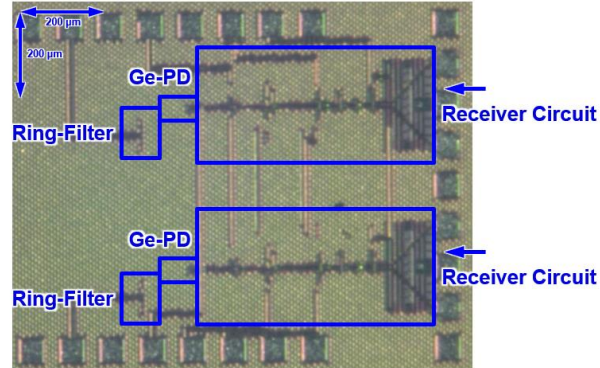
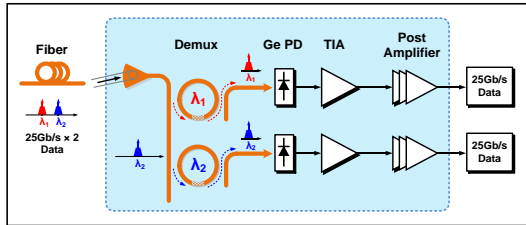


<BER of measured result & calculated result>

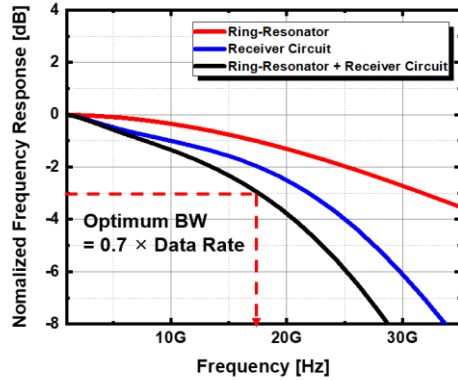
- Calculated BER & measured BER are well matched



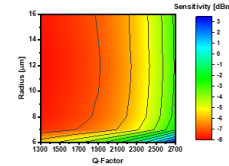
● Photonics Conference



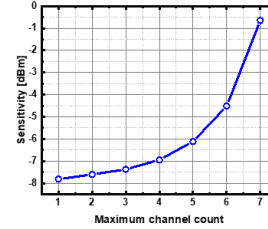
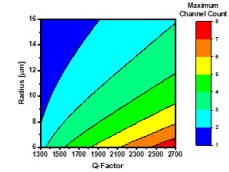
● SPIE Photonics West



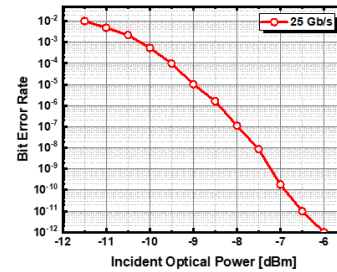
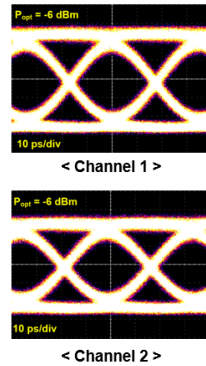
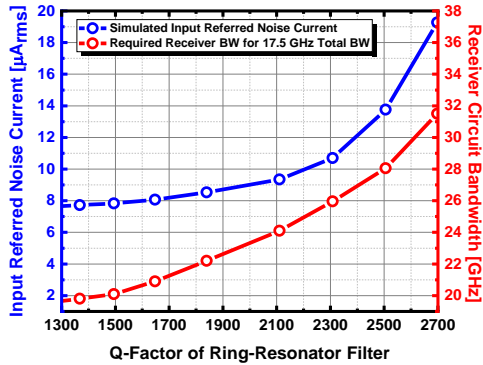
● Sensitivity



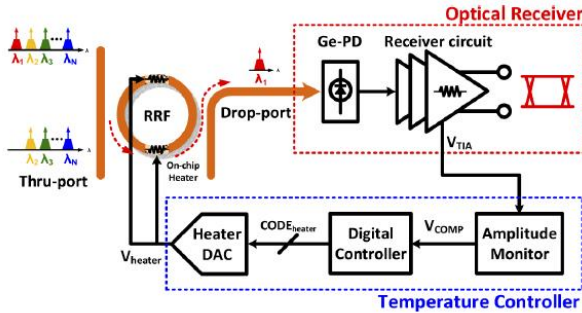
● Maximum channel count



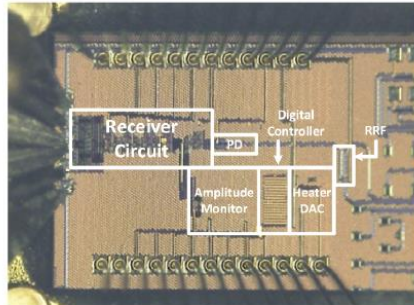
→ Relationship between sensitivity and maximum channel count



