

The background of the slide features a large, light blue watermark of the Yonsei University seal. The seal is circular with the text 'YONSEI UNIVERSITY' around the top and 'YONSEI' in Korean at the bottom. In the center is a shield with a book, a torch, and a central circle, with the year '1885' at the bottom.

2025 Workshop

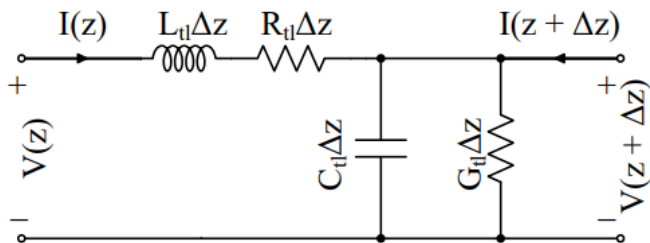
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Dept. of Electrical and Electronic Engineering
Yonsei University**

➤ Motivation for high speed MZM

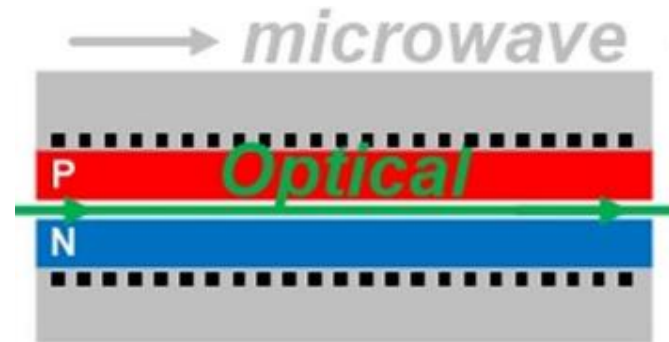
Reverse bias PN junction → modulation efficiency ↓ → long phase shifter

TW(Traveling wave) MZM ($\lambda \ll L$)



