

Silicon Photonics

Singapore Hybrid-Integrated Next-Generation μ -Electronics (SHINE) Centre Technical Capabilities

Heterogeneous Integration of Thin-Film Lithium Niobate (TFLN) on Si Photonics Wafer via Micro-Transfer Printing	Micro-Transfer Printing of TFLN	• Die size: 20 x 20 μm – 2000 x 2000 μm • Min TFLN footprint: 15 μm ring radius • Min TFLN thickness: 350 nm • XY placement/alignment accuracy: $\pm 0.5 \mu\text{m}$ @ 3σ • Rotation accuracy: $\pm 0.1^\circ$ @ 3σ • Wafer size: 300 mm
	TFLN-on-Si Micro-Ring Modulator	• Electro-optic efficiency: $V_{\pi L} = 1.5 \text{ V}\cdot\text{cm}$ • Min insertion loss: 0.6 dB • Min TFLN-Si coupling loss: 0.3 dB/facet • Min TFLN waveguide propagation loss: 0.28 dB/cm • Max extinction ratio: 24.8 dB • Max thermal resonance wavelength shift: 1 pm @ 0.74 mW heating
Hybrid Ferroelectric Photonic Memory	Programmable Wavelength Division Multiplexing (WDM) Photonic Memory	• Micro-ring resonator (MRR) resonance tuning efficiency: 90 pm/V • Non-volatile shift: $\geq 0.3 \text{ nm}$ • Min addressable cells: 8 • Min weight resolution: 4-bit (16-state) • Max inter-channel crosstalk: -10 dB