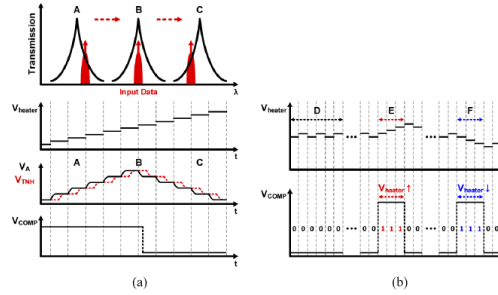
● Optics Express



(a)

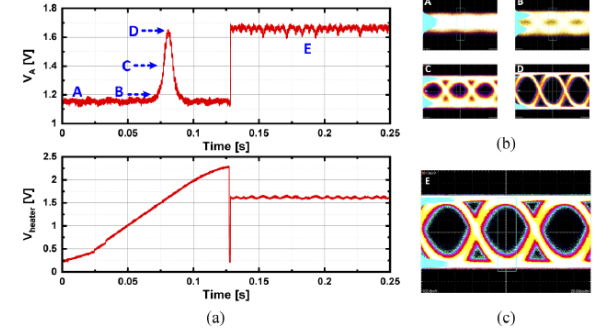


(b)



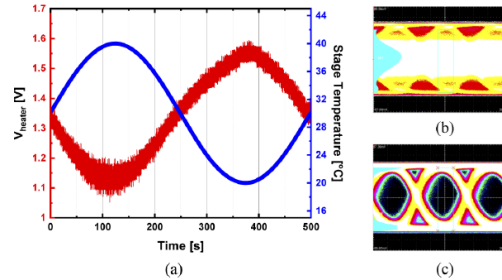
(a)

(b)



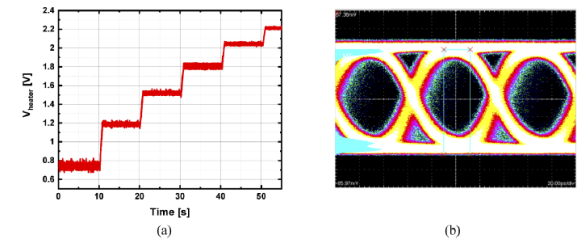
(a)

(c)



(a)

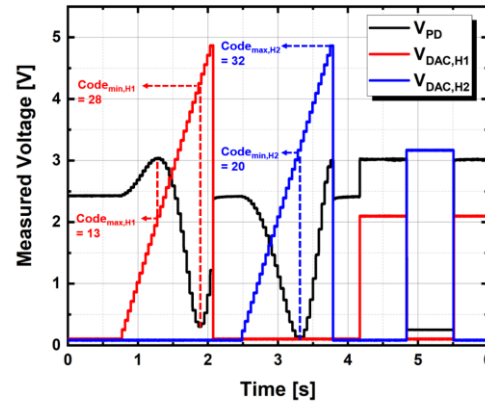
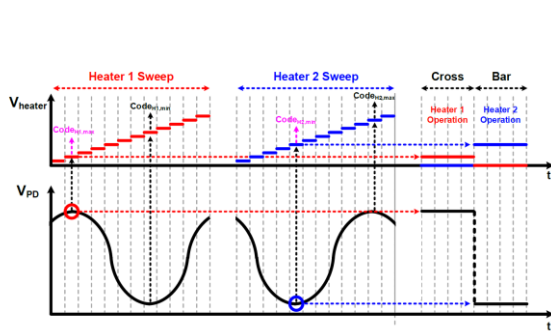
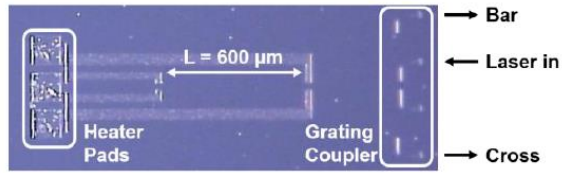
(c)



