

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 '1885' at the bottom. In the center is a shield with a book and a lightbulb.

HSCS 2025 Seminar

Yongjin Ji's 2025

**High-Speed Circuits & Systems Lab.
Dept. of Electrical and Electronic Engineering
Yonsei University**

Abstract of 2025

- **3 Tape outs**
- **1 Internship**
- **5 Conferences + 1 accept**
- **2 Patents**

Tape Out

- JAN : AMF
- OCT : IHP EPIC (SG25H7) – ~120GHz ORx
- DEC~JAN : Samsung 28nm – XTC Tx

Tape Out 1 : AMF

	<Tx>				
	12um	Qfactor	FWHM[pm]	modulation BW[GHz]	OMA(@4Vpp)
4&8CH	12_260_280				기존
4&8CH	12_200_240				기존 2배 BW
	12_220_220				
	12_200_260				
XTC	12_280_300				최고 OMA효율
XTC	12_220_240				기존 1.5배 BW
XTC	12_200_200				최고 BW -intel과 같은 Q
	12_240_280				

- **Done (+ on going)**
 - 4CH & 8CH Tx / Rx
 - Neuromorphic photonics

- **Not done yet**
 - Edge coupler
 - Filters (dual ring)

ORx

Filters

Edge
Coupler

Neuromorphic
Photonics

RAMZM

OTx

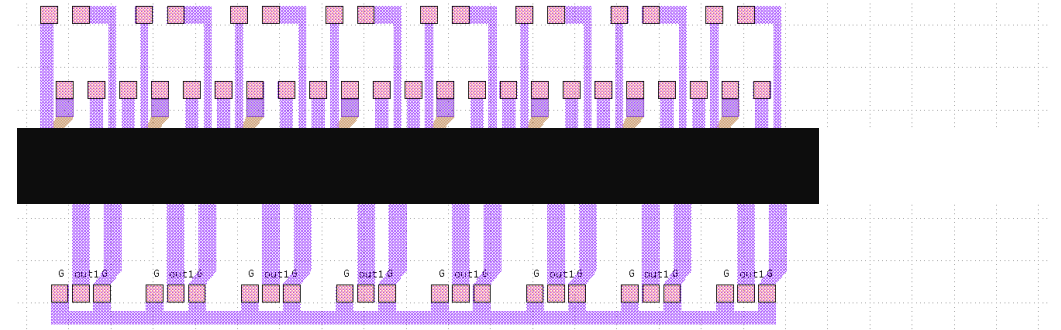
Next AMF (01 MAR 2026)

- Flipchip Tx / Rx

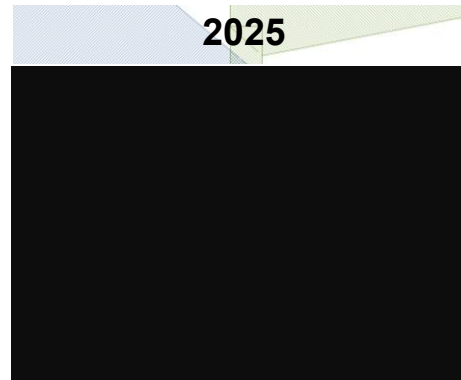
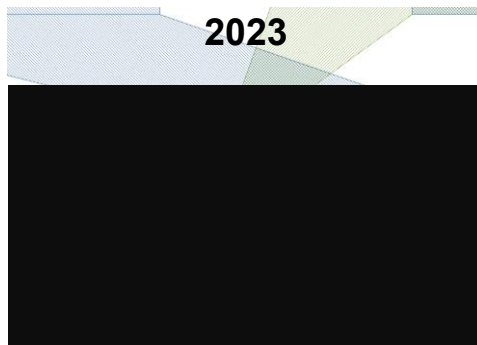
EIC



PIC



- Improved MRM



2026

- Doping area optimization
- Metal / via
- Optical parameter optimization
 - Peaking effect (MRM)

