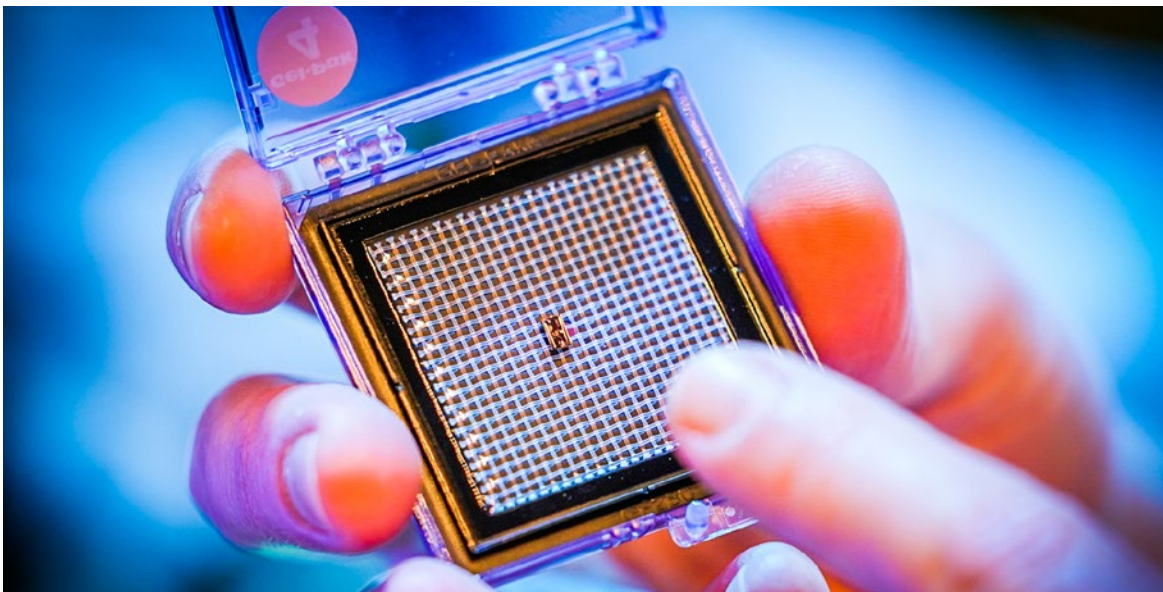


BUILDING BLOCK PERFORMANCE SUMMARY

Generic Process, Gen 2 PDK

SMART Photonics offers a generic process for manufacturing Indium Phosphide based Photonic Integrated Circuits (PIC). This process allows for fast prototyping and low cost development without compromising performance and functionality. Custom designed Photonic Integrated Circuits can be developed using the SMART Photonics Process Design Kit (PDK). This PDK consists of an extensive building block library and design rules. No in-depth knowledge of the manufacturing process technology is required from the designer. A building block is an active or passive device which can be combined in specific combinations to create your own photonics integrated circuit.

The performance enhancements offered by Generic Process Gen 2 range from improved device to device insulation on the PIC to increased modulators bandwidth. Improved specification values in the table below are highlighted in bold. Our Design Manual has been updated to allow our customers to implement their designs and enjoy these improvements.



BUILDING BLOCK	PARAMETER	TYPICAL PERFORMANCE
General		
	Wavelength range ¹	1530-1565nm
	Operating Temperature	< 45 °C
Active Devices		
Amplifiers and Lasers		
Semiconductor Optical Amplifier	Small-Signal Gain	30 dB/mm
	Saturation Power (3dB)	15 dBm
	Max Injection Current	200 mA/mm
	Noise Figure	5 dB
DFB Laser ^{2,3}	Tuning Range (temperature control)	3 nm
	Output Power ⁴	20 mW @100 mA
	Threshold Current	10 mA
DBR Laser ³	Tuning Range ⁵	4 nm
	Output Power ⁴	>10 mW @100 mA
	Linewidth	< 500 kHz
	Threshold Current	14 mA
SG-DBR Laser ³	Tuning Range	30 nm
	Output Power ⁴	> 10 mW @100 mA
	Linewidth	< 500 kHz
	Threshold Current	15 mA
Low Linewidth Tunable Laser ^{3,6}	Tuning Range	35 nm
	Output Power incl. booster SOA	20 mW @100 mA
	Threshold Current	40 mA
	Linewidth	< 100 kHz
Fabry-Perot Laser ³	Output Power ⁴	20 mW @100 mA
Modulators		
Electro-Optical phase modulator (MZI)	Insertion Loss	2 dB
	Bandwidth	25 GHz
	V π	5 V
	Extinction Ratio	> 25 dB
Current Injection Phase control ⁷	Loss	< 0.5 dB for 1 mm
Electro-Absorption modulator (EAM)	Insertion Loss	2 dB
	Bandwidth	> 50 GHz
	V _{op}	3 V
	Extinction Ratio	> 6 dB
Photodiodes		
PIN Photodiodes	3 dB bandwidth	30 GHz
	Dark current	25 nA @ -2 V Bias (DC pin diode)
	Responsivity	0.85 A/W

