

Photonic Integrated Circuits

ANMD-MRS7-068 · Advanced Semiconductor Applications

A Global Sustainability Due Diligence & Market Research Study

History 2020–2024 · Base Year 2025 · Forecast 2025–2032 · Outlooks 2035 / 2040 / 2050 · Currency US\$

WHY THIS REPORT

Photonic integrated circuits move data with light instead of electrons — the silicon-photonics, indium-phosphide and co-packaged-optics PICs that carry terabits through datacenters, telecom networks and, increasingly, AI clusters. This decision-grade study sizes the global market three ways — value, unit volume and Tbps delivered — across platform, application and data rate, across seven regions and four scenarios to 2032, with outlooks to 2050.

SUSTAINABILITY & SDG IMPACT — THE ANMD LENS

Sustainability is this report's backbone, not an afterthought. Photonics' core contribution is energy-per-bit reduction across the interconnect that increasingly dominates datacenter and AI-cluster power.

Mapped Sustainable Development Goals:

SDG 7 Affordable & Clean Energy	SDG 9 Industry, Innovation & Infrastructure	SDG 12 Responsible Consumption	SDG 13 Climate Action
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Measurable sustainability outcomes assessed:

- Energy-per-bit reduction across the interconnect
- Datacenter and AI-cluster power relief
- Bandwidth scaling within tight power budgets
- Fab energy, compound-semiconductor sourcing and end-of-life as material risks

Framework alignment: Double materiality mapped to GRI, SASB, ISSB, TCFD, TNFD, CSRD and the EU Taxonomy, with greenwashing and SDG-washing screens applied throughout.

WHAT'S INSIDE AT A GLANCE

53 Chapters	9 Report Parts	7 Regions Covered	40+ Country Markets
2025–32 Forecast Horizon	4 Forward Scenarios	25+ Companies Profiled	4 SDGs Mapped

REPORT COVERAGE

Geographic scope: North America, Europe, Asia Pacific, Latin America, Africa, Middle East and Rest of World — with named country intelligence. North America leads silicon photonics and co-packaged optics; Asia Pacific is the manufacturing and transceiver engine; Europe adds platforms and startups; other regions assessed on their own merits.

MARKET OVERVIEW

From telecom specialty to strategic compute — where optics becomes the only path to scale.

Photonics is being pulled into the AI build-out. Demand is driven by datacenter optical interconnect, co-packaged optics for AI clusters, telecom transport and emerging optical-compute and sensing — with silicon-photonics integration central to cost and scale. The market is read three ways — value, unit volume and Tbps delivered — and forecast under four scenarios, each region reported separately.

- **North America leads silicon photonics and co-packaged optics** — United States, on datacenter and co-packaged-optics deployment
- **Asia Pacific is the manufacturing and transceiver engine** — China, Japan and Taiwan, on optical-module assembly and growing PIC fabrication
- **Europe adds platforms and startups** — United Kingdom, on silicon-photonics and sensing platforms
- **Co-packaged optics is the differentiator** — moving optics next to the switch/accelerator die slashes interconnect energy and unlocks bandwidth scaling

REGIONAL OUTLOOK

Across seven reporting regions, the report separates leading markets from high-growth and emerging ones — each profiled in full rather than aggregated into Rest of World.

Region	Stage	Lead Markets & Drivers
North America	SiPh & CPO leader	United States — datacenter & co-packaged optics
Asia Pacific	Module & fab engine	China, Japan, Taiwan — transceiver assembly, PIC fab
Europe	Platforms & startups	United Kingdom — sensing & SiPh platforms
Latin America	Emerging	Brazil — telecom transport, datacenter build-out
Africa	Frontier	South Africa — backbone transport, datacenter links
Middle East	Accelerating	Saudi Arabia, UAE — sovereign datacenters, optical backbone

KEY MARKET DRIVERS & RESTRAINTS

Drivers	Restraints
• Datacenter optical-interconnect demand • Co-packaged optics for AI clusters • Telecom & transport bandwidth growth • Energy-per-bit pressure on interconnect • Optical-compute & sensing emergence	• Packaging & fibre-coupling complexity • Manufacturing yield & test cost • Thermal & laser-integration challenges • Ecosystem & standards immaturity • Capital intensity of photonics fabs

SEGMENTATION SNAPSHOT

By Platform	Silicon photonics (SiPh) · indium phosphide (InP) · hybrid / heterogeneous integration
By Application	Datacenter interconnect · co-packaged optics · telecom transport · optical compute · sensing
By Product	Transceivers · optical engines · CPO modules · PIC chips
By End User	Hyperscalers · telecom operators · OEMs · research
By Data Rate	≤400 G · 800 G · 1.6 T+
By Business Model	Device sale · IP licensing · foundry · co-design

TABLE OF CONTENTS — PARTS & CHAPTERS

The full report is organised into nine parts across 53 chapters, listed below. Detailed sub-headings, country tables and directories are provided in the full report.