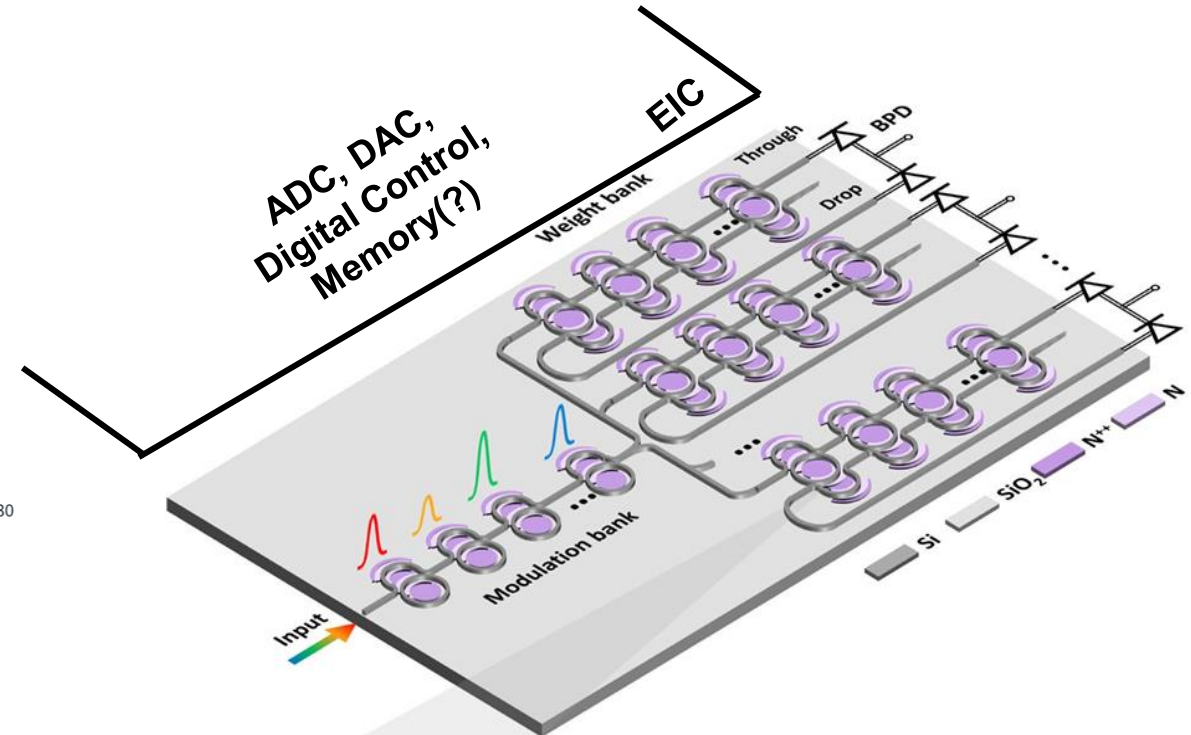
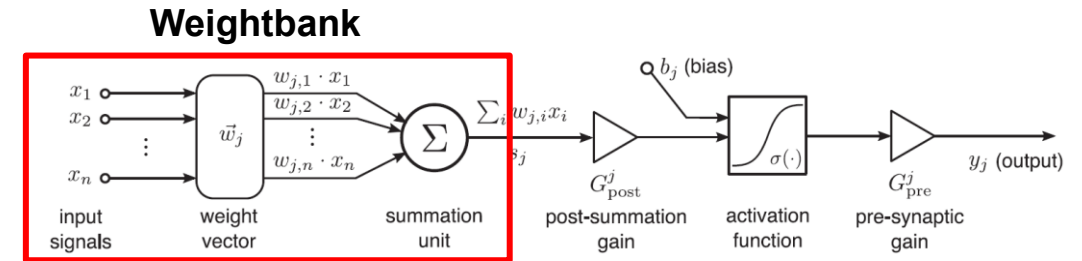
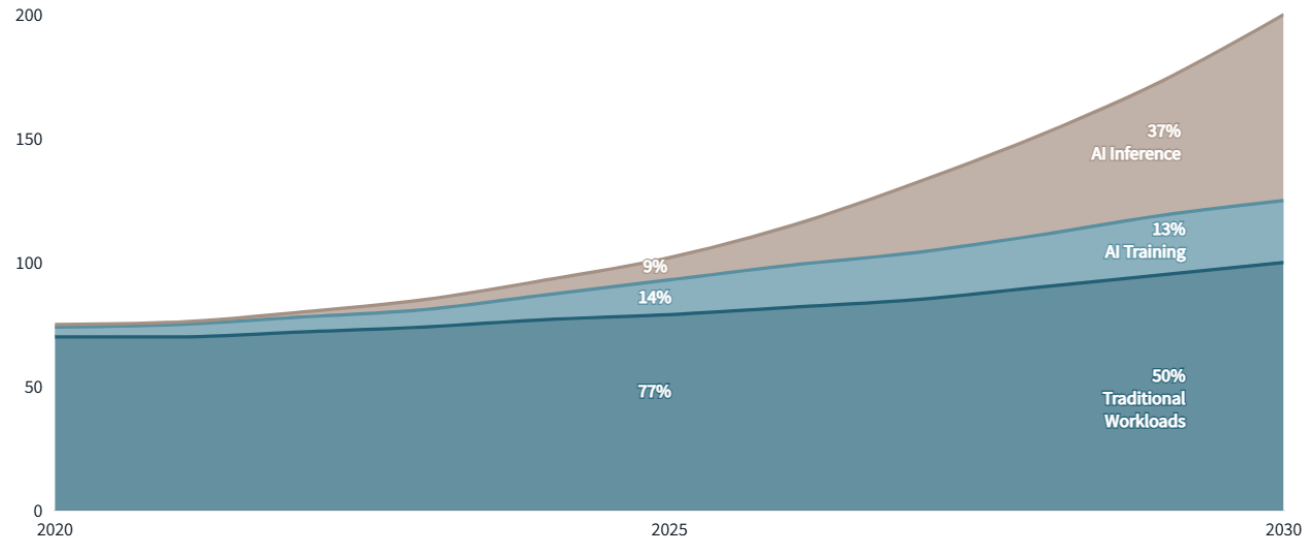
Next AMF (01 MAR 2026)

- High speed NP (~GHz)

A significant shift is anticipated in 2027, when inference workloads could overtake training as the dominate AI requirement

Total global data center workloads (GW)

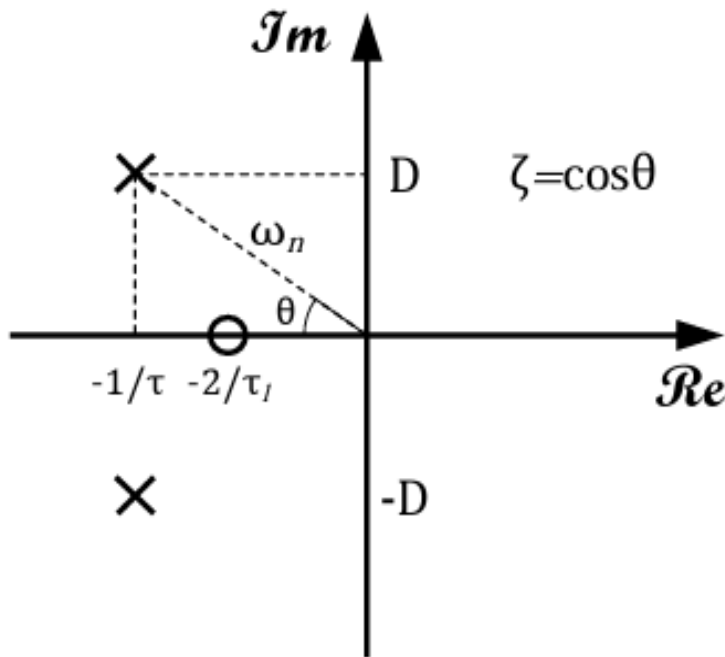
■ Traditional workloads ■ AI Training ■ AI Inference