$$Z_o \approx \sqrt{\frac{L}{C}}$$

$$n_{mw} = c\sqrt{LC}$$



- Impedance mismatch
- Velocity mismatch
- RF loss

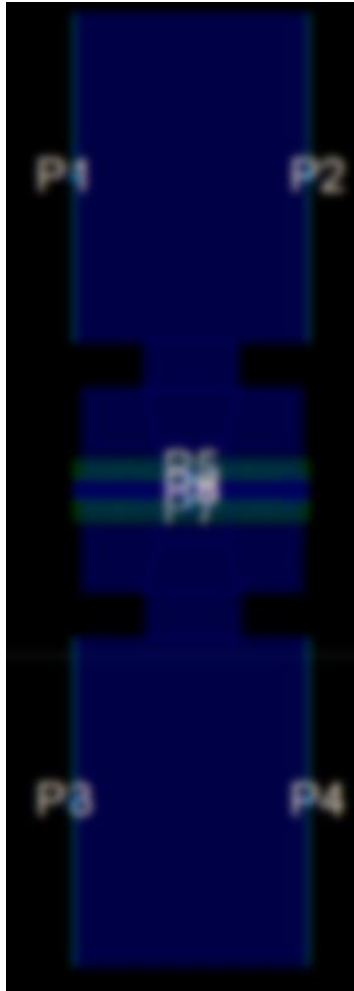
➤ TW MZM design study

1) Impedance matching

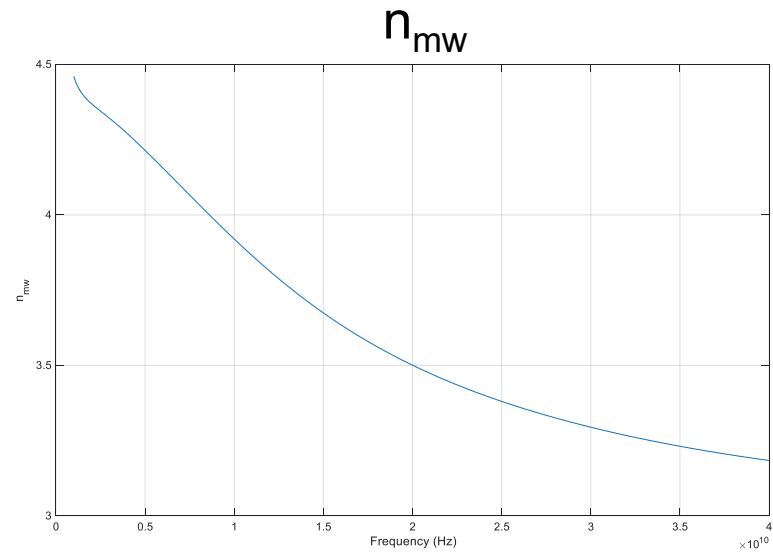
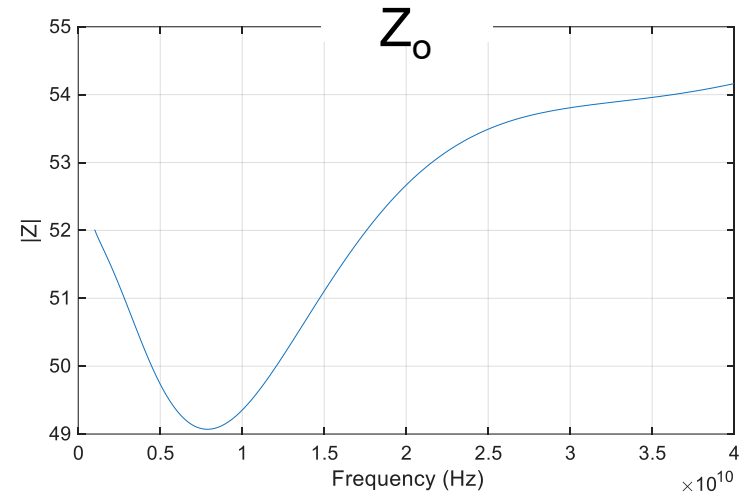
$$Z_o \approx \sqrt{\frac{L}{C}} \approx 50\Omega$$