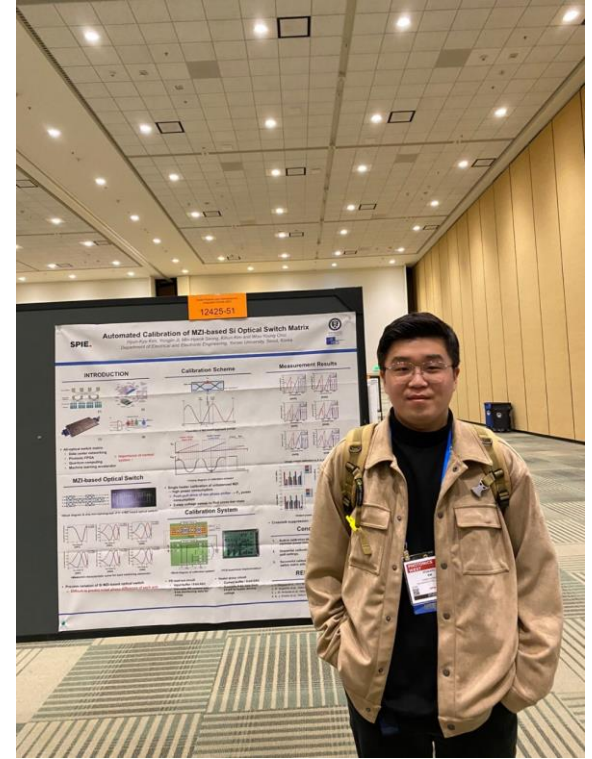
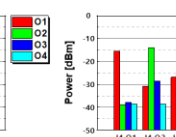
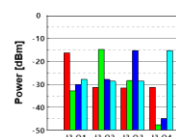
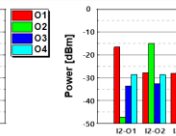
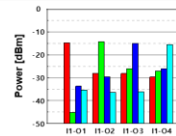
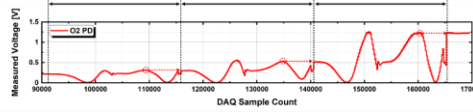
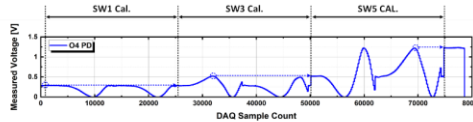
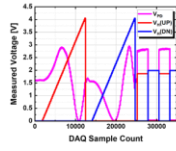
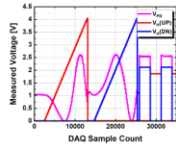
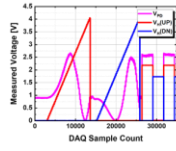
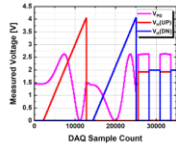
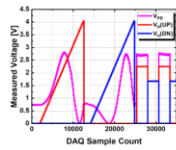
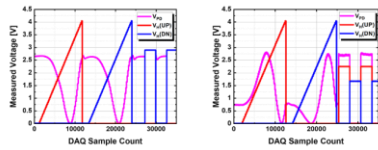
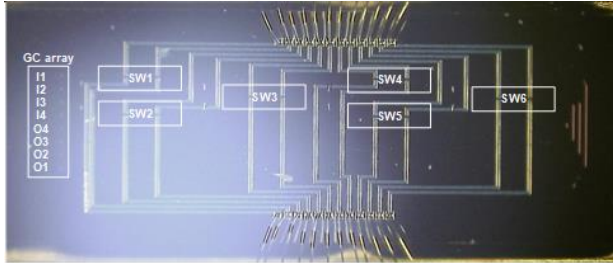
(a)

(b)