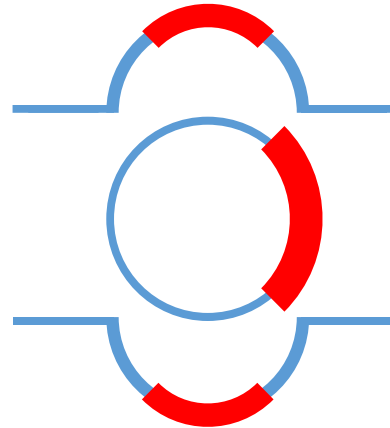
Next AMF (01 MAR 2026)

- Bandwidth boosting via MRM

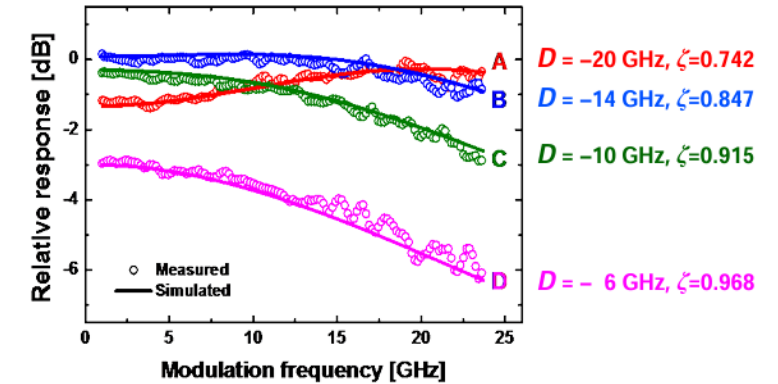
2P1Z Diagram of MRM SSM



Coupling Tunable MRM

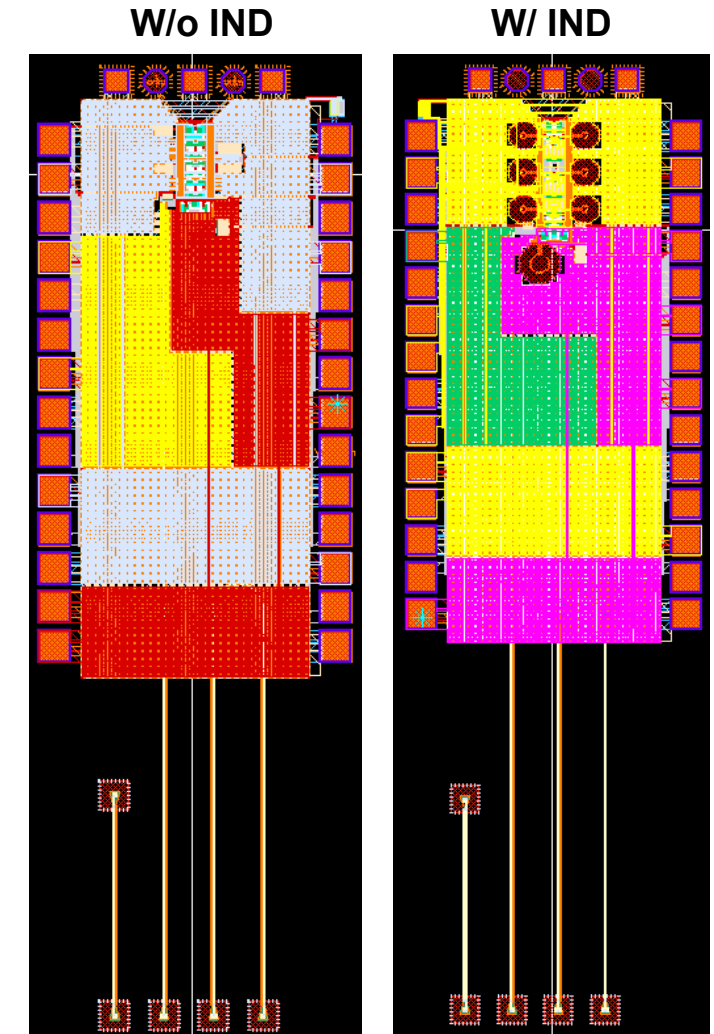
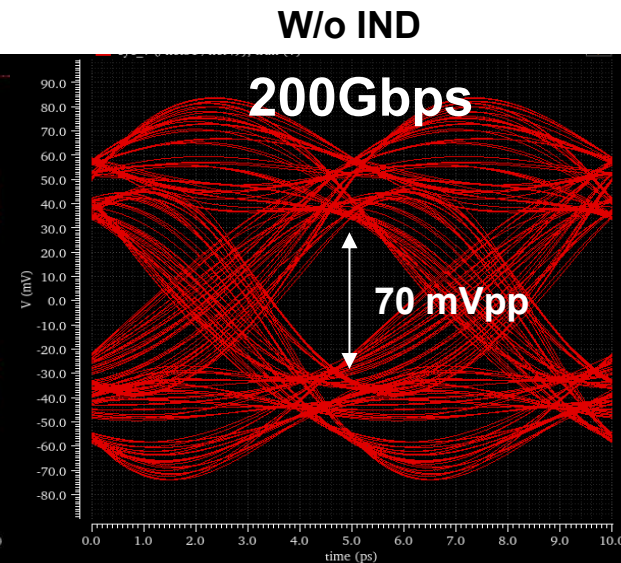
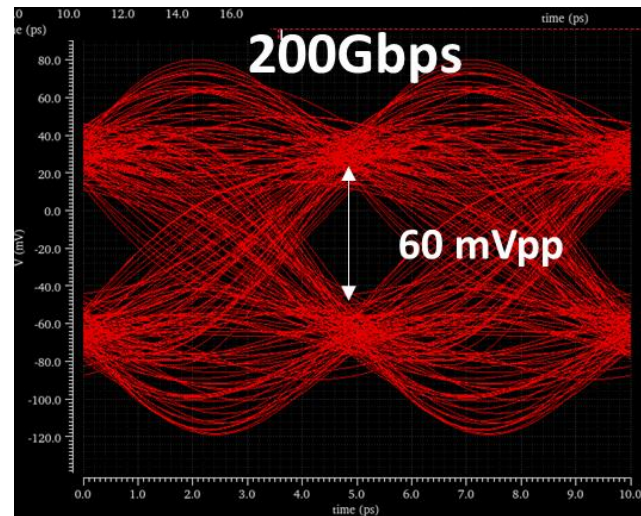
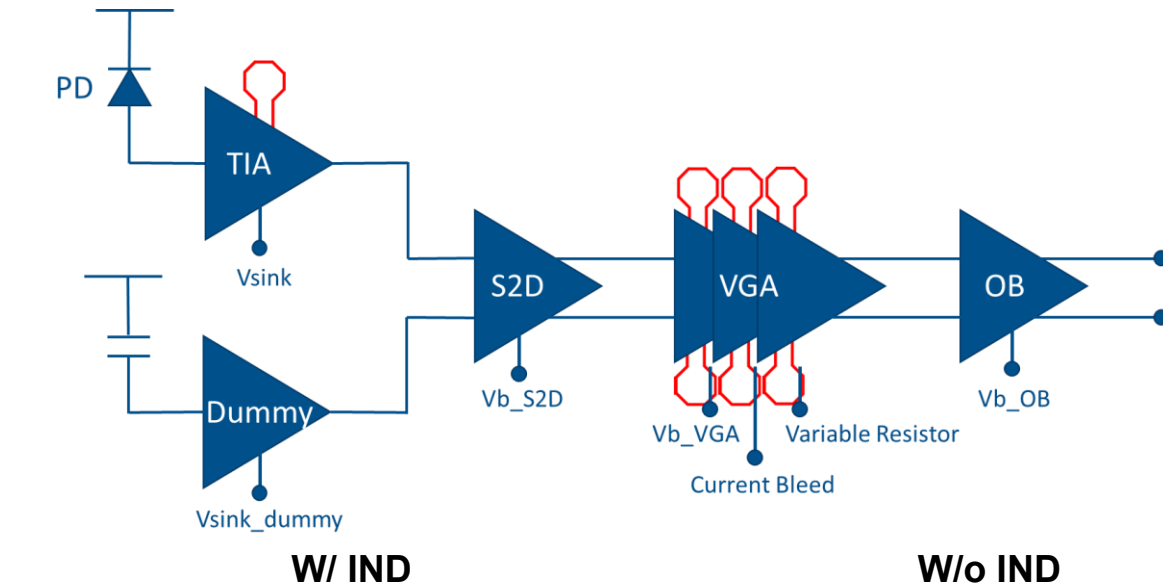


