



SIPhoDiAS

SPACE-GRADE OPTO-ELECTRONIC INTERFACES FOR PHOTONIC DIGITAL AND ANALOGUE VERY-HIGH-THROUGHPUT SATELLITE PAYLOADS

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Abstract

SIPhoDiAS aims to develop critical photonic building blocks at TRL-7 needed for high-performance and low size, weight, and power photonics-enabled Very High Throughput Satellites.

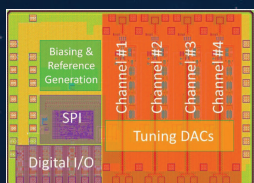
- high-bandwidth Ka and Q-bands analogue photodetectors
- compact V-band GaAs electro-optic modulator arrays
- On-board optics digital optical transceiver sub-assemblies
- Full-custom Rad-Hard VCSEL Drivers & TIA ICs in SiGe 130nm

www.space-siphodias.eu

Consortium

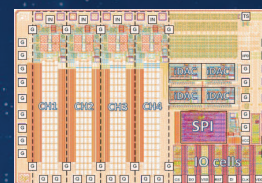
- LEO Space Photonics R&D – Transceiver IC design
- ALTER TECHNOLOGY – OSA/Module development & testing
- IHP – Transceiver IC design & Foundry
- ALBIS OPTOELECTRONICS – Photodetector development
- AXENIC – Modulator development
- Thales Alenia Space – Specification and end-user

Rad-Hard VCSEL Driver and TIA chipset

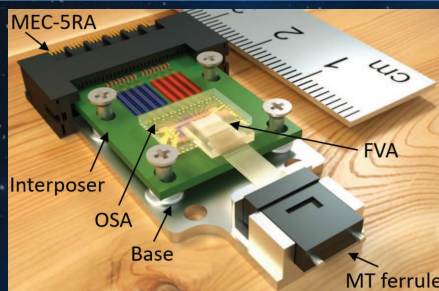
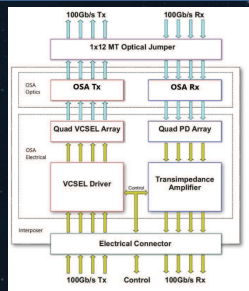


- Targeting Gen-1: 4 x 28Gb/s OOK, Gen-2: 4 x 56Gb/s PAM4
- Gen-1 taped out in SiGe BiCMOS 130nm Rad-Hard process
- Programmable VCSEL ER/OMA and PD bias current
- 8 x 8bit registers digital Rad-Hard SPI IP
- Temperature sensing

2.6mm²/die, 4 x 28 Gb/s OOK, 645mW total
(post-layout sim, 3.3V supply)



On-board optics digital transceiver module

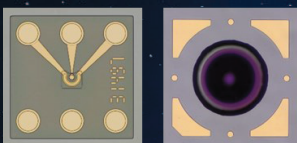


- MEC-5RA on-board connector – 56Gb/s PAM4 ready
- Borosilicate-based optical sub-assembly
- Interposer – Retiming circuit / SMT caps (optionally)
- Dimensions: 17 x 38.42 x 7.2 mm. – Mass 9gr (est.)

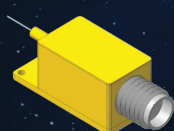
Photodetectors

Monolithically integrated lens

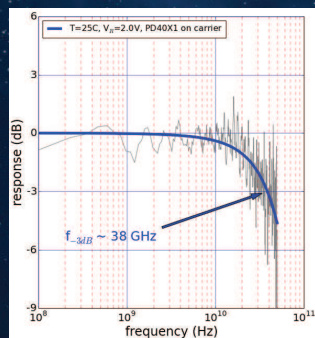
38GHz-bandwidth



Responsivity
0.8A/W @ 1550nm

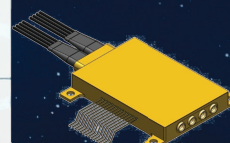
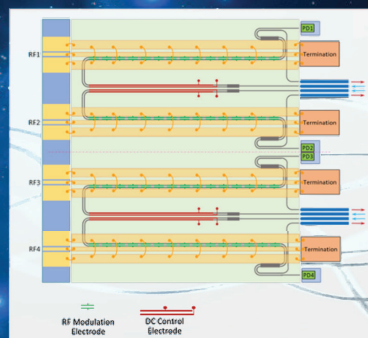


Mass 8gr
(est.)



Modulators

Folded GaAs MZM with parallel, symmetric array interfaces.



Targeting 50GHz
bandwidth

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