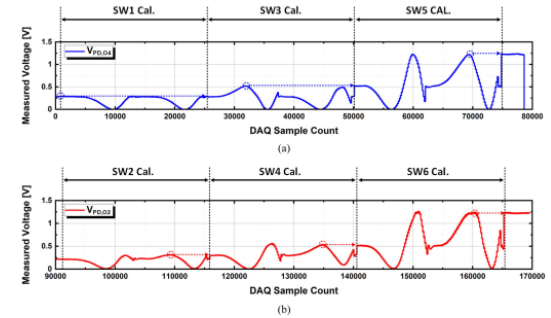
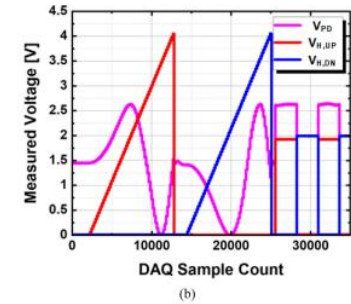
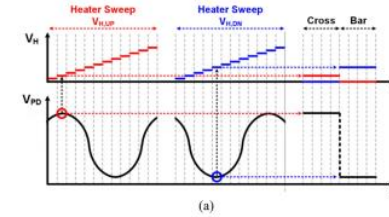
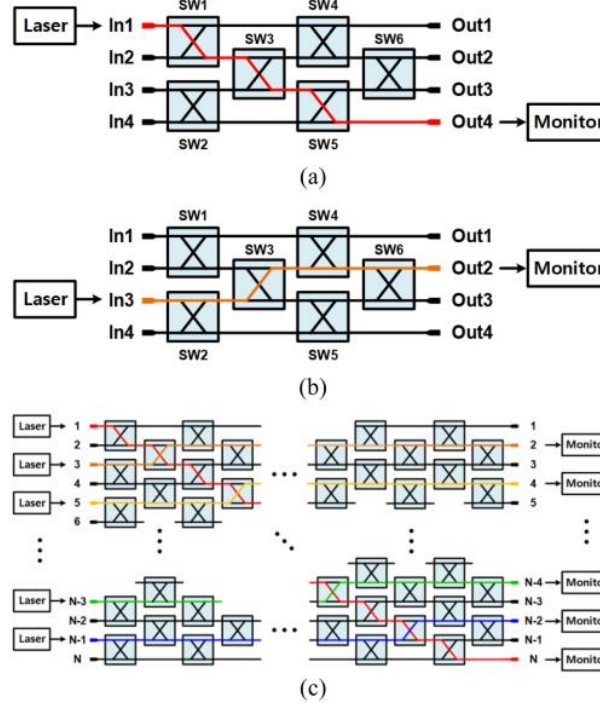
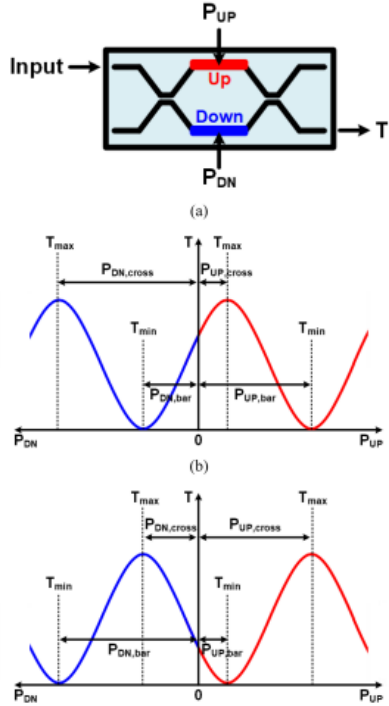
● 동계학술발표회



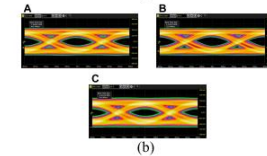
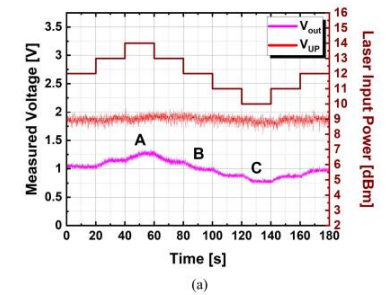
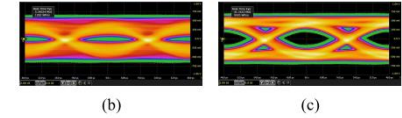
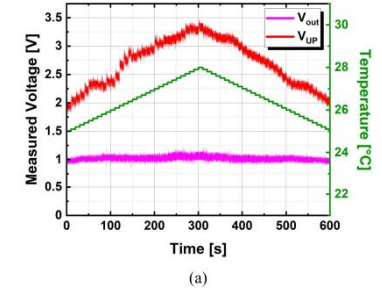
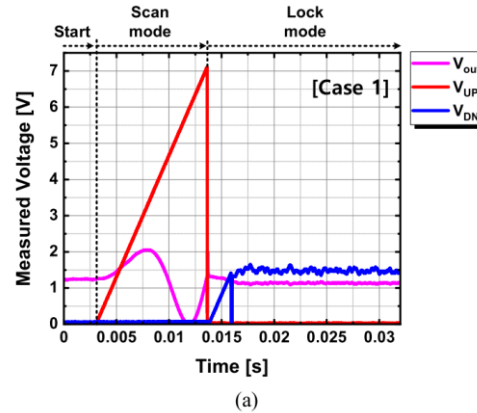
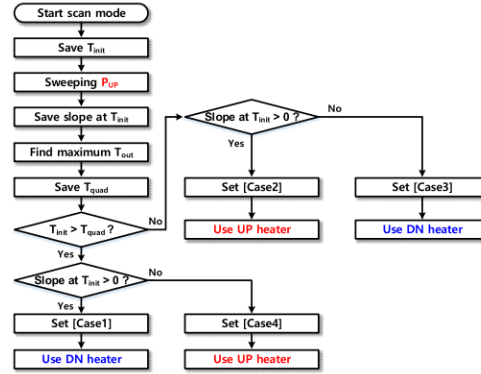
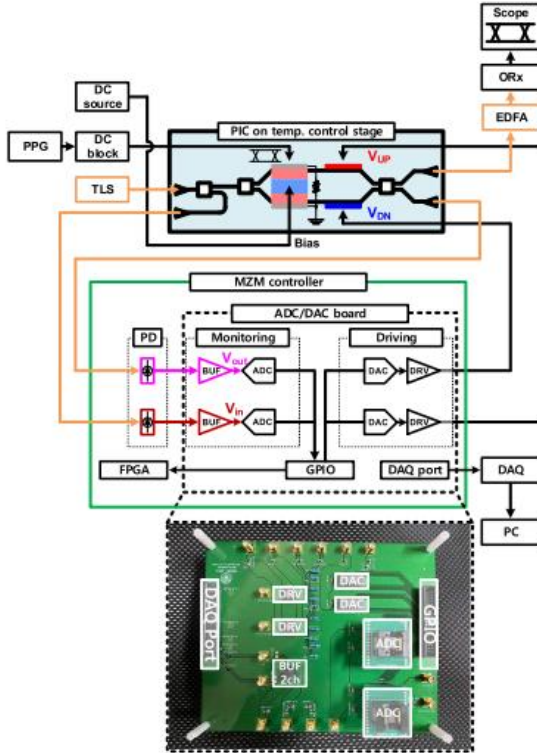
● SPIE Photonics West