S21 @different detuning



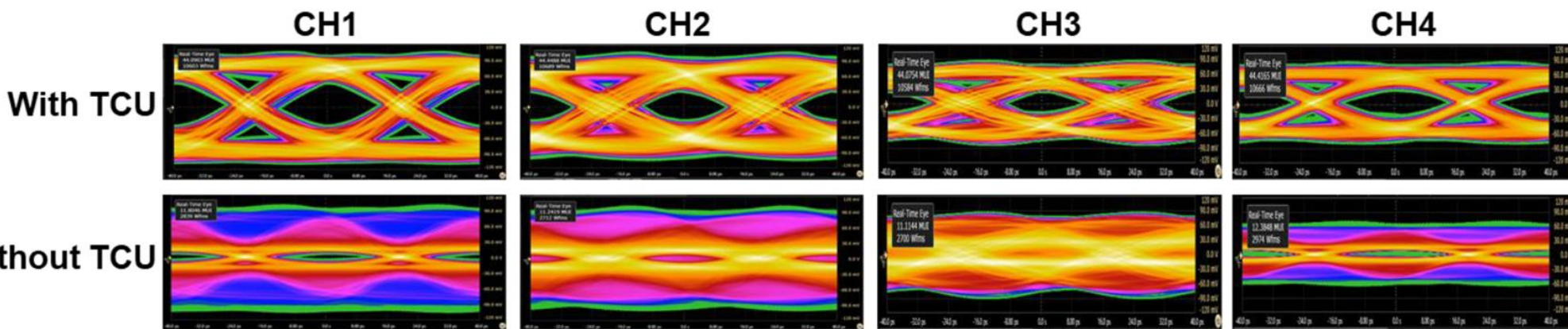
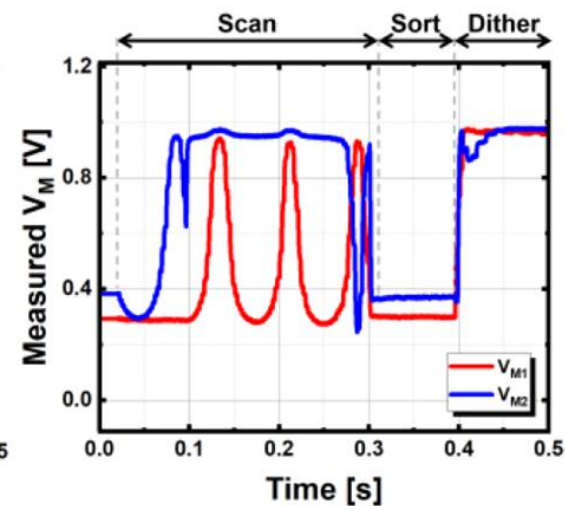
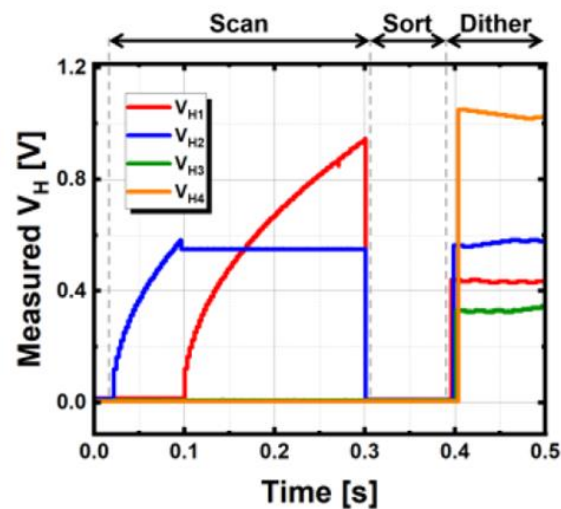
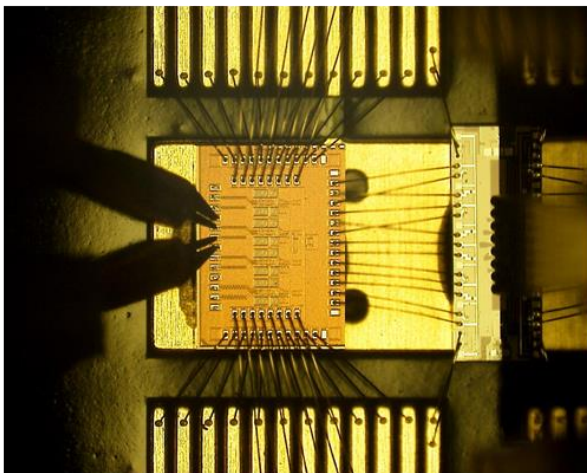
- 2p1z diagram of MRM small signal model
- Zero
 - Roundtrip loss (α)
 - Transmission (coupling) coefficient at the drop port
- Pole
 - Transmission(coupling) coefficient at the through port
 - Detuning
- BW boosting with fixed detuning (@max OMA)