Part I — Report Foundation, Discovery and Strategic Intelligence

- › Chapter 1. Scope, Methodology and Report Architecture
- › Chapter 2. Industry Discovery Summary — Photonic Integrated Circuits
- › Chapter 3. Executive Intelligence and Decision Dashboard
- › Chapter 4. Strategic Findings, Materiality and Investment Verdict Preview

Part II — Market Intelligence, Sizing, Forecasting and Segmentation

- › Chapter 5. Industry Overview and Market Evolution
- › Chapter 6. Market Dynamics
- › Chapter 7. Global Market Size and Forecast, 2020–2032
- › Chapter 8. Market Segmentation Analysis
- › Chapter 9. End-User and Demand-Side Intelligence
- › Chapter 10. Pricing, Cost and Commercial Model Intelligence

Part III — Regional and Country Intelligence

- › Chapter 11. Global Regional Intelligence Framework
- › Chapter 12. North America Market Intelligence
- › Chapter 13. Europe Market Intelligence
- › Chapter 14. Asia Pacific Market Intelligence
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- › Chapter 18. Rest of World Market Intelligence

Part IV — Technology, Innovation and Category-Specific Intelligence

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- › Chapter 20. Emerging and Next-Generation Technology Intelligence
- › Chapter 21. Category-Specific Intelligence Module
- › Chapter 22. Research, Innovation and Funding Landscape

Part V — Company, Competition, Patent and Project Intelligence

- › Chapter 23. Competitive Landscape
- › Chapter 24. Company Profiles
- › Chapter 25. Mergers, Acquisitions, Partnerships and Ecosystem Intelligence
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Part VI — Sustainability, ESG, SDG, Climate and Natural-Capital Intelligence

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- › Chapter 41. Investment, Sustainable Finance and Bankability Intelligence

Part VIII — Scenario, Future Intelligence and Final Due Diligence Verdict

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- › Chapter 43. Sustainability Due Diligence Framework and Data-Room Index
- › Chapter 44. Risk Register, RAG Rating and Anti-Greenwashing Screen
- › Chapter 45. Bottom-Line Verdict and Strategic Recommendations
- › Chapter 46. Implementation Roadmap and Stakeholder Playbooks

Part IX — Annexes, Directories and Reference Material

- › Chapter 47. Methodology Annex
- › Chapter 48. Corporate Directory and Company Intelligence Annex
- › Chapter 49. Patent Directory and Patent Intelligence Annex
- › Chapter 50. Project Intelligence Annex
- › Chapter 51. Forecast Annex
- › Chapter 52. Sustainability KPI Annex
- › Chapter 53. Reference Annexes

COMPETITIVE & INVESTMENT SNAPSHOT

The competitive field spans silicon-photonics leaders, optical-module houses and co-packaged-optics startups. Deal activity — CPO partnerships, transceiver acquisitions and foundry alliances — signals a market consolidating around scalable silicon-photonics and co-packaged-optics platforms.

Representative players profiled in the full report:

Intel Corporation · Cisco Systems, Inc. · Marvell Technology, Inc. · Coherent Corp. · Lumentum Holdings Inc. · Broadcom Inc. · Ayar Labs, Inc. · and 18+ further profiled players.

Investment intelligence: venture, infrastructure, development, climate and blended finance, green bonds and sustainability-linked loans — culminating in a bankability assessment and a conditional investment view.

KEY QUESTIONS THIS REPORT ANSWERS

- How large is the global photonic integrated circuits market, and how fast will it grow to 2032?
- Which regions, countries and segments offer the strongest risk-adjusted opportunity?
- How does co-packaged optics change value versus electrical interconnect?
- Who leads, and where is the competitive and patent white space?
- Is the investment case bankable — and under what conditions?
- How does the category align with the SDGs, datacenter energy and disclosure regulation?

WHY ANMD — THE DIFFERENCE

Most market studies stop at units and revenue. This report is built as a sustainability due diligence instrument — fusing market sizing with ESG, SDG, climate, water and natural-capital intelligence and a decision-ready bankability view in a single architecture.

- **Triangulated sizing** — every market read three ways so value, volume and the physical-unit views reconcile rather than conflict.
- **Region-honest forecasting** — Latin America, Africa and the Middle East reported in full, never hidden inside Rest of World, every forecast resolved to the 2025 base year.
- **Integrated evidence base** — company, patent and project databases linked to the analysis, with published-filing patents and FTO treated as an indicator, not a legal conclusion.
- **No-fabrication discipline** — every estimate carries a data-confidence rating and disclosed sources; gaps are flagged for further diligence, never filled with invented numbers.
- **Anti-greenwashing rigour** — SDG-washing and greenwashing screens plus claim-substantiation checks built into the ESG and project analysis.
- **Decision-first structure** — 9 Parts and 53 Chapters culminating in stakeholder playbooks and a clear, conditional investment view.

WHO SHOULD BUY THIS REPORT

Investors, OEMs, hyperscalers, telecom operators, foundries, lenders and policymakers, and strategic corporate planners and decision-makers.

Access the Full Report

The complete report delivers all 53 chapters in full, with every sub-heading, country table, company and patent directory, forecast model and due diligence checklist.

Purchase at www.anewmarketdynamics.com · Standard & Premium licences · Single-Site (SSL) and Global-Site (GSL) options at checkout.

Want the Complete Detailed Table of Contents?

This prospectus lists the nine parts and 53 chapters. The complete detailed table of contents — every sub-heading, country table, exhibit, company and patent directory and annex — is available on request to registered users. To receive it, register with your official company email at www.anewmarketdynamics.com. The full detailed table of contents will be sent directly to your registered company email address.