● Photonics Journal



● Photonics Technology Letters



● Journal of Lightwave Technology / Domestic Patent

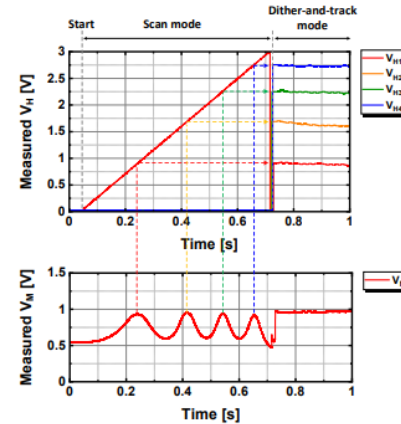
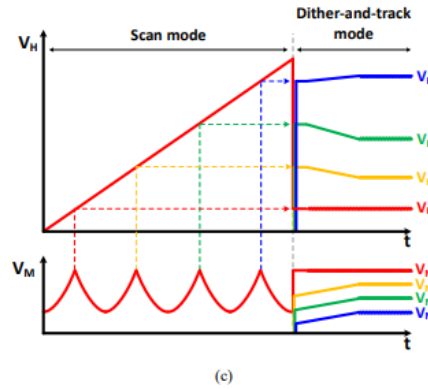
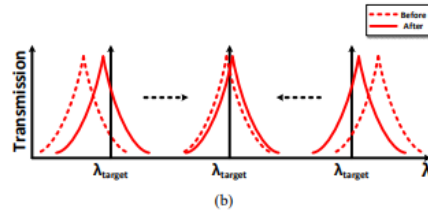
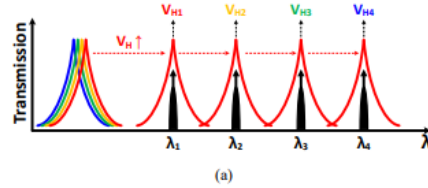
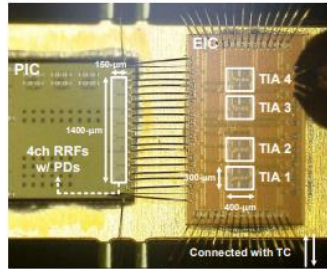
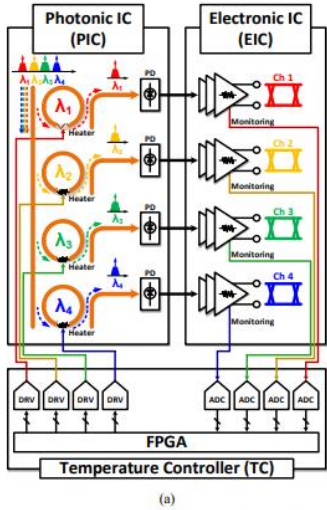


Fig. 6. Measured V_H and V_M values with initial TC operation.