Tape Out 2 : IHP EPIC



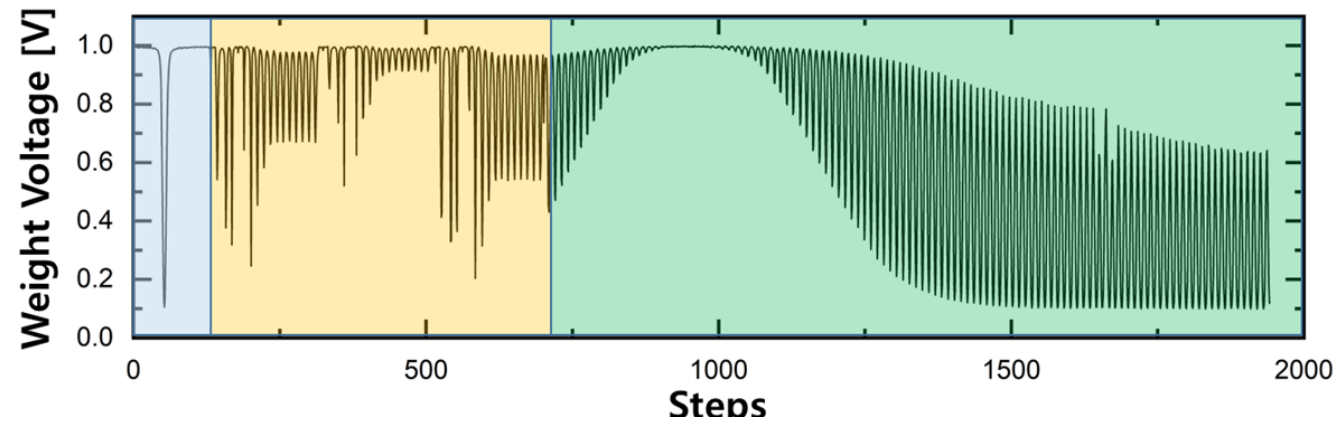
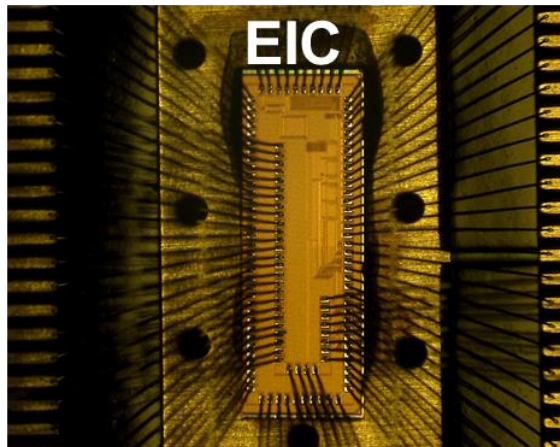
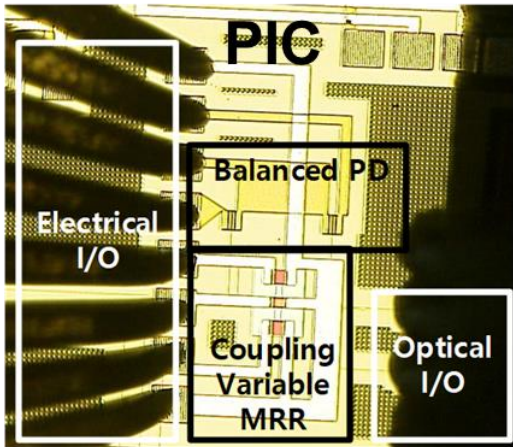
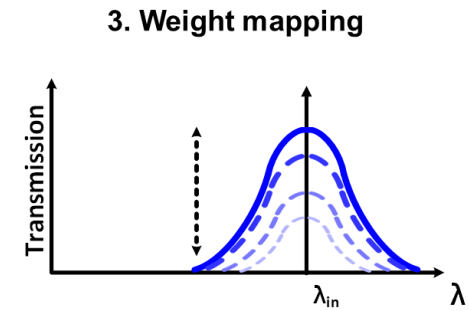
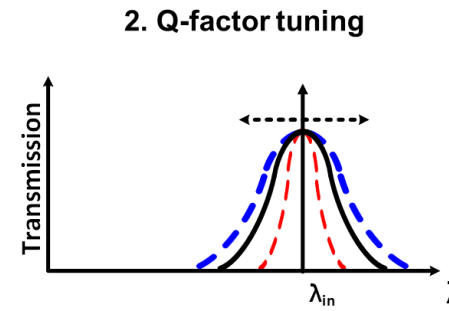
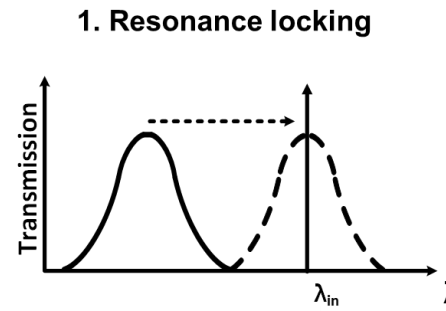
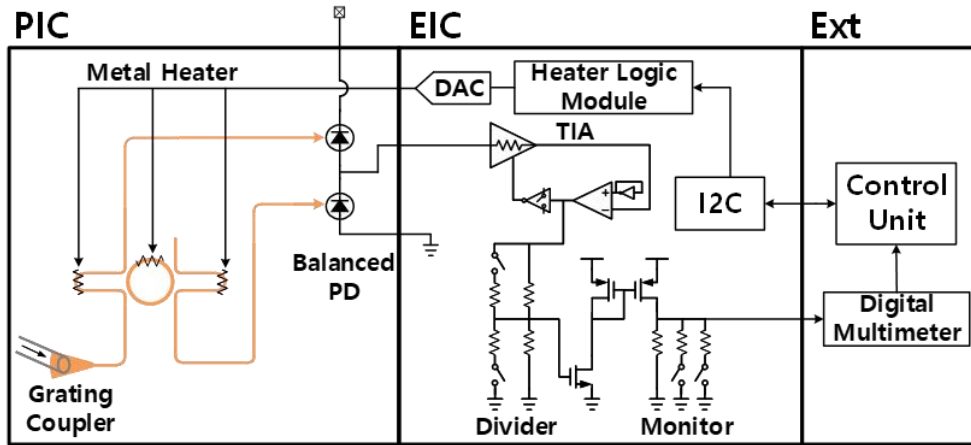
Conferences