BUILDING BLOCK	PARAMETER	TYPICAL PERFORMANCE
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Passive Devices

Passive waveguides

Shallow Waveguide	Loss	1.5 dB/cm
	Minimal Bending Radius	400 μm
Deep Waveguide	Loss	2 dB/cm
	Minimal Bending Radius	100 μm
	Curved Deep Waveguide Loss	0.1 dB/90°

Gratings

Uniform Grating	Coupling Factor	50 /cm
	Current Controlled Tuning Range	2 nm
Sampled Grating	Coupling Factor	50 /cm

Broad Band Reflectors

1x2 MMI Reflector	Loss	2 dB
	Reflectivity	40 %
1x1 MMI Reflector	Loss	2 dB
	Reflectivity	60 %

Couplers

1x2 MMI coupler	Loss	0.5 dB
2x2 MMI coupler	Loss	0.5 dB

Other features

Active-Passive Transition	Loss	\ll 0.1 dB
	Reflectivity	-50 dB
Isolation Section	Loss	0.1 dB

1 Operating range compliant with C-band specifications.

2 Not available on MPW, only on dedicated wafer runs.

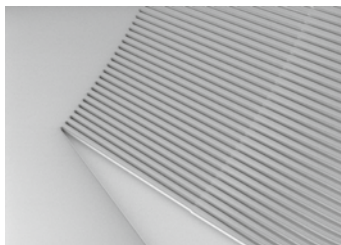
3 All laser types can be designed in our platform, but are not part of the PDK. Performance values are of a reference design.

4 Output power without booster SOA. An additional booster can be put at the output if more power is needed.

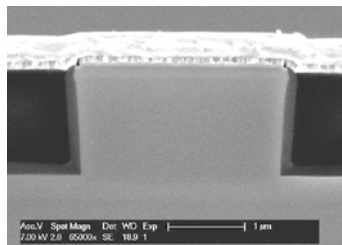
5 DBR laser tuning range can go up to 12 nm on dedicated run.

6 Other available Low Linewidth Tunable Laser with 75 nm Tuning Range and 300-360 kHz Linewidth.

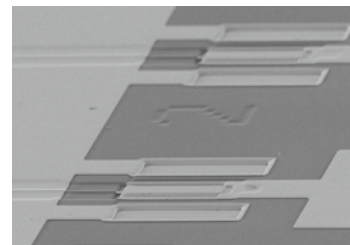
7 In forward bias bandwidth is smaller than in reverse bias (electro-optical phase modulator is the same device but reverse-biased).



AWG



EML



Photodiode array



Future developments

SMART Photonics commits to develop a new process generation on a yearly basis in order to offer its customers improved performance and new building blocks.

In the next generations, SMART Photonics will implement O-band compliance. New building blocks will be introduced, as well as various performance improvements of the existing ones. An increase in maximum operating temperature up to 85 °C will also be implemented.

For further information, feel free to contact our sales representatives at the following email address:

sales@smartphotonics.nl

SMART Photonics

At SMART Photonics, our aim is to be the leading foundry and development partner in integrated photonics that works closely together with our customers to create innovative products that improve people's lives.



Integrity is key in the services SMART Photonics offers. As an independent Pure Play InP Foundry, we work at the sole discretion of our customers and their businesses.

Teams of highly experienced experts support all of our clients' requests. Our production services range from epitaxial growth and regrowth to coating and testing of the individual chips. We accommodate both proof-of-concept and volume manufacturing.

We are a European based manufacturer with production and research facilities located in Eindhoven.

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