2) Velocity matching

$$n_{mw} = c\sqrt{LC} \approx n_g$$

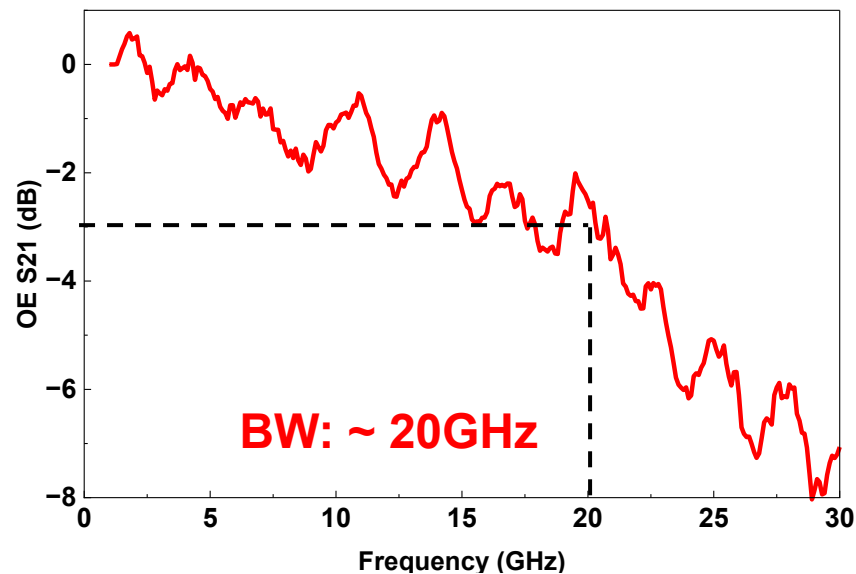
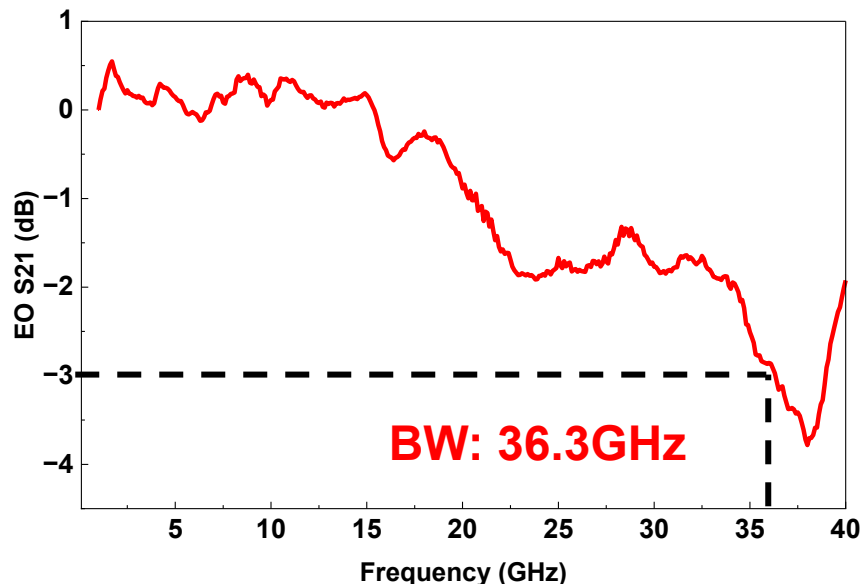
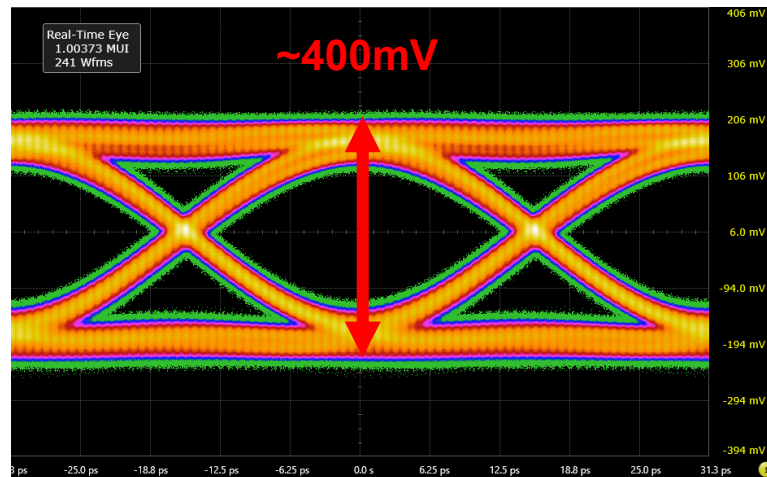


ADS sim
(Electrode design)



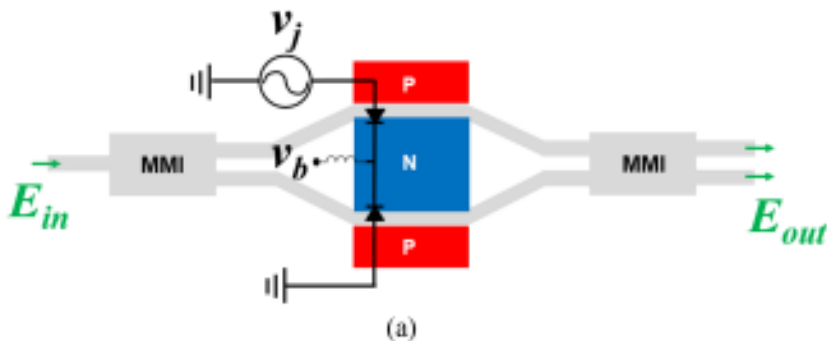
MATLAB sim

➤ TW MZM, PD Measurement



➤ TW MZM, BPD Design

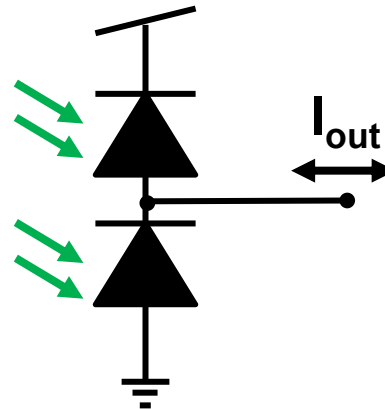
SPP(Single-Push-Pull MZM)