- JAN : OFC (poster)



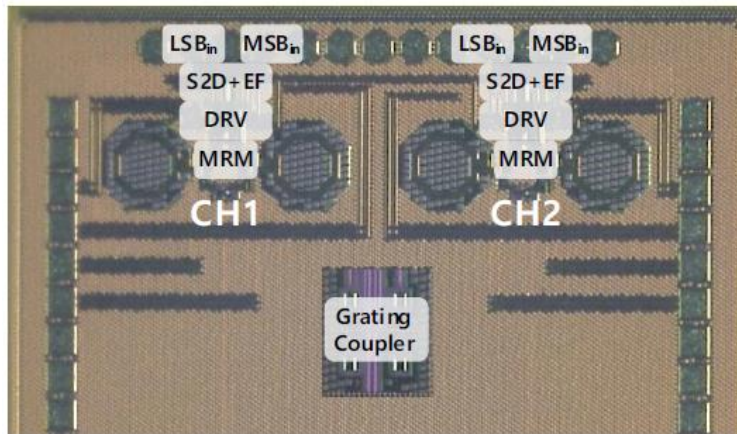
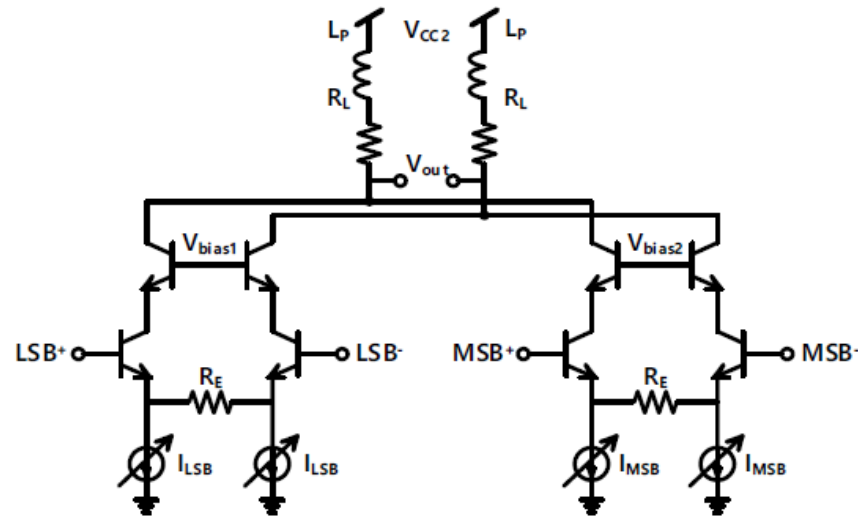
Conferences

