From layout to chips
Silicon Photonic ICs

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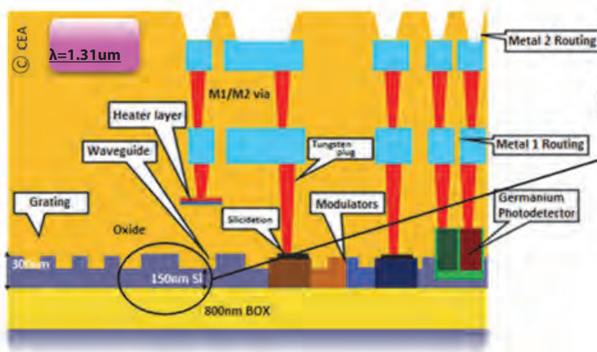
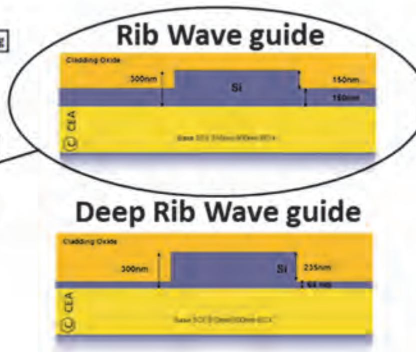
In addition to ICs and MEMS, **Circuits Multi Projets®/Multi-Project Circuits® (CMP)** is offering the Si310-PHMP2M technology from CEA-LETI in the frame of IRT Nanoelec for prototyping and low volume production of Silicon Photonic ICs.

Si310–PHMP2M 1600€/mm²*

This MPW capability on 310nm SOI platform is offering best performance for grating couplers, multilevel option for silicon patterning that allows the design of various passive and high-speed active devices as silicon electro-optic modulators and germanium photo-detectors and still coupled with thermal tuning capability as metal heaters. Two AlCu levels are available for more optimal routing which is also compatible for backend treatment as Under Bump Metallization.





Advanced structure
⇒ Based on 200mm CMOS platform
⇒ SOI substrate HR BOX 800nm / Si 310nm
⇒ Tungsten plugs
⇒ 2 Metal layers (MET1 and Alucap)

Very High performance building blocks
⇒ PCells and Black boxes

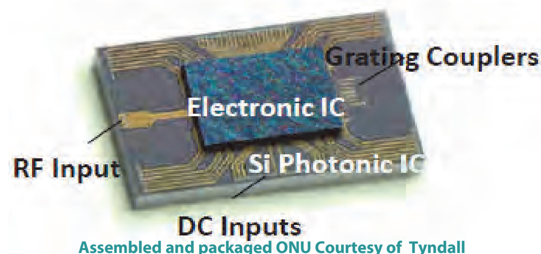
Integration of more functions in the chip
⇒ Passive structures (1 mask layer DUV 193nm)
* Optional Slab 65nm (Deep Rib WG)

⇒ Active structures
* Lateral Ge PIN photodiode
* MZ and RR Modulators
* TiN Metal Heater Layer–

PDKs available via Cadence, Mentor Graphics, Phoenix Software

Photonic technology is compatible with Open 3D Post-process*
3D packaging allows optical interconnects closer to the electronic chip. The benefits are:

⇒ Stacking electronic/photonic circuits
⇒ Miniaturization
⇒ High performance
⇒ Network on chip
⇒ High density photonic circuit
⇒ 3D Multi-photonic layer integration.



Assembled and packaged ONU Courtesy of Tyndall

The following post-process options are available:

Front-side modules: Bumps / µ-Bumps / UBM	Photonic chips, CMOS chips
Back-side modules: TSV last / RDL / Bumps	CMOS chips

*Availability & prices depending on chosen module and die area.
Consult CMP website. Prices may change without notice.

Contact us Lyubomir KERACHEV [lyubomir.kerachev@imag.fr]

Ring Modulator

Multi-Project Circuits®

CMP is a service organization in ICs, Photonics & MEMS for prototyping and low volume production. Circuits are fabricated for Universities, Research Laboratories and Industrial companies.

CAD, design kits and support

CMP distributes design kits for the MEMS technologies and for most of the CAD tools. Some specific support is given to CMP customers for MEMS design.

Packaging

Ceramic: CQFP, DIL, LCC, JLCC, PGA, SOIC, QFN...
Plastic: BGA, QFN, QFP, PLCC, SOIC, TSSOP
Flip Chip and stacked chip
Wafer and die thinning

MEMS Packaging: Optical resin/Chip On Board (COB)/Thermal solutions/Metallic package/Hermetic package.

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Jan-17

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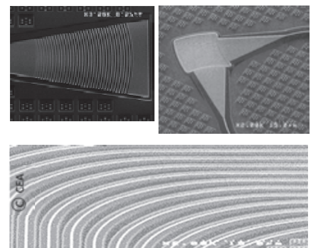
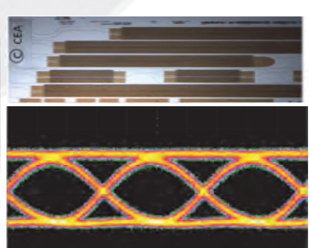
Si310-PHMP2M library contents and indicative performances



Passive components

Heaters

Lateral Ge PIN diode



Carrier depletion PN MZ or RR Modulator

Device	Type of cell	Specification	Value
Crossing RIB	Black Box	Loss	<0.25 dB
Multimode interferometer 1x2 Multimode interferometer 1x4 Multimode interferometer 2x2	Black Box	Loss Output balance	<0.5 dB +/- 5%
Transition single mode DEEPRIB / Single mode RIB	Black Box	Loss	<0.03 dB
Transition single mode RIB / Multi mode RIB			<0.03 dB
Transition single mode STRIP / Multi mode RIB			<0.03 dB
Transition single mode STRIP / Single mode RIB			<0.03 dB
Fiber grating coupler 1D	Black Box	Insertion loss Peak wavelength @ 11.5° in air 1dB bandwidth	<3 dB 1310nm 30nm
Fiber grating coupler 2D	Black Box	Insertion loss Peak wavelength @ 11.5° in air 1dB bandwidth	<5 dB 1310nm 30nm
Straight Waveguide	Parametric	Strip Rib Single mode Rib Multi mode DeepRib — Loss	<4 dB/cm <2 dB/cm <0.2 dB/cm <4 dB/cm
Sbend Waveguide	Parametric		
90° Bend Waveguide	Parametric	Loss	<0.015 dB/90° (R≥5µm)
Waveguide	Parametric		
Directional Coupler Waveguide	Parametric		
Racetrack Resonator Waveguide and heater	Parametric	Loss Extinction Rate Quality Factor	< 0.5 dB >15 dB >10000
Photodiode PiN longitudinal	Parametric	OE bandwidth @ -1V Responsivity @1310nm, 1V Dark current @ -1V, 20°C	> 25 GHz > 0.75 A/W < 10 nA
Mach Zehnder Modulator	Parametric	EO bandwidth @ -2V Loss Junction Vpi Lpi @ -2V	> 15 GHz < 2 dB/mm < 2.5 V.cm
Ring Racetrack Modulator	Parametric	EO bandwidth @ -2V Insertion loss Vpi Lpi @ -2V	> 15 GHz < 0.5dB < 2 V.cm

Ring Modulator

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