$$\alpha_{Sil} \propto f^2 C_{pn}^2 R_{pn}$$

Pros : RF loss ↓

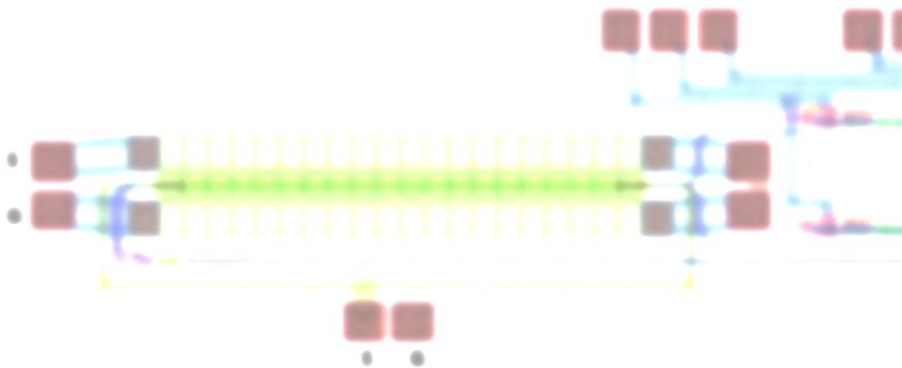
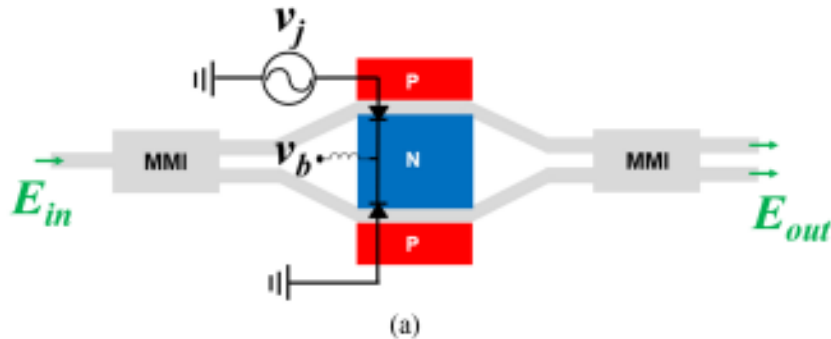
BPD(Balanced PD)



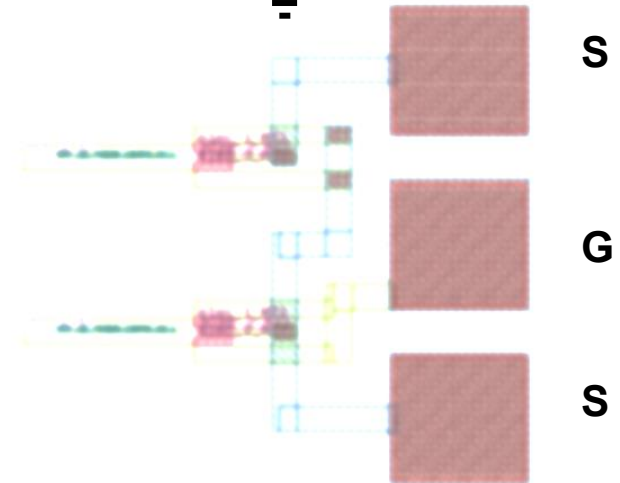
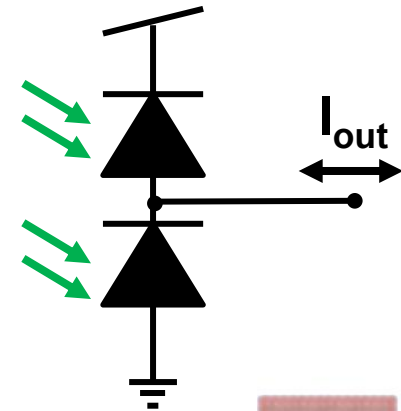
Pros : Common noise ↓

➤ TW MZM, BPD Design

SPP(Single-Push-Pull MZM)



BPD(Balanced PD)



➤ Chip design (26.05 AMF)