- APR : SiPh , JUN : OSW

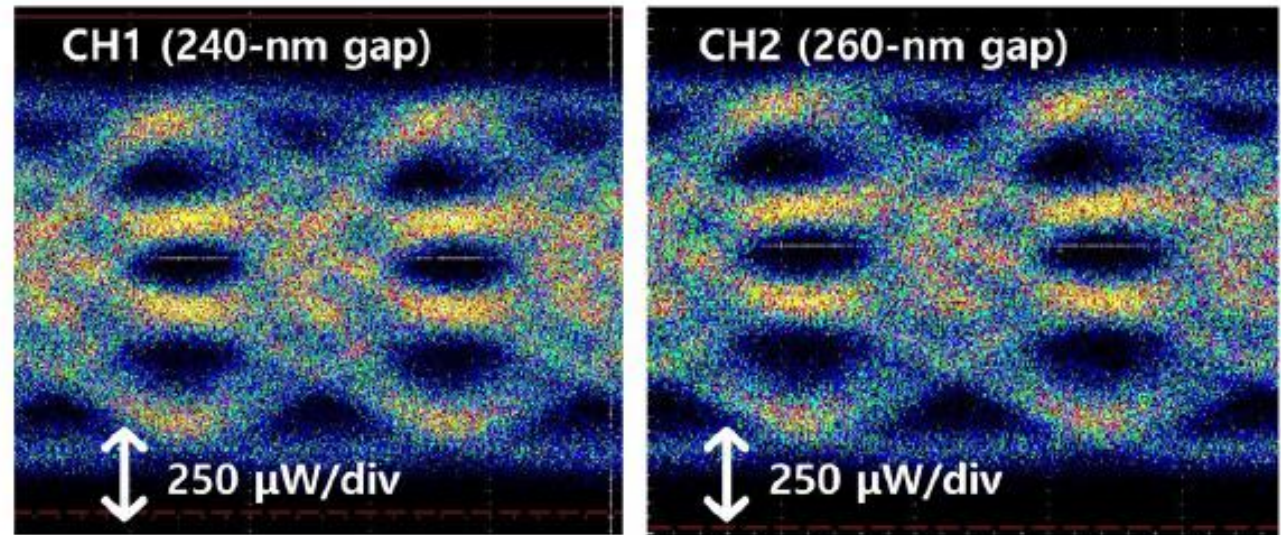


Conferences

- JUL : SUM Topicals

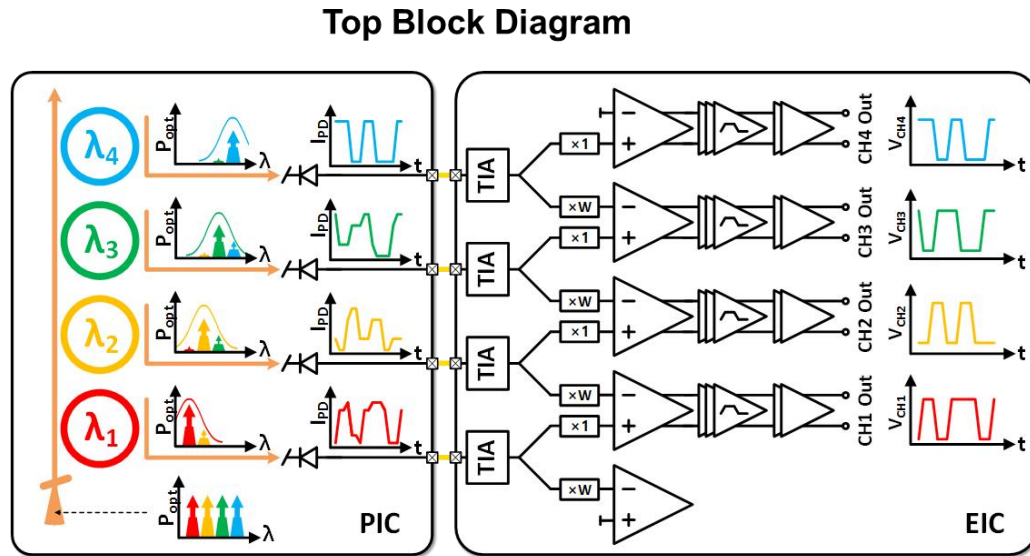


64Gbps PAM4 Eye Diagram

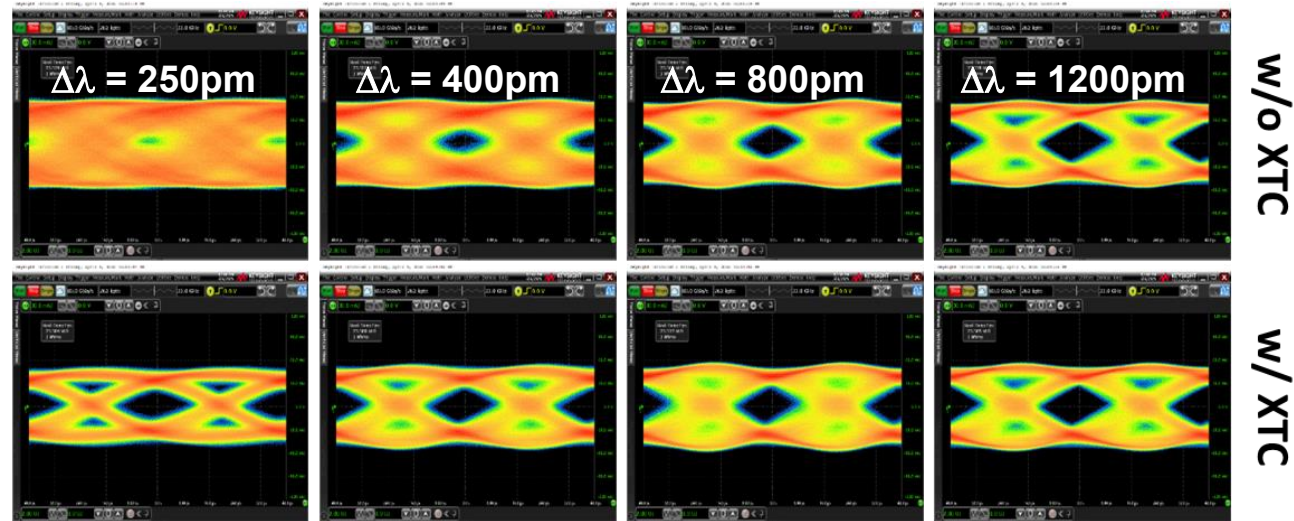
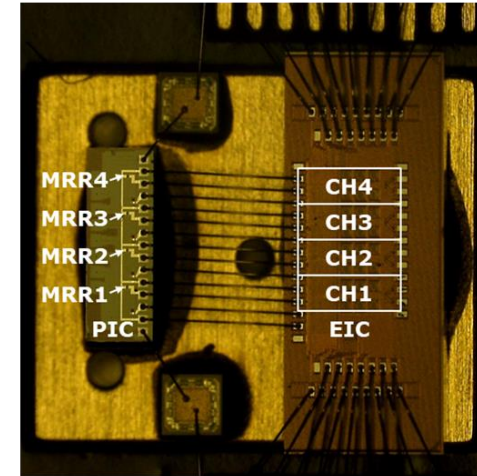


Conferences

■ OCT : ECOC



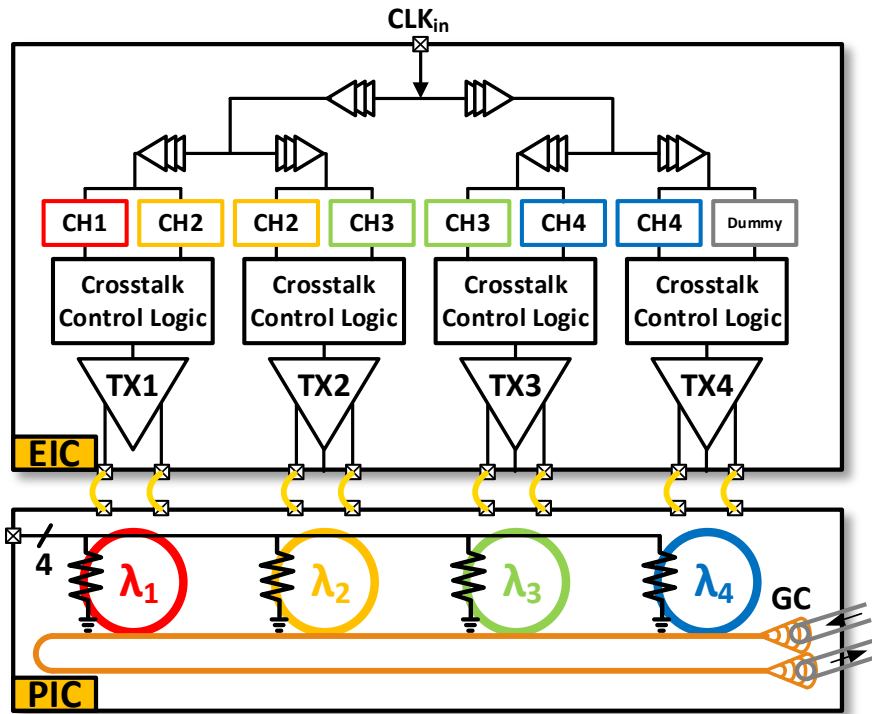
Chip Photo



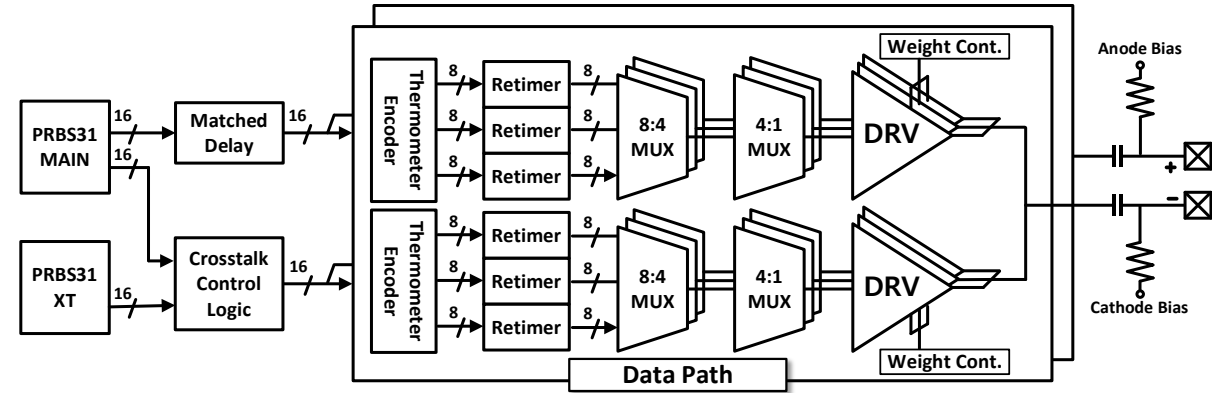
Conferences

■ MAR (2026) : OFC

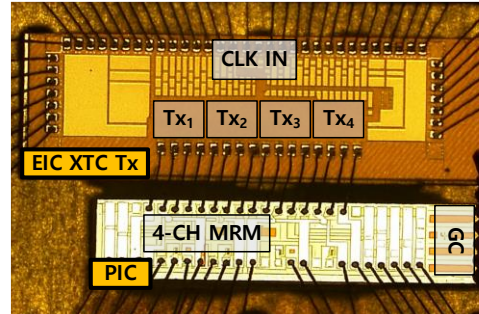
Block Diagram



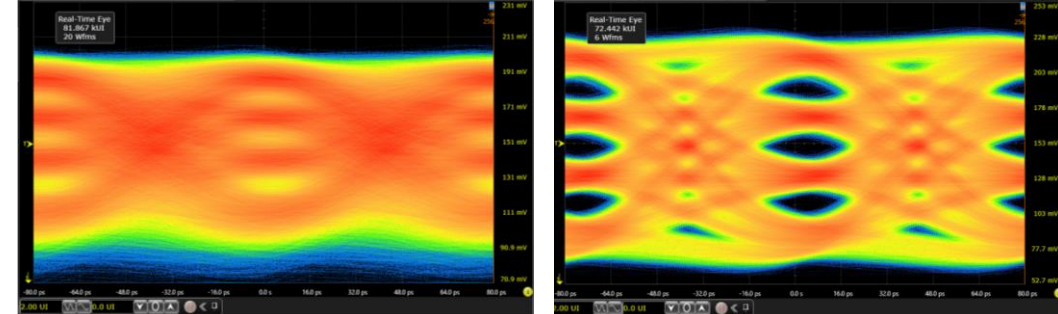
MRM Crosstalk Cancellation Driver



Chip Photograph



Eye Diagram w/ & w/o XTC



2026 To Do

- Tape out
 - AMF (~01 MAR)
 - TSMC 180nm (~MAY)
- Measurement
 - EIC – PIC Integrated Neuromorphic photonics (w/재호)
 - DWDM XTC Tx
 - High speed Neuromorphic Photonics(w/민규)
 - IHP EPIC (w/재호)
- Journal submission
 - DWDM wavelength calibration (w/재호)
 - EIC – PIC Integrated Neuromorphic photonics (w/재호)
 - DWDM XTC Rx (w/승재)
 - DWDM XTC Tx
 - High speed Neuromorphic Photonics (w/민규)

